QUARTZVILLE GEOLOGICAL FIELD TRIP GUIDE

________________ROAD LOG______________

-**Boxed** in numbers are check points
-Italicized numbers is the mileage between each checkpoint
-**Last** numbers are the total road miles traveled beginning at 0.0 and ending at 45.2

1 ***0.0*** 0.0 West city limits of Sweet Home, on Highway 20, 0.6 miles east of milepost 26. (At the time of publication, the city limits sign had been taken down because of road construction.)

Dense, dark rocks with columnar jointing that are found on the south or right-hand side of the road are basalts that have been classified by various authors as Columbia River Basalt, Stayton Lava, or Little Butte Volcanics.

Drive east through town on Highway 20.

2 ***4.6*** 4.6 On the left side is the Foster Reservoir viewpoint.

3 ***1.3*** 5.9 In the roadcut on the right-hand side of the road at the traffic separator sign, just before the road curves to the right, note the irregular contact between underlying sedimentary beds of siltstone and shale and an overlying basalt flow (see Figure 1). Note also the baked zone along the edges of the sedimentary rocks, caused by the heat of the basalt.

Slickensides (scratches or grooves) occur in this zone, indicating movement of the sediments, probably from the weight and flowing motion of the lava.

4 ***0.5*** 6.4 You are now at the junction of Highway 20 and the Green Peter Dam-Quartzville townsite road. Note the columnar jointed basalt to the right of the junction.

Turn left here and drive toward Quartzville.

After you have crossed the bridge, you again see basalt overlying sediments, as at Checkpoint 3.

Before you cross the north arm of Foster Reservoir, note the paleoriver terraces in the roadcut to the left, indicating that the Santiam River was once at this level. Some of the old river terrace gravels contain gold and have been mined in the past.

6 ***0.5*** 7.7 In the roadcut on your left, below the schoolhouse, you can see graded stream gravels and alluvial fan deposits. This material was probably deposited by a fast-moving stream which flowed into a slower-moving body of water and dropped its load of sand and gravel. Imbrication (shingling or overlapping) of the rocks can be used to determine stream-flow direction. Note also that some of the bedding is abruptly terminated or truncated.

7 ***0.2*** 7.9 The Sunnyside Park entrance is to the right. The park is located on an old river terrace known as the Green Horn Bar, which was placer mined for gold in the late 1850's and 1860's.

The men working the bar were called "greenhorns" because of their lack of mining experience. In their hydraulic mining, they used California type riffles in the sluice boxes, resulting in the loss of most of the gold.

8 ***0.6*** 8.5 Across the river to your right are a series of cliff-forming basalt flows, locally named the Green Peter Basalts by the U.S. Army Corps of Engineers. These basalts are faulted and cut in some places by dikes.

9 ***1.0*** 9.5 Note the zone of alteration in the roadcut to the left. Stop at the small turnout on the right, just before the road curves to the left. In this outcrop you are looking at the mineralization of the Quartzville mining district in miniature (see Figure 2). Notice the three types of alteration that occur here, ranging from propylitic (hydrothermal alteration that has produced epidote, chlorite, and pyrite) at the edges through argillitic (alteration. producing clay minerals) to phyllic (alteration to quartz and sericite) at the center of the zone. The phyllic alteration occurs along a very narrow fracture which served as a channel for ascending hydrothermal fluids through otherwise impermeable basalt. Dioritic and granodioritic intrusive rocks are exposed to the west (left) of this fracture. This intrusion and associated alteration are indicative of the type of hydrothermal fluid at depth that was the carrier for the mineralization in the Quartzville mining district. The zonation of alteration that you see here is present in most large mining districts, but it usually covers hundreds of feet, rather than inches, as here.

10 ***2.0*** 11.5 Green Peter Dam. To your right is a parking area and viewpoint. Work on the dam and its reservoir lasted from 1961 to 1967. The dam, which used 1,142,000 cubic yards of concrete, is 320 feet high, with deck elevation of 1,020 feet.

The reservoir holds 430,000 acre-feet of water and covers 3,720 acres of land. During construction of the dam, emery boulders were uncovered at the bottom of the river. The original emery outcrop was located by tracing emery "float" (loose boulders of emery) back to the source, 36 river miles up the Middle Fork of the Santiam River.

11 ***0.5*** 12.0 Park in the pull off to your right and look to your left at the basaltic lava flow rock which is cut by several vertical basalt dikes. The dikes, which look very much like the flow rock because of similarities in composition, can be identified by their horizontal jointing which formed perpendicular to their cooling edges.

At the west end of the roadcut are south eastward dipping basalt flows which were deformed before being covered by the younger basalt flow you can see above them. The white blebs in the basalt are amygdules (secondary quartz, calcite, or zeolite minerals that filled small cavities left in cooling lava by escaping gas bubbles).

12 ***3.3*** 15.3 Just after crossing a small stream, the road curves to the right. In the roadcut to the left, note the orange and yellow alteration, which is due to hydrothermal processes that have altered the minerals to clay and deposited pyrite, which in turn weathered to various iron oxides (rust) (see

Figure 3). Because the alteration has affected all the different types of rock exposed here, you can see that it is younger than they are.

13 ***1.7*** 17.0 You are now crossing an arm of the Green Peter Reservoir.

14 ***0.8*** 17.8 On the right is the entrance to Whitcomb Creek Park.

15 ***1.7*** 19.5 At the curve just past milepost 12, note the slickensides in the rocks to your left (see Figure 4). Slickensides are polished and striated (scratched) surfaces resulting from rocks moving past one another along a fault plane. This particular fault plane has been exposed to weathering; therefore, the striations and polish are not as distinct as those on a freshly exposed surface.

16 ***1.2*** 20.7 Note the alteration zone with abundant iron staining. This area and the associated riverbank (now under water) are known locally as the Donaca Bar, the site of some large placer-mining operations in the late 1890's and again in the 1930's. Several thousand dollars in gold was removed from these gravels. One possible source for the gold is the bright yellow and chocolate-brown alteration zone you see in the roadcut.

17 ***2.2*** 22.9 Upper end of the Green Peter Reservoir. On the south or opposite side of Quartzville Creek is a river terrace. Notice the gravel bar on the inside of the bend in the creek. Gravel is deposited here because the velocity of this side of the creek drops as the creek flows around the curve. To the left is a roadcut in which sandstone, siltstone, and volcanic material are exposed as bedded units. Note the eastward dip of the beds. At the east end of the roadcut the sedimentary sequence is overlain by a basalt flow. The black layer which separates the two units is a paleosoil horizon which was baked by the heat of the basalt flow. This soil zone contains some petrified wood fragments.

18 ***1.8*** 24.7 You are now at Dogwood Park, located on a gravel bar which was the site of placer-mining operations from the 1890's through the 1930's.

During the summer you can see weekend miners using small dredges~ sluice boxes, and gold rockers here and all along the creek. Figure 5 shows gold-panning and a gold rocker powered by a gasoline engine.

19 ***0.7*** 25.4 After you cross Four-bit Creek, the BLM road shops are on your right.

20 ***1.0*** 26.4 The rocks in the stone quarry on your left contain much pyrite and some tourmaline, indicating a highly mineralized area. At least one rock sample taken from here contained a trace of silver.

21 ***0.2*** 26.6 Just before the Yellowstone access road and Yellowstone Creek, notice the alteration in the rocks to your left. The iron staining is from the oxidation of pyrite and minor amounts of chalcopyrite. Some silicification has occurred, and tourmaline is also present.

22 ***0.1*** 26.7 To the right a bridge crosses Quartzville Creek. This is Boulder Creek Road. Cross bridge, turn left, and drive 1.6 miles.

23 ***1.6*** 28.3 Note the white-colored, 25-foot-wide alteration zone in the roadcut on your left (see Figure 6). Pyrite crystals up to 3/8-inches in diameter occur in this alteration zone (seeFigure 7). Many of the crystals are in the form of pyritohedrons, which means they have 12 crystal faces, each of which has five sides. After collecting some choice samples, return to the main road, (road 11) turn right, and continue.

24 ***5.2*** 33.5 On the left is the entrance to the Yellow Bottom Creek Recreation Area.

25 ***0.1*** 33.7 The roadcut to the left exposes a coarse grained buff-colored intrusive rock called diorite. The light minerals in it are primarily plagioclase feldspar; most of the dark minerals are hornblende. This diorite is part of the plutonic (intrusive) complex which is probably responsible for the mineralization in the Quartzville area.

26 ***0.1*** 33.7 At the curve in the road, note the outcrop in the roadcut to the left. Part of the rock in this outcrop is the same diorite you saw at Checkpoint 25. The diorite formed from the cooling and crystallization of molten rock in an underground magma chamber. In addition, near the center of the roadcut is a section of light colored, fine-grained, and sugary-textured rock called aplite, which has a different chemical composition (more silica, less iron and magnesium) than the diorite. The aplite formed toward the end of the cooling history of the magma chamber, after most of the iron and magnesium minerals had already crystallized out of the melt. Note that the outcrop is cut by basalt dikes; therefore, the basalt is younger than the diorite and the aplite.

27 ***1.0*** 34.7 In the roadcut to the left, just opposite the small building on the right, a basalt flow conformably overlies a lacustrine (lake) ash deposit which has thin layers called laminae. The laminae are interbedded with layers of airfall ash. Occasional rip-up clasts (fragments of partly consolidated sediments that have been ripped up and transported by strong currents) can be found in the sediments.

28 ***0.2*** 34.9 You are now at a road junction. The blacktop road (Forest Service Road 11) follows Quartzville Creek; the road to your left (Road 1131) follows Canal Creek; the center road (Road 1133) goes up the hill and leads to the Quartzville townsite (*you can also use this road 1133 to get to Detroit Dam*). Note the columnar basalt in the roadcut. This vesicular basalt, which contains some olivine (the bottle-green minerals on a freshly broken surface), is classified as Recent in age because it is only a few hundred thousand years old.

Follow Road 1131, Canal Creek road, to your left.

29 ***0.4*** 35.3 Stop for a moment and look across the creek at the rock projecting like a wall from the creek and hillside on the other side. The country rock was originally solid; but when deep-seated forces within the earth caused the rock to fracture, molten rock which was under great pressure moved up from great depths through the fractures to an environment where there was less pressure. As the magma passed through the fracture. some of it remained, cooled, and solidified, forming a tabular body called a dike. The surrounding rock, softer than the dike, eroded away more quickly. Leaving the diorite dike exposed, as you see it. in the shape of a wall.

30 ***0.7*** 36.0 To your right is a quarry of columnar basalt that was a small intracanyon lava flow. Note that the base of the flow is lower than the rocks on either side.

Now walk to the edge of the road and look down at Canal Creek. You should be able to see water running out of the ground below you into the creek. The source of this water, which old timers call

Cold Spring, is in Dry Gulch. The gravels of Dry Gulch and those covered by the intracanyon basalt flow act as a channel way for water. All year this spring carries water from the slopes of Dry Gulch. The underground channel way can carry all the summer runoff. So Dry Gulch remains dry during summer months. But the capacity of the underground channel way is insufficient during other seasons of the year, and then the excess water flows through Dry Gulch.

Return to the junction, turn left. and take the center road (Road 1133) toward the Quartzville townsite.

31 ***1.2*** 37.2 At the first switchback in the road, the cinders and basalt you see in the upper part of the roadcut at the right are part of the same sequence of Recent volcanics you saw at the junction (Checkpoint 28). Below the volcanic material is a layer of unconsolidated glacial drift. This sequence of deposits can be used to give a rough maximum age for the lava, for the lava lies above the glacial drift and is therefore younger.

32 ***0.9*** 38.1 To your right is a cinder pit. Few Recent volcanic cinder cones have been found this far west of the High Cascades. Note the dip of the layers of cinders in the pit wall. Normally all the layers of a cinder cone dip away from the center of the cone, so the dip of these layers indicates that the cone itself should be upslope and to the south of this location, which it is. You will find scoria. cinders, a few lava bombs, and chunks of light-colored granitic rocks which were ripped from the magma conduit by the upward-flowing magma. These granitic fragments are indicative of at least one type of rock present below this location. The extreme youthfulness of the Recent volcanic rocks seen in this part of the Quartzville district suggests that they occurred too recently to have been responsible for the mineralization of the district.

***Note from Penny**: This cinder rock quarry cut is what I have always called "The Breathing Wall"; the first time we stopped here, I could feel a super cold air current flowing down the rocky wall. There were gaps below some of the largest boulders, and this was where the chilly air was coming from. I held my lighter flame at the gaps, and it **blew away** from the rocks. The next time we stopped there I held my lighter flame there and the air was **sucking** the flame **back** into the gap. I took out our thermometer and the temperature read 38 degrees F. Cold!*

*So, there must be some open interior volcanic channels throughout this lava system that creates this flow of air. That's why I call it The Breathing Wall". Since that time, stupid people have gone there and tried "excavating" the wall, making a huge and dangerous mess out of the place. But you can still feel the frigid air flowing down from that area, just as you drive by it, even on a hot summer day. If you could actually **see** that air, it would look like a slow-moving waterfall.*

33 ***0.3*** 38.4 The bridge crosses Dry Gulch. This is the drainage that feeds Cold Springs (Checkpoint 30). Only during times of high water can flowing water be seen here.

34 ***0.9*** 39.3 To your right is a signboard identifying the Quartzville townsite (*sign is long gone*). The district's largest producing mine. the Lawler, is located across the valley but is hard to see because of second- growth timber. IT IS UNSAFE TO ENTER THIS MINE!

35 ***0.6*** 39.9 On your left, 10 feet above the road, is the lower Snowstorm (Edison) tunnel, which was driven in a rhyolite breccia cemented with quartz.

A second tunnel can be found by walking to the road switchback and entering the upstream side of the stream valley (staying to the left side of the stream valley). Shortly after leaving the road, follow the trail which goes straight up the hillside to the left. Where the trail forks, follow the steeper trail.

Both of these tunnels are reasonably safe to enter if you carry a flashlight. The second tunnel follows a fault gouge seam which you can see overhead in the tunnel.

Figure 8 shows why these tunnels are safe to enter. The roof has a natural arch with no loose hanging rocks. The rock is hard and strong and will not cave in. No shafts into which you might fall have been dug below the tunnel floor. No mine timber was left to rot and form bad air. Most other mines, tunnels, and shafts in the Quartzville and other mining districts are NOT safe to enter.

The Snowstorm tunnels are owned by a private party; permission is not needed to enter these tunnels but may be required in the future.

Return to the fork in the road, turn left, and follow the paved road (Road 11), the Quartzville Creek road.

36 ***3.6*** 43.5 Quartzvllle Creek -Galena Creek Road junction. Take the right-hand road (Road 805). which crosses Quartzville Creek.

37 ***1.7*** 45.2 At this point the road crosses Galena Creek. The gravel in this creek contains specimens of tourmaline hornfels. fine-grained rocks which have been metamorphosed by contact with a hot intrusive body. These hornfels are indicative of a higher grade intrusive activity; and the original outcrop where the hornfels occurred, if cut by a vein, would be a good place to look for mineral values and interesting mineral and rock specimens.

Turn around and retrace route to Sweet Home.

End of road log.

Additional Reading

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