

PM
JA

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

API 47-085-10014 County Ritchie District Clay
Quad Pennsboro Pad Name PEN16 Field/Pool Name _____
Farm name Heartwood Forestland FU Well Number 514387
Operator (as registered with the OOG) EQT Production
Address 625 Liberty Avenue 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 4,344,711.8 Easting 505,242.9
Landing Point of Curve Northing 4,344,689.7 Easting 504,922.4
Bottom Hole Northing 4,345,839.6 Easting 504,522.7

Elevation (ft) 784' 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, ferrochrome lignosulfonate, calcium carbonate, fibrous cellulose

Date permit issued 5/31/13 Date drilling commenced 7/5/13 Date drilling ceased 8/6/13
Date completion activities began 9/7/2013 Date completion activities ceased 10/31/2013
Verbal plugging (Y/N) N Date permission granted _____ Granted by _____

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

Freshwater depth(s) ft 127', 395' Open mine(s) (Y/N) depths _____ N
Salt water depth(s) ft 1,470' Void(s) encountered (Y/N) depths _____ N
Coal depth(s) ft 820' Cavern(s) encountered (Y/N) depths _____ N
Is coal being mined in area (Y/N) N

RECEIVED
Office of Oil and Gas
JUL 10 2014
WV Department of
Environmental Protection
Reviewed by:

API 47-085 - 10014 Farm name Heartwood Forestland FU Well number 514387

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade w/ft	Basket Depth(s)	Did cement circulate (Y/N) * Provide details below*
Conductor	30"	26"	71'	New	82.6#	N/A	Yes
Surface	24"	20"	433'	New	94#	81', 342'	Yes
Coal							
Intermediate 1	17-1/2"	13-3/8"	996'	New	54#	514'	Yes
Intermediate 2	12-5/8"	9-5/8"	5,172'	New	40#	1,170', 3,041', 4,626'	Yes
Intermediate 3							
Production	8-1/2"	5-1/2"	10,949'	New	20#	N/A	Yes
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	15.6	1.18		0'	8
Surface	Class A	825	15.6	1.19	175	0'	8
Coal							
Intermediate 1	Class A	896	15.6	1.19	190	0'	8
Intermediate 2	Class A / Class A	350 / 309	14.2 / 15.6	1.28 / 1.18	80 / 65	0'	8
Intermediate 3							
Production	Class A / Class H	250 / 590	14.2 / 15.2	1.32 / 1.94	59 / 204	4,503'	8
Tubing							

Drillers TD (ft) 10,948 Loggers TD (ft) N/A
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 6,291'

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 - 3-Bow spring centralizers to be placed at casing shoe and 380' or deepest fresh water.
 Intermediate - 3-Bow spring centralizers to be placed at shoe, 600 and 300'.
 Intermediate 2- 3-Bow spring centralizers placed at the shoe and every 500'
 Production - Run centralizers every other joint from 20's to 1,000' above KOP.

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 - 10014 Farm name Heartwood Forestland FU Well number 514387

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
1	9/25/13	10,801	10,893	32	Marcellus
2	9/25/13	10,651	10,773	40	Marcellus
3	9/25/13	10,501	10,623	40	Marcellus
4	9/25/13	10,351	10,473	40	Marcellus
5	9/25/13	10,201	10,323	40	Marcellus
6	9/26/13	10,051	10,173	40	Marcellus
7	9/26/13	9,901	10,023	40	Marcellus
8	9/26/13	9,751	9,873	40	Marcellus
9	9/26/13	9,601	9,723	40	Marcellus
10	9/26/13	9,451	9,573	40	Marcellus
11	9/26/13	9,301	9,423	40	Marcellus
12	9/27/13	9,151	9,273	40	Marcellus
13	9/27/13	9,001	9,123	40	Marcellus
14	9/27/13	8,851	8,973	40	Marcellus
15	9/27/13	8,701	8,823	40	Marcellus
16	9/27/13	8,551	8,673	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	9/24/13	5	6,316	NA	NA	0	869	0
1	9/25/13	98	7,747	5,564	4,637	194,300	4,909	0
2	9/25/13	99.4	7,393	5,716	4,299	202,000	5,070	0
3	9/25/13	99.26	7,609	5,785	4,645	202,100	4,997	0
4	9/25/13	100.7	7,640	5,366	4,142	202,700	5,097	0
5	9/25/13	94.7	8,123	5,527	4,222	201,900	5,025	0
6	9/26/13	99.7	7,529	5,879	4,566	201,900	5,040	0
7	9/26/13	98	7,731	6,750	4,127	201,800	5,064	0
8	9/26/13	100.3	7,474	5,715	4,170	199,800	5,025	0
9	9/26/13	97.8	7,528	5,987	3,911	201,200	5,011	0
10	9/26/13	99.5	7,559	6,315	3,574	201,900	5,019	0
11	9/27/13	98.7	7,952	6,370	3,740	201,900	4,994	0
12	9/27/13	99.4	7,804	6,594	4,044	201,700	5,048	0
13	9/27/13	98.1	7,307	5,646	3,447	202,200	5,073	0
14	9/27/13	99.8	7,455	6,144	3,494	192,500	5,001	0
15	9/27/13	98.8	7,464	6,657	3,523	201,600	5,002	0

Please insert additional pages as applicable.

API 47- 085 - 10014 Farm name Heartwood Forestland FU Well number 514387

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
<u>Marcellus</u>	<u>6,028</u> TVD	<u>6,478</u> MD
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 2,325 psi Bottom Hole NA psi DURATION OF TEST 70 hrs

OPEN FLOW Gas 12,156 mcfpd Oil 0 bpd NGL 144 bpd Water 552 bpd GAS MEASURED BY Estimated Orifice Pilot

<u>LITHOLOGY/ FORMATION</u>	<u>TOP</u>	<u>BOTTOM</u>	<u>TOP</u>	<u>BOTTOM</u>	<u>DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H₂S, ETC)</u>
	<u>DEPTH IN FT NAME TVD</u>	<u>DEPTH IN FT TVD</u>	<u>DEPTH IN FT MD</u>	<u>DEPTH IN FT MD</u>	
	<u>0</u>		<u>0</u>		
<u>See Attached</u>	<u>Formation</u>	<u>Descriptions</u>			<u>Fresh at 127' and 395'</u>
					<u>Brine at 1,470'</u>

Please insert additional pages as applicable.

Drilling Contractor Pioneer Drilling Services
Address 1083 North 88 Road City Rices Landing State PA Zip 15357

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

Cementing Company Nabors
Address 2504 Smith Creek Road City Waynesburg State PA Zip 15370

Stimulating Company Halliburton
Address 121 Champion Way City Cecil State PA Zip 15321

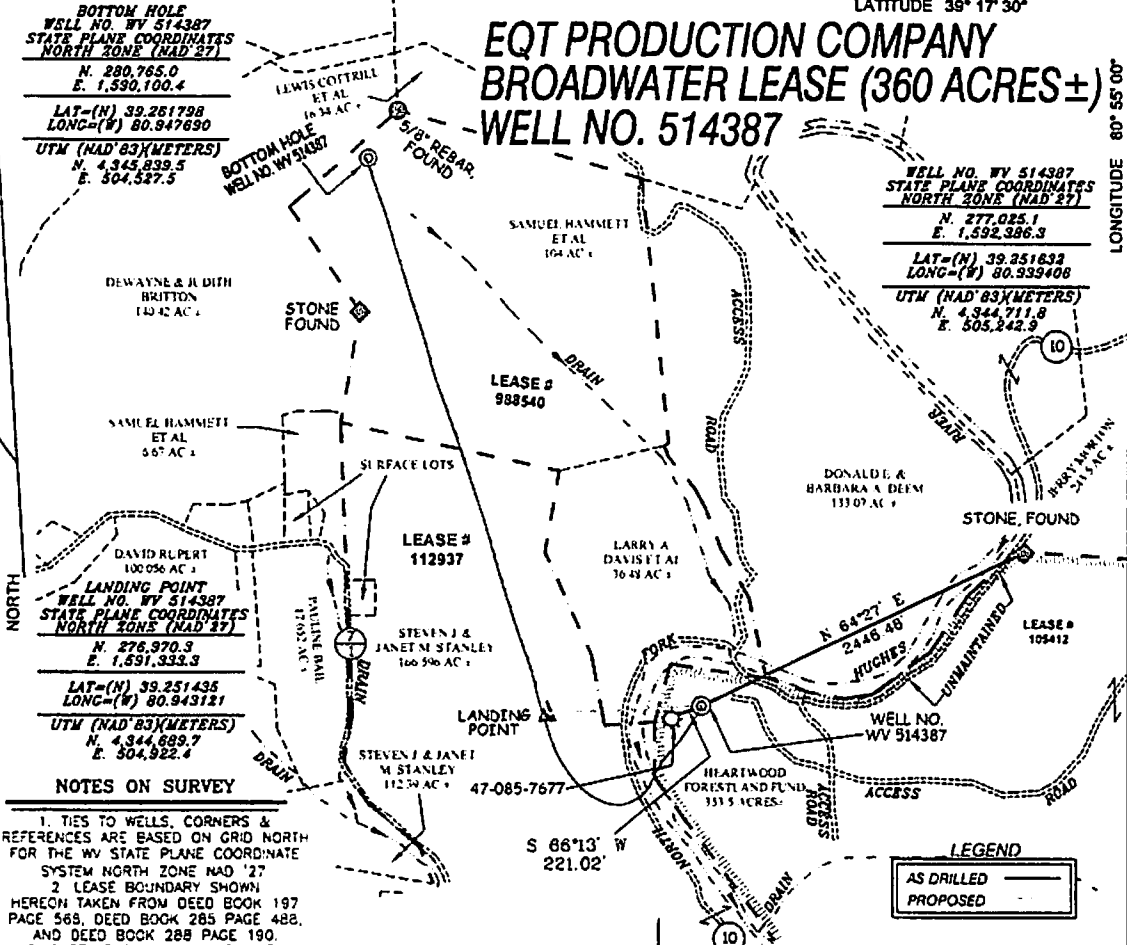
Please insert additional pages as applicable.

Completed by [Signature] Telephone 412-553-7053
Signature [Signature] Title Drilling Manager Date 12/18/13

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

Formation Name	Final Top TVD (ft)	Final Blm TVD (ft)	Final Top MD (ftGL) (ft)	Final Blm MD (ftGL) (ft)	Notes
SAND / SHALE	0	829	0	829	FW @ 127' and 395'
PITTSBURGH COAL	829	834	829	834	SW @ 1,470'
SAND / SHALE	834	1,780.90	834	1,781.00	
MAXTON	1,780.90	1,813.90	1,781.00	1,814.00	
SAND / SHALE	1,813.90	1,999.90	1,814.00	2,000.00	
BIG LIME	1,999.90	2,068.90	2,000.00	2,069.00	
SAND / SHALE	2,068.90	2,111.90	2,069.00	2,112.00	
BIG INJUN	2,111.90	2,178.90	2,112.00	2,179.00	
SAND / SHALE	2,178.90	2,406.80	2,179.00	2,407.00	
WEIR	2,406.80	2,463.80	2,407.00	2,464.00	
SAND / SHALE	2,463.80	2,611.80	2,464.00	2,612.00	
GANTZ	2,611.80	2,634.80	2,612.00	2,635.00	
SAND / SHALE	2,634.80	2,751.80	2,635.00	2,752.00	
FIFTY FOOT	2,751.80	2,774.80	2,752.00	2,775.00	
SAND / SHALE	2,774.80	2,832.80	2,775.00	2,833.00	
THIRTY FOOT	2,832.80	2,876.80	2,833.00	2,877.00	
GORDON	2,876.80	2,949.80	2,877.00	2,950.00	
SAND / SHALE	2,949.80	2,957.80	2,950.00	2,958.00	
FORTH SAND	2,957.80	2,969.80	2,958.00	2,970.00	
SAND / SHALE	2,969.80	3,146.80	2,970.00	3,147.00	
BAYARD	3,146.80	3,174.80	3,147.00	3,175.00	
SAND / SHALE	3,174.80	3,492.80	3,175.00	3,493.00	
WARREN	3,492.80	3,538.80	3,493.00	3,539.00	
SAND / SHALE	3,538.80	3,576.80	3,539.00	3,577.00	
SPEECHLEY	3,576.80	3,610.80	3,577.00	3,611.00	
SAND / SHALE	3,610.80	3,961.50	3,611.00	3,962.00	
BALLTOWN A	3,961.50	3,981.40	3,962.00	3,982.00	
SAND / SHALE	3,981.40	4,219.00	3,982.00	4,225.00	
RILEY	4,219.00	4,547.00	4,225.00	4,572.00	
BENSON	4,547.00	4,805.30	4,572.00	4,847.00	
ALEXANDER	4,805.30	5,535.90	4,847.00	5,755.00	
RHINESTREET	5,535.90	5,753.70	5,755.00	6,028.00	
SONYEA	5,753.70	5,869.20	6,028.00	6,180.00	
Middlesex	5,869.20	5,924.40	6,180.00	6,270.00	
Genesee	5,924.40	5,978.30	6,270.00	6,365.00	
Genesee	5,978.30	6,008.20	6,365.00	6,428.00	
Tully	6,008.20	6,021.30	6,428.00	6,460.00	
Hamilton	6,021.30	6,028.00	6,460.00	6,478.00	
Marcellus	6,028.00		6,478.00		

EQT PRODUCTION COMPANY BROADWATER LEASE (360 ACRES±) WELL NO. 514387



BOTTOM HOLE
WELL NO. WV 514387
STATE PLANE COORDINATES
NORTH ZONE (NAD 27)
N. 280,765.0
E. 1,590,100.4
LAT=(N) 39.261798
LONG=(W) 80.947690
UTM (NAD'83)(METERS)
N. 4,345,839.5
E. 504,527.5

WELL NO. WV 514387
STATE PLANE COORDINATES
NORTH ZONE (NAD 27)
N. 277,025.1
E. 1,592,386.3
LAT=(N) 39.251632
LONG=(W) 80.939408
UTM (NAD'83)(METERS)
N. 4,344,711.8
E. 505,242.9

LANDING POINT
WELL NO. WV 514387
STATE PLANE COORDINATES
NORTH ZONE (NAD 27)
N. 276,970.3
E. 1,591,933.3
LAT=(N) 39.251436
LONG=(W) 80.943121
UTM (NAD'83)(METERS)
N. 4,344,889.7
E. 504,922.4

- NOTES ON SURVEY**
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, DEED BOOK 285 PAGE 482, AND DEED BOOK 288 PAGE 190.
 3. SURFACE OWNER AND ADJONER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF RITCHIE COUNTY IN JULY, 2013.
 4. WELL LAT./LONG. (NAD'27) ESTABLISHED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK).
 5. PLAT UPDATED 08/14/13 TO SHOW THE AS-DRILLED COORDINATES FROM INFORMATION PROVIDED BY EQT ON 08/08/13.

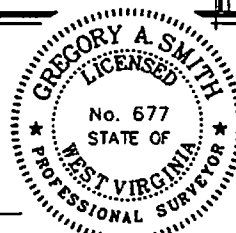
LEGEND
AS DRILLED (solid line)
PROPOSED (dashed line)

AS DRILLED INFORMATION

BOTTOM HOLE WELL NO. WV 514387 STATE PLANE COORDINATES NORTH ZONE (NAD 27) N. 280,765.8 E. 1,590,084.8 LAT=(N) 39.261799 LONG=(W) 80.947745 UTM (NAD'83)(METERS) N. 4,345,839.6 E. 504,522.7	WELL NO. WV 514387 STATE PLANE COORDINATES NORTH ZONE (NAD 27) N. 277,025.1 E. 1,592,386.3 LAT=(N) 39.251632 LONG=(W) 80.939406 UTM (NAD'83)(METERS) N. 4,344,711.8 E. 505,242.9
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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.



(*) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
DATE SEPTEMBER 20, 20 12
REVISED DATE AUGUST 14, 2013 & APRIL 1, 2014
OPERATORS WELL NO. WV 514387
API WELL NO. 47
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1/200 FILE NO. 7566ASDRILLED514387
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 WASTE IF "GAS" PRODUCTION STORAGE ___ DEEP ___ SHALLOW
LOCATION: ELEVATION 787.5 (GROUND) 795 (PROPOSED) 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±), JOE LYNN FAMILY PRESERVATION TRUST (140.48 AC±), & RAYMOND HARDMAN (178 AC±)
PROPOSED WORK: LEASE NO. 105412 / 988540 / 112937
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

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	9/24/2013
Job End Date:	9/29/2013
State:	West Virginia
County:	Ritchie
API Number:	47-085-10014-00-00
Operator Name:	EQT Production
Well Name and Number:	514387
Longitude:	-80.93940000
Latitude:	39.25163000
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,087
Total Base Water Volume (gal):	5,899,340
Total Base Non Water Volume:	268,131



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	89.51796	
Sand	Halliburton	Proppant	Crystalline Silica	14808-60-7	100.00000	10.21521	
MC MX 5	Halliburton	Nitrate Reducing Bacteria	Sodium Nitrate	7631-99-4	60.00000	0.06178	
28% HCl	Halliburton	Dissolves cement & minerals in perforations	Hydrochloric Acid	7647-01-0	28.00000	0.04975	
FR-66	Halliburton	Friction Reducer	Hydrotreated light petroleum distillate	64742-47-8	30.00000	0.02307	
WG-36	Halliburton	Gelling Agent	Guar Gum	9000-30-0	100.00000	0.00647	
LP-65	Halliburton	Scale Inhibitor	Ammonium Chloride	12125-02-9	10.00000	0.00267	
BA-40L	Halliburton	Buffer	Potassium carbonate	584-08-7	60.00000	0.00177	
HAI-OS	Halliburton	Protects casing					

			Methanol	67-56-1	60.00000	0.00037
			Propargyl Alcohol	107-19-7	10.00000	0.00006
SP Breaker	Halliburton	Oxidizing Breaker				
			Sodium Persulfate	7775-27-1	100.00000	0.00015
BE-9	Halliburton	Biocide				
			Tributyl tetradecyl phosphonium chloride	81741-28-8	10.00000	0.00004
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

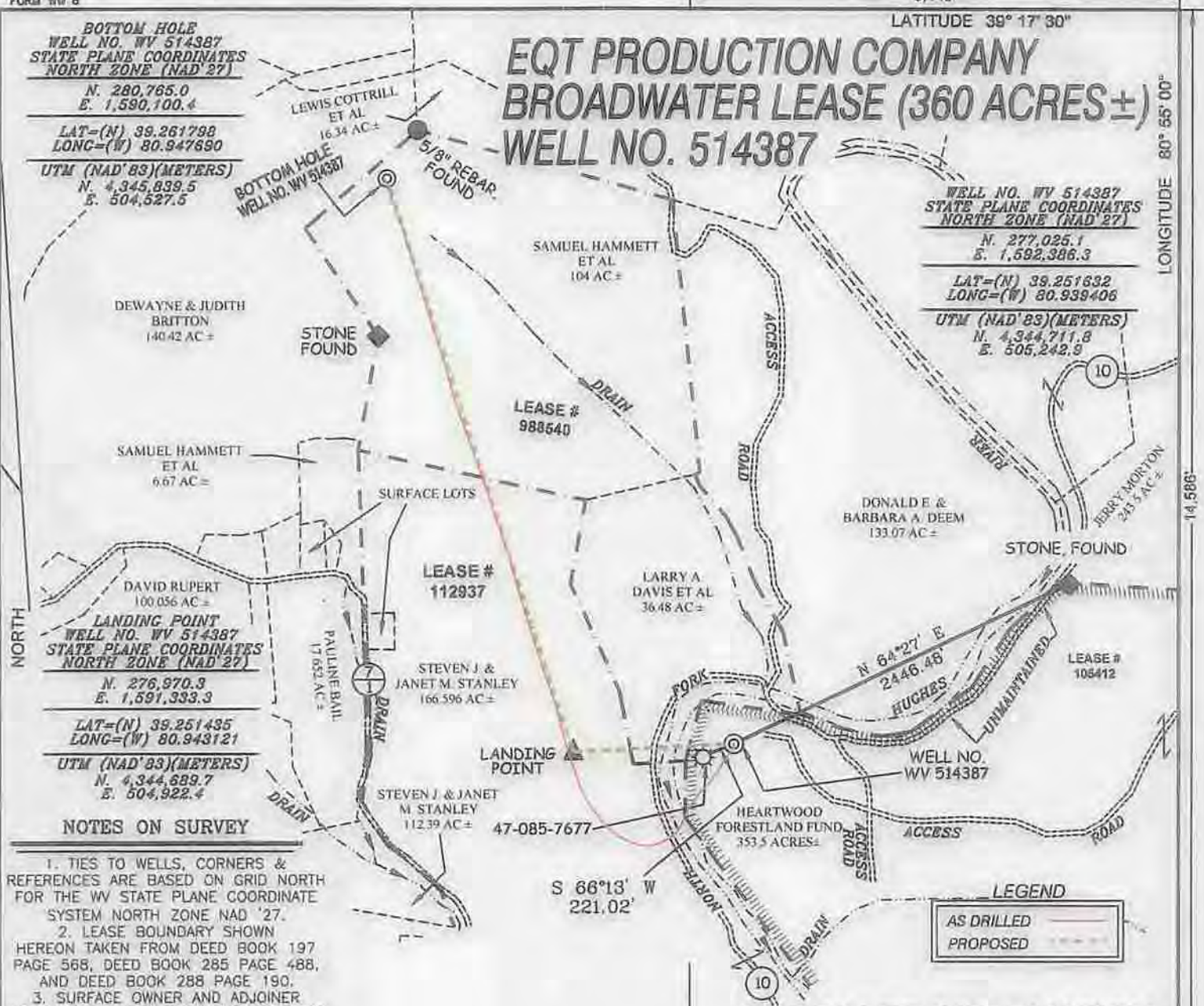
** Information is based on the maximum potential for concentration and thus the total may be over 100%

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. 514387

BOTTOM HOLE
WELL NO. WV 514387
STATE PLANE COORDINATES
NORTH ZONE (NAD'27)
N. 280,785.0
E. 1,590,100.4
LAT=(N) 39.261798
LONG=(W) 80.947690
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LAT=(N) 39.251632
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UTM (NAD'83)(METERS)
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LANDING POINT
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STATE PLANE COORDINATES
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LONG=(W) 80.943121
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NOTES ON SURVEY

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P.S. 677 *Gregory A. Smith*

AS DRILLED INFORMATION

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LAT=(N) 39.261799 LONG=(W) 80.947745	LAT=(N) 39.251632 LONG=(W) 80.939406
UTM (NAD'83)(METERS) N. 4,345,839.3 E. 504,522.7	UTM (NAD'83)(METERS) N. 4,344,711.8 E. 505,242.9

(*) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
DATE SEPTEMBER 20, 2012
REVISED DATE AUGUST 14, 2013 & JUNE 27, 2014
OPERATORS WELL NO. WV 514387
API WELL NO. 47-085-10014
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1/200
FILE NO. 7566ASDRILLED514387R
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 787.5' (GROUND) 785' (PROPOSED) WATERSHED NORTH FORK HUGHES RIVER
DISTRICT CLAY COUNTY RITCHIE QUADRANGLE PENNSBORO 7.5'
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ROYALTY OWNER JEFFERSON BROADWATER HEIRS ET AL (360 AC.±), JOELYNN FAMILY PRESERVATION TRUST (140.48 AC.±) & RAYMOND HARDMAN (178 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
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09122014

COUNTY NAME PERMIT