

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

API 47 - 017 - 06817 County Doddridge District West Union
 Quad West Union 7.5' Pad Name Middle Pad Field/Pool Name ----
 Farm name Antero Resources Corporation Well Number Caboose Unit 2H
 Operator (as registered with the OOG) Antero Resources Corporation
 Address 1615 Wynkoop Street City Denver State CO Zip 80202

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
 Top hole Northing 4352592.047m Easting 516682.326m
 Landing Point of Curve Northing 4352780.14m Easting 516296.52m
 Bottom Hole Northing 4354999.245m Easting 515339.861m

Elevation (ft) 843' 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 _____
 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)

Air - Foam & 4% KCL

Mud - Polymer

Date permit issued 6/19/2017 Date drilling commenced 9/29/2017 Date drilling ceased 4/5/2018
 Date completion activities began 7/16/2018 Date completion activities ceased 9/18/2018
 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 None Identified Open mine(s) (Y/N) depths No
 Salt water depth(s) ft None Identified Void(s) encountered (Y/N) depths No
 Coal depth(s) ft None Identified Cavern(s) encountered (Y/N) depths No
 Is coal being mined in area (Y/N) No

Reviewed by:

WR-35
Rev. 8/23/13

API 47-017 - 06817 Farm name Antero Resources Corporation Well number Caboose Unit 2H

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	24"	20"	112'	New	94#, H-40	N/A	Y
Surface	17-1/2"	13-3/8"	550'	New	54#, J-55	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2616'	New	36#, J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	15294'	New	23#, HCP-110	N/A	Y
Tubing		2-3/8"	6598'		4.7#, P-110		
Packer type and depth set		N/A					

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	Class A	204 sx	15.6	1.18	241	0'	8 Hrs.
Surface	Class A	445 sx	15.6	1.21	538	0'	8 Hrs.
Coal							
Intermediate 1	Class A	860 sx	15.6	1.22	1049	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	725 sx (Lead) 1358 sx (Tail)	14(Lead), 15.2 (Tail)	1.45 (Lead), 1.83 (Tail)	3536	-500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 15294' MD, 6411' TVD (BHL), 6416' (Deepest Point Drilled) Loggers TD (ft) 15294' MD
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 5842'

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

Conductor - 0
 Surface - 1 above guide shoe, 1 above insert float, 1 every 4th joint to surface
 Intermediate - 1 above float joint, 1 above float collar, 1 every 4th joint to surface
 Production - 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

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 N/A

WR-35
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PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6339' (TOP)	TVD	6647' (TOP) MD

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 3600 psi Bottom Hole -- psi DURATION OF TEST -- hrs

OPEN FLOW Gas 12590.85 mcfpd Oil 105.73 bpd NGL -- bpd Water 598.48 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	

***PLEASE SEE ATTACHED EXHIBIT 3**

Please insert additional pages as applicable.

Drilling Contractor Frontier Drilling LLC
Address 562 Spring Run Road City Pennsboro State WV Zip 26415

Logging Company Nine Energy Service
Address 125 Museum Rd City Washington State PA Zip 15301

Cementing Company C&J Energy Services
Address 1650 Hackers Creek City Lane Jew State WV Zip 26378

Stimulating Company Haliburton
Address 121 Champion Way City Canonsburg State PA Zip 15317

Please insert additional pages as applicable.

Completed by Karin Cox Telephone 303-357-6820
Signature _____ Title Permitting Agent Date _____

API 47-017-06817 Farm Name Antero Resources Corp Well Number Caboose Unit 2H					
EXHIBIT 1					
Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	7/16/2018	15092	15191.4	60	Marcellus
2	8/9/2018	14892.158	15060.693	60	Marcellus
3	8/9/2018	14692.316	14860.851	60	Marcellus
4	8/9/2018	14492.474	14661.009	60	Marcellus
5	8/10/2018	14292.632	14461.167	60	Marcellus
6	8/10/2018	14092.79	14261.325	60	Marcellus
7	8/10/2018	13892.948	14061.483	60	Marcellus
8	8/11/2018	13693.106	13861.641	60	Marcellus
9	8/11/2018	13493.264	13661.799	60	Marcellus
10	8/12/2018	13293.422	13461.957	60	Marcellus
11	8/12/2018	13093.58	13262.115	60	Marcellus
12	8/12/2018	12893.738	13062.273	60	Marcellus
13	8/12/2018	12693.896	12862.431	60	Marcellus
14	8/13/2018	12494.054	12662.589	60	Marcellus
15	8/13/2018	12294.212	12462.747	60	Marcellus
16	8/14/2018	12094.37	12262.905	60	Marcellus
17	8/14/2018	11894.528	12063.063	60	Marcellus
18	8/14/2018	11694.686	11863.221	60	Marcellus
19	8/15/2018	11494.844	11663.379	60	Marcellus
20	8/15/2018	11295.002	11463.537	60	Marcellus
21	8/15/2018	11095.16	11263.695	60	Marcellus
22	8/15/2018	10895.318	11063.853	60	Marcellus
23	8/16/2018	10695.476	10864.011	60	Marcellus
24	8/16/2018	10495.634	10664.169	60	Marcellus
25	8/16/2018	10295.792	10464.327	60	Marcellus
26	8/17/2018	10095.95	10264.485	60	Marcellus
27	8/17/2018	9896.108	10064.643	60	Marcellus
28	8/17/2018	9696.266	9864.801	60	Marcellus
29	8/17/2018	9496.424	9664.959	60	Marcellus
30	8/18/2018	9296.582	9465.117	60	Marcellus
31	8/18/2018	9096.74	9265.275	60	Marcellus
32	8/18/2018	8896.898	9065.433	60	Marcellus
33	8/18/2018	8697.056	8865.591	60	Marcellus
34	8/19/2018	8497.214	8665.749	60	Marcellus
35	8/19/2018	8297.372	8465.907	60	Marcellus
36	8/19/2018	8097.53	8266.065	60	Marcellus
37	8/20/2018	7897.688	8066.223	60	Marcellus
38	8/20/2018	7697.846	7866.381	60	Marcellus
39	8/20/2018	7498.004	7666.539	60	Marcellus
40	8/20/2018	7298.162	7466.697	60	Marcellus
41	8/21/2018	7098.32	7266.855	60	Marcellus
42	8/21/2018	6898.478	7067.013	60	Marcellus
43	8/21/2018	6698.636	6867.171	60	Marcellus

API 47-017-06817 Farm Name Antero Resources Corp Well Number Caboose Unit 2H

EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	7/16/2018	70.7	7452	0	3894	264740	6162.548	N/A
2	8/9/2018	79.89	8331	5877	3720	404700	8637.119	N/A
3	8/9/2018	64.2	8163	5735	3612	410400	9596	N/A
4	8/9/2018	73.7	8001	4466	3528	404520	8374.071	N/A
5	8/10/2018	74.05	7913	4622	3680	407540	8479.214	N/A
6	8/10/2018	73.97	7918	5658	3624	407160	8535.786	N/A
7	8/10/2018	69.7	8001	5851	4512	407700	8299.595	N/A
8	8/11/2018	68.28	8090	5681	3938	407140	8548.381	N/A
9	8/11/2018	57.35	8183	5731	4728	396720	10621.45	N/A
10	8/12/2018	67.6	7973	5588	3862	400400	10603.67	N/A
11	8/12/2018	71.65	7932	5473	4395	404200	8701.5	N/A
12	8/12/2018	67.39	7719	5623	4781	400420	8308.381	N/A
13	8/12/2018	70.8	7759	5669	4195	402040	7906.31	N/A
14	8/13/2018	73.1	7868	6101	4223	399340	8244.952	N/A
15	8/13/2018	57.64	8252	6033	6167	179130	7736.929	N/A
16	8/14/2018	66.02	8306	5821	4038	400600	9772.381	N/A
17	8/14/2018	74.67	8001	6105	5269	407580	8741.976	N/A
18	8/14/2018	73.6	7674	6167	4026	406940	8133.595	N/A
19	8/15/2018	72.7	7657	6132	4093	402580	8110.095	N/A
20	8/15/2018	70.75	7678	6203	4234	406520	8199.095	N/A
21	8/15/2018	71.04	7727	5710	4566	408420	8199.905	N/A
22	8/15/2018	71.4	7685	6102	3793	402140	8097.262	N/A
23	8/16/2018	67.2	7862	5850	5289	405420	8301.929	N/A
24	8/16/2018	67.46	7738	5715	3938	399300	8190.19	N/A
25	8/16/2018	66.58	7932	5692	3841	408200	8252.143	N/A
26	8/17/2018	73.3	7769	6002	4207	402300	8054.119	N/A
27	8/17/2018	68.38	7703	5952	4123	405580	8124.667	N/A
28	8/17/2018	68.8	7636	6081	4690	406220	8185.071	N/A
29	8/17/2018	75.4	7533	5750	4008	412176	8245.143	N/A
30	8/18/2018	68.4	7517	5806	4182	360980	7461.929	N/A
31	8/18/2018	67.93	7057	6232	4611	406300	8180.524	N/A
32	8/18/2018	71.86	7521	5973	4260	411160	8181.452	N/A
33	8/18/2018	79.1	7683	5796	4129	403920	8142.738	N/A
34	8/19/2018	75.4	7642	5925	4945	404940	8205	N/A
35	8/19/2018	75.37	7448	5985	4908	404800	8105.881	N/A
36	8/19/2018	74.19	7580	5960	4541	408900	8052.381	N/A
37	8/20/2018	75.6	7150	5991	5161	401640	8123.048	N/A
38	8/20/2018	71.75	7303	5828	4628	397240	8020.833	N/A
39	8/20/2018	78.58	7258	6299	4794	423970	8141.31	N/A
40	8/20/2018	77.9	7121	6116	5147	403160	8009.929	N/A
41	8/21/2018	79.7	7042	6356	4363	402020	7969.429	N/A
42	8/21/2018	50.04	6705	6349	4814	401380	7981.095	N/A
43	8/21/2018	76.27	6852	6044	4135	417590	8172.929	N/A
	AVG=	71	7,682	5,722	4,363	17,018,126	358,112	TOTAL

API 47-017-06817 Farm Name Antero Resources Corp Well Number Caboose Unit 2H				
EXHIBIT 3				
LITHOLOGY/ FORMATION	TOP DEPTH (TVD)	BOTTOM DEPTH (TVD)	TOP DEPTH (MD)	BOTTOM DEPTH (MD)
	From Surface	From Surface	From Surface	From Surface
Sandstone	0	177	0	177
Sandstone tr coal	est. 177	217	est. 177	217
Sandy shale	est. 217	232	est. 217	232
Calcareous Shale	est. 232	319	est. 232	319
Sandstone	est. 319	373	est. 319	373
Calcareous Shale	est. 373	1,065	est. 373	1,065
Silty Sandstone	est. 1065	1,137	est. 1065	1,137
Silty shale	est. 1137	1,287	est. 1137	1,287
Sandy Shale	est. 1287	1,357	est. 1287	1,357
Shale	est. 1357	1,540	est. 1357	1,546
Big Lime	1,540	2,218	1,546	2,238
Fifty Foot Sandstone	2,218	2,474	2,238	2,497
Gordon	2,474	2,658	2,497	2,683
Fifth Sandstone	2,658	2,723	2,683	2,749
Bayard	2,723	3,510	2,749	3,544
Speechley	3,510	3,827	3,544	3,866
Balltown	3,827	4,309	3,866	4,356
Bradford	4,309	4,736	4,356	4,789
Benson	4,736	4,986	4,789	5,042
Alexander	4,986	5,972	5,042	6,050
Sycamore	5,972	6,145	6,050	6,259
Middlesex	6,145	6,271	6,259	6,483
Burkett	6,271	6,300	6,483	6,553
Tully	6,300	6,339	6,553	6,647
Marcellus	6,339	NA	6,647	NA

*Please note Antero determines formation tops based on mud logs that are only run on one well on a multi-well pad. The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	8/8/2018
Job End Date:	8/21/2018
State:	West Virginia
County:	Doddridge
API Number:	47-017-06817-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Caboose 2H
Latitude:	39.32249400
Longitude:	-80.80663900
Datum:	NAD27
Federal Well:	NO
Indian Well:	NO
True Vertical Depth:	6,417
Total Base Water Volume (gal):	15,329,989
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
Fresh Water	Operator	Base Fluid					
			Water	7732-18-5	100.00000	88.08935	Density = 8.330
Ingredients	Listed Above	Listed Above					
			Water	7732-18-5	100.00000	0.12363	

Items above are Trade Names with the exception of Base Water. Items below are the individual ingredients.						
				Crystalline silica, quartz	14808-60-7	100.00000
				Acrylamide acrylate polymer	Proprietary	30.00000
				Inorganic salt	Proprietary	30.00000
				Hydroteated light petroleum distillate	64742-47-8	30.00000
				Guar gum	9000-30-0	100.00000
				Hydrochloric acid	7647-01-0	15.00000
				Ethylene glycol	107-21-1	60.00000
				Glutaraldehyde	111-30-8	30.00000
				Telmer	Proprietary	10.00000
				Sodium persulfate	7775-27-1	100.00000
				Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl chlorides	68424-85-1	5.00000
				Sodium polyacrylate	9003-04-7	1.00000
				Ethanol	64-17-5	1.00000
				Methanol	67-56-1	0.14000
				Phosphoric acid	7664-38-2	0.10000
				Acrylic acid	79-10-7	0.01000
				Sodium sulfate	7757-82-6	0.10000
						11.73955
						0.01720
						0.01720
						0.01679
						0.01100
						0.00852
						0.00268
						0.00142
						0.00055
						0.00045
						0.00014
						0.00009
						0.00001
						0.00001
						0.00000
						0.00000

* Total Water Volume sources may include various types of water including fresh water, produced water, and recycled water

** Information is based on the maximum potential for concentration and thus the total may be over 100%

*** If you are calculating a percentage of total ingredients do not add the water volume below the green line to the water volume above the green line

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)

8,783' to Bottom Hole

4,291' to Top Hole

BTM LATITUDE 39 - 22 - 30
TOP LATITUDE 39 - 20 - 00

LONGITUDE 80 - 47 - 30

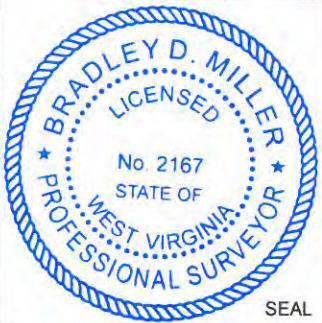
3,886' to Top Hole

11,088' to Bottom Hole

Antero Resources
Well No. Caboose Unit 2H
As-Drilled
Antero Resources
Corporation

(+) Denotes Location of Well on United States Topographic Maps

Note: It appears 23 water wells were found within 2000' of proposed well. No occupied dwellings or buildings 2,500 square feet or larger used to house or shelter dairy cattle or poultry husbandry are located within 625' of the center of the well pad.



	Bearing	Dist.
L1	S 84°40' W	594.3'
L2	N 07°50' E	497.5'
L3	N 24°50' E	830.2'
L4	S 36°04' W	631.9'

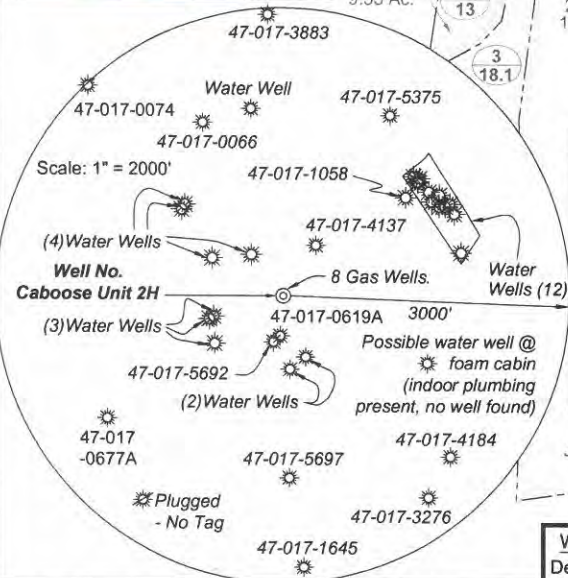
Legend

- Proposed gas well
- Found corner, as noted
- Existing Well, as noted
- Creek or Drain
- Existing Road
- Surface boundary (approx)
- Interior surface tracts (approx)

Notes:
West Virginia Coordinate System of 1927, North Zone based upon Differential GPS Measurements.
Well No. Caboose Unit 2H Top Hole coordinates are N: 302,256.97' Latitude: 39°19'20.98" E: 1,630,357.07' Longitude: 80°48'23.89"
Bottom Hole coordinates are N: 310,229.86' Latitude: 39°20'39.16" E: 1,626,083.52' Longitude: 80°49'19.76"
UTM Zone 17, NAD 1983
Top Hole Coordinates N: 4,352,592.047m E: 516,682.326m
Bottom Hole Coordinates N: 4,354,999.245m E: 515,339.861m
Plat orientation and corner and well references are based upon the grid north meridian.
Well location references are based upon the magnetic meridian.

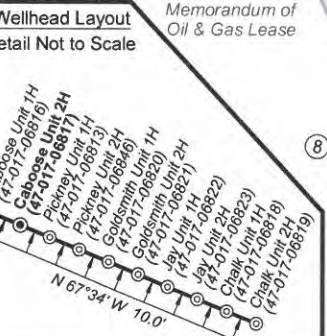
Top Hole Coordinates, As-drilled data and information was provided by Antero Resources Corporation. Allegheny Surveys Inc. (ASI) is not certifying the data and information provided. ASI is not responsible for any errors or inaccuracies with the data and information that has been provided.

TM/Par	Bk / Pg	Acres	Owner(s)	
1	6/2	214 / 279	32.19	William Randall Lynch & Dixie Janet Craig
2	6/2.5	253 / 222	8.66	
3	6/2.8	305 / 419	2.68	
4	6/2.6	266 / 36	3.52	Dominion Field Services, Inc.
5	6/1.3	305 / 416	4.68	Equitrans, L.P.
6	6/2.4	163 / 44	14.98	
7	6/2.3	197 / 659	4.15	Carol & Frieda Painter
8	7/5	167 / 782	176.5	Joel W. & Bonnie Ostroff
9	3/15.1	235 / 236	0.56	Richard J. & S. Jean Kruse



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.

Bradley D. Miller
Bradley D. Miller, P.S. 2167



FILE NO: 236-30-WU-14
DRAWING NO: Caboose 2H As-Drilled Well Plat
SCALE: 1" = 1200'
MINIMUM DEGREE OF ACCURACY: Submeter
PROVEN SOURCE OF ELEVATION: WVDOT, Harrisville, WV

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

DATE: January 16 2019
OPERATOR'S WELL NO. Caboose Unit 2H
API WELL NO
47 - 017 - 06817
STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
(IF GAS) PRODUCTION: STORAGE DEEP SHALLOW
LOCATION ELEVATION: As-Drilled Grade - 843' WATERSHED: Headwaters Middle Island Creek QUADRANGLE: West Union
DISTRICT: West Union WV Division of Natural Resources; COUNTY: Doddridge 78.75; 56.07;
SURFACE OWNER: William Randall Lynch & Dixie Craig William Paul McCutchan; Lewis Maxwell, et al; 32.75; 20.49;
ROYALTY OWNER: William Randall Lynch, et ux, Memorandum of Oil & Gas Lease; William Mark Smith; 8.66; 32.15; 150;
PROPOSED WORK: DRILL CONVERT DRILL DEEPER FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE IN WELL (SPECIFY) As-Drilled 6,411' TVD
 PLUG AND ABANDON CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus Shale ESTIMATED DEPTH: 15,294' MD

WELL OPERATOR: Antero Resources Corporation DESIGNATED AGENT: Dianna Stamper - CT Corporation System
ADDRESS: 1615 Wynkoop Street ADDRESS: 5400 D Big Tyler Road
Denver, CO 80202 Charleston, WV 25313

