EXPLORING EAST OF THE SUMMIT

A Field Trip Guide to Steamboat Springs, Lake Tahoe, and the Comstock Area

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TRIP SUMMARY

• Beginning at the Reno Hilton, travel south on U.S. Highway 395 through the southern portion of the Truckee Meadows to Stop One, Steamboat Springs.

• From the Steamboat Springs geothermal area, turn west on State Route 431 to climb the broad alluvial fan that forms the eastern flank of the Carson Range. The route generally follows the drainage of Galena Creek up the east side of the range and then crosses Mount Rose Summit, the high mountain pass that lies between Mount Rose and Slide Mountain. Descending the western slope of the range, you will soon catch sight of Lake Tahoe which occupies the basin between the Carson Range and the Sierra Nevada to the west. Near the foot of the grade, you arrive at Stop Two, Incline/Lake Tahoe Overlook.

• From this viewpoint overlooking Incline Village, you will see the Sierras crest to the west of Lake Tahoe as well as landmarks along the shores of the lake. From here, continue your descent to lake level at Incline Village and turn south on State Route 28 to travel along the eastern shore of the lake to Stop Three, Memorial Point Rest Area.

• After leaving this scenic overlook on the shore of Lake Tahoe, travel south along the lake shore to the intersection with U.S. Highway 50 at Spooner Junction. At this junction, turn east on U.S. Highway 50 to climb and cross the Carson Range at Spooner Summit. As the route winds down the eastern face of the range, look to the south into Carson Valley to see the trace of the Genoa fault which forms the eastern margin of the Carson Range. At the foot of the grade, turn left to follow U.S. Highway 50 (now Carson Street) north to inch your way through the congested urban area that lies south of Carson City’s historical city center. After passing through the government and gaming center of the city, turn east on William Street (still U.S. Highway 50) and continue on your way to the Comstock. After leaving Carson City, you will pass through Mound House, then turn left on State Route 341 to Silver City and Gold Hill, finally arriving at Stop Four, Virginia City.

• After a stop in Virginia City to examine some of the history and geology of the Comstock Lode and to spend a little time in the shops along C Street, complete your journey at Stop Five, Gold Hill.

• From the historic Gold Hill Hotel, retrace your route north through Virginia City, then follow State Route 341 down Geiger Grade to the Truckee Meadows at Steamboat Springs and return to Reno.

USING THE FIELD TRIP GUIDE

This field trip guide is designed to be used in conjunction with Nevada Bureau of Mines and Geology Special Publication 19, “Geologic and Natural History Tours in the Reno Area.” With the exception of one short segment, the trip is composed of portions of trips A, B, and C described in that publication. To relate the parts of SP19 to this trip route, refer to the supplemental road log in this field guide that points to the sections in SP19 that contain detailed information on points of local history, maps, and photos. NBMG Special Publication 28, the 3-D map of the Lake Tahoe basin by Johnson and Pizarro, would be useful at Stop 2 of this trip (a page-size copy of the map is included in this field guide). The section of the trip that follows U.S. Highway 50, from Spooner Junction at Lake Tahoe through Carson City to Mound House, is covered in NBMG’s newest guidebook, Special Publication 26, “Traveling America’s Loneliest Road, A Geologic and Natural History Tour Through Nevada on U.S. Highway 50.” Material from SP26 is included in this supplemental log in several places.

TIME AND LOGISTICS

This guide was prepared for a field trip of the Association of Earth Science Editors on November 13, 2000. The trip left the south parking lot of the Reno Hilton about 12:30 PM, and arrived at the Gold Hill Hotel in Gold Hill for a special dinner at 5:30 PM. Following dinner, the group returned to Reno via State Route 341.

The trip takes about four hours to complete, depending on the time of year, road conditions, and the amount of time devoted to Lake Tahoe and the shops in Virginia City. If you want to include lunch or dinner at the Gold Hill Hotel in your trip plans, check with the hotel as you pass through Gold Hill on your way to Virginia City as their dining room schedule varies with the season. There are also several places to eat in Virginia City.

There are public restrooms at Memorial Point on Lake Tahoe and facilities are also available in Virginia City—even if the shops are closed (and most close around dark in the winter), the saloons (and their rest rooms) will be open!
Reno to Stop 1, Steamboat Springs geothermal area (Route map 1):

Leave the Reno Hilton parking lot from the south and turn right on Mill Street. Following the signs for “U.S. 395 South,” continue on Mill Street as it passes under the freeway, then turn left to enter the U.S. 395 South freeway onramp.

You are now traveling south through the southern part of the Truckee Meadows, a largely downwarped basin between the Carson Range, the mostly forested mountains on the right, and the Virginia Range, the mostly barren mountains in the background to the left. The lower hills close to the freeway on the left are the Hufskaker Hills; the northernmost of this group is Rattlesnake Mountain (elevation 5,011 feet), familiar to all who have flown in or out of Reno-Tahoe International Airport (see SP19, maps, p. 20 and 27; discussion, p. 29–31).

Active north-trending range front faults are present along both the eastern and western margins of the Truckee Meadows, and the structural block underlying the basin is tilted to the east, as evidenced by the large dissected alluvial fan-pediment surfaces on the west side of the basin, the sharp truncation of the eastern margin of the basin, and the fact that the surface drainage flows along the east edge of the valley. The Truckee Meadows was a marshy environment prior to urban development, and a shallow groundwater table exists in much of the area today (Garside and Lechler, 1995).

This part of the Truckee Meadows was first occupied by small ranches and farms and later by dude ranches specializing in the divorce trade. As you can see, today the meadows are almost completely covered by housing developments and shopping centers as urban Reno continues to consume these lands (see SP19, p. 22–24, Reno history).

Continuing south on U.S. 395, look to the right for a good view of the Carson Range and two of its high peaks. Mount Rose (elevation 10,776 feet) is the peak to the north; Slide Mountain (elevation 9,698) is to the south.

As you approach the south end of the Truckee Meadows and the freeway begins a gentle turn to the right toward the Steamboat Hills, you can see (at least you could in early November 2000), remains of undeveloped meadow land. After this gentle turn, the Steamboat Hills will be to the left. If the weather is cold enough there is usually a plume of steam to be seen venting from the geothermal plant on the south skyline of these hills. As the freeway continues to turn into the hills, note the colorful rock used here as fill and riprap for the curving freeway ramps. Quarried from the altered hot springs area southwest of here, the rock will probably always look as fresh and uncluttered by vegetation as it now does—it contains too much arsenic and mercury to support much more than the sparse covering of yellow-blooming rabbitbrush that you now see.

Exit the freeway to the right at the Virginia City-Carson City off ramp. As the cloverleaf merges with south Virginia Street, immediately exit, again to the right, onto the Mount Rose Highway (State Route 431). Travel a short distance west, past the car pool parking area. Enter this parking area from the far (west) end and park in the striped area facing south toward the Steamboat Hills.

Stop 1. Steamboat Springs Geothermal Area:

Nevada is second only to California in installed geothermal capacity. In 1999, Nevada produced approximately 1.6 million MWh of geothermal power, with a sales value of about $90 million. The lower generating complex a Steamboat Springs is the second largest in Nevada. In 1999, the Steamboat geothermal plants generated about 475,000 MWh, or about 30 percent of the total Nevada geothermal power output.

For more discussion of the Steamboat Springs geothermal area and power plants see SP19 (p. 27 and 99, maps; p. 98–102, discussion and photos). Also refer to the general information sheet “Geothermal Energy for Power Generation” (p. 11), “Steamboat Springs Facts,” (p. 13–14), and refer to the page-size copy of NBMG Map 126 for information on other Nevada geothermal sites (p. 15).

Steamboat Springs to Stop 2, Incline/ Lake Tahoe overlook (Route Map 1):

Leave Stop 1, turn right onto State Route 431, the Mount Rose Highway, and continue west.

For a detailed, mile-by-mile road log between this point and the next stop, read SP19, p. 103–113. For a lighter overview, read the following comments.

A short distance west of your stop, look to the left into Pine Basin and note the white alteration in the poorly exposed granitic rocks there. The resident Jeffrey pines can tolerate the acidic soil created by the hot-springs alteration. Beyond Pine Basin, also on the left, is the site of the new (mostly future) Redfield Campus of the University of Nevada. The large “G” on the hills to the left draws attention to Galena High School, the cluster of buildings on the left, west of the college site.

Lancers Hill (SP19, p. 106, mi. 2.2), the small hill on the right just beyond the Galena County Estates sign, was the site of a popular restaurant during the 1960s and 1970s. Perched on the north side of the small hill of Miocene andesite, it provided diners a spectacular view of Reno’s city lights.

Mount Rose is now directly ahead and Slide Mountain, with its visible ski runs, is slightly to the left.

Watch for the Callahan Ranch road intersection, on the left about 2 miles beyond Lancers Hill, and see if you can spot some of the north-trending faults that cross the route in this area. (SP19, p. 106–107, discussion and photo). The Galena Fire Station, on the right a little farther west, is constructed directly on one of the faults.
Geothermal Resources in Nevada

The map is a compilation of several databases that include all reported thermal wells and springs with temperatures >37 °C (100 °F) from 1984 to 1998. A total of 2911 records were included on the map. Questionable records were eliminated from each database. The four categories of geothermal wells and springs that were included on the map are: 1) thermal based on a gradient of <50 °C/100 m (90 °F/330 ft) with a surface temperature above average annual surface temperature, 2) wells with temperatures >37 °C (100 °F) eliminated from each database. The four categories of geothermal wells and springs that were included on the map are:

2. Beowawe (1985, 16.7 MW)
4. Yankee Caithness (1988, 14.4 MW)
5. Dixie Valley (1988, 66 MW)
7. Verdi (1994)
8. WATSTORE — U.S. Geological Survey chemical data
Location and History:
The extensive Steamboat Springs geothermal area, containing numerous hot springs and steam vents, is located just west of U.S. 395 and south of the Mount Rose Highway. Steamboat Springs, so named for the huffing and puffing sight and sound of the escaping steam, is just south of the emigrant trail that crossed the Truckee Meadows on its way to California and by the 1850s the springs had become a favorite camping ground for westward bound travelers. By 1862 Steamboat Springs had a commercial bathhouse, cottages, and a hospital. With the development of the Comstock Mines, Steamboat became a junction point on the road between Reno and Virginia City and, later, became a station on the Virginia & Truckee Railroad. In the 1870s, Steamboat was a fashionable spa, with a fine hotel, drugstore, cottages, and medicinal baths but, by 1900, the resort had almost completely deteriorated. Drilling and geothermal exploration in the area over the past 30 or so years has caused the huffing and puffing (active geysering) to cease, but steam still vents at times. A small resort still operates on the east side of U.S. 395, and the Steamboat Post Office, established in 1880, is still operating.

Geology:
Much of the Steamboat Springs area is underlain by Cretaceous granodiorite. Pleistocene basaltic andesite flows cap the hills to the south of the main hot springs area. The hot-spring system formed in the early Pleistocene, prior to the eruption of the basaltic andesite flows. Steamboat Springs is an example of a present-day, active epithermal gold-silver hydrothermal system. The thermal area is on a line connecting several rhyolite domes, located to the southeast and northeast, and it has been proposed that another rhyolite intrusion may underlie the hot-spring area. The source of energy for the thermal system is most probably the completely crystallized magma chamber from which the rhyolite domes were emplaced.

The basaltic andesites have been dated at approximately 2.5 million years old and the rhyolite domes have been dated at 1.15 to 1.52 million years old. Thus, the hot-spring system has been active, possibly intermittently, for over 2.5 million years.

Water Temperature and Chemistry:
The springs at Steamboat are near boiling, and exploration and production steam wells at the three geothermal generating plants have encountered temperatures as high as 190° C. The thermal waters contain trace amounts of metals, including mercury, antimony, arsenic, silver, and gold. Small amounts of stibnite, gold, silver, and cinnabar have been deposited in both hot-spring sinter and in the altered wall rock adjacent to the hot-spring vents.

Rock Alteration:
All of the wall rocks in the thermal area have been altered. Acid bleaching is the most obvious alteration; it has strongly affected the rocks at surface, and extends to depths of 100 feet or more. The spring deposits on the main terrace are composed of both opaline sinter and chalcedonic sinter. The younger opaline deposits are to the east, and the older chalcedonic sinter deposits are to the west in the vicinity of Pine Basin (opaline sinter changes to chalcedonic sinter with time).

Power Development:
At the present time, there are three geothermal power-generating plants in operation in the Steamboat area. One plant, consisting of two 12-MW, air-cooled, binary units, is located on the low terrace near the intersection of U.S. 395 and State Route 431. The plant was brought on line in December 1992. An older 7-MW plant is located about 1/3 mile to the west, slightly higher on the terrace. These plants are operated by S.B. Geo, Inc. The geothermal fluid cycle at these plants is completely contained and the fluids are injected back into the ground (closed binary-cycle system). The existing resource is expected to last 30 years or more and can support an additional 36 MW of production capacity. Higher on the side of the Steamboat Hills (near the steam plume) Yankee Caithness operates a 14.4-MW flash turbine system. The Yankee Caithness Steamboat plant came on line in 1988, and the produced power is purchased by Sierra Pacific Power Co. on a 30-year contract.
Lake Tahoe Facts

Lake Tahoe is the largest alpine lake on the North American continent. It is the highest lake of its size in the United States, and the thin, clear mountain air allows the lake’s pure crystalline water to reflect the sky above resulting in its sparkling blue color. It can also appear red during sunsets or gray-black during storms.

Sixty-three streams flow into Lake Tahoe, but only one, the Truckee River, flows out past Reno and into Pyramid Lake. Tahoe’s water never reaches the ocean, since Pyramid is a landlocked desert lake.

Depth:
- Deepest point is 1,645 feet—average is 989 feet.
- 2nd deepest lake in the United States.
- 3rd deepest lake in North America.
- 8th deepest lake in the world.

Elevation:
- Natural rim is 6,223 feet above sea level.
- Bottom of the lake is approximately 95 feet below the elevation of Carson City.

Evaporation:
- 1,400,000 tons of water evaporate on average per day.

Purity:
- 99.7% pure—about the same as distilled water.
- 2nd cleanest body of water in the world.
- The lake is so clear in some places that objects can be seen to depths of 75 feet.

Shoreline:
- 72 miles total—43 miles in California and 29 miles in Nevada.

Size:
- 22 miles long and 12 miles wide.

Snowfall:
- 300–500 inches at alpine skiing elevations—125 inches at lake level.

Sunshine:
- About 75% of the time.

Surface Area:
- 193 square miles.

Temperature:
- Summer months, 68°F in upper 12 feet of lake.
- Winter months, 41°F; 39°F below depths of 600 feet.

Volume:
- 39 trillion gallons of water.
- If drained, enough water to cover an area the size of California to a depth of 14 inches—but it would take 700 years to refill.

Facts from South Lake Tahoe Chamber of Commerce website:
tahoeinfo.com/visit/faqs.html
Incline/Lake Tahoe Overlook to Stop 3, Memorial Point Rest Area (Route Map 2):

After carefully leaving the overlook parking area, continue down-grade to the west on State Route 431 to its intersection with State Route 28 in Incline Village.

For the first long section of grade beyond the rest area, you will be heading northwest and will have a view of the crest of the Carson Range between Rose Knob Peak, on the right, and Rose Knob, on the left. Note that the rocks on the crest have the same brownish outcrop color as the rocks capping Mount Rose to the east. These rocks are Pliocene and Miocene andesite and dacite volcanic flows that cap the lighter colored Cretaceous granitic rocks. As you continue down the grade, you will see small tongues of these flows exposed in road cuts. Where you see dark, greenish-gray rocks filling the gabions (the rock-filled wire structures securing the cuts above the road on the right), an andesite flow was cut at that point, and the rubble was put to use in the gabions (SP19, p. 121, mi. 21.7 and 24.4).

After turning left onto State Route 28 at the bottom of the grade, you pass through some of the housing areas and businesses that comprise Incline Village. New construction along Lake Tahoe here, and in all other areas within the Lake Tahoe basin, is closely controlled and very little new construction is allowed. As you might expect, real estate values are extremely high here and Incline has become affordable to only those in the highest income brackets (SP19, p. 121, mi. 24.9).

As you leave Incline Village and curve to the right toward the lake shore, Ponderosa Ranch is on the left (SP19, p. 121, mi. 27.3). Among other things at this tourist attraction is a replica of the ranch house used in the “Bonanza” TV series (no one has to admit being old enough to remember the original run of this series about the exploits of Ben Cartwright and his sons, Adam, Hoss, and Little Joe—but you may have caught the reruns!).

Just in back of Ponderosa Ranch is the former location of the “Incline” that hauled cut lumber from a sawmill located here during Comstock days up the steep slope to a flume. The flume, running along the west face of the slope, carried the lumber around the point, across the next valley to the east, and eventually into the Carson City area for transport (east). This lake was tapped as the water supply for the Comstock mines in the 1870s, and still supplies water to Virginia City through a system of aqueducts and pipelines (SP19, p. 54–55, map; p. 85–88, discussion, photos; p. 127, photo).

A short distance around the lake from Ponderosa Ranch, you enter Lake Tahoe State Park. Memorial Point is on the lake shore to the right just beyond the park boundary.

Stop 3. Memorial Point Rest Area:

This is a stop to view the lake shore, to test the water (with your hand, you may find the water a little cold for swimming), to check out the interpretive displays placed around the deck, and to use the rest rooms. Stairs lead down to the beach from both ends of the parking lot and from the deck, but please use caution as the stairs and trails can be slippery following seasonal storms.

You will find this to be about the best view of the lake along this stretch of State Route 28. To the north is Incline Village, Sand Harbor is to the south, and to the west is a good view of the high Sierra crest. Particularly impressive at this location are the rounded granite outcrops and boulders that define the shoreline here.

Memorial Point to Stop 4, Virginia City Cemetery by way of Spooner Junction and Carson City (Route Maps 2 and 3):

Enjoy the view of the lake for the next several miles as you continue traveling through Lake Tahoe State Park along the eastern shore of Lake Tahoe to Sand Harbor. If the light is right, you can easily see more of the rounded granite boulders on the lake bottom through the clear water.

Sand Harbor Park, on the right, is a very popular swimming-picnicking spot during the summer months. It has a good sandy beach, shallow enough in some areas to benefit from solar heating and somewhat reduce the shock to swimmers of the normal summer water temperature of 68º F. In late July and early August of each year, Sand Harbor is home to the Lake Tahoe Shakespeare Festival. Two productions are presented each year, patrons sit on blankets or beach chairs on the sand and enjoy Shakespeare with the lake and night sky as a backdrop (SP19, p. 123, mi. 30.3 and photo).

Beyond Sand Harbor, you will see areas along the lake with more large granite boulders close to shore, screening small coves and inlets. These isolated beaches get lots of summer usage, there are rumors of “nude beaches,” and parking along this stretch of highway is a growing problem.

About 5 miles south of Sand Harbor, the route leaves the lakeshore and turns slightly east to cross the small valley of Marlette Creek. Marlette Creek originates from Marlette Lake located in the Carson Range about one mile to the left (east). This lake was tapped as the water supply for the Comstock mines in the 1870s, and still supplies water to Virginia City through a system of aqueducts and pipelines (SP19, p. 54–55, map; p. 85–88, discussion, photos; p. 127, photo).

In outcrops and road cuts for about the next 2 miles beyond Sand Harbor, notice the exfoliation and spheroidal weathering displayed by the granitic rocks (SP19, p. 123–125, mi. 31.7 to 33.8, photos). This type of weathering produces the rounded boulders you have been admiring all along the lakeshore.

Spooners Meadows and Spooner Lake Park, both within Lake Tahoe State Park, are on your left about 5 miles beyond Marlette Creek. During winter, Spooner Lake Park is a popular area for snowshoeing and cross-country skiing. There
are groomed trails around the lake and the more adventurous skiers can take trails high into the Carson Range from here.

Just beyond the park, State Route 28 ends at Spooner Junction where it intersects U.S. Highway 50. Named “America’s Loneliest Road” for its behavior farther to the east in central Nevada, it is here a busy commuter highway connecting the gaming center at Stateline on Lake Tahoe’s south shore with Carson City.

Continue to the left, now heading east on U.S. Highway 50 and following the railroad route used in the Comstock era to haul timber from mills at Glenbrook (on the lake, down Glenbrook Canyon to your right) to the rail-flume transfer point at Spooner Summit (SP19, p. 129, mi. 40.4).

**Glenbrook and Logging**
(from SP26, p. 23)

Glenbrook was the first permanent settlement at Lake Tahoe, and was the focal point for the logging industry during the Comstock mining boom. Timber was needed in vast quantities in the mines to shore up shafts and tunnels dug to get to the Lode, and to provide ground support as the rich ores were removed. Many of the surrounding slopes were clear-cut to satisfy this appetite; the timber you now see is all second growth.

Lumbering operations in the Glenbrook area began with the construction of a sawmill in 1861. From timbered areas around the lake, logs were floated or barged to Glenbrook to be cut into mine timbers and other lumber for Comstock use. The Carson & Tahoe Lumber & Fluming Co. railroad hauled lumber from Glenbrook up Spooner Summit to the crest of the Carson Range. At that point, the lumber was sent by flume down the east slope of the range to Carson City for shipment to Virginia City. Logging in the area reached a record high in 1875 but essentially died out by the late 1880s because of the decline of mining on the Comstock and the decline of the timber resource.

Today Glenbrook is a resort and residential community.

At Spooner Junction, keep to the right and continue up the grade to Spooner Summit. Spooner Summit (elevation 7,146 feet), as well as Spooner Lake, bear the name of Michele E. Spooner, a French Canadian entrepreneur who, with several partners, operated a shingle mill and sawmill here in 1868 supplying wood and lumber to the Comstock.

Crossing the highway at the summit is the Tahoe Rim Trail, a hiking, equestrian, and in some sections, biking trail that circles the Lake Tahoe basin. It extends for 150 miles and follows ridges and mountaintops through two states.

Continuing down the east side of the range, you enter Carson City, not the urban city limit, but its rural boundary. Carson City is a combined city-county and what was originally Ormsby County, with Carson City as its seat, is now all Carson City (County?). You will get to the urban part in a few minutes.

About 2 miles beyond the County/City line, there is a wide turnout on the right that affords a good view to the south into Carson Valley. The Genoa fault, forming a boundary between the Carson Range and Carson Valley, is expressed by the steep slope of the mountain front to the south. The fault zone passes through the rounded hills below to the south and there are deposits of sinter there formed from hot springs related to the fault.

A stoplight marks the foot of the grade and the intersection of U.S. Highway 50 with U.S. Highway 395. Turn left to follow combined Highways 50/395 (now also Carson Street) north to make your way through the congested urban area that lies south of Carson City’s historical city center.

**Carson City**
(from SP26, p. 25)

Carson City, Nevada’s capital, was founded in 1858 by Abe Curry, who named it for Kit Carson, John Frémont’s celebrated scout. The fortuitous discovery of the Comstock Lode in 1859 gave the city life as a freight and transportation center for the mines, and Carson City was selected as the territorial capital in 1861. The Territorial Legislature also established Carson City as the seat of Ormsby County and leased Curry’s Warm Springs Hotel (east of town) as the site of the Territorial Prison. The site (considerably renovated and expanded) is still in use as one of the state’s maximum security prisons. When Nevada became a state in 1864, Carson City was selected as the state’s capital. In addition to the State Capitol and other government buildings, there are many historical buildings and homes in the city.

Carson City is set between the Carson Range, on the left (west), the Virginia Range, straight ahead beyond the city (north), and the Pine Nut Mountains on the right (east). There is a slight complication to Carson City’s location; Carson City is not located in Carson Valley! Carson Valley is the next valley to the south and is the location of the towns of Minden and Gardnerville. Carson City is in Eagle Valley, commemorating the site where one Frank Hall shot and killed an eagle in 1851. For more on Carson City, see SP19, p. 78–80.

About 2 miles north of the stoplight-marked intersection, you pass the Nevada State Railroad Museum, on the left (SP19, p. 139, mi. 28.4).

Continue on to the north through downtown Carson City. You will pass the Ormsby House casino on the left, then within the next block are the three main houses of government for the State of Nevada. Starting on the right with the Legislature building, which houses both the Senate and the Assembly (Senate on the north end, Assembly on the south end). Next, still on the right and a little further back, is the new Supreme Court Building. The shining dome
is atop the Capitol, which houses the office of the Governor. Directly across Carson Street is the old Supreme Court Building, which now houses the office of the Attorney General. Notice that the Capitol and some of the older buildings along this street, including the Mint Building ahead, are constructed of a buff-colored sandstone. This rock was quarried at the State Prison quarry just east of town (SP19, p. 77, mi. 5.0).

Next on the right is the old Federal Building, now the Paul Laxalt State Building. This vintage 1890 red brick building housed Carson City’s main post office for years. It later housed the Nevada State Library and now, after undergoing renovation, is the home of the Nevada Commission on Tourism and the Nevada Magazine. The Carson Nugget casino is to the north of this building and, diagonally across the street from the Nugget is the Carson City Mint building that now houses the Nevada State Museum. Further up the block on the right stands the old depot for the V&T. From here, freight and passengers went northeast to Virginia City and the Comstock Lode or north to Reno to connect with the Central Pacific Railroad (SP19, p. 140, mi. 29.3 to 30.0, photo; p. 81–84).

After passing by the historical buildings in the government and gaming center of the city, turn east on U.S. Highway 50 (William Street) to leave Carson City. The scenery on the short segment of U.S. Highway 50 between Carson City and State Route 341, the road to Virginia City, has a mountain backdrop. The Virginia Range is to the left and the Pine Nut Range is to the right, but at close range you see mostly strip malls and other shopping areas typical of the margins of most cities. Centennial Park and the Eagle Valley Golf Course, on the left as you leave town, provide rare glimpses of green in this desert setting.

Your route now roughly parallels the Carson River, which occupies a canyon cut across the mountain front to the right. During the heyday of the Comstock mines, mills to treat Comstock ores were built along this section of the river to take advantage of an abundant source of water power.
Near here, on the east bank of the river near the town of Empire, the first small mill was built in 1860 and later enlarged to become the Mexican Mill. Other large mills were then constructed further downstream, and the 7-mile portion of the Carson River, from east of Empire extending into Lyon County toward Dayton, was virtually a continuous strip of mills and settlements. Traces of the old mills can still be seen along the river today.

Unfortunately, these mills did not recover all of the silver and gold in the ore. It is estimated that only about 75 percent of the value of the ore was recovered and the remainder, as much as 3 million ounces of gold and 64 million ounces of silver, was lost in tailings discharged into the river. Along with these tailings, 15 million pounds of mercury were also lost. All of this material, rock tailings, gold, silver, and mercury, ended up scattered along miles of the Carson River channel and floodplain below the old mill sites (see SP19, p. 75–77).

The historical settlement of Mound House is on the left just beyond the Lyon County line. Now a somewhat freewheeling suburb of Carson City, this area was a station and stop on the V&T Railroad in the 1870s and 1880s. The main line to Virginia City curved left into the Virginia Range from here carrying passengers and freight through American Flat and Gold Hill then on to the Comstock. Ore from the Comstock mines was hauled down grade on the same line to Mound House and then on to the mills located on the river (SP19, p. 74, mi. 1.3).

During 1900–1920, extensive gypsum mining and milling operations to produce plaster were carried out immediately northwest of Mound House. Gypsum is still mined from a large open pit located in the south flank of the Virginia Range about 1.5 miles northwest of the highway. The gypsum is found in a small, fault-bounded block of Mesozoic-age metasedimentary rocks surrounded by granitic rocks (SP19, p. 74, mi. 0.6).

About one mile beyond Mound House, turn left (north) on State Route 341 and begin the gentle climb to the Comstock cities.

Many consider Virginia City to be the cradle of civilization in Nevada and, for sometimes rough and rowdy mining camps, Virginia City and its two Comstock neighbors really were true outposts of civilization. Follow State Route 341 for a couple of miles, past whimsical metal sculptures on the right, to where the road forks at Gold Canyon and then take State Route 342 to the left to follow Gold Canyon to Silver City.

Gold Canyon heads in the Virginia Range near Gold Hill (ahead) and extends to the Carson River about 3 miles down canyon to your right. Placer gold was discovered in 1849 at Dayton at the mouth of this canyon. Prospectors following this placer gold up Gold Canyon made the discovery of the Comstock Lode at a site in what is now Gold Hill in the spring of 1859.

The tanks and buildings near the road on the left as you enter the lower part of Silver City are remains of the Dayton Consolidated Mill and, beyond on the right are the buildings of the old Donovan Mill (SP19, p. 69–70, mi. 3.4–3.5).

After viewing the few buildings remaining in the business district, you will pass through the rock narrows known as Devils Gate (SP19, p. 67–69, mi. 2.8–3.3, photo). For a short time beginning in 1859, this was a gate on a toll road to Gold Hill.

The Lucerne open pit is on the left just beyond Devils Gate. This pit is developed on the Silver City branch of the Comstock Lode, and the last activity here was in the early 1990s (SP19, p. 67, mi. 1.9).

Straight ahead now, if the light is right, you can see the flash of bare rock in the pits that marks the trace of the Comstock lode across the lower face of Mount Davidson, the peak above Virginia City.

You now enter Gold Hill. Up canyon a short distance beyond the Gold Hill sign, note the metal headframe over the New York Mine in the distance on the right (SP19, p. 66, mi. 1.5; p. 67, photo). Buildings of the Crown Point Mill and the concrete headframe of the Yellow Jacket are to the left of the highway and the Gold Hill Hotel building, also on the left, is just north of the Yellow Jacket Mine (SP19, p. 65–66, mi. 0.8, photo).

Just beyond the hotel, the road crosses rails of the “new” V&T Railroad, a tourist attraction that runs trains on a short length of track between here and Virginia City during the summer months. The original V&T Gold Hill depot is on the left (SP19, p. 64–65, mi. 0.7, photo), and beyond that, on your left as you enter the sharp turn at Greiner’s Bend, is the Gold Hill open pit mine. The 1859 Comstock discovery site was at surface, somewhere in what is now space near the north end of this open pit. This pit was last mined in the 1980s by Houston Oil and Minerals Co. (SP19, p. 64, mi. 0.5; p. 63, photo).

The crest of the grade between Gold Hill and Virginia City is known as “the Divide,” and gained some notoriety as the site of the bogus holdup of Mark Twain described by him in “Roughing It.” To the right at the Divide are some red buildings that mark the location of the eastern terminus of the Marlette Lake-Virginia City water system.

Liberty, Nevada — Virginia City and the Comstock Lode

Virginia City’s story began in 1849 with the discovery of placer gold at the mouth of Gold Canyon. Placer miners worked the stream on and off for the next few years, following the gold upstream to its source—many small gold-bearing veins in the Silver City area. The stream was mostly barren above what is now called Devils Gate. The outcrop of the Comstock Lode at what is now Gold Hill was also quickly found, but it too was mostly barren of gold and was ignored for several years. Eventually, prospectors digging
alongside the Lode uncovered the top of what later was known as the “Old Red Ledge” in March or April 1859. The ore, formed in a hanging-wall split of the main Comstock Lode, was crushed and weathered, and consisted of quartz, gold, and a lot of heavy, blue-black material that turned out to be rich silver sulfide. In June 1859, a similar discovery was made a little over one mile to the northeast on veincroppings at what became known as the Ophir discovery site. Once the incredibly rich silver ore of the Comstock was recognized, the “Rush to Washoe” began. Virginia City became Nevada’s first bonanza boom town, and the first silver-mining camp in the United States. During its main production period, from 1860 to 1880, the Comstock produced more precious metals than all of the rest of the United States and, before it finally came to a (temporary?) rest in 1986, almost $500 million in silver and gold was dug from a roughly 3-mile-long stretch of ground along the base of Mount Davidson. Many excellent books are available on the history of Virginia City and the Comstock. Dan DeQuille’s Big Bonanza, and Elliot Lord’s Comstock Mines and Miners are good contemporary descriptions of the boom period. Grant Smith’s The History of the Comstock Lode is a good overall history of the Lode and its engineering works, and gives comments on the politics that operated behind the mining scene. This book has been recently updated with new sections covering the modern era of mining activity.

The valuable ore deposits of the Comstock Lode are precious-metal-bearing quartz veins. The veins occur in and along a major north-northeast-trending fault (the Comstock fault) that bounds the southeast face of Mount Davidson, the mountain that looms above Virginia City, C Street, Virginia City’s main street, runs roughly parallel to the course of the vein system, and outcrops of Comstock quartz can still be seen, and even pounded on and sampled, on the hillside above town. The Lode is essentially a stockwork zone (a zone of narrow, branching and interconnecting veins) of brecciated quartz formed along the Comstock fault and in nearly vertical hanging-wall fractures connected with the main fault. The bonanza ores consisted of quartz and a little calcite along with sphalerite, galena, chalcopyrite, pyrite, and lesser amounts of argentite and gold.

The Lode was mined in deep underground mines, and the ore was hoisted out through shafts sunk farther and farther to the east of the outcrop to intersect deeper and deeper parts of the lode. The first line of shafts were close to the outcrop, uphill from C Street; the second line of shafts were sunk just downhill from the center of town, along a line to the east of the site of the old V&T depot; and the deep third-line shafts were along the present east edge of town. Only the dumps of the shafts remain; with one exception, none of the surface mine workings have survived to the present (part of the headframe of the Combination Shaft is still in place).

Additional material on Virginia City and the Comstock Lode, including maps and photos, are found in SP19, p. 51–63.

Entering Virginia City, travel north through town on C Street. The imposing building on the right is the Fourth Ward School, the sole survivor of Virginia City’s Comstock-era grammar school buildings. Now restored, it houses a museum. Most of the other buildings lining C Street date to the nineteenth century and the gaps represent those buildings that didn’t survive. If you notice that some buildings look slightly out of plumb and a little crumbly, remember that the mines were immediately under town—the lode outcrop was just uphill from C Street—and the old workings are still settling.
Comstock Facts

Production:
- About 192 million ounces of silver and 8.3 million ounces of gold 1859–1886 (80% prior to 1880).
- Value at time of production, about $412 million.
- The Crown Point Bonanza, found in 1871, produced $35 million.
- The “Big Bonanza,” found in John Mackay’s Consolidated Virginia Mine, produced $105 million between 1873 and 1880.

Geology:
- Host rock, early to middle Miocene (21–14 Ma) Alta Formation andesite.
- Mount Davidson (above town) is composed of Davidson Diorite (actually a granodiorite) which is correlative with age of Alta Formation; Davidson Diorite is in the footwall of the Lode for most of its length.
- Two types of mineralization are present:
  1. Regionally most extensive is advanced argillic, high-sulfidation mineralization (16–15 and 14 Ma). Lots of pyrite, silica ledges, and associated alunite, but very little gold or silver. Red rocks along Geiger Grade are evidence of this type mineralization.
  2. More restricted Comstock quartz-adularia, low-sulfidation mineralization (13.7–12.5 Ma). Quartz, calcite, adularia ores with associated silver and gold. This is the Comstock ore-stage mineralization.
- Later rocks, Kate Peak Andesite flows and domes (Sugar Loaf) are mostly post-mineral.
- Most of the known orebodies occur within the Comstock fault zone (at Virginia City and Gold Hill), or the Silver City fault zone (at Silver City). A few orebodies occur in hanging wall fractures of the Comstock fault zone, such as the famous Con Virginia bonanza.
- The Comstock fault zone can be traced on surface by pits that can be seen on the slope to the west above town and by silicified zones and veins (narrow, light-colored ribs) that can be seen cropping out on the steep slope above the pits.
- The Comstock Lode is a stockwork zone of quartz veins. Individual veins commonly are .1 to one inch wide, and rarely exceed one foot. Near surface, the veins are composed of calcite, quartz, and adularia. Deeper veins are entirely quartz with adularia. The veins are usually banded. Ore minerals consist of argentite and electrum with some galena, chalcopyrite, and minor pyrite.
- The vertical extent of the orebodies within the Lode rarely exceeded 500 feet, and strike lengths rarely exceeded 1000 feet. Mining widths were up to 150 feet.

Mine Areas and Names:
- Most Comstock descriptions speak of three groups of mines:
  1. The South End Mines. These are the Gold Hill Mines including the Overman, Belcher, Crown Point, Yellow Jacket, and Imperial. The Gold Hill discovery was made on the Imperial.
  2. The Middle Mines. These are in the general area of the “Divide” between Gold Hill and Virginia City, and include the Best & Belcher, Gould & Curry, Chollar, Potosi, Savage, and Hale & Norcross.
  3. The North End Mines. These were the major producers under the north part of Virginia City, and included the Consolidated Virginia, Mexican, and Ophir, as well as the less productive Union and Sierra Nevada Mines in the cemetery area.
- Comstock descriptions also speak of three “lines” of shafts:
  1. The first line of shafts referred to in Comstock literature would have been along a line now marked by the several small open pits, above A Street. These shafts were collared on outcrops of mineralized Lode.
  2. The second line of shafts was generally along D and E Streets, and intersected the Lode around 1,500 to 1,700 feet below surface.
  3. The third line shafts were sunk from locations below town to the east, and on the hills south of town. These intersected the Lode at depths of 2,500 to 3,200 feet. Many of these shafts reached the Lode late in the life of the Comstock, and few were economic ventures.

Sutro Tunnel:
- Driven under the mines at the level of the Carson River from a point on the range front about 4 miles to the southeast of Virginia City.
- Purpose was to drain the water from the mines, provide ventilation, and provide haulage route for ore through the tunnel to mills located on the Carson River near the tunnel mouth.
- Intersected the Lode at the 1,650 foot level of the Savage Mine in July 1878.
- By the time it intersected the Lode, the mines were as much as 1,500 feet below tunnel level.
LOCATION OF HISTORICAL CLAIMS AND DEEP SHAFTS, 1880

THE COMSTOCK LODGE

SECTION ALONG THE SUTRO TUNNEL  (looking south-southwest)
On the left, across the street from the Fourth Ward School, is the Loring Pit, mined in the 1930s and 1940s. The Chollar and Savage Mines developed the underground section of the Lode that lies beneath us (SP19, p. 63, mi. 0.0).

The Storey County Courthouse, with its statue of Justice out front (the statue lacks the traditional blindfold, miners liked their justice to be meted out with eyes wide open!), is one block uphill to the left on B Street. The V&T railroad yards and depot were in the flat area one block downhill to the right. At the north end of town, pull off to the right at Stop 4.

**Stop 4. Cemetery overlook:**

This is a convenient spot to stop, get out of your car, and orient yourself to Virginia City. The cemeteries are below you to the east, if you want to explore them go back toward town one block, turn left, and drive to the parking area that you can see from the overlook. Notable landmarks visible from this point include St. Mary’s Church (the prominent steeple about one block below the center of town), and several of the historical mine dumps below town (refer to the Virginia City map, p. 17; and the Comstock Lode poster, p. 19).

**Cemetery Overlook to Stop 5, the Gold Hill Hotel (Route Map 3):**

(For the Nov. 13, 2000 field trip, the Earth Science Editors spent time examining the shops on C Street, then traveled back to the Gold Hill Hotel for an end-of-the-trip dinner. You can also return to Gold Hill, or you can spend your time in Virginia City, then return directly to Reno via Geiger Grade)

Heading south along C Street, you will encounter various shops, historical saloons, plus some fairly recent additions such as candy shops, a bookstore, and various tourist emporiums. Wander into such places as the Bucket of Blood, the Silver Queen, and the Delta. Once you get into the center of things, walk up Union Street to B Street (one block uphill to the right) to Piper’s Opera House, then go a block south on B Street to the Storey County Courthouse. Or you can stay on C street past Union, noting the old office of the Territorial Enterprise on the left, then turn left on Taylor Street and go one block downhill to Saint Mary’s of the Mountains church.

After you finish your tour of the “Queen of the Comstock,” you can retrace your path south over the Divide into Gold Hill and end your tour at the historic Gold Hill Hotel. The Hotel is graced with a nice old bar, a gathering room with a large fireplace (in the cold months usually putting out traces of pungent piñon pine smoke), and adjoining dining rooms. The hotel also has a bookshop well stocked with Nevada and Comstock titles.

**The Homestretch, Gold Hill Hotel to Reno (Route Map 3):**

From the Gold Hill Hotel, retrace your route north through Virginia City, past your earlier Stop 4, then continue on State Route 341 down Geiger Grade to intersect U.S. Highway 395 at Steamboat Springs, just east of the first stop of the trip.

The road log in SP19, p. 41–50, covers this segment of your trip. You are, however, traveling the route in reverse so you need to read backward from page 50.

At the foot of Geiger Grade, turn right (north) on Highway 395, enter the freeway, and return to Reno.

**References:**


South Lake Tahoe Chamber of Commerce website, 2000, tahoeinfo.com/visit/faqs.html.

