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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 - 01281 County Taylor District Flemington
Quad Rosemont 7.5' Pad Name Armstrong / Reynolds Field/Pool Name Unknown
Farm name Ridenour, Pauline W. Well Number 2HM
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 4350785.446462 Easting 574965.003703
Landing Point of Curve Northing 4350463.239277 Easting 575043.983297
Bottom Hole Northing 4351942.349033 Easting 574547.803546

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 10/09/2013 Date drilling ceased 12/11/2013
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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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"	582'	New	J-55 / 54.5#	62'	Y
Coal	N/A						
Intermediate 1	12 1/4"	9 5/8"	2901'	New	J-55 / 40#	63'	Y
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	13,944'	New	P-110 / 20#	None	Y
Tubing							
Packer type and depth set							

Comment Details

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	820	15.6	1.18	968	Surface	16.5
Coal	N/A						
Intermediate 1	Class A	1022	15.6	1.18	1206	Surface	29
Intermediate 2							
Intermediate 3							
Production	L: Class A / T: Type 1	1734 / 1554	Both: 14.5	Both: 1.18	3880	Surface	N/A
Tubing							

Drillers TD (ft) 13,968' Loggers TD (ft) 13,968'

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 (62' 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 66 (depth from surface was 63').

5 1/2" Production String: Spira-glide centralizers on the first 218 joints(to a depth of 3905' below surface). Bow Spring centralizers every 4 joints after that into surface casing at 2077' 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 Core Labs chemical tracers

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
1	01/20/14	13749	13869	40	Marcellus
2	01/21/14	13599	13719	50	Marcellus
3	01/23/14	13449	13569	50	Marcellus
4	01/23/14	13299	13419	50	Marcellus
5	01/25/14	13149	13216	50	Marcellus
6	01/26/14	12999	13119	50	Marcellus
7	01/26/14	12849	12969	50	Marcellus
8	01/26/14	12699	12819	50	Marcellus
9	02/01/14	12549	12669	50	Marcellus
10	02/02/14	12399	12519	50	Marcellus
11	02/02/14	12249	12369	50	Marcellus
12	02/02/14	12099	12219	50	Marcellus
13	02/02/14	11949	12069	50	Marcellus
14	02/02/14	11799	11919	50	Marcellus
15	02/02/14	11649	11769	50	Marcellus
16	02/03/14	11499	11619	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	01/21/14	82	8100	8599	5461	218694	4256	NA
2	01/23/14	80	7641	8381	5794	222206	4201	NA
3	01/23/14	80	7467	7971	6274	221252	4091	NA
4	01/25/14	80	7735	8487	6143	223259	4180	NA
5	01/25/14	80	7495	8688	5083	225050	4087	NA
6	01/26/14	79	7488	8118	5950	223152	4152	NA
7	01/26/14	81	7239	8497	6047	220264	4658	NA
8	01/27/14	74	8291	9501	9000	137446	3829	NA
9	02/01/14	83	7509	8561	5550	222227	4681	NA
10	02/02/14	83	7310	8760	6053	220948	4097	NA
11	02/02/14	81	7306	7881	5396	222776	4182	NA
12	02/02/14	82	7406	8058	5494	200599	4712	NA
13	02/02/14	83	7282	8112	6338	223376	4101	NA
14	02/02/14	83	7287	7591	5901	206482	4060	NA
15	02/03/14	79	7213	7509	5106	220863	4811	NA
16	02/03/14	78	7402	8597	4948	222553	4050	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	02/03/14	11349	11469	50	Marcellus
18	02/03/14	11199	11319	50	Marcellus
19	02/04/14	11049	11169	50	Marcellus
20	02/04/14	10899	11019	50	Marcellus
21	02/04/14	10749	10869	50	Marcellus
22	02/04/14	10599	10719	50	Marcellus
23	02/05/14	10449	10569	50	Marcellus
24	02/05/14	10299	10419	50	Marcellus
25	02/05/14	10149	10269	50	Marcellus
26	02/06/14	9999	10119	50	Marcellus
27	02/06/14	9849	9969	50	Marcellus
28	02/06/14	9699	9819	50	Marcellus
29	02/07/14	9549	9663	50	Marcellus
30	02/07/14	9399	9519	50	Marcellus
31	02/07/14	9249	9369	50	Marcellus
32	02/07/14	9099	9219	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	02/03/14	80	7290	8934	5447	223218	4049	NA
18	02/04/14	80	7361	8373	5527	221054	4110	NA
19	02/04/14	80	7505	8060	6090	220418	4076	NA
20	02/04/14	79	7308	7712	5721	217610	4084	NA
21	02/04/14	80	7358	7747	5312	216577	4034	NA
22	02/04/14	80	7321	8827	5640	224829	3957	NA
23	02/05/14	80	7387	7883	5794	220861	4091	NA
24	02/05/14	79	7398	7933	5992	222594	4069	NA
25	02/05/14	79	7158	7744	6036	218419	3990	NA
26	02/06/14	79	7301	7754	5097	223479	3960	NA
27	02/06/14	79	7502	8080	5420	225010	4058	NA
28	02/06/14	76	7310	8084	4939	217173	3928	NA
29	02/07/14	77	7263	8037	5255	221730	3991	NA
30	02/07/14	78	7605	8020	5106	217661	4051	NA
31	02/07/14	77	7248	7942	5587	222024	4046	NA
32	02/08/14	77	7001	7783	5685	220857	3888	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)
33	02/08/14	8949	9069	50	Marcellus
34	02/08/14	8799	8919	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)
33	02/08/14	80	7056	7384	5749	157072	3468	NA
34	02/08/14	80	7471	8291	5942	360561	5035	NA

Please insert additional pages as applicable.

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PRODUCING FORMATION(S)	DEPTHS		
Marcellus Shale	7833' - 7912'	TVD	8530' - 13,968' 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 7,178 mcfpd Oil ___ bpd NGL ___ bpd Water 1,041 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 QUANTITYAND 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	1725	
Gantz	1963	2043	1963	2043	
50 Foot	2076	2125	2076	2125	
30 Foot	2126	2157	2126	2157	
4th Sand	2491	2537	2491	2537	
5th Sand	2601	2647	2601	2647	
Benson	4647	4689	4649	4691	
Sycamore	6923	7036	7510	7638	
Tully	7606	7662	8228	8292	
Hamilton	7662	7833	8292	8530	
Marcellus	7833	7912	8530	13,968	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 ___ Title Sr Geologist Date 04/21/2014

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

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:	47-091-01281-00-00
Operator Name:	PDC Energy
Well Name and Number:	Armstrong Reynolds 2HM
Longitude:	-80.13079900
Latitude:	39.30310000
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	7,800
Total Base Water Volume (gal):	6,208,986
Total Base Non Water Volume:	0

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

Oil & Gas

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	87.09953	None
Sand (Proppant)	Baker Hughes	Proppant					
			Silica Substrate	NA	100.00000	12.57777	None
MaxPerm 20A	Baker Hughes	Friction Reducer					
			Aliphatic hydrocarbon	Proprietary	30.00000	0.04492	None
			Oxyalkylated alcohol	Proprietary	5.00000	0.00749	None
Hydrochloric Acid (15%)	Baker Hughes	Acidizing					
			Hydrochloric Acid	7647-01-0	15.00000	0.01439	None
GasFlo G	Baker Hughes	Surfactant					
			Methanol	67-56-1	30.00000	0.01314	None
SC-30	X-Chem	Scale Inhibitor					
			Sodium polyacrylate	Proprietary	30.00000	0.00511	None
GBW 5	Baker Hughes	Frac gel breaker					
			Ammonium persulphate	7727-54-0	100.00000	0.00180	None
ADOX 3125/8125	Dupont	Biocide					
			Sodium Chlorite	7758-19-2	25.00000	0.00128	None
Reagent A	X-Chem	Biocide					
			Hydrogen chloride	7647-01-0	32.00000	0.00085	None

Reagent B	X-Chem	Biocide					
			Sodium Hypochlorite	7681-52-9	15.00000	0.00084	None
CI-14	Baker Hughes	Corrosion Inhibitor					
			Methanol	67-56-1	100.00000	0.00037	None
			Polyoxyalkylenes	Proprietary	30.00000	0.00011	None
			Fatty acids	Proprietary	10.00000	0.00004	None
			Propargyl alcohol	107-19-7	5.00000	0.00002	None
			Olefin	Proprietary	5.00000	0.00002	None
Ferrotrol 300L	Baker Hughes	Iron Control					
			Citric Acid	77-92-9	60.00000	0.00037	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)

91-01281