pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 8, 2019

CERTIFIED MAIL NO. 7018 1130 0001 2752 8970

[redacted]

Subject Property: [redacted]

Re: 58 Pa. C.S. § 3218 Determination
Water Supply Request for Investigation
Dimock Township, Susquehanna County

Dear '

The Department has completed its investigation of your water supply located at the above referenced address ("Water Supply"). Based on the sample results reviewed and supplementary information obtained to date, the Department has determined that the Water Supply was temporarily affected by oil and gas activities but has returned to expected background conditions. Nevertheless, please note that, in the absence of any treatment, your water quality does not meet (i.e., is worse than) the following aesthetic standard.

Parameter	Unit	Statewide Standards or Recommended Levels	Your Sample Results that Are Above Statewide Standards/Levels
Turbidity	NTU	1	**1.36**

Based on current post-treatment system sampling, the treatment system that was previously installed, and is currently operating on the Water Supply, appears to be effectively reducing the levels of the above contaminant to below detection limits. The Department's investigation into your complaint is detailed below.

Summary of Investigation

In the course of investigating possible gas migration issues in the area, the Department was granted permission to sample your water supply. As a result of this screening and sampling, the Department became aware of the presence of combustible gas in the headspace of your water well, and of low levels of dissolved methane in your Water Supply. During inspections conducted by the Department, and by others over the course of the investigation, combustible gas was observed at various levels in the headspace of your well and dissolved methane was detected in your Water Supply. Samples from your Water Supply were collected by the Department as

shown in the attached tables, and submitted to the Department's laboratory in Harrisburg for analysis. The sample results were previously provided to the former property owner but are summarized in pertinent part for your reference in the attached tables.

The initial sample results from your Water Supply had detectable methane at levels the Department believed to be elevated by nearby oil and gas activities. The Department and others also documented varying levels of combustible gas in your water well headspace requiring that it be vented. On December 15, 2010, the Department determined that your Water Supply was impacted by nearby oil and gas activities based on data collected and reviewed by the Department.

The determination made on December 15, 2010 was part of an executed Consent Order and Settlement Agreement (COSA) between the Department and Cabot Oil and Gas Corporation (Cabot). In addition to a provision for a whole house treatment system, the COSA required the creation of an escrow fund for the impacted water supply property owner. That fund was to hold the greater of $50,000 or two times the assessed value of the property and was intended to provide for ongoing operating and/or maintenance expenses related to restoring or replacing the affected water supply. Cabot was also required to continue sampling the water supply at regular intervals until enough supporting data was collected to meet the requirements of the COSA. The Department has received sufficient data to support the following conclusions.

Dissolved methane data for your Water Supply shows that the concentrations detected in your Water Supply have been near zero since the investigation began, with only slight elevations in 2013 and 2014. Since those elevations, dissolved methane levels have been stable and have remained relatively constant for the last five years. Further analysis of the levels of combustible gas in the headspace of your Water Supply have shown stability with only sporadic low level detections since 2014.

The data collected and reviewed during this investigation leads the Department to believe that the current levels of dissolved methane in your Water Supply are consistent with expected background conditions. Additionally, the Department has evaluated the data and determined that the other compounds analyzed in your Water Supply are also consistent with expected background conditions. Although slightly elevated above statewide standards, elevated turbidity is common in fresh groundwater aquifers in the area and it is not unusual for it to be present above those standards in water supplies.

Based on its investigation, the Department has determined that the impacts to your Water Supply were temporary and that the concentration of methane in your Water Supply is now consistent with expected background conditions. In addition, as noted above, the treatment system on your Water Supply is addressing the slightly elevated turbidity. As a result, the Department does not plan to require further action regarding your Water Supply.

Please contact Michael O'Donnell at 570.346.5530 should you have any questions concerning this matter.

Sincerely,

Jennifer W. Means
Environmental Program Manager
Eastern Oil and Gas District

Enclosures:
Laboratory Analytical Tables
"How to Interpret A Water Analysis Report"

cc:
Michael O'Donnell
Eric Rooney, P.G.
Sharon Steinbacher
Dimock Gas Migration File

All results in mg/l unless otherwise noted	1/12/2009 DEP Raw	1/27/2009 DEP Raw	10/21/2010 DEP Raw	10/27/2010 DEP Raw (Duplicate)	2/3/2012 DEP Raw (Dissolved)	2/3/2012 DEP Treated (Dissolved)	5/14/2014 DEP Raw (Dissolved)	5/14/2014 DEP Treated (Dissolved)	MCL or Action Level *Denotes Primary
Methane	<0.0079	0.0138	<0.0079	<0.0079	<0.0079	<0.0079	<0.012	<0.012	7
Ethane	<0.0198	<0.0198	<0.0079	<0.0079	<0.0198	<0.0198	<0.0124	<0.0124	No Standard
Propane	<0.0198	<0.0198	<0.0198	<0.0198	<0.0142	<0.0142	<0.0142	<0.0142	No Standard
Ethene	<0.0198	<0.0198	<0.0198	<0.0198	~	~	~	~	No Standard
Alkalinity	~	~	56.4	57.8	~	~	53.8	50.8	No Standard
Aluminum	~	~	<0.2	<0.2(<0.01)	<0.01(<0.01)	<0.01(<0.01)	<0.2(<0.2)	<0.2(<0.2)	0.2
Arsenic	~	~	~	<0.003	<0.003(<0.003)	<0.003(<0.003)	<0.003(<0.003)	<0.003(<0.003)	*0.01
Barium	~	~	0.142	0.149(0.151)	0.093(0.093)	0.102(0.104)	0.099(0.091)	0.112(0.113)	*2
Bromide	~	~	~	~	<0.2	<0.2	<0.2	<0.2	No Standard
Calcium	~	~	31.3	32.2	23.1(22.6)	23(23)	26.34(24.64)	23.2(22.9)	No Standard
Hardness	~	~	100	102	~	~	84	76	No Standard
Iron	~	~	<0.02	<0.2(<0.02)	<0.02(<0.02)	<0.02(<0.02)	0.07(<0.02)	<0.02(<0.02)	0.3
Lithium	~	~	~	~	<0.025(<0.025)	<0.025(<0.025)	<0.025(<0.025)	<0.025(<0.025)	No Standard
Magnesium	~	~	5.33	5.235(5.396)	3.975(3.934)	3.987(4.07)	4.359(<4.143)	4.479(4.467)	No Standard
Manganese	~	~	<0.01	<0.01(<0.01)	<0.01(<0.01)	<0.01(<0.01)	0.01(<0.01)	0.01(<0.01)	0.05
pH (units)	~	~	6.8	6.7(6.6)	~	~	7.1	7.2	6.5-8.5
Potassium	~	~	2.042	1.948	1.69(1.67)	1.684(1.739)	1.589(1.527)	1.614(1.584)	No Standard
Selenium	~	~	~	<0.007	<0.007(<0.007)	<0.007(<0.007)	<0.007(<0.007)	<0.007(<0.007)	*0.05
Sodium	~	~	12.2	13.1(13.9)	8.147(8.061)	8.275(8.446)	8.707(8.303)	8.824(8.708)	No Standard
SPC (uS/cm)	~	~	287	304	~	~	205	206	No Standard
Strontium	~	~	0.089	0.093	0.057(0.056)	0.065(0.066)	0.06(0.062)	0.08(0.076)	No Standard
Total Chloride	~	~	28.1	31.2(31.37)	11.95	11.91	14.4	14.4	250
TDS	~	~	196	176(178)	114	144	104	100	500
Total Sulfate	~	~	~	18.03	18.91	18.81	95.3	39.4	250
TSS	~	~	~	~	<5	<5	<5	<5	No Standard
Turbidity (NTU)	~	~	~	<0.3	~	~	1.36	<1	*1 NTU
Zinc	~	~	~	<0.01	0.013(<0.01)	0.014(0.014)	<0.01(<0.01)	0.015(0.016)	5

Highlighting indicates an exceeded standard or level

~ not analyzed

< analyte not observed above the detection limit

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 8, 2019

CERTIFIED MAIL NO. 7018 1130 0001 2752 8987

Subject Address: [redacted]

Re: 58 Pa. C.S. § 3218 Determination
Water Supply Request for Investigation
Dimock Township, Susquehanna County

Dear

The Department has completed its investigation of the water supply located at the above referenced subject address ("Water Supply"). Based on the sample results reviewed and supplementary information obtained to date, the Department has determined that the Water Supply was temporarily affected by oil and gas activities but has returned to expected background conditions. Nevertheless, please note that, in the absence of any treatment, the water quality does not meet (i.e., is worse than) the following aesthetic standard.

Parameter	Unit	Statewide Standards or Recommended Levels	Your Sample Results that Are Above Statewide Standards/Levels
Manganese	mg/L	0.05	**0.08**

It is the Department's understanding that the Water Supply addressed in this letter has been abandoned and the well head buried.

Summary of Investigation

In the course of investigating possible gas migration issues in the area, the Department was granted permission to sample the subject Water Supply. During inspections conducted by the Department, and by others over the course of the investigation, combustible gas was observed at various levels in the headspace of the well and dissolved methane was detected in the Water Supply. Samples from the Water Supply were collected by the Department as shown in the attached tables, and submitted to the Department's laboratory in Harrisburg for analysis. The sample results were previously provided to the former property owner but are summarized in pertinent part for your reference in the attached tables.

The initial sample results from your Water Supply had detectable methane at levels the Department believed to be elevated by nearby oil and gas activities. The Department also documented varying levels of combustible gas in the water well headspace requiring that it be vented outside the structure. The samples also showed that the Water Supply had levels of aluminum, iron, and manganese above Statewide Standards. On December 15, 2010, the Department determined that the Water Supply was impacted by nearby oil and gas activities based on data collected and reviewed by the Department.

The determination made on December 15, 2010 was part of an executed Consent Order and Settlement Agreement (COSA) between the Department and Cabot Oil and Gas Corporation (Cabot). In addition to a provision for a whole house treatment system, the COSA required the creation of an escrow fund for the impacted water supply property owner. That fund was to hold the greater of $50,000 or two times the assessed value of the property, and was intended to provide for ongoing operating and/or maintenance expenses related to restoring or replacing the affected water supply. Cabot was also required to continue sampling the water supply at regular intervals until enough supporting data was collected to meet the requirements of the COSA. The Department has received sufficient data to support the following conclusions.

The data set for the subject Water Supply is limited due to the fact that the previous owner of the property restricted the Department's and Cabot's access to the Water Supply. Nevertheless, the data that the Department does have shows that the concentrations of methane detected in the subject Water Supply have decreased since 2009, and were found to be at levels below detection in 2014. Further analysis of the levels of combustible gas in the headspace of the Water Supply well have shown a similar downward trend, to the point that combustible gas has not been detected since late 2009. Please note that when the well was buried, the vent was removed and the Department was no longer able to screen for combustible gas.

The data collected and reviewed during this investigation supports the Department's original assertion that the detectable, elevated levels of dissolved methane in the Water Supply and combustible gas in the water well headspace were not background concentrations. It also supports the Department's conclusion that the current levels of dissolved methane in the subject Water Supply are consistent with expected background conditions. Additionally, the Department has evaluated the data and determined that the other compounds analyzed in your Water Supply are now consistent with expected background conditions. Although still elevated above Statewide Standards, manganese is common in fresh groundwater aquifers in the area and it is not unusual for it to be present in water supplies above those standards. Since manganese was not analyzed in a pre-drill sample, it is not possible to say with certainty whether the levels detected in the last sample collected by the Department are representative of pre-drill conditions.

Based on its investigation, the Department has determined that the impacts to the subject Water Supply were temporary and that the concentration of methane in the Water Supply is now consistent with expected background conditions. As a result, the Department does not plan to require further action regarding the Water Supply.

Please contact Michael O'Donnell at 570.346.5530 should you have any questions concerning this matter.

Sincerely,

Jennifer W. Means
Environmental Program Manager
Eastern Oil and Gas District

Enclosures:
Laboratory Analytical Tables
"How to Interpret A Water Analysis Report"

cc:
Michael O'Donnell
Eric Rooney, P.G.
Sharon Steinbacher
Dimock Gas Migration File

All results in mg/l unless otherwise noted	1/5/2009 DEP Raw	2/3/2009 DEP Raw	3/26/2009 DEP Raw	4/30/2009 DEP Raw	6/30/2009 DEP Raw	10/21/2009 DEP Raw	9/16/2010 DEP Raw	9/23/2010 DEP Raw (Duplicate)	10/21/2010 DEP Raw	11/3/2010 DEP Raw	11/23/2010 DEP Raw	12/2/2010 DEP Raw	12/8/2010 DEP Raw	MCL or Action Level *Denotes Primary
Methane	4.01	12.3	15.5	5.88	4.58	10.3	0.491	1.65	1.08	2.02	0.457	0.17	0.0222	7
Ethane	0.0861	0.502	0.567	0.215	0.131	0.416	<0.0079	<0.0079	0.0126	0.0174	<0.0079	<0.0079	<0.0079	No Standard
Propane	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	ND	ND	<0.0198	<0.0198	<0.0198	No Standard
Ethene	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	ND	ND	<0.0198	<0.0079	<0.0079	No Standard
Alkalinity	106.6	~	92.2	100.4	101	109.2	86.6	104.2	91.6	92.8	90.2	85.2	83.8	No Standard
Aluminum	1.339	~	<0.2	<0.2	<0.01	<0.2	<0.2	<0.2(0.0259)	<0.2	<0.2	<0.2	<0.2	<0.2	0.2
Arsenic	~	~	~	~	~	~	~	<0.003	~	~	~	~	~	*0.01
Barium	0.244	~	0.149	0.147	0.151	0.156	0.141	0.155(0.157)	0.123	0.119	0.197	0.146	0.145	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	32.8	~	38.5	32	33.9	35.7	36.8	36.9	40.1	40	42.4	40.8	40.5	No Standard
Hardness	115	~	131	110	115	123	126	126	135	134	144	136	136	No Standard
Iron	2.365	~	<0.02	<0.02	<0.02	<0.02	0.423	0.214(0.410)	0.183	0.133	0.429	0.389	0.354	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	7.919	~	8.37	7.268	7.39	8.25	8.233	8.129(8.767)	8.375	8.183	9.13	8.313	8.369	No Standard
Manganese	0.324	~	<0.01	<0.01	<0.01	0.011	0.216	0.123(0.146)	0.084	0.064	0.37	0.214	0.199	0.05
pH (units)	7.7	~	7.7	7.8	8	7.9	7.4	7.4(7.4)	7.3	7.1	7.3	7.4	7.2	6.5-8.5
Potassium	1.288	~	1.14	<1.0	1.05	1.07	1.006	1.013	1.058	<1	1.187	1.055	1.054	No Standard
Selenium	~	~	~	~	~	~	~	<0.007	~	~	~	~	~	*0.05
Sodium	9.86	~	10.1	7.845	8.4	8.31	11	9.2(8.92)	11	10.7	12.2	11.6	11.4	No Standard
SPC (uS/cm)	275	~	290	268	263	282	336	299	343	338	352	361	365	No Standard
Strontium	0.233	~	0.163	0.194	0.218	0.173	126	0.139	0.116	0.109	0.156	0.125	0.121	No Standard
Total Chloride	15.5	~	27	14.1	10.3	18.8	47.7	27.4(29.6)	45.1	45.2	51.5	55.6	56.1	250
TDS	178	~	182	172	172	192	198	172(192)	216	218	214	228	248	500
Total Sulfate	~	~	~	~	~	~	~	6.84	~	~	~	~	~	250
TSS	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	~	~	~	~	~	~	1.62 NTU	~	~	~	~	~	*1 NTU
Zinc	~	~	~	~	~	~	~	0.016	~	~	~	~	~	5

Highlighting indicates an exceeded standard or level

~ not analyzed

< analyte not observed above the detection limit

All results in mg/l unless otherwise noted	1/30/2014 DEP Raw (Dissolved)											MCL or Action Level *Denotes Primary
Methane	<0.012											7
Ethane	<0.0124											No Standard
Propane	<0.0142											No Standard
Ethene	~											No Standard
Alkalinity	105.6											No Standard
Aluminum	<0.2(<0.2)											0.2
Arsenic	<0.003(<0.003)											*0.01
Barium	0.143(0.128)											*2
Bromide	<0.2											No Standard
Calcium	38.1(34.9)											No Standard
Hardness	132											No Standard
Iron	0.03(<0.02)											0.3
Lithium	<0.025(<0.025)											No Standard
Magnesium	8.818(8.35)											No Standard
Manganese	0.08(<0.01)											0.05
pH (units)	7.8											6.5-8.5
Potassium	1.061(<1)											No Standard
Selenium	<0.007(<0.007)											*0.05
Sodium	10.6(8.887)											No Standard
SPC (uS/cm)	300											No Standard
Strontium	0.21(0.194)											No Standard
Total Chloride	30.6											250
TDS	184											500
Total Sulfate	<20											250
TSS	<5											No Standard
Turbidity (NTU)	1											*1 NTU
Zinc	0.046(0.034)											5

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~ not analyzed

< analyte not observed above the detection limit

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 8, 2019

CERTIFIED MAIL NO. 7018 1130 0001 2752 8994

[redacted]

Subject Address: [redacted]

Re: 58 Pa. C.S. § 3218 Determination
Water Supply Request for Investigation
Dimock Township, Susquehanna County

Dear [redacted]

The Department has completed its investigation of your water supply located at the above referenced subject address ("Water Supply"). Based on the sample results reviewed and supplementary information obtained to date, the Department has determined that the Water Supply was temporarily affected by oil and gas activities but has returned to expected background conditions. Nevertheless, please note that, in the absence of any treatment, your water quality does not meet (i.e., is worse than) the following aesthetic standard.

Parameter	Unit	Statewide Standards or Recommended Levels	Your Sample Results that Are Above Statewide Standards/Levels
Manganese	mg/L	0.05	**0.252**

Based on current post-treatment system sampling, the treatment system that was previously installed, and is currently operating on the Water Supply, appears to be effectively reducing the levels of the above contaminants to below detection limits. The Department's investigation into your complaint is set forth below.

Summary of Investigation

In the course of investigating possible gas migration issues in the area, the Department was granted permission to sample your water supply. As a result of this screening and sampling, the Department became aware of the presence of combustible gas in the headspace of your water well, and of dissolved methane in your Water Supply. During inspections conducted by the Department, and by others over the course of the investigation, combustible gas was observed at various levels in the headspace of your well and, dissolved methane was detected in your Water Supply. Samples from your Water Supply were collected by the Department as shown in the

attached tables, and submitted to the Department's laboratory in Harrisburg for analysis. The sample results were previously provided to you but are summarized in pertinent part for your reference in the attached tables.

The initial sample results from your Water Supply had detectable methane at levels the Department believed to be elevated by nearby oil and gas activities. The Department also documented varying levels of combustible gas in your water well headspace requiring that it be vented outside the structure. The samples also showed that the Water Supply had levels of aluminum, iron, and manganese above Statewide Standards. On December 15, 2010, the Department determined that your Water Supply was impacted by nearby oil and gas activities based on data collected and reviewed by the Department.

The determination made on December 15, 2010, was part of an executed Consent Order and Settlement Agreement (COSA) between the Department and Cabot Oil and Gas Corporation (Cabot). In addition to a provision for a whole house treatment system, the COSA required the creation of an escrow fund for you as an impacted water supply property owner. Your escrow fund was to hold the greater of $50,000 or two times the assessed value of your property, and the fund was intended to provide for ongoing operating and/or maintenance expenses related to restoring or replacing your water supply. Cabot was also required to continue sampling your water supply at regular intervals until enough supporting data was collected to meet the requirements of the COSA. The Department has received sufficient data to support the following conclusions.

Dissolved methane data for your Water Supply shows that the concentrations detected in your Water Supply have decreased since 2010, stabilized, and remained relatively constant for the last seven years. The last water sample with elevated methane noted by the Department was documented in 2012, and the last water sample with elevated methane noted in Cabot's sampling was in 2016. Further analysis of the levels of combustible gas in the headspace of your Water Supply well demonstrates an obvious downward trend, to the point that combustible gas has not been detected since screening in 2012.

The data collected and reviewed during this investigation supports the Department's original assertion that the detectable levels of dissolved methane in the Water Supply and combustible gas in the water well headspace were not background concentrations. It also supports the Department's conclusion that the current levels of dissolved methane in your Water Supply and combustible gas in the headspace are consistent with expected background conditions. Please note that when the Department observed elevated levels of dissolved methane in water samples obtained in 2012, a sample was also collected after the installed treatment system. That sample was found to have only negligible levels of dissolved methane, indicating that the treatment system is effectively removing any remaining dissolved methane. Additionally, the Department has evaluated the data and determined that the other compounds analyzed in your Water Supply are now comparable to predrill sample results, or are consistent with expected background conditions. Although still elevated above Statewide Standards, manganese is common in fresh groundwater aquifers in the area and it is not unusual for it to be present in water supplies above those standards. Since manganese was not analyzed in a pre-drill sample, it is not possible to say

with certainty whether the levels detected in the untreated water are representative of pre-drill conditions.

Based on its investigation, the Department has determined that the impacts to your Water Supply were temporary and that the concentration of methane in the Water Supply is now consistent with expected background conditions. In addition, as noted above, the treatment system on your Water Supply is effectively addressing the manganese. As a result, the Department does not plan to require further action regarding the Water Supply.

Please contact Michael O'Donnell at 570.346.5530 should you have any questions concerning this matter.

Sincerely,

Jennifer W. Means
Environmental Program Manager
Eastern Oil and Gas District

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"How to Interpret A Water Analysis Report"

cc:
Michael O'Donnell
Eric Rooney, P.G.
Sharon Steinbacher
Dimock Gas Migration File

All results in mg/l unless otherwise noted	7/17/2008 Cabot Pre-Drill	12/17/2008 DEP Raw	1/21/2009 DEP Raw	4/19/2010 DEP Raw	6/15/2010 DEP Raw	7/8/2010 DEP Raw	7/13/2010 DEP Raw	7/21/2010 DEP Raw	7/29/2010 DEP Raw	8/4/2010 DEP Raw	8/11/2010 DEP Raw	8/18/2010 DEP Raw	8/24/2010 DEP Raw	MCL or Action Level *Denotes Primary
Methane	~	~	0.0665	39.3	33.3 (E)	21.2	23.6	11.3	7.97	9.85	6.78	3.55	0.569	7
Ethane	~	~	<0.0198	1.42	1.4	0.842	0.716	0.26	0.244	0.236	0.0809	0.0442	0.00855	No Standard
Propane	~	~	<0.0198	<0.0198	Cancelled	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	No Standard
Ethene	~	~	<0.0198	<0.0198	Cancelled	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	No Standard
Alkalinity	~	~	~	116.6	118	113.6	114.4	116.4	115	114.8	117.2	115.4	113.8	No Standard
Aluminum	~	<0.010	~	0.462	0.0652	0.0251	0.05	<0.010	<0.200	<0.01	<0.2	0.01	<0.2	0.2
Arsenic	~	<0.003	~	~	~	~	~	~	~	~	~	~	~	*0.01
Barium	~	0.175	~	0.192	0.182	0.148	0.166	0.156	0.147	0.151	0.162	0.16	0.146	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	~	~	~	32.4	32.3	34.1	30.8	30.9	34.4	34.4	30.3	32	31.7	No Standard
Hardness	~	~	~	112	112	117	113	111	118	119	110	114	110	No Standard
Iron	0.015	0.031	~	0.541	0.131	0.051	0.023	<0.020	0.023	<0.02	<0.02	<0.02	<0.02	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	5.84	3.633	~	7.488	7.567	7.868	8.617	8.215	7.728	8.009	8.268	8.276	7.455	No Standard
Manganese	~	0.027	~	0.21	0.583	0.026	0.029	0.026	0.021	0.026	0.029	0.026	0.02	0.05
pH (units)	7.1	8.1	~	8.1	7.8	7.9	8.2	8	7.6	7.8	7.8	7.9	7.9	6.5-8.5
Potassium	~	~	~	1.404	1.238	1.223	1.249	1.215	1.237	1.264	1.219	1.212	1.152	No Standard
Selenium	~	<0.007	~	~	~	~	~	~	~	~	~	~	~	*0.05
Sodium	~	45.3	~	6.493	6.677	6.526	7.714	7.417	7.144	7.344	7.837	7.503	7.396	No Standard
SPC (uS/cm)	~	~	~	247	255	249	253	248	252	251	254	247	258	No Standard
Strontium	~	~	~	0.399	0.471	0.302	0.358	0.332	0.315	0.324	0.347	0.34	0.317	No Standard
Total Chloride	6.55	11	~	3	3.3	3.1	3	2.9	3.1	3	3	2.9	3	250
TDS	164	196	~	158	156	144	156	154	136	152	152	138	148	500
Total Sulfate	~	9.87	~	~	~	~	~	~	~	~	~	~	~	250
TSS	<5	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	<0.3 NTU	~	~	~	~	~	~	~	~	~	~	~	*1 NTU
Zinc	~	0.011	~	~	~	~	~	~	~	~	~	~	~	5

Highlighting indicates an exceeded standard or level

~ not analyzed

< analyte not observed above the detection limit

All results in mg/l unless otherwise noted	8/31/2010 DEP Raw	9/8/2010 DEP Raw	9/15/2010 DEP Raw (Duplicate)	9/21/2010 DEP Raw	10/7/2010 DEP Raw	10/13/2010 DEP Raw	10/21/2010 DEP Raw	2/13/2012 DEP Raw (Dissolved)	2/13/2012 DEP Treated (Dissolved)	7/23/2014 DEP Raw	7/23/2014 DEP Treated	7/18/2018 DEP Raw	MCL or Action Level *Denotes Primary
Methane	0.118	0.293	0.44	0.12	0.0207	0.379	0.814	22.8	0.0343	1.58	<0.012	0.19	7
Ethane	<0.0079	<0.0079	0.00145	<0.0079	<0.0079	<0.0079	<0.0079	0.522	<0.0198	<0.0124	<0.0124	<0.0124	No Standard
Propane	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0142	<0.0142	<0.0142	<0.0142	<0.0142	No Standard
Ethene	<0.0079	<0.0079	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	~	~	~	~	~	No Standard
Alkalinity	115.6	116.2	114	119.4	116.8	117.4	115.4	~	~	107.4	110	114.4	No Standard
Aluminum	<0.2	<0.2	<0.2(0.075)	<0.2	<0.2	<0.2	<0.2	0.0105(<0.01)	<0.01(<0.01)	<0.2	<0.2	<0.2	0.2
Arsenic	~	~	<0.003	~	~	~	~	<0.003(<0.003)	<0.003(<0.003)	<0.003	<0.003	<0.003	*0.01
Barium	0.144	0.151	0.148(0.147)	0.145	0.159	0.136	0.138	0.155(0.150)	0.149(0.155)	0.216	0.121	0.189	*2
Bromide	~	~	~	~	~	~	~	<0.2	<0.2	<0.2	<0.2	<0.2	No Standard
Calcium	32.1	28.6	32.4	31.5	29.4	32.9	32.7	33.7(32.6)	31.7(30.6)	32.16	31.18	34.24	No Standard
Hardness	112	105	111	107	108	112	113	~	~	111	108	118	No Standard
Iron	<0.2	<0.02	<0.02(<0.02)	<0.02	<0.02	<0.02	<0.02	<0.02(<0.02)	<0.02(<0.02)	0.03	<0.02	0.021	0.3
Lithium	~	~	~	~	~	~	~	~	~	<0.025	<0.025	<0.025	No Standard
Magnesium	7.649	8.035	7.327(7.138)	6.836	8.49	7.29	7.538	7.549(7.8)	7.198(7.497)	7.33	7.178	7.91	No Standard
Manganese	0.012	0.01	<0.01(<0.01)	<0.01	<0.01	<0.01	<0.01	0.043(0.044)	0.039(0.04)	0.71	<0.01	0.252	0.05
pH (units)	7.4	7.9	7.8(7.9)	7.3	7.8	7.7	7.8	~	~	7.7	8.1	8	6.5-8.5
Potassium	1.147	1.186	1.203	1.165	1.209	1.17	1.258	1.217(1.24)	1.258(1.288)	1.323	1.252	1.26	No Standard
Selenium	~	~	<0.007	~	~	~	~	<0.007(<0.007)	<0.007(<0.007)	<0.007	<0.007	<0.007	*0.05
Sodium	6.814	7.25	9.81(10.1)	8.986	7.822	6.848	7.246	8.444(8.603)	10.8(10.5)	10.52	11.01	9.55	No Standard
SPC (uS/cm)	259	255	255	259	259	248	257	~	~	269	260	264	No Standard
Strontium	0.304	0.323	0.371	0.361	0.344	0.297	0.294	0.434(0.448)	0.479(0.498)	0.63	0.58	0.543	No Standard
Total Chloride	2.6	2.9	2.8(3.52)	2.8	2.9	2.6	2.7	5.38	5.27	12.1	9.1	6.7	250
TDS	146	154	118(134)	156	<5	144	154	146	154	166	172	156	500
Total Sulfate	~	~	11.9	~	~	~	~	13.42	13.01	17.9	16.1	14.07	250
TSS	~	~		~	~	~	~	<5	<5	<5	<5	<5	No Standard
Turbidity (NTU)	~	~	0.37 NTU	~	~	~	~	~	~	<1NTU	<1	<1	*1 NTU
Zinc	~	~	<0.01	~	~	~	~	<0.01(<0.01)	0.012(0.01)	<0.01	<0.01	<0.01	5

Highlighting indicates an exceeded standard or level

~ not analyzed

< analyte not observed above the detection limit

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

February 8, 2019

CERTIFIED MAIL NO. 7018 1130 0001 2752 9007

[redacted]

Subject Address: [redacted]

Re: 58 Pa. C.S. § 3218 Determination
Water Supply Request for Investigation
Dimock Township, Susquehanna County

Dear [redacted]

The Department has completed its investigation of your water supply located at the above referenced subject address ("Water Supply"). Based on the sample results reviewed and supplementary information obtained to date, the Department has determined that the Water Supply was temporarily affected by oil and gas activities but has returned to expected background conditions. Nevertheless, please note that, in the absence of any treatment, the water quality in the subject Water Supply does not meet (i.e., is worse than) the following aesthetic and health standards.

Parameter	Unit	Statewide Standards or Recommended Levels	Your Sample Results that Are Above Statewide Standards/Levels
Iron	mg/L	0.3	2.43
Manganese	mg/L	0.05	0.147
Turbidity	NTU	1	54.4

It is the Department's understanding that the subject Water Supply has been abandoned.

Summary of Investigation

In response to a request to investigate potential impacts to the subject Water Supply, the Department collected a water sample on September 18, 2008. During its investigation, the Department became aware of the presence of combustible gas in the headspace of the subject water well and of elevated dissolved methane, iron, and aluminum in the Water Supply. Samples from the Water Supply were collected by the Department as shown in the attached tables, and submitted to the Department's laboratory in Harrisburg for analysis. The sample results were

previously provided to the former property owner but are summarized in pertinent part for your reference in the attached tables.

The initial sample results from the Water Supply had detectable levels of iron that were elevated over pre-drill iron concentrations. Consequently, the Department issued a determination letter in December of 2008. Continued sampling later revealed that the levels of dissolved methane and aluminum were above Statewide Standards/Levels. In addition, screening of the headspace of the Water Supply also revealed a consistent presence of combustible gas. On November 4, 2009, the Department again documented that the subject Water Supply was impacted by nearby oil and gas activities based on the timing of those activities and the distance between the Water Supply and those activities.

On December 15, 2010, the Department executed a Consent Order and Settlement Agreement (COSA) with Cabot Oil and Gas Corporation (Cabot). In addition to a provision for a whole house treatment system, the COSA required the creation of an escrow fund for the impacted water supply property owner. That escrow fund was to hold the greater of $50,000 or two times the assessed value of the property and was intended to provide for ongoing operating and/or maintenance expenses related to restoring or replacing the affected water supply. Cabot was also required to continue sampling the water supply at regular intervals until enough supporting data was collected to meet the requirements of the COSA. The Department has received sufficient data to support the following conclusions.

Dissolved methane data for the Water Supply shows that the concentrations detected in the subject Water Supply have decreased since 2009 and 2010, stabilized, and have remained near or below detectable concentrations since 2011. The levels of combustible gas detected in the headspace of the water supply also exhibit a similar decrease over the same time period. This information supports the Department's original assertion that the detectable, elevated levels of methane dissolved in the Water Supply were not background concentrations. It also supports the Department's conclusion that the current levels of dissolved methane in the subject Water Supply are consistent with expected background conditions. While the most recent samples indicate elevations in the levels of dissolved iron, manganese, and turbidity, the Department believes these elevations to be related to the fact that this water supply has been abandoned since 2013. Since the well was abandoned, all samples are collected using a generator to operate the existing submersible pump. These sampling events are the only time the subject Water Supply is used. Although the well is purged, the stagnant conditions in the well appear to be the cause of the elevations in iron, manganese, and turbidity. Furthermore, these elevations are not consistent with earlier data collected and have only been observed consistently at similar levels since the abandonment occurred.

Based on its investigation, the Department has determined that the impacts to the subject Water Supply were temporary and that the concentration of methane in the Water Supply is now consistent with expected background conditions. As a result, the Department does not plan to require further action regarding the Water Supply. The Department recommends you have the well evaluated by a qualified professional in the event you plan to put it back into service.

Please contact Michael O'Donnell at 570.346.5530 should you have any questions concerning this matter.

Sincerely,

Jennifer W. Means
Environmental Program Manager
Eastern Oil and Gas District

Enclosures:
Laboratory Analytical Tables
"How to Interpret A Water Analysis Report"

cc:
Michael O'Donnell
Eric Rooney, P.G.
Sharon Steinbacher
Dimock Gas Migration File

All results in mg/l unless otherwise noted	7/31/2008 Cabot Pre-drill	9/18/2008 DEP Raw	11/19/2008 DEP Raw	11/19/2008 DEP Treated	12/16/2008 DEP Raw	12/16/2008 DEP Treated	1/12/2009 DEP Post Chlor	1/29/2009 DEP Raw	2/13/2009 DEP Raw	2/23/2009 DEP Raw	3/26/2009 DEP Raw	3/26/2009 DEP Treated	4/14/2009 DEP Raw	MCL or Action Level *Denotes Primary
Methane	~	~	~	~	~	~	17.6	18.2	~	18.6	19.6	~	14.4	7
Ethane	~	~	~	~	~	~	0.924	0.878	~	0.867	0.812	~	0.722	No Standard
Propane	~	~	~	~	~	~	0.0392	0.0229	~	0.0266	<0.0198	~	<0.0198	No Standard
Ethene	~	~	~	~	~	~	<0.0198	<0.0198	~	<0.0198	<0.0198	~	<0.0198	No Standard
Alkalinity	~	93.8	112	58.8	103	77	~	~	94.8	89.6	94.2	69.6	~	No Standard
Aluminum	~	~	2.55	<0.20	2.2	<0.010	~	~	1.145	1.479	0.628	<0.2	~	0.2
Arsenic	~	~	~	~	~	~	~	~	~	~	~	~	~	*0.01
Barium	~	0.193	0.203	<0.01	0.206	<0.01	~	~	0.199	0.203	0.18	<0.01	~	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	~	31.4	37	<0.03	35.1	<0.03	~	~	36.3	33.1	34.5	0.059	~	No Standard
Hardness	~	107	122	0	119	0	~	~	122	113	115	0	~	No Standard
Iron	0.011	0.551	1.106	<0.020	1.729	<0.020	~	~	1.658	1.915	0.956	<0.02	~	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	<0.030	6.83	7.266	<0.01	7.526	<0.01	~	~	7.629	7.309	6.93	<0.01	~	No Standard
Manganese	~	0.024	0.021	<0.010	0.027	<0.010	~	~	0.031	0.037	0.628	<0.01	~	0.05
pH (units)	7.2	7.3	7.7	6.7	7.6	7	~	~	7.7	7.6	7.8	7.3	~	6.5-8.5
Potassium	~	1.335	1.406	<1.0	1.869	<1.0	~	~	1.448	1.502	1.47	<1.0	~	No Standard
Selenium	~	~	~	~	~	~	~	~	~	~	~	~	~	*0.05
Sodium	~	14.3	26	82.9	18.9	76.1	~	~	11.5	9.287	10.8	72.6	~	No Standard
SPC (uS/cm)	~	277	361	403	331	348	~	~	288	273	298	326	~	No Standard
Strontium	~	0.218	0.198	<0.010	0.198	<0.010	~	~	0.206	0.193	0.185	<0.01	~	No Standard
Total Chloride	12.7	15.2	30.5	38.5	24.3	30.1	~	~	15.5	13.6	21.6	27.6	~	250
TDS	190	186	214	234	244	240	~	~	204	186	208	202	~	500
Total Sulfate	~	~	~	~	~	~	~	~	~	~	~	~	~	250
TSS	<5	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	~	~	~	~	~	~	~	~	~	~	~	~	*1 NTU
Zinc	~	~	~	~	~	~	~	~	~	~	~	~	~	5

Highlighting indicates an exceeded standard or level

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All results in mg/l unless otherwise noted	4/14/2009 DEP Treated	4/30/2009 DEP Raw	4/30/2009 DEP Treated	7/15/2009 DEP Raw	7/15/2009 DEP Treated	10/21/2009 DEP Raw	10/21/2009 DEP Treated	2/4/2010 DEP Raw	4/13/2010 DEP Raw	4/27/2010 DEP Raw	5/27/2010 DEP Raw	6/9/2010 DEP Raw	6/15/2010 DEP Raw	MCL or Action Level *Denotes Primary
Methane	6.48	12.6	0.61	10.8	2.98	14.1	1.32	19.9	10.6	<0.00992	0.0667	<0.00792	2.21	7
Ethane	0.369	0.564	0.0479	0.172	0.161	0.57	0.0736	0.631	<0.0198	<0.0198	<0.0198	<0.0198	0.0448	No Standard
Propane	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	Cancelled	Cancelled	No Standard
Ethene	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	Cancelled	Cancelled	No Standard
Alkalinity	~	94.8	72.8	93.6	90	111.6	88.4	88.4	111.4	106.4	80.2	109	85.4	No Standard
Aluminum	~	0.751	<0.2	3.075	0.0391	1.02	<0.2	2.787	0.956	0.415	0.0518	0.0817	0.0132	0.2
Arsenic	~	~	~	~	~	~	~	~	~	~	~	~	~	*0.01
Barium	~	0.157	<0.01	0.193	<0.01	0.178	<0.01	0.2	0.238	0.19	0.164	0.177	0.165	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	~	33.2	<0.03	36.6	0.036	35.8	<0.03	36.2	34.4	34.1	29.8	35.1	29.6	No Standard
Hardness	~	110	0	121	0	120	0	121	115	113	97	116	97	No Standard
Iron	~	0.193	<0.02	1.73	<0.020	0.21	<0.02	4.517	1.181	0.548	0.071	0.111	<0.020	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	~	6.554	<0.01	7.247	<0.01	7.31	<0.01	7.423	6.943	6.781	5.459	6.859	5.618	No Standard
Manganese	~	<0.01	<0.01	0.043	<0.01	0.033	<0.01	0.11	0.048	0.013	0.014	<0.010	0.011	0.05
pH (units)	~	7.6	7.8	7.7	8	7.7	7.9	7.6	7.8	8	7.3	7.4	7.2	6.5-8.5
Potassium	~	1.087	<1.0	1.55	<1.0	1.32	<1.0	1.783	1.499	1.417	1.158	1.213	1.145	No Standard
Selenium	~	~	~	~	~	~	~	~	~	~	~	~	~	*0.05
Sodium	~	17.9	66.3	14.8	60.4	21.4	71.7	7.924	17	19.3	10.3	17.2	7.913	No Standard
SPC (uS/cm)	~	320	331	315	315	342	350	260	295	300	243	314	243	No Standard
Strontium	~	0.174	<0.01	0.197	<0.01	0.212	<0.01	171	0.228	0.226	0.175	0.216	0.181	No Standard
Total Chloride	~	24.2	27.6	22.4	22.5	23.4	27.1	13.6	17.5	16.5	10.2	17.4	10.2	250
TDS	~	206	206	206	188	222	228	180	184	184	160	178	160	500
Total Sulfate	~	~	~	~	~	~	~	~	~	~	~	~	~	250
TSS	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	~	~	~	~	~	~	~	~	~	~	~	~	*1 NTU
Zinc	~	~	~	~	~	~	~	~	~	~	~	~	~	5

Highlighting indicates an exceeded standard or level

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All results in mg/l unless otherwise noted	6/24/2010 DEP Raw	7/6/2010 DEP Raw	7/13/2010 DEP Raw	7/21/2010 DEP Raw	7/29/2010 DEP Raw	8/4/2010 DEP Raw	8/11/2010 DEP Raw	8/18/2010 DEP Raw	8/24/2010 DEP Raw	8/31/2010 DEP Raw	9/8/2010 DEP Raw	9/15/2010 DEP Raw (Duplicate)	10/7/2010 DEP Raw	MCL or Action Level *Denotes Primary
Methane	0.447	1.21	<0.0079	1.74	<0.0079	<0.0079	4.45	0.0712	0.00904	0.0157	<0.0079	0.0156	0.0116	7
Ethane	<0.0198	0.0301	<0.0079	0.0586	<0.0079	<0.0079	0.097	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	No Standard
Propane	Cancelled	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	No Standard
Ethene	Cancelled	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0198	<0.0198	No Standard
Alkalinity	101.2	114.2	111.6	117	83	111	91.6	118.4	117.2	105.6	89.2	115.2	103.8	No Standard
Aluminum	0.0656	0.0745	0.0474	0.0218	<0.200	0.116	<0.2	0.0978	<0.2	<0.2	<0.2	<0.2(0.0477)	<0.2	0.2
Arsenic	~	~	~	~	~	~	~	~	~	~	~	<0.03	~	*0.01
Barium	0.16	0.17	0.171	0.18	0.17	0.182	0.163	0.173	0.17	0.17	0.154	0.166(0.16)	0.195	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	38.4	33	32.8	29.7	34.8	35	33.4	32.6	32.2	37.1	31.9	30.7	34.9	No Standard
Hardness	127	109	111	102	113	116	114	109	107	122	108	103	119	No Standard
Iron	0.108	0.096	0.054	0.036	0.141	0.0207	0.065	0.136	0.19	0.031	0.052	0.033(0.036)	0.031	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	7.41	6.394	7.076	6.783	6.368	6.845	7.304	6.627	6.519	7.099	6.934	6.259(5.921)	7.827	No Standard
Manganese	<0.01	<0.010	<0.010	<0.010	0.011	<0.01	<0.010	<0.01	0.016	<0.1	<0.01	<0.01(<0.010)	<0.01	0.05
pH (units)	7.8	7.8	8.1	7.9	7	7.7	7.6	8	7.9	7.1	7.2	7.9(8)	7.6	6.5-8.5
Potassium	1.29	1.197	1.244	1.236	1.249	1.295	1.208	1.231	1.237	1.141	1.225	1.249	1.25	No Standard
Selenium	~	~	~	~	~	~	~	~	~	~	~	<0.007	~	*0.05
Sodium	9.31	22.5	18.3	23	10.7	19	9.322	27	24.3	9.49	9.782	26.7(28.1)	12.3	No Standard
SPC (uS/cm)		326	318	324	273	314	295	320	336	312	290	333	318	No Standard
Strontium	0.223	0.215	0.222	0.227	0.185	0.225	0.182	0.215	0.217	0.197	0.175	2.17	0.235	No Standard
Total Chloride	16.2	17.2	17	16.8	11.9	17.3	15.4	17.9	16.9	16.5	13.8	17.3(18.6)	16.6	250
TDS	188	192	200	190	156	190	174	198	196	198	182	202(178)	186	500
Total Sulfate	~	~	~	~	~	~	~	~	~	~	~	16.6	~	250
TSS	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	~	~	~	~	~	~	~	~	~	~	1.25	~	*1 NTU
Zinc	~	~	~	~	~	~	~	~	~	~	~	0.027	~	5

Highlighting indicates an exceeded standard or level

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< analyte not observed above the detection limit

All results in mg/l unless otherwise noted	10/12/2010 DEP Raw	10/19/2010 DEP Raw	10/26/2010 DEP Raw	11/2/2010 DEP Raw	11/8/2010 DEP Raw	11/15/2010 DEP Raw	11/22/2010 DEP Raw	12/2/2010 DEP Raw	12/7/2010 DEP Raw	1/21/2014 DEP Raw (Dissolved)	7/18/2018 DEP Raw			MCL or Action Level *Denotes Primary
Methane	<0.0079	<0.0079	<0.0079	9.11	<0.0079	<0.0079	<0.0079	0.00889	0.0196	0.014	0.468			7
Ethane	<0.0079	<0.0079	<0.0079	0.781	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0124	<0.0124			No Standard
Propane	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0079	<0.0198	<0.0198	<0.0198	<0.0142	<0.0142			No Standard
Ethene	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0079	<0.0079	~	~			No Standard
Alkalinity	105.2	105.2	107	123	102.6	102	107.4	96.6	108.8	98.2	169			No Standard
Aluminum	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	1.257(<0.2)	1.807			0.2
Arsenic	~	~	~	~	~	~	~	~	~	<0.003(<0.003)	<0.003			*0.01
Barium	0.182	0.182	0.188	0.264	0.172	0.165	0.183	0.174	0.185	0.372(0.348)	0.184			*2
Bromide	~	~	~	~	~	~	~	~	~	<0.2(<0.2)	<0.2			No Standard
Calcium	37.2	37.2	36.1	28.7	36.95	36.2	35	37.3	35.4	28.6(27.9)	12.75			No Standard
Hardness	122	122	118	92	122	119	116	122	117	95	44			No Standard
Iron	0.119	0.119	0.038	0.571	0.145	0.113	0.154	0.087	0.203	6.98(0.05)	2.43			0.3
Lithium	~	~	~	~	~	~	~	~	~	0.032(0.031)	0.126			No Standard
Magnesium	7.043	7.043	6.794	4.847	7.09	6.99	6.973	7.086	6.945	5.602(5.718)	2.96			No Standard
Manganese	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.16(0.042)	0.147			0.05
pH (units)	7.6	7.6	7.4	8	7.4	7.6	7.6	7.6	7.7	7.4	8.3			6.5-8.5
Potassium	1.262	1.262	1.25	1.425	1.274	1.218	1.341	1.311	1.366	1.792(1.524)	1.99			No Standard
Selenium	~	~	~	~	~	~	~	~	~	<0.007(<0.007)	<0.007			*0.05
Sodium	12.9	12.9	16.6	16.8	14.29	14.4	19.3	12.3	18.5	16.4(15.8)	72.59			No Standard
SPC (uS/cm)	319	319	310	258	309	315	323	310	331	260	386			No Standard
Strontium	0.232	0.232	0.232	0.66	0.214	0.216	0.232	0.215	0.253	0.44(0.468)	0.236			No Standard
Total Chloride	16.8	16.8	17.7	3.8	19	18.7	18.6	18.4	18.7	11.8	14.42			250
TDS	194	194	186	172	174	166	176	190	190	162	234			500
Total Sulfate	~	~	~	~	~	~	~	~	~	17	17.55			250
TSS	~	~	~	~	~	~	~	~	~	6	24			No Standard
Turbidity (NTU)	~	~	~	~	~	~	~	~	~	23.52	54.4			*1 NTU
Zinc	~	~	~	~	~	~	~	~	~	0.403(0.064)	0.238			5

Highlighting indicates an exceeded standard or level

~ not analyzed

< analyte not observed above the detection limit

pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

February 8, 2019

CERTIFIED MAIL NO. 7018 1130 0001 2752 9007

[redacted]

Re: 58 Pa. C.S. § 3218 Determination
Water Supply Request for Investigation
Dimock Township, Susquehanna County

Dear [redacted]

The Department has completed its investigation of your water supply located at the above referenced address ("Water Supply"). Based on the sample results reviewed and supplementary information obtained to date, the Department has determined that your Water Supply was temporarily affected by oil and gas activities but has returned to expected background conditions. Nevertheless, please note that, in the absence of any treatment, your water quality does not meet (i.e., is worse than) the following aesthetic and health standards.

Parameter	Unit	Statewide Standards or Recommended Levels	Your Sample Results that Are Above Statewide Standards/Levels
Manganese	mg/L	0.05	0.058
Turbidity	NTU	1	3.55

Based on the most recent post-treatment system sampling, the treatment system that was previously installed appears to have been effectively reducing the levels of the above contaminants to below detection limits. The Department's investigation into your complaint is detailed below.

Summary of Investigation

In response to a request to investigate potential impacts to your Water Supply, the Department collected a water sample on November 19, 2008. During the investigation, the Department became aware of the presence of combustible gas in the headspace of your water well and dissolved methane, iron, manganese, and aluminum in your Water Supply. During inspections conducted by the Department, and by others over the course of the investigation, combustible gas was observed at various levels in the headspace of your well and dissolved methane was detected in your Water Supply. Samples from your Water Supply were collected by the Department as shown in the attached tables, and submitted to the Department's laboratory in

Harrisburg for analysis. The sample results were previously provided to you but are summarized in pertinent part for your reference in the attached tables.

Results of samples from your Water Supply periodically had detectable levels of aluminum, iron and manganese above Statewide Standards/Levels. Screening of the headspace of the Water Supply also revealed a consistent presence of combustible gas. On November 4, 2009, the Department determined that your Water Supply was presumed to be impacted by nearby oil and gas activities based on the timing of those activities and the distance between your Water Supply and those activities.

On December 15, 2010, the Department executed a Consent Order and Settlement Agreement (COSA) with Cabot Oil and Gas Corporation (Cabot). In addition to a provision for a whole house treatment system, the COSA required the creation of an escrow fund for you as an impacted water supply property owner. Your fund was to hold the greater of $50,000 or two times the assessed value of your property, and the fund was intended to provide for ongoing operating and/or maintenance expenses related to restoring or replacing your affected water supply. Cabot was also required to continue sampling your water supply at regular intervals until enough supporting data was collected to meet the requirements of the COSA. The Department has received sufficient data to support the following conclusions.

Dissolved methane data for your Water Supply establishes that the concentrations detected in your Water Supply have shown a decreasing trend since 2012 and have remained near or below detectable concentrations since 2016. The presence of combustible gas detected in the headspace of your Water Supply has also exhibited a similar decrease over the same time period. This information supports the Department's original assertion that the detectable, elevated levels of methane dissolved in the Water Supply were not background concentrations. It also supports the Department's conclusion that the current levels of dissolved methane in the subject Water Supply are consistent with expected background conditions. Additionally, the Department has evaluated the data and determined that the other compounds analyzed in your Water Supply are now comparable to expected background conditions. Although still elevated above Statewide Standards, manganese and turbidity are common in fresh groundwater aquifers in the area and it is not unusual for them to be present in water supplies above those standards. Since manganese and turbidity were not analyzed in the pre-drill sample, it is not possible to say with certainty whether the levels detected in your untreated water are representative of pre-drill conditions. The elevated levels of turbidity appear to be related to bacteriological activity that has been documented previously in your Water Supply.

Based on its investigation, the Department has determined that the impacts to your Water Supply were temporary and that the concentration of methane in your Water Supply is now consistent with expected background conditions. In addition, as noted above, the treatment system previously installed on your Water Supply and available for your use has the ability to address the manganese when in operation. As a result, the Department does not plan to require further action regarding the Water Supply.

Please contact Michael O'Donnell at 570.346.5530 should you have any questions concerning this matter.

Sincerely,

Jennifer W. Means
Environmental Program Manager
Eastern Oil and Gas District

Enclosures:
Laboratory Analytical Tables
"How to Interpret A Water Analysis Report"

cc:
Michael O'Donnell
Eric Rooney, P.G.
Sharon Steinbacher
Dimock Gas Migration File

All results in mg/l unless otherwise noted	7/17/2008 Cabot Pre-Drill	11/19/2008 DEP Raw	12/16/2008 DEP Raw	12/16/2008 DEP Raw	1/12/2009 DEP Raw	1/29/2009 DEP Raw	3/17/2009 DEP Raw	4/14/2009 DEP Raw	4/14/2009 DEP Treat	4/30/2009 DEP Raw	4/30/2009 DEP Treated	7/15/2009 DEP Raw	7/15/2009 DEP Treated	MCL or Action Level *Denotes Primary
Methane	~	~	~	~	7.99	14.2	5.62	0.311	<0.00792	11.8	3.12	2.09	0.0202	7
Ethane	~	~	~	~	0.086	0.476	0.031	<0.0198	<0.0198	0.469	0.115	<0.0198	<0.0198	No Standard
Propane	~	~	~	~	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	No Standard
Ethene	~	~	~	~	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	No Standard
Alkalinity	~	94.8	79.6	~	~	~	62.4	~	~	85.6	85.8	73.4	74.4	No Standard
Aluminum	~	<0.2	0.224	0.714	~	~	<0.2	~	~	0.366	<0.2	0.0135	0.0113	0.2
Arsenic	~	~	~	<0.003	~	~	~	~	~	~	~	~	~	*0.01
Barium	~	0.134	0.14	0.141	~	~	0.096	~	~	0.117	0.101	0.116	0.112	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	~	31.6	31.9	~	~	~	28.4	~	~	30	28.4	32.6	33.7	No Standard
Hardness	~	103	106	~	~	~	91	~	~	98	93	108	109	No Standard
Iron	0.03	0.135	0.284	0.086	~	~	0.034	~	~	0.509	0.104	<0.02	<0.02	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	5.96	5.76	6.273	6.377	~	~	4.925	~	~	5.684	5.285	6.396	6.086	No Standard
Manganese	~	<0.010	<0.010	<0.010	~	~	<0.010	~	~	0.012	<0.01	<0.01	<0.01	0.05
pH (units)	6.3	7.4	7	6.9	~	~	7.1	~	~	7.8	7.5	7.5	7.9	6.5-8.5
Potassium	~	1.07	1.137	~	~	~	<1	~	~	1.024	<1.0	1.073	1.038	No Standard
Selenium	~	~	~	<0.007	~	~	~	~	~	~	~	~	~	*0.05
Sodium	~	14.2	12.9	9.24	~	~	10.1	~	~	11.7	15.5	14.5	14.5	No Standard
SPC (uS/cm)	~	262	278	~	~	~	242	~	~	263	272	302	303	No Standard
Strontium	~	0.129	0.135	~	~	~	0.089	~	~	0.111	0.105	0.118	0.112	No Standard
Total Chloride	7.9	12.1	20.8	20.6	~	~	22.9	~	~	17.2	20.3	34	34.2	250
TDS	149	154	202	166	~	~	152	~	~	164	172	186	200	500
Total Sulfate	~	~	~	13.1	~	~	~	~	~	~	~	~	~	250
TSS	<5	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	~	~	2.65 NTU	~	~	~	~	~	~	~	~	~	*1 NTU
Zinc	~	~	~	0.032	~	~	~	~	~	~	~	~	~	5

Highlighting indicates an exceeded standard or level

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All results in mg/l unless otherwise noted	10/1/2009 DEP Raw	10/1/2009 DEP Treated	4/13/2010 DEP Raw	4/27/2010 DEP Raw	5/27/2010 DEP Raw	5/27/2010 DEP Treated	6/2/2010 DEP Raw	6/2/2010 DEP Treated	6/9/2010 DEP Raw	6/15/2010 DEP Raw	6/15/2010 DEP Treated	6/24/2010 DEP Raw	6/24/2010 DEP Treated	MCL or Action Level *Denotes Primary
Methane	16	1.5	<0.00792	<0.00792	6.67	3.19	11.1	0.896	0.154	5.04	2.38	5.91	0.902	7
Ethane	0.802	0.0961	<0.0198	<0.0198	<0.0198	0.0274	0.292	0.0283	<0.0198	0.0932	0.0399	0.0295	<0.0198	No Standard
Propane	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	Cancelled	Cancelled	Cancelled	Cancelled	Cancelled	Cancelled	Cancelled	No Standard
Ethene	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	Cancelled	Cancelled	Cancelled	Cancelled	Cancelled	Cancelled	Cancelled	No Standard
Alkalinity	90.2	92	64.8	75	76.6	83.6	85.8	85.6	76	73.4	86.8	83.2	85.6	No Standard
Aluminum	<0.2	<0.2	0.0218	6.05	0.177	0.0445	0.11	0.0885	0.0657	0.042	0.0359	0.0345	0.0317	0.2
Arsenic	~	~	~	~	~	~	~	~	~	~	~	~	~	*0.01
Barium	0.129	0.14	0.234	0.284	0.104	0.119	0.111	0.112	0.104	0.114	0.113	0.16	0.118	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	30.6	30.3	29	28.4	31.9	32.1	32.2	31.2	31.6	32.5	30.8	34.9	34.8	No Standard
Hardness	103	104	93	96	104	104	105	101	103	106	101	113	112	No Standard
Iron	0.127	0.106	0.035	10.6	0.291	0.071	0.191	0.16	0.087	0.046	0.044	0.066	0.049	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	6.444	6.835	4.898	6.148	5.77	5.809	6.067	5.662	5.828	5.915	5.757	6.252	6.158	No Standard
Manganese	0.01	<0.01	<0.01	0.362	0.012	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	0.027	0.05
pH (units)	7.7	8	7	7	7.2	7.6	7.4	7.7	7	7	7.3	7.5	7.8	6.5-8.5
Potassium	1.124	1.048	1.172	2.676	1.084	1.061	<1.0	<1.0	<1.0	<1.00	1.013	1.152	1.14	No Standard
Selenium	~	~	~	~	~	~	~	~	~	~	~	~	~	*0.05
Sodium	8.629	9.251	12.7	14.7	7.848	10.3	7.342	11.8	9.22	9.84	12.3	11.2	13.9	No Standard
SPC (uS/cm)	260	259	256	246	257	260	257	262	267	276	278	268	274	No Standard
Strontium	0.125	0.135	0.263	173	0.1	0.123	0.111	0.12	0.101	0.107	0.117	0.171	0.125	No Standard
Total Chloride	13	13.3	26.3	18.4	19.3	18.1	16	16.2	22.1	25.7	21.8	20.9	21.3	250
TDS	168	170	156	168	160	166	122	170	164	190	180	164	176	500
Total Sulfate	~	~	~	~	~	~	~	~	~	~	~	~	~	250
TSS	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	~	~	~	~	~	~	~	~	~	~	~	~	*1 NTU
Zinc	~	~	~	~	~	~	~	~	~	~	~	~	~	5

Highlighting indicates an exceeded standard or level

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All results in mg/l unless otherwise noted	7/8/2010 DEP Raw	7/8/2010 DEP Treated	7/13/2010 DEP Raw	7/13/2010 DEP Treated	7/21/2010 DEP Raw	7/21/2010 DEP Treated	7/28/2010 DEP Raw	8/18/2010 DEP Raw	8/18/2010 DEP Treated	8/24/2010 DEP Raw	8/24/2010 DEP Treated	8/31/2010 DEP Treated	9/2/2010 DEP Raw	MCL or Action Level *Denotes Primary
Methane	10.7	0.332	3.03	1.19	0.565	0.444	~	0.0656	0.0124	<0.0079	<0.0079	0.0809	<0.0079	7
Ethane	0.265	<0.0079	<0.0079	0.0106	<0.0079	<0.0079	~	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	No Standard
Propane	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	~	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0079	No Standard
Ethene	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	~	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0198	No Standard
Alkalinity	86.6	81.8	98.2	97.2	87	90	~	91.4	125.4	91.4	115.6	96.6	124.6	No Standard
Aluminum	0.0271	0.0226	0.0783	0.0268	0.0128	0.0129	0.0234	<0.01	<0.010	<0.2	<0.2	<0.2	<0.2	0.2
Arsenic	~	~	~	~	~	~	<0.003	~	~	~	~	~	~	*0.01
Barium	0.096	0.1	0.131	0.137	0.108	0.12	0.084	0.142	0.118	0.15	0.113	0.109	0.123	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	34.3	34.2	29.4	29.8	32.4	31.1	~	34.2	22.8	33.4	25.5	30.7	1.18	No Standard
Hardness	111	110	101	102	108	104	~	114	76	109	84	99	81	No Standard
Iron	0.039	0.031	0.038	0.026	0.023	<0.020	0.032	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	6.171	5.998	6.708	6.629	6.639	6.256	6.312	6.979	4.675	6.288	4.922	5.408	5.006	No Standard
Manganese	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.01	<0.01	<0.010	<0.010	0.01	<0.01	<0.010	0.05
pH (units)	7.2	7.5	7.9	8.1	7.5	7.9	7.4	7.6	8.3	7.6	8.2	7.3	7.4	6.5-8.5
Potassium	<1.00	<1.00	1.048	1.05	<1.0	1.016	~	1.013	1.099	1.048	1.063	1.049	1.18	No Standard
Selenium	~	~	~	~	~	~	<0.007	~	~	~	~	~	~	*0.05
Sodium	8.698	8.25	9.07	12.4	7.841	11.1	8.872	9.33	38.7	11.9	30.7	19	32.9	No Standard
SPC (uS/cm)	259	258	283	279	266	272	~	268	314	290	315	301	321	No Standard
Strontium	0.104	0.106	0.133	0.15	0.111	0.125	~	0.147	0.147	0.154	0.137	0.116	0.161	No Standard
Total Chloride	15.9	17.5	16.3	14.6	16.4	17.2	19.7	15.4	14.1	18	14.4	18.1	15.8	250
TDS	166	164	176	176	178	134	190	172	194	172	176	178	174	500
Total Sulfate	~	~	~	~	~	~	13.5	~	~	~	~	~	~	250
TSS	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	~	~	~	~	~	1.11	~	~	~	~	~	~	*1 NTU
Zinc	~	~	~	~	~	~	<0.01	~	~	~	~	~	~	5

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All results in mg/l unless otherwise noted	9/8/2010 DEP Raw	9/8/2010 DEP Treated	9/15/2010 DEP Raw	9/15/2010 DEP Treated	9/21/2010 DEP Raw	9/21/2010 DEP Treated	10/12/2010 DEP Raw	10/12/2010 DEP Treated	10/21/2010 DEP Raw	10/21/2010 DEP Treated	10/28/2010 DEP Raw	10/28/2010 DEP Treated	11/2/2010 DEP Raw	MCL or Action Level *Denotes Primary
Methane	1.41	0.0125	<0.0079	<0.0079	2.02	0.0153	10.1	0.819	1.02	0.232	9.36	1.14	24.6	7
Ethane	<0.0079	<0.0079	<0.0079	<0.0079	0.064	<0.0079	0.193	0.0156	0.00957	<0.0079	0.15	0.0234	0.979	No Standard
Propane	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	0.00775J	No Standard
Ethene	<0.0079	<0.0079	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	No Standard
Alkalinity	87.2	94.2	93.2	102.2	172	94.2	84.6	90.6	83.6	99	84.8	85.4	90.8	No Standard
Aluminum	<0.2	<0.2	<0.2	<0.2	0.213	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.2
Arsenic	~	~	~	~	~	~	~	~	~	~	~	~	~	*0.01
Barium	0.119	0.135	0.14	0.122	0.118	0.133	0.108	0.123	0.118	0.11	0.111	0.114	0.116	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	32.1	28.9	33.3	33.3	9.59	31.8	34.5	32	33.8	28.6	34.3	33.8	32.9	No Standard
Hardness	106	99	110	109	32	107	112	104	111	93	111	109	107	No Standard
Iron	0.025	<0.02	<0.020	<0.02	0.48	<0.020	0.022	<0.02	0.027	<0.02	<0.2	<0.02	<0.02	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	6.129	6.481	6.576	6.209	1.877	6.784	6.321	5.915	6.324	5.186	6.102	6.062	5.962	No Standard
Manganese	<0.01	<0.01	<0.01	<0.001	0.057	<0.010	0.012	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05
pH (units)	7.2	7.9	7.6	7.6	9.3	8.2	7.4	7.9	7.2	7.8	7	7.4	7.2	6.5-8.5
Potassium	1.017	1.088	1.053	<0.001	1.28	1.065	1.167	1.151	1.131	1.155	1.054	1.068	1.077	No Standard
Selenium	~	~	~	~	~	~	~	~	~	~	~	~	~	*0.05
Sodium	7.703	9.85	11.6	12.6	70.6	11.6	9.87	13.5	9.66	24	8.766	9.82	11.5	No Standard
SPC (uS/cm)	275	286	279	286	384	284	288	294	278	310	289	289	288	No Standard
Strontium	0.123	0.141	0.158	0.13	0.162	0.141	0.109	0.123	0.12	0.116	0.109	0.112	0.11	No Standard
Total Chloride	16.9	17.8	14.8	14.2	12.5	15.4	19.4	19	19.7	21.3	19.5	19.6	19.5	250
TDS	176	174	172	164	236	40	180	178	180	162	164	174	190	500
Total Sulfate	~	~	~	~	~	~	~	~	~	~	~	~	~	250
TSS	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	~	~	~	~	~	~	~	~	~	~	~	~	*1 NTU
Zinc	~	~	~	~	~	~	~	~	~	~	~	~	~	5

Highlighting indicates an exceeded standard or level

~ not analyzed

< analyte not observed above the detection limit

All results in mg/l unless otherwise noted	11/2/2010 DEP Treated	11/9/2010 DEP Raw	11/9/2010 DEP Treated	11/22/2010 DEP Raw	11/22/2010 DEP Treated	12/2/2010 DEP Raw	12/2/2010 DEP Treated	12/7/2010 DEP Raw	12/7/2010 DEP Treated	1/26/2012 DEP Raw (Dissolved)	1/26/2012 DEP Treated (Dissolved)	1/21/2014 DEP Raw (Dissolved)	MCL or Action Level *Denotes Primary
Methane	11.9	4.19	0.0804	~	0.454	8.23	0.578Q	8.37	0.621	2.86	0.0271	1.58	7
Ethane	0.191	0.065	<0.0079	~	0.02	0.168	0.0138Q	0.112	0.0115	0.0272	<0.0198	0.0207	No Standard
Propane	<0.0198	<0.0198	<0.0198	~	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0142	<0.0142	<0.0142	No Standard
Ethene	<0.0198	<0.0198	<0.0198	~	<0.0198	<0.0079	0.0079	<0.0079	<0.0079	~	~	~	No Standard
Alkalinity	85.4	92	96.4	84	90	78.4	82.4	70.2	70	~	~	84.6	No Standard
Aluminum	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.01(<0.01)	<0.01(<0.01)	<0.2(<0.2)	0.2
Arsenic	~	~	~	~	~	~	~	~	~	<0.003(<0.003)	<0.003(<0.003)	<0.003(<0.003)	*0.01
Barium	0.12	0.132	0.135	0.125	0.12	0.121	0.122	0.108	0.117	0.083(0.082)	0.091(0.089)	0.154(0.153)	*2
Bromide	~	~	~	~	~	~	~	~	~	<0.2	<0.2	<0.2	No Standard
Calcium	33.3	38.3	34.8	32.5	33.9	33.7	34.9	33.2	33.5	28.2(29.5)	28.6(28.5)	29.5(29.4)	No Standard
Hardness	108	124	113	106	111	109	113	107	108	~	~	96	No Standard
Iron	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.021	<0.02	<0.02(<0.02)	<0.02(<0.02)	0.06(<0.02)	0.3
Lithium	~	~	~	~	~	~	~	~	~	<0.025(<0.025)	<0.025(<0.025)	<0.025(<0.025)	No Standard
Magnesium	6.037	6.895	6.191	5.96	6.274	6.085	6.184	5.769	5.885	5.252(5.248)	5.299(5.203)	5.444(5.372)	No Standard
Manganese	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01(<0.01)	<0.01(<0.01)	0.03(<0.01)	0.05
pH (units)	7.6	7.6	7.6	7.2	7.9	7.2	7.9	6.9	7.6	~	~	7	6.5-8.5
Potassium	1.087	1.166	1.082	1.106	1.095	1.118	1.161	1.18	1.163	<1(<1)	<1(<1)	1.23(1.197)	No Standard
Selenium	~	~	~	~	~	~	~	~	~	<0.007(<0.007)	<0.007(<0.007)	<0.007(<0.007)	*0.05
Sodium	11.4	11.7	15.7	15.1	10.3	10.7	11.5	12.5	12.3	9.025(9.04)	9.95(9.93)	18(18)	No Standard
SPC (uS/cm)	287	286	291	285	291	291	292	291	292	~	~	284	No Standard
Strontium	0.111	0.133	0.133	0.123	0.117	0.116	0.117	0.1	0.108	0.084(0.084)	0.095(0.093)	0.19(0.194)	No Standard
Total Chloride	21	21.2	20.3	21.3	21.4	23.3	23.2	29.8	29.3	14.58	14.36	31.2	250
TDS	186	176	184	150	174	184	180	156	158	128	142	168	500
Total Sulfate	~	~	~	~	~	~	~	~	~	14.27	14.29	15.2	250
TSS	~	~	~	~	~	~	~	~	~	<5	<5	<5	No Standard
Turbidity (NTU)	~	~	~	~	~	~	~	~	~	~	~	2.55	*1 NTU
Zinc	~	~	~	~	~	~	~	~	~	<0.01(<0.01)	0.025(0.022)	0.023(0.015)	5

Highlighting indicates an exceeded standard or level

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< analyte not observed above the detection limit

All results in mg/l unless otherwise noted	6/30/2015 DEP Raw	7/17/2018 DEP Raw											MCL or Action Level *Denotes Primary
Methane	<0.012	<0.0116											7
Ethane	<0.0124	<0.0124											No Standard
Propane	<0.0142	<0.0142											No Standard
Ethene	~	~											No Standard
Alkalinity	104.2	70.2											No Standard
Aluminum	<0.2	<0.2											0.2
Arsenic	<0.003	<0.003											*0.01
Barium	0.296	0.082											*2
Bromide	<0.2	<0.2											No Standard
Calcium	23.6	28.8											No Standard
Hardness	76	93											No Standard
Iron	0.04	0.085											0.3
Lithium	0.06	<0.025											No Standard
Magnesium	4.237	5.06											No Standard
Manganese	0.267	0.058											0.05
pH (units)	7.8	7.6											6.5-8.5
Potassium	1.513	<1											No Standard
Selenium	<0.007	0.007											*0.05
Sodium	30.4	6.39											No Standard
SPC (uS/cm)	281	227											No Standard
Strontium	0.41	0.075											No Standard
Total Chloride	11.8	11.83											250
TDS	174	134											500
Total Sulfate	20.6	17.37											250
TSS	<5	<5											No Standard
Turbidity (NTU)	1.65	3.55											*1 NTU
Zinc	0.046	0.017											5

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL
PROTECTION

February 8, 2019

CERTIFIED MAIL NO. 7018 1130 0001 2752 9014

[redacted]

Re: 58 Pa. C.S. § 3218 Determination
Water Supply Request for Investigation
Dimock Township, Susquehanna County

Dear [redacted]

The Department has completed its investigation of your water supply located at the above address ("Water Supply"). Based on the sample results reviewed and supplementary information obtained to date, the Department has determined that your Water Supply was temporarily affected by oil and gas activities but has returned to expected background conditions.

Summary of Investigation

In the course of investigating possible gas migration issues in the area, the Department was granted permission to sample your Water Supply. As a result of this sampling, the Department became aware of the presence of dissolved methane in your Water Supply. Samples from your Water Supply were collected by the Department as shown in the attached tables, and submitted to the Department's laboratory in Harrisburg for analysis. The sample results were previously provided to you but are summarized in pertinent part for your reference in the attached tables.

The initial sample results from your Water Supply had detectable methane at levels the Department believed to be elevated as a result of nearby oil and gas activities. The samples also showed that the Water Supply had levels of aluminum, iron, and manganese above Statewide Standards. On November 4, 2009, the Department determined that your Water Supply was presumed to have been impacted by nearby oil and gas activities based on the timing of those activities and the distance between your Water Supply and those activities.

On December 15, 2010, the Department executed a Consent Order and Settlement Agreement (COSA) with Cabot Oil and Gas Corporation (Cabot). In addition to a provision for a whole house treatment system, the COSA required the creation of an escrow fund for you as an impacted water supply property owner. Your escrow fund was to hold the greater of $50,000 or two times the assessed value of your property, and the fund was intended to provide for ongoing operating and/or maintenance expenses related to restoring or replacing the affected water supply. Cabot was also required to continue sampling your water supply at regular intervals until enough supporting data was collected to meet the requirements of the COSA. The Department has received sufficient data to support the following conclusions.

Dissolved methane data for your Water Supply shows that the concentrations detected in your water supply have decreased since 2009 and 2010, stabilized, and have remained constant for the last five years. This information supports the Department's original assertion that the detectable, elevated levels of methane in the Water Supply were not background concentrations. It also supports the Department's conclusion that the current levels of dissolved methane in your Water Supply are consistent with expected background conditions. Additionally, the Department has evaluated the data and determined that the other compounds analyzed in your Water Supply are now comparable to predrill sample results, or are consistent with expected background conditions.

Based on its investigation, the Department has determined that the impacts to your Water Supply were temporary and that the concentration of methane in the Water Supply is now consistent with expected background conditions. As a result, the Department does not plan to require further action regarding the Water Supply.

Please contact Michael O'Donnell at 570.346.5530 should you have any questions concerning this matter.

Sincerely,

Jennifer W. Means
Environmental Program Manager
Eastern Oil and Gas District

Enclosures:
Laboratory Analytical Tables
"How to Interpret A Water Analysis Report"

cc:
Michael O'Donnell
Eric Rooney, P.G.
Sharon Steinbacher
Dimock Gas Migration File

All results in mg/l unless otherwise noted	5/13/2008 Cabot Pre-Drill	2/23/2009 DEP Raw	5/13/2010 DEP Raw	5/27/2010 DEP Raw	8/11/2010 DEP Raw	8/18/2010 DEP Raw	8/24/2010 DEP Raw	9/2/2010 DEP Raw	9/9/2010 DEP Raw	9/30/2010 DEP Raw (Duplicate)	10/14/2010 DEP Raw	10/28/2010 DEP Raw	11/2/2010 DEP Raw	MCL or Action Level *Denotes Primary
Methane	~	3.61	1.18	0.61	<0.0079	0.0114	0.0196	0.0132	0.0183	0.0499	0.218	0.58	1.75	7
Ethane	~	<0.0198	<0.0198	<0.0198	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	No Standard
Propane	~	<0.0198	Cancelled	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	<0.0198	No Standard
Ethene	~	<0.0198	Cancelled	<0.0198	<0.0079	<0.0079	<0.0079	<0.0079	<0.0079	<0.0198	<0.0079	<0.0198	<0.0198	No Standard
Alkalinity	~	~	141.4	136	117.6	117.8	117.4	115.2	116.4	127.2	139	126.8	145.8	No Standard
Aluminum	~	~	13.7	0.334	<0.2	0.031	<0.2	<0.2	<0.2	<0.2(0.111)	<0.2	<0.2	<0.2	0.2
Arsenic	~	~	~	~	~	~	~	~	~	0.0033	~	~	~	*0.01
Barium	~	~	0.855	0.435	0.373	0.407	0.409	0.377	0.404	0.342(0.398)	0.318	0.324	0.234	*2
Bromide	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Calcium	~	~	35.59	24.4	26.8	31.9	29.9	27.6	28.1	22.7	17.7	19.8	13.8	No Standard
Hardness	~	~	117	78	89	101	96	91	92	72	56	64	43	No Standard
Iron	<0.05	~	16.06	0.299	0.064	0.195	0.065	0.034	0.144	0.127(0.316)	0.032	0.03	0.056	0.3
Lithium	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Magnesium	2.27	~	6.721	4.111	5.343	5.043	5.199	5.395	5.188	3.682(3.751)	2.835	3.43	2.168	No Standard
Manganese	~	~	0.374	0.047	0.038	0.055	0.054	0.056	0.067	0.055(0.065)	0.016	0.016	0.012	0.05
pH (units)	6.7	~	8.6	8.4	8.1	7.7	7.6	8.1	8.2	8.5(8.5)	8.8	8.3	9	6.5-8.5
Potassium	~	~	4.433	1.849	1.606	1.641	1.76	1.708	1.753	1.647	1.636	1.621	1.496	No Standard
Selenium	~	~	~	~	~	~	~	~	~	~	~	~	~	*0.05
Sodium	~	~	36.87	23.6	11.6	13.3	13.6	12.7	13.1	29.5(30)	42	30.7	51.2	No Standard
SPC (uS/cm)	~	~	274	267	239	231	248	241	239	257	292	269	294	No Standard
Strontium	~	~	0.913	1.11	1.154	1.153	1.189	1.16	1.22	0.959	0.844	0.985	0.658	No Standard
Total Chloride	<2	~	3.3	3.2	1.5	1.2	1.3	1.4	1.4	2.4(2.18)	3.2	3	4.1	250
TDS	135	~	222	46	138	144	142	134	140	158(188)	158	156	198	500
Total Sulfate	~	~	~	~	~	~	~	~	~	7.58	~	~	~	250
TSS	~	~	~	~	~	~	~	~	~	~	~	~	~	No Standard
Turbidity (NTU)	~	~	~	~	~	~	~	~	~	4.67 NTU	~	~	~	*1 NTU
Zinc	~	~	~	~	~	~	~	~	~	0.03	~	~	~	5

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All results in mg/l unless otherwise noted	11/9/2010 DEP Raw	11/22/2010 DEP Raw	12/2/2010 DEP Raw	12/7/2010 DEP Raw	1/30/2012 DEP Raw (Dissolved)	1/30/2012 DEP Treated (Dissolved)	1/21/2014 DEP Raw (Dissolved)	7/17/2018 DEP Raw	MCL or Action Level *Denotes Primary
Methane	2.13	1.08	1.04	0.0429	0.173	0.192	0.342	<0.0116	7
Ethane	<0.0079	<0.0079	<0.0079	<0.0079	<0.0198	<0.0198	<0.0124	<0.0124	No Standard
Propane	<0.0198	<0.0198	<0.0198	<0.0198	<0.0142	<0.0142	<0.0142	<0.0142	No Standard
Ethene	<0.0198	<0.0079	<0.0079	<0.0079	~	~	~	~	No Standard
Alkalinity	145	144.8	135.8	120	~	~	121.8	116.2	No Standard
Aluminum	<0.2	<0.2	<0.2	<0.2	0.037(<0.01)	0.0101(<0.01)	<0.2(<0.2)	<0.2	0.2
Arsenic	~	~	~	~	<0.003(<0.003)	<0.003(<0.003)	<0.003(<0.003)	<0.003	*0.01
Barium	0.247	0.265	0.297	0.352	0.287(0.318)	0.266(0.302)	0.415(0.401)	0.376	*2
Bromide	~	~	~	~	<0.2	<0.2	<0.2	<0.2	No Standard
Calcium	12.8	13	19.7	24.3	16.4(19.7)	15.8(18.6)	21.2(21.8)	23.65	No Standard
Hardness	41	41	62	77	~	~	67	73	No Standard
Iron	0.031	0.08	0.024	<0.02	0.024(<0.02)	<0.02(<0.02)	<0.02(<0.02)	<0.02	0.3
Lithium	~	~	~	~	0.092(0.068)	0.096(0.077)	0.054(0.053)	0.039	No Standard
Magnesium	2.092	2.162	3.086	4.055	2.777(3.199)	2.619(2.999)	3.497(3.391)	3.48	No Standard
Manganese	<0.01	<0.01	<0.01	<0.01	<0.01(<0.01)	<0.01(<0.01)	0.01(<0.01)	<0.01	0.05
pH (units)	8.9	9.2	8.8	8.2	~	~	8.3	8.3	6.5-8.5
Potassium	1.695	1.547	1.629	1.67	1.767(1.766)	1.734(1.748)	1.814(1.794)	1.73	No Standard
Selenium	~	~	~	~	<0.007(<0.007)	~	<0.007(<0.007)	<0.007	*0.05
Sodium	65.8	51.9	37.7	21.5	44.8(32.5)	46.4(38)	23.6(24.2)	18.63	No Standard
SPC (uS/cm)	295	303	286	252	~	~	236	233	No Standard
Strontium	0.695	0.725	0.972	1.142	0.956(1.094)	0.895(1.028)	1.56(1.504)	1.53	No Standard
Total Chloride	4.2	4.5	3.7	1.9	2.68	4.5	2.7	1.86	250
TDS	124	170	172	138	186	206	144	130	500
Total Sulfate	~	~	~	~	7.68	7.17	<15	6.7	250
TSS	~	~	~	~	<5	<5	<5	<5	No Standard
Turbidity (NTU)	~	~	~	~	~	~	<1	<1	*1 NTU
Zinc	~	~	~	~	<0.01(<0.01)	~	<0.01(<0.01)	<0.01	5

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