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**west virginia** department of environmental protection

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Office of Oil and Gas  
601 57th Street SE  
Charleston, WV 25304  
(304) 926-0450  
(304) 926-0452 fax

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
www.dep.wv.gov

September 26, 2013

**WELL WORK PERMIT**

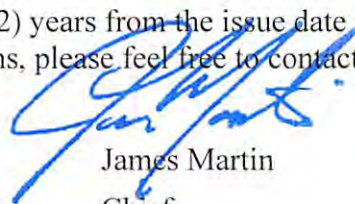
**Horizontal 6A Well**

This permit, API Well Number: 47-6900175, issued to CHESAPEAKE APPALACHIA, L.L.C., is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.



James Martin  
Chief

Operator's Well No: ROY FERRELL OHI 206H

Farm Name: FERRELL, ROY E.

**API Well Number: 47-6900175**

**Permit Type: Horizontal 6A Well**

Date Issued: 09/26/2013

**Promoting a healthy environment.**

**09/27/2013**

# PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

## CONDITIONS

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1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACOE). Through this permit, you are hereby being advised to consult with USACOE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the fill material shall be within plus or minus 2% of the optimum moisture content as determined by the standard proctor density test, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. Each lift must meet 95 % compaction of the optimum density based on results from the standard proctor density test of the actual soils used in specific engineered fill sites. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

09/27/2013

STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
WELL WORK PERMIT APPLICATION

1) Well Operator: Chesapeake Appalachia, LLC 49447757 69-Ohio 7-Triadelphia 648-Valley Grove  
Operator ID County District Quadrangle

2) Operator's Well Number: Roy Ferrell OHI 206H Well Pad Name: Roy Ferrell OHI Pad

3 Elevation, current ground: 1196' Elevation, proposed post-construction: 1196'

4) Well Type: (a) Gas  Oil  Underground Storage   
Other \_\_\_\_\_  
(b) If Gas: Shallow  Deep   
Horizontal

5) Existing Pad? Yes or No: Yes

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):  
Target formation- Marcellus, Target top TVD- 6616', Target base TVD- 6676', Anticipated thickness- 60', Associated Pressure -4432

7) Proposed Total Vertical Depth: 6,660'

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 16,700'

10) Approximate Fresh Water Strata Depths: 340'

11) Method to Determine Fresh Water Depth: From analysis of water wells in the area

12) Approximate Saltwater Depths: 797'

13) Approximate Coal Seam Depths: 691'

14) Approximate Depth to Possible Void (coal mine, karst, other): 691' void abandoned mine.

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine: No.

16) Describe proposed well work: Drill and stimulate any potential zones between and including the Benson to the Marcellus. \*\*If we should encounter a void, place basket above and below void area - balance cement to bottom of void and grout from basket to surface. Run casing not less than 20' below void nor more than 50' below void.  
(\*If freshwater is encountered deeper than anticipated it must be protected, set casing 50' below and cts)

17) Describe fracturing/stimulating methods in detail:  
Well will be perforated within the target formation and stimulated with a slurry of water, sand, and chemical additives at a high rate. This will be performed in stages with the plug and perf method along the wellbore until the entire lateral has been stimulated within the target formation. All stage plugs are then drilled out and the well is flowed back to surface.  
The well is produced through surface facilities consisting of high pressure production units, vertical separation units, water and oil storage tanks.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 11.0  
Office of Oil and Gas

19) Area to be disturbed for well pad only, less access road (acres): WV Dept. of Environmental Protection

**Received**

*WRH*  
*9-8-13*

20)

CASING AND TUBING PROGRAM

69 00175

<u>TYPE</u>	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft.</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill -up (Cu. Ft.)</u>
Conductor	20"	New	J-55	94#	100'	100'	CTS
Fresh Water	13 3/8"	New	J-55	54.5#	741'	741'	680 sx/CTS
Coal	9 5/8"	New	J-55	40#	2,210'	2,210'	820 sx/CTS
Intermediate	7"	New	P-110	20#	If Needed	If Needed	If needed/As Possible
Production	5 1/2"	New	P-110	20#	16,700'	16,700'	Lead 1,250 sx Tail 2,120sx/100' inside Intermediate
Tubing	2 3/8"	New	N-80	4.7#	Approx. 7,744'	Approx. 7,744'	
Liners							

*WRH*  
*9.9-13*

<u>TYPE</u>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield</u>
Conductor	20"	30"	0.25	2120	15.6 ppg	1.19/50% Excess
Fresh Water	13 3/8"	17.5"	0.380	2740	15.6 ppg	1.19/50% Excess
Coal	9 5/8"	12 1/4"	0.395	3950	15.6 ppg	1.19/50% Excess
Intermediate	7"	8 3/4"	.0317	4360	15.6 ppg	1.20/15% Excess
Production	5 1/2"	8 3/4"	0.361	12360	15.6 ppg	1.20/15% Excess
Tubing	2 3/8"	4.778"	0.190			
Liners						

PACKERS

Kind:	10K Arrowset AS1-X		
Sizes:	5 1/2"		
Depths Set:	Approx. 6,197'		

Received

Page 2 of 3

13

Office of Oil and Gas  
WV Dept. of Environmental Protection

09/27/2013

69 00175

21) Describe centralizer placement for each casing string.

All casing strings will be ran with a centralizer at a minimum of 1 per every 3 joints of casing.

22) Describe all cement additives associated with each cement type.

\*\*Please see attached sheets for Chemical Listing of Cement & Additives for Chesapeake Energy wells.

23) Proposed borehole conditioning procedures.

All boreholes will be conditioned with circulation and rotation for a minimum of one bottoms up and continuing until operator is satisfied with borehole conditions.

\*Note: Attach additional sheets as needed.

Received 09/27/2013

13



SLB Cement Additives

	Product Name	Product Use
Surface	D046	antifoam
	D130	polyester flake - lcm
	S001	calcium chloride
	SPACER	
	D020	bentonite extender
Intermediate	D046	antifoam
	D130	polyester flake - lcm
	D044	granulated salt
	D153	Anti-Settling Agent
	SPACER	
	D020	bentonite extender
Kick Off Plug	D080	cement liquid dispersant
	D801	mid-temp retarder
	D047	antifoam agent
	SPACER	
	B389	MUDPUSH* Express
	D206	Antifoaming Agent
	D031	barite
B220	surfactant	
Production - Lead	D167	UNIFLAC* S
	D154	low-temperature extender
	D400	EasyBLOK
	D046	antifoam
	D201	basic cements enabler
	D202	low-temperature solid dispersant
	D046	antifoam
	D167	UNIFLAC* S
	D065	TIC* Dispersant

69 00175

09/27/2013

Received

D201	basic cements enabler
D153	Anti-Settling Agent
<u>SPACER</u>	
B389	MUDPUSH* Express
D206	Antifoaming Agent
D031	barite
B220	surfactant

69 00175

Received 09/27/2013

Chemical Name	CAS Number	% Concentration Used
Fuller's earth (attapulgitite)	8031-18-3	0.2% BWOC
Polypropylene glycol	25322-69-4	
polyethylene terephthalate	25038-59-9	0.125 lb/sk
calcium chloride	10043-52-4	2% BWOC
polyethylene terephthalate	25038-59-9	1 lb/bbl
bentonite	1302-78-9	20 lb/bbl
Fuller's earth (attapulgitite)	8031-18-3	0.2% BWOC
Polypropylene glycol	25322-69-4	
polyethylene terephthalate	25038-59-9	0.125 lb/sk
sodium chloride	7647-14-5	10% BWOW
chrystalline silica	14808-60-7	0.15% BWOC
bentonite	1302-78-9	20 lb/bbl
polyethylene terephthalate	25038-59-9	1 lb/bbl
product classified as non-hazardous.		0.05 gal/sk
product classified as non-hazardous		0.01 gal/sk
polypropylene glycol	25322-69-4	0.02 gal/sk
Carbohydrate	proprietary	1 lb/bbl
Silica Organic Polymer	proprietary	0.1 gal/bbl
barium sulfate	7727-43-7	310 lb/bbl
fatty acid amine	proprietary	
ethoxylated alcohol	proprietary	
glycerol	56-81-5	
2.2'-lminodiethanol	111-42-2	1 gal/bbl
aliphatic amide polymer	proprietary	0.35% BWOC
non-crystalline silica	7631-86-9	6% BWOC
boric acid	10043-35-3	0.8% BWOC
Fuller's earth (attapulgitite)	8031-18-3	
Polypropylene glycol	25322-69-4	0.2% BWOC
chrystalline silica	14808-60-7	
metal oxide	proprietary	0.2% BWOC
sulphonated synthetic polymer	proprietary	
formaldehyde (impurity)	50-00-0	0.3% BWOC
Fuller's earth (attapulgitite)	8031-18-3	
Polypropylene glycol	25322-69-4	0.2% BWOC
aliphatic amide polymer	proprietary	0.35% BWOC
Sodium Polynaphthalene Sulfonate	9008-63-3	
Sodium Sulfate	7757-82-6	0.25% BWOC

69 00175

Received 09/27/2013




chrystalline silica	14808-60-7	
metal oxide	proprietary	0.2% BWOC
chrystalline silica	14808-60-7	0.2% BWOC
Carbohydrate	proprietary	proprietary
Silica Organic Polymer	proprietary	proprietary
barium sulfate	7727-43-7	7727-43-7
fatty acid amine	proprietary	proprietary
ethoxylated alcohol	proprietary	proprietary
glycerol	56-81-5	56-81-5
2.2'-Iminodiethanol	111-42-2	111-42-2

69 00175

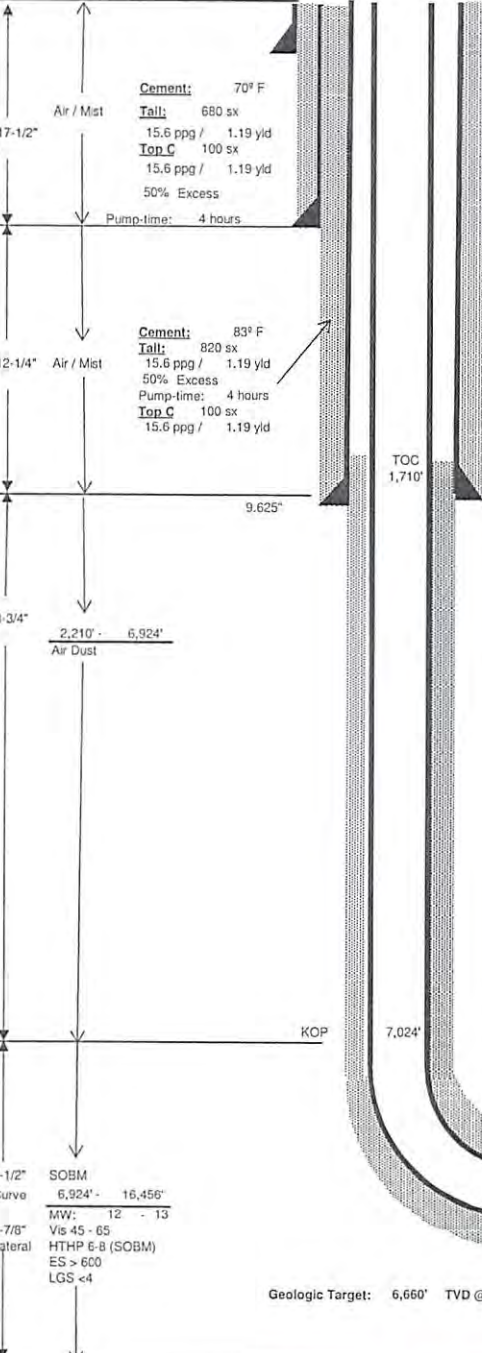
09/27/2013

Received

13

	Well Name: <b>Roy Ferrell OHI 206H</b>	Drilling Rig: <b>N/A</b> Directional Drilling: <b>N/A</b>
Drilling Engineer: <b>TBD</b> Superintendent: <b>N/A</b> Asset Manager: <b>N/A</b> Geologist: <b>N/A</b> Land: <b>N/A</b>	Formation: <b>Marcellus</b> County, State: <b>Ohio, WV</b> Surface Latitude: <b>40.043171</b> Surface Longitude: <b>-80.531214</b> BH Latitude: <b>40.017946</b> BH Longitude: <b>-80.526514</b> KB Elevation: <b>1230'</b> Ground Elevation: <b>1210'</b>	Drilling Mud: <b>N/A</b> Cement Surface: <b>N/A</b> Cement Longstrings: <b>N/A</b> Wellhead: <b>N/A</b> AFE #: <b>N/A</b>



**Cement:** 70° F  
Tall: 680 sx  
15.6 ppg / 1.19 yld  
Top C 100 sx  
15.6 ppg / 1.19 yld  
50% Excess  
Pump-time: 4 hours

**Cement:** 83° F  
Tall: 820 sx  
15.6 ppg / 1.19 yld  
50% Excess  
Pump-time: 4 hours  
Top C 100 sx  
15.6 ppg / 1.19 yld

**SOBM**  
Curve 6,924' - 16,456'  
MW: 12 - 13  
Vis 45 - 65  
HTHP 6.8 (SOBM)  
ES > 600  
LGS < 4

Wellhead Equipment						
Tree Description	Blanking Cap					
Tubing Head **	11" x 5M x 7-1/16" 10M					
'B' Section	9-5/8" SOW x 11" 5M					
'A' Section						

\*\* Space out such that Blanking Cap is no more than 30" above grade.

Casing Detail						
	Size	Wt	Grd	Conn.	From:	To:
Surface	13.375	54.5 #	J-55	STC	0'	741'
Interm	9.625	40 #	J-55	LTC	0'	2,210'
Prod	5.5	20 #	P-110	GBCD	0'	16,456'

Report any water or gas flows. Catch liquid sample if possible.

Casing Design						
	Size	ID	Coll	Burst	Tens	MU torq
Surface	13.375	12.615	1130	2740	514	5140
Interm	9.625	8.835	2570	3950	520	5200
Prod	5.5	4.778	12200	12360	641	8530

Surface Nudge for Anti-Collision purposes.

Directional Drilling Details								
Section	TMD	Inc.	Azimuth	TVD	BUR	DLS	+N/-S	+E/-W
Surface	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0
Hold	800	0.00	0.00	800	0.00	0.00	0.0	0.0
Hold	1,200	0.00	0.00	1,200	0.00	0.00	0.0	0.0
Hold	1,800	0.00	0.00	1,800	0.00	0.00	0.0	0.0
Hold	2,200	0.00	0.00	2,200	0.00	0.00	0.0	0.0
KOP1	2,310	0.00	0.00	2,310	0.00	0.00	0.0	0.0
Hold	4,188	37.56	240.67	4,056	2.00	2.00	-289.1	-518.7
KOP2	7,024	37.56	240.67	6,304	0.00	0.00	-1,130.6	-2,028.8
Landing Pt	7,744	90.00	156.74	6,660	7.28	12.00	-1,675.8	-2,090.5
TD	16,456	90.00	156.74	6,660	0.00	0.00	-9,680.0	1,350.0
VS Plane	156.74						VS Length 9,426.36'	
							Lateral Length ==>	8,712.30'

Plat Date 7/25/13

Logging Program		
Run	Log Type	Interval
1	TBD	TBD
2	TBD	TBD
Mudlogger operational at Surface		

**Formation Depths (TVD)**

BASE BIG INJUN	2,059'
GENESE0	6,454'
TULLY	6,484'
HAMILTON	6,512'
MARCELLUS	6,630'
ONONDAGA	6,690'

**Cement:** 122° F  
Lead: 1,260 sx  
15.6 ppg / 1.20 yld  
Tall: 2,120 sx  
15.6 ppg / 1.20 yld  
15% Excess  
Pump-time: 6 hours

**PBHL:** 5.5"  
TMD: 16,456'  
TVD: 6,660'  
Inclination: 90.00 deg

Geologic Target: 6,660' TVD @ 0° VS w/ 0.00 degrees/100 ft Up-dip

**Gyro the 1st well on the pad at KOP.**  
**Ensure all Surveys are referenced to Grid North!!**

Drawn by: **TBD**  
Date: **7/26/2013**

*WPA  
8-3-13*

09/27/2013

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STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
OFFICE OF OIL AND GAS

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Chesapeake Appalachia, LLC OP Code 49447757

Watershed (HUC 10) Wheeling Creek Quadrangle 648-Valley Grove

Elevation 1196' County 69-Ohio District 7-Triadelphia

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes x No       

Will a pit be used for drill cuttings? Yes        No x

If so, please describe anticipated pit waste: Closed loop system in place at this time- cuttings will be taken to a permitted landfill.

Will a synthetic liner be used in the pit? Yes x No x If so, what ml.?       

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection ( UIC Permit Number 2D0072539/ 2D0413175/ 2D0610306/ 2D0610317 )
- Reuse (at API Number at next anticipated well, API# will be included with the WR-34/DDMR &/or permit addendum. )
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain Flow back fluids will be put in steel tanks and reused or taken to a permitted disposal facility. )

Will closed loop system be used? Yes

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Air and salt saturate mud

-If oil based, what type? Synthetic, petroleum, etc. Synthetic Oil Base

Additives to be used in drilling medium? see attached sheets

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Landfill

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust)       

-Landfill or offsite name/permit number? Meadowfill SWF-1032, SS Grading SWF-4902, Northwestern SWF-1025, Short Creek 1034/WV0109517/CID28726, Carbon Limestone 28726/CID 28726

Arden Landfill 10072, American 02-12954, Country Wide 38390/CID 38390, Pine Grove 13688

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature 

Company Official (Typed Name) Danielle Southall

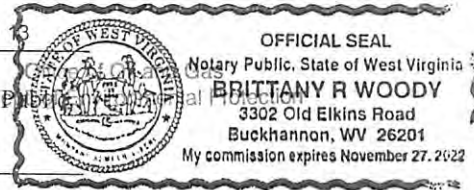
Company Official Title Regulatory Analyst

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Subscribed and sworn before me this 2nd day of August, 2013

  
My commission expires 11/27/2013

Notary Public



09/27/2013



Chesapeake Appalachia, LLC

Proposed Revegetation Treatment: Acres Disturbed 10+/- Prevegetation pH \_\_\_\_\_

Lime as determined by pH test min. 2 \_\_\_\_\_ Tons/acre or to correct to pH 6.5

Fertilizer (10-20-20 or equivalent) 500 lbs/acre (500 lbs minimum)

Mulch Hay/Straw 2.5 Tons/acre

Seed Mixtures

Area I		Area II	
Seed Type	lbs/acre	Seed Type	lbs/acre
White Clover	15	White Top	15
Red Top	15	Red Top	15
Orchard Grass	20	Orchard Grass	20

Attach:

Drawing(s) of road, location, pit and proposed area for land application.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: *Bill Handcock*

Comments: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Title: Oil and Gas Inspector Date: 8-3-17

Field Reviewed?  Yes  No

Received

09/27/2013

69 00175

Supplier Name	Product Name	Product Use	Chemical Name	CAS Number
BAKER HUGHES	ALPHA 1427	Biocide	Didecyl Dimethyl Ammonium Chloride	007173-51-1
			Ethanol	000064-17-5
			Glutaraldehyde (Pentanediol)	000111-30-8
			Quaternary Ammonium Compound	068424-85-1
			Water	007732-18-5
	BF-7L	Buffer	Potassium Carbonate	000584-08-7
	ClayCare	Clay Stabilizer	Choline Chloride	000067-48-1
			Water	007732-18-5
	Enzyme G-I	Breaker	No Hazardous Components	NONE
	ENZYME G-NE	Breaker	No Hazardous Components	NONE
	FRW-18	Friction Reducer	Petroleum Distillate Hydrotreated Light	064742-47-8
	GW-3LDF	Gel	Petroleum Distillate Blend	N/A-014
			Polysaccharide Blend	N/A-021
	SCALETROL 720	Scale Inhibitor	Diethylene Glycol	000111-46-6
			Ethylene Glycol	000107-21-1
XLW-32	Crosslinker	Boric Acid	010043-35-3	
		Methanol (Methyl Alcohol)	000067-56-1	
FRAC TECH SERVICES	APB01 (AMMONIUM PERSUFATE BREAKER)	Breaker	Ammonium Persulfate	007727-54-0
	B05 (LOW PH BUFFER)	Buffer	Acetic acid	000064-19-7
	BXL03 Borate XL Delayed High Temp	Crosslinker	No Hazardous Components	NONE
	FRW-200	Friction Reducer	No Hazardous Components	NONE
	HVG01 (TURQUOISE-1 BULK)	Gelling Agent	Petroleum Distillate Hydrotreated Light	064742-47-8
	KCLS-4	Clay Stabilizer	No Hazardous Components	NONE
	LTB-1	Breaker	Ammonium Persulfate	N/A

Received

13 09/27/2013



69 00175

Supplier Name	Product Name	Product Use	Chemical Name	CAS Number
NALCO ONESOURCE	EC6110A	Biocide	Ethanol	000064-17-5
			Glutaraldehyde (Pentanediol)	000111-30-8
			Quaternary Ammonium Compounds	N/A-063
	EC6629A	Biocide	No Hazardous Components	NONE
WEATHERFORD	WBK-133 OXIDIZER	Breaker	Ammonium Persulfate	007727-54-0
	WBK-134	Breaker	Ammonium Persulfate	007727-54-0
			Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7
	WCS-631LC	Clay Stabilizer	Proprietary Non Hazardous Salt	N/A-229
			Water	007732-18-5
	WFR-55LA	Friction Reducer	No Hazardous Components	NONE
	WGA-15L	Gel	Petroleum Distillate Hydrotreated Light	064742-47-8
	WPB-584-L	Buffer	Potassium Carbonate	000584-08-7
			Potassium Hydroxide	001310-58-3
	WXL-101LE	Corsslinker	No Hazardous Components	NONE
	WXL-101LM	Crosslinker	Petroleum Distillate Hydrotreated Light	064742-47-8
			Water	007732-18-5
			Ethylene Glycol	000107-21-1
Boric Acid			010043-35-3	
WXL-105L	Crosslinker	Ethanolamine	000141-43-5	
SCHLUMBERGER	B244 Green-Cide 25G	Biocide	Glutaraldehyde	111-30-8
	L071 Temporary Clay Stabilizer	Clay Stabilizer	Cholinium Chloride	67-48-1
	Breaker J218	Breaker	Diammonium Peroxidisulphate	7727-54-0
	EB-Clean* J475 Breaker		Diammonium Peroxidisulphate	7727-54-0
	Friction Reducer B315	Friction Reducer	Distillates (petroleum), Hydrotreated light Aliphatic Alcohol Glycol Ether	64742-47-8 Proprietary
			Ammonium Sulfate	7783-20-2

Received 09/27/2013

13 2013



Supplier Name	Product Name	Product Use	Chemical Name	CAS Number
SCHLUMBERGER	Water Gelling Agent J580	Gel	Carbohydrate Polymer	Proprietary
	Scale Inhibitor B317	Scale Inhibitor	Trisodium ortho phosphate Ethane-1, 2-diol	7601-54-9 107-21-1
	Borate Crosslinker J532	Crosslinker	Aliphatic polyol Sodium tetraborate decahydrate	Proprietary 1303- 96-4
	Crosslinker J610		Aliphatic polyol Potassium hydroxide	Proprietary 1310- 58-3

09/27/2013  
Received

13

8/13



## Water Management Plan: Primary Water Sources



WMP- 01398

API/ID Number: 047-069-00175

Operator:

Chesapeake Energy

Roy Ferrell OHI 206H

### Important:

For each proposed primary water source (including source intakes for purchased water sources) identified in your water management plan, and summarized herein, DEP has made an evaluation concerning water availability over the specified date range. DEP's assessment is based on the following considerations:

- Statistical analysis of historical USGS stream gauge data (transferred to un-gauged locations as necessary);
- Identification of sensitive aquatic life (endangered species, mussels, etc.);
- Quantification of known existing demands on the water supply (Large Quantity Users);
- Minimum flows required by the Army Corps of Engineers; and
- Designated stream uses.

Based on these factors, DEP has provided, for each intake location (and origination point for purchased water), a reference gauge location and discharge flow reading which must be surpassed prior to withdrawals. Additionally, DEP has established a minimum passby flow at the withdrawal location which must also be surpassed prior to withdrawals. These thresholds are considered terms of the permit and are enforceable as such.

**DEP is aware that some intake points will be used for mutiple wells and well sites. In these cases, the thresholds set by the Water Management Plan are to be interepreted as total withdrawal limits for each location over the specified date range regardless of how many wells are supported by that intake.**

For all purchased water intakes, determinations of water availability are made at the original source intake location. It is the responsibility of the Oil and Gas Operator, not the seller, to cease withdrawal of water from the seller when flows are less than the minimum gauge reading at the stream gauge referenced by the Water Management Plan in order to protect stream uses.

Note that the determinations made herein are based on the best available data, but it is impossible to predict water availability in the future. While the DEP has carefully established these minimum withdrawal thresholds, it remains the operator's responsibility to protect aquatic life at all times. Approval to withdrawal is contingent upon permission from the land owner. It is the responsibility of the operator to secure and maintain permission prior to any withdrawals.

The operator is reminded that 24-48 hours prior to withdrawing (or purchasing) water, DEP must be notified by email at [DEP.water.use@wv.gov](mailto:DEP.water.use@wv.gov).

APPROVED SEP 20 2013



## Source Summary

WMP-01398

API Number: 047-069-00175  
Roy Ferrell OHI 206H

Operator: Chesapeake Energy

### Stream/River

● Source **Ohio River WP 1 (Beech Bottom Staging Area)** Brooke Owner: **Brownlee Land Ventures**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000		40.226889	-80.658972

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): **6,000** Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: <http://www.erh.noaa.gov/ohrfc//flows.shtml>

● Source **Little Wheeling Creek WP 1 (Rt. 40 Staging Area)** Ohio Owner: **JDS Investments, LLC**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000		40.078324	-80.591145

Regulated Stream? Ref. Gauge ID: 3112000 WHEELING CREEK AT ELM GROVE, WV

Max. Pump rate (gpm): **2,000** Min. Gauge Reading (cfs): **64.80** Min. Passby (cfs) **2.83**

DEP Comments:

● Source **Middle Wheeling Creek @ Anderson Withdrawal Site** Brooke Owner: **Paul & Verna Anderson**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000		40.04409	-80.55348

Regulated Stream? Ref. Gauge ID: 3112000 WHEELING CREEK AT ELM GROVE, WV

Max. Pump rate (gpm): **2,500** Min. Gauge Reading (cfs): **62.57** Min. Passby (cfs) **4.17**

DEP Comments:

**09/27/2013**

### Source Summary

WMP- 01398

API Number:

047-069-00175

Operator:

Chesapeake Energy

Roy Ferrell OHI 206H

## Purchased Water

Source **Ohio River @ J&R Excavating** Marshall Owner: **J&R Excavating**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000	1,890,000	39.998509	-80.737336

Regulated Stream? **Ohio River Min. Flow** Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: <http://www.erh.noaa.gov/ohrfc//flows.shtml>

Source **The Village of Valley Grove** Ohio Owner: **The Village of Valley Grove**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000	720,000	-	-

Regulated Stream? **Ohio River Min. Flow** Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: <http://www.erh.noaa.gov/ohrfc//flows.shtml>

Source **Ohio County PSD** Ohio Owner: **Ohio county PSD**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	6,552,000	720,000	-	-

Regulated Stream? **Ohio River Min. Flow** Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: <http://www.erh.noaa.gov/ohrfc//flows.shtml>

09/27/2013

## Source Detail

WMP- 01398

API/ID Number: 047-069-00175

Operator:

Chesapeake Energy

Roy Ferrell OHI 206H

Source ID: 23103    Source Name: Ohio River @ J&R Excavating  
J&R Excavating

Source Latitude: 39.998509

Source Longitude: -80.737336

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000    County: Marshall

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

- Endangered Species?     Mussel Stream?
- Trout Stream?     Tier 3?
- Regulated Stream?    Ohio River Min. Flow
- Proximate PSD?
- Gauged Stream?

Total Volume from Source (gal): 6,552,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm)

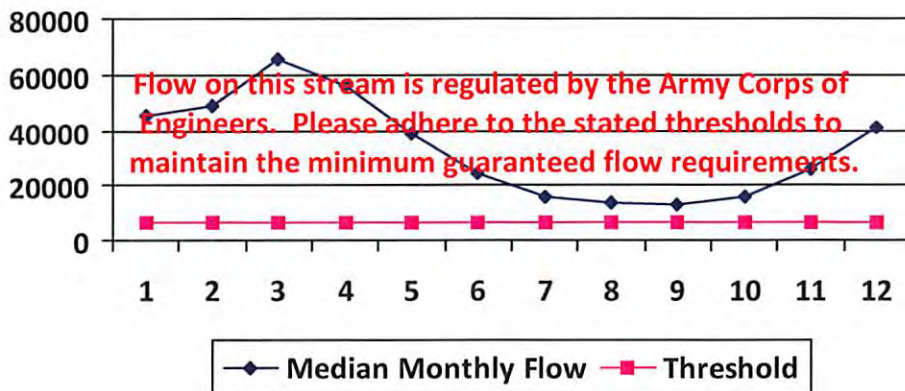
Reference Gaug 9999999    Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00

Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

09/27/2013



## Source Detail

WMP- 01398

API/ID Number: 047-069-00175

Operator: Chesapeake Energy

Roy Ferrell OHI 206H

Source ID: 23105    Source Name: The Village of Valley Grove  
The Village of Valley Grove

Source Latitude: -  
Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000    County: Ohio

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Endangered Species?     Mussel Stream?

Total Volume from Source (gal): 6,552,000

Trout Stream?     Tier 3?

Max. Pump rate (gpm):

Regulated Stream?    Ohio River Min. Flow

Max. Simultaneous Trucks:

Proximate PSD?    Wheeling Water Department

Max. Truck pump rate (gpm)

Gauged Stream?

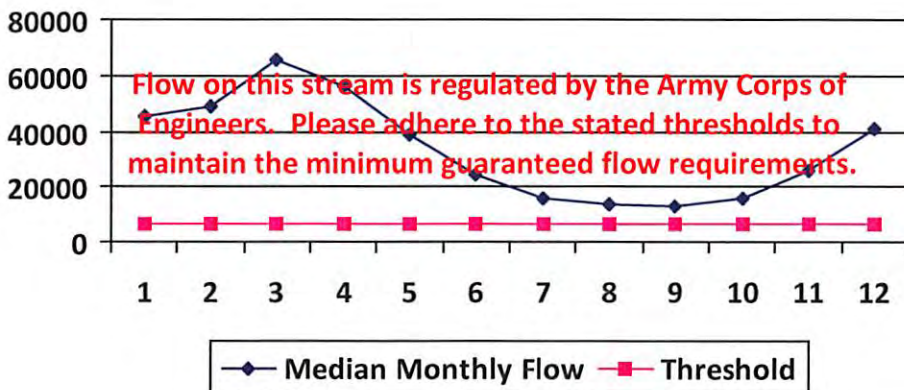
Reference Gaug: 9999999    Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.): 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs):

Downstream Demand (cfs):

Pump rate (cfs):

Headwater Safety (cfs): 0.00

Ungauged Stream Safety (cfs): 0.00

---

Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

09/27/2013



### Source Detail

WMP-01398

API/ID Number: 047-069-00175

Operator:

Chesapeake Energy

Roy Ferrell OHI 206H

Source ID: 23106    Source Name: Ohio County PSD  
Ohio county PSD

Source Latitude: -  
Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000    County: Ohio

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Endangered Species?     Mussel Stream?

Total Volume from Source (gal): 6,552,000

Trout Stream?     Tier 3?

Max. Pump rate (gpm):

Regulated Stream?    Ohio River Min. Flow

Max. Simultaneous Trucks:

Proximate PSD?    Wheeling Water Department

Max. Truck pump rate (gpm)

Gauged Stream?

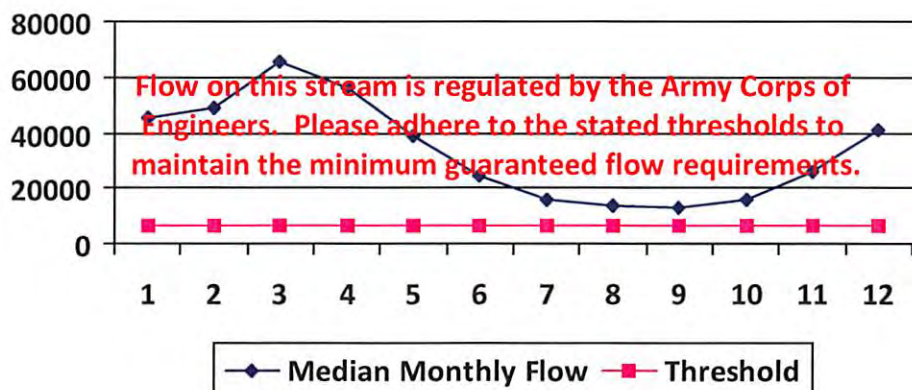
Reference Gaug: 9999999    Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.): 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

### Water Availability Profile



#### Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs): -

Downstream Demand (cfs): -

Pump rate (cfs): -

Headwater Safety (cfs): 0.00

Ungauged Stream Safety (cfs): 0.00

---

Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

09/27/2013

## Source Detail

WMP- 01398

API/ID Number: 047-069-00175

Operator: Chesapeake Energy

Roy Ferrell OHI 206H

Source ID: 23100 Source Name: Ohio River WP 1 (Beech Bottom Staging Area)  
Brownlee Land Ventures

Source Latitude: 40.226889  
Source Longitude: -80.658972

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 County: Brooke

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Endangered Species?  Mussel Stream?

Total Volume from Source (gal): 6,552,000

Trout Stream?  Tier 3?

Max. Pump rate (gpm): 6,000

Regulated Stream? Ohio River Min. Flow

Max. Simultaneous Trucks: 0

Proximate PSD? Beech Bottom Water Dept.

Max. Truck pump rate (gpm): 0

Gauged Stream?

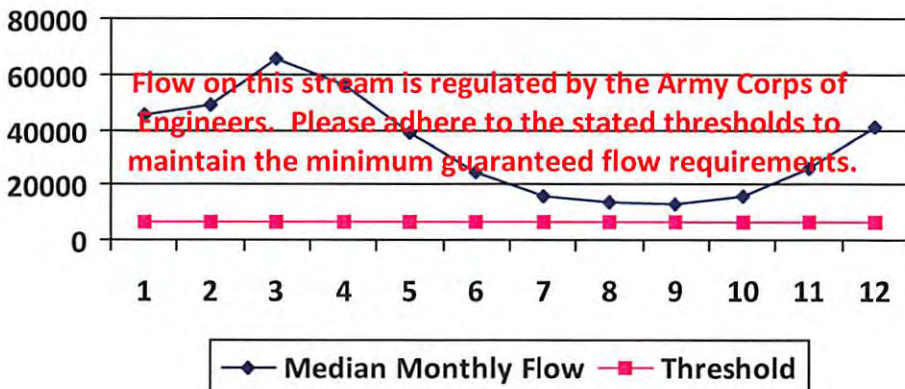
Reference Gaug: 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.): 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	-
Downstream Demand (cfs):	-
Pump rate (cfs):	13.37
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

09/27/2013





## Source Detail

WMP-01398

API/ID Number: 047-069-00175

Operator: Chesapeake Energy

Roy Ferrell OHI 206H

Source ID: 23102    Source Name: Middle Wheeling Creek @ Anderson Withdrawal Sit  
Paul & Verna Anderson

Source Latitude: 40.04409  
Source Longitude: -80.55348

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 20.54    County: Brooke

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Endangered Species?     Mussel Stream?

Total Volume from Source (gal): 6,552,000

Trout Stream?     Tier 3?

Max. Pump rate (gpm): 2,500

Regulated Stream?

Max. Simultaneous Trucks: 0

Proximate PSD?

Max. Truck pump rate (gpm): 0

Gauged Stream?

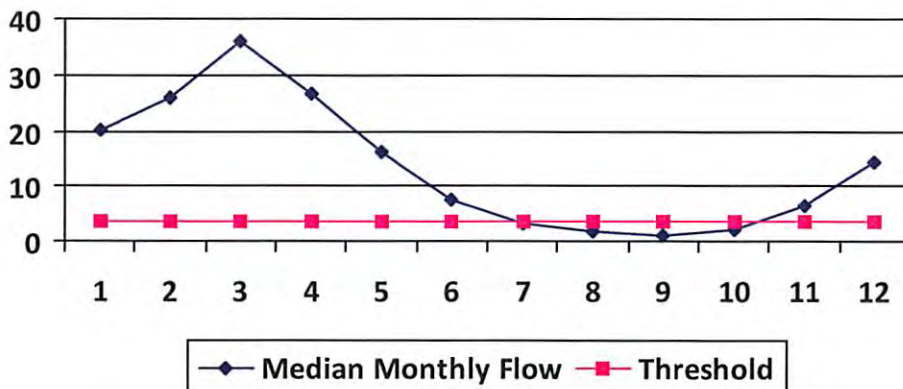
Reference Gaug: 3112000    WHEELING CREEK AT ELM GROVE, WV

Drainage Area (sq. mi.): 281.00

Gauge Threshold (cfs): 38

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	20.35	9.74	10.73
2	25.97	9.74	16.35
3	36.01	9.74	26.39
4	26.73	9.74	17.11
5	16.30	9.74	6.68
6	7.42	9.74	-2.20
7	3.28	9.74	-6.34
8	1.92	9.74	-7.70
9	1.22	9.74	-8.40
10	2.02	9.74	-7.60
11	6.35	9.74	-3.27
12	14.40	9.74	4.78

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs): 2.78

Upstream Demand (cfs): 0.00

Downstream Demand (cfs): 0.00

Pump rate (cfs): 5.57

Headwater Safety (cfs): 0.69

Ungauged Stream Safety (cfs): 0.69

Min. Gauge Reading (cfs): 62.57

Passby at Location (cfs): 4.17

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

09/27/2013





# Water Management Plan: Secondary Water Sources



WMP- 01398

API/ID Number 047-069-00175

Operator:

Chesapeake Energy

Roy Ferrell OHI 206H

### Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

## Purchased Water

Source ID: 23104	Source Name	Pennsylvania American Water Public Water Provider	Source start date:	9/1/2013
			Source end date:	9/1/2014
Source Lat:		Source Long:		County
Max. Daily Purchase (gal)	720,000	Total Volume from Source (gal):	6,552,000	
DEP Comments:	Please ensure that the sourcing of this water confirms to all rules and guidance provided by PA DEP.			

**Important:**

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

**Recycled Frac Water**

Source ID: 23107 Source Name Chad Glauser OHI 10H

Source start date: 9/1/2013

Source end date: 9/1/2014

Source Lat:

Source Long:

County

Max. Daily Purchase (gal)

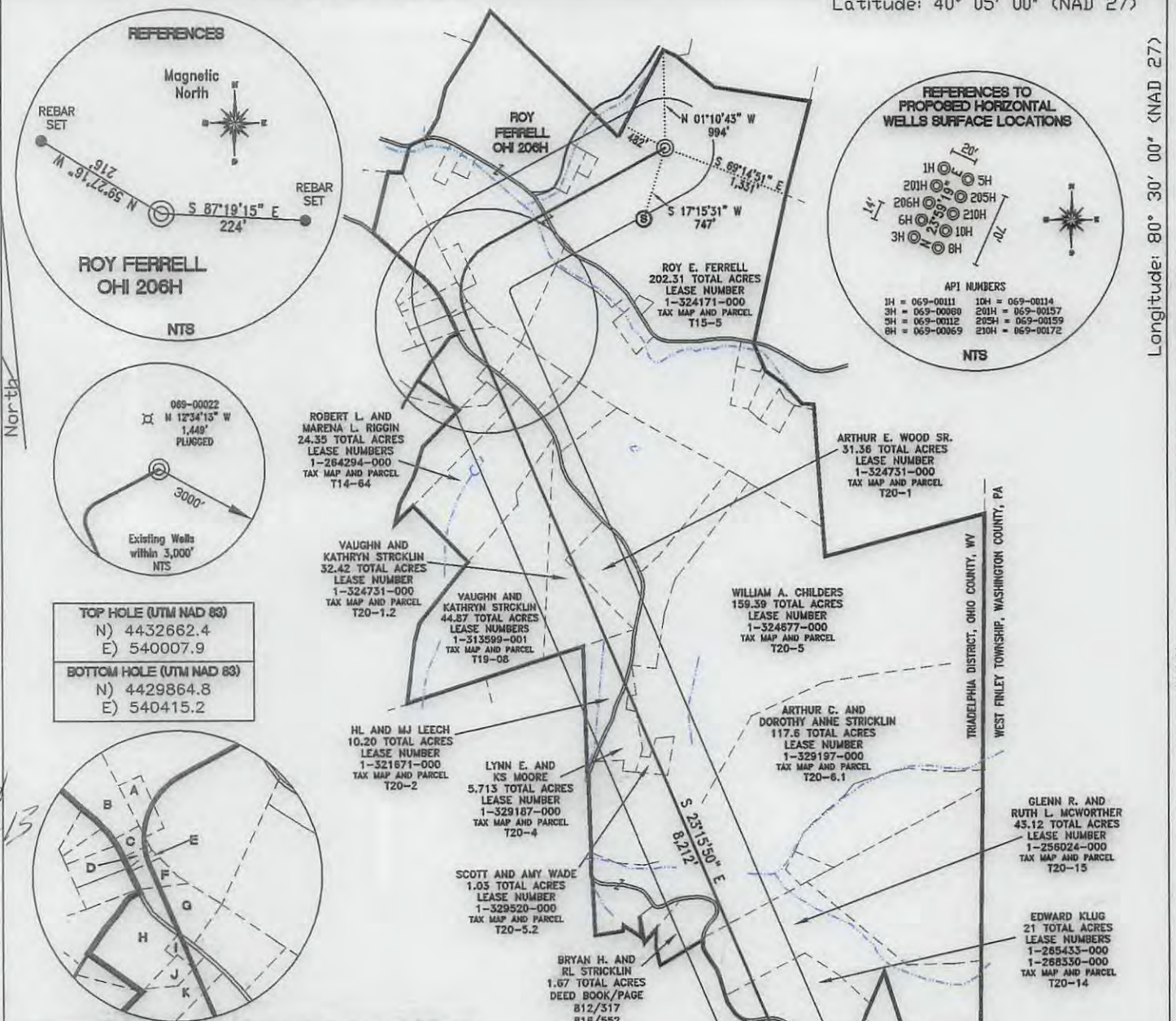
Total Volume from Source (gal): 1,638,000

DEP Comments:









**TOP HOLE (UTM NAD 83)**  
N) 4432662.4  
E) 540007.9

**BOTTOM HOLE (UTM NAD 83)**  
N) 4429864.8  
E) 540415.2

*WRB  
8-8-13*

PROPERTY OWNER	PARCEL ID	TOTAL ACRES	LEASE NUMBER
A MICHAEL AND THEODORA FERRELL	T14-63	2.02 ACRES	CHEVRON 815/403
B NANCY McCONN	T14-37	11.0 ACRES	CHEVRON 821/600
C LEMOYNE AND DELLA EARLWINE	T14-43	1.55 ACRES	CHEVRON 815-457
D GARY L. AND FAY EARLWINE	T14-43.1	0.27 ACRES	CHEVRON 815/455
E GARY L. AND FAY EARLWINE	T14-44.1	0.25 ACRES	CHEVRON 815/455
F GRANT AND LINDA FLETCHER	T14-44	1.31 ACRES	47-000824-000
G CLARENCE W. HALL	T14-45	4.73 ACRES	1-327104-000
H DOUGLAS AND LINDA MOORE	T14-47	6.58 ACRES	CHEVRON 802/596
I RALPH AND ROSELLA RICHEY	T14-56	0.81 ACRES	CHEVRON 802/174
J RALPH AND ROSELLA RICHEY	T14-59	1.12 ACRES	CHEVRON 802/174
K RALPH AND ROSELLA RICHEY	T14-62	10.66 ACRES	CHEVRON 802/174

**REFERENCE NOTES**  
Boundaries as shown taken from deeds, tax maps and field locations. A full boundary survey is not expressed nor implied. All bearings are based on true north. Ownership taken from public records Ohio County, West Virginia FEBRUARY 2011  
State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS  
Drafted by: E.A.M.

FILE #: CHE 034  
DRAWING #: 1974  
SCALE: PLAT: 1"=1600'  
TICK: 1"=2000'  
MINIMUM DEGREE OF ACCURACY: 1/200  
PROVEN SOURCE SUBMETER MAPPING OF ELEVATION: GRADE GPS

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: *[Signature]*  
L.L.S. #2124 : Ernest J. Benchek III.



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS  
WVDEP  
OFFICE OF OIL & GAS  
601 5TH STREET  
CHARLESTON, WV 25304

Well Type:  Oil  Waste Diposal  Production  Deep  
 Gas  Liquid Injection  Storage  Shallow

WATERSHED: WHEELING CREEK ELEVATION: 1,196'  
COUNTY/DISTRICT: OHIO/TRIADELPHIA QUADRANGLE: VALLEY GROVE WV.  
SURFACE OWNER: ROY E. FERRELL ACREAGE: 202.31 +/-  
OIL & GAS ROYALTY OWNER: ROY E. FERRELL ACREAGE: 724.313 +/-

LEASE NUMBERS: \_\_\_\_\_

DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE   
PLUG OFF FORMATION  PERFORATE NEW FORMATION  PLUG & ABANDON   
CLEAN OUT & REPLUG  OTHER CHANGE  (SPECIFY): \_\_\_\_\_

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,660' TMD: 15,956'  
WELL OPERATOR: CHESAPEAKE APPALACHIA, LLC. DESIGNATED AGENT: ERIC B. GILLESPIE  
ADDRESS: PO BOX 18496 ADDRESS: PO BOX 6070  
CITY: OKLAHOMA CITY STATE: OK ZIP CODE: 73154-0496 CITY: CHARLESTON STATE: WV ZIP CODE: 25301

DATE: JULY 26, 2013  
OPERATOR'S WELL #: ROY FERRELL DHI 206H  
API WELL #: 47 69 00175  
STATE COUNTY PERMIT  
09/27/2013