

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

APPROVED
NAME: Michael
DATE: 1/27/16

API 47-085-10135 County RITCHIE District UNION
Quad OXFORD 7.5' Pad Name OXF163 Field/Pool Name _____
Farm name HAROLD K. PIERCE Well Number 513759
Operator (as registered with the OOG) EQT Production Company
Address 625 Liberty Ave. EQT Plaza, Suite 1700 City Pittsburgh State PA Zip 15222

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4,331,882.6 Easting 513,596.5
Landing Point of Curve Northing 4,331,220.3 Easting 512,854.3
Bottom Hole Northing 4,330,056.1 Easting 513,254.1

Elevation (ft) 1159 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 w/o Flowback
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)
Water base Mud 12.5 ppg barium sulfate, sodium chloride, xanthan gum, polyanionic cellulose, modified starch, sodium hydroxide, phosphonates and alkyl phosphates, glutaraldehyde solution, calcium hydroxide, partially hydrolyzed polyacrylamide/polyacrylate, potassium chloride, sodium carbonate, ground walnut shells, alcohol and modified fatty acid, ferrochrome lignosulfonate, calcium carbonate, fibrous cellulose

Date permit issued 9/22/2014 Date drilling commenced 01/9/2015 Date drilling ceased 6/2/2015
Date completion activities began 10/5/2015 Date completion activities ceased 10/14/2015
Verbal plugging (Y/N) N 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 176',453',517' Open mine(s) (Y/N) depths N
Salt water depth(s) ft 1156' Void(s) encountered (Y/N) depths N
Coal depth(s) ft _____ Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed by:
MAG

02/05/2016

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API 47- 085 - 10135 Farm name HAROLD K. PIERCE Well number 513759

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"	40'	NEW	A-500 78.7LB/FT	NONE	Y
Surface	17.5"	13.375"	1057'	NEW	J-55 54.5LB/FT	469'	Y
Coal							
Intermediate 1	12.375"	9.625"	3037'	NEW	A-500 40LB/FT	1810'	Y
Intermediate 2							
Intermediate 3							
Production	8.5"	5.5"	14,684'	NEW	P-110 20LB/FT	NONE	N
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	CLASS A	38	15.6	1.18	44.84	0	8
Surface	CLASS A	803	15.6	1.18	948.9	0	8
Coal							
Intermediate 1	CLASS A	1031	15.6	1.18	1218.5	0	8
Intermediate 2							
Intermediate 3							
Production	Class H / Class H	995 / 785	14.2 / 15.2	1.26 / 1.97	2800.15	2,550' MD	72
Tubing							

Drillers TD (ft) 14,700' MD Loggers TD (ft) N/A

Deepest formation penetrated Marcellus Plug back to (ft) N/A

Plug back procedure N/A

Kick off depth (ft) 4,989' MD

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- NONE

SURFACE- JOINTS: 1,11, 23

INTERMEDIATE- RAN AT LEAST EVERY 500' FEET

PRODUCTION- 242 Composite Centralizers. One on every joint from TD to 4,300 MD

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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Environmental Protection

API 47- 085 - 10135 Farm name HAROLD K. PIERCE Well number 513759

Drilling Contractor Savanna Drilling
Address 2204 Timberloch Place Suite 230 City Woodlands State TX Zip 77380

Logging Company GYRODATA
Address 601 MAYER ST City BRIDGEVILLE State PA Zip 15017

Logging Company _____
Address _____ City _____ State _____ Zip _____

Cementing Company C&J Energy Services
Address 1650 Hackers Creek Rd City Jane Lew State WV Zip 26378

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API 47 - 085 - 10135

Formation Name	Final Top MD (ftGL) (ft)	Final Top TVD (ft)	Final Btm MD (ftGL) (ft)	Final Btm TVD (ft)
FRESH WATER ZONE	0	0	520	520
SAND/SHALE	520	520	1,774	1,774
MAXTON	1,774	1,774	1,955	1,955
BIG LIME	1,955	1,955	2,244	2,243
WEIR	2,244	2,243	2,472	2,471
GANTZ	2,472	2,471	2,567	2,566
50F	2,567	2,566	2,653	2,652
30F	2,653	2,652	2,715	2,714
GORDON	2,715	2,714	2,803	2,802
4TH	2,803	2,802	2,959	2,958
BAYARD	2,959	2,958	3,299	3,298
WARREN	3,299	3,298	3,352	3,351
SPEECHLEY	3,352	3,351	3,846	3,845
BALLTOWN A	3,846	3,845	4,430	4,429
RILEY	4,430	4,429	4,767	4,766
BENSON	4,767	4,766	5,100	5,096
ALEXANDER	5,100	5,096	7,765	6,222
SONYEA	7,765	6,222	8,134	6,351
MIDDLESEX	8,134	6,351	8,290	6,408
GENESSEE	8,290	6,408	8,475	6,468
GENESE0	8,475	6,468	8,631	6,509
TULLY	8,631	6,509	8,692	6,522
HAMILTON	8,692	6,522	8,737	6,532
MARCELLUS	8,737	6,532	14,700	6,567

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513759-47-085-10135-0000 - Perforations

Stage Number	Perforation Date	Top Perf Depth (ftKB)	Bottom Perf Depth (ftKB)	Number of Shots	Formation
Initiation Sleeve	10/5/2015	14,683	14,684	10	MARCELLUS
1	10/5/2015	14,538	14,630	32	MARCELLUS
2	10/5/2015	14,388	14,510	40	MARCELLUS
3	10/5/2015	14,238	14,360	40	MARCELLUS
4	10/6/2015	14,088	14,210	40	MARCELLUS
5	10/6/2015	13,938	14,060	40	MARCELLUS
6	10/8/2015	13,788	13,910	40	MARCELLUS
7	10/8/2015	13,638	13,756	40	MARCELLUS
8	10/8/2015	13,488	13,610	40	MARCELLUS
9	10/8/2015	13,339	13,460	40	MARCELLUS
10	10/8/2015	13,188	13,310	40	MARCELLUS
11	10/9/2015	13,038	13,160	40	MARCELLUS
12	10/9/2015	12,888	13,010	40	MARCELLUS
13	10/10/2015	12,738	12,860	40	MARCELLUS
14	10/10/2015	12,588	12,710	40	MARCELLUS
15	10/10/2015	12,438	12,560	40	MARCELLUS
16	10/10/2015	12,291	12,410	40	MARCELLUS
17	10/10/2015	12,138	12,260	40	MARCELLUS
18	10/10/2015	11,988	12,110	40	MARCELLUS
19	10/10/2015	11,838	11,956	40	MARCELLUS
20	10/11/2015	11,688	11,810	40	MARCELLUS
21	10/11/2015	11,538	11,660	40	MARCELLUS
22	10/11/2015	11,387	11,510	40	MARCELLUS
23	10/11/2015	11,238	11,360	40	MARCELLUS
24	10/11/2015	11,088	11,210	40	MARCELLUS
25	10/12/2015	10,938	11,058	40	MARCELLUS
26	10/12/2015	10,788	10,910	40	MARCELLUS
27	10/12/2015	10,638	10,760	40	MARCELLUS
28	10/12/2015	10,487	10,610	40	MARCELLUS
29	10/12/2015	10,338	10,460	40	MARCELLUS
30	10/12/2015	10,192	10,310	40	MARCELLUS
31	10/13/2015	10,038	10,160	40	MARCELLUS
32	10/13/2015	9,891	10,010	40	MARCELLUS
33	10/13/2015	9,738	9,860	40	MARCELLUS
34	10/13/2015	9,588	9,710	40	MARCELLUS
35	10/14/2015	9,438	9,560	40	MARCELLUS
36	10/14/2015	9,288	9,410	40	MARCELLUS
38	10/14/2015	8,988	9,110	40	MARCELLUS
37	10/14/2015	9,138	9,260	40	MARCELLUS
39	10/14/2015	8,844	8,958	32	MARCELLUS

513759 47-085-10135-0000 - Stimulated Stages

Stage Number	Stimulation 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)
Initiation Sleeve	10/5/2015	18.6	6,363	7,226	3,910	0	1030	0
1	10/5/2015	90.9	8,336	8,951	3,819	250,400.00	6,906.00	0
2	10/5/2015	93.1	8,571	8,717	3,991	248,340.00	6,641.00	0
3	10/6/2015	96.2	8,710	8,908	4,095	248,980.00	6,561.00	0
4	10/6/2015	96.6	8,620	8,901	4,054	244,300.00	7,162.00	0
5	10/7/2015	84.2	8,275	8,636	5,120	249,700.00	9,344.00	0
6	10/8/2015	99.5	8,752	9,023	4,716	249,180.00	6,689.00	0
7	10/8/2015	100.1	8,599	8,728	4,703	252,520.00	6,192.00	0
8	10/8/2015	101.4	8,358	8,610	3,742	251,440.00	6,564.00	0
9	10/8/2015	101	8,462	8,637	3,910	249,200.00	6,199.00	0
10	10/9/2015	101	8,431	8,568	3,665	251,540.00	6,197.00	0
11	10/9/2015	100.2	8,476	8,622	4,787	253,220.00	6,215.00	0
12	10/9/2015	100.4	8,326	8,419	3,765	253,000.00	6,237.00	0
13	10/10/2015	100.3	8,413	8,501	4,381	249,080.00	6,255.00	0
14	10/10/2015	100.4	8,378	9,061	4,523	249,740.00	6,136.00	0
15	10/10/2015	100.7	8,248	8,417	3,787	252,570.00	6,090.00	0
16	10/10/2015	100	8,515	8,758	3,769	254,830.00	6,091.00	0
17	10/10/2015	100.2	8,699	8,939	4,312	250,870.00	6,344.00	0
18	10/10/2015	100.5	8,277	8,666	3,592	250,174.00	6,281.00	0
19	10/11/2015	100.3	8,285	8,500	3,831	249,000.00	6,298.00	0
20	10/11/2015	101.2	8,397	8,897	3,650	250,400.00	6,206.00	0
21	10/11/2015	99.8	8,507	8,853	3,640	252,060.00	5,954.00	0
22	10/11/2015	100.1	8,570	8,980	3,708	251,140.00	6,060.00	0
23	10/11/2015	100.2	8,089	8,224	3,254	248,720.00	6,170.00	0
24	10/12/2015	99.1	8,592	9,036	3,100	254,600.00	6,528.00	0
25	10/12/2015	100.1	8,223	8,600	3,265	249,300.00	6,174.00	0
26	10/12/2015	100.6	8,136	8,377	3,416	250,780.00	5,733.00	0
27	10/12/2015	100.6	8,026	8,320	3,364	252,040.00	5,647.00	0
28	10/12/2015	100.5	8,072	8,419	3,696	249,710.00	5,589.00	0
29	10/12/2015	100.1	7,897	8,146	3,481	254,860.00	6,106.00	0
30	10/12/2015	100.1	8,023	8,440	3,366	253,850.00	6,029.00	0
31	10/13/2015	97.9	8,205	8,998	3,408	249,100.00	6,532.00	0
32	10/13/2015	98	7,930	8,317	3,825	248,720.00	5,924.00	0
33	10/13/2015	93.1	8,220	9,534	5,712	253,160.00	6,216.00	0
34	10/13/2015	8.6	4,829	6,672	4,583	0.00	3,113.00	0
35	10/14/2015	100	7,783	8,070	3,794	252,860.00	6,043.00	0
36	10/14/2015	99.5	7,504	7,821	3,270	248,880.00	6,017.00	0
37	10/14/2015	98.8	7,850	8,453	3,842	253,000.00	6,322.00	0
38	10/14/2015	99.8	7,264	7,441	3,692	250,960.00	5,651.00	0
39	10/14/2015	54.8	6,433	8,704	4,068	67,040.00	5,179.00	0
39	10/14/2015	100.8	7,312	7,650	2,912	473,446.00	10,272.00	0

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	10/5/2015
Job End Date:	10/14/2015
State:	West Virginia
County:	Ritchie
API Number:	47-085-10135-00-00
Operator Name:	EQT Production
Well Name and Number:	513759
Longitude:	-80.84285300
Latitude:	39.13593200
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,532
Total Base Water Volume (gal):	10,621,674
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	Keane Group	Carrier/Base Fluid	Water	7732-18-5	100.00000	89.65604	None
Sand (Proppant)	Keane Group	Proppant	Silica Substrate	14808-60-7	100.00000	9.93554	None
MC MX 437-5	Multi-Chem	Calcium nitrate solution	Calcium nitrate	10124-37-5	60.00000	0.05747	None
Hydrochloric Acid (15%)	Keane Group	Acidizing	Hydrochloric Acid	7647-01-0	15.00000	0.03397	None
FFR760	Keane Group	Friction Reducer	Hydrotreated Light Distillate	64742-47-8	30.00000	0.01801	None
			Alkyl Alcohol	Proprietary	10.00000	0.00600	None
			Oxyalkylated alcohol A	Proprietary	5.00000	0.00300	None
EC6330A	Keane Group	Scale Inhibitor	Ethylene Glycol	107-21-1	5.00000	0.00127	None
			Sodium Phosphate, Tribasic	7601-54-9	5.00000	0.00127	None
AI 600	Keane Group	Corrosion Inhibitor	Ethylene Glycol	107-21-1	40.00000	0.00022	None
			Dimethylformamide	68-12-2	20.00000	0.00011	None

			Pyridine, alkyl derives, quaternized with benzyl chloride	68909-18-2	15.00000	0.00008	None
			Cinnamialdehyde	104-55-2	15.00000	0.00008	None
			2-Butoxyethanol	111-76-2	5.00000	0.00003	None
			1-Octanol	111-87-5	5.00000	0.00003	None
			1-Decanol	112-30-1	5.00000	0.00003	None
			Nonyl Phenol Ethoxylate, Branched	127087-87-0	5.00000	0.00003	None
			Triethyl Phosphate	78-40-0	2.50000	0.00001	None
			Methanol	67-56-1	2.50000	0.00001	None
			Alkyl Pyridine	68391-11-7	1.00000	0.00001	None
Breaker- LEB 10 X	Keane Group	Gel Breaker					
			Ethylene Glycol	107-21-1	30.00000	0.00003	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)

ROYALTY OWNERS		
CRAIG H. WILLIAMS	243.83 AC.±	LEASE NO. 987447
RUSSELL L. LOCKE	40.00 AC.±	LEASE NO. 987490
J.P. SMITH ET UX	130.00 AC.±	LEASE NO. 107857

NOTES ON SURVEY

1. NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
2. AS DRILLED INFORMATION PROVIDED BY EQT.
3. NONPRODUCTIVE SUBSURFACE RIGHT OF WAY.

**EQT PRODUCTION COMPANY
J.E. PIERCE ET AL LEASE
108 (98.73±) ACRES±
WELL NO. WV 513759
(OXF163 H4)**

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

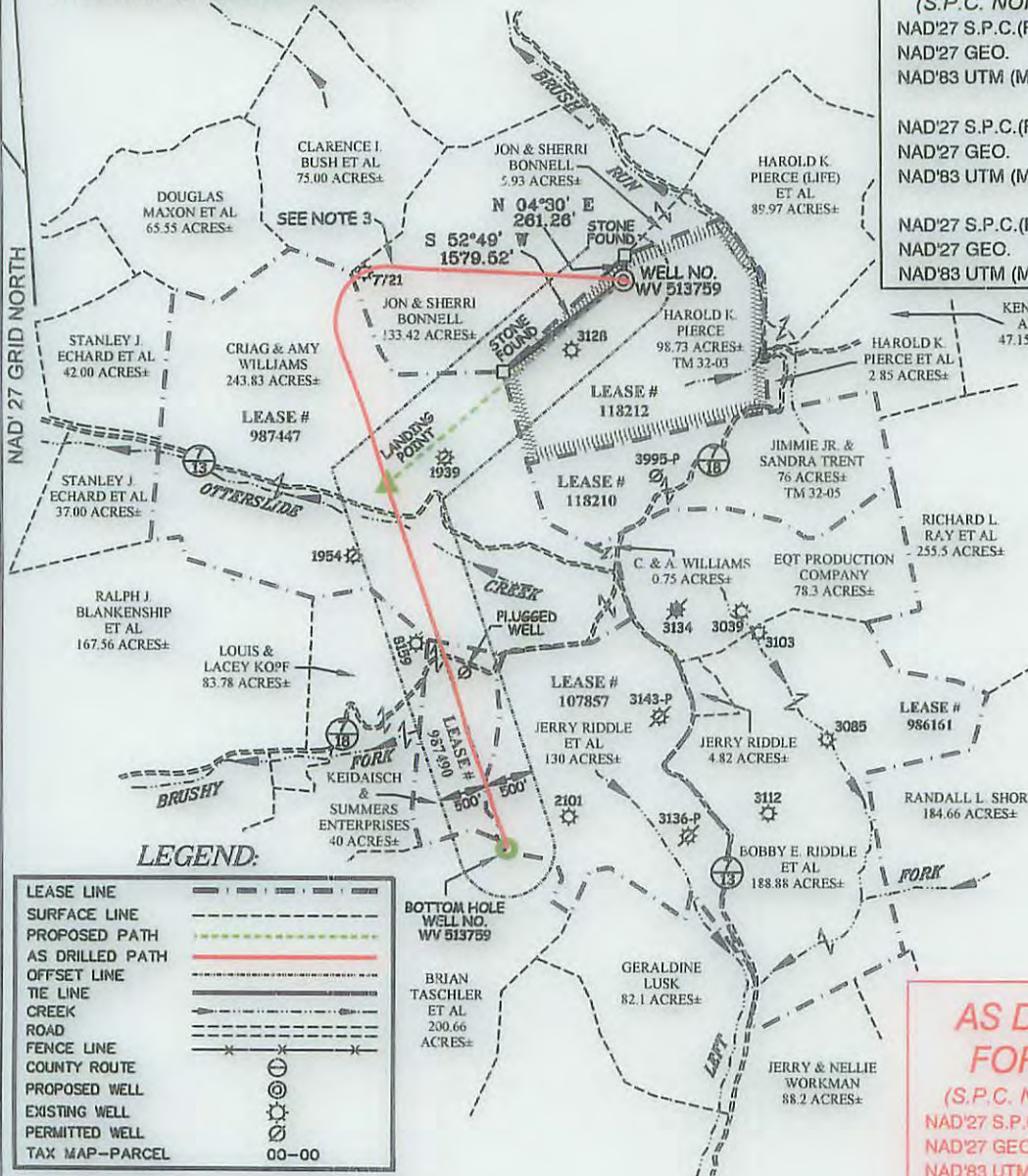
NAD'27 S.P.C.(FT)	N. 234,466.6	E. 1,619,096.5
NAD'27 GEO.	LAT-(N) 39.135932	LONG-(W) 80.842853
NAD'83 UTM (M)	N. 4,331,882.6	E. 513,596.5

LANDING POINT

NAD'27 S.P.C.(FT)	N. 252,333.9	E. 1,616,624.6
NAD'27 GEO.	LAT-(N) 39.129976	LONG-(W) 80.851453
NAD'83 UTM (M)	N. 4,331,220.3	E. 512,854.3

BOTTOM HOLE

NAD'27 S.P.C.(FT)	N. 228,491.7	E. 1,617,873.0
NAD'27 GEO.	LAT-(N) 39.119479	LONG-(W) 80.846850
NAD'83 UTM (M)	N. 4,330,056.1	E. 513,254.1



LEGEND:

LEASE LINE	---
SURFACE LINE	---
PROPOSED PATH AS DRILLED PATH	---
OFFSET LINE	---
TIE LINE	---
CREEK	---
ROAD	---
FENCE LINE	---
COUNTY ROUTE	---
PROPOSED WELL	⊙
EXISTING WELL	⊙
PERMITTED WELL	⊙
TAX MAP-PARCEL	00-00

AS DRILLED COORDINATES FOR WELL NO. WV 513759

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

NAD'27 S.P.C.(FT)	N. 234,466.6	E. 1,619,096.5
NAD'27 GEO.	LAT-(N) 39.135932	LONG-(W) 80.842853
NAD'83 UTM (M)	N. 4,331,882.6	E. 513,596.5

BOTTOM HOLE

NAD'27 S.P.C.(FT)	N. 228,491.8	E. 1,617,866.8
NAD'27 GEO.	LAT-(N) 39.119480	LONG-(W) 80.846801
NAD'83 UTM (M)	N. 4,330,056.2	E. 513,258.3

Professional Energy Consultants
A DIVISION OF SMITH LAND SURVEYING, INC.

SURVEYORS
ENGINEERS
ENVIRONMENTAL
PROJECT MGMT.

(304) 462-5834 WWW.SLSURVEYS.COM



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 DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 2288 *Earl N. Thompson*

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

DATE MAY 27, 20 14

REVISED 03/22/14, 10/27/14 & 12/03/15

OPERATORS WELL NO. WV 513759

API WELL NO. 47 - 085 - 10135H

STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 7698AD513759

HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

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

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL IF "GAS" PRODUCTION STORAGE DEEP SHALLOW

LOCATION: ELEVATION 1,174'(GROUND)1,158.5'(PROPOSED) WATERSHED BRUSH RUN OF MIDDLE FORK

DISTRICT UNION COUNTY RITCHIE QUADRANGLE OXFORD 7.5'

SURFACE OWNER HAROLD K. PIERCE ACREAGE 98.73±

ROYALTY OWNER J.E. PIERCE ET AL ACREAGE 108± (98.73±)

PROPOSED WORK: LEASE NO. 118212

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON CLEAN OUT AND REPLUG OTHER

PHYSICAL CHANGE IN WELL (SPECIFY) _____ TARGET FORMATION MARCELLUS

ESTIMATED DEPTH TVD 6495'

WELL OPERATOR EQT PRODUCTION COMPANY DESIGNATED AGENT REX C. RAY

ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330

LONGITUDE 80°50'00" COUNTY NAME PERMIT

02/05/2016