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December 19, 2017

CERTIFIED MAIL NO. [REDACTED]

[REDACTED]

Re: 58 Pa. C.S. § 3218 Determination
Water Supply Request for Investigation No. 287981

[REDACTED]

Moreland Township, Lycoming County

Dear [REDACTED]

The Department has completed its investigation of your water supply located at the above address ("Water Supply"). Based on the sample results reviewed and supplementary information obtained to date, the Department has determined that the Water Supply was impacted by oil and gas activities. Please note that without any treatment, your water quality does not meet (*i.e.*, is worse than) the following health and/or aesthetic statewide standards:

Parameters	Unit	Statewide Standards or Recommended Levels	Your Sample Results that Are Above Statewide Standards/Levels
Iron	mg/L	0.3	0.331
Manganese	mg/L	0.05	0.289
Turbidity	NTU	1	14.8

Based on current post-remedial system sampling, the remedial system that was previously installed on the Water Supply appears to be effectively mitigating the levels of the above results. The Department's investigation into your complaint is set forth below.

Summary of Investigation

On March 27, 2012, you complained to the Department that methane gas had impacted your Water Supply. During inspections conducted by the Department and others, methane gas was observed in the water and the headspace of the Water Supply. Samples from the Water Supply were collected as shown in the attached tables, and submitted to a Pennsylvania-accredited laboratory for analysis.

Initial results of samples from the Water Supply showed that the Water Supply had levels of methane above expected background conditions. However, additional sampling results, including isotopic analysis of the methane in the Water Supply, revealed that the source of the stray gas may have been interrupted or suspended. The levels of methane in your Water Supply have returned to levels which are near or below the Department's unofficial action level for methane. The enclosed tables compare those results. Continued use of the previously installed treatment system should continue to mitigate any occasional

spikes in dissolved methane, as well as treat the low levels of background methane, that remain in the Water Supply.

Please note that the sample results collected during the course of the investigation have shown methane present at concentrations as high as 23.8 milligrams per liter (mg/L) in your Water Supply.

Methane is the predominant component of natural gas. Federal water standard limitations have not been established for methane gas. The level of concern begins above 28 mg/L methane, which is referred to as the saturation level. At this level, under normal atmospheric pressure, the water cannot hold additional methane in solution. This may allow the gas to come out of the water and concentrate in the air space of your home or building. There is a physical danger of fire or explosion due to the migration of natural gas into water wells or through soils into dwellings where it could be ignited by sources that are present in most homes/buildings. Natural gas can also cause a threat of asphyxiation, although this is extremely rare.

When the Department is made aware of methane levels greater than 7 mg/L, we notify the water supply owner of the hazards associated with methane in their water supply. Please be aware however, that the methane levels can fluctuate. This means that even with a relatively low level of methane, you should be vigilant of changes in your water that could indicate an increase in methane concentration.

It is the Department's recommendation that all water wells should be equipped with a working vent. This will help alleviate the possibility of concentrating these gases in areas where ignition would pose a threat to life or property. Please note that it is not possible to completely eliminate the hazards of having natural gas in your water supply by simply venting your well.

As detailed in the table above, several tested parameters remain above their respective health and/or aesthetic statewide standards. The most recent turbidity level detected was 14.8 nephelometric turbidity units (NTU). Turbidity is caused by the presence of suspended matter such as sediment, nonliving organic particulates, plankton, or other microscopic organisms. In the case of your Water Supply, it appears the turbidity detected is also partially responsible for the detected concentrations of iron and manganese.

Iron and manganese, common metals associated with groundwater in the region, remain above their secondary maximum contaminant levels (SMCLs) in water samples collected from the Water Supply. The most likely source of these metals is from the bedrock from which the Water Supply derives its water and geochemical reactions within the Water Supply. Continued use of the previously installed treatment system should alleviate the concentrations of metals in your Water Supply.

This is an ongoing investigation. The Department will send you a follow-up letter if there are significant changes to the Water Supply. Should you have any questions concerning this matter, please feel free to contact William J. Kosmer, P.G. at 570.974.2613.



Jennifer W. Means
Environmental Program Manager
Eastern Oil and Gas District