

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

API 47 - 017 - 6392 County Doddridge District 8
Quad Oxford Pad Name OXF149 Field/Pool Name _____
Farm name Harper, Lucy E. Well Number 512478
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 4,341,349 Easting 517,189
Landing Point of Curve Northing _____ Easting _____
Bottom Hole Northing 4,342,170 Easting 516,789

Elevation (ft) 1240 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 11.5 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 1/21/2014 Date drilling commenced 7/10/2014 Date drilling ceased 11/9/2014
Date completion activities began 5/9/2015 Date completion activities ceased 5/19/2015
Verbal plugging (Y/N) N Date permission granted N/A Granted by N/A

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

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Freshwater depth(s) ft 438 Open mine(s) (Y/N) depths No
Salt water depth(s) ft N/A Void(s) encountered (Y/N) depths No
Coal depth(s) ft 642 Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) No

**No WV Department of
Environmental Protection**

Reviewed by:
JLK 8/21/15
08/21/2015

API 47-017 - 6392 Farm name Harper, Lucy E. Well number 512478

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	MC-50, 81.#/ft	N/A	Yes
Surface	17-1/2"	13-3/8"	1178.72'	New	J-55, 54.5#/ft	N/A	Yes
Coal							
Intermediate 1	12-3/8"	9-5/8"	5303.02'	New	A-500, 40#/ft	1,336'	Yes
Intermediate 2							
Intermediate 3							
Production	8-1/2"	5-1/2"	9,567	New	P-110, 20lb/ft	N/A	No
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	38	15.6	1.18	57.82	0	8
Surface	Class A	771	15.6	1.19	1094	0	8
Coal							
Intermediate 1	Class A / Class A	923 / 215 / 1138	14.2/15.6/15.6	1.26/1.18/1.18	2248.4	0	8
Intermediate 2							
Intermediate 3							
Production	Class A / Class H	585 / 355 / 940	14.2 / 15.2	1.26 / 1.97	1,499	3,200'	72
Tubing							

Drillers TD (ft) 9,572' Loggers TD (ft) _____
 Deepest formation penetrated Marcellus Plug back to (ft) _____
 Plug back procedure _____

Kick off depth (ft) 5,500'

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 20" Conductor - N/A

13-3/8" Surface - Bowspring Centralizers set at 71', 526', 901'
 9-5/8" Intermediate - Bowspring Centralizers set at 408', 872', 1,336', 1,800', 2,265', 2,688', 3,112'
 5-1/2" Production- Composite bodied centralizers on every joint from Shoe track up to 500' above KOP

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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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API 47- 017 - 6392 Farm name Harper, Lucy E. Well number 512478

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
Please See Attached					

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)
						Please	See	Attached

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Please insert additional pages as applicable.

API 47- 017 - 6392 Farm name Harper, Lucy E. Well number 514665

<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
Marcellus	6,685'	TVD 6,854' MD

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 1,250 psi Bottom Hole N/A psi DURATION OF TEST 68.5 hrs

OPEN FLOW Gas 7,245 mcfpd Oil N/A bpd NGL 49.4 bpd Water 700.4 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 QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	0		0		

Please insert additional pages as applicable.

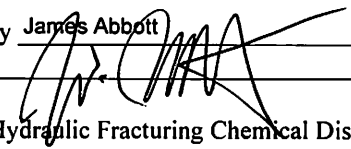
Drilling Contractor Alpha Hunter 8
Address 28407 State Route 7 City Marietta State OH Zip 45750

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

Cementing Company Nabors
Address 380 Southpointe Boulevard Suite 210 City Canonsburg State PA Zip 15317

Stimulating Company FTSI
Address 301 E 18th Street City Houston State TX Zip 77056

Please insert additional pages as applicable.

Completed by James Abbott Telephone 412-553-5996
Signature  Title Completions Director Date 7/30/2015

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

08/21/2015

Drilling Contractor: **Patterson UTI**

Address: **207 Carlton Drive**

City: **Eighty Four** State: **PA**

Zip: **15330**

Cementing Company **Allied Services**

Address **333 Technology Drive, Suite 290**

City **Canonsburg**

State **PA**

Zip **15317**

Logging Company _____

Address _____

City _____

State _____

Zip _____

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Formation Name	Final Top TVD (ftGL) (ft)	Final Btm TVD (ftGL) (ft)
FRESH WATER ZONE	1	438
SANDSTONE/SHALE	1	642
COAL	642	645
SANDSTONE/SHALE	645	1,518.00
MAXTON	1,518.00	1,863.00
BIG LIME	1,863.00	1,923.00
KEENER	1,923.00	2,153.00
WEIR	2,153.00	2,353.00
BEREA	2,353.00	2,365.00
GANTZ	2,365.00	2,448.00
50F	2,448.00	2,557.00
30F	2,557.00	2,596.00
GORDON	2,596.00	2,702.00
4TH	2,702.00	2,839.00
5TH	2,839.00	2,878.00
BAYARD	2,878.00	3,213.00
WARREN	3,213.00	3,283.00
SPEECHLEY	3,283.00	3,810.00
BALLTOWN A	3,810.00	3,965.00
BALLTOWN B	3,965.00	4,160.00
BRADFORD	4,160.00	4,405.00
RILEY	4,405.00	4,837.00
BENSON	4,837.00	5,099.00
ALEXANDER	5,099.00	5,784.50
RHINESTREET	5,784.50	6,044.90
RHINESTREET UPPER	6,044.90	6,315.90
SONYEA	6,315.90	6,470.60
MIDDLESEX	6,470.60	6,526.90
GENESSEE	6,526.90	6,596.90
GENESE0	6,596.90	6,644.10
TULLY	6,644.10	6,665.40
HAMILTON	6,665.40	6,685.30
MARCELLUS	6,685.30	

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512478 47-017-06392-0000 - 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	5/9/2015	11.8	8,645.00	9,617.00	4,735.00	0	1041	0
1	5/9/2015	94.2	8,276.00	8,851.00	3,468.00	51,945	5403	0
2	5/10/2015	97.8	8,108.00	10,017.00	5,254.00	49,067	5162	0
3.01	5/10/2015	3.8	5,576.00	9,610.00	6,503.00	0	336	0
3.02	5/10/2015	3.6	6,521.00	8,768.00	5,569.00	0	373	0
3.03	5/16/2015	9.4	6,194.00	8,100.00	5,280.00	0	1821	0
3	5/16/2015	100	7,292.00	8,146.00	3,914.00	50,643	5266	0
4	5/16/2015	94.3	7,697.00	8,963.00	4,371.00	51,094	5245	0
5	5/16/2015	97.4	8,289.00	8,470.00	5,360.00	52,879	5424	0
6	5/16/2015	95	8,290.00	8,290.00	4,285.00	51,545	6141	0
7	5/17/2015	97.8	7,824.00	8,906.00	4,813.00	50,527	5404	0
8	5/17/2015	90.1	7,858.00	9,203.00	5,364.00	43,271	4959	0
9.01	5/17/2015	9	6,165.00	6,977.00	4,951.00	0	2243	0
9	5/17/2015	101.5	7,479.00	8,252.00	5,074.00	49,603	5305	0
10	5/17/2015	99.5	7,859.00	8,958.00	4,941.00	49,656	5848	0
11	5/18/2015	88.3	8,269.00	9,107.00	5,222.00	52,207	5748	0
12	5/18/2015	90.1	8,040.00	8,944.00	5,321.00	51,702	4937	0
13	5/18/2015	100.1	7,631.00	8,087.00	5,188.00	49,246	5021	0
14	5/18/2015	100.6	7,966.00	8,279.00	5,132.00	49,243	4853	0
15	5/18/2015	102.1	7,844.00	9,104.00	4,508.00	39,121	5414	0
16	5/18/2015	100.8	7,441.00	7,935.00	4,142.00	49,540	5090	0
17	5/19/2015	99.8	7,601.00	8,602.00	5,150.00	51,571	5017	0
18	5/19/2015	100.1	6,921.00	8,133.00	3,994.00	49,298	4999	0

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512478 47-017-06392-0000 - Perforations

Stage Number	Perforation Date	Top Perf Depth (ftKB)	Bottom Perf Depth (ftKB)	Number of Shots	Formation
Initiation Sleeve	1/17/2015	9,565.03	9,566.50	10	MARCELLUS
1	5/9/2015	9,420.00	9,510.00	32	MARCELLUS
2	5/10/2015	9,266.00	9,390.00	40	MARCELLUS
3	5/16/2015	9,124.00	9,242.00	40	MARCELLUS
4	5/16/2015	8,970.00	9,092.00	40	MARCELLUS
5	5/16/2015	8,820.00	8,942.00	40	MARCELLUS
6	5/16/2015	8,668.00	8,788.00	40	MARCELLUS
7	5/17/2015	8,520.00	8,642.00	40	MARCELLUS
8	5/17/2015	8,370.00	8,492.00	40	MARCELLUS
9	5/17/2015	8,220.00	8,342.00	40	MARCELLUS
10	5/17/2015	8,072.00	8,192.00	40	MARCELLUS
11	5/18/2015	7,920.00	8,042.00	40	MARCELLUS
12	5/18/2015	7,770.00	7,892.00	40	MARCELLUS
13	5/18/2015	7,620.00	7,742.00	40	MARCELLUS
14	5/18/2015	7,470.00	7,592.00	40	MARCELLUS
15	5/18/2015	7,320.00	7,442.00	40	MARCELLUS
16	5/18/2015	7,170.00	7,292.00	32	MARCELLUS
17	5/19/2015	7,020.00	7,142.00	40	MARCELLUS
18	5/19/2015	6,870.00	6,992.00	40	MARCELLUS

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Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	5/9/2015
Job End Date:	5/19/2015
State:	West Virginia
County:	Doddridge
API Number:	47-017-06392-00-00
Operator Name:	EQT Production
Well Name and Number:	512478
Longitude:	-80.80104600
Latitude:	39.22116200
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,685
Total Base Water Volume (gal):	4,244,100
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	FIS International	Carrier/Base Fluid	Water	7732-18-5	100.00000	97.02063	None
Sand (Proppant)	FIS International	Proppant	Crystalline Silica	14808-60-7	100.00000	2.44396	None
MC MX 437-5	Multi-Chem	Calcium nitrate solution	Calcium nitrate	10124-37-5	60.00000	0.06220	None
Hydrochloric Acid (15%)	FIS International	Acidizing	Hydrochloric Acid	7647-01-0	15.00000	0.04711	None
FRW-900	FIS International	Friction reducer	Hydrotreated light distillate	64742-47-8	30.00000	0.02601	None
			Alkyl Alcohol	Proprietary	10.00000	0.00867	None
			Oxyalkylated alcohol A	Proprietary	5.00000	0.00433	None
CS-500-SI	FIS International	Scale inhibitor	Ethylene glycol	107-21-1	10.00000	0.00259	None
HVG-1	FIS International	Gelling agent	Petroleum distillate	64742-47-8	55.00000	0.00123	None
			Guar gum	9000-30-0	50.00000	0.00112	None
			Surfactant	68439-51-0	2.00000	0.00004	None

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FE-100L	FTS International	Iron control	Clay	14808-60-7	2.00000	0.00004	None
CI-150	FTS International	Acid Corrosion Inhibitor	Citric acid	77-92-9	55.00000	0.00096	None
			Ethylene glycol	107-21-1	30.00000	0.00019	None
			Organic amine resin salt	Proprietary	30.00000	0.00019	None
			Isopropanol	67-63-0	30.00000	0.00019	None
			Aromatic aldehyde	Proprietary	10.00000	0.00006	None
			Dimethylformamide	68-12-2	10.00000	0.00006	None
			Quaternary ammonium compound	Proprietary	10.00000	0.00006	None
NE-100	FTS International	Non-emulsifier	2-Propanol	67-63-0	10.00000	0.00004	None
			2-Butoxyethanol	111-76-2	10.00000	0.00004	None
			Dodecylbenzenesulfonic acid	27176-87-0	5.00000	0.00002	None
APB-1	FTS International	Breaker	Ammonium persulfate	7727-54-0	95.00000	0.00002	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)

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LEWIS MAXWELL LEASE

2654 ACRES± WELL NO. WV 512478

LATITUDE 39° 15' 00"
NOTES ON SURVEY

1. TIES TO WELLS, REFERENCES AND CORNERS 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 28 PAGE 177.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF DODDRIDGE COUNTY IN JULY, 2013.
4. WELL LAT./LONG. (NAD'27) ESTABLISHED BY DGPS(SURVEY GRADE).
5. PLAT DATED 03/10/10 REVISED 12/26/12 TO EXTEND HORIZONTAL LEG AND CHANGE BOTTOM HOLE COORDINATES, REVISED 06/06/13 TO SHOW NEW TOP HOLE COORDINATES, 08/12/13 TO CONFORM WITH WV CODE R. 35-8, ETC.
6. AS DRILLED INFORMATION PROVIDED BY EQT.

LONGITUDE 80° 47' 30"



BOTTOM HOLE
WELL NO. WV 512478
STATE PLANE COORDINATES
(NORTH ZONE) NAD'27

N. 268,049.8
E. 1,630,135.9

LAT=(N) 39.228576
LONG=(W) 80.805660

UTM (NAD83)(METERS)
N. 4,342,169.7
E. 516,788.8

WELL NO. WV 512478
STATE PLANE COORDINATES
(NORTH ZONE) NAD'27

N. 265,331.0
E. 1,631,403.8

LAT=(N) 39.221162
LONG=(W) 80.801046

UTM (NAD83)(METERS)
N. 4,341,347.9
E. 517,188.9

LEGEND

AS DRILLED ———

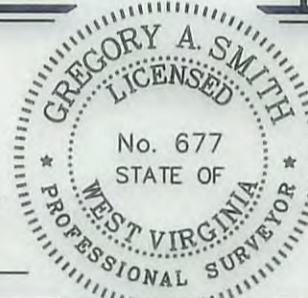
PROPOSED - - - - -

AS DRILLED INFORMATION

BOTTOM HOLE WELL NO. WV 512478 STATE PLANE COORDINATES (NORTH ZONE) NAD'27	WELL NO. WV 512478 STATE PLANE COORDINATES (NORTH ZONE) NAD'27
N. 268,048.1 E. 1,630,133.4	N. 265,331.0 E. 1,631,403.8
LAT=(N) 39.228571 LONG=(W) 80.805669	LAT=(N) 39.221162 LONG=(W) 80.801046
UTM (NAD83)(METERS) N. 4,342,169.2 E. 516,788.1	UTM (NAD83)(METERS) N. 4,341,347.9 E. 517,188.9

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 AUGUST 29, 20 13

REVISED DATE NOVEMBER 24, 20 14

OPERATORS WELL NO. WV 512478

API WELL NO. 47 - 017 - 06392

STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 200

FILE NO. 6980ASDRILLED512478

SCALE 1" = 1,000'

PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIE TO CORS NETWORK)

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 1,240' (GROUND) 1,242.5' (PROPOSED) WATERSHED LEFT FORK

DISTRICT WEST UNION COUNTY DODDRIDGE QUADRANGLE OXFORD 7.5'

SURFACE OWNER LUCY E. HARPER ACREAGE 442.6±

ROYALTY OWNER LEWIS MAXWELL HEIRS LEASE ACREAGE 2,654± LEASE NO. 080616

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