



Enigmatic quartzite piles of La Tierra-Las Dos subdivisions area, Santa Fe County, New Mexico

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ENIGMATIC QUARTZITE PILES OF THE LA TIERRA-LAS DOS SUBDIVISIONS AREA, SANTA FE COUNTY, NEW MEXICO

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Six miles (10 km) northwest of Santa Fe are located eight scattered and isolated piles of quartzite boulders that, by their very presence, create a puzzling geologic problem. Recent subdivision road building has made six of the piles easily accessible and one can drive directly to two of them (piles 4 and 7). Only Baldwin (Spiegel and Baldwin, 1963), in a comprehensive study of the geology of the Santa Fe area, has addressed the quartzite-pile problem; later workers either have been unaware of it or have elected not to deal with it. Baldwin states (p. 78) that "the quartzite closely resembles Pennsylvanian sedimentary quartzite exposed northeast of Santa Fe; no other known rock in the areas bears any resemblance." The quartzite is lithologically very different from both the five ft (1.5 m) of Pennsylvanian siliceous sandstone to which he referred (p. 235), and the Pennsylvanian sandstones of the southern Sangre de Cristo Mountains described by Sutherland (Miller and others, 1963, p. 56-73). The problem is complicated further because the age of the La Tierra-Las Dos-subdivisions-area quartzite is yet to be established and may never be, inasmuch as quartz cannot be dated by either the fission-track or the K-Ar method, and the rocks are unfossiliferous.

The geologic setting for the quartzite piles is in itself puzzling inasmuch as they overlie a thick section of the Tesuque Formation consisting of a number of sedimentary rock types, none of which bears any lithologic resemblance to the quartz-

ites; the piles are approximately 6 mi (10 km) from the nearest non-Tesuque rocks. At the time of the Santa Fe study, Baldwin (Spiegel and Baldwin, 1963, p. 78) speculated that "one is forced to accept the conclusion that the quartzite piles represent talus from the 'basement' rocks; and hence that the basement rocks have been raised as much as 3,500 ft (1,070 m) along faults...." One could appreciate Baldwin's conclusion in view of observations and facts available at the time; however, since then, a geophysical study (Cordell, 1976), drilling adjacent to many of the piles (Consulting Professionals, 1975, 1977, 1978; Jenkins, 1977a,b), and further field observations make his conclusion untenable.

The quartzite piles, whose locations and condensed descriptions are listed in Table 1 and shown on Figure 1, have, with minor variations, the following distinctive characteristics:

- (1) They are sedimentary rocks, massive (15 ft (4.5 m) thick and more) and crudely bedded, that commonly contain scattered well rounded pebbles, cobbles and boulders of yellow chert, white or banded quartzite, and some mica schist; some blocks exhibit conglomeratic zones of these materials.
- (2) They are of one rock type only, orthoquartzite, colored dark red or buff, composed of well sorted, clear quartz grains, fine-grained, subangular and very well cemented with silica.
- (3) They are composed of chaotically arranged angular blocks (fig. 2) ranging in size from 1 to 2 ft (30 to 60

Table 1. Descriptions and locations of the quartzite piles of the La Tierra-Las Dos subdivisions, Santa Fe County, New Mexico.

Location no.*	Pile no. (name)	size (yds.)	Approximate altitude (ft.)*	Remarks
17.9.5.121	1 (Alamo Creek)	40 x 20	6820	On nose of ridge. Elongate N-S.
18.9.30.133 18.9.30.134	8 (Las Dos)	60 x 20	6600	Monolithic. Elongate E-W.
18.9.31.232	7 (Turnaround)	30 x 20(NW)	6680	NW pile well exposed, SE pile ill-defined, scattered.
18.9.32.124 18.9.32.142	3 (White Peak)	100 x 20 40 x 20(SE)	6800	In arroyo immediately east of "White Peak." Elongate N-S.
18.9.32.144	5	20 x 30	6800	On gentle slope.
18.9.32.144a	6	20 x 20	6800	On slope of low hill.
18.9.32.211	4 (Red)	40 x 30	6800	On east slope of N-S ridge.
18.9.32.344	2	50 x 20	6820	Near top of low ridge. Elongate N-S.

*The location-numbering system is that used by the U.S. Geological Survey and the New Mexico State Engineer Office; the approximate altitudes, in feet above sea level, were determined from topographic maps.

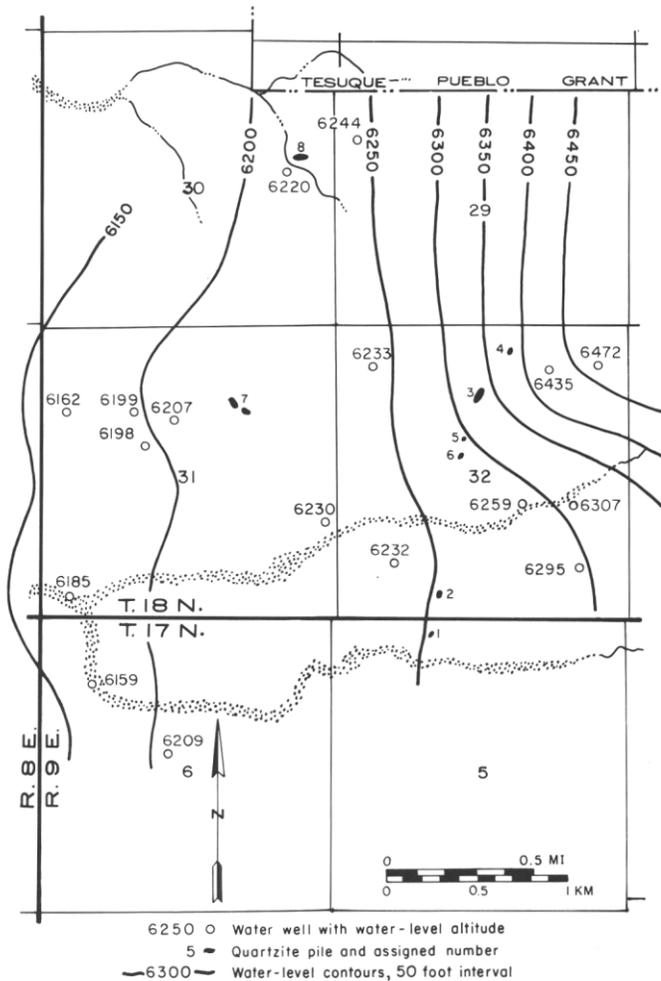


Figure 1. Location of quartzite piles and configuration of the water-table contours, La Tierra-Las Dos subdivisions area, Santa Fe County, New Mexico.



Figure 2. Chaotic arrangement of quartzite blocks at pile 1 (Alamo Creek).

cm) square to as large as 15' x 12' x 4' (4.6 x 3.7 x 1.2 m) (pile 5). With one notable exception (the Las Dos occurrence), the individual blocks or boulders of the piles bear no relationship to one another; i.e., dark red boulders about buff boulders, and boulders entirely composed of fine-grained quartzite lie on or lean against very conglomeratic boulders.

- (4) Many of the piles have a "draped" appearance. Parts of piles 4 and 7 have deep roadcuts at their margins which make it quite clear that the piles are rootless (and therefore are not the exposed tips of buried hills), and appear to be resting atop or somehow let down on a previously existing surface on the Tesuque Formation. Recent geophysical mapping (Cordell, 1976) indicates that the base of the Tesuque Formation is as much as 5,000 ft (1,525 m) below the land surface. Driller's logs and cuttings from 16 recently drilled water wells in the area show only typical Tesuque lithology to more than 800 ft (245 m) (see Table 2); in addition, the configura-

Table 2. Records of selected water wells in the La Tierra-Las Dos subdivisions area, Santa Fe County, New Mexico.

Location no.*	Depth (ft.)	Land-surface altitude (ft.)*	Depth to water (ft.)*	Date of measurement	Water-level altitude (ft.)
17.9. 6.114	743	6660	451	2/75	6209
17.9. 6.14432	730	6660	447	7/76	6213
18.9.29.131	770	6678	434	4/77	6244
18.9.30.243	773	6599	379	4/77	6220
18.9.31.13121	727	6725	563	4/77	6162
18.9.31.14121	634	6690	491	7/76	6199
18.9.31.14223	804	6670	463	4/77	6207
18.9.31.14322	670	6695	497	7/76	6198
18.9.31.333	585	6570	385	12/76	6185
18.9.31.42424	697	6720	490	7/76	6230
18.9.32.114	790	6744	511	4/77	6233
18.9.32.214	727	6865	430	3/77	6435
18.9.32.2232	765	6840	368	3/77	6472
18.9.32.332	750	6760	528	3/77	6232
18.9.32.423	750	6835	528	3/77	6307
18.9.32.441	710	6920	625	2/71	6295

*The well-numbering system is that used by the U.S. Geological Survey and the New Mexico State Engineer Office; land-surface altitudes, in feet above sea level, were determined from topographic maps; water-level measurements were rounded off to nearest foot.

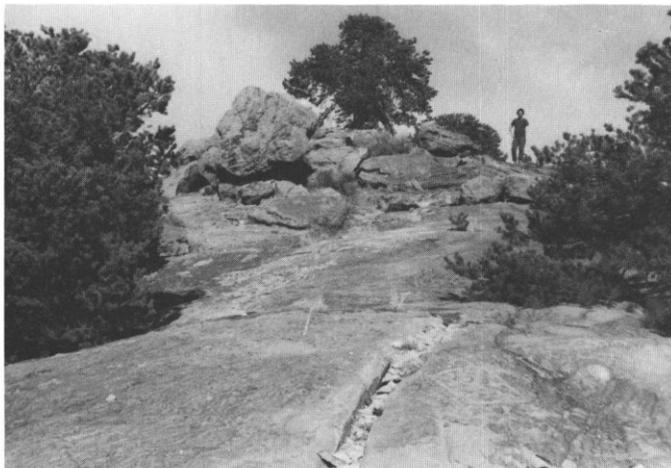


Figure 3. Monolithic aspect of pile 8 (Las Dos). Note jointing and petroglyphs.

tion of water-level contours in the area (fig. 1, Table 2) is undistorted, indicating that the piles do not form a barrier to ground-water movement.

- (5) An essentially north-south line is formed by the easternmost six quartzite piles (fig. 1), all at an elevation of approximately 6,800 ft (2,075 m); in addition, three of the piles are elongated north-south (Table 1). Although Baldwin's reasoning that this essentially north-south line of piles represented the trace of an upfaulted block has been discounted by recent drilling and geophysical study, there is probably some significance to this observation.

Of particular interest is the buff-colored Las Dos occurrence (pile 8), which is not only exceptionally large, but is essentially monolithic, with a pronounced east-west elongation, and with east-west and north-south vertical jointing prominent but sparse (fig. 3). Although the main body of the occurrence is essentially one unbroken piece of quartzite, there are slumped and jumbled marginal areas, particularly on the south side, and a jumbled pile rests atop the eastern end of the westward-tilted monolith (fig. 3).

Inasmuch as the quartzite piles are found, without exception, associated with the Tesuque Formation, both vertically and laterally, there is a strong temptation to relate them in some way to sandstones of the Tesuque. Aside from the gross observation that both are sandstones of sedimentary origin, there are no further similarities; sandstones of the Tesuque are medium-bedded at best, and are commonly arkosic and micaceous, poorly sorted, friable and weakly cemented with calcite, whereas the quartzites are massive, composed solely of quartz, well sorted and very well cemented with silica.

It has been stated previously that the piles are composed of angular blocks of quartzite, but there exists one exception

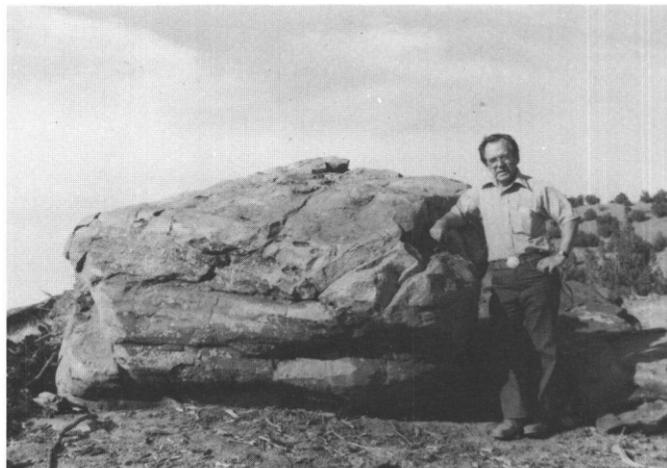


Figure 4. Rounded and polished quartzite block at pile 7 (Turnaround).

which is a 6' x 4' x 4' (1.8 x 1.2 x 1.2 m) block at the southeast top of the northwest pile of two at pile 7 (fig. 4). An upper corner and irregular surfaces adjacent to it are well rounded and glassy smooth. It is difficult to explain why such characteristics are found in only one block of hundreds, is confined to only a relatively small part of the block, or how such rounding occurred.

At this time, it is not possible to explain the presence of the eight exotic quartzite piles of the La Tierra-Las Dos subdivisions area with respect to time, location or method of emplacement. Further study and time for contemplation may solve this geologic enigma.

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