



January 15, 2021

CERTIFIED MAIL NO. [REDACTED]

[REDACTED]

Re: 58 Pa. C.S. § 3218 Determination
Water Supply Request for Investigation No. 328143

Subject Address:

[REDACTED]

Orwell Township, Bradford County

Dear [REDACTED]

The Department has been investigating the possible degradation (reported presence of discolored water) of your water supply located at the above subject address ("Water Supply"), in response to a July 12, 2017 complaint that gas well drilling activities may have affected your Water Supply. The Department's investigation, prompted by information you provided, has determined that your Water Supply was adversely affected by oil and gas activities, including but not limited to the drilling, alteration, or operation of an oil or gas well.

Please note that without any treatment, water quality sampling indicates that on occasion your water quality does not meet (*i.e.*, is worse than) the following health and/or aesthetic statewide standards, (Note that Primary Maximum Contaminant Levels (MCLs) are intended to reflect potential dangers to human health, while secondary Maximum Contaminant Levels (SMCLs) reflect the aesthetics of the water (*i.e.* taste, smell, etc.)):

Parameters	Unit	Statewide Standards or Recommended Levels	Your <u>Highest</u> Sample Results that were Detected Above Statewide Standards/Levels
Methane	mg/L	7	49
Barium	Mg/L	2 (Primary MCL)	3.1
Manganese	mg/L	0.05	0.76
Iron	mg/L	0.3	58.3
Aluminum	mg/L	0.2	21.2
Turbidity	NTU	<1	>1,000

The information upon which this determination is based is summarized below.

Summary of Investigation

On July 12, 2017, you reported that the water from the Water Supply was "discolored." During inspections conducted by the Department and others, methane gas was observed in the water and the headspace of the Water Supply. Subsequently, water quality samples were collected from the Water Supply on several occasions by the Department and private consultants, and were submitted to the Department's laboratory or to an accredited third party laboratory for analysis. The analytical reports for the samples collected by the Department were previously submitted to you, but are summarized for your convenience in the enclosed table along with sample results provided by Repsol.

Analytical data collected over the investigation period reveal concentrations of methane ranging from 34 mg/L to 49 mg/L. Methane was detected at 0.994 mg/L in the pre-drill sample collected from your Water Supply on March 18, 2011. Free gas in the headspace of the water well has been detected at levels as high as 90 % gas by volume.

Samples of the methane from the Water Supply were collected and sent to a specialized laboratory for isotopic and compositional analysis. These analyses allowed for a more detailed characterization of the gas present in the Water Supply. The isotope and compositional analyses indicate that the stray gas in your Water Supply appears to be associated with oil and gas activities.

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.

Over the course of the investigation, samples collected from the Water Supply contained barium above its MCL of 2 mg/L, in concentrations ranging from 1.3 mg/L to 3.1 mg/L. Iron,

January 15, 2021

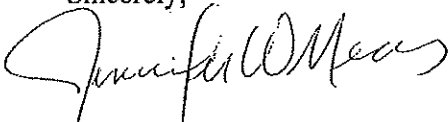
manganese, and aluminum were all detected above their SMCLs during the investigation. Manganese was detected above its SMCL of 0.05 mg/L at concentrations ranging from 0.06 mg/L to 0.76 mg/L. Iron was detected above its SMCL of 0.3 mg/L at concentrations ranging from 0.6 mg/L to 58.3 mg/L, and aluminum was detected above its SMCL of 0.2 mg/L at concentrations ranging from 0.19 mg/L to 21.2 mg/L.

Turbidity was detected above its MCL of 1 NTU at concentrations ranging from 69 NTU to >1,000 NTU. All other parameters tested during the monitoring period met their respective MCLs/SMCLs for compounds for which an MCL/SMCL exists. It should be noted that turbidity and iron exceeded their respective standards in samples collected prior to gas drilling activities in the area, but at lesser concentrations than observed during the investigation period.

Given analytical data available for analysis, the Department has determined that your Water Supply was adversely affected by oil and gas activities, including but not limited to the drilling, alteration, or operation of an oil or gas well.

The Department is continuing to work to permanently resolve this issue. Should you have any questions regarding the investigation, please contact William J. Kosmer, P.G. at 570.974.2613.

Sincerely,



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

Enclosures:
Laboratory Analytical Table
"How to Interpret A Water Analysis Report"

cc:
William J. Kosmer, P.G.
Stephanie Wharton
Matthew Nuss
Carrie Knapp
Complaint File # 328143