Chesapeake ENERGY

November 08, 2011

Jennifer Means
Environmental Program Manager
Oil & Gas Management Program
Pennsylvania Department of Environmental Protection
208 W. Third Street, Suite 101
Williamsport, PA 17701

Re: Consent Order and Agreement

Dear Ms. Means:

I write in connection with the May 16, 2011 Consent Order and Agreement ("COA") between Chesapeake Appalachia LLC ("Chesapeake") and the Commonwealth of Pennsylvania, Department of Environmental Protection ("Department").

I am submitting with this letter Chesapeake's revised plan and schedule, pursuant to Section 7.b of the COA to address water supplies with dissolved methane equal to or greater than 7 mg/l or measured free gas in the headspace greater than 25% of the L.E.L. The quality of a restored or replaced water supply will meet the standards established under the Pennsylvania Safe Drinking Water Act. Chesapeake is prepared to implement the plan upon approval by the Department, pursuant to Section 7.c of the COA.

In the event that a homeowner does not allow Chesapeake to fully implement the approved plan, Chesapeake will establish an escrow account, or a common account for all such residences, in an amount approved by the Department to be used for the exclusive purpose of funding all of the expenses associated with providing either a treatment system or a replacement permanent water supply to the residence, as provided in Section 7.d of the COA.

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Sincerely,

Michael D. Sherman

Michael D. Sherman
Environmental Manager, Eastern Division
Chesapeake Appalachia, LLC

Chesapeake Energy Corporation
300 North Second Street, 5th Floor • Harrisburg, PA 17101
717.230.8620 • fax 717.233.3582

Enclosures:

Plan and Schedule for Water Supplies
Line Drawing of Standard TCW Methane Removal System
Product Literature

Chesapeake Energy Corporation
300 North Second Street, 5th Floor • Harrisburg, PA 17101
717.230.8620 • fax 717.233.3582

STANDARD TCW METHANE REMOVAL SYSTEM

SYSTEM IS SET ON A 40/60 PSI SWITCH

MAXIMUM FLOW RATE OF SYSTEM IS 12GPM

+ = Test Port

X = Shut off Valve

System Designed by

Tri-County Water Treatment
619 Point Township Drive
Northumberland, PA 17857
1-800-660-2441

Your Local Dealer is:

Better Water Industries Inc.

"YOUR PROBLEM WATER SPECIALIST"

BETTER WATER INDUSTRIES, INC.
PROTECTING YOUR WATER

SENTRY I

Open - Air System

Sentry I Open - Air System

The Sentry I Open-Air System combines an adjustable air-draw venturi with the Sentry Dry Pellet Chlorinator. The combination of aeration and chlorination creates a powerful oxidizer and sanitizer. The Sentry I Open-Air System will treat: Iron, Iron Bacteria, Sulfur, Sulfate Reducing Bacteria, Black Manganese, Algae, Tannins, Arsenic, Radon Gas, Methane Gas, Low output wells, and Low pH. The Sentry I Open-Air System increases your water quality. An increase in water quality reduces your maintenance cost on all appliances that utilize water. Ice makers, dishwashers, washers, water heaters and every faucet in the house are affected by water quality! By using the Sentry I Open-Air System to oxidize iron for sprinkler systems, it will reduce up to 85% of the iron staining and will reduce troublesome sprinkler head clogs.

Open – Air Specifications

Specifications			
Continuous Flow	10 gpm	18 gpm	25 gpm
Max Flow	14 gpm	22 gpm	28 gpm
Capacity	130 gal	130 gal	300 gal
Voltage	115 VAC	115 VAC	230 VAC
Operating Current	10 amp	10 amp	6.8 amp
Max Current	12 amp	12 amp	8 amp
Power	1/2hp	1/2 hp	3/4 hp
Frequency	60 Hz	60 Hz	60 Hz
Dimensions (LxWxH)	43"x27"x59"	43"x27"x59"	48"x32"x76"
Clearance Needed	45"x27"x65"	45"x27"x65"	50"x33"x82"
AB Weight	170 lb	170 lb	215 lb
Gas Reduction	200 lb	205 lb	245 lb
Radon	205 lb	210 lb	250 lb
Tank Height (T)	45"	45"	61"

SENTRY I	
Pellet Feed Rate (Max)	8 Pellets per minute
Pellet Feed Rate (MIN)	1 Pellet per 21 minutes
Pellet Storage	5 or 10 lbs container

SENTRY I (Air Stripper)	
Max Vacuum	35" H2O
Max Air Flow	43 cfm
Voltage	115 VAC
Operating Current	3.8 amp
Power	1/3 hp
Frequency	60 Hz

Better Water Industries, Inc.

Kinetico
water systems

Kinetico 4060f OD

System Components

Upper Media Vessel (qty) Size ..... (2) 8 x 17"
- Vessel Construction ..... Fiberglass Wrapped Engineered Plastic
- Bed Volume (empty / media) ..... 0.40 ft^3 / 0.20 ft^3
- Media Type ..... 40 / 60 mesh Macrolite

Lower Media Vessel (qty) Size ..... (2) 8 x 24"
- Vessel Construction ..... Fiberglass Wrapped Engineered Plastic
- Bed Volume (empty / media) ..... 0.70 ft^3 / 0.40 ft^3
- Media Type ..... Acid Washed Carbon

Riser Tube ..... 1" ABS
Distributor Upper ..... None
Lower ..... 0.014" Slots, ABS Basket
Under bedding (each tank) ..... ⅛ x ¼ Gravel
Under bedding Volume (each tank) ..... 0.6 ft^3 (6 lbs.)
Regeneration Control ..... Non-electric Use Meter
Regeneration Type ..... Countercurrent
Meter Type ..... 0.3 - 25.00 gpm Polypropylene Turbine

Inlet Water Quality

Pressure Range ..... 25 – 125 psi Dynamic Pressure
Temperature Range ..... 35 – 120° F
pH Range ..... 5 – 10 SU
Free Chlorine Cl_2 (Max.) ..... 2.0 mg/L
Hardness as $CaCO_3$ (Max.) ..... 40 gpg

Operating Specs

Flow Range (15 / 30 psig) ..... 11.0- 18.0 gpm
Flow Configuration ..... Overdrive
Dimensions (width x depth x height) ..... 17 x 8 x 48"
Weight (Operating / Shipping) ..... 200 / 160 lbs.

Connections

Inlet / Outlet Connections ..... Custom Adapter and E-Clip
Drain Connection ..... 0.50" Tube
Brine Line Connection ..... 0.375" Tube
Power ..... None

System Part Numbers

Kinetico 4060f OD (Macrolite/Carbon) 11232

Regeneration Specifications

Regeneration Volume ..... 75 gallons
Regeneration Time ..... 20 minutes
Backwash Flow Control ..... 3.0 gpm

Disc Selection

Meter Disc	1	2	3	4	5	6	7	8
Gallons/Backwash:	2,168	1,084	723	542	434	361	310	271

*Compensated hardness in gpg = Hardness + (3 x Fe in mg/L)

Kinetico
water systems

Kinetico 4060f OD

Operating Profile

Filter shall remove chlorine to less than 0.05 mg/L when operated within normal operating specifications. The system shall provide filtered water through the use of a duplex (two tank) configuration. This duplex configuration shall operate with both tanks on-line during service. During backwash cycles, one tank shall provide water to service and to the backwash. A water meter shall initiate system backwashes. The water meter shall measure the processed volume and be adjustable. Service flow shall be downflow.

Regeneration Control Valve

The backwash control valve shall be top mounted (top of media tank), and manufactured from non-corrosive materials. Control valve shall not weigh more than four pounds. Control valve shall provide service and backwash control for two media tanks. Inlet and outlet ports shall accept a quick-connect double O-ring sealed adapter. Interconnection between tanks shall be made through the regeneration valve with a quick connect adapter.

Control valve shall operate using a minimum inlet pressure of 15 psi. Pressure shall be used to drive all valve functions. No electric hook-up shall be required. Control valve shall incorporate three operational cycles including; service, backwash, and a downflow fast rinse. Control valve shall contain a self-adjusting backwash flow control. The control valve will prevent the by-pass of unfiltered water to service during the backwash cycle.

Media Tanks

The tanks shall be designed for a maximum working pressure of 125 psi and hydrostatically tested at 300 psi. Tanks shall be made of nylon wrapped with a 2.5 in. threaded top opening. Each tank shall be NSF approved. Upper and lower distribution system shall be of a slot design. They will provide even distribution of backwash water and the collection of processed water.

Media

Each unit shall include 0.2 ft^3 of Macrolite and 0.4 ft^3 of Activated Carbon.

em Description	Operation and Maintenance (O&M) Frequency
Open Air system with a 130 gallon	Semi-Annual
Open Air system with a 130 gallon eter, heated shed.	Quarterly
Open Air system, 130 gallon baffled basement.	Semi-Annual
em installed, but would re-evaluate in onal water samples to aid in with his	Either Semi-Annual or Quarterly
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arbon, 110 V Sentry I Open Air system nd water meter, heated shed.	Semi-Annual
Carbon, 110 V Sentry I Open Air system and water meter, heated shed.	Quarterly
/Carbon, 110 V Sentry I Open Air system and water meter, heated shed.	Semi-Annual
ervice during November of 2010.	--
ervice January 2011. On April 2, 2011, he account with the Borough to initiate	--
ervice January 2011. On April 2, 2011, he account with the Borough to initiate	--
Open Air system with a 300 gallon	Quarterly
Open Air system with a 130 gallon	Quarterly

ten installed.

Plan and Schedule for Water Supplies Listed in Exhibit C of the May 16, 2011 Consent Order and Agreement

Chesapeake Appalachia, LLC

Tuscarora, Terry, Monroe, Towanda and Wilmot Townships, Bradford County, Pennsylvania

May 16, 2011 Consent Order and Agreement

Area	Landowner	Actions to Date					Planned Actions Scheduled to Occur After Approval by the Department	Methane Treatment Syst
		Offer System	Offer Public Water	Offer Accepted or Declined	System Installation date	System Activation Date		
Sugar Run	Carl Postupak	1st Quarter 2011	--	Accepted	5/24/2011	7/18/2011	Provide for permanent payment of increased O&M	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I baffled tank, 20" bag filter, water meter, heated shec
Sugar Run	Don Pickett	1st Quarter 2011	--	Accepted	5/10/2011	6/8/2011	Provide for permanent payment of increased O&M	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I baffled tank, 20" bag filter, UF filter system, water m
Sugar Run	Robert Baldwin	1st Quarter 2011	--	Accepted	3/16/2011	4/15/2011	Provide for permanent payment of increased O&M	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I tank, 20" bag filter, new pressure tank, water meter,
Sugar Run	David Buck #1 (Bunnell Trailer)	1st Quarter 2011	--	Declined	--	--	Offer and install system or fund escrow account Provide for permanent payment of increased O&M	Mr. Buck declined to have a methane treatment syst summer 2011. He requested the collection of additi decision making.
Sugar Run	David Buck #2 (Yellow House)	1st Quarter 2011	--	Declined	--	--	Offer and install system or fund escrow account Provide for permanent payment of increased O&M	Mr. Buck declined to have a methane treatment syst summer 2011. He requested the collection of additi decision making.
Sugar Run	Dale Dunklee	1st Quarter 2011	--	Declined	--	--	Offer and install system or fund escrow account Provide for permanent payment of increased O&M	Ms. Dunklee declined to have a methane treatment
Sugar Run	Kenneth Reinhart	1st Quarter 2011	--	Declined	5/24/2011	--	Offer and install system or fund escrow account Provide for permanent payment of increased O&M	Mr. Reinhart declined to have a methane treatment summer 2011.
Sugar Run	Peggy Loomis	1st Quarter 2011	--	Accepted	--	6/13/2011	Provide for permanent payment of increased O&M	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I baffled tank, 20" bag filter, water meter, heated shec
Paradise Road	Edwin Bidlack	1st Quarter 2011	--	Declined	2/17/2011	--	Offer and install system or fund escrow account * Provide for permanent payment of increased O&M	CHK has contacted Mr. Bidlack during the first qua
Paradise Road	Scott Spencer	1st Quarter 2011	--	Accepted	2/17/2011	3/18/201	Provide for permanent payment of increased O&M	Drilled new water well. Kinetico 4060f OD Macrolite with a 130 gallon baffled tank, 20" bag filter, energy
Paradise Road	Michael Phillips	4th Quarter 2010	--	Accepted	2/17/2011	4/1/2011	Provide for permanent payment of increased O&M	Drilled new water well. Kinetico 4060f OD Macrolite with a 130 gallon baffled tank, 20" bag filter, energy
Paradise Road	Jared McMicken	4th Quarter 2010	--	Accepted	4th Quarter 2010	3/18/2011	Provide for permanent payment of increased O&M	Drilled new water well. Kinetico 4060f OD Macrolite with a 130 gallon baffled tank, 20" bag filter, energy
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Brocktown Road	Earl Sites (owned by P. Sites)	--	4th Quarter 2010	Accepted	1st Quarter 2011	Approximately May 1, 2011	Provide for permanent payment of increased O&M	Connected to Towanda Municipal Authority Water s Mrs. Sites called CHK and said she was activating t service.
Brocktown Road	Sibley (owned by P. Sites)	--	4th Quarter 2010	Accepted	3/4/2011	Approximately May 1, 2011	Provide for permanent payment of increased O&M	Connected to Towanda Municipal Authority Water s Mrs. Sites called CHK and said she was activating t service.
Springhill Road	John Parys	1st Quarter 2011	1st Quarter 2011	Accepted	3/1/2011	3/31/2011	Provide for permanent payment of increased O&M*	Kinetico 4060f OD Macrolite/Carbon, 220 V Sentry I baffled tank, 20" bag filter, water meter, basement.
Springhill Road	Ron Brown	1st Quarter 2011	--	Accepted	--	4/6/2011	Provide for permanent payment of increased O&M*	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I baffled tank, 20" bag filter, water meter, heated shec

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Hand-delivered 11/8/11
QWM
CHK Gas Mig COA

Chesapeake ENERGY

November 08, 2011

Jennifer Means
Environmental Program Manager
Oil & Gas Management Program
Pennsylvania Department of Environmental Protection
208 W. Third Street, Suite 101
Williamsport, PA 17701

Re: Consent Order and Agreement
Request for Determination of Background – Bidlack

Dear Ms. Means:

I write in connection with the May 16, 2011 Consent Order and Agreement ("COA") between Chesapeake Appalachia LLC ("Chesapeake") and the Commonwealth of Pennsylvania, Department of Environmental Protection ("Department"); specifically, to petition for a determination that the concentration of methane in the aquifer supplying the Edwin and Candy Bidlack residence is at background levels, and for a determination that the concentration of combustible free gas at the wellhead is at levels that do not present a danger to persons or property if properly vented.

As you are aware, paragraph 7 of the COA provides, in relevant part, as follows:

> (a) Beginning upon execution of this [COA], with respect to the water supplies listed on Exhibit C, Chesapeake shall:
>
> 1) at least once every two weeks, screen the well at each water supply listed in Exhibit C for percentage of free combustible gas, and sample the well at each of those water supplies, provided the landowner consents to such screening and sampling;
>
> 2) for each water sample collected at a water supply listed in Exhibit C, Chesapeake shall have the water sample analyzed in a Pennsylvania-accredited laboratory for dissolved methane dissolved ethane, and dissolved propane;
>
> 3) Chesapeake shall continue to conduct the screening and sampling under Paragraph 7.a.1), above, once every two weeks at each water supply listed in Exhibit C, provided the landowner consents, until the results of the screenings and sampling done by the Department or by Chesapeake under Paragraph 7.a.1), above, show (A) that either no combustible free gas is present at the water supply's wellhead, or, that such levels of combustible free gas, if properly vented pursuant to applicable regulations and Department practice, do not pose a danger to persons or property *and* (B) that the concentration of dissolved methane is below 7 milligrams/liter. However, Chesapeake may petition the Department, based on information obtained in accordance with this Paragraph for a determination that the concentration of methane in the water supply is at

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Chesapeake ENERGY

background levels for the aquifer that supplies the water supply. Chesapeake may further petition the Department for a determination that the concentration of combustible free gas at the wellhead is at levels that do not present a danger to persons or property if properly vented according to applicable regulations and Department practice; . . . .

On September 28, 2011, counsel for the Bidlacks directed SAIC, the consultant retained by Chesapeake to conduct water sampling pursuant to COA, to cease all sampling of the Bidlack water supply. I enclose herewith a letter confirming that directive. In addition, please note that all of the water supply samples collected at the Bidlack residence by SAIC to date contain less than 7 mg/l of methane, and that the measurements of free gas in the Bidlack's well headspace have been substantially less than 25% of LEL:

COA Sampling Event		Water Well Headspace Reading	Dissolved Methane Concentration (mg/L)
Sampling Event 1	May 27, 2011	access denied	
Sampling Event 2	June 10, 2011	access denied	
Sampling Event 3	June 23, 2011	access denied	
Sampling Event 4	July 8, 2011	access denied	
Sampling Event 5	July 18, 2011	0.37ppm, 0% LEL	5.21
Sampling Event 6	August 4, 2011	4,277ppm, 7% LEL	4.82
Sampling Event 7	August 18, 2011	1.86ppm, 0% LEL	4.95
Sampling Event 8	September 1, 2011	1.92ppm, 0% LEL	1.51
Sampling Event 9	Not Sampled Due to Flooding		
Sampling Event 10	Not Sampled		

Given these test results, pursuant to paragraph 7.a.3) of the COA Chesapeake request a determination that the concentration of methane in the Bidlacks' water supply is at background levels for the aquifer that supplies the water supply. We also request, pursuant to the same paragraph of the COA, a determination that the concentration of combustible free gas at the Bidlack wellhead is at levels that do not present a danger to persons or property if properly vented.

On October 21, 2011, counsel for the Bidlacks changed his direction and requested renewed testing. Pending action by the Department on this petition, Chesapeake will renew testing on a quarterly basis per sections 7.a.4) and 7.a.5) of the COA.

We appreciate the Department's time and assistance with this matter. Please contact me with any questions that you might have.

Sincerely,

Michael D. Sherman

Michael D. Sherman
Environmental Manager, Eastern Division
Chesapeake Appalachia, LLC

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Chesapeake GMI
COA File
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Capacity	130 gal	130 gal	300 gal
Voltage	115 VAC	115 VAC	230 VAC
Operating Current	10 amp	10 amp	6.8 amp
Max Current	12 amp	12 amp	8 amp
Power	1/2hp	1/2 hp	3/4 hp
Frequency	60 Hz	60 Hz	60 Hz
Dimensions (LxWxH)	43"x27"x59"	43"x27"x59"	48"x32"x76"
Clearance Needed	45"x27"x65"	45"x27"x65"	50"x33"x82"
AB Weight	170 lb	170 lb	215 lb
Gas Reduction	200 lb	205 lb	245 lb
Radon	205 lb	210 lb	250 lb
Tank Height (T)	45"	45"	61"

SENTRY I	
Pellet Feed Rate (Max)	8 Pellets per minute
Pellet Feed Rate (MIN)	1 Pellet per 21 minutes
Pellet Storage	5 or 10 lbs container

SENTRY I (Air Stripper)	
Max Vacuum	35" H2O
Max Air Flow	43 cfm
Voltage	115 VAC
Operating Current	3.8 amp
Power	1/3 hp
Frequency	60 Hz

Better Water Industries, Inc.

Kinetico
water systems

Kinetico 4060f OD

System Components

Upper Media Vessel (qty) Size	(2) 8 x 17"
Vessel Construction	Fiberglass Wrapped Engineered Plastic
Bed Volume (empty / media)	0.40 ft^3 / 0.20 ft^3
Media Type	40 / 60 mesh Macrolite
Lower Media Vessel (qty) Size	(2) 8 x 24"
Vessel Construction	Fiberglass Wrapped Engineered Plastic
Bed Volume (empty / media)	0.70 ft^3 / 0.40 ft^3
Media Type	Acid Washed Carbon
Riser Tube	1" ABS
Distributor Upper	None
Lower	0.014" Slots, ABS Basket
Under bedding (each tank)	⅛ x ¼ Gravel
Under bedding Volume (each tank)	0.6 ft^3 (6 lbs.)
Regeneration Control	Non-electric Use Meter
Regeneration Type	Countercurrent
Meter Type	0.3 - 25.00 gpm Polypropylene Turbine

Inlet Water Quality

Pressure Range	25 – 125 psi Dynamic Pressure
Temperature Range	35 – 120° F
pH Range	5 – 10 SU
Free Chlorine Cl_2 (Max.)	2.0 mg/L
Hardness as $CaCO_3$ (Max.)	40 gpg

Operating Specs

Flow Range (15 / 30 psig)	11.0- 18.0 gpm
Flow Configuration	Overdrive
Dimensions (width x depth x height)	17 x 8 x 48"
Weight (Operating / Shipping)	200 / 160 lbs.

Connections

Inlet / Outlet Connections	Custom Adapter and E-Clip
Drain Connection	0.50" Tube
Brine Line Connection	0.375" Tube
Power	None

System Part Numbers

Kinetico 4060f OD (Macrolite/Carbon)	11232

Regeneration Specifications

Regeneration Volume	75 gallons
Regeneration Time	20 minutes
Backwash Flow Control	3.0 gpm

Disc Selection

Meter Disc	1	2	3	4	5	6	7	8
Gallons/Backwash:	2,168	1,084	723	542	434	361	310	271

*Compensated hardness in gpg = Hardness + (3 x Fe in mg/L)

Kinetico
water systems

Kinetico 4060f OD

Operating Profile

Filter shall remove chlorine to less than 0.05 mg/L when operated within normal operating specifications. The system shall provide filtered water through the use of a duplex (two tank) configuration. This duplex configuration shall operate with both tanks on-line during service. During backwash cycles, one tank shall provide water to service and to the backwash. A water meter shall initiate system backwashes. The water meter shall measure the processed volume and be adjustable. Service flow shall be downflow.

Regeneration Control Valve

The backwash control valve shall be top mounted (top of media tank), and manufactured from non-corrosive materials. Control valve shall not weigh more than four pounds. Control valve shall provide service and backwash control for two media tanks. Inlet and outlet ports shall accept a quick-connect double O-ring sealed adapter. Interconnection between tanks shall be made through the regeneration valve with a quick connect adapter.

Control valve shall operate using a minimum inlet pressure of 15 psi. Pressure shall be used to drive all valve functions. No electric hook-up shall be required. Control valve shall incorporate three operational cycles including; service, backwash, and a downflow fast rinse. Control valve shall contain a self-adjusting backwash flow control. The control valve will prevent the by-pass of unfiltered water to service during the backwash cycle.

Media Tanks

The tanks shall be designed for a maximum working pressure of 125 psi and hydrostatically tested at 300 psi. Tanks shall be made of nylon wrapped with a 2.5 in. threaded top opening. Each tank shall be NSF approved. Upper and lower distribution system shall be of a slot design. They will provide even distribution of backwash water and the collection of processed water.

Media

Each unit shall include 0.2 ft^3 of Macrolite and 0.4 ft^3 of Activated Carbon.

Plan and Schedule for Water Supplies Listed in Exhibit C of the May 16, 2011 Consent Order and Agreement

Chesapeake Appalachia, LLC

Tuscarora, Terry, Monroe, Towanda and Wilmot Townships, Bradford County, Pennsylvania

May 16, 2011 Consent Order and Agreement

Area	Landowner	Actions to Date					Planned Actions Scheduled to Occur After Approval by the Department	Methane Treatment Sys
		Offer System	Offer Public Water	Offer Accepted or Declined	System Installation date	System Activation Date		
Sugar Run	Carl Postupak	1st Quarter 2011	--	Accepted	5/24/2011	7/18/2011	Provide for permanent payment of increased O&M	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry baffled tank, 20" bag filter, water meter, heated she
Sugar Run	Don Pickett	1st Quarter 2011	--	Accepted	5/10/2011	6/8/2011	Provide for permanent payment of increased O&M	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry baffled tank, 20" bag filter, UF filter system, water n
Sugar Run	Robert Baldwin	1st Quarter 2011	--	Accepted	3/16/2011	4/15/2011	Provide for permanent payment of increased O&M	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry tank, 20" bag filter, new pressure tank, water meter
Sugar Run	David Buck #1 (Bunnell Trailer)	1st Quarter 2011	--	Declined	--	--	Offer and install system or fund escrow account Provide for permanent payment of increased O&M	Mr. Buck declined to have a methane treatment sys summer 2011. He requested the collection of addit decision making.
Sugar Run	David Buck #2 (Yellow House)	1st Quarter 2011	--	Declined	--	--	Offer and install system or fund escrow account Provide for permanent payment of increased O&M	Mr. Buck declined to have a methane treatment sys summer 2011. He requested the collection of addit decision making.
Sugar Run	Dale Dunklee	1st Quarter 2011	--	Declined	--	--	Offer and install system or fund escrow account Provide for permanent payment of increased O&M	Ms. Dunklee declined to have a methane treatment
Sugar Run	Kenneth Reinhart	1st Quarter 2011	--	Declined	--	--	Offer and install system or fund escrow account Provide for permanent payment of increased O&M	Mr. Reinhart declined to have a methane treatment summer 2011.
Sugar Run	Peggy Loomis	1st Quarter 2011	--	Accepted	5/24/2011	6/13/2011	Provide for permanent payment of increased O&M	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry baffled tank, 20" bag filter, water meter, heated she
Sugar Run	Edwin Bidlack	1st Quarter 2011	--	Declined	--	--	Offer and install system or fund escrow account * Provide for permanent payment of increased O&M	CHK has contacted Mr. Bidlack during the first quar
Paradise Road	Scott Spencer	4th Quarter 2010	--	Accepted	2/17/2011	3/18/201	Provide for permanent payment of increased O&M	Drilled new water well. Kinetico 4060f OD Macrolite with a 130 gallon baffled tank, 20" bag filter, energy
Paradise Road	Michael Phillips	4th Quarter 2010	--	Accepted	2/17/2011	4/1/2011	Provide for permanent payment of increased O&M	Drilled new water well. Kinetico 4060f OD Macrolite with a 130 gallon baffled tank, 20" bag filter, energy
Paradise Road	Jared McMicken	4th Quarter 2010	--	Accepted	2/17/2011	3/18/2011	Provide for permanent payment of increased O&M	Drilled new water well. Kinetico 4060f OD Macrolite with a 130 gallon baffled tank, 20" bag filter, energy
Brocktown Road	Greg Laws	--	4th Quarter 2010	Accepted	4th Quarter 2010	11/16/2010	Provide for permanent payment of increased O&M	Connected to Towanda Municipal Authority Water s
Brocktown Road	Earl Sites (owned by P. Sites)	--	4th Quarter 2010	Accepted	4th Quarter 2010	Approximately May 1, 2011	Provide for permanent payment of increased O&M	Connected to Towanda Municipal Authority Water s Mrs. Sites called CHK and said she was activating t service.
Brocktown Road	Sibley (owned by P. Sites)	--	1st Quarter 2011	Accepted	1st Quarter 2011	Approximately May 1, 2011	Provide for permanent payment of increased O&M	Connected to Towanda Municipal Authority Water s Mrs. Sites called CHK and said she was activating t service.
Springhill Road	John Parys	1st Quarter 2011	--	Accepted	3/4/2011	3/31/2011	Provide for permanent payment of increased O&M*	Kinetico 4060f OD Macrolite/Carbon, 220 V Sentry baffled tank, 20" bag filter, water meter, basement.
Springhill Road	Ron Brown	1st Quarter 2011	--	Accepted	3/1/2011	4/6/2011	Provide for permanent payment of increased O&M*	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry baffled tank, 20" bag filter, water meter, heated she
Vargson	Sherry Vargson	1st Quarter 2011	--	Declined	--	--	Offer and install system or fund escrow account Provide for permanent payment of increased O&M	Vargson's declined to have a methane treatme

m Description	Operation and Maintenance (O&M) Frequency
Open Air system with a 130 gallon	Semi-Annual
Open Air system with a 130 gallon eter, heated shed.	Quarterly
Open Air system, 130 gallon baffled basement.	Semi-Annual
em installed, but would re-evaluate in onal water samples to aid in with his	Either Semi-Annual or Quarterly
em installed, but would re-evaluate in onal water samples to aid in with his	Either Semi-Annual or Quarterly
system installed.	Either Semi-Annual or Quarterly
system installed, but would re-evaluate in	Either Semi-Annual or Quarterly
Open Air system with a 130 gallon	Semi-Annual
er of 2011 and he refused system.	Either Semi-Annual or Quarterly
Carbon, 110 V Sentry I Open Air system and water meter, heated shed.	Semi-Annual
Carbon, 110 V Sentry I Open Air system and water meter, heated shed.	Quarterly
Carbon, 110 V Sentry I Open Air system and water meter, heated shed.	Semi-Annual
rvice during November of 2010.	- -
rvice January 2011. On April 2, 2011, e account with the Borough to initiate	- -
rvice January 2011. On April 2, 2011, e account with the Borough to initiate	- -
Open Air system with a 300 gallon	Quarterly
pen Air system with a 130 gallon	Quarterly
	Either Semi-Annual or Quarterly

* = subject to pending request for determination of background

Chesapeake ENERGY

October 24, 2011

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OCT 25 2011
OIL & GAS

Jennifer W. Means
Environmental Program Manager
Oil & Gas Management
Eastern Gas Region
Pennsylvania Department of Environmental Protection
Northcentral Regional Office
208 West Third Street, Suite 101
Williamsport, PA 17701-6448

Re: May 16, 2011 Consent Order and Agreement

Dear Ms. Means:

I write on behalf of Chesapeake Appalachia, LLC ("Chesapeake") to request amendment of the May 16, 2011 Consent Order and Agreement ("COA") between Chesapeake and the Department. Chesapeake requests that the Department amend Section 16.b in the manner illustrated below.

Section 16 of the COA provides requirements relating to the transfer of the gas wells covered by the COA. Section 16.a provides that Chesapeake's obligation shall not be altered in any way by the transfer of any legal or equitable interest in any of the gas wells. This request to amend the COA would not change this requirement in any way.

Section 16.b of the COA provides, in the event that Chesapeake intends to transfer any legal or equitable interest in any of the gas wells, Chesapeake shall provide a copy of the COA to the prospective transferee and notice to the Department. Chesapeake believes that this requirement is unnecessarily burdensome and does not provide the Department with any meaningful information pertinent to implementation of the COA.

Legal and equitable interests in gas wells are transferred often. Typically, such interests are small and do not affect operational responsibility for the well. Providing notice of these transactions is unnecessarily burdensome and without any substantial value. We request amendment of COA Section 16.b, as shown below, to limit the requirement of notice to instances where there is a transfer of operational control of a well.

Chesapeake Energy Corporation
P.O. Box 6070 • Charleston, WV 25362 • 414 Summers St. • Charleston, WV 25301
304-353-5216 • fax 304-353-5231 • stephanie.timmermeyer@chk.com

Proposed Amendment:

b. If before the termination of this Consent Order and Agreement, Chesapeake intends to transfer ~~any legal or equitable interest in~~ **operational control of** any of the gas wells on the list submitted pursuant to paragraph 3.a.1), above, Chesapeake shall provide a copy of this Consent Order and Agreement to the prospective transferee at least thirty (30) days prior to the contemplated transfer and shall simultaneously inform the Department of such intent at the address set forth in Paragraph 17, below.

Please advise me if the Department consents to this proposed amendment. If so, we will prepare an amendment agreement for execution by the parties.

Thank you for your consideration of this matter.

Sincerely,

Stephanie Timmermeyer
Director, Regulatory Affairs
Eastern Division

cc: Tal Oden
John Reinhart
Craig Wilson

K&L|GATES

ates LLP
17 North Second Street, 18th Floor
Harrisburg, PA 17101-1507
T 717.231.4500 www.klgates.com

September 16, 2011

Anthony Richard Holtzman
D 717.231.4570
F 717.231.4501
anthony.holtzman@klgates.com

Via Hand Delivery

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SEP 19 2011
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NCRO

Maryanne Wesdock
Acting Secretary to the Board
Environmental Hearing Board
2nd Floor – Rachel Carson State Office Building
400 Market Street – P.O. Box 8457
Harrisburg, PA 17105-8457

Re: *Chesapeake Appalachia, L.L.C. v. Commonwealth of Pennsylvania, Department of Environmental Protection*, EHB Docket No. ____.

Dear Secretary Wesdock:

I have enclosed for filing in the above-referenced matter an original and three copies of a Notice of Appeal.

Please date stamp the extra copy and return it to our messenger. If you have any questions or concerns, please contact me. Thank you.

Very truly yours,

Anthony R. Holtzman

Anthony R. Holtzman

Enclosures
cc: Certificate of Service

COMMONWEALTH OF PENNSYLVANIA
ENVIRONMENTAL HEARING BOARD
(717) 787-3483
Telecopier: (717) 783-4738
2nd Floor – Rachel Carson State Office Building
400 Market Street, P.O. Box 8457
Harrisburg, PA 17105-8457
http://ehb.courtapps.com
Maryanne Wesdock
Acting Secretary to the Board

NOTICE OF APPEAL

1. Name, address and telephone number of Appellant:

Chesapeake Appalachia, L.L.C.
6100 North Western Avenue
Oklahoma City, OK 73118
(405) 848-8000

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SEP 19 2011
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NCRO

2. Subject of your appeal:

(a) Action of the Department for which review is sought (*a copy must be attached*):

Chesapeake Appalachia, L.L.C. ("Chesapeake") appeals the Department's August 17, 2011 letter to Tal Oden (the "Letter"), which approved – with modifications – a corrective action plan that Chesapeake submitted pursuant to the May 16, 2011 Consent Order and Agreement between Chesapeake and the Department.

A copy of the Letter is attached as Appendix A.

(b) The Department's official who took the action:

The Letter was issued by Jennifer W. Means, Environmental Program Manager, Bureau of Oil and Gas Management.

(c) The location of the operation or activity which is the subject of the Department's action (municipality, county):

Bradford County, Pennsylvania.

(d) On what date and how you received notice of the Department's action:

Chesapeake received a copy of the Letter, by e-mail, on August 18, 2011.

3. *Objections to the Department's action in separate, numbered paragraphs.* The objections may be factual or legal and must be specific. If you fail to state an objection here, you may be barred from raising it later in your appeal. Attach additional sheets, if necessary.

A Statement of Objections is attached as Appendix B.

4. Specify any related appeal(s) now pending before the Board. If you are aware of any such appeal(s) provide that information.

Chesapeake is not aware of any related appeals now pending before the Board.

The information submitted is true and correct to the best of my information and belief.

Anthony R. Holtzman
(717) 231-4570

If you have authorized counsel to represent you, please supply the following information (CORPORATIONS MUST BE REPRESENTED BY COUNSEL):

K&L GATES LLP

Anthony R. Holtzman
Craig P. Wilson
Pa. Supreme Ct. I.D. No. 65721
David R. Overstreet
Pa. Supreme Ct. I.D. No. 68950
Anthony R. Holtzman
Pa. Supreme Ct. I.D. No. 200053
Market Square Plaza
17 N. Second St., 18th Floor
Harrisburg, PA 17101
(717) 231-4500
Counsel for Appellant
Chesapeake Appalachia, L.L.C.

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHCENTRAL REGIONAL OFFICE

August 17, 2011

CERTIFIED MAIL NO. 7010 1870 0001 7876 2476

Mr. Tal Oden
Chesapeake Energy Corporation
P.O. Box 18496
Oklahoma City, OK 73154-0496

Re: Deficiency Letter
Chesapeake COA Document: Corrective Action Plan
July 2011
Bradford County, PA

Dear Mr. Oden:

The Department has performed a review of the revised Corrective Action Plan For Well Evaluation and Potential Remediation (CAP) submitted by Chesapeake on July 11, 2011 as required by the Consent Order and Agreement (COA) executed on May 16, 2011. Pursuant to paragraph 9 of the COA, the Department is approving the CAP with the following modifications added to the Corrective Action Plan under Item 3. Corrective Action:

a) The 16 wells listed in Table 2, Gas Wells With SISCPs Exceeding 100psig, should be considered Phase 1 for additional evaluation to prioritize them for remediation. Begin work on these wells immediately and establish a timeline for starting and remediating all 16 of these wells with all work to be completed within 4 months of the date of this letter. As Phase 2, assess the remaining 97 wells listed in Table #1, Gas Wells by Study Area, and prioritize them for remedial well work. Establish a timeline to follow Phase 1 above, and start remediating all 97 wells until the stray gas is eliminated. Should the gas migration cease prior to initiation of Phase 2, Chesapeake may petition the Department for an alternative.

The CAP is approved as modified above. Please begin implementation within 5 days.

Should you have any questions, please feel free to contact me via email at jemeans@pa.gov or at 570.321.6557

Sincerely,

Jennifer W. Means

Jennifer W. Means
Environmental Program Manager
Oil & Gas Management
Eastern Gas Region

cc: Stephanie Timmermeyer
Gas Migration Files: Paradise Road, Miller/Luce, Broctown Road, Sivers/Beaver Pond, Sugar Run, Spring Hill Road, and Vargson
Nels Taber
Geoffrey Ayers
John Ryder
Bruce Jankura

Statement of Objections

Background

3.1. On May 16, 2011, Chesapeake and the Department entered into a Consent Order and Agreement ("COA") that pertains to Chesapeake's gas well operations in certain areas of Bradford County, Pennsylvania.

3.2. Pursuant to section 3 of the COA, Chesapeake submitted to the Department a corrective action plan ("CAP") for the evaluation and potential rehabilitation of a number of its gas wells in Bradford County.

3.3. In turn, the Department, by way of an August 17, 2011 letter to Tal Oden (the "Letter"), approved the CAP, but did so with significant modifications.

Objections

3.4. To the extent that the Department's modifications to the CAP require Chesapeake to remediate each of the "Phase 1" wells, regardless of the outcome of the assessment that the CAP requires for the well, they are not authorized by the COA and are otherwise contrary to law, unsupported by fact, arbitrary, capricious, unreasonable, and an abuse of discretion.

3.5. To the extent that the Department's modifications to the CAP require Chesapeake to complete all work on "Phase 1" wells under the CAP "within four months of the date" of the Letter, they are not authorized by the COA and are otherwise contrary to law, unsupported by fact, arbitrary, capricious, unreasonable, and an abuse of discretion.

3.6. To the extent that the Department's modifications to the CAP require Chesapeake to remediate each of the "Phase 2" wells and do so "until the stray gas is eliminated," they are not authorized by the COA and are otherwise contrary to law, unsupported by fact, arbitrary, capricious, unreasonable, and an abuse of discretion.

3.7. The Department's issuance of the Letter is otherwise contrary to law, unsupported by fact, arbitrary, capricious, unreasonable, and an abuse of discretion.

3.8. Chesapeake reserves the right to amend this Notice of Appeal to include additional objections that may arise during further investigations and discovery in this matter.

PROOF OF SERVICE

I, Anthony R. Holtzman, hereby certify that a copy of the foregoing Notice of Appeal was, on September 16, 2011, served upon the following in the manner indicated:

Via Hand Delivery
Department of Environmental Protection
Office of Chief Counsel, Litigation Support Unit
Attention: Connie Luckadoo
9th Floor, Rachel Carson State Office Building
400 Market Street, P.O. Box 8464
Harrisburg, PA 17105-8464

Via First Class Mail, Postage Prepaid
Department of Environmental Protection
Northcentral Regional Office
Attention: Jennifer W. Means
208 West Third Street
Suite 101
Williamsport, PA 17701-6448

Anthony R. Holtzman
Pa. Supreme Ct. I.D. No. 200053
K&L Gates LLP
Market Square Plaza
17 N. Second St., 18th Floor
Harrisburg, PA 17101
(717) 231-4500
Counsel for Appellant
Chesapeake Appalachia, L.L.C.

ALL CONSULTING

GOVERNMENT RELATIONS • ENERGY • PLANNING • TECHNOLOGY
ENGINEERING • ENVIRONMENTAL

September 6, 2011 (transmitted via email)

PN: 1367

Ms. Jennifer W. Means
Environmental Program Manager
Eastern Region Oil and Gas Management
Department of Environmental Protection
208 West Third Street – Suite 101
Williamsport, PA 17701-6448

RECEIVED
SEP 12 2011
OIL & GAS
NCRO

Subject: 48-Hour Notice of SISCP Testing and Submittal of Test Results
Chesapeake Appalachia, LLC
Bradford County, Pennsylvania

Dear Ms. Means:

Chesapeake Appalachia, LLC (Chesapeake), entered into a Consent Order and Agreement (COA) on May 16, 2011, with the Commonwealth of Pennsylvania Department of Environmental Protection (DEP). ALL Consulting (ALL) is supporting Chesapeake with its compliance with the COA.

The COA requires Chesapeake to perform certain testing and rehabilitation activities at select Chesapeake owned and operated gas wells. The testing and rehabilitation tasks are outlined in the *Corrective Action Pan for Well Evaluation and Potential Remediation, Bradford County, Pennsylvania* (hereinafter referred to as the CAP) dated May 2011 and approved, with modifications, by the DEP on August 17, 2011. Chesapeake separately has objected to the CAP modifications, but is implementing work under protest.

This letter provides DEP with 48-hour advance written notice and schedule of Chesapeake's intent to initiate vent flow rate testing and SISCP testing at a well the DEP has identified within the COA (see Table 1, herein). Please advise ALL if DEP will attend the initiation of the SISCP test. If so, please provide the names and cell phone numbers of DEP staff scheduled to be on-site so that Chesapeake or ALL Consulting may contact them to coordinate a meeting location.

This letter also provides the results of vent flow rate testing and SISCP testing completed on September 1 and 2, 2011. In accordance with the CAP, results must be provided to the DEP within five (5) days of the completion of the test. SISCP test charts and results of the balloon testing, if applicable, are attached. Table 2 summarizes the test results. Please note that results for the Storms 2H SISCP test are not valid; a needle valve leading to the pressure transducer was not open. As noted above, an additional test has been scheduled.

If DEP requires additional information please do not hesitate to contact ALL Consulting at 918-382-7581.

Sincerely,
ALL Consulting

J. Daniel Arthur, PE, SPEC
Project Manager

xc: Mr. Tal Oden, Regulatory Manager North, East Division, Chesapeake Energy Corp.

Table 1
Proposed Well Testing Schedule

Gas Well	Vent Flow Rate Test Date	SISCP Test Date	Test Start Time
Storms 2H	September 9, 2011	September 9, 2011	8 AM

Table 2
SISCP & Vent Flow Rate Test Results

Well Name	Shut-In Pressure Test Results		Vent Flow Rate Test Results			
	Date Test Ended	SISCP test	Test Date	Manometer Reading (0.25" Orifice)		Balloon test
				Inches of Water	Mcf/d	
Morse 5H	9/1/2011	184 psi in 48 hrs	8/30/2011	<0.1	<0.557	Fully inflated in 10 minutes
Readinger 4H	9/1/2011	0.4 psi in 48 hrs	8/30/2011	<0.1	<0.557	Minimally inflated in 10 minutes
Storms 2H	9/1/2011	-2 psi in 48 hrs*	8/31/2011	<0.1	<0.557	Fully inflated in 10 minutes
Yoder 2H	9/1/2011	14 psi in 48 hrs	8/30/2011	0.2	0.789	--
Benscoter 1H	9/2/2011	171 psi in 48 hrs	8/31/2011	0.6	1.365	Fully inflated in 1 minute and 34 seconds
Duffield 2H	9/2/2011	33 psi in 48 hrs	8/31/2011	0.1	0.557	--
Sivers 1H	9/2/2011	9 psi in 48 hrs	8/31/2011	<0.1	<0.557	Minimally inflated in 10 minutes

*A needle valve leading to the pressure transducer was mistakenly left closed during the 48-hour SISCP test. Test data is not valid.

Morse 5H

SISCP & Balloon Test Results

Morse 5H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Morse 5H – 8/30/2011

Full inflation of balloon after 10 minutes.

Prepared by ALL Consulting
Trade Secret & Confidential Proprietary Information

Readinger 4H

SISCP & Balloon Test Results

Readinger 4H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Readinger 4H – 8/30/2011

Limp balloon after 10 minutes.

Storms 2H

SISCP & Balloon Test Results

Storms 2H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Storms 2H – 8/31/2011

Full inflation of balloon after 10 minutes.

Yoder 2H

SISCP Test Results

Yoder 2H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

Benscoter 1H

SISCP & Balloon Test Results

Benscoter 1H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Benscoter 1H – 8/31/2011

Full inflation of balloon after 1 minute 34 seconds.

Duffield 2H

SISCP Test Results

Prepared by ALL Consulting
Trade Secret & Confidential Proprietary Information

Duffield 2H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

Sivers 1H

SISCP & Balloon Test Results

Sivers 1H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Sivers 1H – 8/31/2011

Minimal to no inflation of balloon after 10 minutes.

ALL CONSULTING

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ENGINEERING • ENVIRONMENTAL

September 2, 2011 (transmitted via email)

PN: 1367

Ms. Jennifer W. Means
Environmental Program Manager
Eastern Region Oil and Gas Management
Department of Environmental Protection
208 West Third Street – Suite 101
Williamsport, PA 17701-6448

RECEIVED
SEP 12 2011
OIL & GAS
NCRO

Subject: 48-Hour Notice of SISCP Testing
and Submittal of Test Results
Chesapeake Appalachia, LLC
Bradford County, Pennsylvania

Dear Ms. Means:

Chesapeake Appalachia, LLC (Chesapeake), entered into a Consent Order and Agreement (COA) on May 16, 2011, with the Commonwealth of Pennsylvania Department of Environmental Protection (DEP). ALL Consulting (ALL) is supporting Chesapeake with its compliance with the COA.

The COA requires Chesapeake to perform certain testing and rehabilitation activities at select Chesapeake owned and operated gas wells. The testing and rehabilitation tasks are outlined in the *Corrective Action Pan for Well Evaluation and Potential Remediation, Bradford County, Pennsylvania* (hereinafter referred to as the CAP) dated May 2011 and approved, with modifications, by the DEP on August 17, 2011. Chesapeake separately has objected to the CAP modifications, but is implementing work under protest.

This letter provides DEP with 48-hour advance written notice and schedule of Chesapeake's intent to initiate vent flow rate testing and SISCP testing at a well the DEP has identified within the COA (see Table 1, herein). Please advise ALL if DEP will attend the initiation of the SISCP test. If so, please provide the names and cell phone numbers of DEP staff scheduled to be on-site so that Chesapeake or ALL Consulting may contact them to coordinate a meeting location.

This letter also provides the results of vent flow rate testing and SISCP testing completed through August 31, 2011. In accordance with the CAP, results must be provided to the DEP within five (5) days of the completion of the test. SISCP test charts and results of the balloon testing, if applicable, are attached. Table 2 summarizes the test results. Please note that there was an apparent malfunction of the data logging equipment during the Welles 3-5H SISCP test. As noted above, an additional test has been scheduled.

If DEP requires additional information please do not hesitate to contact ALL Consulting at 918-382-7581.

Sincerely,
ALL Consulting

J. Daniel Arthur, PE, SPEC
Project Manager

xc: Mr. Tal Oden, Regulatory Manager North, East Division, Chesapeake Energy Corp.

Table 1
Proposed Well Testing Schedule

Gas Well	Vent Flow Rate Test Date	SISCP Test Date	Test Start Time
Welles 3-5H	September 6, 2011	September 6, 2011	8 AM

Table 2
SISCP & Vent Flow Rate Test Results

Well Name	Shut-In Pressure Test Results		Vent Flow Rate Test Results			
	Date Test Ended	SISCP test	Test Date	Manometer Reading (0.25" Orifice)		Balloon test
				Inches of Water	Mcf/d	
Harper 4H	8/29/2011	0.2 psi in 48 hrs	8/27/2011	1	1.76	Fully inflated in 0.25 seconds
Harper 5H	8/29/2011	6 psi in 48 hrs	8/27/2011	0.6	1.365	Fully inflated in 0.5 seconds
Otten 1H	8/29/2011	226 psi in 8.6 hrs	8/29/2011	0.2	0.789	Fully inflated in 0.5 seconds
Otten 2H	8/30/2011	215 psi in 20.3 hrs	8/29/2011	<0.1	<0.557	Fully inflated in 5.45 seconds
Alton 6H	8/30/2011	202 psi in 8.6 hrs	8/30/2011	0.4	1.114	--
Everbreeze 2H	8/30/2011	238 psi in 2.6 hrs	8/30/2011	0.6	1.365	--
ACLA 2H	8/31/2011	9 psi in 48 hrs	8/29/2011	<0.1	<0.557	Fully inflated in 5 minutes, 6 seconds
Stoorza 5H	8/31/2011	257 psi in 48 hrs	8/29/2011	0.4	1.114	--
Welles 3-5H	8/31/2011	Equipment malfunction - will rerun test	8/29/2011	<0.1	<0.557	Minimally inflated after 10 minutes

Harper 4H

SISCP & Balloon Test Results

Trade Secret & Confidential Proprietary Information

Harper 4H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Harper 4H – 8/27/2011

Full inflation of balloon after 0.25 seconds.

Harper 5H

SISCP & Balloon Test Results

Trade Secret & Confidential Proprietary Information

Harper 5H - 48hr Shut-In Pressure Test

Trade Secret &Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Harper 5H – 8/27/2011

Full inflation of balloon after 0.5 seconds.

Otten 1H

SISCP & Balloon Test Results

Trade Secret & Confidential Proprietary Information

Otten 1H - 48hr Shut-In Pressure Test

Trade Secret &Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Otten 1H – 8/29/2011

Full inflation of balloon after 0.5 seconds.

Otten 2H

SISCP & Balloon Test Results

Trade Secret & Confidential Proprietary Information

Otten 2H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Otten 2H – 8/29/2011

Full inflation of balloon after 5.45 seconds.

Alton 6H

SISCP Test Results

Trade Secret & Confidential Proprietary Information

Alton 6H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

Everbreeze 2H

SISCP Test Results

Trade Secret & Confidential Proprietary Information

Everbreeze 2H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

ACLA 2H

SISCP & Balloon Test Results

Trade Secret & Confidential Proprietary Information

ACLA 2H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Acla 2H – 8/29/2011

Full inflation of balloon after 5 minutes and 6 seconds.

Stoorza 5H

SISCP Test Results

Trade Secret & Confidential Proprietary Information

Stoorza 5H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

Welles 3-5H

SISCP & Balloon Test Results

Trade Secret & Confidential Proprietary Information

Welles 3-5H - 48hr Shut-In Pressure Test

Trade Secret & Confidential Proprietary Information

Prepared by ALL Consulting

10 Minute Balloon Test

Welles 3-5H – 8/29/2011

Limp balloon after 10 minutes.

ALL CONSULTING
GOVERNMENT RELATIONS - ENERGY - PLANNING - TECHNOLOGY
ENGINEERING - ENVIRONMENTAL

RECEIVED
AUG 29 2011
OIL & GAS

August 25, 2011 (transmitted via email)

PN: 1367

Ms. Jennifer W. Means
Environmental Program Manager
Eastern Region Oil and Gas Management
Department of Environmental Protection
208 West Third Street – Suite 101
Williamsport, PA 17701-6448

Subject: Gas Well Evaluation Project Schedule
and 48-Hour Notice of SISCP Testing
Chesapeake Appalachia, LLC
Bradford County, Pennsylvania

Dear Ms. Means:

Chesapeake Appalachia, LLC (Chesapeake) entered into a Consent Order and Agreement (COA) on May 16, 2011 with the Commonwealth of Pennsylvania Department of Environmental Protection (DEP). ALL Consulting (ALL) is supporting Chesapeake with its compliance with the COA.

The COA requires Chesapeake to perform certain testing and rehabilitation activities at select Chesapeake owned and operated gas wells. The testing and rehabilitation tasks are outlined in the *Corrective Action Pan for Well Evaluation and Potential Remediation, Bradford County, Pennsylvania* (hereinafter referred to as the CAP) dated May 2011 and approved, with modifications, by the DEP on August 17, 2011. Chesapeake separately has objected to the CAP modifications, but is implementing work under protest.

Chesapeake has been working on the evaluation and remediation of many of the wells the DEP designated as Phase 1 wells since before the COA was finalized. In order to further expedite the process, Chesapeake continued its evaluation and remediation work after the COA was final, while the CAP was being prepared and reviewed by the DEP. Chesapeake has conducted this work in conformance with the approach outlined in the CAP. These activities are still ongoing and are summarized briefly in Table 1. The 16 wells will now be retested as specified by the CAP. You will note from Table 1 that Chesapeake has already made considerable progress at reducing shut-in pressures in several of these wells.

This letter provides DEP with 48-hour advance written notice and schedule of Chesapeake's intent to initiate vent flow rates testing and SISCP testing at the wells the DEP designated as Phase 1 well locations (see Table 2, herein). The order of testing is based on the order of

importance (as specified by Table 2 of the CAP) and also geographic proximity to facilitate efficient testing (see Figure 1 for a map of the area). Please note that the test time is approximate and represents a "no earlier than" time frame. Please understand that if additional time is needed to initiate testing at a given well then tests at other wells scheduled to begin later on the same day may be delayed. In any event, it is Chesapeake's intention that each of these well tests will be initiated prior to midnight of the indicated start date.

Please advise ALL if DEP will attend the initiation of the SISCP tests. If so, please provide the names and cell phone numbers of DEP staff scheduled to be on-site so that Chesapeake or ALL Consulting may contact them to coordinate a meeting location. If DEP personnel will attend, it may be advantageous to meet at Chesapeake's Towanda office 2 hours prior to mobilizing to the first well site.

If DEP requires additional information please do not hesitate to contact ALL Consulting at 918-382-7581.

Sincerely,
ALL Consulting

J. Daniel Arthur, PE, SPEC
Project Manager

xc: Mr. Tal Oden, Regulatory Manager North, East Division, Chesapeake Energy Corp.

TABLE 1
CHEASAPEAKE WELL EVALUATION PROGRESS SUMMARY (BEGINNING MAY 16, 2011)

Well Name	Shut-In Pressure Test (Max Pressure Observed)		Surface Casing Flow Readings			Logging			Remediation		Comments
	Surface Casing	Test Date	Manometer Reading (inH_2O)	MCFD	Test Date	Date	Type	Results	Date	Type	
ACLA 2H	124 psi in 48 hrs	7/5/2011	0.4	1.114	7/5/2011	8/19/2011	Noise/Temperature Log	Anomalies Identified	TBD	Squeeze Planned	Evaluating data to plan further remedial action.
						8/20/2011	Noise/Temperature Log	Anomalies Identified	--	--	Evaluating data to plan further remedial action.
Alton 6H	232 psi in 3.5 hrs	8/9/2011	0.4	1.114	7/5/2011	--	--	--	--	--	Evaluating data to plan further remedial action.
Benscoter 1H	180 psi in 48 hrs	7/20/2011	<0.1	--	7/4/2011	--	--	--	--	--	Evaluating to determine if any remediation is needed.
Duffield 2H	28 psi in 48 hrs	7/2/2011	<0.1	--	7/5/2011	--	--	--	--	--	Evaluating to determine if any remediation is needed.
Everbreeze 2H	34 psi in 48 hrs	6/28/2011	<0.1	--	7/4/2011	--	--	--	5/19/2011	Perforate and Spot Cement	Evaluating to determine if any remediation is needed.
Harper 4H	3 psi in 48 hrs	7/25/2011	<0.1	--	7/2/2011	5/31/2011	Noise/Temperature Log	No Anomalies Noted	5/21/2011	Perforate and Squeeze Cement	
									5/26/2011	Perforate and Squeeze Cement	
Harper 5H	2 psi in 48 hrs	7/25/2011	0.2	0.789	7/5/2011	6/3/2011	Radial Cement Bond Log		6/12/2011	Spot Acid to Breakdown Perfs	Evaluating to determine if any remediation is needed.
						6/4/2011	Noise/Temperature Log	Anomalies Identified	6/15/2011	Spot Acid to Breakdown Perfs	
						6/6/2011	Noise/Temperature Log	Anomalies Identified	6/17/2011	Spot Sodium Silicate	
						6/30/2011	Noise/Temperature Log	No Anomalies Noted	6/21/2011	Spot Sodium Silicate	
						7/1/2011	Noise/Temperature Log	No Anomalies Noted	6/25/2011	Spot Cement	
Morse 5H	200 psi in 48 hrs	7/5/2011	<0.1	--	7/1/2011	--	--	--	--	--	Evaluating data to plan further remedial action.
Otten 1H	325 psi in 9 hrs	7/22/2011	0.7	1.472	7/5/2011	8/15/2011	Noise/Temperature Log	Anomalies Identified	TBD	Squeeze Planned	Evaluating data to plan further remedial action.
						8/16/2011	Noise/Temperature Log	Anomalies Identified			
Otten 2H	297 psi in 29.5 hrs	7/22/2011	0.2	0.0789	7/5/2011	8/19/2011	Noise/Temperature Log	Anomalies Identified	TBD	Squeeze Planned	Evaluating data to plan further remedial action.
						8/20/2011	Noise/Temperature Log	Anomalies Identified			
Readinger 4H	0 psi in 48 hrs	7/13/2011	<0.1	--	7/3/2011	--	--	--	--	--	Evaluating to determine if any remediation is needed.
Sivers 1H	4 psi in 48 hrs	7/2/2011	<0.1	--	7/5/2011	--	--	--	--	--	Evaluating to determine if any remediation is needed.
Stoorza 5H	197 psi in 32.4 hrs	7/5/2011	0.3	0.966	7/5/2011	--	--	--	--	--	Evaluating data to plan further remedial action.
Storms 2H	60 psi in 48 hrs	7/2/2011	<0.1	--	7/1/2011	--	--	--	--	--	Evaluating to determine if any remediation is needed.
Welles 3-5H	0 psi in 48 hrs	8/16/2011	<0.1	--	7/1/2011	--	--	--	--	--	Evaluating to determine if any remediation is needed.
Yoder 2H	136 psi in 48 hrs	8/5/2011	0.2	0.789	7/5/2011	--	--	--	--	--	Evaluating data to plan further remedial action.

Table 2
Proposed Phase 1 Well Testing Schedule

Gas Well	Vent Flow Rate Test Date	SISCP Test Date	Test Start Time
Harper 4H	August 27, 2011	August 27, 2011	2 PM
Harper 5H	August 27, 2011	August 27, 2011	2 PM
Acla 2H	August 29, 2011	August 29, 2011	8 AM
Otten 2H	August 29, 2011	August 29, 2011	10 AM
Otten 1H	August 29, 2011	August 29, 2011	10 AM
Stoorza 5H	August 29, 2011	August 29, 2011	12 N
Welles 3-5H	August 29, 2011	August 29, 2011	2 PM
Alton 6H	August 30, 2011	August 30, 2011	8 AM
Everbreeze 2H	August 30, 2011	August 30, 2011	10 AM
Yoder 2H	August 30, 2011	August 30, 2011	12 N
Readinger 4H	August 30, 2011	August 30, 2011	2 PM
Morse 5H	August 30, 2011	August 30, 2011	4 PM
Sivers 1H	August 31, 2011	August 31, 2011	8AM
Duffield 2H	August 31, 2011	August 31, 2011	10 AM
Benscoter 1H	August 31, 2011	August 31, 2011	12 N
Storms 2H	August 31, 2011	August 31, 2011	2 PM

Prepared for:
Chesapeake Appalachia, LLC
Project Manager: Don Arthur
Figure 1
Map Design: Jason Veale
Corrective Action Plan
Phase 1 Wells
0 0.5 1 2
Miles
August 2011
Legend
All Wells
Phase 1 Wells
4 Mile Study Area
County Boundary
Municipality Boundary
Alton 6H
Miller/Luce Area
Yoder 2H
Readinger 4H
Everbreeze 2H
Morse 5H
Vargson Area
Dan Ellis Area
Acla 2H
Otten 2H
Otten 1H
Harper 4H
Harper 5H
Welles 3-5H
Stoorza 5H
Paradise Road Area
Sugar Run Area
Sivers Area
Duffield 2H
Storms 2H
Sivers 1H
Benscoter 1H
Spring Hill Road Area
SMITHFIELD
SPRINGFIELD
TROY
GRANVILLE
LEROY
FRANKLIN
OVERTON
KLAND
FORKS
ALBANY
CHERRY
COLLEY
WILMOT
WINDHAM
TERRY
MONROE
TOWANDA
ROME
WYSOX
HERRICK
WYALUSING
AUBURN
RUSH
STEVENS
ORWELL
PIKE
Bradford Co.
Sullivan Co.
Susquehanna Co.
Wyomin Co.

ALL CONSULTING

GOVERNMENT RELATIONS · ENERGY · PLANNING · TECHNOLOGY
ENGINEERING · ENVIRONMENTAL

August 31, 2011 (transmitted via email)

PN: 1367

Ms. Jennifer W. Means
Environmental Program Manager
Eastern Region Oil and Gas Management
Department of Environmental Protection
208 West Third Street – Suite 101
Williamsport, PA 17701-6448

RECEIVED
SEP 12 2011
OIL & GAS
NCRO

Subject: 48-Hour Notice of SISCP Testing
Chesapeake Appalachia, LLC
Bradford County, Pennsylvania

Dear Ms. Means:

Chesapeake Appalachia, LLC (Chesapeake) entered into a Consent Order and Agreement (COA) on May 16, 2011, with the Commonwealth of Pennsylvania Department of Environmental Protection (DEP). ALL Consulting (ALL) is supporting Chesapeake with its compliance with the COA.

The COA requires Chesapeake to perform certain testing and rehabilitation activities at select Chesapeake owned and operated gas wells. The testing and rehabilitation tasks are outlined in the *Corrective Action Pan for Well Evaluation and Potential Remediation, Bradford County, Pennsylvania* (hereinafter referred to as the CAP) dated May 2011 and approved, with modifications, by the DEP on August 17, 2011. Chesapeake separately has objected to the CAP modifications, but is implementing work under protest.

This letter provides DEP with 48-hour advance written notice and schedule of Chesapeake's intent to initiate vent flow rate testing and SISCP testing at wells the DEP has identified within the COA (see Table 1, herein). The order of testing is based on the geographic proximity to facilitate efficient testing (see Figure 1 for a map of the area). Please note that the test time is approximate and represents a "no earlier than" time frame. Please understand that if additional time is needed to initiate testing at a given well then tests at other wells scheduled to begin later on the same day may be delayed. In any event, it is Chesapeake's intention that each of these well tests will be initiated prior to midnight of the indicated start date.

Please advise ALL if DEP will attend the initiation of the SISCP tests. If so, please provide the names and cell phone numbers of DEP staff scheduled to be on-site so that Chesapeake or ALL Consulting may contact them to coordinate a meeting location. If DEP personnel will

attend, it may be advantageous to meet at Chesapeake's Towanda office 2 hours prior to mobilizing to the first well site.

If DEP requires additional information please do not hesitate to contact ALL Consulting at 918-382-7581.

Sincerely,
ALL Consulting

J. Daniel Arthur, PE, SPEC
Project Manager

xc: Mr. Tal Oden, Regulatory Manager North, East Division, Chesapeake Energy Corp.

Table 1
Proposed Well Testing Schedule

Gas Well	Vent Flow Rate Test Date	SISCP Test Date	Test Start Time
Welles 2-2H	September 2, 2011	September 2, 2011	10 AM
Welles 2-5H	September 2, 2011	September 2, 2011	10 AM
Welles 1-3H	September 2, 2011	September 2, 2011	12 N
Welles 1-5H	September 2, 2011	September 2, 2011	12 N
Welles 3-2H	September 2, 2011	September 2, 2011	2 PM
Welles 4-2H	September 3, 2011	September 3, 2011	10 AM
Welles 4-5H	September 3, 2011	September 3, 2011	10 AM
Welles 5-2H	September 3, 2011	September 3, 2011	12 N
Welles 5-5H	September 3, 2011	September 3, 2011	12 N
Champdale 4H	September 3, 2011	September 3, 2011	2 PM
Champdale 5H	September 3, 2011	September 3, 2011	2 PM

Prepared for:
Chesapeake Appalachia, LLC

Project Manager: Dan Arthur	Figure 1	Map Design: Jason Veale

Trade Secret and Confidential Proprietary Information

Corrective Action Plan
Scheduled SISCP Testing

0 0.5 1 2
Miles
August 2011

Chesapeake ENERGY

August 25, 2011

VIA UPS OVERNIGHT DELIVERY

Jennifer W. Means
Environmental Program Manager
Oil & Gas Management
Eastern Gas Region
Pennsylvania Department of Environmental Protection
Northcentral Regional Office
208 West Third Street, Suite 101
Williamsport, PA 17701-6448

Re: May 16, 2011 Consent Order and Agreement – Corrective Action Plan

Dear Ms. Means:

I write on behalf of Chesapeake Appalachia, LLC ("Chesapeake") with respect to the Department's letter dated August 17, 2011 approving with modifications the Corrective Action Plan ("CAP") that Chesapeake submitted pursuant to the May 16, 2011 Consent Order and Agreement ("COA") between Chesapeake and the Department. Chesapeake requests that the Department withdraw the modification stated in its August 17 letter. Chesapeake has begun implementation of the CAP under protest for the reasons stated here.

Section 3 of the COA requires Chesapeake to submit to the Department, for review and approval, a corrective action plan, to implement the plan approved by the Department, and to submit bi-weekly reports to the Department regarding the status and progress of the work. The obligation to submit bi-weekly progress reports ends when the Department determines in writing that Chesapeake "has eliminated the unpermitted discharge of natural gas into waters of the Commonwealth" from any gas well owned or operated by Chesapeake within the areas identified in the COA.

By its August 17 letter, the Department purports to expand the scope of the required correction action by requiring remediation of "Phase 2" wells "until the stray gas is eliminated." An obligation to "eliminate" all stray gas would be substantially in excess of what is required by the COA, an unwarranted imposition on Chesapeake, and likely not possible. Chesapeake objects to

this attempt to expand the scope of work and, accordingly, requests that the Department withdraw the CAP modification.

The August 17 letter also appears to require remediation of all "Phase I" wells. What Chesapeake proposed in the CAP was to *assess* each well for potential corrective action, and to develop and implement a well-specific remedial strategy for each well warranting such action where appropriate and technically justified. Yet, the August 17 letter seems to require remedial work on every "Phase 1" well regardless of the results of the assessment. Chesapeake sees no justification for making a decision to require corrective action at particular wells in advance of the assessments. For this reason, as well, Chesapeake requests that the Department withdraw the CAP modification.

Finally, Chesapeake is concerned by the 4 month deadline for all "Phase 1" stated in the August 17 letter. Without knowing the nature and scope of work that may be required on any particular well, Chesapeake believes there is no basis to establish a firm deadline. Chesapeake is committed to working diligently to fulfill the obligations of the COA, and will report progress on a bi-weekly basis as required. It may prove necessary to extend the 4 month period, depending upon the nature and scope of work that is required.

Thank you for your consideration of this matter. Chesapeake respectfully requests a response within fourteen (14) days.

Sincerely,

Stephanie Timmermeyer
Director – Regulatory Affairs

cc: Tal Oden
John Reinhart
Craig Wilson

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHCENTRAL REGIONAL OFFICE

August 17, 2011

CERTIFIED MAIL NO. 7010 1870 0001 7876 2483

Mr. Tal Oden
Chesapeake Energy Corporation
P.O. Box 18496
Oklahoma City, OK 73154-0496

Re: Deficiency Letter
Chesapeake COA Document: "Status of Water Supply Monitoring and Remediation Plans" – July 18, 2011
Bradford County, PA

Dear Mr. Oden:

The Department has performed a review of the "Water Supply Monitoring and Remediation Plans" document submitted by Chesapeake on July 18, 2011 as required by the Consent Order and Agreement (COA) executed on May 16, 2011. Based on this review, the following deficiencies were noted:

1. Supporting laboratory analysis data sheets were not submitted. Please provide all supporting laboratory analysis data sheets. These can be provided in PDF format on CD if preferred.

2. Pursuant to paragraph 7(b) of the COA, and consistent with Chapter 78.51(d)(2), "The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established under the Pennsylvania Safe Drinking Water Act (35 P.S. §§ 721.1 – 721.17), or is comparable to the water quality supply before it was affected if that water supply did not meet these standards." Chesapeake did not include a schedule for sampling and submission of sample results of finished water. Please include as part of your plan a schedule for sampling of finished (treated) water to ensure this obligation is satisfied. Alternate water supplies should not be removed until this obligation can be satisfied.

3. Chesapeake did not provide a schedule or indicate the preferred medium for future submittals of data gathered in accordance with paragraph 7(a)(1-5). Please provide a schedule and preferred medium for future submittals of data gathered in accordance with paragraph 7(a)(1-5).

4. Chesapeake did not provide a detailed description of the means by which Chesapeake intends to provide for the long-term operation and maintenance of the restored/replaced water supplies as required by Chapter 78.51(d)(1)(v). Please provide a detailed description of the means by which Chesapeake intends to provide for the long-term operation and maintenance of the restored/replaced water supplies as required by Chapter 78.51(d)(1)(v).

In response to the request to reduce sampling frequency at the Brown and Pary residences per paragraph 7(a)(3) of the COA, the Department intends to collect confirmation samples at these water supplies within the next two weeks. The Department will address this request after we receive our results.

Please submit a revised Water Supply Montioring and Remediation Plan that addresses the above deficiencies by September 1, 2011.

Should you have any questions, please feel free to contact me via email at jenmeans@state.pa.us or at 570.321.6557.

Sincerely,

Jennifer W. Means

Jennifer W. Means
Environmental Program Manager
Oil & Gas Management
Eastern Gas Region

cc: Stephanie Timmermeyer
Gas Migration Files: Paradise Road, Miller/Luce, Broctown Road, Sivers/Beaver Pond, Sugar Run, Spring Hill Road, and Vargson
Nels Taber
Geoffrey Ayers
John Ryder
Bruce Jankura

Agenda

DEP / Chesapeake COA Review

November 9, 2011

10:30 AM – Northcentral Regional Office, Goddard Room

- Introductions

- CHK Gas Well Evaluation Progress Report
  - Testing Criteria, Assessment & Prioritization Strategy
  - Testing and Assessment Results
  - Remediation Criteria and Prioritization Strategy
  - Remediation Results
  - Timeline of Additional Gas Well Evaluations (Table I & II)
    - ❑ Testing and Assessment
    - ❑ Remediation

- CHK Water Supply Testing & Analysis Progress Report
  - Testing Summary
  - Results
  - Timeline of Additional Testing

- DEP COA Compliance Expectations
  - Gas Well Evaluations
  - Water Supply Testing

- Followup Deliverables

(Chesapeake GMI COA File)

11/9/11

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Chesapeake | DEP
COA and CAP Meeting
Williamsport NCRO.

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHCENTRAL REGIONAL OFFICE

August 17, 2011

CERTIFIED MAIL NO. 7010 1870 0001 7876 2483

Mr. Tal Oden
Chesapeake Energy Corporation
P.O. Box 18496
Oklahoma City, OK 73154-0496

Re: Deficiency Letter
Chesapeake COA Document: "Status of Water Supply Monitoring and Remediation Plans" – July 18, 2011
Bradford County, PA

Dear Mr. Oden:

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1. Supporting laboratory analysis data sheets were not submitted. Please provide all supporting laboratory analysis data sheets. These can be provided in PDF format on CD if preferred.

2. Pursuant to paragraph 7(b) of the COA, and consistent with Chapter 78.51(d)(2), "The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established under the Pennsylvania Safe Drinking Water Act (35 P.S. §§ 721.1 – 721.17), or is comparable to the water quality supply before it was affected if that water supply did not meet these standards." Chesapeake did not include a schedule for sampling and submission of sample results of finished water. Please include as part of your plan a schedule for sampling of finished (treated) water to ensure this obligation is satisfied. Alternate water supplies should not be removed until this obligation can be satisfied.

3. Chesapeake did not provide a schedule or indicate the preferred medium for future submittals of data gathered in accordance with paragraph 7(a)(1-5). Please provide a schedule and preferred medium for future submittals of data gathered in accordance with paragraph 7(a)(1-5).

4. Chesapeake did not provide a detailed description of the means by which Chesapeake intends to provide for the long-term operation and maintenance of the restored/replaced water supplies as required by Chapter 78.51(d)(1)(v). Please provide a detailed description of the means by which Chesapeake intends to provide for the long-term operation and maintenance of the restored/replaced water supplies as required by Chapter 78.51(d)(1)(v).

In response to the request to reduce sampling frequency at the Brown and Pary residences per paragraph 7(a)(3) of the COA, the Department intends to collect confirmation samples at these water supplies within the next two weeks. The Department will address this request after we receive our results.

Please submit a revised Water Supply Montioring and Remediation Plan that addresses the above deficiencies by September 1, 2011.

Should you have any questions, please feel free to contact me via email at jenmeans@state.pa.us or at 570.321.6557.

Sincerely,

Jennifer W. Means

Jennifer W. Means
Environmental Program Manager
Oil & Gas Management
Eastern Gas Region

cc: Stephanie Timmermeyer
Gas Migration Files: Paradise Road, Miller/Luce, Broctown Road, Sivers/Beaver Pond, Sugar Run, Spring Hill Road, and Vargson
Nels Taber
Geoffrey Ayers
John Ryder
Bruce Jankura

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Water Supply
Defic. letter

Sent To: Tal Oden

Street, Apt. No.; or PO Box No.: CHK

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
NORTHCENTRAL REGIONAL OFFICE

August 17, 2011

CERTIFIED MAIL NO. 7010 1870 0001 7876 2476

Mr. Tal Oden
Chesapeake Energy Corporation
P.O. Box 18496
Oklahoma City, OK 73154-0496

Re: Deficiency Letter
Chesapeake COA Document: Corrective Action Plan
July 2011
Bradford County, PA

Dear Mr. Oden:

The Department has performed a review of the revised Corrective Action Plan For Well Evaluation and Potential Remediation (CAP) submitted by Chesapeake on July 11, 2011 as required by the Consent Order and Agreement (COA) executed on May 16, 2011. Pursuant to paragraph 9 of the COA, the Department is approving the CAP with the following modifications added to the Corrective Action Plan under Item 3. Corrective Action:

a) The 16 wells listed in Table 2, Gas Wells With SISCPs Exceeding 100psig, should be considered Phase 1 for additional evaluation to prioritize them for remediation. Begin work on these wells immediately and establish a timeline for starting and remediating all 16 of these wells with all work to be completed within 4 months of the date of this letter. As Phase 2, assess the remaining 97 wells listed in Table #1, Gas Wells by Study Area, and prioritize them for remedial well work. Establish a timeline to follow Phase 1 above, and start remediating all 97 wells until the stray gas is eliminated. Should the gas migration cease prior to initiation of Phase 2, Chesapeake may petition the Department for an alternative.

The CAP is approved as modified above. Please begin implementation within 5 days.

Should you have any questions, please feel free to contact me via email at jemeans@pa.gov or at 570.321.6557

Sincerely,

Jennifer W. Means

Jennifer W. Means
Environmental Program Manager
Oil & Gas Management
Eastern Gas Region

cc: Stephanie Timmermeyer
Gas Migration Files: Paradise Road, Miller/Luce, Broctown Road, Sivers/Beaver Pond, Sugar Run, Spring Hill Road, and Vargson
Nels Taber
Geoffrey Ayers
John Ryder
Bruce Jankura

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COA
Defic. letter

Sent To: Tal Oden

Street, Apt. No.; or PO Box No.: CHK

City, State, ZIP+4

July 18, 2011

VIA UPS NEXT DAY AIR

Jennifer Means
Environmental Program Manager
Oil & Gas Management Program
Pennsylvania Department of Environmental Protection
208 W. Third Street, Suite 101
Williamsport, PA 17701

Re: Consent Order and Agreement
Status of Water Supply Monitoring and Remediation Plans

Dear Ms. Means:

Pursuant to Section 7(a) of the May 16, 2011 Consent Order and Agreement ("COA") between **Chesapeake Appalachia LLC ("Chesapeake") and the Commonwealth of Pennsylvania, Department of Environmental Protection ("Department")**, Chesapeake has been conducting bi-weekly water supply screening and sampling at each of the water supplies identified in Exhibit C to the COA, as amended, provided the landowner has given consent to such screening. Enclosed are a summary table (Table 1) that includes screening and sampling results for the water supplies listed in Exhibit C and a summary table (Table 2) of actions taken by Chesapeake to address each water supply.

Based on the results of this screening and sampling (Table 1), and pursuant to Section 7(b) of the COA, Chesapeake is submitting a plan and schedule of actions (Table 2) to address each of the following water supplies, the screening and sampling results for which have shown dissolved methane equal to or greater than 7 milligrams per liter ("mg/L") or free gas in the headspace greater than 25% of lower explosive limit ("LEL").

Postupak
Pickett
Baldwin
Buck #1
Buck #2
Dunklee
Reinhart
Loomis
Bidlack
Spencer
Phillips
McMiken
Laws
Earl Sites (owned by P. Sites)
Sibley (owned by P. Sites)
Vargson

Chesapeake Energy Corporation
300 North Second Street, 5th Floor • Harrisburg, PA 17101
717.230.8620 • fax 717.233.3582

Chesapeake will be prepared to implement the plan and schedule within fourteen (14) days of approval by the Department, in accordance with Section 7(c) of the COA. Chesapeake will continue to conduct bi-weekly screening and sampling of these supplies pending approval by the Department of the plan and schedule to address the supplies, and, upon approval of the plan and schedule, will conduct quarterly screening and sampling pursuant to Section 7(a)(4) of the COA.

Based on the results of this screening and sampling (Table 1), and pursuant to Section 7(a)(3) and 7(a)(4) of the COA, Chesapeake proposes to conduct quarterly screening and sampling of the following water supplies, the screening and sampling results for which have shown (A) either no combustible free gas in the wellhead, or levels of combustible free gas that, if properly vented, do not pose a danger to persons or property, and (B) concentration of dissolved methane below 7 mg/L:

Brown
Pary

Both of these water supplies also have installed and operating water treatment systems described on Table 3. We request the Department's concurrence with reducing sampling frequency of these wells to quarterly.

In accordance with Section 7(a)(3) of the COA, Chesapeake also may petition the Department for a determination that the concentration of methane in the water supply is at background levels for the aquifer that supplies a water supply and that the combustible free gas at a wellhead is at levels that do not present a danger to persons or property if properly vented according to applicable regulations and Department practice.

Water Supply Screening and Sampling Results

Screening and sampling commenced during the week of May 22, 2011. Subsequent screening and sampling occurred during the weeks of June 5, June 19 and July 3. No sampling or screening has occurred to date at the Bidlack residence because landowner consent had not been obtained despite our best efforts to obtain such consent. Chesapeake recently obtained the necessary landowner consent and will begin screening and sampling on July 18, 2011. All water samples were analyzed by Test America, a Pennsylvania accredited laboratory for dissolved methane, ethane and propane.

Status of Water Supply Remediation and Plans to Address Each Water Supply

Chesapeake has been extremely proactive over the past six months, predating the COA, to address resident's concerns about their water supplies.

A summary table detailing the status of water supplies listed in Exhibit C is attached (Table 2). For those water supplies with installed treatment systems, a brief description of the system is included (Table 3). Standards and specifications for the treatment systems are also enclosed, including a system flow chart and specifications and descriptions of the Sentry I Open-Air System and Kinetico 4060 OD water filtration unit.

At present, nine residences have installed and operating water treatment systems. Ongoing discussions continue with Buck (2 water supplies) and Reinhart. Dunklee is not interested in a system at this time,

and Bidlack and Vargson have refused Chesapeake's offer for a system. Sibley, E. Sites and Laws have been provided connections to the local public water system.

If you have any questions regarding this submittal, please contact me at the number listed below.

Sincerely,

Michael D. Sherman

Michael D. Sherman
Environmental Manager, Eastern Division
Chesapeake Appalachia, LLC

Chesapeake Energy Corporation
300 North Second Street, 5th Floor • Harrisburg, PA 17101
717.230.8620 • fax 717.233.3582

Table 1

Monitoring of Water Supplies Listed in Exhibit C of the May 16, 2011 Consent Order and Agreement

Chesapeake Appalachia, LLC
Tuscarora, Terry, Monroe, Towanda and Wilmot Townships, Bradford County, Pennsylvania
May 16, 2011 Consent Order and Agreement

Area	Landowner	Treatment System	Treatment System Install Date	COA Sampling Event 1 May 23 - 27, 2011			COA Sampling Event 1A - June 3, 2011 - Resample of samples collected on May 27, 2011		
				Sample Date	Dissolved Methane Concentration (mg/L)	Water Well Headspace Reading	Sample Date[1]	Dissolved Methane Concentration (mg/L)	Water Well Headspace Reading
Sugar Run	Carl Postupak	Yes	5/24/2011	5/27/2011	31.4	56,600ppm, 91% LEL	6/3/2011	20.8	76,900ppm, 100%LEL
Sugar Run	Don Pickett	Yes	5/10/2011	5/26/2011	11.3	10.97ppm, 0% LEL			
Sugar Run	Robert Baldwin	Yes	3/16/2011	5/26/2011	24.0	>130,200ppm, 100% LEL			
Sugar Run	David Buck #1 (Bunnell Trailer)	No	--	5/27/2011	21.8	741ppm, 0% LEL	6/3/2011	14.6	3,160ppm, 4% LEL
Sugar Run	David Buck #2 (Yellow House)	No	--	5/27/2011	32.8	1,379ppm, 5% LEL	6/3/2011	14.0	1,924ppm, 0% LEL
Sugar Run	Dale Dunklee	No	--	5/26/2011	3.81	134,700ppm, 100% LEL			
Sugar Run	Kenneth Reinhart	No	--	5/27/2011	40.7	10,500ppm, 18% LEL	6/3/2011	45.1	3,002ppm, 4% LEL
Sugar Run	Peggy Loomis	Yes	5/24/2011		NS		6/3/2011	13.3	Not measured
Sugar Run	Edwin Bidlack	No	--		NS				
Paradise Road	Scott Spencer	Yes	2/17/2011	5/23/2011	8.63	10.02ppm, 0% LEL			
Paradise Road	Michael Phillips	Yes	2/17/2011	5/23/2011	9.21	69.81ppm, 0% LEL			
Paradise Road	Jared McMicken	Yes	2/17/2011	5/23/2011	8.86	1.37ppm, 0% LEL			
Brocktown Rd	Greg Laws	Public Water	4th Quarter 2010	5/27/2011	21.4	22,500ppm, 30% LEL	6/3/2011	16.9	12,100ppm, 21%
Brocktown Rd	Earl Sites (owned by P. Sites)	Public Water	4th Quarter 2010	5/26/2011	21.6	4.70ppm, 0% LEL			
Brocktown Rd	Sibley (owned by P. Sites)	Public Water	1st Quarter 2011	5/26/2011	15.0	4,095ppm, 11% LEL			
Springhill Rd.	John Parys	Yes	3/4/2011	5/26/2011	3.17	0.84ppm, 0% LEL			
Springhill Rd.	Ron Brown	Yes	3/1/2011	5/27/2011	0.277	1.05ppm, 0% LEL	6/3/2011	0.0892	0.45ppm, 0%
Vargson	Sherry Vargson	No	--	5/26/2011	41.9	69.78ppm, 0% LEL			

Note 1: Samples collected on 6/3/2011 were resamples because of a FedEx shipping delay that caused temperature issues in the shipping coolers.
NS: Not Sampled
DPV: Data Pending Validation
mg/L: Milligrams per Liter
PPM: Parts Per Million
LEL: Lower Explosive Limit

Table 1 (continued)

Monitoring of Water Supplies Listed in Exhibit C of the May 16, 2011 Consent Order and Agreement

Chesapeake Appalachia, LLC
Tuscarora, Terry, Monroe, Towanda and Wilmot Townships, Bradford County, Pennsylvania
May 16, 2011 Consent Order and Agreement

COA Sampling Event 2 - June 7 - 10, 2011			COA Sampling Event 3 - June 22 - 24, 2011			COA Sampling Event 4 - July 5 - 8, 2011		
Sample Date	Dissolved Methane Concentration (mg/L)	Water Well Headspace Reading	Sample Date	Dissolved Methane Concentration (mg/L)	Water Well Headspace Reading	Sample Date	Dissolved Methane Concentration (mg/L)	Water Well Headspace Reading
6/8/2011	27.5	>106,900ppm, 100% LEL	6/23/2011	28.9	9.56ppm, 0%LEL	7/6/2011	28.9	>149,800ppm, 100% LEL
6/6/2011	15.4	48.86ppm, 0% LEL	6/22/2011	21.8	512ppm, 0% LEL	7/7/2011	24.1	1,531ppm, 0% LEL
6/6/2011	34.7	>90,200ppm, 100% LEL	6/23/2011	39.7	321,700ppm, 100% LEL	7/7/2011	35.1	>150,600ppm, 100% LEL
6/10/2011	17.3	398ppm, 0% LEL	6/23/2011	21.5	5,663ppm, 7% LEL	7/7/2011	DPV	12,100ppm, 25% LEL
6/8/2011	26	6.98ppm, 0% LEL	6/23/2011	31.9	957ppm, 0% LEL	7/5/2011	DPV	6,282ppm, 7% LEL
6/6/2011	6.42	4,918ppm, 8% LEL	6/22/2011	6.28	70,400ppm, 100% LEL	7/5/2011	DPV	19,400ppm, 35% LEL
6/8/2011	41.2	>90,800ppm, 100% LEL	6/23/2011	41.3	330,400ppm, 100% LEL	7/5/2011	41.7	150,000ppm, 100% LEL
6/10/2011	12.3	32,600ppm, 87% LEL	6/23/2011	10.5	4,480ppm, 18% LEL	7/8/2011	DPV	12,300ppm, 11% LEL
	NS			NS			NS	
6/8/2011	7.71	71.66ppm, 0% LEL	6/22/2011	11.3	4.12ppm, 0% LEL	7/6/2011	9.31	23.21ppm, 0% LEL
6/8/2011	9.89	57.71ppm, 0% LEL	6/22/2011	10.4	48.02ppm, 0% LEL	7/6/2011	10.8	0.88ppm, 0% LEL
6/8/2011	8.79	60.69ppm, 0% LEL	6/22/2011	10.4	1.80ppm, 0% LEL	7/6/2011	6.24	0.21ppm, 0% LEL
6/10/2011	22.3	872ppm, 0% LEL	6/24/2011	20.4	1.09ppm, 0% LEL	7/8/2011	20.2	12,800ppm, 31% LEL
6/10/2011	<0.0260	1.48ppm, 0% LEL	6/24/2011	28.1	11.26ppm, 0% LEL	7/8/2011	29.3	16.13ppm, 0% LEL
6/10/2011	13.0	137ppm, 0% LEL	6/24/2011	6.38	0.26ppm, 0% LEL	7/8/2011	8.55	44.18ppm, 0% LEL
6/7/2011	3.90	2,220ppm, 0% LEL	6/22/2011	6.29	6,072ppm, 10% LEL	7/6/2011	3.48	0.68ppm, 0% LEL
6/7/2011	<0.0260	1.47ppm, 0% LEL	6/22/2011	<0.0260	0.90ppm, 0% LEL	7/6/2011	<0.0260	0.16ppm, 0% LEL
6/9/2011	67.8	9,733ppm, 7% LEL	6/23/2011	70.3	15,800ppm, 15% LEL	7/7/2011	65.6	32,500ppm, 59% LEL

Note 1: Samples collected on 6/3/2011 were resamples because of a FedEx shipping delay that caused temperature issues in the shipping coolers.
NS: Not Sampled
DPV: Data Pending Validation
mg/L: Milligrams per Liter
PPM: Parts Per Million
LEL: Lower Explosive Limit

Table 2

Plan and Schedule for Water Supplies Listed in Exhibit C of the May 16, 2011 Consent Order and Agreement

Chesapeake Appalachia, LLC
Tuscarora, Terry, Monroe, Towanda and Wilmot Townships, Bradford County, Pennsylvania
May 16, 2011 Consent Order and Agreement

Area	Landowner	Actions to Date					Planned Actions Scheduled to Occur After Approval by the Department
		Offer System	Offer Public Water	Offer Accepted or Declined	System Installation date	System Activation Date	
Sugar Run	Carl Postupak	1st Quarter 2011	--	Accepted	5/24/2011	7/18/2011	Negotiate O&M payment or fund escrow account
Sugar Run	Don Pickett	1st Quarter 2011	--	Accepted	5/10/2011	6/8/2011	Negotiate O&M payment or fund escrow account
Sugar Run	Robert Baldwin	1st Quarter 2011	--	Accepted	3/16/2011	4/15/2011	Negotiate O&M payment or fund escrow account
Sugar Run	David Buck #1 (Bunnell Trailer)	1st Quarter 2011	--	Declined	--	--	Offer system or fund escrow account (If system accepted, then negotiate O&M payment or fund escrow account)
Sugar Run	David Buck #2 (Yellow House)	1st Quarter 2011	--	Declined	--	--	Offer system or fund escrow account (If system accepted, then negotiate O&M payment or fund escrow account)
Sugar Run	Dale Dunklee	1st Quarter 2011	--	Declined	--	--	Offer system or fund escrow account (If system accepted, then negotiate O&M payment or fund escrow account)
Sugar Run	Kenneth Reinhart	1st Quarter 2011	--	Declined	--	--	Offer system or fund escrow account (If system accepted, then negotiate O&M payment or fund escrow account)
Sugar Run	Peggy Loomis	1st Quarter 2011	--	Accepted	5/24/2011	6/13/2011	Negotiate O&M Payment or Fund Escrow Account
Sugar Run	Edwin Bidlack	1st Quarter 2011	--	Declined	--	--	Offer system or fund escrow account (If system accepted, then negotiate O&M payment or fund escrow account)
Paradise Road	Scott Spencer	4th Quarter 2010	--	Accepted	2/17/2011	3/18/201	Negotiate O&M payment or fund escrow account
Paradise Road	Michael Phillips	4th Quarter 2010	--	Accepted	2/17/2011	4/1/2011	Negotiate O&M payment or fund escrow account
Paradise Road	Jared McMicken	4th Quarter 2010	--	Accepted	2/17/2011	3/18/2011	Negotiate O&M payment or fund escrow account
Brocktown Road	Greg Laws	--	4th Quarter 2010	Accepted	4th Quarter 2010	11/16/2010	Negotiate payment for municipal water supply expense
Brocktown Road	Earl Sites (owned by P. Sites)	--	4th Quarter 2010	Accepted	4th Quarter 2010	Approximately May 1, 2011	Negotiate payment for municipal water supply expense
Brocktown Road	Sibley (owned by P. Sites)	--	1st Quarter 2011	Accepted	1st Quarter 2011	Approximately May 1, 2011	Negotiate payment for municipal water supply expense
Springhill Road	John Parys	1st Quarter 2011	--	Accepted	3/4/2011	3/31/2011	Negotiate O&M payment or fund escrow account
Springhill Road	Ron Brown	1st Quarter 2011	--	Accepted	3/1/2011	4/6/2011	Negotiate O&M payment or fund escrow account
Vargson	Sherry Vargson	1st Quarter 2011	--	Declined	--	--	Offer system or fund escrow account (If system accepted, then negotiate O&M payment or fund escrow account)

-- = Not Applicable

STANDARD TCW METHANE REMOVAL SYSTEM

BY-PASS ALSO SUPPLIED
WITH OPEN AIR SYSTEM

SYSTEM IS SET ON A 40/60 PSI SWITCH

MAXIMUM FLOW RATE OF SYSTEM IS 12GPM

+ = Test Port

X = Shut off
Valve

System Designed by

Tri-County Water Treatment
619 Point Township Drive
Northumberland, PA 17857
1-800-660-2441

Table 3

Descriptions of Methane Treatment Systems Installed for Water Supplies Listed in Exhibit C of the May 16, 2011 Consent Order and Agreement

Chesapeake Appalachia, LLC

Tuscarora, Terry, Monroe, Towanda and Wilmot Townships, Bradford County, Pennsylvania

May 16, 2011 Consent Order and Agreement

Area	Landowner	Methane Treatment System Description	Sampling Dates	
			Initial Sampling	Second Sampling
Sugar Run	Carl Postupak	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I Open Air system with a 130 gallon baffled tank, 20" bag filter, water meter, heated shed.	6/23/2011	Week of Aug 1st
Sugar Run	Don Pickett	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I Open Air system with a 130 gallon baffled tank, 20" bag filter, UF filter system, water meter, heated shed.	5/10/2011	7/7/2011
Sugar Run	Robert Baldwin	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I Open Air system, 130 gallon baffled tank, 20" bag filter, new pressure tank, water meter, basement.	3/31/2011	5/17/2011
Sugar Run	David Buck #1 (Bunnell Trailer)	Mr. Buck declined to have a methane treatment system installed, but would re-evaluate in summer 2011. He requested the collection of additional water samples to aid in with his decision making.	- -	- -
Sugar Run	David Buck #2 (Yellow House)	Mr. Buck declined to have a methane treatment system installed, but would re-evaluate in summer 2011. He requested the collection of additional water samples to aid in with his decision making.	- -	- -
Sugar Run	Dale Dunklee	Ms. Dunklee declined to have a methane treatment system installed.	- -	- -
Sugar Run	Kenneth Reinhart	Mr. Reinhart declined to have a methane treatment system installed, but would re-evaluate in summer 2011.	- -	- -
Sugar Run	Peggy Loomis	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I Open Air system with a 130 gallon baffled tank, 20" bag filter, water meter, heated shed.	6/23/2011	7/8/2011
Sugar Run	Edwin Bidlack	CHK has contacted Mr. Bidlack during the first quarter of 2011 and he refused	- -	- -
Paradise Road	Scott Spencer	Drilled new water well. Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I Open Air system with a 130 gallon baffled tank, 20" bag filter, energy and water meter, heated shed.	2/18/2011	4/7/2011
Paradise Road	Michael Phillips	Drilled new water well. Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I Open Air system with a 130 gallon baffled tank, 20" bag filter, energy and water meter, heated shed.	3/1/2011	4/7/2011
Paradise Road	Jared McMicken	Drilled new water well. Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I Open Air system with a 130 gallon baffled tank, 20" bag filter, energy and water meter, heated shed.	2/17/2011	4/7/2011
Brocktown Road	Greg Laws	Connected to Towanda Municipal Authority Water service during November of 2010.	- -	- -
Brocktown Road	Earl Sites (owned by P. Sites)	Connected to Towanda Municipal Authority Water service January 2011. On April 2, 2011, Mrs. Sites called CHK and said she was activating the account with the Borough to initiate service.	- -	- -
Brocktown Road	Sibley (owned by P. Sites)	Connected to Towanda Municipal Authority Water service January 2011. On April 2, 2011, Mrs. Sites called CHK and said she was activating the account with the Borough to initiate service.	- -	- -
Springhill Road	John Parys	Kinetico 4060f OD Macrolite/Carbon, 220 V Sentry I Open Air system with a 300 gallon baffled tank, 20" bag filter, water meter, basement.	3/16/2011	4/14/2011
Springhill Road	Ron Brown	Kinetico 4060f OD Macrolite/Carbon, 110 V Sentry I Open Air system with a 130 gallon baffled tank, 20" bag filter, water meter, heated shed.	3/23/2011	4/25/2011
Vargson	Sherry Vargson	Vargson's declined to have a methane treatment system installed.	- -	- -

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SENTRY I

Open - Air System

Sentry I Open - Air System

The Sentry I Open-Air System combines an adjustable air-draw venturi with the Sentry Dry Pellet Chlorinator. The combination of aeration and chlorination creates a powerful oxidizer and sanitizer. The Sentry I Open-Air System will treat: Iron, Iron Bacteria, Sulfur, Sulfate Reducing Bacteria, Black Manganese, Algae, Tannins, Arsenic, Radon Gas, Methane Gas, Low output wells, and Low pH. The Sentry I Open-Air System increases your water quality. An increase in water quality reduces your maintenance cost on all appliances that utilize water. Ice makers, dishwashers, washers, water heaters and every faucet in the house are affected by water quality! By using the Sentry I Open-Air System to oxidize iron for sprinkler systems, it will reduce up to 85% of the iron staining and will reduce troublesome sprinkler head clogs.

Open – Air Specifications

Specifications			
Continuous Flow	10 gpm	18 gpm	25 gpm
Max Flow	14 gpm	22 gpm	28 gpm
Capacity	130 gal	130 gal	300 gal
Voltage	115 VAC	115 VAC	230 VAC
Operating Current	10 amp	10 amp	6.8 amp
Max Current	12 amp	12 amp	8 amp
Power	1/2hp	1/2 hp	3/4 hp
Frequency	60 Hz	60 Hz	60 Hz
Dimensions (LxWxH)	43"x27"x59"	43"x27"x59"	48"x32"x76"
Clearance Needed	45"x27"x65"	45"x27"x65"	50"x33"x82"
AB Weight	170 lb	170 lb	215 lb
Gas Reduction	200 lb	205 lb	245 lb
Radon	205 lb	210 lb	250 lb
Tank Height (T)	45"	45"	61"

SENTRY I	
Pellet Feed Rate (Max)	8 Pellets per minute
Pellet Feed Rate (MIN)	1 Pellet per 21 minutes
Pellet Storage	5 or 10 lbs container

SENTRY I (Air Stripper)	
Max Vacuum	35" H2O
Max Air Flow	43 cfm
Voltage	115 VAC
Operating Current	3.8 amp
Power	1/3 hp
Frequency	60 Hz

Better Water Industries, Inc.

Kinetico
water systems

Kinetico 4060f OD

System Components

Upper Media Vessel (qty) Size ..... (2) 8 x 17"
- Vessel Construction ..... Fiberglass Wrapped Engineered Plastic
- Bed Volume (empty / media) ..... 0.40 ft^3 / 0.20 ft^3
- Media Type ..... 40 / 60 mesh Macrolite

Lower Media Vessel (qty) Size ..... (2) 8 x 24"
- Vessel Construction ..... Fiberglass Wrapped Engineered Plastic
- Bed Volume (empty / media) ..... 0.70 ft^3 / 0.40 ft^3
- Media Type ..... Acid Washed Carbon

Riser Tube ..... 1" ABS
Distributor Upper ..... None
Lower ..... 0.014" Slots, ABS Basket
Under bedding (each tank) ..... ⅛ x ¼ Gravel
Under bedding Volume (each tank) ..... 0.6 ft^3 (6 lbs.)
Regeneration Control ..... Non-electric Use Meter
Regeneration Type ..... Countercurrent
Meter Type ..... 0.3 - 25.00 gpm Polypropylene Turbine

Inlet Water Quality

Pressure Range ..... 25 – 125 psi Dynamic Pressure
Temperature Range ..... 35 – 120° F
pH Range ..... 5 – 10 SU
Free Chlorine Cl_2 (Max.) ..... 2.0 mg/L
Hardness as $CaCO_3$ (Max.) ..... 40 gpg

Operating Specs

Flow Range (15 / 30 psig) ..... 11.0- 18.0 gpm
Flow Configuration ..... Overdrive
Dimensions (width x depth x height) ..... 17 x 8 x 48"
Weight (Operating / Shipping) ..... 200 / 160 lbs.

Connections

Inlet / Outlet Connections ..... Custom Adapter and E-Clip
Drain Connection ..... 0.50" Tube
Brine Line Connection ..... 0.375" Tube
Power ..... None

System Part Numbers

Kinetico 4060f OD (Macrolite/Carbon) 11232

Regeneration Specifications

Regeneration Volume ..... 75 gallons
Regeneration Time ..... 20 minutes
Backwash Flow Control ..... 3.0 gpm

Disc Selection

	1	2	3	4	5	6	7	8
Meter Disc Gallons/Backwash:	2,168	1,084	723	542	434	361	310	271

*Compensated hardness in gpg = Hardness + (3 x Fe in mg/L)

revision date: June 2008

Kinetico
water systems

Kinetico 4060f OD

Operating Profile

Filter shall remove chlorine to less than 0.05 mg/L when operated within normal operating specifications. The system shall provide filtered water through the use of a duplex (two tank) configuration. This duplex configuration shall operate with both tanks on-line during service. During backwash cycles, one tank shall provide water to service and to the backwash. A water meter shall initiate system backwashes. The water meter shall measure the processed volume and be adjustable. Service flow shall be downflow.

Regeneration Control Valve

The backwash control valve shall be top mounted (top of media tank), and manufactured from non-corrosive materials. Control valve shall not weigh more than four pounds. Control valve shall provide service and backwash control for two media tanks. Inlet and outlet ports shall accept a quick-connect double O-ring sealed adapter. Interconnection between tanks shall be made through the regeneration valve with a quick connect adapter.

Control valve shall operate using a minimum inlet pressure of 15 psi. Pressure shall be used to drive all valve functions. No electric hook-up shall be required. Control valve shall incorporate three operational cycles including; service, backwash, and a downflow fast rinse. Control valve shall contain a self-adjusting backwash flow control. The control valve will prevent the by-pass of unfiltered water to service during the backwash cycle.

Media Tanks

The tanks shall be designed for a maximum working pressure of 125 psi and hydrostatically tested at 300 psi. Tanks shall be made of nylon wrapped with a 2.5 in. threaded top opening. Each tank shall be NSF approved. Upper and lower distribution system shall be of a slot design. They will provide even distribution of backwash water and the collection of processed water.

Media

Each unit shall include 0.2 ft^3 of Macrolite and 0.4 ft^3 of Activated Carbon.

ALL CONSULTING

GOVERNMENT RELATIONS - ENERGY - PLANNING - TECHNOLOGY
ENGINEERING - ENVIRONMENTAL

Memorandum

To: Stephanie Timmermeyer/ Chesapeake Energy

From: Dan Arthur/ ALL Consulting
Dave Cornue/ ALL Consulting
Brian Bohm/ ALL Consulting

CC: Mike Brownell/ Chesapeake Energy

Date: July 11, 2011

Re: Comments on June 24, 2011, Deficiency Letter from PADEP

The following are ALL Consulting's (ALL) comments to the June 24, 2011, Deficiency Letter from Jennifer Means with the Pennsylvania Department of Environmental Protection (DEP), regarding the Chesapeake Appalachia (Chesapeake) document: Corrective Action Plan for Bradford County, PA (CAP), dated May 2011.

Revisions Requested by the Department:

1. *For Figure 2, Please add 8.5" x11" maps of the individual study areas with readable font size. Only the Vargson Study Area has this detailed Map.*

Response:
Individual maps of each study area are provided in the revised CAP.

2. *Please confirm that the wells listed in Table 3 have not had SISCP tests performed or what is meant by the phrase "without Previous SISCP Tests."*

Response:
The wells listed in Table 3 of the CAP are wells that had not yet had shut-in surface casing pressure (SISCP) tests performed at the time the CAP was prepared. The wording now reads "without SISCP Tests."

Also note that Table 3 has been simplified. The casing depth information originally presented in Table 3 was duplicative of the same information provided for these wells in Table 1 (also of the CAP). The purpose of Table 3 is only to identify the three-string wells not tested (SISCP) as of the May 16, 2011, reference date.

Additionally, Table 1 has been modified by the inclusion of cement tops for the intermediate and production casing strings. Note that all measurements presented therein are in feet from the Kelly Bushing (ft KB). The surface casings for Chesapeake's wells have been cemented to surface (=20 ft KB).

Department requests that the following technical deficiencies be addressed to improve the wellbore evaluation process:

1. *CAP (Corrective Action Plan) 1.b. – Increase the notification to at least "48 hours."*

Response:
The 24-hour notification was originally stipulated by the Consent Order and Agreement (COA) §3.c. The CAP language has been modified to note "DEP will be notified in writing at least forty-eight (48) hours before SISCP testing begins."

2. *CAP 1.d. – The pressure test should include a simple pre-test flow measurement from the casing annulus ports, measured in cubic feet per day. If the flow test is zero or too small to measure, then a methane detection device should be utilized to determine the presence of methane and the percent of the LEL (Lower Explosive Limit) of the gases or percentage of methane inside the casing port(s). The purpose of this customary measurement is to provide a benchmark for post remediation well work evaluation.*

Response:
Language has been added to the CAP and Appendix 1 noting the collection of a pre-test flow measurement on the casing annulus ports using a manometer. If flow is too small to measure with a manometer, a balloon test will be performed for up to 10 minutes.

3. *CAP 2.b. – Well Logging. Appendix 2, Procedure #9.b. refers to the venting status of the casing annulus ports to be "open/venting" and #9.c. suggests a 10 psig maximum pressure variation per hour as an indication that the pressure is stable. These steps appear to indicate that the casing annulus ports might be shut in prior to running the logs, which should increase the likelihood of detecting behind pipe anomalies as the pressure is released. There is no indication of pre-logging shut-in times. Please explain these steps in more detail and include a pre-logging shut in protocol.*

Response:
The following discussion clarifies 1) which ports are open and which are closed; and 2) the purpose of having ports opened or closed in respect to the objective of identifying noise or temperature anomalies from the annular space. The well logging protocol is designed to minimize the noise/temperature effects due to gas flow in the casing or annulus that is not being logged. The casing annulus or the production casing is shut-in and monitored to achieve a stable pressure state in order to minimize any extraneous noise or temperature contributions from the annulus or casing not being logged. For example:

- If logging the well to evaluate for flow behind the surface casing, then the service company would shut-in the annulus between the surface casing and production casing and monitor until the pressure change is less than a 10 psig variation per hour. During both this stabilization period and logging, the production casing is shut-in and the surface casing/production casing annulus is open and venting.
- If logging the well to evaluate for flow in the intermediate casing/production casing annulus, then the service company would shut-in the surface casing/intermediate casing annulus along with the production casing while leaving the intermediate casing/production casing annulus open to vent. This allows any potential flow up the intermediate casing/production casing annulus to be detected without noise or temperature interference from the intermediate casing/production casing annulus or from the production casing.

There is no mandatory minimum shut-in time prior to running logs. The specific characteristics of each well will determine how long it will take for pressure to stabilize. The procedure is to check the pressure build-up every half hour and to terminate the pre-logging stabilization period once the hourly variation in pressure is less than 10 psig. Once shut-in pressure is thus stabilized, the logging will begin.

4. *A cement bond evaluation has not been included as part of the well evaluation/corrective action process. Please include a cement bond evaluation (such as cement bond logging) 1) when Noise/Temperature log results are not definitive and 2) when gas well construction analysis indicates a need to verify cement quality at critical areas in the wellbore.*

Response:
While a cement bond log (CBL) is one tool that can be utilized when noise/temperature log results are inconclusive, a CBL is only one of many tools or approaches that can be utilized. Requiring a CBL as the next mandatory step would limit the use of other options. The CAP has been revised to indicate that a CBL will be used as an additional investigatory tool when the findings of previous SISCP and noise/temperature logs indicate that its use will be beneficial. However, the CBL will not be used as a prescriptive mandatory step as other options, including remedial measures, may be more efficient to achieving the ultimate goal than running a CBL.

The following deficiencies were noted with the gas well screening criteria:

1. *The gas well screening criteria to identify gas wells for additional evaluation should be adjusted to: 1) add the presence of methane gas in any wellhead casing annulus port and methane detected or bubbling around the wellhead, and 2) utilize a pressure level of zero (0) psig instead of 100 psig. In the plan introduction, a 100 psig gas well screening criterion has been selected as being "conservative." There is no scientific basis presented for this pressure level to be considered conservative. This screening criterion is too high for gas wells that exhibit defective cement and are associated with a gas migration case. The reference to 25 PA Code § 78.73 (c) is inappropriate in this context as this section of the regulations is intended to determine the maximum allowable surface casing pressure for wells that utilize the surface casing as production casing, where there is an open annulus filled with gas or liquids. Additional evaluation of wells that exhibit lesser annular pressures could be deferred until other wells identified by Chesapeake have been evaluated. However, using a 100 psig screening criterion would exclude wells with defective cement that may be contributing to gas migration and is not appropriate.*

Response:
ALL believes that a requirement of zero (0) psig is excessive, unnecessary, and potentially unsafe. ALL has prepared the following justification that SISCP pressures less than 100 psig are *de minimis* and the presence of pressures less than this level, alone, should not require further action. The information provided includes:

1. Analysis of venting flow rates
2. Correlation with other state regulations/practices
3. Review of 25 Pa. Code §78.73(c)
4. Competent cement tops are below surface casings (2-string wells)
5. Gas migration endangerment based on gas volumes

6. Review of legacy wells and naturally occurring shallow system gas
7. Summary

Detailed information for each of the above items is presented below:

1. Analysis of venting flow rates

In an effort to asses potential risks from wells identified in the study area, flow tests were conducted on Chesapeake gas wells that had been identified as having a SISCP test exceeding 100 psig. Tests were conducted in July 2011. For the 16 wells tested, 9 of the 16 wells demonstrated gas venting volumes too low to be measured by a manometer. For the remaining wells, gas venting rates ranged from approximately 0.56 Mcf/d to 1.47 Mcf/d. Table 1 in Appendix A lists a summary of the gas venting volume tests performed.

For those wells that demonstrated gas venting volumes below the measurement threshold of the manometer, balloon tests were performed. Several of these wells produced so little gas that they were unable to inflate a small (4-inch) balloon in 10 minutes. Attachment A includes selected photos of completed balloon tests for the Everbreeze 2H and Readinger 4H.

Of significance is the fact that the gas venting volumes for wells having SISCP above 100 psig remains extremely minimal. This would further suggest that the potential of gas volumes for wells having a SISCP less than 100 psig would likely be below measureable levels – even with balloon testing. Gas volumes at this level do not appear to offer any significant environmental threats, especially if proper mitigation steps are taken (i.e., venting).

2. Correlation with Other State Regulations/Practices

Other oil and gas producing states assess annular pressures using higher thresholds than what the PA DEP is proposing. This may be based on shallow *de minimis* gas zones present in various areas as well as other circumstances. Some states require continuous or regular monitoring of casing pressure at the bradenhead (i.e., the casing head that seals the annular space between surface casing and production and/or intermediate casing strings).[1] A review of oil and gas regulations in other states provides supporting information that the 100 psig SISCP threshold is a conservative value and that venting is a common mitigation control for *de minimis* gas:

- The information presented below is for selected states that have regulations or policies to address positive annular pressures at a well. These states typically assess the issue in one of two ways. This generally includes analysis using a calculation of an acceptable pressure based on casing depth or the comparison of the annular pressure at the well to an established pressure limit. Examples are presented below:
    - Colorado uses a testing method designed to assess the pressure relative to pressure thresholds which have been established for specific areas. In addition Colorado has specific regulations to assess pressures during well stimulations and has established a maximum pressure increase at 200 psig.[2]
        - The Mamm Creek area has a specific written policy using 150 psi as the cutoff for potential remediation (a COGCC determination). Bradenhead venting is allowed as a remedial measure with COGCC approval on a Sundry Notice per Rule 912.b.
    - Texas also has a bradenhead pressure assessment protocol that applies any time pressure is shown on the annulus between the surface and production casing. The protocol requires the well to be killed and pressure to be allowed to

build up during which time a pump applies pressure through the tubing head. If the bradenhead pressure is equal to the pressure exerted on the tubing head (indicating that the casing backside is not isolated from the production tubing) the well must be remediated or plugged.[3]

- Wyoming has specific requirements for Mechanical Integrity Testing of wells every 5 years. Wyoming also requires monthly monitoring of casing pressures and can require additional testing or remediation activities if irregularities are observed.[4] One specific area (the Trona area, a location of subsurface mining activities) within Wyoming has a surface casing pressure threshold of 100 psig. If the surface casing pressure on a well exceeds 100 psig in this area then that well requires remedial action. This is a provision to protect the local mines.[5]
- Wyoming also has regulations for the venting of low-rate casing head gas that allows for up to sixty (60) Mcf of gas per day to be vented unless the Supervisor or Commission determines that venting to be a waste of the natural gas resource.
- New York is in the process of revising its regulations related to horizontally drilled and high volume hydraulically fractured wells. There are several references to casing pressure issues in the 1992 Generic Environmental Impact Statement[6] and in the 2009 draft Supplemental Generic Environmental Impact Statement[7] using annulus pressure assessment to ensure that casing pressure does not "break down the formation at the shoe of the surface casing."[8] While these documents do not specifically reference a pressure threshold or gradient, because of confining forces and rock mechanics, the breakdown pressure of a formation would far exceed the simple hydrostatic pressure exerted by a column of fresh water or brine.

3. Review of 25 Pa. Code §78.73(c)

25 Pa. Code §78.73(c) is a subset of 25 Pa. Code §78 "Well Drilling, Operation and Plugging." This section presents DEP's screening regulation to calculate the maximum allowable casing pressure at the surface casing shoe depth. As a "General provision for well construction and operation," 25 Pa. Code §78.73(c) is applicable to all oil and gas wells. Contrary to DEP's assertion in its June 24, 2011, Deficiency Letter to Chesapeake, there is no provision within 25 Pa. Code §78.73, or by reference, that states or suggests that 25 Pa. Code §78.73 or 25 Pa. Code §78.73(c) applies only to wells "that utilize the surface casing as production casing, where there is an open annulus filled with gas or liquids" (DEP letter of June 24, 2011). Additionally, 25 Pa. Code §78.73 cross-referenced several other regulatory provisions that suggest it applies more broadly to all oil and gas wells. In particular, see 25 Pa. Code §78.83, 25 Pa. Code §78.83b, and 25 Pa. Code §78.88. Below are details of each of these references to 25 Pa. Code §78.73(c):

- 25 Pa. Code §78.83 ("Surface and coal protective casing and cementing procedures") – 25 Pa. Code §78.83(a) applies to wells drilled after February 5, 2011, and states that surface casing cannot be "utilized as production casing unless" the operator "demonstrates that the pressure in the well is no greater than the pressure permitted under 78.73(c) (relating to general provision for well construction and operation)."
- 25 Pa. Code §78.83b ("Casing and cementing – lost circulation") does not indicate that it applies only to wells where the surface casing is also the production casing. Interestingly, 25 Pa. Code §78.83b(a)(1) states that "shut-in pressure on the casing seat of the additional (surface or coal protective) string of casing may not exceed the requirements of 25 Pa. Code §78.73(c) (relating to intermediate and production casing)."

- 25 Pa. Code §78.88 ("Mechanical integrity of operating wells") does not indicate that it applies only to wells where the surface casing is also the production casing. To the contrary, it expressly states that it applies to each operating well other than wells for underground gas storage and wells granted inactive status. 25 Pa. Code §78.88(c) and (d) then refer to 25 Pa. Code §78.73(c) for compliance with pressure standards for mechanical integrity as well as measures to bring non-compliant wells into compliance including the performance of additional mechanical integrity tests to demonstrate that compliance has been achieved.

There is no statement in these citations that prescribes applicability of § 78.73(c) only to wells "that utilize the surface casing as production casing, where there is an open annulus filled with gas or liquids" (DEP letter of June 24, 2011). In fact, the referenced 25 Pa. Code 78.83b and 25 Pa. Code 78.88 apply generally to all oil and gas wells in the state. Therefore, it is ALL's belief that DEP's letter is in error and that 25 Pa. Code §78.73(c) is applicable to Chesapeake's gas wells included in the COA.

The regulation under 25 Pa. Code §78.73(c) is a scientifically based method for the assessment of the hydrostatic head of a continuous column of fresh water in the annular space exerting approximately 0.433 psi per foot of depth (the hydrostatic gradient of fresh water).[9] Therefore, the hydrostatic pressure at the casing shoe depth would be equal to the product of that fresh water column depth at the casing shoe times the 0.433 psi/ft pressure gradient. DEP's regulation provides an additional safety factor by requiring that wells exhibit less than 80% of the calculated pressure at the casing shoe depth as measured at the surface. Such wells are compliant and would not require corrective measures based on PA's regulations. In the proposed CAP, ALL has included an additional safety factor by reducing the screening threshold to 100 psi for all covered wells. DEP's June 24, 2011, Deficiency Letter states that "no scientific basis presented for this pressure level to be considered conservative." ALL believes, to the contrary, that the hydrostatic gradient of fresh water provides a scientific basis, and the substantial safety factor that ALL has included renders the screening threshold amply conservative.

4. Competent cement tops are below surface casings (2-string wells)

The top of competent cement in all of the wells covered in the CAP is below the base of the surface or intermediate casing string (i.e., for 2-string or 3-string wells, respectively). In some wells where cement was observed to extend above the base of the surface or intermediate casing, the well nonetheless exhibited the presence of *de minimis* gas from the annular space. However, it is important in such situations to distinguish the top of competent cement as intended when constructed. The observed presence of *de minimis* gas in cases where some cement extends above the base of the surface casing, does not necessarily correspond to the actual top of competent cement. As such, shallow system gas may still have pathways to reach the annular space and result in pressure on the casing annulus. In most instances, where SISCPs are less than 100 psig or where no environmental concerns are identified (e.g., from temperature and noise logging), management of this *de minimis* gas can best be handled by venting.

5. Gas migration endangerment based on gas volumes

Concerns of the potential endangerment posted by *de minimis* gas can be evaluated analytically. As observed through gas venting volume testing and as previously discussed, wells included in the CAP that have SISCPs exceeding 100 psig have very low venting volumes on a daily basis. Recent tests showed that the majority of wells that also had SISCPs exceeding 100 psig had gas venting at a rate/volume that was too small to measure with a manometer. For those that could be measured, rates were still very small (less than 1.5 Mcf/d).

Furthermore, SISCP test analysis suggests that the presence of *de minimis* gas is generally a temporary phenomenon with gas pressures generally decreasing over time.

When evaluating these minor gas volumes over an extended period and considering the temporary nature of the phenomenon that has been observed and recorded by Chesapeake, estimates can be made as to the actual significance of potential gas migration from one area of the subsurface to another.

With this in mind, volumetric analysis can be used to estimate the potential radius of impact from *de minimis* gas migration. To conduct basic volumetric analysis, ALL developed a simple volumetric model which uses a gas flow rate and assumptions about the effective porosity and thickness of a receiving formation to calculate a radial distance of migration. The model can be used to solve for a specific radius, if flow rates, durations of gas flow, effective porosity and formation thickness are known. The example provided was developed to illustrate the ranges of values for various sets of assumptions.

Using a simple volumetric approach, analysis was performed to determine the effective radial distance (calculated in feet) that gas could migrate away from a venting wellbore at different percentages of venting gas. This was calculated using the following equation:

$$r = \frac{1-\%\,Venting}{Radial\ Flow}\sqrt{\frac{Gas\ Flow\ Rate\ X\ 1{,}000\ X\ Duration}{Thickness\ Porosity\ Value\ X\ \pi}}$$

Tables 2 and 3 (in Attachment A) present results of the analytical model conducted for this assessment. A description of the information included in Tables 2 and 3 is provided below:

- The first column includes the product of effective porosity multiplied by the thickness of the receiving formation interval. For example, an effective porosity of 5% (0.05) and a porous formation thickness of 100 ft results in a value of 5. The rows of the table represent different potential products based on:
    - Effective porosity values of 0.05 and 0.10.
    - Porous formation thicknesses of 1 ft, 10 ft, 100 ft, 500 ft, and 1,000 ft.
- The second row represents differing flow rates.
- The table is then populated by the calculated radius of gas migration out away from the wellbore.

The tables in Attachment A compare the calculated radii for two scenarios. Tables 2a-2c present a scenario where 90% of the gas is vented and 10% is choked back and retained in the subsurface. Tables 3a-3c present a scenario where none of the gas from the annular space is allowed to vent.

The radius calculated in each cell of the tables is presented as the result of constant flow rates for the duration of the time being modeled (100 days, 365 days and 730 days). Monitoring data shows that the flow rates and pressures on the annulus are declining over time. Therefore, the data presented in the tables represent a conservative radius because it was calculated based on constant flow rates when in fact the pressure and, hence, flow rates are decreasing over time (see Chart 1 in Attachment A).

Calculations are also provided for flow rates higher than those recently observed and, therefore, these presentations include yet another level of conservatism (see Table 1 observations compared to computed values in Tables 2 and 3 of Attachment A).

An alternative approach to estimate the radial distance of migration would be to evaluate the variable rate over different durations. For example, Table 1b shows the radial distance for a 2.0 Mcf/d flow to a formation with a thickness porosity value of 0.05 to be 216 feet after 365 days. Using a combination of 122-day intervals (i.e., one-third year) from Table 1a, a radial distance for the declining rate from 2.0 Mcf/d to 0.1 Mcf/d using three time steps would be approximately:

$$\frac{(113\,ft\,*\,122\,days) + (80\,ft\,*\,122\,days) + (37\,ft\,*\,121\,days)}{365\,days} = 76\,ft$$

Table 1 in Attachment A provides a summary of the flow volumes measured for several of the wells being reviewed under the CAP. The table shows the low volumes being measured with many of the wells not providing sufficient flow to be detected by the manometer. Chart 1 in Attachment A also shows the temporary nature of the *de minimis* gas as determined by analysis from SISCP tests. The chart shows the *de minimis* gas pressure in the casing annulus to be a declining trend from which it is possible to predict a zero pressure date (for the Duffield 2H example this date is 8/8/2011).

6. Review of legacy wells and naturally occurring shallow system gas

A threshold annulus pressure of zero (0) psig is believed to be unobtainable for wells in this region of Pennsylvania. This is because a source of pressure is gas from shallow shale formations stratigraphically above the Marcellus Shale. This Upper Devonian gas is *de minimis* gas that has likely been flowing out of these zones for millions of years.

De minimis gas is not a new problem that has only arisen since the onset of modern Marcellus Shale development in Bradford County. A review of natural gas and oil development in Bradford and Wyoming Counties, PA, between 1890-1910 and 1925-1935 indicates that a considerable level of activity has occurred in the area historically. In general the "local" oil and gas development started in Tioga County, PA, and worked its way east through Bradford County and into parts of Wyoming County. Natural gas wells were drilled throughout the mid-1800s to early 1900s with varying success. Reported accounts indicate that several of the deeper natural gas wells completed in Tioga County were considered very successful and spurred the exploration for natural gas in other counties previously thought to lack potential.

During the second "boom" in the late 1920s and 1930s, additional wells were drilled or recompleted. It was during this period that the drilling and exploration of oil and gas wells were routinely reported and covered in the local (and regional) newspapers.

In the vicinity of the project area, one newspaper account describes a well (completed at 1,420 feet and drilled in 1906) which produced for a period and was then abandoned when the casing was pulled. The well was subsequently left to vent for 30 years.[10] Other reports discuss the discovery of shallow coal deposits that have been documented to produce coal bed methane if dewatered or depressurized[11]; reported detections of natural gas occurring in three groundwater wells one of which was noted as flammable[12]; and accounts of water well drillers encountering gas pockets at shallow depths (180 feet).[13]

A recent (2007) incident of stray gas migration in Rome Township is believed to have been linked to a legacy oil and gas well. An isotopic analysis indicated that the gas was thermogenic in nature but did not match nearby producing gas wells.[14]

The 2nd Geologic Survey of PA (1883) reports on two gas wells drilled in Mehoopany (Wyoming County), PA.[15] A local account of the project indicates that the casing was pulled from the first well and then reused in the second well.[16] Also, in the late 1880s, Winola Oil and Gas

Development was drilling near Factoryville in Wyoming County, PA, when gas and water were encountered between 400 to 500 feet. The gasses "forced" salty water to the surface at a rate of 1,100 barrels per minute. The well produced what was later bottled by Lithia Water as a carbonated soft drink (a two-quart bottle contained 2/3 cup of salt).[17]

These examples of historical gas production from the Upper Devonian section, abandoned and venting wells, and shallow gas occurring in old water wells demonstrate that natural gas is present in the shallow bedrock of the region. Furthermore, these accounts demonstrate that the occurrence of natural gas is both a result of natural conditions and, potentially, a result of historical gas wells that have not been abandoned to current industry and regulatory standards. Therefore, the presence of natural gas in the shallow (2000 ft or less) Upper Devonian strata of the Bradford County and Wyoming County area is not a new occurrence.

7. Summary

To summarize, it is ALL's opinion that:

- 25 Pa. Code §78.73(c) is applicable to Chesapeake's gas wells included in the COA.
- A threshold of zero (0) psig is unrealistic, unnecessary, and unachievable for all wells. In fact, repeated remedial attempts to achieve such a degree of seal may ultimately lead to other well integrity problems.
- Venting is a practical and safe means of managing *de minimis* gas in most cases while also protecting against stray gas migration that might endanger the environment. Data collected to date show that the phenomenon is temporary in nature and the combination of volume measurements and modeling support a lack of endangerment posed by *de minimis* gas. Venting as a mitigation measure is used in other oil and gas producing states and is accepted as a sound mitigation measure.
- A working threshold of 100 psig is practical, technically achievable, and based on sound science. This threshold is also extremely conservative. As observed from gas venting volume measurements, 9 of the 16 wells having a 48-hour SISCP greater than 100 psig are venting inadequate volumes of *de minimis* gas to fill a balloon during the test period.
- Gas flow rates associated with pressures less than 100 psig do not present a practical risk of radial migration for significant distances away from the wellbore. Furthermore, the calculation methodology presented herein is conservative and overestimates the extent of radial migration. The calculated radial flow distances do not represent a practical endangerment to nearby water wells (except for situations in which there is only a single and very thin receiving strata, e.g., 10 ft or less, and higher flow rates than have generally been observed; local geology and stratigraphy suggest it is unlikely that porous and permeable strata would be limited to a single thin zone).
- Because the shale from which the shallow gas is sourced has not been artificially fractured its ability to off-gas significant volumes of natural gas over time is limited. This is demonstrated by declining shut-in pressures over time. Without a continual supply of gas, pressure is not maintained and must fall off. Therefore, the extent of radial gas migration at pressures less than 100 psig decreases over time and can be expected to have a relatively short duration.

2. *Utilizing a pressure level of 0 psig, please provide the hierarchy of wells listed in Table 1 for evaluation as required by 3.a.2) of the COA.*

Response:
The above justification for 100 psig screening allows Table 1 and Table 2 of the CAP to remain as previously presented.

---

[1] Bureau of Land Management (BLM), *2010 Bradenhead Testing and Comparison with Prior Data*, San Juan Resource Area (March 2010), http://cogcc.state.co.us/Library/BLM_Bradenhead/2010BHRPT.pdf (accessed June 10, 2011).

[2] Colorado Oil and Gas Conservation Commission (COGCC), Colorado Code of Regulations 404-1, Title 300, Rule 341. Bradenhead Monitoring During Well Stimulation Operations, http://www.sos.state.co.us/CCR/Rule.do?deptID=13&deptName=400%20Department%20of%20Natural%20Resources&agencyID=79&agencyName=404%20Oil%20and%20Gas%20Conservation%20Commission&ccrDocID=2124&ccrDocName=2%20CCR%20404-1%20PRACTICE%20AND%20PROCEDURE&subDocID=42702&subDocName=300-SERIES%20%20DRILLING,%20DEVELOPMENT,%20PRODUCTION%20AND%20ABANDONMENT&version=17 (accessed June 9, 2011).

[3] Texas Administrative Code, Title 16: Economic Regulation; Part 1: Railroad Commission of Texas; Chapter 3: Oil and Gas Division; Rule §3.17: Pressure on Bradenhead (effective January 1, 1976), http://info.sos.state.tx.us/pls/pub/readtac$ext.TacPage?sl=R&app=9&p_dir=&p_rloc=&p_tloc=&p_ploc=&pg=1&p_tac=&ti=16&pt=1&ch=3&rl=17 (accessed June 9, 2011).

[4] Wyoming Oil and Gas Conservation Commission (WOGCC), Chapter 2: General Rules, Section 6 Test and Surveys (effective April 2, 2008), http://soswy.state.wy.us/RULES/rules/6912.pdf (accessed June 9, 2011).

[5] Wyoming Oil and Gas Conservation Commission (WOGCC), Chapter 3: Operations and Drilling Rules, Section 22 General Drilling Rules (effective April 2, 2008), http://soswy.state.wy.us/RULES/rules/6913.pdf (accessed June 9, 2011).

[6] New York Department of Environmental Conservation (DEC), *Final Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program* (July 1992).

[7] New York Department of Environmental Conservation (DEC), *Draft Supplemental Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program: Well Permit Issuance for Horizontal Drilling and High-Volume Hydraulic Fracturing to Develop the Marcellus Shale and Other Low-Permeability Gas Reservoirs* (September 30, 2009), http://www.dec.ny.gov/energy/58440.html (accessed June 9, 2011).

[8] New York Department of Environmental Conservation (DEC), *Final Generic Environmental Impact Statement on the Oil, Gas and Solution Mining Regulatory Program* (July 1992).

[9] Schlumberger, Oilfield Glossary: "Pressure Versus Depth Plot" (© 2011), http://www.glossary.oilfield.slb.com/DisplayImage.cfm?ID=111 (accessed July 7, 2011).

[10] "Old 'Gas' Well Near South Branch Still Shows Possibility," *The [Towanda, PA] Daily Review* (March 7, 1931).

[11] "Coal found on Sugar Run Farm," *The [Towanda, PA] Daily Review* (June 17, 1931).

[12] S.A. Lohman, "Ground Water in North-Central Pennsylvania," *Pennsylvania Geological Survey*, Fourth Series, Bulletin W6 (1939): 102-15.

[13]. "Diller for water hit gas," *The [Towanda, PA] Daily Review* (April 18, 1931).

[14] Pennsylvania Department of Environmental Protection (DEP), Bureau of Oil and Gas Management, "Draft-Stray Natural Gas Migration Associated with Oil and Gas Wells" (October 28, 2009).

[15] I.C. White, "Report of Progress G7," *Second Pennsylvania Geological Survey*, Bulletin G7 (1883): 140-43.

[16] Personal Communication with Paula Radwanski, Wyoming County Historical Society, Tunkhannock, PA, May 18, 2011.

[17] A.F. Derr, *The "Hollow" in the Beech Woods* (Factoryville, PA: Unpublished, 2007).

Attachment A

Everbreeze 2H – 7/4/2011

Manometer Reading = <0.1

Balloon Test: 1 minute 30 seconds to fill balloon

Readinger 4H – 7/3/2011

Manometer Reading = <0.1

Balloon Test: Balloon did not inflate after 10 minute test.

Chart 1: Plot of 48 hr SISCP Results for the Duffield 2H Well.

	9/28/2010	7/2/2011	8/8/2011
Duffield 2H 48hr SISCP	240	28	0

Privileged and Confidential: Prepared at the Request of Legal Counsel

Prepared by ALL Consulting

Table 1: Surface Casing Flow Readings for 16 Example Wells

	Well Name	Study Area	Manometer Reading	MCFD	Date
1	Harper 4H	Paradise RD	<0.1	--	7/2/2011
2	Alton 6H	Miller/Luce	0.4	1.114	7/5/2011
3	Everbreeze 2H	Vargson	<0.1	--	7/4/2011
4	Harper 5H	Paradise RD	0.2	0.789	7/5/2011
5	Yoder 2H	Vargson	0.2	0.789	7/5/2011
6	Otten 2H	Paradise RD	0.2	0.0789	7/5/2011
7	Sivers 1H	Sivers	<0.1	--	7/5/2011
8	Duffield 2H	Sivers	<0.1	--	7/5/2011
9	Otten 1H	Paradise RD	0.7	1.472	7/5/2011
10	Stoorza 5H	Paradise RD	0.3	0.966	7/5/2011
11	Readinger 4H	Vargson	<0.1	--	7/3/2011
12	Benscoter 1H	Sivers	<0.1	--	7/4/2011
13	Morse 5H	Vargson	<0.1	--	7/1/2011
14	Storms 2H	Sivers	<0.1	--	7/1/2011
15	Welles 3-5H	Paradise RD	<0.1	--	7/1/2011
16	Acla 2H	Paradise RD	0.4	1.114	7/5/2011

Table 2a: Calculated Distance of Radial Flow in FEET (assuming 90% of Gas is Venting, Full Radial Flow, 100 Days duration)

Thickness-Porosity Value [1]	Gas Flow Rate (mcf/day)								
	0.1	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
0.05	25	40	56	69	80	89	98	106	113
0.1	18	28	40	49	56	63	69	75	80
0.5	8	13	18	22	25	28	31	33	36
1	6	9	13	15	18	20	22	24	25
5	3	4	6	7	8	9	10	11	11
10	2	3	4	5	6	6	7	7	8
50	1	1	2	2	3	3	3	3	4
100	1	1	1	2	2	2	2	2	3

Table 2b: Calculated Distance of Radial Flow in FEET (assuming 90% of Gas is Venting, Full Radial Flow, 365 Days duration)

Thickness-Porosity Value [1]	Gas Flow Rate (mcf/day)								
	0.1	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
0.05	48	76	108	132	152	170	187	202	216
0.1	34	54	76	93	108	121	132	143	152
0.5	15	24	34	42	48	54	59	64	68
1	11	17	24	30	34	38	42	45	48
5	5	8	11	13	15	17	19	20	22
10	3	5	8	9	11	12	13	14	15
50	2	2	3	4	5	5	6	6	7
100	1	2	2	3	3	4	4	5	5

Table 2c: Calculated Distance of Radial Flow in FEET (assuming 90% of Gas is Venting, Full Radial Flow, 730 Days duration)

Thickness-Porosity Value [1]	Gas Flow Rate (mcf/day)								
	0.1	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
0.05	68	108	152	187	216	241	264	285	305
0.1	48	76	108	132	152	170	187	202	216
0.5	22	34	48	59	68	76	83	90	96
1	15	24	34	42	48	54	59	64	68
5	7	11	15	19	22	24	26	29	30
10	5	8	11	13	15	17	19	20	22
50	2	3	5	6	7	8	8	9	10
100	2	2	3	4	5	5	6	6	7

[1] Thickness-Porosity Value represents a combined value equal to the thickness x effective porosity.

Table 3a: Calculated Distance of Radial Flow in FEET (assuming 0% of Gas is Venting, Full Radial Flow, 100 Days duration)

Thickness-Porosity Value [1]	Gas Flow Rate (mcf/day)								
	0.1	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
0.05	252	399	564	691	798	892	977	1056	1128
0.1	178	282	399	489	564	631	691	746	798
0.5	80	126	178	219	252	282	309	334	357
1	56	89	126	155	178	199	219	236	252
5	25	40	56	69	80	89	98	106	113
10	18	28	40	49	56	63	69	75	80
50	8	13	18	22	25	28	31	33	36
100	6	9	13	15	18	20	22	24	25

Table 3b: Calculated Distance of Radial Flow in FEET (assuming 0% of Gas is Venting, Full Radial Flow, 365 Days duration)

Thickness-Porosity Value [1]	Gas Flow Rate (mcf/day)								
	0.1	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
0.05	482	762	1078	1320	1524	1704	1867	2017	2156
0.1	341	539	762	933	1078	1205	1320	1426	1524
0.5	152	241	341	417	482	539	590	638	682
1	108	170	241	295	341	381	417	451	482
5	48	76	108	132	152	170	187	202	216
10	34	54	76	93	108	121	132	143	152
50	15	24	34	42	48	54	59	64	68
100	11	17	24	30	34	38	42	45	48

Table 3c: Calculated Distance of Radial Flow in FEET (assuming 0% of Gas is Venting, Full Radial Flow, 730 Days duration)

Thickness-Porosity Value [1]	Gas Flow Rate (mcf/day)								
	0.1	0.25	0.5	0.75	1.0	1.25	1.5	1.75	2.0
0.05	682	1078	1524	1867	2156	2410	2640	2852	3049
0.1	482	762	1078	1320	1524	1704	1867	2017	2156
0.5	216	341	482	590	682	762	835	902	964
1	152	241	341	417	482	539	590	638	682
5	68	108	152	187	216	241	264	285	305
10	48	76	108	132	152	170	187	202	216
50	22	34	48	59	68	76	83	90	96
100	15	24	34	42	48	54	59	64	68

[1] Thickness-Porosity Value represents a combined value equal to the thickness x effective porosity.

Red font values > 1,000 ft from well

Chesapeake Facility File

Chesapeake COA File

pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION

NORTHCENTRAL REGIONAL OFFICE

June 24, 2011

CERTIFIED MAIL NO. 7010 0290 0003 1042 5637

Mr. Tal Oden
Regulatory Manager
Chesapeake Energy Corporation
P.O. Box 18496
Oklahoma City, OK 73154-0496

Re: Deficiency Letter
Chesapeake COA Document: Corrective Action Plan
May 2011
Bradford County, PA

Dear Mr. Oden:

The Department has performed a review of the Corrective Action Plan (CAP) submitted by Chesapeake on May 31, 2011 as required by the Consent Order and Agreement (COA) executed on May 16, 2011. Based on this review, there are items that require clarification, modification, or adjustments as noted below.

Revisions Requested by the Department:

Please provide clarification on the following:

1. For Figure 2, please add 8.5" x 11" maps of the individual study areas with readable font size. Only the Vargson Study Area has this detail map.

2. Please confirm that the wells listed in Table 3 have not had SISCP tests performed or what is meant by the phrase "without Previous SISCP Tests".

The Department requests that the following technical deficiencies be addressed to improve the wellbore evaluation process:

1. CAP (Corrective Action Plan) 1.b. – Increase the notification to at least "48 hours".

2. CAP 1.d. – The pressure test should include a simple pre-test flow measurement from the casing annulus ports, measured in cubic feet per day. If the flow test is zero or too small to measure, then a methane detection device should be utilized to determine the presence of methane and the percent of the LEL (Lower Explosive Limit) of the gases or

percentage of methane inside the casing port(s). The purpose of this customary measurement is to provide a benchmark for post remediation well work evaluation.

3. CAP 2.b. – Well Logging. Appendix 2, Procedure #9.b. refers to the venting status of the casing annulus ports to be "open/venting" and #9.c. suggests a 10 psig maximum pressure variation per hour as an indication that the pressure is stable. These steps appear to indicate that the casing annulus ports might be shut in prior to running the logs, which should increase the likelihood of detecting behind pipe anomalies as the pressure is released. There is no indication of pre-logging shut-in times. Please explain these steps in more detail and include a pre-logging shut in protocol.

4. A cement bond evaluation has not been included as part of the well evaluation/corrective action process. Please include a cement bond evaluation (such as cement bond logging) 1) when Noise/Temperature log results are not definitive and 2) when gas well construction analysis indicates a need to verify cement quality at critical areas in the wellbore.

The following deficiencies were noted with the gas well screening criteria:

1. The gas well screening criteria to identify gas wells for additional evaluation should be adjusted to: 1) add the presence of methane gas in any wellhead casing annulus port and methane detected or bubbling around the wellhead, and 2) utilize a pressure level of zero (0) psig instead of 100 psig. In the plan introduction, a 100 psig gas well screening criterion has been selected as being "conservative". There is no scientific basis presented for this pressure level to be considered conservative. This screening criterion is too high for gas wells that exhibit defective cement and are associated with a gas migration case. The reference to 25 PA Code § 78.73(c) is inappropriate in this context as this section of the regulations is intended to determine the maximum allowable surface casing pressure for wells that utilize the surface casing as production casing, where there is an open annulus filled with gas or liquids. Additional evaluation of wells that exhibit lesser annular pressures could be deferred until other wells identified by Chesapeake have been evaluated. However, using a 100 psig screening criterion would exclude wells with defective cement that may be contributing to gas migration and is not appropriate.

2. Utilizing a pressure level of 0 psig, please provide the hierarchy of the wells listed in Table 1 for evaluation as required by 3.a.2) of the COA.

Please submit a revised CAP that addresses the above deficiencies by July 11, 2011.

Should you have any questions, please feel free to contact me via email at jenmeans@state.pa.us or at 570.321.6557

Sincerely,

Jennifer W. Means
Environmental Program Manager
Oil & Gas Management
Eastern Gas Region

cc: Stephanie Timmermeyer
Gas Migration Files: Paradise Road, Miller/Luce, Brocktown Road, Sivers/Beaver Pond, Sugar Run, Spring Hill Road, and Vargson
Nels Taber
Geoffrey Ayers
John Ryder
Bruce Jankura

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PS Form 3800, August 2006 *(Reverse)* PSN 7530-02-000-9047

facilities file
Chesapeake gas mysteries

Means, Jennifer

COPA

From: Raphael, David J.
Sent: Monday, May 23, 2011 9:47 AM
To: Means, Jennifer
Subject: Fw: Chesapeake Energy Wire Transfer

Jen:

See the attached email. All payments have been received.

Dave

From: Shakely, William W (DEP)
Sent: Friday, May 20, 2011 11:50 AM
To: Raphael, David J.
Subject: FW: Chesapeake Energy Wire Transfer

William W. Shakely | Deputy Chief Counsel
Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street | Harrisburg, PA 17101
Phone: 717.787.4449 | Fax: 717.772.5996
www.depweb.state.pa.us

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-----Original Message-----
From: Kerstetter, Dean
Sent: Friday, May 20, 2011 11:49 AM
To: Shakely, William W (DEP); Logan, Jeffrey; Hines, John; Perry, Scott
Cc: Sale, Patricia
Subject: FW: Chesapeake Energy Wire Transfer

The wire transfer of $1,088,000 from Chesapeake has been posted to SAP with revenue document 1400694541. Treasury should receipt it on Monday.

Dean

Dean S Kerstetter | Senior Budget Analyst
Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street | Harrisburg, PA 17101
Phone: 717.787.8102 | Fax: 717.783.7244
email: dkerstet@state.pa.us
www.depweb.state.pa.us

From: Wilhelm, Michelle [mailto:mrwilhelm@patreasury.org]
Sent: Friday, May 20, 2011 8:48 AM
To: Kerstetter, Dean
Subject: RE: Chesapeake Energy Wire Transfer

5/18 1,088,000.00 FUNDS TRANSFER (ADVICE 2011051800044331)
RCVD FROM BOKF NA /
ORG=CHESAPEAKE OPERATING INC
RFB=110518160100H100 OBI=PAYMENT FOR BRADFORD
REF=110518160100H100 05/18/11 04:51PM ET

From: Kerstetter, Dean [mailto:dkerstet@state.pa.us]
Sent: Friday, May 20, 2011 8:39 AM
To: Wilhelm, Michelle
Subject: FW: Chesapeake Energy Wire Transfer
Importance: High

Michele,

Below is information on funds wired to the Commonwealth by Chesapeake Energy that we spoke on the phone yesterday. The wires are to pay for three fines and our legal people have given possibility of the amounts wired below. If you can identify, please let me know so I can prepare the necessary TR's. I am sorry I cannot give a definite amount of the wires.

Thanks

Dean

Dean S Kerstetter | Senior Budget Analyst
Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street | Harrisburg, PA 17101
Phone: 717.787.8102 | Fax: 717.783.7244
email: dkerstet@state.pa.us
www.depweb.state.pa.us

From: Shakely, William W (DEP)
Sent: Thursday, May 19, 2011 3:18 PM
To: Kerstetter, Dean
Subject: Chesapeake Energy Wire Transfer

Dean:

Chesapeake's counsel is traveling and we may not be able to get a hold of him for more information.

The payor will be Chesapeake Energy.

Dollar amounts: There were 3 civil penalties:

$700,000
$200,000
$188,000

The first two are related so the breakdown could be:

$900,000
$188,000

Another possibility is that there could be a single transfer of:

$1,088,000

I suppose another permutation (less likely) is:

$700,000
$388,000

William W. Shakely | Deputy Chief Counsel
Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street | Harrisburg, PA 17101
Phone: 717.787.4449 | Fax: 717.772.5996
www.depweb.state.pa.us

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

IN THE MATTER OF:

Chesapeake Appalachia, LLC	:	Violations of The Oil and Gas Act,
Tuscarora, Terry, Monroe, Towanda,	:	and The Clean Streams Law
and Wilmot Townships	:	
Bradford County	:	

CONSENT ORDER AND AGREEMENT

This Consent Order and Agreement is entered into this 16th day of May, 2011, by and between the Commonwealth of Pennsylvania, Department of Environmental Protection (hereinafter "Department"), and Chesapeake Appalachia, LLC (hereinafter "Chesapeake").

The Department has found and determined the following:

A. The Department is the agency with the duty and authority to administer and enforce the Oil and Gas Act, Act of December 19, 1984, P.L. 1140, as amended, 58 P.S. §§ 601.101-601.605 ("Oil and Gas Act"); The Clean Streams Law, Act of June 22, 1937, P.L. 1987, as amended, 35 P.S. §§ 691.1-691.1001 ("Clean Streams Law"); Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177, as amended, 71 P.S. §§ 510-17 ("Administrative Code"); and the rules and regulations promulgated thereunder (hereinafter "Regulations").

B. Chesapeake Appalachia, LLC (hereinafter "Chesapeake") is an Oklahoma Limited Liability Company authorized to do business in Pennsylvania which maintains a business address of P.O. Box 18496, Oklahoma City, OK 73154-0496.

C. Chesapeake constitutes a "person" as that term is defined by Section 103 of the Oil and Gas Act, 58 P.S. § 601.103, and by Section 1 of the Clean Streams Law, 35 P.S. § 691.1.

D. Chesapeake is the "owner" and "operator," as those terms are defined by Section 103 of the Oil and Gas Act, 58 P.S. §601.103, of certain gas wells within the areas defined by the Department as follows: the Miller/Luce area of Towanda Township, Bradford County (hereinafter "Miller/Luce Area"); the Sivers area in Tuscarora Township, Bradford County (hereinafter "Sivers Area"); the Paradise Road area of Terry Township, Bradford County (hereinafter "Paradise Road Area"); the Dan Ellis area in Monroe Township, Bradford County (hereinafter "Dan Ellis Area"); the Sugar Run area of Wilmot Township, Bradford County (hereinafter "Sugar Run Area"); the Spring Hill Road area of Tuscarora Township, Bradford County (hereinafter "Spring Hill Road Area"); and the Vargson residence. Maps of the Miller/Luce Area, Sivers Area, Paradise Road Area, Dan Ellis Area, Sugar Run Area, Spring Hill Road Area, and Vargson Area, are attached as Exhibit A and incorporated herein.

Miller/Luce Area

E. In February of 2010, Mr. Luce contacted Chesapeake to complain about his water supply well producing black water and "churning."

F. Chesapeake responded and provided Mr. Luce with temporary replacement water.

G. On February 26, 2010, Chesapeake contacted the Department about the Luce water well and the actions Chesapeake intended to take in response to Mr. Luce's complaint.

H. The Department reviewed Chesapeake's planned tasks and asked that additional measures be taken, including on-site gas screening of residences, low lying areas, and springs/streams; and that the annulus pressures at the Miller, Farr and Kent well pads be checked.

I. Chesapeake carried out the additional measures requested by the Department.

J. On March 1, 2010, Mr. Luce informed Chesapeake that a pond on his property was bubbling.

K. On March 3, 2010, Chesapeake installed a PVC riser pipe (vent stack) on the Luce water well. An elevated concentration of methane was detected in the well headspace. Methane also was detected at low levels in the basement and upstairs of the Luce residence.

L. On March 4, 2010, Chesapeake installed a methane monitor in the basement of the Luce residence.

M. On March 24, 2010, a second landowner, Mr. Mignano, contacted Chesapeake about problems with his water well. Chesapeake responded and notified the Department.

N. Chesapeake installed methane monitoring equipment in a total of five residential locations in the Miller/Luce area.

O. On March 29, 2010, with the approval of the Department, Chesapeake began remedial work at the Miller gas wells.

P. On April 13, 2010, the Department issued Chesapeake a Notice of Violation for the failure to prevent the migration of gas into sources of fresh groundwater and for defective casing or cementing of the Miller gas wells.

Q. By approximately April 20, 2010, visible water disturbance had subsided in the Luce pond. Chesapeake drilled a new water well for the Luce residence in May, 2010.

Sivers Area

R. On June 25, 2010, the Department received a complaint of bubbling in a beaver pond in Tuscarora Township, Bradford County.

S. The nearest gas wells to the beaver pond are operated by Chesapeake. Chesapeake's Sivers well pad is 1,700 feet from the pond and Chesapeake's Mowry 2 well pad is 3,600 feet from the beaver pond.

T. The Department notified Chesapeake of this complaint on June 30, 2010 and Chesapeake initiated an investigation.

U. On July 26, 2010, Chesapeake provided the Department with a summary of its investigation relating to the Sivers well pad, including an isotopic analysis of the gas emitted from the beaver pond and of gas found in the annular space of the surface casing of Chesapeake's wells on three surrounding pads. A plan of action was also submitted that called for modifying the wellbore construction, particularly with respect to cementing; additional testing; and implementing a 3-string casing design.

V. On August 6, 2010, the Department issued Chesapeake a Notice of Violation for the unpermitted discharge of polluting substances and failure to prevent the migration of gas into sources of fresh groundwater for the Sivers area.

W. On August 7, 2010, Chesapeake instituted a monitoring plan which included inspections of the beaver pond, private residences, and gas wells in the Sivers area.

X. Gas emitted from the beaver pond had similar characteristics to gas found in the annular space of the surface casing of Chesapeake's Mowry 2 gas well.

Y. Bubbling at the beaver pond continued from June 25, 2010, in diminishing amounts, to August 26, 2010.

Z. Chesapeake completed remedial work on their nearby gas wells between August 18, 2010, and August 30, 2010.

AA. Since August 26, 2010 to the present, no bubbling has been observed at the beaver pond.

Paradise Road Area

AB. On July 13, 2010, the Department became aware of water supply complaints by Michael Phillips and Jared McMicken, who reside on Paradise Road, Terry Township, Bradford County.

AC. On July 15, 2010, the Department investigated the complaints and collected groundwater samples at the Phillips and McMicken residences.

AD. On July 21, 2010, the Department became aware of a water supply complaint by Scott Spencer, also on Paradise Road, Terry Township, Bradford County. The Department investigated and collected samples of the Spencer well on the same day.

AE. On August 2 and 3, 2010, Chesapeake collected water samples and installed methane alarm systems at the McMicken, Spencer and Phillips residences.

AF. On August 6, 2010, the Department issued Chesapeake a Notice of Violation for the unpermitted discharge of polluting substances and failure to prevent the migration of gas into sources of fresh groundwater for the Paradise Road Area.

AG. Chesapeake has provided temporary replacement water, installed water well vent stacks, drilled replacement wells, and installed water treatment systems at the McMicken, Phillips and Spencer residences.

AH. Isotopic analyses of gas from a residence and water wells in the Paradise Road Area indicate that the gas at the homes is not microbial in origin and is consistent with isotopic analyses of gas found in the annular space of surface casing of Chesapeake's Welles gas wells.

Dan Ellis Area

AI. On August 4, 2010, Chesapeake responded to a landowner complaint of possible methane intrusion in a water supply at a home on Brockton Road, Monroe Township, Bradford

County. Chesapeake responded and, that same day, notified the Department that methane was detected in three private water supplies and one home along Brockton Road.

AJ. On August 6, 2010, the Department confirmed the presence of methane in the headspace of the three home water wells along Brockton Road.

AK. On August 6, 2010, Chesapeake instituted a monitoring plan of certain residences in the area of Chesapeake's Dan Ellis well pad, which is located approximately 4,700 feet to the South.

AL. On August 6, 2010, the Department issued Chesapeake a Notice of Violation for the unpermitted discharge of polluting substances and the failure to prevent the migration of gas into sources of fresh groundwater for the Dan Ellis area.

Sugar Run Area

AM. On September 2, 2010, the Department received information of bubbling in the Susquehanna River near the community of Sugar Run, in Wilmot Township, Bradford County.

AN. On September 3, 2010, the Department inspected the Sugar Run Area and found gas bubbling at numerous locations in the Susquehanna River. A sample of the gas was collected and sent to an independent laboratory to be analyzed. In addition, the Department inspected numerous residential dwellings in the Sugar Run Area and found methane in several water supply wells.

AO. On September 3, 2010, Chesapeake began screening the locations of bubbling in the river, certain residential water wells, and soils in the Sugar Run Area.

AP. On September 7, 2010, the Department collected water samples from the potentially impacted water wells in the Sugar Run Area.

AQ. Chesapeake installed vent stacks on water supply wells at residences in the Sugar Run Area owned or occupied by Dale Dunklee, Donald Pickett, Carl Postupak, Kenneth

Reinhart, David Buck (Rental Unit 1), and Robert Baldwin. Chesapeake also provided temporary replacement water for Donald Pickett and Carl Postupak.

AR. On September 9, 2010, the Department issued Chesapeake a Notice of Violation for the unpermitted discharge of polluting substances and the failure to prevent the migration of gas into sources of fresh groundwater for the Sugar Run Area.

Spring Hill Road Area

AS. On September 16, 2010, Chesapeake notified the Department that methane gas was detected in a water supply located along Spring Hill Road in Tuscarora Township, Bradford County.

AT. The nearest drilled Marcellus well, Chesapeake's Champdale well, is approximately 880 feet from the water supply referenced in paragraph AT, above.

AU. On September 24, 2010, the Department issued Chesapeake a Notice of Violation for the unpermitted discharge of polluting substances and the failure to prevent the migration of gas into sources of fresh groundwater for the Spring Hill Road Area, and for defective casing or cementing of the Champdale/Champluvier gas wells.

Vargson Residence

AV. On or about June 24, 2010, Bruce and Sherry Vargson contacted Chesapeake with a complaint about their water at 2331 Baileys Corners, in Granville Township, Bradford County. Chesapeake initiated an investigation and determined that an elevated concentration of methane gas was present in the well headspace.

AW. A water sample collected from the Vargson's water supply on June 26, 2010, indicated an elevated level of methane.

AX. On July 8, 2011, Sherry Vargson filed a complaint with the Department alleging her water supply had been impacted by gas drilling activity.

AY. On July 14, 2010, methane was detected in the headspace of the Vargson water well.

AZ. On September 15, 2010, the Department issued Chesapeake a Notice of Violation for the unpermitted discharge of polluting substances and the failure to prevent the migration of gas into sources of fresh groundwater.

Additional Investigations

AAA. Since August of 2010, the Department has inspected various Chesapeake gas wells in the Sivers, Dan Ellis, Paradise Road, Sugar Run, and Spring Hill Road Areas. As a follow-up and precaution, Chesapeake has perforated and squeezed additional cement behind the casing in a number of its gas wells in the subject areas.

AAB. In the course of its investigation, the Department has collected water samples from drinking water wells at residences in the Paradise Road, Dan Ellis, Sugar Run, and Spring Hill Road Areas. The Department also has collected isotopic gas samples to compare the gas from various gas wells drilled by Chesapeake to gas from various locations.

Determination of Discharge of Natural Gas into the Groundwater

AAC. Chesapeake has caused or allowed the unpermitted discharge of natural gas, a polluting substance, into the groundwater, which constitutes a "water of the Commonwealth" as that term is defined in 35 P.S. §691.1, in violation of Section 401 of the Clean Streams Law, 35 P.S. §691.401.

AAD. As of the date of this Consent Order and Agreement, Chesapeake has taken certain actions approved by the Department to prevent the ongoing, unpermitted discharge of natural gas into the waters of the Commonwealth.

Determination of Gas Migration Violations

AAE. Chesapeake failed to properly case and cement the gas wells and to prevent the migration of gas into sources of fresh groundwater in violation 25 Pa. Code §§ 78.73(a), 78.81(a), and 78.86, as in effect prior to February 5, 2011.

AAF. The violations described in Paragraphs AAC through AAE, above constitute unlawful conduct under the laws and regulations administered by the Department, including Section 509, of the Oil and Gas Act, 58 P.S. § 601.509 and Section 611 of the Clean Streams Law, 35 P.S. § 691.611; constitute a public nuisance under Section 502 of the Oil and Gas Act, 58 P.S. § 601, and Section 401 of the Clean Streams Law, 35 P.S. § 691.401; require restoration or replacement of certain water supplies pursuant to Section 208 of the Oil and Gas Act, 58 P.S. § 601.208 and 25 Pa. Code § 78.51; and subject Chesapeake to civil penalty liability under Section 506, of the Oil and Gas Act, 58 P.S. § 601.506 and Section 605 of the Clean Streams Law, 35 P.S. §§ 691.605.

Order

After full and complete negotiation of all matters set forth in this Consent Order and Agreement, and upon mutual exchange of the covenants contained herein, the parties desiring to avoid litigation and intending to be legally bound, it is hereby ORDERED by the Department and AGREED to by Chesapeake as follows:

1. **Authority.** This Consent Order and Agreement is an Order of the Department authorized and issued pursuant to Section 503, of the Oil and Gas Act, 58 P.S. § 601.503; Section 5 of the Clean Streams Law, 35 P.S. § 691.5; and Section 1917-A of the Administrative Code, supra.

2. **Findings.**

a. Chesapeake agrees that the findings in Paragraphs A through AAB above are true and correct and, in any matter or proceeding involving Chesapeake and the Department, Chesapeake shall not challenge the accuracy or validity of these findings.

b. The parties do not authorize any other persons to use the findings in this Consent Order and Agreement in any matter or proceeding.

c. Chesapeake disagrees with the determinations stated in Paragraphs AAC through AAF above.

3. **Corrective Actions.**

a. Within fourteen (14) days after the date of this Consent Order and Agreement, Chesapeake shall submit to the Department, for review and approval, a plan which:

1) includes a list of all gas wells drilled by or on behalf of Chesapeake in the areas depicted on Exhibit A and identifies the number of casings used in each well and the depth to which the strings of casing are set;

2) includes the defined logging protocol (hereinafter "wellbore evaluations") which Chesapeake shall employ to evaluate the integrity of wells appearing on the list submitted pursuant to Paragraph 3.a.1), identification of a hierarchy of the wells that will be so evaluated, and an explanation of the rationale for selecting the hierarchy of such wells, above;

3) includes an implementation schedule not to exceed six (6) months which sets forth, at a minimum, the date on which Chesapeake shall commence the wellbore evaluation on the wells identified for evaluation pursuant to Paragraph 3.a.2), above; and

4) identifies the actions Chesapeake shall take to analyze each and every gas well identified for evaluation pursuant to Paragraph 3.a.2), above, and recommendations for the rehabilitation work necessary to control and mitigate shut-in surface casing pressure and stray gas from those wells;

b. Within five (5) days of approval by the Department, Chesapeake shall implement the plan submitted pursuant to Paragraph 3.a., above, as approved by the Department;

c. Within seven (7) days of the date of the approval of the plan submitted pursuant to Paragraph 3.a, above, Chesapeake shall begin pressure testing of each accessible annuli on each of the gas wells identified for evaluation pursuant to Paragraph 3.a.2), above. Chesapeake shall pressure test each annuli for forty-eight (48) consecutive hours, and shall provide the test results for each tested well within five (5) days of completion of the pressure test on each respective well. At least twenty-four (24) hours before Chesapeake begins pressure testing in accordance with this Paragraph, Chesapeake shall provide the Department written notice of the gas well to be tested, and the date and approximate time that Chesapeake shall begin such pressure test.

d. Within sixty (60) days of the date of the approval of the plan submitted pursuant to Paragraph 3.a, above, in all cases Chesapeake shall have completed the 48-hour pressure test of the annuli on all of the gas wells identified pursuant to Paragraph 3.a.2), above, and shall provide the Department with the results of the pressure tests for all of those wells.

e. Every other Monday following the approval of the plan submitted pursuant to Paragraph 3.a., above, Chesapeake shall submit a report containing the following information for each well identified pursuant to Paragraph 3.a.2):

1) the status of the work at each well (i.e., 'Deemed Finished,' 'In Progress,' or 'Scheduled');

2) Chesapeake's analysis of each well's logs and recommended actions to be taken based on all of the information available to Chesapeake.

3) For wells In Progress:

i. the date logged; date or dates on which cement was squeezed; depth of squeezes; date and time the 48-hour casing pressure build-up test was started, supported by information in the form of a chart or digital recording;

ii. a daily well work activity summary, separate from any monitoring report, that includes a brief description of that work and of the wellhead's status; and

iii. Chesapeake's daily completion reports, including all of the days of work on each well.

f. Chesapeake's obligation to submit the weekly reports required in Paragraph 3.e. shall terminate when the Department determines in writing that Chesapeake has eliminated the unpermitted discharge of natural gas into the waters of the Commonwealth from any well owned and/or operated by Chesapeake within the areas of Bradford County identified in Paragraph D, above, in this Consent Order and Agreement.

4. **Specifications of New Wells.** All gas wells drilled by or on behalf of Chesapeake in the areas identified in Paragraph D, above on or after the date of this Consent Order and Agreement shall be cased and cemented in a manner consistent with the specifications and practices described in Exhibit D unless, based on conditions observed in advance of or at the time of drilling, Chesapeake determines that alternate specifications or practices are warranted.

In the event that Chesapeake determines that alternate specifications or practices are warranted, Chesapeake shall notify the Department of the alternate specifications or practices utilized.

5. **Installation of Pressure Gauges**. Within ninety (90) days after the date of this Consent Order and Agreement, Chesapeake shall install pressure gauges on all existing wells within the areas described in Paragraph D, above, at the surface and intermediate casing ports in a manner allowing pressures to be inspected at any time by the Department. Chesapeake shall install such gauges on all wells drilled by or on behalf of Chesapeake within the areas described in Paragraph D, above, on or after the date of this Consent Order and Agreement.

6. **Reporting Water Supply Complaints.** Attached as Exhibit B is a Protocol For Reporting Water Supply Complaints identifying (i) the procedures Chesapeake shall implement within the areas identified in Paragraph D, above, to report to the Department water supply complaints within twenty four (24) hours after Chesapeake receives any such complaint, in accordance with 25 Pa. Code § 78.51(h) (effective February 5, 2011); (ii) the actions Chesapeake shall take to investigate any such complaint; (iii) the information to be reported to the Department based on such investigation; and (iv) the timing and form of such reports. Chesapeake shall implement the plan for any future complaint within the areas identified in Paragraph D, above.

7. **Remediation of Water Supplies**.

a. Beginning upon execution of this Consent Order and Agreement, with respect to the water supplies listed on Exhibit C, Chesapeake shall:

1) at least once every two weeks, screen the well at each water supply listed in Exhibit C for percentage of free combustible gas, and sample the well at each of those water supplies, provided the landowner consents to such screening and sampling;

2) for each water sample collected at a water supply listed in Exhibit C, Chesapeake shall have the water sample analyzed in a Pennsylvania-accredited laboratory for dissolved methane, dissolved ethane, and dissolved propane;

3) Chesapeake shall continue to conduct the screening and sampling under Paragraph 7.a.1), above, once every two weeks at each water supply listed in Exhibit C, provided the landowner consents, until the results of the screenings and sampling done by the Department or by Chesapeake under Paragraph 7.a.1), above, show (A) that either no combustible free gas is present at the water supply's wellhead, or, that such levels of combustible free gas, if properly vented pursuant to applicable regulations and Department practice, do not pose a danger to persons or property *and* (B) that the concentration of dissolved methane is below 7 milligrams/liter. However, Chesapeake may petition the Department, based on information obtained in accordance with this Paragraph for a determination that the concentration of methane in the water supply is at background levels for the aquifer that supplies the water supply. Chesapeake may further petition the Department for a determination that the concentration of combustible free gas at the wellhead is at levels that do not present a danger to persons or property if properly vented according to applicable regulations and Department practice;

4) for each water supply that meets the standards under Paragraph 7.a.3), above, or for which a plan has been submitted and approved pursuant to Paragraph 7.b and 7.c, Chesapeake shall continue to screen each such water supply for free combustible gas and shall sample each such water supply at least once per quarter, and shall have the water sample analyzed in a Pennsylvania-

accredited laboratory for the parameters listed in Exhibit E, provided the landowner consents to such screening and sampling; and

5) unless the Department determines that the concentration of methane in the water supply is at background levels for the aquifer that supplies the water supply, Chesapeake shall continue such screenings and sampling under paragraph 7.a.4), above, for each quarter until the results of the screenings and sampling done by the Department and by Chesapeake under this Paragraph 7 show that, for eight consecutive quarters, seventy-five percent (75%) of the water samples within each monitoring point over time contain seven (7) milligrams per liter or less of dissolved methane (or meets the standard then prescribed by applicable regulations), and no individual water sample exceeds two times this standard.

b. If after 60 days beyond the date of this Consent Order and Agreement, the dissolved methane is equal to or greater than 7 mg/l, or the measured free gas in the headspace is greater than 25% of the L.E.L., then Chesapeake shall submit to the Department for review and approval a plan and schedule to address each water supply listed on Exhibit C, including such remedial actions as Chesapeake may already have implemented. The quality of a restored or replaced water supply will be deemed adequate if it meets the standards established under the Pennsylvania Safe Drinking Water Act (35 P.S. §§ 721.1—721.17), or is comparable to the quality of the water supply before it was affected if that water supply did not meet these standards. Despite the filing of such a plan, Chesapeake shall remain obligated to monitor and screen such water supplies as required by this Paragraph 7.

c. Within fourteen (14) days of the Department's approval of any plan submitted pursuant to Paragraph 7.b., above, Chesapeake shall fully implement that plan as approved by the Department, subject to any determination by the Department that the concentration of methane in the water supply is at background or otherwise acceptable levels for the aquifer that supplies the water supply and the concentration of combustible free gas at the wellhead is at levels that do not present a danger to persons or property if properly vented according to applicable regulations and Department practice.

d. In the event that the owner of a residence identified in Exhibit C does not allow Chesapeake to fully implement the plan approved by the Department pursuant to Paragraph 7.d., above, then for each such residence Chesapeake shall establish an escrow account, or a common account for all such residences, in an amount approved by the Department to be used for the exclusive purpose of funding all of the expenses associated with providing either a treatment system or a replacement permanent water supply to the residence(s).

e. Chesapeake shall be responsible for paying any fees, charges, or taxes associated with every required escrow account or any common account.

f. Chesapeake shall maintain each escrow account, or the common account, until such time as the occupants of the residence(s) for which the account has been established notify Chesapeake in writing that installation of a treatment system or a replacement permanent water supply either has occurred at the residence owner's expense, or the funds in the escrow account may be used to install a permanent water supply at the residence.

g. Within thirty (30) days of the Department's receipt of notice that the funds in an escrow account may be used to install a treatment system or a replacement

permanent water supply at a residence, Chesapeake shall make all necessary arrangements with any necessary vendors or contractors for the purchase and installation of a treatment system or replacement permanent water supply at the residence at issue. Chesapeake shall provide copies of the paid invoice(s) from the vendors or contractors to the Department.

h. Within fourteen (14) days of receiving the paid invoice(s) for the purchase and installation of the treatment system or replacement permanent water supply, the Department shall draw on the appropriate escrow account, or the common account, in the amount necessary to reimburse Chesapeake for the payments to the vendors or contractors for such.

i. Following the purchase and installation of any system or water supply using funds drawn against an escrow account, Chesapeake shall maintain the escrow account to secure the long term operation and maintenance expenses of such systems or supply.

j. In the absence of any notification referenced in Paragraph 7.g., Chesapeake shall maintain each escrow account, or the common account, until such time as other arrangements for disposition of the escrow account are made by the Department.

8. **Sampling Protocol.** All water samples gathered and analyzed by or on behalf of Chesapeake, and submitted to the Department pursuant to this Consent Order and Agreement, shall be collected in accordance with the following protocol, or other method approved by the Department:

After purging the well, fill the 5 gallon bucket with water. Attach a nozzle and 12" length of ¼ inch diameter tubing to the end of the 5/8 inch hose connected to a faucet. Make sure that the flow rates through the tubing are low. Remove the cap of the 1 L bottle (or vial) and fill it

with water. Once the bottle filled, immerse it in the 5 gallon bucket full of water, keeping the tubing at the bottom of the bottle. Place the bottle at the bottom of the bucket under a head of water, and keep water flowing at a low rate until another 2 volumes of water have been displaced from the bottle. Then slowly lift the tubing out of the bottle and immediately cap it under water. No air should be allowed into the 1 L bottle. When finished, tape the cap to the bottle around the neck, pack the bottle upside down in ice, and ship it overnight.

9. **Submission of Documents.** With regard to any document that Chesapeake is required to submit pursuant to this Consent Order and Agreement, the Department will review Chesapeake's document and will approve, modify or disapprove the document, or a portion thereof, in writing. If the document, or any portion of the document, is found to be deficient by the Department, within 14 days of receipt of the deficiencies, Chesapeake shall submit a revised document to the Department that addresses the Department's concerns. The Department will approve, modify or disapprove the revised document in writing. Upon approval by the Department, the document, and any schedule therein, shall become a part of this Consent Order and Agreement for all purposes and shall be enforceable as such.

10. **Civil Penalty Settlement.** In settlement of any claim for civil penalties which the Department is authorized to pursue under law, including Section 506 of the Oil and Gas Act, 58 P.S. § 601.506, and Section 605 of the Clean Streams Law, 35 P.S. §§ 691.605, the Department hereby assesses a civil penalty of Seven Hundred Thousand Dollars ($700,000) for the violations set forth in the Findings, above. The payment shall be made by corporate check or the like, made payable to the "Commonwealth of Pennsylvania," and forwarded to the Department pursuant to Paragraph 17, below, or by an alternate method approved by the Department, within five days of execution of the Consent Order and Agreement.

11. **Donation to Well Plugging Fund.** Chesapeake agrees to donate Two Hundred Thousand Dollars ($200,000) to the Department's Well Plugging Fund. Chesapeake shall make such payment in the manner described in Paragraph 10, within five days of execution of the Consent Order and Agreement.

12. **Stipulated Civil Penalties.**

a. **If Chesapeake fails to comply with any provision of this Consent Order and Agreement, Chesapeake shall be in violation of this Consent Order and Agreement and, in addition to other applicable remedies, shall pay a civil penalty as follows:** If Chesapeake fails to comply with any obligation imposed upon it pursuant to this Consent Order and Agreement, Chesapeake shall be in violation of this Consent order and Agreement, and, in addition to other applicable remedies, shall pay a civil penalty in the amount of One Thousand Dollars ($1000) per day for each day, or any portion thereof, that Chesapeake fails to comply with its obligation.

b. Stipulated civil penalties shall be due automatically without further notice on or before the 15th day of each succeeding month, shall be made by corporate check or the like made payable to "Commonwealth of Pennsylvania," and shall be sent to the Department at the address set forth in Paragraph 17, below.

c. Any payment under this Paragraph shall neither waive Chesapeake's duty to meet its obligations under this Consent Order and Agreement, nor preclude the Department from commencing an action to compel Chesapeake's compliance with the terms and conditions of this Consent Order and Agreement for which payment is made.

13. **Additional Remedies.**

a. In the event Chesapeake fails to comply with any provision of this Consent Order and Agreement, the Department may, in addition to the remedies

prescribed herein, pursue any remedy available for a violation of an order of the Department.

b. The remedies provided by this paragraph and Paragraph 12 (Stipulated Civil Penalties) are cumulative and the exercise of one does not preclude the exercise of any other. The failure of the Department to pursue any remedy shall not be deemed to be a waiver of that remedy. The payment of a stipulated civil penalty, however, shall preclude any further assessment of civil penalties for the violation for which the stipulated civil penalty is paid.

14. **Reservation of Rights.** The Department reserves the right to require additional measures to achieve compliance with applicable law. Chesapeake reserves the right to challenge any action which the Department may take to require those measures.

15. **Liability of Chesapeake.** Chesapeake shall be liable for any violations of the Consent Order and Agreement, including those caused by, contributed to, or allowed by its officers, directors, agents, employees, contractors, successors, and assigns.

16. **Transfer of Gas Wells.**

a. Chesapeake's duties and obligations under this Consent Order and Agreement shall not be modified, diminished, terminated or otherwise altered by the transfer of any legal or equitable interest in any of the gas wells identified on the list submitted pursuant to paragraph 3.a.1), above, or any other Chesapeake gas wells covered hereby.

b. If before the termination of this Consent Order and Agreement, Chesapeake intends to transfer any legal or equitable interest in any of the gas wells on the list submitted pursuant to paragraph 3.a.1), above, Chesapeake shall provide a copy of this Consent Order and Agreement to the prospective transferee at least thirty (30) days

prior to the contemplated transfer and shall simultaneously inform the Department of such intent at the address set forth in Paragraph 17, below.

c. The Department, in its discretion, may agree to modify or terminate Chesapeake's duties and obligations under this Consent Order and Agreement and may agree to a transfer upon determination that Chesapeake is in full compliance with this Consent Order and Agreement, including payment of any stipulated penalties owed, and upon the transferee entering into a Consent Order and Agreement with the Department concerning the gas wells at issue. Chesapeake agrees to waive any right that it may have to challenge the department's decision in this regard.

17. **Correspondence with Department.** All correspondence with the Department concerning this Consent Order and Agreement shall be addressed to:

Jennifer W. Means
Environmental Program Manager
Eastern Region Oil and Gas Management
Department of Environmental Protection
208 West Third Street – Suite 101
Williamsport, PA 17701-6448
Phone (business hours): (570) 321-6557
Phone (non-business hours): (570)327-3636
e-Mail: jenmeans@state.pa.us

18. **Correspondence with Chesapeake.** All correspondence with Chesapeake concerning this Consent Order and Agreement shall be addressed to:

Tal Oden
Regulatory Manager North, East Division
Chesapeake Energy Corporation
P.O. Box 18496
Oklahoma City, OK 73154
Phone: (405) 935-4073
e-Mail: tal.oden@chk.com

Chesapeake shall notify the Department whenever there is a change in the contact person's name, title, or address. Service of any notice or any legal process for any purpose under this

Consent Order and Agreement, including its enforcement, may be made by mailing a copy by first class mail to the above address.

19. **Severability.** The paragraphs of this Consent Order and Agreement shall be severable and should any part hereof be declared invalid or unenforceable, the remainder shall continue in full force and effect between the parties.

20. **Entire Agreement.** This Consent Order and Agreement shall constitute the entire integrated agreement of the parties. No prior or contemporaneous communications or prior drafts shall be relevant or admissible for purposes of determining the meaning or intent of any provisions herein in any litigation or any other proceeding.

21. **Attorneys Fees.** The parties shall bear their respective attorney fees, expenses and other costs in the prosecution or defense of this matter or any related matters, arising prior to execution of this Consent Order and Agreement.

22. **Modifications.** No changes, additions, modifications, or amendments of this Consent Order and Agreement shall be effective unless they are set out in writing and signed by the parties hereto.

23. **Titles.** A title used at the beginning of any paragraph of this Consent Order and Agreement may be used to aid in the construction of that paragraph, but shall not be treated as controlling.

24. **Decisions under Consent Order and Agreement.** Except for Paragraph 16.c., above, any decision which the Department makes under the provisions of this Consent Order and Agreement, including a notice that stipulated civil penalties are due, is intended to be neither a final action under 25 Pa. Code § 1021.2, nor an adjudication under 2 Pa. C.S. § 101. Any objection which Chesapeake may have to the decision will be preserved until the Department enforces this Consent Order and Agreement.

25. **Termination.** Chesapeake's obligations, but not the Findings, of this Consent Order and Agreement shall terminate when the Department provides written notice that Chesapeake has completed all of the requirements of this Consent Order and Agreement, and has paid any outstanding stipulated civil penalties due under Paragraph 12, above.

26. **Execution of Agreement.** This Consent Order and Agreement may be signed in counterparts, each of which shall be deemed to be an original and all of which together shall constitute one and the same instrument. Facsimile signatures shall be valid and effective.

IN WITNESS WHEREOF, the parties hereto have caused this Consent Order and Agreement to be executed by their duly authorized representatives. The undersigned representatives of Chesapeake certify under penalty of law, as provided by 18 Pa. C.S. § 4904, that they are authorized to execute this Consent Order and Agreement on behalf of Chesapeake; that Chesapeake consents to the entry of this Consent Order and Agreement as a final Order of the Department; and that Chesapeake hereby knowingly waives its rights to appeal this Consent Order and Agreement and to challenge its content or validity, which rights may be available under Section 4 of the Environmental Hearing Board, the Act of July 13, 1988, P.L. 530, No. 1988-94, 35 P.S. § 7514; the Administrative Agency Law, 2 Pa. C.S. § 103(a) and Chapters 5A and 7A; or any other provision of law.

Signature by Chesapeake's attorney certifies only that the agreement has been signed after consulting with counsel.

FOR CHESAPEAKE APPALACHIA, L.L.C.:

13 MAY 11
John K. Reinhart (Date)
Vice President, Operations-Eastern Division

5-13-11
Craig P. Wilson, Esq. (Date)
Attorney for Chesapeake Appalachia, L.L.C.

FOR THE COMMONWEALTH OF PENNSYLVANIA, DEPARTMENT OF ENVIRONMENTAL PROTECTION:

5/13/11
Jennifer W. Means (Date)
Environmental Program Manager
East Region Oil & Gas Management

5/13/2011
Geoffrey J. Ayers (Date)
Regional Counsel
Northcentral Region

5/16/11
David J. Raphael (Date)
Chief Counsel
Department of Environmental Protection

Exhibit A

Maps of:

Miller/Luce Area

Sivers Area

Paradise Road Area

Dan Ellis Area

Sugar Run Area

Spring Hill Area

Vargson Area

Sivers Beaver Pond Stray Gas Area - 4 Mile Radius

☆ Sivers Beaver Pond Stray Gas

• Permitted Oil and Gas Wells

N

0 0.5 1 2 3 4 Miles

*Permitted Oil and Gas Locations mat contain multiple wells per location. Refer to attached table.

9/27/2010

Dan Ellis / Brocktown Rd Stray Gas Area - 4 Mile Radius

N

0 0.5 1 2 3 4 Miles

- Permitted Oil and Gas Locations
- ★ Dan Ellis Brocktown Stray Gas

*Permitted Oil and Gas Locations mat contain multiple wells per location. Refer to attached table.

9/27/2010

Sugar Run Stray Gas Area - 4 Mile Radius

N

0 0.5 1 2 3 4 Miles

★ Sugar Run Stray Gas

• Permitted Oil and Gas Location

*Permitted Oil and Gas Locations may contain multiple wells per location. Refer to attached table.

9/27/2010

Springhill Rd Stray Gas Area - 4 Mile Radius

N

0 0.5 1 2 3 4 Miles

★ Springhill Rd Stray Gas

• Permitted Oil and Gas Location

*Permitted Oil and Gas Locations mat contain multiple wells per location. Refer to attached table.

Vargson - Granville Twp., Bradford County

4/12/2011

EXHIBIT B

PROTOCOL FOR REPORTING WATER SUPPLY COMPLAINTS

(1) Reporting of water supply complaints – combustible gas detected = 10 % LEL

If combustible gas is detected inside a building or structure at a concentration equal to or greater than 10 % LEL, then (A) immediate notification shall be made to the Department, (B) a report shall be filed with the Department by phone and email within 24 hours after the interview with the complainant and field survey of the extent of natural gas, and (C) weekly reports shall be provided to the Department in accordance with (3) and (4) below.

(2) Investigating water supply complaints

All investigations of potential gas migration incidents shall be conducted in accordance with 25 Pa. Code § 78.89, or as subsequently prescribed by applicable regulation.

(3) Information to be reported to the Department

Weekly reports required by (1)(C) above shall include, in addition to what is required pursuant to 25 Pa. Code § 78.89, the following:

(A) The location and type of all gas monitoring equipment installed;

(B) Results of methane readings, if any, in tabular form and including % of methane by volume and % of LEL, from each potentially affected location (water wells, headspace, surface water);

(C) Results of water chemistry data from water well samples and surface water samples, when available, including the location of each sampling point; and

(D) An explanation of any corrective actions undertaken, including a description of any equipment installed.

The first weekly report submitted in connection with any investigation shall identify the nearest Chesapeake gas well and include the following well construction information: well depth, number of casings, length of each casing string, wellbore evaluation results, caliper logs, and cement returns.

The first weekly report submitted in connection with any investigation also shall identify the latitude and longitude and street address of each home, business, farm, water well, surface water body, and structure implicated by the complaint, and the owner or occupier of such.

(4) Timing and form of reports

Weekly reports required by (1)(C) above shall be submitted each Monday, beginning one week after the 24-hour report has been made to the Department in accordance with (1)(B) above. The obligation to submit weekly reports shall continue until a final report is submitted for the incident.

EXHIBIT C

List of Water Supplies

Determination letters pursuant to Section 208(b) of the Oil and Gas Act

Sugar Run

Carl Postupak	8156 Route 187S.	Sugar Run, PA	18846
Don Pickett	RR #1 Box 12	Sugar Run, PA	18846
Robert Baldwin	RD 1 Box 1	Sugar Run, PA	18846
David Buck Well#1	7417 Route 187S	Sugar Run, PA	18846
David Buck Well #2	7417 Route 187S	Sugar Run, PA	18846
Dale Dunklee	7939 Route 187S	Sugar Run, PA	18846
Kenneth Reinhart	480 Table Rock Road	Gettysburg, PA	17325

Paradise Rd

Scott Spencer	RR2 Box 37C Paradise Rd	Wyalusing, PA	18853
Michael Phillips	244 Paradise Rd	Wyalusing, PA	18853
Jared McMicken	224 Paradise Rd	Wyalusing, PA	18853

Brocktown/Dan Ellis

Greg Laws	2420 Brocktown Rd.	Monroeton, PA	18832
Earl Sites (owned by Paul Sites)	2600 Brocktown Rd	Monroeton, PA	18832
Sibley (owned by Paul Sites)	2600 Brocktown Rd	Monroeton, PA	18832

Springhill Rd

John Pary	525 Spring Hill Rd	Laceyville, PA	18623
Ron Brown	3096 Springhill Rd	Laceyville, PA	18623

Vargson

Sherry Vargson	2331 Baileys Corner	Granville Summitt, PA	16926

No determination letter

Sugar Run

Peggy Loomis	8081 Rt. 187	Sugar Run, PA	18846

EXHIBIT D

SPECIFICATIONS AND PRACTICES FOR CASING AND CEMENTING

Well Casing and Cement Illustration

Cementing Practices

Conductor

- 26" Hole to minimum depth of ±70'.
- 20" Conductor to be cemented with High Density Cement.
- Record all fresh ground water encountered in the Driller's Log Book.

Surface Section

- 17-1/2" hole to be drilled to minimum of ±50' below base of fresh ground water. In the absence of other data, the depth of fresh ground water is determined primarily by using the known depths of surrounding water wells within a ±2500' radius, and correcting for elevation differences.
- Record all fresh ground water encountered in the Driller's Log Book.
- Circulate and condition hole.
- Run new string of 13-3/8" surface casing.
- Run centralizers in the middle and top of the first joint, top of third joint, and every third to surface.
- Pump ±35 bbls of gelled spacer, ±100 bbls of fresh water, drop bottom plug.
- Pump High Density Cement with gas block additive.
- Drop top plug and displace with water at maximum rate.
- Record volume of cement to surface in the Driller's Log Book.
- Wait on cement for 8 hrs.
- Performing FIT to 15 ppg EMW on surface casing (squeeze shoe if less than 15 ppg EMW).

Cementing Practices (continued)

Intermediate Section

- 12-1/4" hole to be drilled to intermediate casing depth. Intermediate depth is typically at a minimum of ±2000', but is well specific and is based on various data sources and geologic interpretation.
- Circulate and condition hole.
- Run new string of 9-5/8" intermediate casing.
- Run centralizers in the middle and top of the first joint, top of third joint, and every third to surface.
- Reciprocate casing throughout the cement job.
- Pump ±35 bbls of gelled spacer, ±100 bbls of fresh water, drop bottom plug.
- Pump High Density Cement with gas block additive.
- Drop top plug and displace with water at maximum rate.
- Record volume of cement to surface in the Driller's Log Book.
- Wait on cement for 8 hrs.
- Performing FIT to 16 ppg EMW on intermediate casing (squeeze shoe if less than 16 ppg EMW).

Cementing Practices (continued)

Production Section

- 8-3/4", 8-1/2", or 7-7/8" hole to be drilled to casing depth.
- Run new string of 5-1/2" production casing.
- Run centralizers at least from end of curve to TOC on every second joint.
- Prior to cementing, circulate at least three bottoms up annular volumes.
- If possible, reciprocate and rotate casing throughout the cement job.
- Pump minimum of ±50 bbls of weighted chem wash at ±14.0 ppg.
- Drop bottom plug.
- Pump High Density Cement with gas block additive from above curve to TOC.
- Drop top plug and displace with water at maximum rate.
- Wait on cement for 8 hrs and attempt to hold 250 psi on annulus.

EXHIBIT E

STANDARD ANALYSIS CODE 942 LIST OF PARAMETERS

SPECIFIC CONDUCTIVITY @ 25.0 C

pH, LAB (ELECTROMETRIC)

ALKALINITY TOTAL AS CACO3 (TITRIMETRIC)

TOTAL DISSOLVED SOLIDS (TDS)

HARDNESS TOTAL (Calculated)

CALCIUM, TOTAL BY TRACE ELEMENTS IN WATERS & WASTES

MAGNESIUM, TOTAL BY TRACE ELEMENTS IN WATERS &

SODIUM, TOTAL BY TRACE ELEMENTS IN WATERS & WASTES

POTASSIUM, TOTAL BY TRACE ELEMENTS IN WATERS &

CHLORIDE, TOTAL

BARIUM, TOTAL BY TRACE ELEMENTS IN WATERS & WASTES

IRON, TOTAL BY TRACE ELEMENTS IN WATERS & WASTES BY

MANGANESE, TOTAL BY TRACE ELEMENTS IN WATERS &

STRONTIUM, TOTAL BY TRACE ELEMENTS IN WATERS &

TURBIDITY

METHANE

ETHANE

PROPANE

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

News for Immediate Release

May 16, 2011

DEP Fines Chesapeake Energy More Than $1 Million
Penalties Address Violations in Bradford, Washington Counties

Harrisburg – The Department of Environmental Protection announced today it has fined Chesapeake Energy $1,088,000 for violations related to Marcellus Shale natural gas drilling activities.

Through two Consent Orders and Agreement (COA) with Chesapeake, DEP collected $900,000, $200,000 of which must be donated to the department's well plugging fund, for contaminating private water supplies in Bradford County, and $188,000 for a tank fire at a drilling site in Avella, Washington County.

"It is important to me and to this administration that natural gas drillers take very seriously their responsibility to comply with our regulations and not put public health and safety at risk," DEP Secretary Mike Krancer said. "The water well contamination fine is the largest DEP has ever assessed against an oil and gas operator, and the tank fire penalty is the highest possible amount under the laws we administer. Our message to drillers is clear."

At various times throughout 2010, DEP investigated private water well complaints from residents of Tuscarora, Terry, Monroe, Towanda and Wilmot Townships, Bradford County, and determined that because of improper well casing and cementing, natural gas from several of Chesapeake's nearby drilling operations had migrated into fresh groundwater and contaminated 16 families' drinking water supplies.

As part of the COA, Chesapeake agrees to take multiple measures to prevent future gas migration, including creating a plan to be approved by DEP that outlines corrective actions for the wells in question; remediating the contaminated water supplies; installing necessary equipment; and reporting water supply complaints to DEP, among other things. The well plugging fund supports DEP's Oil and Gas program operations and can be used to mitigate gas migration problems in cases where the source of the gas cannot be identified.

On Feb. 23, while testing and collecting fluid from wells on a drill site in Avella, Washington County, three condensate separator tanks caught fire, injuring three subcontractors working on-site. DEP conducted an investigation and determined the cause to be ignition of condensate vapors. Under the COA, Chesapeake must

submit for approval to the department a Condensate Management Plan for each well site that may produce condensate, a wet gas only found in certain geographic areas.

"Marcellus Shale natural gas drilling presents a tremendous opportunity for Pennsylvania. With this opportunity come a number of challenges," Krancer said. "The Corbett administration continues to face those challenges head-on to ensure, as we have with these strong enforcement actions, that we are overseeing this industry responsibly."

For more information, visit www.depweb.state.pa.us.

Media contact: Katy Gresh, 717-787-1323

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