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**CHAUTAUQUA COUNTY DEPARTMENT OF HEALTH**  
**Division of Environmental Health Services**

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*Director of Environmental Health Services*

June 1, 2009

Mr. Chris Miller  
NYS DEC Division of Mineral Resources  
182 East Union Street  
Allegany, NY 14701

Re: Water Well Contamination  
David and Kelly Ferrugia  
2641 Donelson Rd  
Jamestown, NY 14701  
Town of Kiantone

Dear Mr. Miller:

On April 20, 2009 I investigated a private drinking water well contamination problem at the above referenced property that is suspected to have been caused by a nearby gas well. There are several gas wells in the vicinity of Ferrugia's water well, two of which are within 1,000 ft. Nornew's well (API number 31013240990000), the closest, was completed on September 1, 2005 and is located 330 ft up-gradient of Ferrugia's water well. Nornew had Ferrugia's water sampled prior to drilling that well, and again on April 16, 2007. See Attachment 1 table for results. The Ferrugias began noticing a change in their drinking water quality in mid to late 2007 which included brown mineral staining of water fixtures, a salty taste to the water and an intermittent sulfur smell, none of which they had experienced before.

Ferrugias began developing their home site in 2001 on a previously undeveloped 22 acre tract of land. Their water well was drilled in 2001 and their septic system installed in 2002. Soils in that area are Fremont silt loam which contains a significant amount of silty clay and exhibit low permeability. According to their water well log (Attachment 2), there is 7 ft of hard pan (glacial till) overlying several feet of fragmented shale, and then firm shale is encountered 15 ft below ground. Their septic tank is located 150 ft down-gradient from their water well. Their leach field is a sand filter located 273 ft down-gradient of their well, near the road. The road is 300 ft down-gradient of their well. See Attachments 3, 4 and 5.

For evaluation, water quality data can be plotted on a Piper diagram. This diagram uses the basic principle that chemical characteristics of water are determined by the relative proportion of seven major ions (calcium, magnesium, sodium, potassium, chloride, sulfate, and alkalinity). The ratios of these ions in milliequivalents can be used as a means to "fingerprint" the water. This is very useful for evaluating changes in water quality over time. Results of water samples collected from the Ferrugia well were plotted on Piper diagrams (Attachment 6) and shows that water quality shifted from being sodium carbonate dominated to sodium chloride dominated. Stearns and Wheler (1996), while conducting research for Chautauqua County, created a generalized groundwater classification scheme using Piper

