

Robert Donnan, 107 Southview Ct., McMurray, PA 15317

October 4, 2012

SUBJECT: Cross Creek County Park

TO: The Washington County Commissioners and fellow citizens of Washington County – It is somewhat alarming to learn from a new US Geological Survey study that nearly 1-percent of our county land has already been disturbed by Marcellus Shale drilling, especially considering the drilling has just begun. According to former DCNR secretary John Quigley, this current wave of resource extraction could rival or surpass the historic disturbance from other mining and logging industries. We are also beginning to learn of the hidden liabilities and environmental costs.

It now appears that Range Resources Appalachia LLC has been violating the terms of their drilling lease inside Cross Creek County Park by burying toxic waste in the park. I submit this letter and the following documents to be included in the public record of this meeting. During a recent file review at the SW office of the Pa. DEP, a 'Waste Management Transmittal - Form OG-71' dated December 2009 (marked Exhibit A) was discovered, showing that Range Resources used 'Alternative Waste Disposal Practices' to bury what some call a 'toxic teabag' in our county park.

This is a direct violation of 'Slush Pit - Section 3.1' of the 'Cross Creek County Park Oil and Gas Lease' dated March 10, 2003 (marked Exhibit B) which reads, "All trash, rubbish, or waste materials from each drilling site shall be removed and disposed of in a properly licensed solid waste site."

Adding to the dire nature of these actions at Cross Creek County Park wells #6H and #8H is the fact that sampling by the US Geological Survey of produced water from well #6H during production activities in 2009 revealed high levels of radioactive materials Radium-226 and Radium-228 (marked Exhibit C).

In the next document, 'Drilling's Legacy: Toxic Teabags in Cross Creek County Park' (marked Exhibit D) you will find an in-depth look at the legal ramifications of these actions in our county park as they apply to the county commissioners and citizens of Washington County. On page 2, please note the expert's recommendation that "Deed Restrictions or Environmental Covenants, noting the presence and locations of buried waste, are about the only means to ensure enforcement of an existing (state) regulation prohibiting the puncturing or perforating of a buried (slush pit) liner."

Two photos (marked Exhibit E) show a restored field below Cross Creek County Park wells #6H and #8H where recent radioactive monitoring revealed radioactivity levels at more than double the background level in surrounding areas of the park. Several spots in that field also revealed partially buried pieces of black plastic pit liner, as seen in the second photo.

My question is this: What do the commissioners plan to do in order to remediate this environmental degradation of our park, prevent future violations of the drilling lease, and protect Washington County citizens from latent liabilities and health risks arising from toxic teabags buried inside Cross Creek County Park?





# Landscape Consequences of Natural Gas Extraction in Bradford and Washington Counties, Pennsylvania, 2004–2010

By E.T. Slonecker, L.E. Milheim, C.M. Roig-Silva, A.R. Malizia, D.A. Marr, and G.B. Fisher

Open-File Report 2012–1154

U.S. Department of the Interior  
U.S. Geological Survey

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# Research maps out gas boom impact in Washington County

By **Timothy Puko**  
TRIBUNE-REVIEW

**Published:** Thursday, September 6, 2012, 12:01 a.m.  
*Updated:* Thursday, September 6, 2012

The natural gas boom has disturbed nearly 1 percent of the land in Washington County, according to a federal study, one of several designed to chart the revived industry's impact on Pennsylvania land.

With possibly thousands gas wells on the way, the early data confirmed previous research that found wells, pipelines and access roads for gas could rival or surpass the historic disturbance from other mining and logging industries, said John Quigley, the former state secretary of Conservation and Natural Resources. Nearly all of the 0.83 percent of land carved up in Washington came from forest and farmland, according to the report released on Wednesday by the U.S. Geological Survey.

Its six-researcher team mapped the land physically changed by gas development between 2004 and 2010. It released results for Washington County and Bradford County, which had 0.41 percent of its land disturbed, according to the report.

Marcellus Shale Coalition spokesman Patrick Creighton said that because of evolving drilling practices, the footprint of wells is smaller than before. "It's important to note that well sites and pipeline right of ways are temporary construction projects on mostly private land that will be reclaimed after work is complete," he said.

Pipeline reclamation usually does not include reforestation, as lines are usually left as clearings so their owners can do safety and security checks with flyovers.

One of the federal study's most important findings was the leading role pipeline installations play in forest fragmentation, said Patrick Drohan, a soil and forest expert at Penn State studying drilling. Those new clearings can lead to big ecological changes, endangering sensitive forest life that depends on interior forest for habitat, Slonecker said.

USGS will release assessments of other counties in coming weeks, part of an effort to set baseline data for a series of government studies on gas drilling impacts, lead author E.T. Slonecker said.

"This is real-time, almost real-time hard data — not estimates, but actual calculations based on high-resolution mapping. This thing is the real deal," Quigley said after reading the report. "This, if it continues, is some of the best information that I can imagine to help us really monitor the physical impacts on the landscape. I think it's tremendously important."

The researchers used biennial aerial photos of the two counties to spot cutouts for wells, pipelines and their access roads, and then charted those into a computer map system to tally the acreage changes.

While ground-level research would have been helpful to verify the work, the study's findings and implications conform with other major recent research on Marcellus shale land use, Drohan said. Drohan's research team in August estimated that the industry could lead to 278 to 695 square miles of disturbance, comparable to the state's number of abandoned surface mines.

The Geological Survey is working on a wide-reaching research agenda mandated by Congress, Slonecker said. Other federally funded researchers will assess the implications of the changes, including studies about sedimentation and water, changes in species distribution, habitat loss and invasive species, he added.

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## About Timothy Puko

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Tribune-Review Staff reporter Timothy Puko can be reached via e-mail or at 412-320-7991.

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## Details

### On the Web

The study can be found at <http://pubs.usgs.gov/of/2012/1154/>.

**WASTE MANAGEMENT TRANSMITTAL FORM**

**OG-71**

FROM: Regina TO: Michael L Morgart  
DATE: 12/23/09 RETURN BY: 01/04/10

AUTH ID: 817625, 817627 PERMIT # 125-22830, 125-22793  
COUNTY: Washington

OPERATOR: Range Resources - Appalachia, LLC  
FARM NAME: Cross Creek County Park WELL # 6H, 8H

**RECOMMENDATIONS BY REVIEWER**

APPROVED: YES  NO

APPROVED WITH CONDITIONS:

Operator shall notify Michael Morgart at 412-417-7944, 48 hours prior to beginning solidification.

DISAPPROVED:

REVIEWERS INITIALS: MM DATE: 12-23-09

PROGRAM MANAGER'S SIGNATURE: Michael L Morgart DATE: 12/30/09

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OIL & GAS



COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
OIL & GAS MANAGEMENT PROGRAM

DEP USE ONLY	
Auth #	APS #
Site #	Facility #
FIX Client #	Sub-fac #

## Request for Approval of Alternative Waste Management Practices

Please read instructions on back before completing this form.

Well Operator Range Resources - Appalachia, LLC		DEP ID 141142	Well Permit or Registration Number 37-125-22830 and 37-125-22793 817625 - 817627	
Address 380 Southpointe Blvd., Suite 300			Well Farm Name Cross Creek County Park	
City Canonsburg	State PA	Zip Code 15317	Well # 6H, 8H	Serial #
Phone (724) 873-3226	Fax (330) 587-1880	County Washington	Municipality Cross Creek	

### INTENDED ALTERNATIVE PRACTICE *Check the appropriate box and complete the applicable section of the form.*

- For temporary containment of fluids and wastes generated during drilling, altering, or completing a well, complete Section A. PITS AND TANKS FOR TEMPORARY CONTAINMENT. See 25 Pa. Code § 78.56 for regulations.
- For disposal of drill cuttings from above the surface casing seat, complete Section B. ALTERNATE WASTE DISPOSAL PRACTICES. See 25 Pa. Code § 78.61 for regulations.
- For disposal of residual waste and drill cuttings from below the surface casing seat, complete Section B. ALTERNATE WASTE DISPOSAL PRACTICES. See 25 Pa. Code § 78.62 or § 78.63 for regulations.

#### A. PITS AND TANKS FOR TEMPORARY CONTAINMENT

Complete this section if requesting approval of an alternative practice for temporary containment of polluttional substances and wastes from drilling, altering, or completing a well. See 25 Pa. Code § 78.56. NOT APPLICABLE

- a) Check the box below and fill in the dates the pit will be used if you are requesting a variance from the requirement that the bottom of the pit be at least 20 inches above the seasonal high groundwater table for a pit that exists only during dry times of the year and is located above groundwater. See 25 Pa. Code § 78.56(a)(4)(iii). NOT APPLICABLE

Variance requested; dates to be used, from \_\_\_\_\_ to \_\_\_\_\_

- b) Check the box below if you are requesting approval of an alternative practice for temporary containment.

Approval of an other alternative practice is requested. Describe the type of waste and the temporary containment method. Include information which will demonstrate that the proposed alternative practices will provide equivalent or superior protection to the practices indentified in 25 Pa. Code § 78.56.

NOT APPLICABLE.

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(continued over)

**B. ALTERNATIVE WASTE DISPOSAL PRACTICES**

Complete this section if requesting approval of an alternative practice to dispose of drill cuttings or residual wastes at the well site. Describe the type of waste, including any additives, and the proposed alternative practice. Include information that will demonstrate the proposed practice will provide protection equivalent or superior to the practices identified in 25 Pa. Code § 78.61, 78.62, or 78.63.

The waste is "top hole" drill cuttings from the Cross Creek County Park Wells Nos. 6H and 8H. These wells are located on the well site where the drill cuttings are being disposed, as required by §78.62(a)(1). The pit in which the waste will be disposed is the reserve pit on the well site and the pit has been constructed in accordance with §78.62 of the regulations.

The material will be disposed in accordance with §78.62(a)(14), which requires that all free liquid fraction of the waste be removed and disposed. The free liquid fraction will be removed from the pit and a solidification material known as Soli-Bond will then be added to the remaining material to stabilize and solidify the material. The MSDS for the Soli-Bond material is attached to this submittal.

Once the material has been stabilized, the liner shall be folded over, or an additional liner will be added if required, to completely cover the waste and the waste will be shaped so that water does not infiltrate the liner and does not get confined about the liner as required by §78.62(a)(15) of the regulations.

The pit will then be backfilled at least 18 inches over the top of the liner and graded to promote runoff, with depressions or low spots that would accumulate or pond water.

**SIGNATURE OF APPLICANT**

Signature of Applicant / Well Operator <i>Carla L. Suszkowski</i>	Print or Type Signer's Name and Title Carla L. Suszkowski, P.E.	D 12-14-09
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**DEP USE ONLY**

<input checked="" type="checkbox"/> Approved <input type="checkbox"/> Denied	Conditions: <input checked="" type="checkbox"/> YES, see below or attached. <input type="checkbox"/> NO	Date 12/29/09
DEP Representative: <i>Michael Morgart</i>		

Conditions:  
Operator should notify Michael Morgart at 412-417-7944, 48 hours prior to beginning solidification.

**Instructions**

Use this form to apply for approval of alternative waste management practices under 25 Pa. Code § 78.56, 78.61, 78.62, or 78.63.

Complete this form and submit it with all other necessary documentation. Label each attachment with applicant's name and the information item it refers to.

Send your application to the Oil and Gas Management Program at the appropriate DEP regional office:

PA DEP  
Oil & Gas Management Program  
Northwest Regional Office  
230 Chestnut Street  
Meadville, PA 16335-3481  
Phone: 814-332-6860  
Fax: 814-332-6121

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PA DEP  
Oil & Gas Management Program  
Southwest Regional Office  
400 Waterfront Drive  
Pittsburgh, PA 15222-4745  
Phone: 412-442-4015  
Fax: 412-442-4328

# MATERIAL SAFETY DATA SHEET

Date Revised: 8/5/08

## I. Product Identification

Identity: Soli-Bond® 1100

Supplier: Soli-Bond, Inc.  
Address: 4204 Armour Ave.  
Bakersfield, CA 93308  
Telephone #: (661) 631-1633

## II. Product Ingredients

Chemical Substances	CAS Number
3CaO-SiO <sub>2</sub>	12168-85-3
2Ca-O-SiO <sub>2</sub>	10034-77-2
3CaO-Al <sub>2</sub> O <sub>3</sub>	12042-78-3
4CaO-Al <sub>2</sub> O <sub>3</sub> -Fe <sub>2</sub> O <sub>3</sub>	12068-35-8
CaSO <sub>4</sub> ·XH <sub>2</sub> O	13397-24-5

Small amounts of CaO, MgO, K<sub>2</sub>SO<sub>4</sub>, Na<sub>2</sub>SO<sub>4</sub> may also be present.

### OSHA PEL

(Transitional)

(Final)

Total dust -- mp/ft<sub>3</sub>  
Contains no asbestos

Total dust -- 10mg/m<sub>3</sub>  
Respirable dust -- 5mg/m<sub>3</sub>

## III. Physical Data

Appearance and Odor:	Wet stone odor, light tan (or white) fine powder		
Boiling Point:	N/A	Evaporation Rate:	N/A
Vapor Pressure:	N/A	Specific Grav. (Water=1):	2.5-2.9
Water Solubility (%):	>1.0%	Melting Point:	N/A
Vapor Density (Air=1):	N/A	Volatile by Volume:	N/A
pH of Saturated Solution:	Approximately 12.0		

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#### IV. Fire and Explosion Data

Flash Point:	N/A
Flammable Limits:	N/A
Extinguishing Media:	N/A
(Product may be used as an extinguisher)	N/A
Unusual Fire or Explosion Hazards:	N/A
Special Fire-Fighting Procedures:	N/A
	NFPA Flammable/Combustible Liquid Classifications: N/A
	Auto-Ignition Temp: N/A

#### V. Health Hazards

##### Summary of Risk

**Summary:** Inhalation of dust should be avoided. The constituents may cause irritation of eyes, skin and respiratory tract. Ingestion may cause irritation of gastrointestinal tract.

**Medical conditions which may be aggravated:** Pre-existing lung conditions may be aggravated if exposed to excessive concentrations of dust.

**Target Organs:** Eyes, skin and respiratory tract

**Acute Health Effects:** Irritation of eyes, skin, nose, throat, and upper respiratory tract.

**Chronic Health Effects:** Prolonged, excessive exposure to dust may cause pulmonary fibrosis or chronic bronchitis.

**Primary Entry Route(s):** Inhalation or ingestion.

##### Signs/Symptoms of Overexposure

**Inhalation:** Coughing, sneezing, wheezing, shortness of breath, or repeated non-specific lung illnesses.

**Skin Contact:** Reddening of skin.

**Skin Absorption:** N/A

**Ingestion:** Gastrointestinal pain.

**Eyes:** Reddening or watering of eyes.

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### **First Aid/Emergency Procedures**

**Inhalation:** Remove from exposure to dust and obtain medical attention immediately.

**Skin Contact:** Flush skin with large amounts of water for 15 minutes. Obtain medical attention, if needed.

**Skin Absorption:** N/A

**Ingestion:** Obtain medical attention immediately.

**Eyes:** Flush eyes with water for 15 minutes and obtain medical attention immediately.

### **VI. Special Protection Information**

**Goggles:** Tight-fitting safety goggles should be worn by persons handling this material.

**Gloves:** Proper gloves should be worn to prevent skin contact.

**Respirator:** An appropriate NIOSH/MSHA approved respirator should be worn where ventilation is inadequate or dust concentration may exceed TLV/PEL.

**Ventilation:** Use local or general exhaust ventilation to keep dust level as low as possible.

\*Note - N/A means information is either not available or not applicable.

The information contained herein is, to the knowledge and belief of Soli-Bond, Inc., complete, accurate, and reliable as of the date of last revision. However, Soli-Bond, Inc. makes no express or implied warranty or guarantee as to the completeness, reliability, or accuracy of this information. It's the user's responsibility to satisfy himself as to the completeness, accuracy and reliability of the information contained herein and to then act accordingly. The use of this material being subject to conditions beyond Soli-Bond, Inc.'s control, Soli-Bond, Inc. makes no warranty of any kind, express or implied as to material or its use.

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*Marcellus*

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OIL AND GAS MANAGEMENT PROGRAM

DEP USE ONLY	
Site Id	Primary Facility Id
Client Id	Sub-facility Id

## WELL RECORD AND COMPLETION REPORT

Well Operator Range Resources – Appalachia, LLC		DEP ID# 141142	Well API # (Permit / Reg) 37-125-22830	Project Number	Acres 70
Address 380 Southpointe Blvd. Suite 300			Well Farm Name Cross Creek County Park	Well # 6-H	Serial #
City Canonsburg	State PA	Zip Code 15317	County Washington	Municipality Cross Creek	
Phone 724-743-6700	Fax 724-743-6790	USGS 7.5 min. quadrangle map Avella			
Check all that apply: <input type="checkbox"/> Original Well Record <input checked="" type="checkbox"/> Original Completion Report <input checked="" type="checkbox"/> Amended Well Record <input type="checkbox"/> Amended Completion Report					

WELL RECORD <small>Also complete Log of Formations on back (page 2)</small>														
Well Type		<input checked="" type="checkbox"/> Gas		<input type="checkbox"/> Oil		<input type="checkbox"/> Combination Oil & Gas		<input type="checkbox"/> Injection		<input type="checkbox"/> Storage		<input type="checkbox"/> Disposal		
Drilling Method		<input type="checkbox"/> Rotary – Air		<input checked="" type="checkbox"/> Rotary – Mud		<input type="checkbox"/> Cable Tool								
Date Drilling Started 7/15/08		Date Drilling Completed 3/6/2009		Surface Elevation 1120 ft.		Total Depth – Driller 8779 ft		Total Depth – Logger 8779 ft						
<b>Casing and Tubing</b>					Cement returned on surface casing? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No					Cement returned on coal protective casing? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A				
Hole Size	Pipe Size	Wt.	Thread / Weld	Amount in Well (ft)	Material Behind Pipe Type and Amount		Packer / Hardware / Centralizers Type Size Depth		Date Run					
22"	20"	106#	Thread	42'	Driven		---		7/15/08					
17-1/2"	13-3/8"	54.50#	Thread	436'	Class A Cement, 410 sx		GS 13-3/8"		436' 7/16/08					
12-1/4"	9-5/8"	36#	Thread	1803'	50/50 POZ 560 sx Class A, 100 sx		GS 9-5/8"		1803" 7/19/08					
8-3/4"	5-1/2"	20#	Thread	8767'	Extendacem, 880 sx, Hall Light, 260 sx		FS 5-1/2"		8767' 3/5/09					
					Fraccem, 250 sx									

COMPLETION REPORT									
Perforation Record					Stimulation Record				
Date	Interval Perforated From To		Date	Interval Treated	Fluid Type Amount		Propping Agent Type Amount		Average Injection
3/23/09	8,675'	6,550'	3/23/09	Marcellus Shale	Water	79,093 bbl	Sand	2,417,453	94.58
					RECEIVED MAY 06 2010 DEP, SOUTHWEST REGION OIL & GAS		RECEIVED JUN 26 2009 DEP, SOUTHWEST REGION OIL & GAS		
Natural Open Flow			Too small to measure		Natural Rock Pressure		Too small to measure		
After Treatment Open Flow			Due to length of the flow-back period, this information is not available at this time but will be provided confidentially to the DEP upon request		After Treatment Rock Pressure		Due to length of the flow-back period, this information is not available at this time but will be provided confidentially to the DEP upon request		

**Well Service Companies** -- Provide the name, address, and phone number of all well service companies involved.

Name Patterson UTI	Name Allegheeny Wireline Services	Name Universal Well Services
Address 4510 Lamesa Highway	Address P.O. Box 506	Address P.O. Box 305
City - State - Zip Snyder, Texas 79549	City - State - Zip Weston, WV 26452	City - State - Zip Punxsutawney, PA 15767
Phone 325-574-6300	Phone 304-269-2500	Phone 814-938-2051

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OCT 16 2009  
DEP, Southwest Region  
California District Office

LOG OF FORMATIONS						Well API#: 37-125-22830
Formation Name or Type	Top (feet)	Bottom (feet)	Gas at (feet)	Oil at (feet)	Water at (fresh / brine; ft.)	Source of Data
Fill	0'	10'				Geophysical Log
Shale	10'	40'				Geophysical Log
Sand & Shale	40'	340'				Geophysical Log
Coal	340'	346'				Geophysical Log
Shale	346'	480'				Geophysical Log
Red Rock	480'	510'				Geophysical Log
Shale	510'	600'				Geophysical Log
Red Rock	600'	634'				Geophysical Log
Sand	634'	687'				Geophysical Log
Shale	687'	761'				Geophysical Log
Sand	761'	814'				Geophysical Log
Shale	814'	901'				Geophysical Log
Sand	901'	1014'				Geophysical Log
Sand & Shale	1014'	1062'				Geophysical Log
Shale	1062'	1103'				Geophysical Log
Sand & Shale	1103'	1127'				Geophysical Log
Sand	1127'	1338'				Geophysical Log
Shale	1338'	1390'				Geophysical Log
Shale	1390'	1410'				Geophysical Log
Sand	1410'	1652'				Geophysical Log
Shale	1652'	1690'				Geophysical Log
Sand	1690'	1715'				Geophysical Log
Shale	1715'	1966'				Geophysical Log
Sand	1966'	1977'				Geophysical Log
Shale	1977'	2152'				Geophysical Log
Sand	2152'	2160'				Geophysical Log
Shale	2160'	2896'				Geophysical Log
Sand	2896'	2910'				Geophysical Log
Shale	2910'	6086'				Geophysical Log
Limestone	6086'	6136'				Geophysical Log
Shale	6136'	6300'				Geophysical Log
Horizontal						Geophysical Log
Limestone	6300'	6306'				Geophysical Log
Shale	6306'	6345'				Geophysical Log
Lime	6345'	6380'				Geophysical Log
Chert	6380'	6485'				Geophysical Log
Sand	6485'					Geophysical Log
Drillers Total Depth		8779'				

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JUN 26 2009

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MAY 06 2010

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Please delete empty rows if necessary to make all of page 2 fit on one page.

Well Operator's Signature:

Title: Sr. Completion Engineer Date: 6/25/09

DEP USE ONLY

Reviewed by:

Date:

5-4-10

Comments:

— VIOLATION OF LEASE —

**Cross Creek County Park Lease – March 10, 2003**

**Page 35 & 36**

**“All trash, rubbish, or waste materials from each drilling site shall be removed and disposed of in a properly licensed solid waste site. All pits shall be filled with earth and developed per County specifications at Lessee’s expense upon completion of each well.”**

OIL AND GAS LEASE

CROSS CREEK COUNTY PARK

SLUSH PIT

3.1 Each slush pit will consist of two compartments; one to contain fluids from the drilling operations and the second to contain surface runoff from the drilling site. Unless authorized by County, all slush pits will be located at approximately the same elevation as the drilling site. Depending on the topography and slope conditions, the slush pit to contain surface runoff may be located below the drilling site and a safe and reasonable distance from the stream in which the effluent will be discharged. The slush pit used to contain drilling fluids, mud, and water will be lined with plastic so that no escape of these fluids will occur. If said fluids contain oil or other chemical substances which are harmful to the forest environment, Lessee shall transport these fluids for disposal. All trash, rubbish, or waste materials from each drilling site shall be removed and disposed of in a properly licensed solid waste site. All pits shall be filled with earth and developed per County specifications at Lessee’s expense upon completion of each well.



## EXHIBIT "A"

### REQUIREMENTS FOR PROTECTION AND CONSERVATION OF COUNTY PARK LANDS

Lessee hereby agrees to the following stipulations:

#### ENVIRONMENTAL QUALITY CONTROL

1.1 Lessee shall take all necessary precautions and measures throughout the entire course of this Lease to insure strict compliance with all pertinent laws and rules and regulations promulgated thereunder, whenever enacted, including: the Air Pollution Control Act, as amended (Act of January 8, 1960, P.L. 2119m 35 P.S. 4001, et. seq.); the Clean Stream Law, as amended (Act of June 22, 1937, P.L. 1987, 35 P.S. 691.1 et seq.); the Solid Waste Management Act, as amended (Act 241, July 31, 1968); the Gas Operations Well Drilling Petroleum and Coal Mining Act, as amended (Act of November 30, 1955, P.L. 756, and known as the Act of the General Assembly No. 38); and the Game and Wildlife Code (34 PA. C.S. Section 101 et seq.) and the Federal Endangered Species Act of 1973.

1.2 Notwithstanding any provisions in this Lease, Lessee shall be held liable for the violation of any relevant laws, rules and regulations.

1.3 Lessee shall at all times perform its work in such a manner as to substantially minimize the possibility of polluting the air, land, or bodies of water with any materials harmful to the environment.

unable to produce and/or market any products from the leased premises by reason of any of the above recited causes, this Lease shall remain in full force and effect.

### **LIABILITY**

31.1 Lessee shall alone be liable and responsible for any pollution or other damage to any portion of the environment in or adjacent to the leased premises which occurs as a result or consequence of Lessee's occupation and use of the leased premises, irrespective of whether or not such pollution or damage be due to negligence or to the inherent nature of Lessee's operations, unless an independence intervening cause be found to be the sole proximate cause of the pollution or damage. In any action for civil damages brought under this section, there shall be a presumption that, but for Lessee's occupation and use of the leased premises, the pollution or other damage would not have occurred, it shall then be incumbent upon Lessee to come forward with evidence to rebut this presumption.

### **RIGHTS RESERVED BY COUNTY**

**32.1** County reserves the right to use the leased premises in any and all respects not specifically limited by the terms of this Lease.

**32.2** County reserves all minerals within the leased premises other than oil, gas and liquid hydrocarbons and shall have the right to lease those mineral rights to third parties insofar as County is otherwise legally entitled to lease the same, subject to rights granted to Lessee under this Lease.

**32.3** County reserves the right to approve in writing all plans for the construction upon the leased premises of structures, rigs, machinery, communication facilities, ways and roads, well locations, pipelines and equipment and for drilling wells. Detailed written plans for any

'EXHIBIT C'

**Radium Content of Oil- and Gas-Field Produced Waters  
in the Northern Appalachian Basin (USA):  
Summary and Discussion of Data**



PUBLISHED  
SEPT. 7, 2011

Scientific Investigations Report 2011-5135

U.S. Department of the Interior  
U.S. Geological Survey

LEVELS OF  
- RADIUM -

CROSS CREEK CONVOY TANK # GH

**Table 1.** Well locations and related information compiled for samples used in this study. The Well/Sample ID column assigns a unique number to each sample; digits to the right of the decimal (for example, "5.1," "5.2") indicate a time series or multiple samples taken from a well on different dates to characterize changes over time.

[Sh, shale; Ss, sandstone; Dolo, dolomite; Fm, formation; Gp, Group; L, lower; M., middle; U., upper; undiv, undivided]

Well / Sample ID	Sample collection date	State	County	Township	Longitude	Latitude	Description of sample site	Producing formation	Producing formation age	Well type
1	11/18/2009	PA	Clinton	Chapman	-77.56	41.37	Storage tank	Marcellus Sh.	Devonian, M.	Gas
2	11/20/2009	PA	Clinton	Beech Creek	-77.68	41.20	Storage tank	Marcellus Sh.	Devonian, M.	Gas
3	6/1/2009	PA	Bradford	Burlington	-76.60	41.74		Marcellus Sh.	Devonian, M.	Gas
4	8/24/2009	PA	Lycoming	Penn	-76.63	41.28		Marcellus Sh.	Devonian, M.	Gas
5.1	3/18/2009	PA	Lycoming	Penn	-76.66	41.27		Marcellus Sh.	Devonian, M.	Gas
5.2	3/30/2009	PA	Lycoming	Penn	-76.66	41.27		Marcellus Sh.	Devonian, M.	Gas
6	12/21/2009	PA	Tioga	Charleston	-77.21	41.79		Marcellus Sh.	Devonian, M.	Gas
7	12/21/2009	PA	Tioga	Richmond	-77.13	41.78		Marcellus Sh.	Devonian, M.	Gas
8	9/8/2009	PA	Centre	Burnside	-78.05	41.13	Impoundment	Marcellus Sh.	Devonian, M.	Gas
9	1/8/2010	PA	Forest	Jenks	-79.16	41.55	Tank or lined pit	Marcellus Sh.	Devonian, M.	Oil
10	12/30/2009	PA	Potter	East Fork	-77.88	41.61		Marcellus Sh.	Devonian, M.	Gas
11.1	4/9/2009	PA	Washington	Cross Creek	-80.39	40.26		Marcellus Sh.	Devonian, M.	Gas
11.2	6/29/2009	PA	Washington	Cross Creek	-80.39	40.26		Marcellus Sh.	Devonian, M.	Gas
12	12/30/2009	PA	Tioga	Gainesville	-77.56	41.69		Marcellus Sh.	Devonian, M.	Gas
13	12/30/2009	PA	Tioga	Gainesville	-77.58	41.68		Truscarora Fm.	Silurian, L.	Gas
14	1/7/2010	PA	Potter	West Branch	-77.62	41.67		Marcellus Sh.	Devonian, M.	Gas
15	12/16/2009	PA	Clearfield	Lawrence	-78.45	41.17		Marcellus Sh.	Devonian, M.	Gas
16	12/22/2009	PA	Westmoreland	Washington	-79.57	40.49		Marcellus Sh.	Devonian, M.	Gas
17	12/7/2009	PA	Westmoreland	Washington	-79.56	40.50		Marcellus Sh.	Devonian, M.	Gas
18	11/13/2009	PA	Westmoreland	Bell	-79.55	40.51		Marcellus Sh.	Devonian, M.	Gas
19	9/18/2009	PA	Westmoreland	Hempfield	-79.65	40.28		Marcellus Sh.	Devonian, M.	Gas
20	7/16/2009	PA	Westmoreland	Hempfield	-79.57	40.50		Marcellus Sh.	Devonian, M.	Gas
21	7/23/2009	PA	Indiana	Rayne	-79.04	40.75		Marcellus Sh.	Devonian, M.	Gas
22	7/31/2009	PA	Westmoreland	Washington	-79.58	40.50		Marcellus Sh.	Devonian, M.	Gas
23	8/13/2009	PA	Westmoreland	Bell	-79.54	40.50		Marcellus Sh.	Devonian, M.	Gas

Source: PA DEP (2009-2010)

Table 1



**Table 2.** Ra-226, Ra-228, gross alpha, and gross beta activities measured in samples of produced water for wells listed in table 1. Analytical uncertainties are included when known.

[TDS, total dissolved solids; mg/L, milligram per liter; pCi/L, picocurie per liter; ND, not detected]

Well / Sample ID	TDS (mg/L)	Gross alpha (pCi/L)	+/-	Gross beta (pCi/L)	+/-	Ra-226 (pCi/L)	+/-	Ra-228 (pCi/L)	+/-	Total radium (pCi/L)	Ra-228/Ra-226	Method, method codes
1	54,000					436	32.2	121	8.2	556	0.28	SM2540C; EPA904.0, 903.0
2	16,200	14	2	1,322	86	ND	1.8	ND	0.3			SM2540C; 7110C; EPA 900.0, 903.0, 904.0
3	333,000	19,220	2,843	7,944	1,320	50	1.3	37	3.3	87	0.73	SM2540C; EPA 900.0, 903.0, 904.0
4	61,800	6,159	743	1,325	190	430	11.0	51	8.9	482	0.12	SM2540C; EPA 900.0, 903.0, 904.0
5.1	38,200	454	126	149	78	66	4.0	2.2	0.9	68	0.03	SM2540C; EPA 900.0, 903.0, 904.0
5.2	82,600	1,644	371	745	242	239	9.7	38	6.3	277	0.16	SM2540C; EPA 900.0, 903.0, 904.0
6		40,880	7,512	750	732	16,920	3.283	1,125	227	18,045	0.07	EPA 903.1, 904.0
7		21,960	4,074	980	757	11,120	2.204	1,287	261	12,407	0.12	EPA 903.1, 904.0
8	124,000					1,525	110	657	76	2,182	0.43	SM18 2540C; EPA 901.1 Mod.
9	284,000	11,810	2,482	1,060	759	4,184	789	1,074	202	5,258	0.26	SM20 2540C; EPA 903.1, 904.0
10	157,000					7,330	460	1,180	180	8,510	0.16	SM18 2540C; EPA 901.1 Mod.
11.1	157,000					951	86	703	69	1,654	0.74	SM18 2540C; EPA 901.1 Mod.
11.2	200,000					1,280	130	1,110	120	2,390	0.87	SM18 2540C; EPA 901.1 Mod.
12	183,000	7,530	1,141	2,683	372	562	26	648	67	1,210	1.15	SM18 2540C; EPA 900.0, 903.0, 904.0
13	358,000	10,356	2,186	11,595	723	892	32	2,589	128	3,481	2.90	SM18 2540C; EPA 900.0, 903.0, 904.0
14	1,470	ND	3	78	4	ND	0.31	ND	0.39	1.00		SM2540C; EPA 900.0, 903.0, 904.0
15	288,900	19,240		7,049		1,268		106		1,374	0.08	SM2540C
16	24,700	318	453	340	590	103	24	168	32	271	1.63	SM2540C; EPA 900.0, 903.0, 904.0
17	88,500	3,640	1,004	ND	631	1,042	197	298	59	1,340	0.29	SM2540C; EPA 900.0, 903.0, 904.0
18	116,000	2,320	800	2,077	929	1,037	200	515	97	1,552	0.50	SM2540C; EPA 900.0, 903.0, 904.0
19	32,500	733	175	81	61	554	104	5.5	1.9	559	0.01	SM2540C; EPA 900.0, 903.0, 904.0
20	45,400	845	213	379	116	66	4.05	1.4	0.3	67	0.02	SM2540C; EPA 900.0, 903.0, 904.0
21	46,460	820	249	505	140	76	2.7	23	2.4	99	0.30	SM2540C; EPA 900.0, 903.0, 904.0
22	47,800	585	163	536	83	36	1.75	2.7	0.2	39	0.08	SM2540C; EPA 900.0, 903.0, 904.0
23	125,100	2,103	631	1,574	335	229	6.8	56	6.5	285	0.25	SM2540C; EPA 900.0, 903.0, 904.0



SEE PAGE 2

LEGAL RAMIFICATIONS

# DRILLING'S LEGACY: TOXIC TEABAGS IN CROSS CREEK COUNTY PARK

1) Current oil and gas regulations permit on-site disposal, in pits, of wastes generated by the drilling or production of an oil or gas well that is located on the site where the waste is disposed (25 PA. Code 78.62). In Pennsylvania this waste is designated as residual waste, which is a solid waste.

2) Residual waste is most commonly disposed of in permitted solid-waste landfills subject to operating and monitoring requirements consistent with those specified for Subtitle D facilities in regulations developed under the Resource Conservation and Recovery Act (RCRA); many/most States now have primacy over this portion of the RCRA regulations, and have developed their own solid waste regulations that meet RCRA requirements.

3) For the disposal of drilling wastes, the oil and gas companies are exempted from the RCRA regulations and, by that, also the State solid-waste regulations, and the current requirements applicable for the on-site disposal of drilling wastes would not meet the requirements specified under RCRA.

4) At well sites where residual wastes have been disposed in pits there is no current regulatory requirement that the location(s) of the buried wastes be permanently marked in the field. Consequently, after sites have been "restored" (graded, seeded, etc.), the locations of the buried waste pits become forgotten. In some cases land owners may not even be aware that wastes were buried on their property.

5) Requirements specified under Pa. Code 78.62(a)(16) state that "Puncturing or perforating of the liner [used to encapsulate the buried wastes] is prohibited". There is no timeframe attached to this regulatory provision, so it applies as long as the wastes remain buried at a site (in most cases, essentially forever).

6) Individuals intentionally, and possibly inadvertently, digging into the buried waste would be in violation of 78.62(a)(16) and potentially subject to enforcement actions by the PADEP. Also, if a property on which wastes were buried were to be sold, there potentially is a legal issue relating to disclosure of the presence of buried wastes, which could affect both the value of the property (e.g., possibility of soil/water contamination) and the ability/cost to subsequently develop the property (e.g., possible necessity to remove and properly dispose of wastes prior to development).

7) Considering that wastes may be buried as shallow as 18 inches below land surface (78.62(a)(17)), the potential to dig or plow into a liner is substantive, especially since the exact location(s) of the buried waste pits may be unknown, or because future owners may have no knowledge that wastes were buried on the property that was acquired. Once a buried liner is breached there arises the question of financial liability to repair same.

8) Owners of property on which drilling and waste disposal have occurred may not be aware that wastes were buried on site, as there is no requirement that the boundaries of buried waste pits be permanently marked, nor a specific requirement that property owners be informed of buried waste areas. However, in the event of future problems/issues, it is likely that the burden of proof and financial liability will go to the property owner, especially if considerable time has passed since the wastes were buried.

9) A way to protect both property owners and prospective buyers from liabilities associated with buried wastes is by recording of Deed Restrictions or Environmental Covenants that clearly designate areas where wastes were disposed, the type(s) of material that was buried, and specific prohibitions on disturbances of the buried wastes. There is a sound argument that such Deed Restrictions or Environmental Covenants should be retroactive, because wastes buried ten years ago have the same potential to cause problems as do wastes buried more recently.

→ Finally, the recording of Deed Restrictions or Environmental Covenants, noting the presence and locations of buried wastes, are about the only means to ensure enforcement the existing regulation prohibiting the puncturing or perforating of a buried liner (78.62(a)(16)), and the environmental protectiveness that this regulation is intended to provide, all be it minimal. Else, it is likely that, at a majority of the properties where wastes have been buried, owners will not be aware of areas where digging is prohibited. It also raises a question as to whether locations of buried wastes should be included in the inventories maintained in the Pa. One-Call system, through which buried utilities are identified prior to excavation.

**Summary: The drilling fields in the State of Pennsylvania substantial volumes of waste material, not well characterized as to chemical make-up, have been buried at the drilling sites, with no subsequent monitoring to identify environmental impacts, no permanent field markers to delineate where wastes were buried, and no requirement that land deeds include a notice that wastes were buried on the property. There is virtually no question that some number of these buried waste impoundments leak contaminants to the surrounding soil and groundwater. However, because there is no regulatory requirement to monitor same, the scope/magnitude of environmental impacts is largely unknown. If, in the future, environmental degradation is discovered, the burden of proof regarding cause and effect will very likely go to the property owner.**

'EXHIBIT E'



