November 1, 2017

Ron Ragle
Fisher Village Office
100 E. School St.
Fisher, IL 61843

Dear Mr. Ragle,

Peoples Energy submitted three dissolved gas samples to our laboratory recently for analysis. According to our information the samples were from the Village of Fisher water plant. Two samples were collected prior to treatment and represent water directly from the water wells (102017VF-40038 and 102017VF-40039) and the third was taken after treatment which including filtration and aeration (102017VF-TP). The samples were collected in IsoFlasks® which are designed for dissolved gas collection. The gas was extracted and analyzed by gas chromatography and the concentrations of methane were calculated. Typically the carbon and hydrogen isotopic composition ($\delta^{13}C$ and δD) of the methane (CH_4) and the $\delta^{13}C$ of carbon dioxide (CO_2) are used to help determine the source of methane from dissolved gas samples. Due to insufficient methane concentrations no isotope analyses could be completed on these samples, however the carbon isotopes were measured on the CO_2 (see attached data reports).

The analytical results showed very little methane present in these samples. No other hydrocarbons were detected. The rest of the gases detected are the same components that are found in the atmosphere: nitrogen (N_2), oxygen (O_2), carbon dioxide (CO_2), and argon (Ar). The concentration of methane in the two well samples (102017VF-40038 and 102017VF-40039) showed only 0.019 and 0.016 mg/L while the post treatment sample, which included aeration, (102017VF-TP) contained only 0.0018 mg/L methane. These concentrations are orders of magnitude below the saturation limit for methane, which is about 28 mg/L depending on temperature. Previous studies of groundwater in Central Illinois by the Illinois State Geological Survey have shown that water from the Mahomet Aquifer and shallower Glasford sands often contain a few mg/L of methane to concentrations greater than the saturation limit for methane.

The isotopic composition of the CO_2 showed values ranging from -19.38 to -20.07 ‰. These values are somewhat more negative compared to many other local samples representative of drift gas (approximately -17 ‰) and may reflect the effects of microbial oxidation reactions of reduced carbon sources for these samples.

In summary, the concentration of methane observed in the Village of Fisher water samples is very low compared to much of the groundwater sampled in the Mahomet and Glasford sands in Central Illinois. One of the main concerns of groundwater with methane is the possibility of the gas escaping in the atmosphere of a home or commercial building where it can become flammable or explosive. However, at the levels observed for the Village of Fisher samples there is no concern of the methane escaping and resulting in a flammable or explosive situation.

Sincerely,

Keith C. Hackley, Ph.D., PG
Senior Isotope Geochemist

Enclosures (3)

Lab #: 635002 Job #: 36396 IS-93926 Co. Job#:
Sample Name: 102017VF-40038 Co. Lab#:
Company: Peoples Gas
API/Well:
Container: IsoFlask
Field/Site Name:
Location: Well West of Plant
Formation/Depth:
Sampling Point:
Date Sampled: 10/20/2017 9:55 Date Received: 10/20/2017 Date Reported: 10/24/2017

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{18}O$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide	nd					
Helium	na					
Hydrogen	nd					
Argon	1.76					
Oxygen	0.75					
Nitrogen	88.47					
Carbon Dioxide	8.93	-19.38				
Methane	0.0928				0.028	0.019
Ethane	nd				< 0.0001	< 0.0002
Ethylene	nd					
Propane	nd				< 0.0001	< 0.0003
Propylene	nd					
Iso-butane	nd					
N-butane	nd					
Iso-pentane	nd					
N-pentane	nd					
Hexanes +	nd					

Remarks:
Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.78
*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 635003 Job #: 36396 IS-93926 Co. Job#:
Sample Name: 102017VF-40039 Co. Lab#:
Company: Peoples Gas
API/Well:
Container: IsoFlask
Field/Site Name:
Location: WII East of Plant
Formation/Depth:
Sampling Point:
Date Sampled: 10/20/2017 10:10 Date Received: 10/20/2017 Date Reported: 10/24/2017

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{18}O$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide	nd					
Helium	na					
Hydrogen	nd					
Argon	1.78					
Oxygen	0.86					
Nitrogen	88.09					
Carbon Dioxide	9.19	-19.82				
Methane	0.0777				0.023	0.016
Ethane	nd				< 0.0002	< 0.0002
Ethylene	nd					
Propane	nd				< 0.0002	< 0.0003
Propylene	nd					
Iso-butane	nd					
N-butane	nd					
Iso-pentane	nd					
N-pentane	nd					
Hexanes +	nd					

Remarks:
Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.81
*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.

Lab #: 635004 Job #: 36396 IS-93926 Co. Job#:
Sample Name: 102017VF-TP Co. Lab#:
Company: Peoples Gas
API/Well:
Container: IsoFlask
Field/Site Name:
Location: Transfer Pump, pre-softened, post Fe Filter
Formation/Depth:
Sampling Point:
Date Sampled: 10/20/2017 10:25 Date Received: 10/20/2017 Date Reported: 10/24/2017

Component	Chemical mol. %	$\delta^{13}C$ ‰	δD ‰	$\delta^{18}O$ ‰	Dissolved gas cc/L	Dissolved gas ppm
Carbon Monoxide	nd					
Helium	na					
Hydrogen	nd					
Argon	1.45					
Oxygen	28.74					
Nitrogen	65.88					
Carbon Dioxide	3.92	-20.07				
Methane	0.0104				0.0027	0.0018
Ethane	nd				< 0.0001	< 0.0002
Ethylene	nd					
Propane	nd				< 0.0001	< 0.0002
Propylene	nd					
Iso-butane	nd					
N-butane	nd					
Iso-pentane	nd					
N-pentane	nd					
Hexanes +	nd					

Remarks:
Analysis is of gas extracted from water by headspace equilibration. Analysis has been corrected for helium added to create headspace. Helium dilution factor = 0.79
*Addition of helium negates the ability to detect native helium and may negate the ability to detect hydrogen.

nd = not detected. na = not analyzed. Isotopic composition of hydrogen is relative to VSMOW. Isotopic composition of carbon is relative to VPDB. All gas component carbon isotope values are reported on a scale defined by a two point calibration of LSVEC and NBS 19. Isotopic composition of oxygen is relative to VSMOW, except for carbon dioxide which is relative to VPDB. Chemical compositions are normalized to 100%. Mol. % is approximately equal to vol. %.