The Meadview groundwater basin, unofficially known as "Where Lake Meads the Grand Canyon," encompasses approximately 190 sq. miles in a remote portion of northwestern Arizona.

The Meadview basin is bounded to the east by the Grand Wash Cliffs, to the south by the Garnet Mountains, to the west by Wheeler Ridge, and to the north by Lake Mead. Elevations in the basin range from approximately 1,400 ft. above mean sea level where Grapevine Wash debouches into Lake Mead to 6,024 ft at an unnamed point on the Grand Wash Cliffs.

Groundwater collected from sites in the alluvium/sedimentary rock is generally acceptable for domestic uses. Nitrate concentrations in the alluvium are elevated enough (2.4 to 4.4 mg/L) that they may be impacts from human activities. The community of Meadview utilizes septic systems for wastewater disposal. However, similar nitrate results from deep wells and springs in nearby Detrital Valley and Sacramento Valley were hypothesized to be caused from natural soil organic matter.

Because of these results, ADEQ strongly recommends that any domestic water sources in this area be tested for radiochemistry constituents. Aesthetics-based water quality standards were exceeded at three of the four sites for fluoride and at one site for TDS. The elevated fluoride concentrations may also be influenced by the area’s granite. Fluoride concentrations in groundwater associated with granite rock have been found to be at least twice the concentration of those measured in other rock types. Similarly elevated fluoride concentrations were found along the predominantly granitic west flank of the Hualapai Mountains in the nearby Sacramento Valley basin.

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REFERENCE CITED
discharge from Grapevine Spring. Lake Mead was formed when Hoover Dam impounded the Colorado River in 1935. Pearce Ferry, a historical crossing on the Colorado River, was later used as a debarment point for boat tours of Lake Mead and currently serves as the primary terminus for Grand Canyon river rafters. The Meadview basin is within the Colorado-Grand Canyon Watershed and contains no impaired surface waters on Arizona’s 2004 303(d) list of impaired waters.

The Muddy Creek Formation is the main aquifer in the basin and can be divided into three units: an upper limestone unit, a middle sandstone/siltstone unit, and a basal conglomerate. Although each unit is capable of producing water, most wells draw from the basal conglomerate because of its high hydraulic conductivity. The upper limestone unit yields water to some shallow wells and springs while the middle sandstone/siltstone unit has a high clay content that inhibits its ability to transmit water. Where sufficiently fractured and faulted, mountain bedrock also provides limited supplies.

Groundwater movement in the Meadview basin follows the Grapevine Wash heading from the southern highlands to the north towards Lake Mead. Depth to water has been reported ranging from 935 ft. below land surface (bbl) near Lake Mead City to 135 ft. bbl near Grapevine Wash east of Meadview. Annual groundwater pumping is estimated to be approximately 100 acre-feet. An estimated 62,500 acre-feet of groundwater is stored in the upper 700 ft. of the basin, based on an estimated 300 ft. of saturated thickness in the aquifers. As frequently occurs, sample sites in granite rock were significantly higher in groundwater influenced by the granitic geology in the south than in the alluvium/sedimentary rock further north; in contrast, the opposite pattern occurs with chloride and nitrate concentrations (ANOVA test, p < 0.05). This illustrates a groundwater flow path with calcium-bicarbonate (often indicative of recharge zones) of the highland areas gradually evolving into a more mixed chemistry as it moves downgradient to the north.

As frequently occurs, sample sites in granite rock often exceeded health-based water quality standards for gross alpha and uranium. Exceedances of aesthetics-based standards for fluoride and TDS also occurred.

Sample sites further north in alluvium/sedimentary rock usually met water quality standards with the exception of arsenic, fluoride, and TDS at one site. The arsenic exceedance of 0.01 mg/L occurred at Grapevine Spring. This arsenic concentration is the minimum reporting limit for the laboratory used in the study as well as the new arsenic PMCL effective in 2006.

GROUNDWATER QUALITY PATTERNS

Groundwater movement in the basin is from south to north. Bicarbonate and calcium concentrations were significantly higher in groundwater influenced by the granitic geology in the south than in the alluvium/sedimentary rock further north; in contrast, the opposite pattern occurs with chloride and nitrate concentrations (ANOVA test, p < 0.05). This illustrates a groundwater flow path with calcium-bicarbonate (often indicative of recharge zones) of the highland areas gradually evolving into a more mixed chemistry as it moves downgradient to the north.

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GROUNDWATER ISOTOPES

Oxygen and hydrogen isotope results (available for six of eight sites) were similar to samples from sites in the nearby Detrital Valley basin that were from deep wells and/or springs. These Detrital Valley sites are thought to represent the oldest water in the basin, recharged during a much cooler time period. The area’s low precipitation and recharge rates support the conclusion that groundwater samples collected in the Meadview basin also consist of old water.

CONCLUSIONS

Based on ADEQ sampling results, groundwater in many areas of the Meadview basin appears to be suitable for domestic use. Data from this ADEQ study generally agree with the findings of a previous Arizona