

State of West Virginia
Department of Environmental Protection - Office of Oil and Gas
Well Operator's Report of Well Work

API 47-091-01279 County Taylor District Flemington
Quad Rosenorth 7.5 Pad Name Armstrong Reynolds Field/Pool Name Unknown
Farm name Ridenour, Pauline W. Well Number 3HM
Operator (as registered with the OOG) PDC Mountaineer, LLC
Address 120 Genesis Blvd. City Bridgeport State WV Zip 26330

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4350788.850491 Easting 574972.732102
Landing Point of Curve Northing 4350579.383968 Easting 575233.450309
Bottom Hole Northing 4351976.592149 Easting 574762.166420

Elevation (ft) 1410' GL Type of Well New Existing Type of Report Interim Final
Permit Type Deviated Horizontal Horizontal 6A Vertical Depth Type Deep Shallow
Type of Operation Convert Deepen Drill Plug Back Redrilling Rework Stimulate
Well Type Brine Disposal CBM Gas Oil Secondary Recovery Solution Mining Storage Other _____
Type of Completion Single Multiple Fluids Produced Brine Gas NGL Oil Other Frac fluid
Drilled with Cable Rotary

Drilling Media Surface hole Air Mud Fresh Water Intermediate hole Air Mud Fresh Water Brine
Production hole Air Mud Fresh Water Brine

Mud Type(s) and Additive(s)

Surface: Air with soap & treated water as needed.

Bottom Hole: Synthetic based mud averaging 12+ ppg & 47 Vis.

Date permit issued 04/30/2013 Date drilling commenced 10/18/2013 Date drilling ceased 11/27/2013
Date completion activities began 01/06/2014 Date completion activities ceased 02/20/2014
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

Freshwater depth(s) ft Est: 130' Open mine(s) (Y/N) depths N
Salt water depth(s) ft Est: 1011' Void(s) encountered (Y/N) depths N
Coal depth(s) ft Est: 48', 82', 151', & 516' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

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Reviewed by: [Signature]

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WS 02/12/2016
AX 02/10/16

API 47-091 - 01279 Farm name Ridenour, Pauline W. Well number 3HM

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/N) * Provide details below*
Conductor	30"	20"	124'	New	H-40 / 94#	N/A	N/A
Surface	17 1/2"	13 3/8"	572'	New	J-55 / 54.5#	89'	Y
Coal	N/A						
Intermediate 1	12 1/4"	9 5/8"	2887'	New	J-55 / 40#	108'	Y
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	13,888'	New	P-110 / 20#	None	Y
Tubing							
Packer type and depth set							

Comment Details N/A

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ³ /sks)	Volume (ft ³)	Cement Top (MD)	WOC (hrs)
Conductor	N/A						
Surface	Class A	572	15.6	1.18	675	Surface	13
Coal	N/A						
Intermediate 1	Class A	944	15.6	1.18	1699	Surface	12
Intermediate 2							
Intermediate 3							
Production	L: Class A / T: Type 1	1759 / 1539	Both: 14.5	Both: 1.18	3891	Surface	N/A
Tubing							

Drillers TD (ft) 13,888' Loggers TD (ft) 13,888'
 Deepest formation penetrated Marcellus Shale Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) Nudge & control surface, begin kick off at 4600'

Check all wireline logs run caliper density deviated/directional induction
 neutron resistivity gamma ray temperature sonic

Well cored Yes No Conventional Sidewall Were cuttings collected Yes No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING

13 3/8" Surface String: Ran a total of 5 centralizers every other joint starting at first joint above shoe. Ran 1 basket at Joint #13 (89' from surface).
 9 5/8" Intermediate String: Ran a total of 13 centralizers every 220 feet starting at Joint #1. Ran a basket at Joint #4 (depth from surface was 108').
 5 1/2" Production String: Spira-glide centralizers on the first 217 joints (to a depth of 3896' below surface). Bow Spring centralizers every 4 joints after that into surface casing at 2056' depth, total of 10.

WAS WELL COMPLETED AS SHOT HOLE Yes No DETAILS

WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS

WERE TRACERS USED Yes No TYPE OF TRACER(S) USED

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
1	01/21/14	13644	13764	40	Marcellus
2	01/21/14	13444	13604	50	Marcellus
3	01/25/14	13244	13404	50	Marcellus
4	01/25/14	13044	13204	50	Marcellus
5	01/26/14	12844	13004	50	Marcellus
6	01/26/14	12644	12804	50	Marcellus
7	01/26/14	12444	12604	50	Marcellus
8	01/27/14	12244	12404	50	Marcellus
9	01/28/14	12044	12204	50	Marcellus
10	01/29/14	11844	12004	50	Marcellus
11	01/29/14	11644	11824	50	Marcellus
12	01/29/14	11444	11604	50	Marcellus
13	01/30/14	11244	11404	50	Marcellus
14	02/02/14	11044	11204	50	Marcellus
15	02/02/14	10844	11004	50	Marcellus
16	02/03/14	10644	10804	50	Marcellus

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbbls)	Amount of Nitrogen/other (units)
1	01/21/14	81	7938	8875	5241	295122	5559	NA
2	01/25/14	82	7802	8752	5576	201509	4847	NA
3	01/25/14	80	7565	8768	6167	288602	5268	NA
4	01/26/14	81	7339	8592	6093	292062	5253	NA
5	01/26/14	80	7476	8367	5509	294238	5272	NA
6	01/26/14	80	7561	8604	5829	281932	5814	NA
7	01/27/14	78	7183	8658	5868	287337	5630	NA
8	01/28/14	80	7424	8236	5764	296241	5303	NA
9	01/28/14	81	7052	7471	5530	296260	5201	NA
10	01/29/14	77	7212	8186	5904	292932	5121	NA
11	01/29/14	78	7261	8383	5204	249309	5580	NA
12	01/29/14	81	7481	8399	5111	261083	4986	NA
13	02/02/14	83	7387	8757	5978	230106	4705	NA
14	02/02/14	80	7586	8616	6454	292215	5213	NA
15	02/03/14	80	7764	8438	5825	292688	5400	NA
16	02/04/14	80	7611	8137	5636	255503	6250	NA

Please insert additional pages as applicable.

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
17	02/04/14	10444	10604	50	Marcellus
18	02/05/14	10244	10404	50	Marcellus
19	02/05/14	10044	10204	50	Marcellus
20	02/06/14	9844	10004	50	Marcellus
21	02/06/14	9644	9804	50	Marcellus
22	02/06/14	9444	9604	50	Marcellus
23	02/07/14	9244	9404	50	Marcellus
24	02/07/14	9044	9204	50	Marcellus
25	02/08/14	8844	9004	50	Marcellus

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbbls)	Amount of Nitrogen/other (units)
17	02/04/14	75	7489	8641	5579	290221	5521	NA
18	02/05/14	78	7653	8151	6064	279831	6393	NA
19	02/05/14	75	7236	8185	6015	277254	5358	NA
20	02/06/14	80	7433	7892	5560	300484	5239	NA
21	02/06/14	76	7506	8734	5607	130436	4623	NA
22	02/07/14	75	7290	8158	5838	267159	5298	NA
23	02/07/14	79	7089	7605	5833	295260	5305	NA
24	02/07/14	75	6922	8137	5512	299550	5236	NA
25	02/08/14	80	7379	8019	6192	299303	4883	NA

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<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
<u>Marcellus Shale</u>	<u>7836' - 7919'</u> TVD	<u>8,541' - 13,898'</u> MD
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface NT psi Bottom Hole NT psi DURATION OF TEST N/A hrs

OPEN FLOW Gas 6,973 mcfpd Oil 0 bpd NGL 0 bpd Water 1,061 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	0		0		
Little Lime	1513	1526	1514	1527	Due to air/fluid rotary drilling, fresh water, salt water, & coal are estimated from surrounding wells and reported on page 1.
Big Lime	1551	1687	1553	1690	
Big Injun	1687	1725	1689	1727	
Gantz	1963	2043	1966	2046	
50 Foot	2076	2125	2079	2128	
30 Foot	2126	2157	2129	2160	
4th Sand	2491	2537	2494	2540	
5th Sand	2601	2647	2604	2650	
Benson	4656	4698	4660	4701	
Sycamore	6925	7032	7486	7608	
Tully	7610	7666	8214	8324	
Hamilton	7700	7836	8324	8541	
Marcellus	7836	7919	8541	13,898	Continuous shows of gas while drilling

Please insert additional pages as applicable.

Drilling Contractor Pioneer Energy Services
Address 1083 N Eighty-Eight Rd City Rices Landing State PA Zip 15357

Logging Company Phoenix Technology Services USA Inc
Address Foster Plaza 5, Suite 300, 651 Holiday Drive City Pittsburgh State PA Zip 15220

Cementing Company Baker Hughes
Address Rt. 2, Box 506, 837 Philippi Pike City Clarksburg State WV Zip 26301

Stimulating Company Baker Hughes
Address Rt. 2, Box 506, 837 Philippi Pike City Clarksburg State WV Zip 26301

Please insert additional pages as applicable.

Completed by Bob Williamson Telephone 304-808-6296
Signature [Signature] Title Sr Geologist Date 04/21/2014

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Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date	1/21/2014
Job End Date	2/8/2014
State	West Virginia
County	Taylor
API Number	47-091-01279-00-00
Operator Name	PDC Energy
Well Name and Number	Armstrong Reynolds 3HM
Longitude	-80.13075100
Latitude	39.30311800
Datum	NAD83
Federal/Tribal Well	NO
True Vertical Depth	7,800
Total Base Water Volume (gal)	5,806,836
Total Base Non Water Volume	0



Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	PDC	Base Fluid					
			Water	NA	100.00000	87.30044	None
Sand (Proppant)	Baker Hughes	Proppant					
			Silica Substrate	NA	100.00000	12.31316	None
MaxPerm 20A	Baker Hughes	Friction Reducer					
			Aliphatic hydrocarbon	Proprietary	30.00000	0.01346	None
			Oxyalkylated alcohol	Proprietary	5.00000	0.001724	None
GasFlo G	Baker Hughes	Surfactant					
			Methanol	67-56-1	30.00000	0.01258	None
Hydrochloric Acid (15%)	Baker Hughes	Acidizing					
			Hydrochloric Acid	7647-01-0	15.00000	0.01158	None
SC-30	X-Chem	Scale Inhibitor					
			Sodium polyacrylate	Proprietary	30.00000	0.001508	None
GBW 5	Baker Hughes	Frac gel breaker					
			Ammonium persulphate	7727-54-0	100.00000	0.00178	None
ADOX 3125/8125	Dupont	Biocide					
			Sodium Chlorite	7758-19-2	25.00000	0.00130	None
Reagent A	X-Chem	Biocide					
			Hydrogen chloride	7647-01-0	32.00000	0.00082	None

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Reagent B	X-Chem	Biocide				
			Sodium Hypochlorite	7681-52-9	15.00000	0.00080 None
Ferrotrol 300L	Baker Hughes	Iron Control				
			Citric Acid	77-92-9	60.00000	0.00030 None
CI-14	Baker Hughes	Corrosion Inhibitor				
			Methanol	67-56-1	100.00000	0.00012 None
			Polyoxyalkylenes	Proprietary	30.00000	0.00004 None
			Fatty acids	Proprietary	10.00000	0.00001 None
			Olefin	Proprietary	5.00000	0.00001 None
			Propargyl alcohol	107-19-7	5.00000	0.00001 None

Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.

- * Total Water Volume sources may include fresh water, produced water, and/or recycled water
- ** Information is based on the maximum potential for concentration and thus the total may be over 100%

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided. Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

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PDC MOUNTAINEER, LLC.
WELL NO. ARMSTRONG/REYNOLDS 3HM

NOTES:
 -PLAT ORIENTATION, CORNERS,
 AND WELL REFERENCES ARE
 BASED UPON THE GRID
 NORTH MERIDIAN FOR
 THE WV STATE PLANE COORDINATE SYSTEM, NORTH
 ZONE NAD 83. WELL LOCATION REFERENCE TIES ARE
 BASED UPON THE MAGNETIC MERIDIAN.

-THERE ARE NO WATER WELLS
 LOCATED WITHIN 250' OF WELL 3HM.

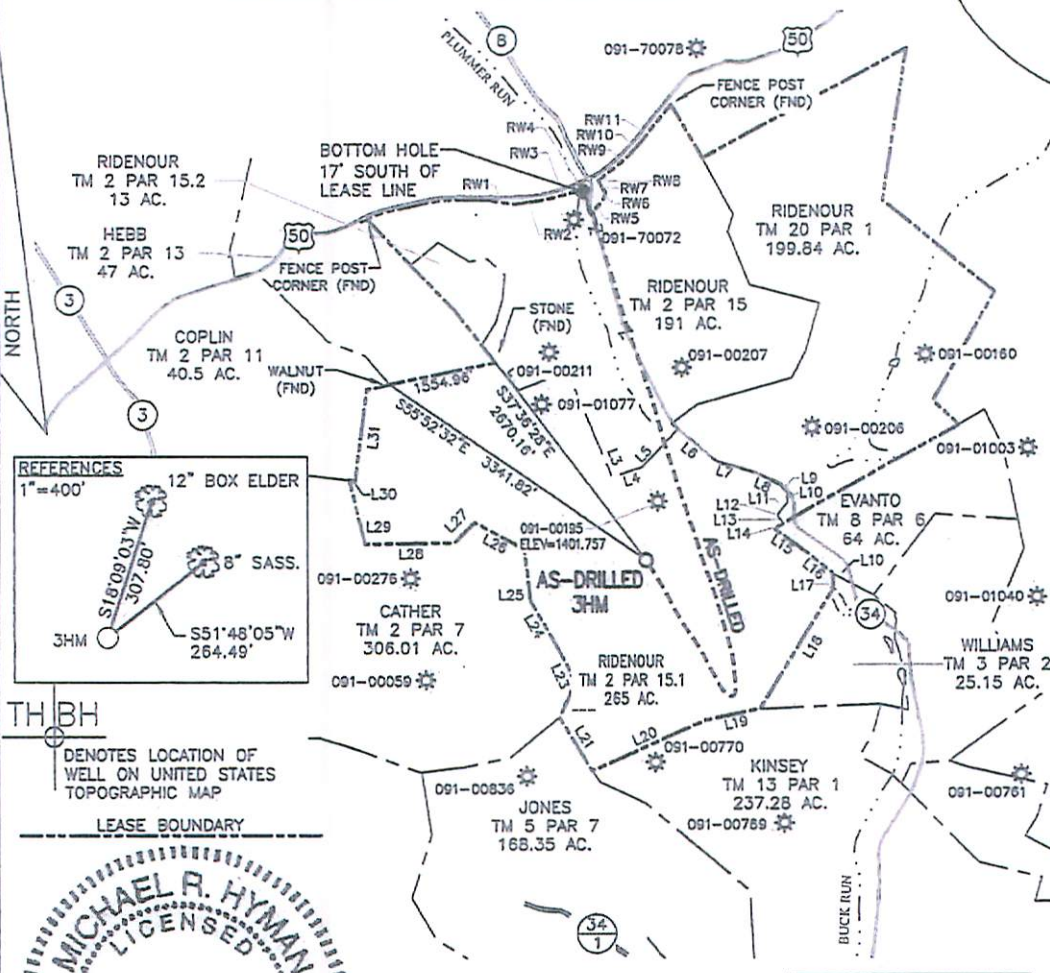
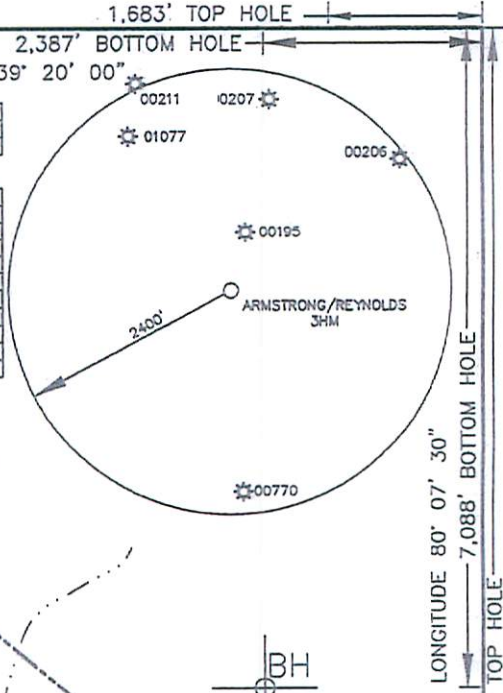
⊙ = MONUMENT FOUND
 IRON REBAR UNLESS
 NOTED OTHERWISE.

L1	S38°45'00"E	394.00'
L2	N71°57'00"E	567.00'
L3	S19°17'00"E	1243.00'
L4	N74°57'00"E	355.00'
L5	N47°11'00"E	548.00'
L6	S48°55'00"E	549.00'
L7	S70°30'00"E	437.00'

L8	S60°15'00"E	300.00'
L9	S38°15'00"E	108.00'
L10	S02°24'00"W	105.00'
L11	S44°13'00"W	138.00'
L12	S25°18'00"W	43.00'
L13	S43°44'00"E	97.00'
L14	S64°27'00"W	123.00'
L15	S51°10'00"E	427.35'
L16	S47°30'00"E	388.48'
L17	S21°45'00"E	225.39'
L18	S35°05'00"W	1505.95'
L19	S82°18'00"W	603.41'
L20	S70°05'00"W	1351.02'
L21	N28°07'00"W	670.07'
L22	N28°57'00"E	399.96'
L23	N21°22'00"W	259.88'
L24	N26°30'00"W	754.22'
L25	N03°00'00"W	563.64'
L26	N58°15'00"W	605.38'
L27	S49°30'00"W	310.53'
L28	N87°09'00"W	980.14'

L29	N10°00'00"W	694.65'
L30	S81°45'00"E	64.02'
L31	N11°00'00"E	955.02'

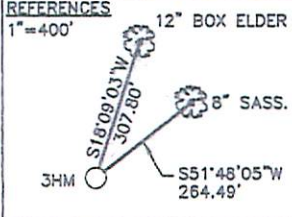
RW1	S80°15'18"E	279.36'
RW2	N82°00'24"E	337.42'
RW3	N76°21'22"E	412.37'
RW4	N75°06'36"E	36.22'
RW5	N41°49'35"E	155.33'
RW6	N20°53'41"E	94.00'
RW7	N30°25'53"W	156.00'
RW8	N53°26'46"E	156.40'
RW9	N50°35'02"E	259.00'
RW10	N43°11'33"E	207.30'
RW11	N38°54'15"E	201.27'



WELL NO. 3HM
AS-DRILLED TOP HOLE
STATE PLANE COORDINATES
 (NAD 83 NORTH ZONE)
 N: 293143.635
 E: 1790012.447
 LAT: 39°18'11.22"
 LON: 80°07'50.71"
UTM COORDINATES
 (NAD 83-METER)
 N: 4350774.763
 E: 574948.026

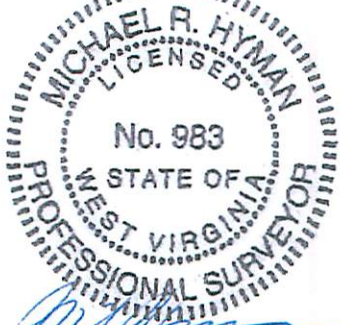
POINT OF PROVEN ELEVATION
 47-091-00195
 LAT: 39°18'17.3934"
 LON: 80°07'49.1072"
 ELEV=1401.757
 3HM AS-DRILLED

WELL NO. 3HM
AS-DRILLED BOTTOM HOLE
STATE PLANE COORDINATES
 (NAD 83 NORTH ZONE)
 N: 297096.070
 E: 1769338.304
 LAT: 39°18'50.24"
 LON: 80°07'59.64"
UTM COORDINATES
 (NAD 83-METER)
 N: 4351975.539
 E: 574722.604



TH BH
 DENOTES LOCATION OF
 WELL ON UNITED STATES
 TOPOGRAPHIC MAP

LEASE BOUNDARY



AS-DRILLED PLAT



Michael R. Hyman, P.S. 983
 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 RULES ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

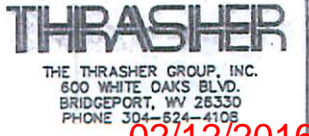
FILE NO. 030-2175
 SCALE: 1"=2000'
 MINIMUM DEGREE OF
 ACCURACY: 1 in 2500
 PROVEN SOURCE OF ELEVATION:
OPUS SURVEY GRADE GPS

STATE OF WEST VIRGINIA
 DIVISION OF ENVIRONMENTAL PROTECTION
 OFFICE OF OIL & GAS

DATE JUNE 3, 2014
 OPERATOR'S WELL NO. ARMSTRONG/REYNOLDS NO. 3HM
 API WELL NO. 47 - 091 - 01279
 STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL (IF "GAS"), PRODUCTION STORAGE DEEP SHALLOW
 LOCATION: ELEVATION: 1410.42' WATER SHED: BUCK RUN

DISTRICT: FLEMINGTON COUNTY: TAYLOR
 QUADRANGLE: ROSEMONT 7.5' ACREAGE: 265 AC±
 SURFACE OWNER: PAULINE W. RIDENOUR LEASE ACREAGE: 735 AC+
 OIL & GAS ROYALTY OWNER: EUGENE ARMSTRONG & T. MARIE REYNOLDS LEASE NO. _____



PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE
 PERFORATE NEW FORMATION PLUG OFF OLD FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) _____

PLUG AND ABANDON _____ CLEAN OUT AND REPLUG _____
 TARGET FORMATION: MARCELLUS SHALE ESTIMATED DEPTH: 7,912' TVD / 13,750' MD

WELL OPERATOR: PDC MOUNTAINEER, LLC. DESIGNATED AGENT: STEVEN JOHNSON
 ADDRESS: 120 GENESIS BOULEVARD ADDRESS: 120 GENESIS BOULEVARD
BRIDGEPORT, WV 26330 BRIDGEPORT, WV 26330

02/12/2016