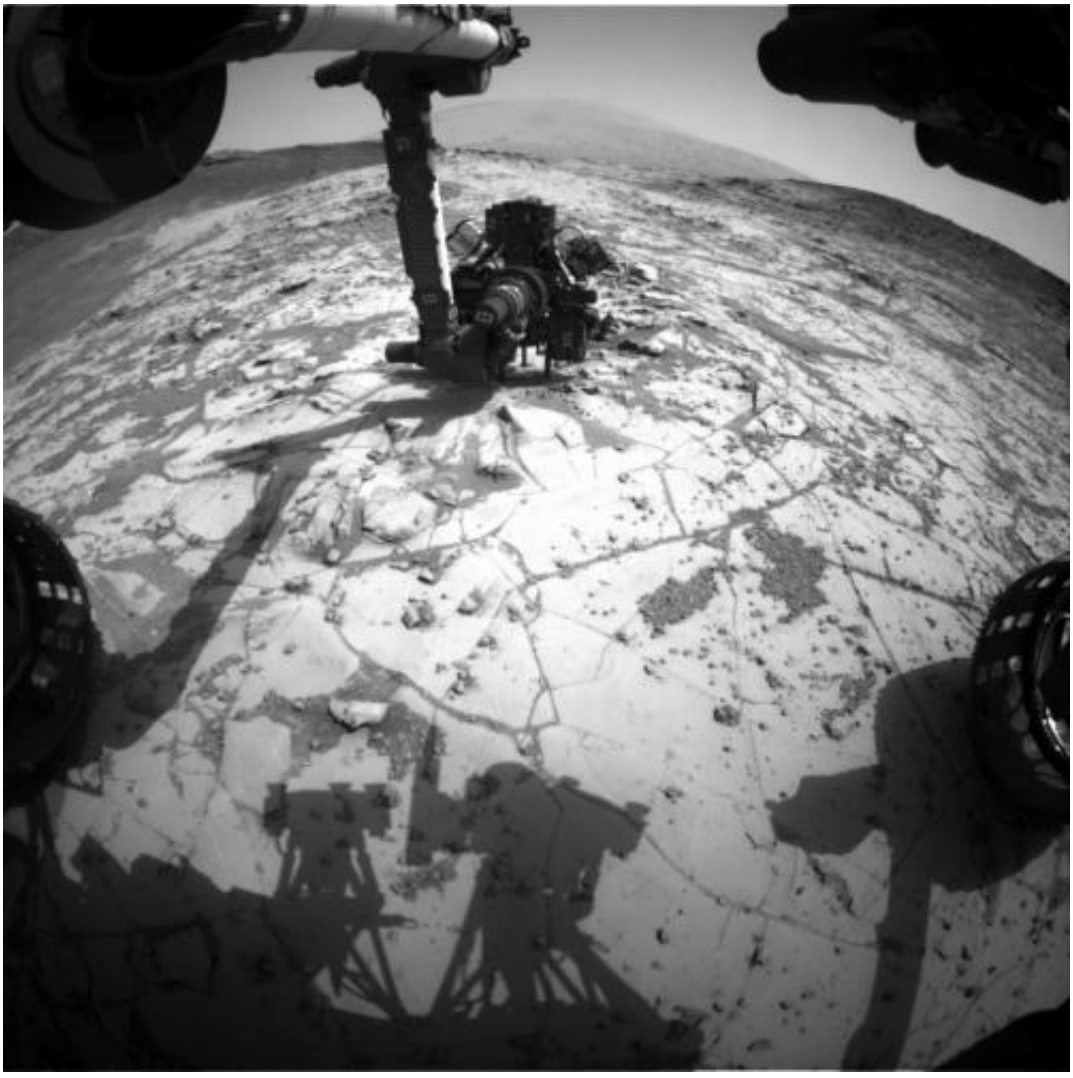
Crystal-rich rock 'Mojave' is next Mars drill target

January 15 2015, by Guy Webster



This view from the wide-angle Hazard Avoidance Camera on the front of NASA's Curiosity Mars Rover shows the rover's drill in position for a mini-drill test to assess whether a rock target called "Mojave" is appropriate for full-depth drilling to collect a sample. It was taken on Jan. 13, 2015. Credit: NASA/JPL-

(Phys.org)—A rock target where NASA's Curiosity Mars rover is using its sample-collection drill this week may have a salty story to tell.

This target, called "Mojave," displays copious slender features, slightly smaller than grains of rice, that appear to be mineral crystals. A chance to learn their composition prompted the Curiosity science team to choose Mojave as the next rock-drilling target for the 29-month-old mission investigating Mars' Gale Crater. The features might be a salt mineral left behind when lakewater evaporated.

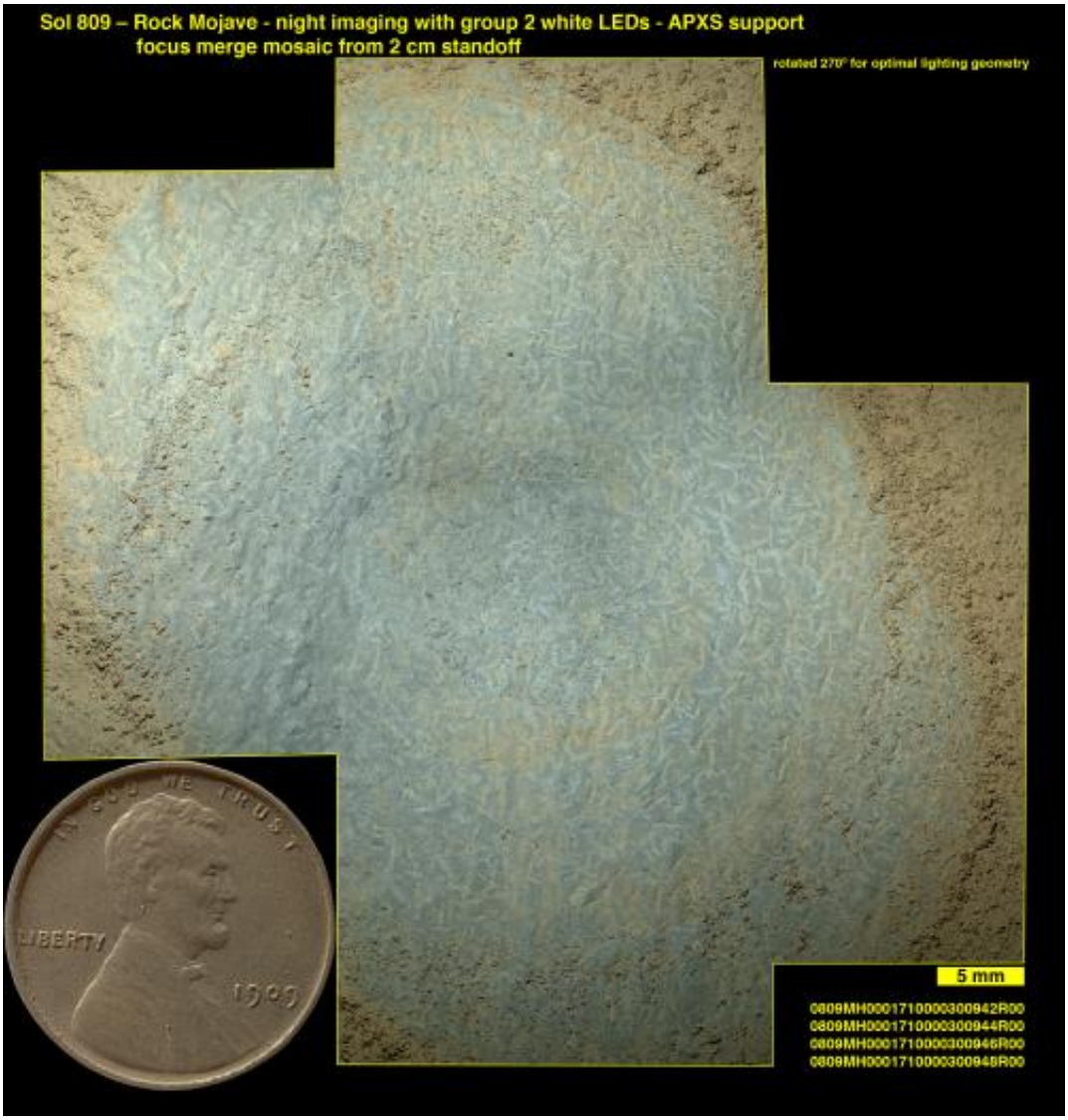
This week, Curiosity is beginning a "mini-drill" test to assess the rock's suitability for deeper drilling, which collects a sample for onboard laboratory analysis.

A weeklong pause in science operations to install a new version of rover flight software is scheduled to begin early next week, possibly before completion of the drilling and sample delivery. This is the fourth new version of the onboard software since the rover's August 2012 landing.

The Mojave drilling begins Curiosity's third round of investigating the basal layer of Mount Sharp exposed at an area called "Pahrump Hills." In the first round, the rover drove about 360 feet (110 meters) and scouted sites ranging about 30 feet (9 meters) in elevation.

Then it followed a similar path, investigating selected sites in more detail. That second pass included inspection of Mojave in November 2014 with the dust-removal brush, close-up camera and Alpha Particle X-Ray Spectrometer on the rover's arm. The results put Mojave at the head of the list of targets for the rover's most intensive inspection, using

laboratory instruments that ingest powdered rock collected by the drill.



Lozenge-shaped crystals are evident in this magnified view of a Martian rock target called “Mojave,” taken by the Mars Hand Lens Imager (MAHLI) instrument on the arm of NASA’s Curiosity Mars rover. Credit: NASA/JPL-Caltech/MSSS

"The crystal shapes are apparent in the earlier images of Mojave, but we

don't know what they represent," said Curiosity Project Scientist Ashwin Vasavada at NASA's Jet Propulsion Laboratory, Pasadena, California. "We're hoping that mineral identifications we get from the rover's laboratory will shed more light than we got from just the images and bulk chemistry."

Curiosity's Chemistry and Mineralogy instrument, or CheMin, can identify specific minerals in rock powder from a drilled sample. Analysis of the drill hole and drill tailings may also reveal whether the crystals are only at the surface, like a salty crust, or are also deeper in the rock.

"There could be a fairly involved story here," Vasavada said. "Are they salt crystals left from a drying lake? Or are they more pervasive through the rock, formed by fluids moving through the rock? In either case, a later fluid may have removed or replaced the original minerals with something else."

Curiosity's work at Pahrump Hills may include drilling one or more additional rocks before heading to higher layers of Mount Sharp.

This Jan. 13, 2015, view from the Mars Hand Lens Imager on NASA's Curiosity Mars rover shows outcomes of a mini-drill test to assess whether the "Mojave" rock is appropriate for full-depth drilling to collect a sample. Cracking of the rock has made freshly exposed surfaces available for inspection.
Credit: NASA/JPL-Caltech/MSSS

Next week's planned software revision, like the mission's earlier ones, adds protections against vulnerabilities identified in rover testbed activities on Earth. It also adds improvements to make planning drives more efficient.

"The files have already been uplinked and are sitting in the rover's file system to be ready for the installation," said JPL's Danny Lam, the deputy engineering operations chief leading the upgrade process.

One change in the new software is to enable use of the rover's gyroscope-containing "inertial measurement unit" at the same time as the rover's drill, for better capability to sense slippage of the rover during a drilling operation. Another is a set of improvements to the rover's ability to autonously identify and drive in good terrain.

Provided by NASA

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