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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

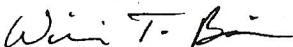
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diagrams as shown in Attachment 7. Applying the Stearns and Wheler work to the Ferrugia data shows that samples collected after gas well drilling are exhibiting characteristics of sodium chloride brine, whereas samples collected before drilling do not exhibit brine characteristics.

Kelly Ferrugia spoke to Brian Jandrew regarding their well contamination problem in December of 2007 or January of 2008. Mr. Jandrew suggested that the problem was caused by either their septic system or by road deicing material. Given the separation distances, topography and soil types, I believe both of Mr. Jandrew's suggestions are extremely unlikely. In the Ferrugia's case the evidence strongly indicates the contamination is from brine. Testing of their water well shows it had good water quality before a gas well was drilled 330 ft away from it. Post-gas well testing shows the well water quality is changing, as shown in samples collected 21 months following gas well development.

This is a well documented case showing drinking water impacts that are seemingly related to gas well development. Based on our MOU with NYS DEC, the Chautauqua County Department of Health requests that your Division thoroughly investigate to identify the cause of contamination and assist the Ferrugias in correcting their water quality problems. Feel free to contact me at 716-753-4481 to discuss.

Sincerely,



William T. Boria, BS Geophysics, MS Geology
Water Resource Specialist
Chautauqua County Department of Health
Mayville District Office

Copies: Mr. and Mrs. David Ferrugia

Mr. Gregory J. Edwards, County Executive
Mr. Bradley J. Field, NYSDEC Division of Mineral Resources
Mr. James DeZolt, P.E., NYSDEC Division of Water
Mr. David Rowley, P.E., NYSDOH
Mr. Paul Heisig, U.S. Geological Survey

Attachment 1

David and Kelly Ferrugia Residence
Summary of Drinking Water Sample Results from Microbac Labs

Parameter	8/17/2005	4/16/2007	MCL
Alkalinity as CaCO ₃ (mg/L)	182	130	
Chloride (mg/L)	3.8	223	250
pH (std units)	8.6	8.1	
TDS (mg/L)	250	600	500
Specific Conductance (uMhos/cm)	362	1000	
Sulfate (mg/L)	14	7	250
Barium (mg/L)	0.181	1.12	2.00
Hardness (mg/L)	34.7	175	
Total Iron (mg/L)	<0.050	<0.050	0.3
Magnesium (mg/L)	1.49	13.4	
Manganese (mg/L)	0.022	0.191	0.3
Potassium (mg/L)	1.94	4.58	
Sodium (mg/L)	76.4	111	**
Calcium (mg/L)	6.95	48.1	
Oil & Grease (mg/L)	<5	<6	
Coliform Bacteria (CFU/100ml)	3	0	0
Methane (mg/L)	0.0008	0.011	
Ethane (mg/L)	<0.02	<0.02	

MCL=Maximum Contaminant Level as set by NYSDOH and EPA

** 20 mg/L if on severely restricted sodium diet; 270 mg/L if on moderately restricted sodium diet

