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

API 47 - 091 - 01278 County Taylor District Flemington
Quad Rosemont 7.5' Pad Name Armstrong / Reynolds Field/Pool Name Unknown
Farm name Ridenour, Pauline W. Well Number 1HM
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 4350780.924379 Easting 574956.423680
Landing Point of Curve Northing 4350439.970335 Easting 574817.401481
Bottom Hole Northing 4351955.576034 Easting 574306.258842

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 09/30/2013 Date drilling ceased 12/22/2013
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:

06/06/2014

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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"		New	H-40 / 94#	None	N/A
Surface	17 1/2"	13 3/8"	546	New	J-55 / 54.5#	64' & 97'	Y
Coal	N/A						
Intermediate 1	12 1/4"	9 5/8"	2874	New	J-55 / 40#	87'	Y
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	14,079	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	793	15.6	1.18	936	Surface	32
Coal	N/A						
Intermediate 1	Class A	1021	15.6	1.18	1205	Surface	34
Intermediate 2							
Intermediate 3							
Production	L: Class A / T: Type 1	1810 / 1650	Both: 14.5	Both: 1.18	4083	Surface	N/A
Tubing							

Drillers TD (ft) 14,100' Loggers TD (ft) 14,100'
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 4800'

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 2 baskets at Joints #12 & #14 (97' & 64' from surface).
9 5/8" Intermediate String: Ran a total of 13 centralizers every 220 feet starting at Joint #1. Ran at basket at Joint 64 (depth from surface was 87').
5 1/2" Production String: Spiraglide centralizers on the first 218 joints(to a depth of 4000' below surface). Bow Spring centralizers every 4 joints after that into surface casing at 2180' 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	01/06/14	13881	13981	54	Marcellus
2	01/20/14	13681	13829	50	Marcellus
3	01/20/14	13481	13641	50	Marcellus
4	01/21/14	13281	13441	50	Marcellus
5	01/21/14	13081	13241	50	Marcellus
6	01/22/14	12881	13041	50	Marcellus
7	01/22/14	12681	12841	50	Marcellus
8	01/23/14	12481	12641	50	Marcellus
9	01/24/14	12281	12441	50	Marcellus
10	01/26/14	12081	12241	50	Marcellus
11	01/27/14	11881	12041	50	Marcellus
12	01/28/14	11681	11841	50	Marcellus
13	01/28/14	11481	11641	50	Marcellus
14	01/29/14	11281	11441	50	Marcellus
15	01/29/14	11081	11241	50	Marcellus
16	01/30/14	10881	11041	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 (bbls)	Amount of Nitrogen/other (units)
1	01/20/14	66	8557	9444	6160	286345	6524	NA
2	01/20/14	81	7859	8486	6832	300157	5493	NA
3	01/21/14	82	7981	8459	5195	296805	5290	NA
4	01/21/14	82	7805	8419	6353	297675	5476	NA
5	01/22/14	81	7829	8709	6143	267543	5365	NA
6	01/22/14	80	7482	8735	6280	294849	5275	NA
7	01/22/14	80	7312	8631	5696	295935	5317	NA
8	01/23/14	80	7478	8667	5627	283215	5251	NA
9	01/26/14	80	7496	8179	6067	294955	5644	NA
10	01/27/14	80	7588	8715	5634	283883	5201	NA
11	01/28/14	79	7503	8259	6369	300658	5407	NA
12	01/28/14	80	6941	7711	5884	293301	5153	NA
13	01/29/14	78	7110	7574	5241	294996	5149	NA
14	01/29/14	81	7398	8279	5923	290557	5169	NA
15	01/29/14	80	7094	7905	5854	295648	5144	NA
16	02/01/14	76	7272	8822	5294	297683	5350	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	02/01/14	10681	10841	50	Marcellus
18	02/02/14	10481	10641	50	Marcellus
19	02/03/14	10281	10441	50	Marcellus
20	02/04/14	10081	10241	50	Marcellus
21	02/04/14	9881	10041	50	Marcellus
22	02/05/14	9681	9841	50	Marcellus
23	02/05/14	9481	9641	50	Marcellus
24	02/06/14	9281	9441	50	Marcellus
25	02/06/14	9081	9241	50	Marcellus
26	02/07/14	8881	9041	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 (bbls)	Amount of Nitrogen/other (units)
17	02/02/14	82	7208	7667	5838	281388	5999	NA
18	02/03/14	80	7432	8634	5862	289789	6927	NA
19	02/04/14	81	7201	7886	6122	294856	5124	NA
20	02/04/14	80	6869	7503	5574	307086	5133	NA
21	02/05/14	81	6952	8458	5450	274032	5450	NA
22	02/05/14	80	7014	7518	5625	296035	5223	NA
23	02/06/14	79	6719	8013	5397	300848	5201	NA
24	02/06/14	79	7180	7672	5427	301999	5220	NA
25	02/06/14	81	7080	8000	6008	301321	5168	NA
26	02/07/14	79	6886	7529	5767	298084	4701	NA

Please insert additional pages as applicable.

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PRODUCING FORMATION(S)	DEPTHS		
Marcellus Shale	7,826' - 7,902'	TVD	8,526' -14,100' MD

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ■ Open Flow OIL TEST ☐ Flow ☐ Pump

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

OPEN FLOW Gas 7,461 mcfpd Oil 0 bpd NGL ____ bpd Water 1,129 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_2S, ETC)
	0		0		
Little Lime	1513	1526	1513	1526	Due to air/fluid rotary drilling, fresh water, salt water, & coal are
Big Lime	1551	1687	1551	1687	estimated from surrounding wells and reported on page 1.
Big Injun	1687	1725	1687	1726	
Gantz	1963	2043	1965	2045	
50 Foot	2076	2125	2078	2127	
30 Foot	2126	2157	2128	2159	
4th Sand	2491	2537	2493	2539	
5th Sand	2601	2647	2603	2650	
Benson	4650	4690	4654	4694	
Sycamore	6946	7026	7487	7584	
Tully	7597	7653	8194	8307	
Hamilton	7653	7826	8307	8526	
Marcellus	7826	7902	8526	14,100	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, Ste. 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.

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

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

06/06/2014

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	1/20/2014
Job End Date:	2/7/2014
State:	West Virginia
County:	Taylor
API Number:	47-091-01278-00-00
Operator Name:	PDC Energy
Well Name and Number:	Armstrong Reynolds 1HM
Longitude:	-80.13084700
Latitude:	39.30308300
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	7,800
Total Base Water Volume (gal):	6,113,268
Total Base Non Water Volume:	0

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

Interstate Oil & Gas Compact Commission

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	86.74367	None
Sand (Proppant)	Baker Hughes	Proppant					
			Silica Substrate	NA	100.00000	12.95605	None
MaxPerm 20A	Baker Hughes	Friction Reducer					
			Aliphatic hydrocarbon	Proprietary	30.00000	0.03557	None
			Oxyalkylated alcohol	Proprietary	5.00000	0.00593	None
Hydrochloric Acid (15%)	Baker Hughes	Acidizing					
			Hydrochloric Acid	7647-01-0	15.00000	0.01577	None
GasFlo G	Baker Hughes	Surfactant					
			Methanol	67-56-1	30.00000	0.01255	None
SC-30	X-Chem	Scale Inhibitor					
			Sodium polyacrylate	Proprietary	30.00000	0.00501	None
ADOX 3125/8125	Dupont	Biocide					
			Sodium Chlorite	7758-19-2	25.00000	0.00196	None
GBW-5	Baker Hughes	Frac gel breaker					
			Ammonium persulphate	7727-54-0	100.00000	0.00152	None
Reagent B	X-Chem	Biocide					
			Sodium Hypochlorite	7681-52-9	15.00000	0.00082	None

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Reagent A	X-Chem	Biocide					
			Hydrogen chloride	7647-01-0	32.00000	0.00075	None
Ferrotrol 300L	Baker Hughes	Iron Control					
			Citric Acid	77-92-9	60.00000	0.00042	None
CI-14	Baker Hughes	Corrosion Inhibitor					
			Methanol	67-56-1	100.00000	0.00016	None
			Polyoxyalkylenes	Proprietary	30.00000	0.00005	None
			Fatty acids	Proprietary	10.00000	0.00002	None
			Propargyl alcohol	107-19-7	5.00000	0.00001	None
			Olefin	Proprietary	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)

91-01278