



**pennsylvania**  
DEPARTMENT OF ENVIRONMENTAL  
PROTECTION

August 29, 2019

**CERTIFIED MAIL NO.** [REDACTED]

[REDACTED]

**Re:** Request for Investigation 310703  
Stray Gas Migrating into Water Supply -- Positive Determination  
Millcreek Township, Clarion County

**Dear** [REDACTED]

The Pennsylvania 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 March 23, 2015. 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:**

<b>Date of Complaint</b>	<b>Nature of Complaint (odor, taste, quantity, use, color)</b>	<b>Pollution</b>
March 23, 2015	A thick oily substance in the water	Bacteria, iron, manganese; dissolved and free ethane, methane, propane in the water supply

## WATER SAMPLE RESULTS:

Parameter/ Description	Statewide standards/ Recommen ded Levels	DEP Sample 03/23/201 5	DEP Sample 07/14/2015 Appearance clear/no odor	DEP Sample 07/26/201 6	DEP Sample 01/19/2017 Appearance clear	DEP Sample 07/12/2017 Appearance clear/metalli c odor
Alkalinity (mg/l)	400	70.4	62.8	70.8	65.2	67.4
Aluminum (ug/l)	200	<200	<200	<200	<200	<200
Arsenic (ug/l)	10	<3.0	<3.0	<3.0	<3.0	<3.0
Barium (mg/l)	2	1.146	1.037	1.234	1.101	0.689
Bromide (mg/l)		<0.2	<0.2	<0.2	<0.2	<0.2
Calcium (mg/l)	25-50	21.200	22.300	23.600	22.400	23.236
Hardness (mg/l)	20-110	70	74	77	74	76
Iron (mg/l)	0.3	5.39	4.76	4.417	9.830	10.776
Lithium (ug/l)		28.000	27.000	28.000	27.000	27.000
Magnesium (mg/l)	25-50	4.055	4.524	4.484	4.271	4.310
Manganese (mg/l)	0.05	0.24	0.304	0.268	0.364	0.346
pH -lab	6.5-8.5	7.0	7.3	7.2	6.9	6.9
Potassium (mg/l)		2.536	2.607	2.657	2.666	2.639
Selenium (ug/l)	50	<7	<7	<7	<7	<7
Sodium (mg/l)		0.666	1.075	0.714	0.692	0.677
Conductivity (umhos/cm)	500	159.00	164.90	169.00	149.60	169.60
Strontium (mg/l)		0.22	0.20	0.22	0.20	0.20
Chloride (mg/l)	250	1.3	6.2	1.61	1.54	1.25
TDS (mg/l)	500	96	110	92	30	106
Sulfate (mg/l)	250	50.4	28.2	12.33	13.45	15.19
TSS (mg/l)		16	<5	<5	8	6
Turbidity (ntu)	1 NTU (applicable unfiltered surface water sources)	Cancelled	33.28	18.90	53.94	13.11
Zinc (ug/l)	500	37.000	<10.0	<10.0	<10.0	<10.0
Ethane (mg/l)	0		0.125	0.600*	0.477	1.040
Methane (mg/l)	Action level 7 mg/l		1.290	4.350*	3.520	8.320
Propane (mg/l)	0		<0.0142	0.0893*	0.0755	.0143
E. coli MPN	0		<1/100ml	<1/100ml	<1/100ml	Na
Total Coliform MPN	0		9/100 ml	1/100 ml	<1/100ml	48/100ml

Iron related bacteria			2,200 cfu/ml	2,200 cfu/ml	25 cfu/ml	Na
Sulfate reducing bacteria			6,000 cfu/ml	Not detected	27,000 cfu/ml	Na

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 bacteria, 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 dissolved methane ranging from 1.29 mg/l to 8.32mg/l, and free methane levels ranging from 0 % to 90 % by volume in the head space of your water well.

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 of 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 dissolved methane levels greater than 7 mg/l or free gas methane levels greater than 25% of the lower explosive limit in a water well head space, 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 4.417 mg/l and 10.776 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 0.240 mg/l to 0.364 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. In addition to the iron and manganese, coliform bacteria levels exceeded the Primary Maximum Contaminant Level (PMCL) of zero during two sampling

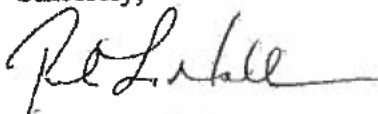
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events. The Department recommends that steps be taken to eliminate the coliform bacteria in the Water Supply.

Based on compositional gas analysis, isotopic analysis, water sample results, oil and gas well inspections, a review of the local geology, free gas monitoring, field investigations, and the plugging activities at the abandoned gas well, the Department has determined that the Water Supply was impacted by oil and gas activity. The Department will continue to work to permanently resolve this matter.

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)  
Dave Adams (email)  
Chad Meyer(email)  
Ruth Taylor (email)  
Michael Braymer/Kayla Despenes (email)  
File through Aaron O'Hara

[REDACTED]

**Confidential**

**Exhibit A**

Address of Water Supply

[REDACTED]