



June 10, 2021

CERTIFIED MAIL NO. [REDACTED]

[REDACTED]

Re: Request for Investigation 344019
Stray Gas Migrating into Water Supply - Positive Determination
Licking Township, Clarion County

Dear [REDACTED]

This letter is regarding your water supply listed in Exhibit A ("Water Supply"). The Department's investigation indicates that oil and gas activities impacted the Water Supply. This information is summarized below.

CASE INFORMATION:

Date of Complaint	Nature of Complaint (odor, taste, quantity, use, color)	Sample Results Above Statewide Standards or Recommended Levels
July 25, 2019	Gas smell coming from water well and faucets in the home	Free and dissolved natural gas in water supply

It was reported to the Department that the Water Supply was drilled in 2012 and that gas was present when the well was drilled, however, the gas level has increased significantly over the past year. Department staff confirmed gas bubbling within the water well and a strong gas odor in the yard surrounding the well.

Oil and gas maps showed one active gas well and multiple historic oil and gas well sites within 2,500 feet of the Water Supply. The owner of the active gas well was notified of the gas migration, and in response, collected gas samples and vented the gas well and the Water Supply. The Department also collected gas samples, and the analysis of these samples showed the gas from your Water Supply and the active gas well were similar. Based on an analysis of the gas samples and indications that venting the gas well may have reduced bubbling in the Water Supply, the operator plugged the gas well.

After the gas well was plugged, free gas levels in the Water Supply declined, the bubbling was eliminated, and the strong gas odor was significantly reduced. However, continued monitoring showed the free gas level fluctuating with levels reaching one hundred percent methane by volume at times. In addition, the dissolved gas levels appeared to increase during the investigation. Due to the continued gas detection in the Water Supply, additional gas samples were collected. These results indicated there may be a second source of gas impacting the Water Supply.

The Department conducted a search for historic oil and gas wells and located six abandoned gas wells within 3,000 feet of your Water Supply. These wells were added to the Department's list of abandoned oil and gas wells. Wells on this list are plugged as funding becomes available. In addition, there are indications that an abandoned gas well may be located on a neighboring property, however, the well could not be located during our investigation.

Based on oil and gas mapping, the isotopic and compositional analysis of the gas samples, water sample results, free gas monitoring of the Water Supply, and the plugging of the gas well, the Department determined that the Water Supply was impacted by oil and gas activities. The active gas well was in part contributing to the stray gas migrating into your Water Supply, and there is likely a second source of gas impacting the Water Supply. The second source of gas may be one of the abandoned gas wells discovered during the investigation. The Department will work towards plugging these wells as funding becomes available.

Free and dissolved gas continues to be detected in the Water Supply and the Department recommends that the Water Supply remain vented. 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. Please refer to the enclosed Fact Sheet: Methane Gas and Water Wells for additional information on venting water wells.

Although no gas was detected in the living space or in the crawlspace of your home, please be aware that 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. Changing conditions can allow gas to migrate to basements and crawlspaces. Consequently, 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. Please refer to the enclosed Fact Sheet: Methane Migration into Occupied Buildings for additional details on methane migration.

WATER SAMPLE RESULTS:

Parameter/Description	Standards or Recommended Levels	DEP Sample 7/25/2019	DEP Sample 9/23/2020	DEP Sample 9/30/2020
Alkalinity (mg/l)		107.2	76.0	
Aluminum (ug/l)	200	<300	<15.0	DISSOLVED GAS ANALYSIS ONLY
Arsenic (ug/l)	10	<3.00	<3.00	
Barium (mg/l)	2	0.132	0.155	
Bromide (mg/l)		<0.2	<0.2	
Calcium (mg/l)		26.900	34.660	
Hardness (mg/l)		105	138	
Iron (mg/l)	0.3	0.305	2.279	
Lithium (ug/l)		<25.0	<25.0	
Magnesium (mg/l)		9.15	12.58	
Manganese (mg/l)	0.05	1.460	2.143	
pH	6.5-8.5	8.1	7.2	
Potassium (mg/l)		2.03	1.97	
Selenium (ug/l)	50	<7.00	<7.00	
Sodium (mg/l)		3.34	3.87	
Conductivity (umhos/cm)		226.00	295.00	
Strontium (mg/l)		0.127	0.161	
Chloride (mg/l)	250	4.81	4.22	
TDS (mg/l)	500	136	182	
Sulfate (mg/l)	250	5.32	48.63	
TSS (mg/l)		<5	<5	
Turbidity (ntu)		37.00	7.90	
Zinc (ug/l)	5000	<30.0	<30.0	
Ethane (mg/l)		2.160	1.270	1.240
Methane (mg/l)	7 mg/l action level	4.610	7.370	7.410
Propane (mg/l)		0.687	Not detected	0.0239

During the Department's investigation, water samples were collected from your Water Supply. The water sample results indicate that your water quality exceeds statewide standards for iron and manganese. In addition, the September 23, 2020, sample results indicate that the iron and manganese levels increased over the levels from the July 25, 2019 sampling event.

Iron and manganese occur naturally in many water supplies in Western Pennsylvania due to the types of rocks the groundwater encounters as it flows to wells. These levels can naturally fluctuate throughout the year due to seasonal variation. Levels can also fluctuate year over year due to climate variability and other influences. Increases in iron and manganese, in some cases, have been attributed to methane migrating into a water supply. One of the abandoned gas wells located during our investigation may be the source of the methane that continues to migrate into your Water Supply, which may be contributing to the increased levels of iron and manganese detected in the latest sampling of your water. Your water is being treated with a water softener and these systems can remove small amounts of iron and magnesium.

June 10, 2021

If you have any questions about any of the above, please contact Aaron O'Hara at 814-332-6199.

Sincerely,

Richard L. Neville

Richard L. Neville
Northwest District Oil and Gas Manager
District Oil and Gas Operations

Enclosures: DEP Fact Sheet: Methane Migration into Occupied Buildings
 DEP Fact Sheet: Methane Gas and Water Wells
 PSU: Iron and Manganese in Private Water Systems

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