

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

PM JK

API 47 - 085 - 10052 County Ritchie District Clay
Quad Pennsboro Pad Name PEN16 Field/Pool Name _____
Farm name Heartwood Forestland FU Well Number 513043
Operator (as registered with the OOG) EQT Production Company
Address EQT Plaza, Suite 1700 625 Liberty Ave 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 4,344,707.2 Easting 505,242.4
Landing Point of Curve Northing 4,344,915.9 Easting 505,489.0
Bottom Hole Northing 4,345,722.6 Easting 505,208.1

Elevation (ft) 795' 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)
Water base Mud (12.4ppg) 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, ferrochroma lignosulfonate, calcium carbonate, fibrous cellulose

Date permit issued 08/07/2013 Date drilling commenced 08/09/2013 Date drilling ceased 08/28/2013
Date completion activities began _____ Date completion activities ceased 10/20/2013
Verbal plugging (Y/N) N Date permission granted N/A **RECEIVED 10/20/2013**
Office of Oil and Gas

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug **JUL 10 2014**

Freshwater depth(s) ft 34,107,157,380 Open mine(s) (Y/N) depths N
Salt water depth(s) ft N/A Void(s) encountered (Y/N) depths N
Coal depth(s) ft 829' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

WV Department of
Environmental Protection

Reviewed by: _____

09/19/2014

API 47-085 - 10052 Farm name Heartwood Forestland FU Well number 513043

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"	26"	94'	New	82.6#		Y
Surface	24"	20"	468'	New	94#		Y
Coal							
Intermediate 1	17-1/2"	13-3/8"	992.5'	New	54.5#	168	Y
Intermediate 2	12-1/4"	9-5/8"	5,243'	New	40#	4298 / 3090 / 1130	Y
Intermediate 3							
Production	8-1/2"	5-1/2"	9,935'	New	20#		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	Class A	87	15.60	1.18	102.7	0	8
Surface	Class A	873	15.60	1.19	1038.9	0	8
Coal							
Intermediate 1	Class A	840	15.60	1.19	999.6	0	8
Intermediate 2	Class A	332/1412	14.20/15.60	1.28/1.18	2091.1	0	8
Intermediate 3							
Production	Class A	250/450	14.20/15.20	1.32/1.94	1203	5,250	8
Tubing							

Drillers TD (ft) 9,944' Loggers TD (ft) N/A
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 3,688'

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 - N/A

Surface - Bow spring centralizers to be placed at casing shoe and deepest fresh water.
 Intermediate - Bow spring centralizers to be placed at shoe, 600 and 300'.
 Intermediate 2 - Bow spring centralizers placed at the shoe and every 500'
 Production - Run centralizers every other joint from 5,250' to 5,700'.

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 _____

API 47- 085 - 10052 Farm name Heartwood Forestland FU Well number 513043

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
TOE	10/5/2013	9908	9908	1	MARCELLUS
1	10/5/2013	9787	9879	32	MARCELLUS
2	10/6/2013	9637	9759	40	MARCELLUS
3	10/6/2013	9487	9604	40	MARCELLUS
4	10/6/2013	9337	9459	40	MARCELLUS
5	10/6/2013	9187	9309	40	MARCELLUS
6	10/6/2013	9037	9159	40	MARCELLUS
7	10/6/2013	8887	9009	40	MARCELLUS
8	10/7/2013	8737	8859	40	MARCELLUS
9	10/7/2013	8587	8709	40	MARCELLUS
10	10/7/2013	8437	8559	40	MARCELLUS
11	10/7/2013	8287	8409	40	MARCELLUS
12	10/7/2013	8137	8259	40	MARCELLUS
13	10/7/2013	7987	8109	40	MARCELLUS
13.1	10/8/2013	7891	7983	40	MARCELLUS
14	10/8/2013	7741	7863	40	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)
TOE	10/5	24.5	8561	NA	NA	0	607	NA
1	10/5	87.9	8049	5207	3095	197437	5699	NA
2	10/6	85	7651	5867	1981	197225	5255	NA
3	10/6	97.55	7534	5673	2038	197867	5270	NA
4	10/6	98.5	7326	6446	3245	197564	5225	NA
5	10/6	98.54	7669	5865	2262	197686	5095	NA
6	10/6	97.8	8099	5860	1992	197080	5355	NA
7	10/6	97.7	7941	5732	2124	130768	4506	NA
8	10/7	94.6	7960	5568	2354	196483	5526	NA
9	10/7	96.7	7307	6100	2037	197040	5229	NA
10	10/7	98.4	7380	5730	2150	197654	5211	NA
11	10/7	97.1	7494	5800	2182	197348	5270	NA
12	10/7	99.3	7905	6230	2219	197641	5325	NA
13	10/8	39.8	8440	5876	2115	4301	2151	NA
13.1	10/8	82.8	7701	5876	2357	160322	4120	NA
INJ	10/8	5	4784	NA	1096	NA	1821	NA

Please insert additional pages as applicable.

API 47- 085 - 10052 Farm name Heartwood Forestland FU Well number 513043

Logging Company Hoss Co. Services LLC
Address 614 Trotters Lane City Charleston State WV Zip 25312

Cementing Company Halliburton Energy Services
Address 121 Champion Way City Canonsburg State PA Zip 15317

85.10052

Formation Name	Final Top TVD (ft)	Final Btm TVD (ft)	Final Top MD (ftGL) (ft)	Final Btm MD (ftGL) (ft)	Notes
SAND/SHALE	0	829	0	829	FW @ 107 & 380'
PITTSBURGH COAL	829	834	829	834	
SAND/SHALE	834	1,781.00	834	1,781.00	
MAXTON	1,781.00	1,814.00	1,781.00	1,814.00	
SAND / SHALE	1,814.00	2,000.00	1,814.00	2,000.00	
BIG LIME	2,000.00	2,069.00	2,000.00	2,069.00	
SAND / SHALE	2,069.00	2,112.00	2,069.00	2,112.00	
BIG INJUN	2,112.00	2,179.00	2,112.00	2,179.00	
SAND / SHALE	2,179.00	2,407.00	2,179.00	2,407.00	
WEIR	2,407.00	2,464.00	2,407.00	2,464.00	
SAND / SHALE	2,464.00	2,612.00	2,464.00	2,612.00	
GANTZ	2,612.00	2,635.00	2,612.00	2,635.00	
SAND / SHALE	2,635.00	2,752.00	2,635.00	2,752.00	
FIFTY FOOT	2,752.00	2,775.00	2,752.00	2,775.00	
SAND / SHALE	2,775.00	2,833.00	2,775.00	2,833.00	
THIRTY FOOT	2,833.00	2,877.00	2,833.00	2,877.00	
GORDON	2,877.00	2,950.00	2,877.00	2,950.00	
SAND / SHALE	2,950.00	2,958.00	2,950.00	2,958.00	
FOURTH SAND	2,958.00	2,970.00	2,958.00	2,970.00	
SAND / SHALE	2,970.00	3,147.00	2,970.00	3,147.00	
BAYARD	3,147.00	3,175.00	3,147.00	3,175.00	
SAND / SHALE	3,175.00	3,493.00	3,175.00	3,493.00	
WARREN	3,493.00	3,539.00	3,493.00	3,539.00	
SAND / SHALE	3,539.00	3,577.00	3,539.00	3,577.00	
SPEECHLEY	3,577.00	3,611.00	3,577.00	3,611.00	
SAND / SHALE	3,611.00	3,958.40	3,611.00	3,962.00	
BALLTOWN A	3,958.40	3,978.00	3,962.00	3,982.00	
SAND / SHALE	3,978.00	4,214.80	3,982.00	4,225.00	
RILEY	4,214.80	4,532.70	4,225.00	4,562.00	
BENSON	4,532.70	4,785.00	4,562.00	4,847.00	
ALEXANDER	4,785.00	5,401.80	4,847.00	5,643.00	
RHINESTREET UPPER	5,401.80	5,500.00	5,643.00	5,755.00	
RHINESTREET	5,500.00	5,758.70	5,755.00	6,055.00	
SONYEA	5,758.70	5,873.20	6,055.00	6,210.00	
Middlesex	5,873.20	5,934.10	6,210.00	6,310.00	
Genesee	5,934.10	5,987.50	6,310.00	6,412.00	
Genesee	5,987.50	6,015.00	6,412.00	6,483.00	
Tully	6,015.00	6,028.00	6,483.00	6,526.00	
Hamilton	6,028.00	6,035.00	6,526.00	6,550.00	
MRC 3	6,035.00		6,550.00		

09/19/2014

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	10/5/2013
Job End Date:	10/10/2013
State:	West Virginia
County:	Ritchie
API Number:	47-085-10052-00-00
Operator Name:	EQT Production
Well Name and Number:	513043
Longitude:	-80.93953000
Latitude:	39.25166000
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,080
Total Base Water Volume (gal):	4,824,511
Total Base Non Water Volume:	213,803



85-10052

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	Halliburton	Carrier	Water	7732-18-5	100.00000	90.29811	
Sand	Halliburton	Proppant	Crystalline Silica	14808-60-7	100.00000	9.10931	
MX-5	Halliburton	Biocide	Sodium Nitrate	7631-99-4	60.00000	0.05781	
15% HCl	Halliburton	Dissolves cement & minerals in perforations	Hydrochloric Acid	7647-01-0	15.00000	0.05453	
FR-66	Halliburton	Friction Reducer	Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.02448	
MX-8	Halliburton	Biocide	Bacteria culture	N/A	100.00000	0.00980	
WG-36	Halliburton	Gelling Agent	Guar Gum	9000-30-0	100.00000	0.00791	
BA-40L	Halliburton	Buffer	Potassium carbonate	584-08-7	60.00000	0.00444	
LP-65	Halliburton	Scale Inhibitor	Ammonium Chloride	12125-02-9	10.00000	0.00251	

85-10052

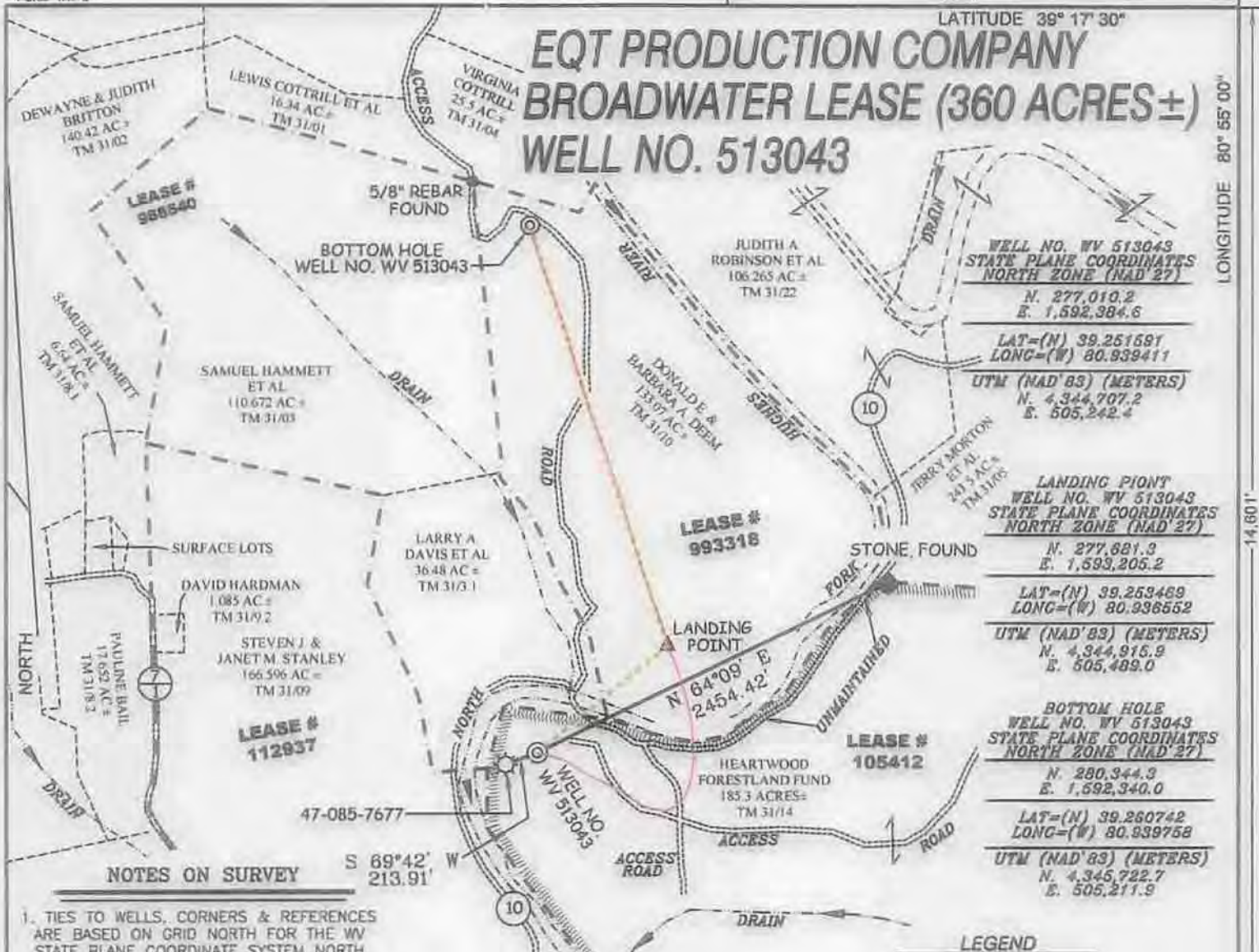
SP Breaker	Halliburton	Oxidizing Breaker	Sodium Persulfate	7775-27-1	100.00000	0.00021
Methanol	Halliburton	Corrosion Inhibitor	Methanol	67-56-1	60.00000	0.00018
Propargyl Alcohol	Halliburton	Corrosion Inhibitor	Propargyl Alcohol	107-19-7	10.00000	0.00003
Ingredients shown above are subject to 29 CFR 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)

EQT PRODUCTION COMPANY BROADWATER LEASE (360 ACRES±) WELL NO. 513043



WELL NO. WV 513043
STATE PLANE COORDINATES
NORTH ZONE (NAD 27)
N. 277,010.2
E. 1,592,384.6
LAT=(N) 39.251591
LONG=(W) 80.939411
UTM (NAD 83) (METERS)
N. 4,344,707.2
E. 505,242.4

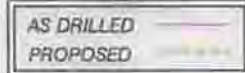
LANDING POINT
WELL NO. WV 513043
STATE PLANE COORDINATES
NORTH ZONE (NAD 27)
N. 277,681.3
E. 1,593,205.2
LAT=(N) 39.253469
LONG=(W) 80.938552
UTM (NAD 83) (METERS)
N. 4,344,915.9
E. 505,489.0

BOTTOM HOLE
WELL NO. WV 513043
STATE PLANE COORDINATES
NORTH ZONE (NAD 27)
N. 280,344.3
E. 1,592,340.0
LAT=(N) 39.260742
LONG=(W) 80.939758
UTM (NAD 83) (METERS)
N. 4,345,722.7
E. 505,211.9

NOTES ON SURVEY

- TIES TO WELLS, CORNERS & REFERENCES ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD '27.
- LEASE BOUNDARY SHOWN HEREON TAKEN FROM DEED BOOK 197 PAGE 568 AND DEED BOOK 251 PAGE 664.
- SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF RITCHIE COUNTY IN JULY, 2012.
- WELL LAT./LONG. (NAD'27) ESTABLISHED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK).
- PLAT UPDATED 06/27/14 TO SHOW THE AS-DRILLED COORDINATES FROM INFORMATION PROVIDED BY EQT IN 2013.

LEGEND



AS DRILLED INFORMATION

BOTTOM HOLE WELL NO. WV 513043 STATE PLANE COORDINATES NORTH ZONE (NAD 27)	WELL NO. WV 513043 STATE PLANE COORDINATES NORTH ZONE (NAD 27)
N. 280,344.2 E. 1,592,327.5	N. 277,010.2 E. 1,592,384.6
LAT=(N) 39.260741 LONG=(W) 80.939802	LAT=(N) 39.251591 LONG=(W) 80.939411
UTM (NAD 83) (METERS) N. 4,345,722.6 E. 505,208.1	UTM (NAD 83) (METERS) N. 4,344,707.2 E. 505,242.4



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. 677 *Gregory A. Smith*

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
 DATE JUNE 03 20 13
 REVISED DATE JUNE 27 20 14
 OPERATORS WELL NO. WV 513043
 API WELL NO. 47-085-10052
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1/200 FILE NO. 7566ASDRILLED513043
 PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 1000'

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

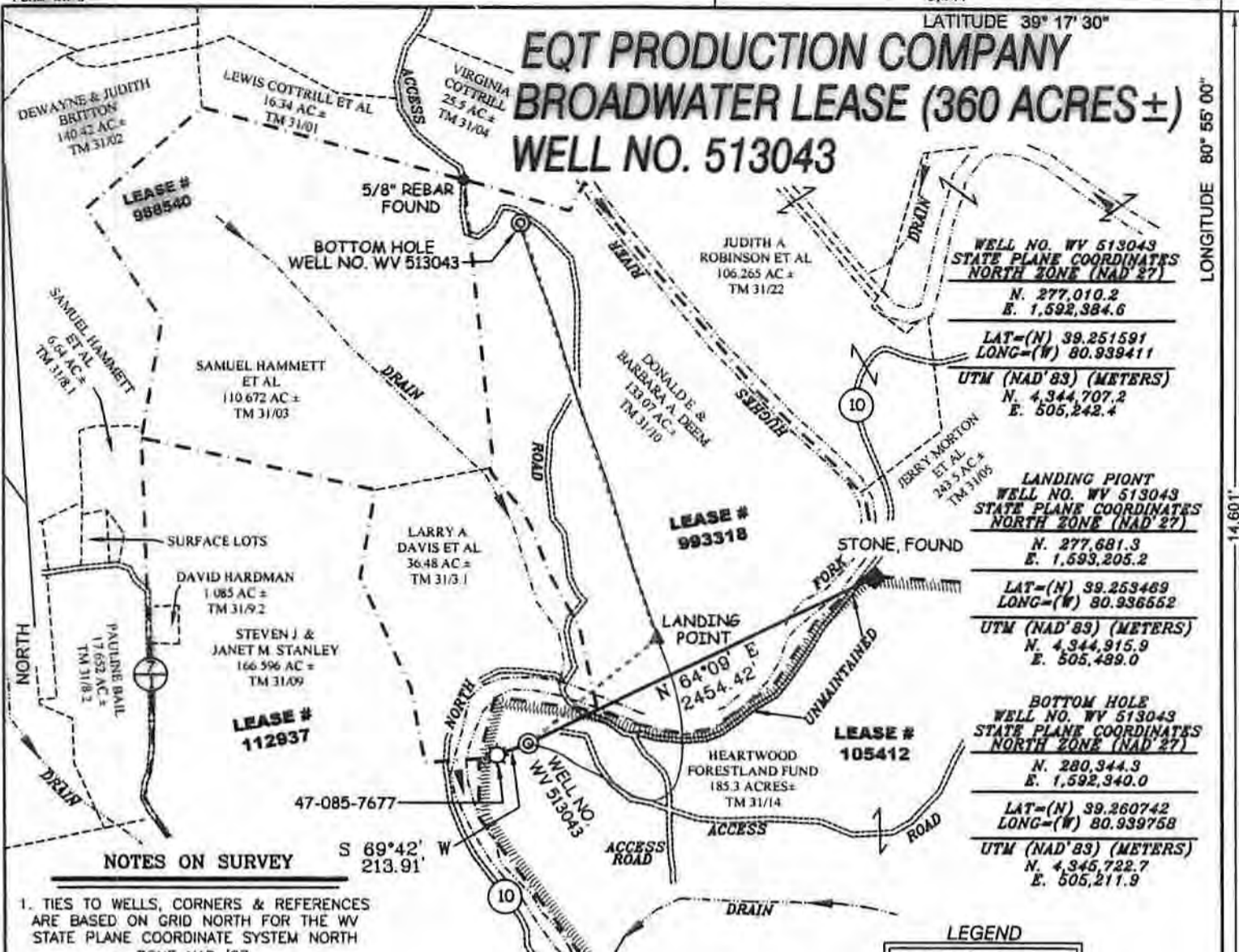
LOCATION: ELEVATION 793' (PAD ELEVATION) WATERSHED NORTH FORK HUGHES RIVER
 DISTRICT CLAY COUNTY RITCHIE QUADRANGLE PENNSBORO 7.5'
 SURFACE OWNER HEARTWOOD FORESTLAND FUND ACREAGE 353.50±
 ROYALTY OWNER JEFFERSON BROADWATER HEIRS ET AL (360 AC±), MIKE ROSS ET AL (133.07AC±), JOELYNN FAMILY PRESERVATION TRUST (140.46 AC±)
 PROPOSED WORK: LEASE NO. 105412 / 993318 / 988540
 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

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

09/19/2014

COUNTY NAME PERMIT

EQT PRODUCTION COMPANY BROADWATER LEASE (360 ACRES±) WELL NO. 513043



WELL NO. WV 513043 STATE PLANE COORDINATES NORTH ZONE (NAD '27)
N. 277,010.2 E. 1,592,384.6
LAT=(N) 39.251591 LONG=(W) 80.939411
UTM (NAD'83) (METERS)
N. 4,344,707.2 E. 505,242.4
LANDING POINT WELL NO. WV 513043 STATE PLANE COORDINATES NORTH ZONE (NAD '27)
N. 277,681.3 E. 1,593,205.2
LAT=(N) 39.253469 LONG=(W) 80.936562
UTM (NAD'83) (METERS)
N. 4,344,915.9 E. 505,489.0
BOTTOM HOLE WELL NO. WV 513043 STATE PLANE COORDINATES NORTH ZONE (NAD '27)
N. 280,344.3 E. 1,592,340.0
LAT=(N) 39.260742 LONG=(W) 80.939758
UTM (NAD'83) (METERS)
N. 4,345,722.7 E. 505,211.9

NOTES ON SURVEY

S 69°42' W
213.91'

1. TIES TO WELLS, CORNERS & REFERENCES ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD '27.
2. LEASE BOUNDARY SHOWN HEREON TAKEN FROM DEED BOOK 197 PAGE 568 AND DEED BOOK 251 PAGE 664.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF RITCHIE COUNTY IN JULY, 2012.
4. WELL LAT./LONG. (NAD'27) ESTABLISHED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK).
5. PLAT UPDATED 06/27/14 TO SHOW THE AS-DRILLED COORDINATES FROM INFORMATION PROVIDED BY EQT IN 2013.

LEGEND

AS DRILLED	—————
PROPOSED	*****

AS DRILLED INFORMATION

BOTTOM HOLE WELL NO. WV 513043 STATE PLANE COORDINATES NORTH ZONE (NAD '27)	WELL NO. WV 513043 STATE PLANE COORDINATES NORTH ZONE (NAD '27)
N. 280,344.2 E. 1,592,327.5	N. 277,010.2 E. 1,592,384.6
LAT=(N) 39.260741 LONG=(W) 80.939802	LAT=(N) 39.251591 LONG=(W) 80.939411
UTM (NAD'83)(METERS) N. 4,345,722.6 E. 505,208.1	UTM (NAD'83)(METERS) N. 4,344,707.2 E. 505,242.4



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. 677
Gregory A. Smith



(*) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
DATE JUNE 03 20 13
REVISED DATE JUNE 27 20 14
OPERATORS WELL NO. WV 513043
API WELL NO. 47-085-10052
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1/200 FILE NO. 7566ASDRILLED513043
PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 1000'

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 793' (PAD ELEVATION) WATERSHED NORTH FORK HUGHES RIVER
DISTRICT CLAY COUNTY RITCHIE QUADRANGLE PENNSBORO 7.5'

SURFACE OWNER HEARTWOOD FORESTLAND FUND ACREAGE 353.50±

ROYALTY OWNER JEFFERSON BROADWATER HEIRS ET AL (360 AC±), MIKE ROSS ET AL (133.07AC±), JOELLYNN FAMILY PRESERVATION TRUST (140.48 AC±)

PROPOSED WORK: 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

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

COUNTY NAME PERMIT