

## A Volcanic “Olivine Bomb” From Texas

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If you are looking for an *olivine volcanic bomb* for whatever reason, Texas is not generally the place you would go. In the Southwest, Arizona or New Mexico would be the places to start. One of the best places in New Mexico is a short distance west of El Paso and not far from the Mexico border in Dona Ana County. The locality is known as Kilbourne Hole and has been a prolific source of much of the olivine and some of the peridot offered for sale in the Southwest. I used to buy chunks of the olivine from this locality for the teaching mineral sets that the Houston Gem & Mineral Society, with support from CONOCOPhillips, gives out to local schools.

A couple of years ago when I obtained Don Saathoff’s Texas mineral collection, I was surprised to find a small 4-cm by 4-cm section of an olivine bomb. Probably improperly located was my original thought, because I had never seen any such specimens from Texas. The label stated that it was from Knippa in Medina County and that it was collected in 1939 by H. Cook, Don’s great grandfather. Well, I knew that Knippa is not in Medina County but in adjacent Uvalde County. Knippa is about 70 miles west of San Antonio on Interstate 10. Although the Uvalde County bedrock is mostly composed of sedimentary rocks, there are some igneous rocks and evidences of Cretaceous age volcanism. One of the most conspicuous is north of the highway where the Knippa quarry operation is working a dark, hard, fine-grained, basaltic rock on the east bank of the Frio River. A volcanic neck has been described in the quarry, and other igneous rocks have been noted in the area (Ewing, Caran, and Hudson 1986).

The Knippa quarry has been the source of some mineral specimens for collectors. Cavities in the volcanic rock contain datolite and gonnardite crystals (Saathoff 1994) and a large cavity yielded equant, rounded-appearing calcite crystals to over 1 cm across with white crescents of barite and coatings of minute spheres of green chamosite (Smith 1999). Ewing, Caran, and Hudson (1986) do mention olivine as occurring in phenocrysts and in spinel peridotite nodules at the volcanic neck, and the basaltic rock in the quarry has been called more technically an olivine nephelinite; however, I am not aware of any typical "olivine volcanic bombs" being reported in the area or in the county. Perhaps it came out of the early working of the quarry because it was active at least 12 years before the specimen was found by Mr. Cook (Lonsdale 1927).

This specimen superficially looks like specimens of "olivine bombs" from Kilbourne Hole. The outer surface is dark gray and weathered, but the inside is fresh and mostly light green from an olivine group mineral, but there is also a much darker bottle green to almost black-appearing mineral when thick. Typically neither mineral has any distinctive faces and in places may be intergrown into a single large grain though their adjoining surfaces are regular and distinct. Since I felt the specimen was an authentic Texas specimen, I decided to send the specimen to Excalibur for EDS analysis and see which mineral of the olivine group was present and what the dark to bottle green mineral is. Here are the analytical results:

Specimen MgO Al<sub>2</sub>O<sub>3</sub> Si<sub>2</sub>O<sub>3</sub> CaO FeO Fe<sub>2</sub>O<sub>3</sub> SO<sub>3</sub> Cl<sub>2</sub>O K<sub>2</sub>O

Lt green 35.53 7.89 51.03 1.07 3.48 - - - -

Dk green 16.16 9.31 53.65 10.79 - 2.18 2.37 4.05 1.50

The light green olivine-group mineral is magnesium rich, so is probably fosterite. The dark green mineral I had hopes might be chrome diopside, but as you can see no chromium is present. It is probably an impure diopside within the olivine. Nothing earth shattering, but some new mineral occurrences for Texas that are somewhat unusual for south Texas.

### References:

Ewing, T. E., Caran, S. C., and Hudson, L. J. 1986. Late Cretaceous Igneous Rocks of the Uvalde Area Southwest Texas. *South Texas Geological Society, 1986 fall field trip*. 35p.

Lonsdale, J. T. 1927. *Igneous rocks of the Balcones fault region of Texas*. University Texas bulletin 2744.

Saathoff, D. 1995 *Preliminary investigation of the secondary mineralization associated with olivine nephelinite volcanic vent at the Vulcan Minerals basalt quarry at Knippa, Texas*. Unpublished report, University of Texas San Antonio.

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