



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

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November 19, 2009

Mr. Jack Dahl  
Director, Bureau of Oil & Gas Regulation  
NYS Department of Environmental Conservation  
Division of Mineral Resources  
625 Broadway  
Albany, NY 12233-6500

Dear Mr. Dahl:

Thank you for responding to my letter dated June 1, 2009 regarding a water well complaint at the Ferrugia home in the Town of Kiantone, Chautauqua County. I appreciate the time you and your staff spent reviewing the information I sent, obtaining additional information, and preparing the response.

With over 6,000 gas and oil wells having been drilled in Chautauqua County, I understand and appreciate the positive impact that the oil and gas industry has had on Chautauqua County's economy and on the region's energy production. I further believe that drilling and development of gas and oil wells in Chautauqua County has resulted in relatively few environmental impacts that we know of. However, there is no denying that impacts have occurred in our county and elsewhere and, due to the rural nature of our county, there may be groundwater quality impacts that we are unaware of.

The increase in gas well drilling activity over the past few years has resulted in an increase in complaints to this Department from property owners who state their water wells were impacted by gas well development. The Ferrugia case happens to be one where the gas drilling company tested nearby water wells before and after drilling gas wells in that area. The data showed a water quality impact following gas well drilling. I understand you have limited resources to spend on these issues. However the information provided herein warrants that a more thorough review of this case be conducted by your Department, especially in light of the anticipated increase in drilling activity we will see in Western New York associated with Marcellus shale.

In summary, your response indicates that the following issues may explain the Ferrugia's well contamination:

- 1) Hydraulic fracturing of the Ferrugia water well by Caster Drilling led to an increase in permeability of the shale aquifer, which likely created a pathway for contaminants to migrate from greater distances to the well.
- 2) The Ferrugia septic system is a likely source of their well contamination.
- 3) Neighboring water wells exhibit chloride and sodium concentrations similar to those currently found in Ferrugia's.
- 4) Concentrations of chlorides and sodium in the Ferrugia well are improving (decreasing) and do not indicate contamination from production brine.

I provide the following discussion on each one of the above issues for your consideration in helping to identify the source of contamination to the Ferrugia water well and to correct the problem:

### **1) Hydraulic Fracturing of Ferrugia Water Well**

The Ferrugia water well was hydraulically fractured when it was drilled in 2001. According to Mr. Gordon Caster owner of Caster Well Drilling, this hydrofracing consisted of installing a packer just above the 30' deep water producing vein and applying ~180 psi to the bore hole for between ~1 to 1.5 minutes until break then immediately releasing the pressure. According to Mr. Caster they have no way of knowing how far fracturing a well in this manner may extend beyond the wellbore, as it is completely dependant on the presence of existing fractures in the rock intersected by the well during drilling, and the type and integrity of rock. They do have evidence that in one case hydrofracing extended 125 ft.

This is similar to hydrofracing a vertical Medina gas well, except pressure is typically ~4000 psi until break and they hold pressure for a longer duration. Also gas well hydrofracing usually creates new fractures and expands old ones, extending several hundred feet from the well bore, according to professionals in the oil and gas well industry.

I agree that hydrofracing the water well increased the zone of contribution to the well, which increased the risk for potential contaminants located further from the well to impact well water quality. However, the only potential contaminant source present within ~300 ft when the water well was fractured was the septic system until 2005 when a gas well was drilled. Hydrofracing the gas well also extended its zone of contribution and could have created contaminant pathways to the water well under unusual conditions.

### **2) Ferrugia Onsite Sewage Treatment System**

The soils in the vicinity of the Ferrugia house are Fremont Silt Loam. These soils are poorly drained and exhibit slow permeability in the substratum. Because of the slow percolation rate at this site, a sand filter was installed for sewage treatment. These systems consist of a layer of washed stone with a dosing system, over 2 ft of sand, over more washed stone that contains an under drain to collect the treated wastewater and direct it to a shallow absorption trench. This trench is designed to "weep" treated effluent onto the ground surface because the soil is too impervious to absorb it. The thickness of overburden (in this case glacial till) above bedrock is 7 ft at the Ferrugia water well. Overburden thickness in the area of their sand filter is at least that thick and likely thicker since overburden usually thickens from hilltop to valley.

The Ferrugia well is more than 273 ft away from and up-gradient of the absorption trench. As you pointed out in your letter, the water well is approximately 15 ft higher in elevation than the 'leach field.' While regional bedrock dip is southeast, locally the top of bedrock surface follows topography; therefore top of rock at this site dips northwest, as pointed out by Dr. Michael P. Wilson from SUNY Fredonia in his 9/30/09 letter.

The bacteriological analysis from the sample collected on 8/1/05 showed a Total Coliform count of 3 bacteria colonies per 100 ml of water. If the septic system were the source of these bacteria, the levels would have been several orders of magnitude greater, and the sample collected on 4/16/07 would have also contained Coliform bacteria. It did not.

