pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

May 7, 2019

CERTIFIED MAIL NO. [redacted]

[redacted]

Re: Request for Investigation 313247
Stray Gas Migrating into Water Supply – Positive Determination
Limestone 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 June 30, 2015. 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 case information is summarized below.

CASE INFORMATION:

Date of Complaint	Nature of Complaint (odor, taste, quantity, use, color)	Pollution
June 30, 2015	Natural gas venting from water well	Free and dissolved natural gas in private water well

WATER SAMPLE RESULTS:

Parameter/Description	Statewide Standards or recommended levels	EQT Sample 3/4/2016 Post-treatment	DEP Sample 4/12/2016	DEP Sample 5/18/2017	DEP Sample 5/22/2018	DEP Sample 9/11/2018
Alkalinity (mg/l)			44.4	52.0	40.6	
Aluminum (ug/l)	200		<200	<200	<200	
Arsenic (ug/l)	10		<3.0	<3.0	<3.0	
Barium (mg/l)	2	<0.0100	0.507	0.527	0.481	
Bromide (mg/l)			<0.2	<0.2	<0.2	
Calcium (mg/l)		<0.500	10.800	10.300	9.720	
Hardness (mg/l)		<0.255	46	45	43	
Iron (mg/l)	0.3	<0.0400	2.943	8.605	1.696	

Lithium (ug/l)			<25	<25	<25	
Magnesium (mg/l)		<0.200	4.634	4.650	4.446	
Manganese (mg/l)	0.05	<0.0100	0.891	0.932	0.787	
pH	6.5-8.5	7.52	7.0	8.0	6.7	
Potassium (mg/l)			1.790	2.007	1.951	
Selenium (ug/l)	50		<7	<7	<7	
Sodium (mg/l)		31.5	0.638	0.630	0.621	
Conductivity (umhos/cm)		148	100.10	94.30	96.50	
Strontium (mg/l)			0.04	0.04	0.036	
Chloride (mg/l)	250	5.53	1.10	0.90	0.95	
TDS (mg/l)	500	128	68	54	56	
Sulfate (mg/l)	250	10.2	4.66	<1.00	7.91	
TSS (mg/l)		<4.00	<5	8	<5	
Turbidity (ntu)		<1.00	15.63	56.02	9.59	
Zinc (ug/l)	500		11.000	36.000	12.000	
Methylene Blue Active Substances		<0.0250				
Oil & Grease		<5.05				
Ethane (mg/l)		0.248	2.450	5.180	0.0128	not detected
Methane (mg/l)	7 (action level)	0.943	7.960	17.500	0.0570	Not detected
Propane (mg/l)			0.994	2.420	Not Detected	Not detected
Iron-related bacteria			25 cfu/ml			
Sulfate-reducing bacteria			Not detected			
Slime-forming bacteria			67,000 cfu/ml			
UVIR			No petroleum products			

The Department's investigation was prompted by notification that natural gas was discovered in a neighboring water well during the cleanout of the well. The Department's investigation involved six private water supplies, twenty-six gas wells, and spanned over three years.

During the investigation, the Department identified four separate water wells that were venting natural gas. The Department monitored the four wells for natural gas throughout the investigation. Specifically, the Department collected and analyzed numerous water samples and gas samples. In addition, the Department collected and analyzed gas samples from several gas wells in the area and compared the results to those from the water wells. The gas sample results indicated that the natural gas entering the water wells is thermogenic and from the same source as the natural gas in nearby gas wells. Multiple gas wells were vented, plugged, and repaired during the investigation.

Based on the isotopic analysis of the gas collected from the water supplies and gas wells, water sample results, monitoring results from the headspace of water wells, and the sequence of plugging and repairs made to gas wells, the Department has determined that the four water

supplies were impacted by oil and gas activity, and that the plugging and repairs to gas wells during the investigation eliminated most of the natural gas from the water supplies.

Dissolved methane gas was detected in your Water Supply ranged from zero to 17.50 mg/l. Free gas levels in the water well ranged from zero to 100% by volume. The latest measured dissolved methane level was zero. In addition, the Department will continue to address oil and gas wells in the area of investigation that are not in compliance with regulatory requirements. The Department also recommends that your water well continue to be equipped with a working vent.

During DEP's investigation, several water samples were collected from your water supply. The sample results indicate that your water quality exceeds health and/or aesthetic statewide standards for iron and manganese. Iron and manganese are metals that are commonly found in private water systems throughout Pennsylvania, however, they are most common in northern and western counties (Penn State Extension Iron and Manganese in Private Water Systems). The most likely source of these elevated parameters is the coal seam(s) and other types of rock encountered by the wellbore of your Water Supply. 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

c: Joe Lichtinger (email)
Steve Lencer (email)
Dave Adams (email)
Chad Meyer (email)
Ruth Taylor (email)
Michael Braymer (email)
Kayla Despenes (email)
File through Aaron O'Hara