pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

March 21, 2019

[redacted]

[redacted]

Re: Request for Investigation 333763
Stray Gas Migrating into Water Supply – Positive Determination
Glade Township, Warren County

Dear [redacted]

The Department of Environmental Protection (Department) has been investigating the possible degradation of your water supply located at the above referenced address ("Water Supply"), in response to a complaint received on April 19, 2018. 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, the most recent water quality sampling indicates that your water quality does not meet (i.e., is worse than) the certain 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.).

The case information is summarized below.

CASE INFORMATION:

Date of Complaint	**Nature of Complaint (odor, taste, quantity, use, color)**	**Pollution**
April 19, 2018	Water has sulfur odor and effervescence (Bubbles)	Dissolved natural gas in private water well

[redacted]

WATER SAMPLE RESULTS:

Parameter/Description	**Standards or Recommended Levels**	**DEP Sample 4/27/2018**	**DEP Sample 8/6/2018**	**DEP Sample 8/27/2018**
Alkalinity (mg/l)	400	183.4	NA	196.4
Aluminum (ug/l)	200	<200	NA	<200
Arsenic (ug/l)	10	<3.0	NA	<3.0
Barium (mg/l)	2	0.239	NA	0.261
Bromide (mg/l)		<0.2	NA	<0.2
Calcium (mg/l)	25-50	35.660	NA	42.20
Hardness (mg/l)	20-110	139	NA	165
Iron (mg/l)	**0.3**	**0.496**	**NA**	**0.712**
Lithium (ug/l)		<25	NA	<25.0
Magnesium (mg/l)	25-50	12.150	NA	14.40
Manganese (mg/l)	**0.05**	**0.085**	**NA**	**0.095**
pH	6.5-8.5	7.5	NA	7.4
Potassium (mg/l)		2.392	NA	2.55
Selenium (ug/l)	50	<7.0	NA	<7.0
Sodium (mg/l)		35.790	NA	23.30
Conductivity (umhos/cm)	500	413.00	NA	426.00
Strontium (mg/l)		0.659	NA	0.741
Chloride (mg/l)	250	20.16	NA	15.26
TDS (mg/l)	500	238	NA	254
Sulfate (mg/l)	250	13.42	NA	14.17
TSS (mg/l)		<5	NA	<5
Turbidity (ntu)		3.09	NA	7.45
Zinc (ug/l)	500	62.000	NA	<10.0
Ethane (mg/l)		0.0225	0.0701	0.101
Methane (mg/l)	**7 action level**	**6.490**	**22.200**	**31.600**
Propane (mg/l)		Not detected	Not detected	Not detected

INVESTIGATION SUMMARY

During the Department's investigation, water samples were collected from your water supply. As set forth above, the sample results indicate that your raw water quality exceeds health and/or aesthetic statewide standards for iron and manganese. Additionally, the Department's investigation confirmed dissolved methane gas is present in the Water Supply at concentrations above the Department action level and expected background conditions. Specifically, analytical data collected over the investigation period reveal concentrations of methane ranging from 6.49 mg/l to 31.6 mg/l.

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 eliminate the hazards of having natural gas in your water supply by simply venting your well.

Over the course of the Department's investigation, iron was detected between 0.496 mg/l and 0.712 mg/l, in exceedance of the SMCL of 0.3 mg/l. Manganese was detected above its SMCL of 0.05 mg/l at concentrations ranging from 0.085 mg/l to 0.095 mg/l. Iron and manganese are common metals associated with groundwater in the region. The most likely source of these metals are from the bedrock from which the Water Supply derives water and geochemical reactions within the Water Supply. It is recommended that the previously installed treatment system continue to be used and maintained as concentrations of iron and manganese provided in tables above can fluctuate over time.

Based on review of geologic mapping and information, water sample results, gas sample analysis, oil and gas well records, field surveys, and well inspections, the Department has determined that the stray gas migrating into your water well is thermogenic (natural gas). During the investigation, five abandoned oil wells were discovered in close proximity to the Water Supply. The abandoned wells were added to the Department's list of wells to be plugged.

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

Sincerely,

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

Enclosure:
Exhibit A

c: Joe Lichtinger (email)
Steve Lencer (email)
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File through Aaron O'Hara