west virginia department of environmental protection

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

March 20, 2014

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-5101719, issued to CHEVRON APPALACHIA, LLC, 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: FRANCIS 12H
Farm Name: WILLIAMS OHIO VALLEY MIDST
API Well Number: 47-5101719
Permit Type: Horizontal 6A Well
Date Issued: 03/20/2014

API Number: 51-01719

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

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 moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. 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.

51-01719

WW - 6B
(3/13)

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

1) Well Operator:	Chevron Appalachia, LLC	49449935	51	Clay	Powhatan, OH-WV 7.5'
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: 12H Well Pad Name: Francis

3 Elevation, current ground: 1283' Elevation, proposed post-construction: 1260'

4) Well Type: (a) Gas ■ Oil _____ Underground Storage _____

Other _____

(b) If Gas: Shallow ■ Deep _____

Horizontal ■

5) Existing Pad? Yes or No: YES

JM 1/28/14
BBK 1/28/14

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):

Marcellus 4323 psi, Upper Devonian 4134 psi, 6488'-6538', 50' anticipated thickness, overpressured

7) Proposed Total Vertical Depth: 6512'

8) Formation at Total Vertical Depth: MARCELLUS

9) Proposed Total Measured Depth: 12,560'

10) Approximate Fresh Water Strata Depths: 110-400'

11) Method to Determine Fresh Water Depth: Local stream base, offset well data, Francis 1 completion report

12) Approximate Saltwater Depths: 1242', 1300', 1910'-2400'

13) Approximate Coal Seam Depths: 800', 1100'

14) Approximate Depth to Possible Void (coal mine, karst, other): None Anticipated

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine: Outside of and approx 230' adjacent to Ireland Mine

16) Describe proposed well work: Drill 17-1/2" hole to 500' then run and cement 13-3/8" casing to surface covering the fresh water.

Drill 12.25" hole to 2,580' then run and cement to surface 9 5/8" casing, covering the Berea. Drill 8 1/2" hole to KOP at 5,764'. Drill 8 1/2" curve and lateral to

12,560' MD and 6,512 TVD. Run 5 1/2" production casing and cement back to surface. If a void is encountered: (see attachment)

17) Describe fracturing/stimulating methods in detail:

Complete, the 10 Marcellus wells utilizing 300,000#s of 40/70 each and frac'd at 100 bpm.

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18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 7.0 acres approximate

19) Area to be disturbed for well pad only, less access road (acres): 2.0 acres

S1-01719

WW-6B Attachment Francis Unit 2H, 3H, 4H, 6H, 7H, 8H, 9H, 10H, 11H, 12H, 13H

- If a void is encountered the contingency will be the following:
  - Once unexpected void is encountered drill 12-1/4" hole to 100' below bottom of mine void.
  - Run 9-5/8", 36 lb/ft, J-55 casing with cement basket 20' above mine void.
  - Cement casing using displacement method to bottom of mine void using 100 percent excess.
  - Grout from surface to cement basket using whatever volume of cement is necessary to get cement to surface.
  - Drill 8-3/4" hole to 2580'.
  - Run 7", 23 lb/ft, N-80 casing.
  - Cement casing to surface using the displacement method with 30% excess.
  - Drill 6-1/4" hole to TD.
  - Run 4-1/2" 13.5 lb/ft, P-110 casing to TD.
  - Cement to surface using displacement method with 10% excess

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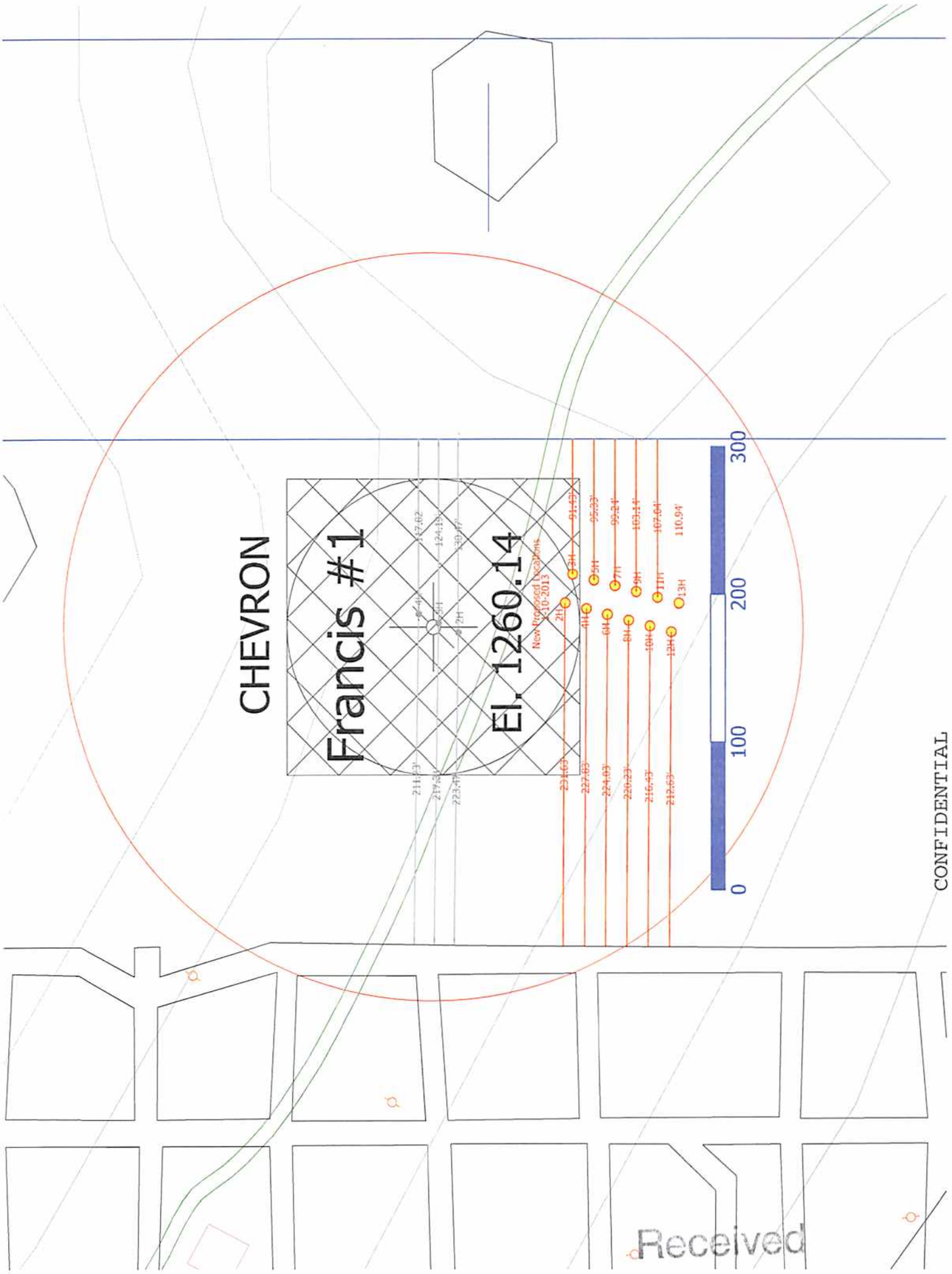
51-01719



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WW - 6B
(3/13)

20) **CASING AND TUBING PROGRAM**

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill -up (Cu. Ft.)
Conductor	20"	New			40'	40'	CTS
Fresh Water	13-3/8"	New	J-55	54.5#	500'	500'	CTS
Coal							
Intermediate	9-5/8"	New	N-80	40#	2,580'	2,580'	CTS
Production	5-1/2"	New	P-110	20#	12,560'	12,560'	CTS
Tubing							
Liners							

SW 1/28/14
KDK 1/29/14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	26"				
Fresh Water	13-3/8"	17-1/2"	0.380"	2,730 psi	Class A	1.18
Coal						
Intermediate	9-5/8"	12-1/4"	0.395"	5,750 psi	Class A	1.29
Production	5-1/2"	8-1/2"	0.361"	12,640 psi	Class A	2.2
Tubing						
Liners						

PACKERS

Kind:	None			
Sizes:				
Depths Set:				

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51-01719

WW - 6B
(3/13)

21) Describe centralizer placement for each casing string.

There will be a bow spring centralizer every two jts on the Water string and intermediate.

The production string will have two centralizer every jt in the lateral and curve, then one every two jts from KOP to surface.

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

For the Water String the blend will contain class A cement, 3% CaCl2, and flake.

The intermediate will contain class A cement, 10% CaCl2, Salt, and flake

The Production cement will have a lead, middle, and tail cement.

The lead will contain class A cement, KCl, dispersant, suspension agent, and retarder.

The middle will contain class A cement, KCl, dispersant,Aluminum Silicate, suspension agent, and retarder.

The tail will contain class A cement, Calcium Carbonate, KCl, dispersant, de-foamer,suspension agent, and friction reducer

23) Proposed borehole conditioning procedures. Well will be circulated a minimum of 3 bottoms up once casing point has been reached on all hole sections and until uniform mud properties are achieved.

*Note: Attach additional sheets as needed.

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SI-01719

Cement Additives for Francis Unit 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

For the Water String the blend will contain class A cement, 3% CaCl2, and flake.
The intermediate will contain class A cement, 10% CaCl2, salt, and flake.
The Production cement will have a lead, middle, and tail cement.
The lead will contain class A cement, KCl, dispersant, suspension agent, and retarder.
The middle will contain class A cement, KCl, dispersant, Aluminum Silicate, suspension agent, and retarder.
The tail will contain class A cement, Calcium Carbonate, KCl, dispersant, de-foamer, suspension agent, and friction reducer.

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51-01719

Francis 12H

Marshall Co WV
10 sept, 2013

Casing & Cementing Details

Ground Level Elevation: 1,283' ft above SL
Depth meas. from KB: 0' ft above GL

	Casing Formation	DEPTH MD	DEPTH TVD	Inclination	HOLE SIZE	CASING SPECS	CEMENT INFO	GENERAL INFO
						Conductor		
	20" Conductor	40'				Minimum 40 ft from GL or at least 10 ft into bedrock		
Bow Spring: 1-shoe jt, 1-every 2nd jt 1 on ea 2-3 jts across previous shoe. Rigid: 2-within 100 ft of surface	Deepest Aquifer	400'				**Surface String** 13-3/8" 54.5# J-55 BTC 0.38" wall Capacity = .1545bbl/ft Annulus = .1237 bbl/ft (+ 6 bbl for shoe track) Burst = 2730 psi	Cement to Surface	
	13 3/8" Casing	500'			17-1/2"	Minimum 35 ft - Optimum 50 ft past deepest coal		
Bow Spring: 1-shoe jt, 1-every 2nd jt 1 on ea 2-3 jts across previous shoe. Double-Bow: 2-within 100 ft of surface	Basket Top Coal Deepest Coal Red Beds Berea	780' 800' 810' 1000' 2,480'				**Intermediate Casing** 9-5/8" 40# N-80 BTC 8.835" ID - 8.679" DD Capacity = .0758 bbl/ft Annulus = .0557 bbl/ft (+ 3.1 bbl for shoe track) Burst = 5750 psi Collapse = 3090 psi	Cement to Surface	
	9-5/8" Casing	2,580'			12-1/4"	Set below the Berea		
	KOP Burkett Sh. Tully Lm. Hamilton Sh. U. Marcellus Cherry Valley L. Marcellus Landing Point Basal Marcellus Onondaga	5,000' 7,799'	6,354' 6,488' 6,505' 6,509' 6,512' 6,533' 6,538'	0° 30° 45° 60° 80° 90°		**Prod. Casing** 5-1/2", 20# P-110, VAM Top Capacity = .0221 bbl/ft (+1 bbl for shoe track) Burst = 12,640 psi Collapse = 11,080 psi ID = 4.778" Drift = 4.653" **Centralization** See Drilling Program • 1 Turbolator per joint for 3 joints above and 3 joints below 9-5/8" shoe • 2 double Bow Spring per 1 joint from top Marcellus to KOP • 2 SpiraGlider per joint from shoe to top of Marcellus	Cement to Surface	
	5-1/2" Casing	12,560'	6,347'	90°	4,761' ↓ 8-1/2"	45 ft Shoe Track		

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WW-9
(9/13)

API Number 47 - 51 - 01719
Operator's Well No. Francis 12H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Chevron Appalachia, LLC OP Code 4944935

Watershed (HUC 10) Middle Grave Creek Quadrangle Glen Easton, WV 7.5'

Elevation 1260.12' County Marshall District Clay

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

Will a pit be used? Yes ☐ No ☑

If so, please describe anticipated pit waste: n/a

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

Proposed Disposal Method For Treated Pit Wastes:

_____ Land Application
_____ Underground Injection (UIC Permit Number _____)
_____ Reuse (at API Number _____)
■ Off Site Disposal (Supply form WW-9 for disposal location)
_____ Other (Explain _____

Will closed loop system be used? If so, describe: N/A

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. A combination of air, freshwater, KCl brine base foam, and highly refined mineral oil base mud

-If oil based, what type? Synthetic, petroleum, etc. Highly refined mineral oil base mud

Additives to be used in drilling medium? emulsifiers, wetting agents, organophillic clays; barite, calcium chloride (for internal phase of invert) gilsonite

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

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

-Landfill or offsite name/permit number? Arden Landfill- Permit # PA DEP 100172

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.

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WV Dept. of Environmental Protection

Company Official Signature Jeremy Hartz

Company Official (Typed Name) Jeremy Hirtz

Company Official Title Permitting Team Lead

Subscribed and sworn before me this 27th day of September, 20 13

Rodney Lee Frazee Notary Public

My commission expires January 12, 2016

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Rodney Lee Frazee, Notary Public
Henry Clay Twp., Fayette County
My Commission Expires Jan. 12, 2016
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

SI-01719

Form WW-9

Operator's Well No. Francis 12H

Chevron Appalachia, LLC

Proposed Revegetation Treatment: Acres Disturbed 190 Prevegetation pH 7

Lime 2 Tons/acre or to correct to pH 6.5-7

Fertilizer type 10-20-10

Fertilizer amount 1000 lbs/acre

Mulch 2 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Annual Ryegrass	40lbs/acre	Perennial Ryegrass 12%	60lbs/acres
		Creeping Red Fescue 27%, Ladino Clover 10%	
		Tall Fescue 42%, Red Top 4%, Birdsfoot Trefoil 10%	

Attach:
Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [signature]

Comments:

Received

Title: Oil + Gas Inspctr Date: 10/2/2013

FEB 11 2014

Field Reviewed? (X) Yes ( ) No

Office of Oil and Gas
WV Dept. of Environmental Protection

51-01719

CHEVRON
APPALACHIA, LLC

DJK
10/2/2013
10/2/13

West Virginia Well Site Safety Plan

Francis Site
Well 12H
Marshall County, West Virginia

Prepared in Conformance with:

West Virginia's Code §22-6A and Legislative Rule §35-8-5.7
and
West Virginia Department of Environmental Protection's, Office of Oil and Gas documents: "Well Site Safety Plan Standards" (issued August 25, 2011), and "Deep Well Drilling Procedures and Site Safety Plan Requirements" (issued October 22, 2012)

Revision 1

Original: September 2012

Revised: June 2013

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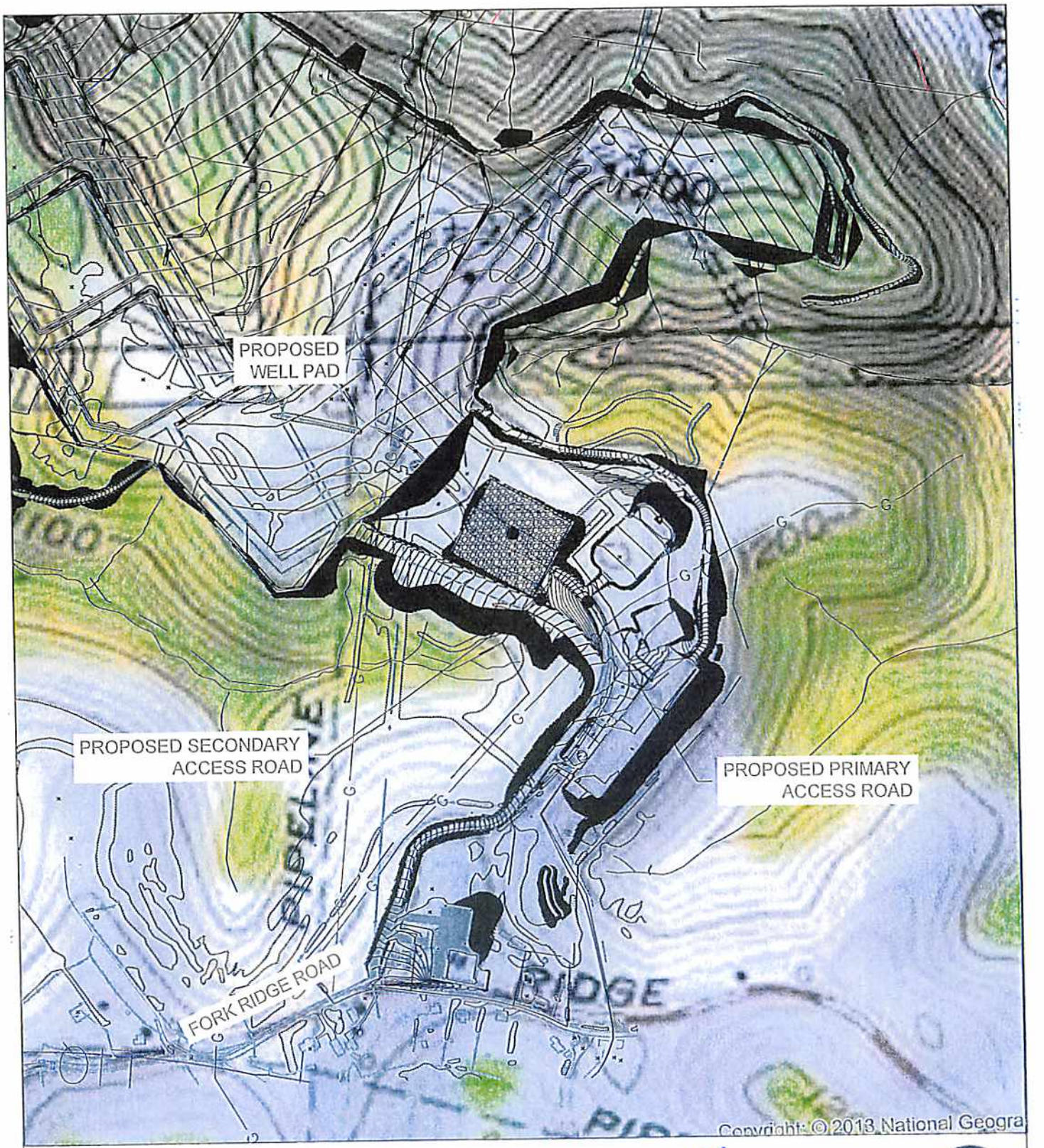

SITE USGS LOCATION MAP

SCALE: 1" = 500'

NORTH

MgK 10/2/2013

10/2/13

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USGS SITE LOCATION MAP

EX-1

FRANCIS WELL SITE
FORK RIDGE ROAD, MARSHALL COUNTY
MOUNDSVILLE, WEST VIRGINIA

PREPARED FOR:
CHEVRON APPALACHIA, LLC
800 MOUNTAIN VIEW DRIVE
SMITHFIELD, PA 15478

Date	No.	REVISION RECORD
-	01	-
-	02	-
-	03	-
-	04	-
-	05	-
-	06	-
-	07	-
-	08	-

GATEWAY

Consulting Engineers & Surveyors
400 Holiday Drive, Suite 300 Pittsburgh, PA 15220
Phone (412) 921-4030 - Fax (412) 921-9960

Department of Environmental Protection

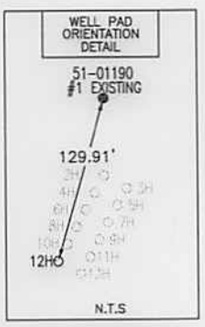
Well is located on topo map 727' feet south of Latitude: 39° 52' 30"

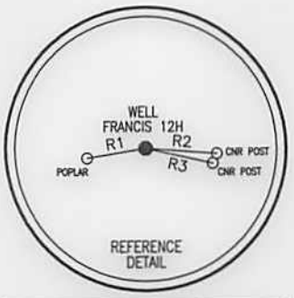
Well is located on topo map 7,219' feet west of Longitude: 80° 40' 00"

SURFACE HOLE LOCATION (SHL)	APPROX. LANDING POINT	BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83 N:4413709.92 E:526306.08	UTM 17-NAD83 N:4413526.62 E:525748.75	UTM 17-NAD83 N:4414658.31 E:524841.02
NAD83, WV NORTH N:502322.38 E:1633844.91	NAD83, WV NORTH N:501751.46 E:1632006.08	NAD83, WV NORTH N:505514.88 E:1629089.47

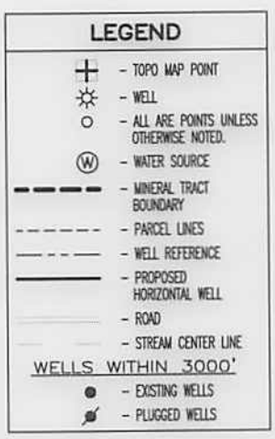
NOTES:

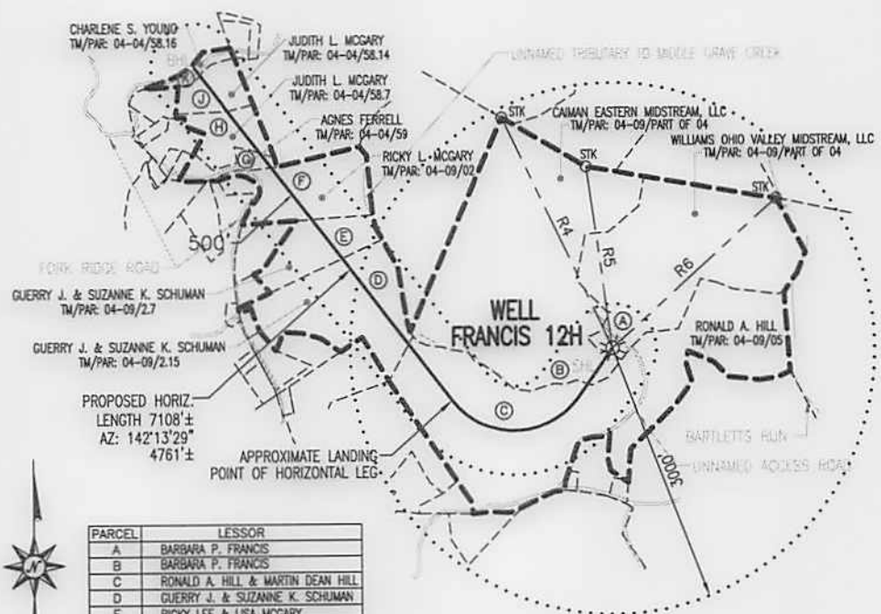
1. There are no water wells or developed springs within 250' of proposed well.
2. There are no existing buildings within 625' of proposed well.
3. Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
4. There are no native trout streams within 300' of proposed well.
5. Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
6. It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted hereon. The location of the boundary lines, as shown, are based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.





LINE	BEARING	DISTANCE
R1	S 80°42'14" W	136.11'
R2	S 85°56'42" E	163.66'
R3	S 77°42'32" E	157.49'
R4	N 25°29'15" W	2895.14'
R5	N 07°57'56" W	2072.45'
R6	N 48°14'25" E	2529.81'





PARCEL	LESSOR
A	BARBARA P. FRANCIS
B	BARBARA P. FRANCIS
C	RONALD A. HILL & MARTIN DEAN HILL
D	GUERRY J. & SUZANNE K. SCHUMAN
E	RICKY LEE & LISA MCGARY
F	RICKY LEE & LISA MCGARY
G	ROBERT V. & AGNES FERRELL
H	ROGER L. & JUDITH L. MCGRAY
J	ROGER L. & JUDITH L. MCGRAY
K	CHARLES V. WHITELATCH

Blue Mountain Inc.
11023 MASON DIXON HIGHWAY
BURTON, WV 26562
PHONE: (304) 662-6486

FILE #: FRANCIS 12H

DRAWING #: FRANCIS 12H

SCALE: 1" = 2000'

MINIMUM DEGREE OF ACCURACY: 1/2500

PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

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: _____

R.P.E.: _____ L.L.S.: P.S. No. 2000

GEORGE D. SIX LICENSED No. 2000 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

PLACE SEAL HERE

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS
WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: FEBRUARY 3, 2014

OPERATOR'S WELL #: FRANCIS 12H

API WELL #: 47 (STATE) 51 (COUNTY) 01719 (PERMIT) H6A

Well Type: ☐ Oil ☐ Waste Disposal ☒ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: MIDDLE GRAVE CREEK ELEVATION: 1260.12'

COUNTY/DISTRICT: MARSHALL / CLAY QUADRANGLE: GLEN EASTON, WV 7.5'

SURFACE OWNER: WILLIAMS OHIO VALLEY MIDSTREAM, LLC ACREAGE: 70.41±

OIL & GAS ROYALTY OWNER: BARBARA P. FRANCIS ACREAGE: 387.019±

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☐

PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐

CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY): _____

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,512'± TMD: 12,560'±

WELL OPERATOR CHEVRON APPALACHIA, LLC DESIGNATED AGENT KENNETH E. TAWNEY

Address 800 MOUNTAIN VIEW DRIVE Address 500 LEE STREET, EAST SUITE 1600

City SMITHFIELD State PA Zip Code 15478 City CHARLESTON State WV Zip Code 25301-3202