

Hydrology - Open-File Report 19

Investigation of Ground-Water Problems Near Vulcan Materials Marble Quarry, Cherokee County, South Carolina

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EXECUTIVE SUMMARY

Citizen complaints about wells drying up and having poor water quality due to blasting at a marble quarry prompted the Office of the Lieutenant Governor to request the South Carolina Water Resources Commission (SCWRC) to conduct an investigation. Since January of 1986 the Piedmont Office of the SCWRC has been conducting a study in the vicinity of the quarry. The study area is in northeastern Cherokee County, approximately 5 miles north of Blacksburg. About 210 people live in the 1.2 square-mile area that contain a trailer park, houses, farmland, and the Vulcan Materials marble quarry.

The quarry is situated on a portion of an elongated marble body that trends northeast-southwest through the area. The geology of the area is characterized by intensely folded and faulted rocks, which greatly influence ground water properties. Wells are generally of medium to low yield and water quality is generally good.

The Piedmont SCWRC Office set out on the following objectives: (1) To identify problems that local residents are experiencing; (2) To evaluate the extent of the problems; (3) To determine the cause(s) of these hydrologic problems; and (4) To present recommendations.

Water levels were measured in 31 wells during March of 1986 to construct a water table map. Automatic data recorders were installed on two deep wells to monitor water levels continuously. Blasting records and other information were obtained from the quarry.

The following conclusions were reached:

Problems:

Several residents complained that, after blasting at the quarry, their wells would dry up temporarily or the water would become silty or have an "iron taste". A more common complaint was that of ground vibration from the blasting, in some cases, causing structural damage to houses and/or wells.

Extent:

An estimated 60 families live in the general area and 37 of these were contacted by the SCWRC. Fifty-four (54) wells were inventoried and descriptions of problems were taken from residents. Of the wells inventoried, 59 percent have had water problems. Of those wells with problems, drilling new wells solved 19 percent or installing water filters. Of the seven families still having

problems, five have water quantity and quality problems while two have only water quality problems.

Causes of hydrologic problems:

- Topographic and drainage modifications by the quarry resulted in lowering of the water table and a reduced ground-water recharge area. These changes proved critical for wells upgradient from the quarry.
- Water quality has been adversely affected in ungrouted wells that allow loose material along the wellbore to travel down the outside of the well casing and enter the well hole after blasting or rainfall.

Recommendations:

- Drilled wells are recommended for sites in the trailer park. Technical advice should be sought from SCWRC or other agencies for site selection.
- Water filters and metal pressure tanks should be used to reduce suspended sediment, and old wells and pumps should be cleaned regularly.
- New wells should be carefully developed to increase yield and improve water quality, and they should be carefully grouted. Surface cement pads should also be installed to protect wells from surface water contamination.
- The quarry should monitor and report water flow in its pit pumps, restore vegetative cover to reduce runoff and increase infiltration, and maintain a constant flow of water in its diversion channels to protect the local water table.
- People with water problems at the south end of the trailer park should consider drilling new wells. Their wells are going dry and eventually will not yield sufficient water to meet their water demands. Drilled wells are preferred, as bored wells may not be deep enough to accommodate declines in the water table.
- Packer tests of existing wells, at an appropriate interval the length of each well, determine hydraulic properties of the subsurface.
- Monitor other wells around the mine to determine if blasting has any impacts on ground water at preferred orientations.
- Well owners should monitor water levels monthly to determine water level fluctuations.
- If possible, well owners should evaluate their pump horsepower and yield for the depth to water. They should determine how their yield would decrease for various increases in water table depth.

Copies of this report are available in the SCDNR's Columbia office.