Supplemental road log 1: From Grants to U.S. Gypsum Perlite Mine (State Road 547)

Virginia T. McLemore, James M. Barker, and George S. Austin
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SUPPLEMENTAL ROAD LOG 1, FROM GRANTS TO U.S. GYPSUM PERLITE MINE (STATE ROAD 547)

VIRGINIA T. McLEMORE, JAMES M. BARKER and GEORGE S. AUSTIN

Assembly point: The Inn, Grants, New Mexico (exit 85).

SUMMARY

This supplemental road log describes a route to the U.S. Gypsum perlite mine on Lobo Canyon Road (State Road 547) northeast of Grants, New Mexico. The trip route traverses Jurassic and Cretaceous units as well as Tertiary volcanic rocks. Limestone, uranium, pumice and perlite have been produced from mines along the route, although only perlite and limestone are currently being mined. The road log also includes a popular mineral collecting locality where micromounts of topaz and garnet occur along with larger Apache tears (obsidian).

Mileage

0.0 Assemble at The Inn, east Grants, near the junction of I-40 and Santa Fe Ave. (Business I-40) at exit 85. Horace Mesa forms the skyline at 12:00 capped by Tertiary basalt and pyroclastic deposits related to the Mt. Taylor volcanic field. **Turn left** onto Santa Fe Ave. **0.4**

0.4 Bridge crosses over Atchison, Topeka and Santa Fe Railroad. Zuni Mountains at 9:00–11:00. Continue through Grants. **1.2**

1.6 El Malpais Information Center (BLM) on right. **0.3**

1.9 U.S. Gypsum Grants Plant, perlite mill on left (Fig. S1-1.9). Perlite is a hydrated siliceous glass (rhyolitic) of igneous origin that expands into a very low-density rock foam when heated (Weber and Austin, 1982). Perlite is used as an aggregate for plaster, concrete, wallboard, soil conditioners and for packing materials. It is also used in filtration and as a filler in plastics. New Mexico is the leading producer of perlite in the United States. Perlite from the East Grants Ridge mine is crushed and packaged at this site and shipped by rail to various U.S. Gypsum plants. **0.1**

2.0 **Traffic light. Turn right** onto First Street (one way). Black Mesa and West Grants Ridge at 9:00 to 11:00. Grants Ridge is at 12:00 (Fig. S1-2.0). All three ridges are capped by Tertiary basalt flows overlying Triassic and Jurassic sedimentary rocks (Thaden et al., 1967). The houses along the hillslopes below the ridges are built on landslide and talus deposits. East Grants Ridge at 12:00–1:00 consists of Tertiary rhyolite and basaltic pyroclastic rocks overlying Jurassic and Cretaceous sedimentary rocks. The white scar below the crest of the ridge is pumice (Kerr and Wilcox, 1963), which was exposed during quarrying from 1938 to 1967. **0.4**

2.4 Traffic light, continue straight. Mt. Taylor at 1:30, an ancient composite volcano, is the highest peak (11,380 ft) on the skyline and is the result of 2 million years of alkalic to mafic volcanic activity. The oldest flows are predominantly alkalic and occurred about 4 my ago. The youngest flows are thoeleiitic (Crumpler, 1982). Lt. John H. Simpson, Topographic Engineers, named Mt. Taylor in 1850 for Zachary Taylor, twelfth President of the United States who died in office on 9 July 1850 (Simpson, 1850; Pearce, 1965). **0.5**

2.9 Stop sign. **Turn right** onto Roosevelt (State Road 547). Horace Mesa at 12:00. **0.4**

3.3 Traffic light. **Turn left** onto State Road 547 (Lobo Canyon Road). Pass Lobo Canyon shopping center. Horace Mesa on right. West Grants Ridge on left. Grants Ridge at 12:00. Hillslopes formed by talus and landslide deposits. **1.1**

4.4 Mt. Taylor ranger station (U.S. Forest Service) on left. Mt. Taylor at 12:30. Hogback at 12:30–2:00 below Hor-

FIGURE S1-1.9. U.S. Gypsum Grants plant, perlite mill on Santa Fe Ave.

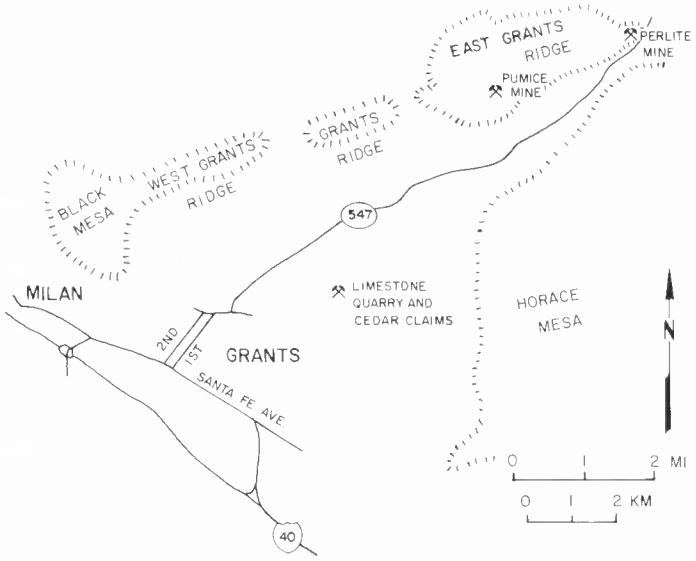

FIGURE S1-2.0. Sketch map showing topographic features along Lobo Canyon Road.

ace Mesa formed by gray-green mudstones and siltstones of the Brushy Basin Mbr and sandstones of the Westwater Canyon Mbr of the Morrison Fm (Jurassic), capped by the Dakota Ss (Cretaceous). The Todilto Limestone Mbr of the Wanakah Fm (Jurassic) crops out below and to the west of the ridge. The limestone is presently quarried and crushed by Griego Trucking Co. of Grants. It is used as aggregate for ready-mix concrete and road material (McLemore et al., 1986); the quarry dumps are at 2:00. From 1952 to 1957, 3198 tons of uranium ore yielding 13,631 pounds of U_3O_8 was produced from the Cedar claims at this site in secs. 20 and 29, T11N, R9W (Hilpert, 1969; McLemore, 1983). **1.2**

5.6 Road intersects hogback on right. Dumps of white pumice on left. **0.3**

5.9 Grants Correctional Facility on right. Roadcuts ahead and hills behind the correctional facility are Quaternary talus and landslide deposits on top of Cretaceous sedimentary rocks (Thaden et al., 1967). **0.2**

6.1 Milepost 4. Quaternary sedimentary rocks on right. **0.5**

6.6 Sanitary landfill in valley fill on left. **0.3**

6.9 **Cattleguard** at Cibola National Forest boundary. Outcrops ahead on right belong to Mancos Shale and Mesaverde Group (Cretaceous). **0.2**

7.1 Milepost 5. **0.4**

7.5 Roadcut in Cretaceous Gallup Sandstone overlain by Quaternary landslide deposits. **0.6**

8.1 Milepost 6. At 10:00 below ridge crest (Fig. S1-8.1), pumice overlain by basalt scoria and intruded by basalt plug (Kerr and Wilcox, 1963). Pumice is white to buff, fine grained and brecciated. The Pumice Corporation of America began pumice production in 1941 when Italian imports were discontinued during World War II. From 1947 to 1952, 59,563 tons of pumice worth over $1 million were produced (New Mexico State Mines Inspector Reports, 1947–1952); production from 1938 to 1946 and minor, sporadic production from 1953 to 1967 were not reported. Pumice was first mined by underground methods, but a cave-in in 1941 resulted in a change to open-pit quarrying (Johnston, 1953). U.S. Gypsum Co. purchased the pumice claims in 1953 but has not mined there for many years. **1.0**

9.1 Milepost 7. Part of squeeze-outs found near the base of East Grants Ridge on left. Toes of these squeeze-outs were cut by bulldozers to test for perlite. The only adequate material of sufficient size and purity was found at the east end of the ridge and is now being mined by U.S. Gypsum. **0.4**

9.5 Roadcut on right is light gray flow-banded, pumiceous rhyolite similar to that found in dozer cuts on left. **0.3**

9.8 Bend in road at head of Lobo Canyon. **OPTIONAL STOP.** Boulders of Tertiary flow-banded rhyolite occur along both sides of the road. This is a well-known locality for collecting micromounts of clear topaz and red to red-brown garnets which occur in vugs and cavities within the rhyolite (Fig. S1-9.8). The largest crystals found are less than about 10 mm. Apache tears (obsidian) have weathered out of the rhyolite and can be found by sifting the soil. **0.2**

10.0 **Turn left** pass gate to U.S. Gypsum perlite mine. Permission from U.S. Gypsum is required to enter the quarry. Mt. Taylor at 2:00. Follow road into open pit. **STOP 1.** Perlite is associated with obsidian and lithoidal rhyolite that forms most of East Grants Ridge. Several varieties of perlite are exposed in the pit. All varieties are slightly to moderately porphyritic with albite, quartz and orthoclase phenocrysts and traces of biotite (Weber and Austin, 1982). Perlite is ripped and loaded onto trucks for transport to the Grants mill (Fig. S1-10.0).

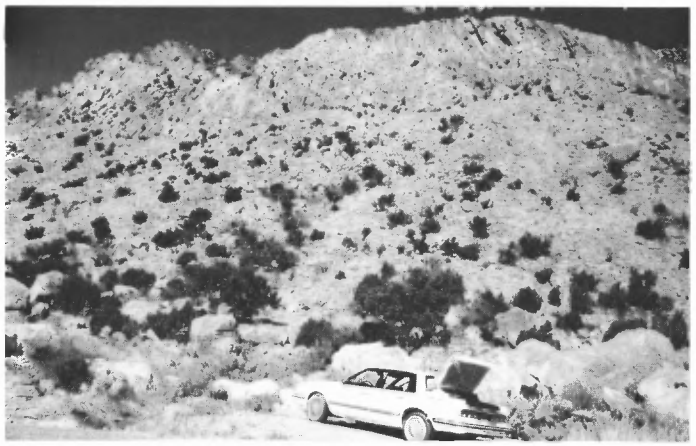

FIGURE S1-9.8. Collecting locality for micromounts of topaz and garnet and larger obsidian.

FIGURE S1-8.1. White fine-grained pumice is overlain by basalt scoria and intruded by a basalt plug (on right).

FIGURE S1-10.0. Front-end loader in the perlite quarry.

Samples of obsidian west of the mine were dated at 3.3 my by potassium-argon methods (Bassett et al., 1963a, b).

Retrace route to The Inn in Grants. **2.8**

12.8 Milepost 5. Zuni Mtns at 12:00. **0.2**
13.0 **Cattleguard. 0.8**
13.8 Milepost 4. **0.3**
14.1 **Grants** city limits. Zuni Mtns at 10:00–12:00. **2.4**
16.5 **Turn right** onto Roosevelt at stop light. **0.4**
16.9 **Stop sign.** Keep straight. **0.1**
17.0 **Turn left** on 2nd Street (one way). Black Mesa at 3:00 and Zuni Mtns at 12:00. Pass Grants High School on right. **0.9**
17.9 Traffic light. **Turn left** onto Santa Fe Ave. **2.0**
19.9 Enter the parking lot of The Inn.

End of Supplemental Road Log 1.

SUPPLEMENTAL ROAD LOG 2, BLACK ROCK TO OJO CALIENTE

SPENCER G. LUCAS and ORIN J. ANDERSON

Mileage

0.0 **Continue straight** (W) toward Zuni Pueblo from intersection of NM-53 with paved road to fairgrounds (N) and Corn Mountains (S), mile 140.8 of second-day road log. **0.8**
0.8 Enter **Zuni Pueblo.** Zuni Pueblo is the center of the Zuni people, farmers and sheepherders noted for their dances and arts and crafts, especially the making of turquoise jewelry. The name Zuni is believed to be a Spanish adaptation of a Keresan word of unknown meaning. The pueblo was one of the legendary "Seven Cities of Cibola" sought by the Spanish conquistadores. **0.4**
1.2 School crossing; Zuni High School to left. **0.5**
1.7 Houses on right are built from sandstone slabs quarried from local outcrops of the Rock Point Mbr of the Chinle Fm. **0.1**
1.8 Zuni tribal offices on right. **0.3**
2.1 Four-way stop; **turn left. 0.2**
2.3 **Bridge** over Zuni River followed by stop sign across from Halona Plaza. **Turn right** and **proceed west. 0.2**
2.5 Road enters from right; **continue straight. 0.5**
3.0 End of paved highway (you are now on Zuni Pueblo Highway 2). **2.3**
5.3 Gravel pit at 10:30 in thick, Pleistocene(?) gravels. **1.2**
6.5 Road forks; **go straight;** right fork goes to Tekapo, a former trading point on NM-53. Note red beds of the Chinle Fm on right beneath alluvium. **0.5**
7.0 At 9:00 note strata of the Petrified Forest Mbr of the Chinle Fm underneath the Rock Point Mbr. **0.8**
7.8 Good view of mudstones and sandstones of the Chinle Fm on right. **0.7**
8.5 Road is now on a stripped surface developed in the Sonsela Ss Bed of the Petrified Forest Mbr of the Chinle Fm. **2.3**
10.8 Note Triassic Chinle sandstones on left. **1.1**
11.9 Owl Rock Mbr of Chinle Fm exposed on mesa at 9:00 and along road for next 0.9 mi. **3.2**
15.1 Bridge; elevation 6244 ft. **1.0**
16.1 Sonsela Ss at 9:00. **0.1**
16.2 Enter **Ojo Caliente. STOP 1,** to examine excellent exposures of Sonsela Ss on left (Fig. S2-16.2). Here, the Sonsela is about 42 ft of chert-pebble conglomerate and coarse-grained, trough crossbedded sandstone overlying purple mudstone. The Sonsela Ss Bed of Kiersch (1955) and Akers et al. (1958) covers an area of 24,000 mi^2 in northeastern Arizona and northwestern New Mexico. It represents an extensive network of coalesced channel bodies of north and northeasterly flowing rivers during the Late Triassic (e.g., Poole, 1961). Ojo Caliente (Spanish, "hot spring"), curiously, is not near a hot spring. After stop, **continue S** through the village of Ojo Caliente. **0.3**
16.5 Bridge over Plumasano Wash; road forks; **proceed left. 0.3**
16.8 Note extensive bench to N (left) formed by Sonsela Ss. **0.3**
17.1 Sharp bend to right in road. **0.6**

FIGURE S2-16.2. The Sonsela Sandstone Bed of the Chinle Petrified Forest Member at Ojo Caliente.