west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

March 24, 2015

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-9502220, issued to EQT PRODUCTION COMPANY, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.

James Martin
Chief

Operator's Well No: 514463
Farm Name: WELLS, VIVIAN J. ET AL
API Well Number: 47-9502220
Permit Type: Horizontal 6A Well
Date Issued: 03/24/2015

03/27/2015

API Number: 95-02220

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.

2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.

3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.

4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.

5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations,* 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.

6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.

7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.

8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.

03/27/2015

WW - 6B
(9/13)

4709502220

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION

1) Well Operator: EQT Production Company | | 095 | 5 | 607
Operator ID | County | District | Quadrangle

2) Operator's Well Number: 514463 Well Pad Name: SHR60

3) Farm Name/Surface Owner: Wells et al. Farm Public Road Access: 60/1

4) Elevation, current ground: 1,018.0 Elevation, proposed post-construction: 1,011.0

5) Well Type: (a) Gas • Oil _____ Underground Storage _____

Other _____

(b) If Gas: Shallow • Deep _____

Horizontal •

6) Existing Pad? Yes or No: No

7) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):

Target formation is Marcellus at a depth of 6,634 with the anticipated thickness to be 52 feet and anticipated target pressure of 2747 PSI

8) Proposed Total Vertical Depth: 6634

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 11,567

11) Proposed Horizontal Leg Length 3,222

12) Approximate Fresh Water Strata Depths: 83, 133, 570, & 906

13) Method to Determine Fresh Water Depth: By offset wells

14) Approximate Saltwater Depths: 1198 & 1865

15) Approximate Coal Seam Depths: 19, 420, 686, 875, & 1315

16) Approximate Depth to Possible Void (coal mine, karst, other): None reported

17) Does proposed well location contain coal seams directly overlying or adjacent to an active mine?

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

03/27/2015

WW - 6B
(3/13)

4709502220

CASING AND TUBING PROGRAM

18)

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: for Drilling	INTERVALS: Left in Well	CEMENT: Fill- up (Cu.Ft.)
Conductor	20	New	MC-50	81	40	40	38 C.T.S.
Fresh Water	13 3/8	New	MC-50	54	992	992	862 C.T.S.
Coal	–	–	–	–	–	–	–
Intermediate	9 5/8	New	MC-50	40	4,857	4,857	1,907 C.T.S.
Production	5 1/2	New	P-110	20	13,623	13,623	See Note 1
Tubing	2 3/8		J-55	4.6			May not be run, if run will be set 100' less than TD
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20	24	0.375	-	Construction	1.18
Fresh Water	13 3/8	17 1/2	0.38	2,480	* See Note 2	1.21
Coal						
Intermediate	9 5/8	12 3/8	0.395	3,590	* See Note 2	1.21
Production	5 1/2	8 1/2	0.361	12,640	-	1.27/1.86
Tubing						
Liners						

Packers

MDG 3/9/2015

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

Note 1: EQT plans to bring the TOC on the production casing cement job 1,000' above kick off point, which is at least 500' above the shallowest production zone, to avoid communication.
Note 2: Reference Variance 2014-17. (Attached)

4709502220

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill and complete a new horizontal well in the Marcellus formation. The vertical drill to go down to an approximate depth of 5582'. Then kick off the horizontal leg into the Marcellus using a slick water frack.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Hydraulic fracturing is completed in accordance with state regulations using water recycled from previously fractured wells and obtained from freshwater sources. This water is mixed with sand and a small percentage (less than 0.3%) of chemicals (including 15% Hydrochloric acid, gelling agent, gel breaker, friction reducer, biocide, and scale inhibitor), referred to in the industry as a "slickwater" completion. Maximum anticipated treating pressures are expected to average approximately 8500 psi, maximum anticipated treating rates are expected to average approximately 100 bpm. Stage lengths vary from 150 to 300 feet. Average approximately 200,000 barrels of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 200,000 pounds of sand per stage.

21) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): ± 31.93 ac

22) Area to be disturbed for well pad only, less access road (acres): ± 5.39 ac

23) Describe centralizer placement for each casing string.

- Surface: Bow spring centralizers – One at the shoe and one spaced every 500'.
- Intermediate: Bow spring centralizers– One cent at the shoe and one spaced every 500'.
- Production: One spaced every 1000' from KOP to Int csg shoe

24) Describe all cement additives associated with each cement type.

Surface (Type 1 Cement): 0-3% Calcium Chloride Used to speed the setting of cement slurries. 0.4% flake. Loss Circulation Material (LCM) is used to combat the loss of the cement slurry to a thief zone.

Intermediate (Type 1 Cement): 0-3% Calcium Chloride. Salt is used in shallow, low temperature formations to speed the setting of cement slurries. 0.4% flake. Loss Circulation Material (LCM) is used to combat the loss of whole drilling fluid or cement slurry (not filtrate) to a thief zone.

Production:

Lead (Type 1 Cement): 0.2-0.7% Lignosulfonate (Retarder). Lengthens thickening time. 0.3% CFR (dispersant). Makes cement easier to mix.

Tail (Type H Cement): 0.25-0.40% Lignosulfonate (Retarder). Lengthens thickening time. 0.2-0.3% CFR (dispersant). This is to make the cement easier to mix. 60 % Calcuim Carbonate. Acid solubility. 0.4-0.6% Halad (fluid loss). Reduces amount of water lost to formation.

25) Proposed borehole conditioning procedures.

Surface: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. To ensure that there is no fill, short trip two stands with no circulation. If there is fill, bring compressors back on and circulate hole clean. A constant rate of higher than expected cuttings volume likely indicates washouts that will not clean up.

Intermediate: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. If foam drilling, to enhance hole cleaning use a soap sweep or increase injection rate & foam concentration.

Production: Pump marker sweep with nut plug to determine actual hole washout. Calculate a gauge holes bottoms up volume. Perform a cleanup cycle by pumping 3-5 bottoms up or until the shakers are clean. Check volume of cuttings coming across the shakers every 15 minutes.

Received

MAR 10 2015

*Note: Attach additional sheets as needed.

03/27/2015

EQT

4709502220

October 24, 2014

Mr. Gene Smith
West Virginia Department of Environmental Protection
Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304

Re: Casing Plan on SHR60 (514460)

Dear Mr. Smith,

For the pilot hole, Well 514460, EQT is requesting the 13-3/8" surface casing be set at 992' KB, 20' below the red rock formation at 972' without setting below elevation. This will cover up red rock formations that have given EQT drilling issues in the past. We will set the 9-5/8" intermediate string at 4857' KB, 50' below the Benson formation. Prior to cementing the 9 5/8" casing, a test will be performed to determine if a deep 9 5/8" casing string is needed. The casing string will then be cemented at 4857' KB. If the test is successful, the remaining wells on the pad will have 9 5/8" casing set at a shallower depth of 2777' KB. If the test is unsuccessful, the remaining wells on the pad will have 9 5/8" casing set at the original permitted depth of 4857' KB. Upon completion of the test, the WV DEP inspector will be notified of the test results and the casing depth for the remaining wells on the pad will be discussed.

The following wells (listed in the subject line) on this pad will be dependent on the results of the pilot hole test referenced above.

514462, 514463, 514464, 514465, 515434, 515435, 515436, & 515437

If you have any questions, please do not hesitate to contact me at (304) 848-0076

Sincerely,

Vicki Roark
Permitting Supervisor - WV

Enc.

Received
Office of Oil & Gas
NOV 17 2014

03/27/2015

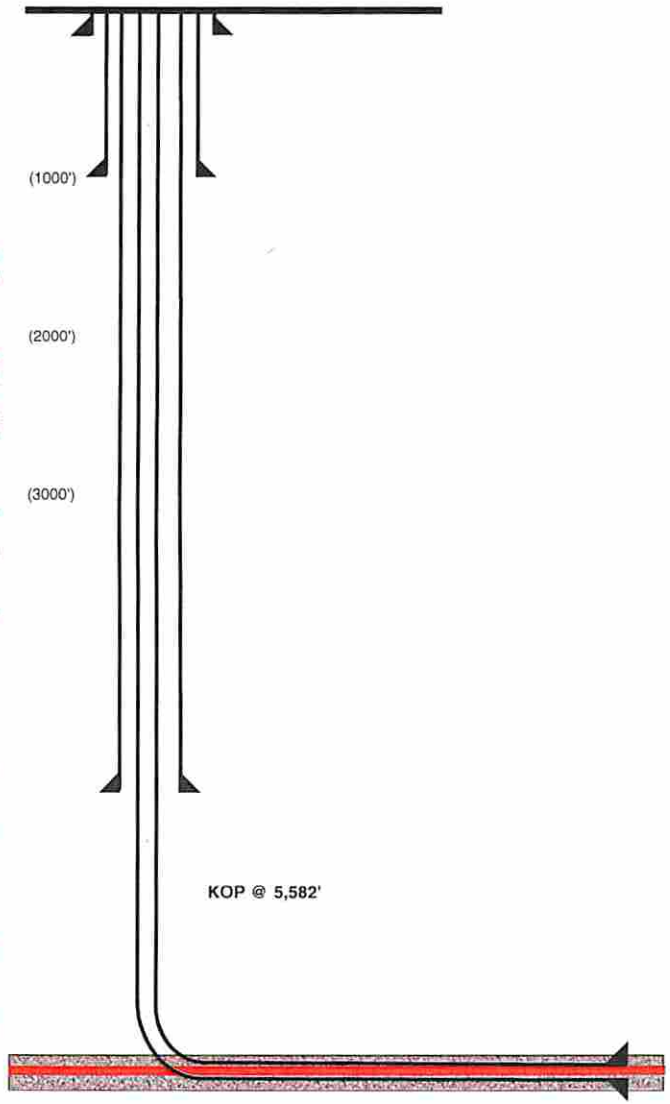
4709502220

03/27/2015

Well 514463 (SHR60H4)
EQT Production
Shirley
Tyler West Virginia

Azimuth 157
Vertical Section 5952

TVD Depth (feet)	Formation Tops (TVD)		
0'			
250'			
500'			
750'			
	Base Fresh Water	906	
1,000'			(1000')
1,250'			
1,500'	Maxton	1438 -	1452
	Big Lime	1680 -	1909
1,750'			
	Base Red Rock	1876	
2,000'			(2000')
	Weir	2084 -	2196
2,250'	-Gantz	2276 -	2328
	-Thirty foot	2466 -	2491
2,500'	-Gordon	2491 -	2522
	-Forth Sand	2630 -	2746
2,750'			
3,000'			(3000')
	-Warren	3155 -	3229
3,250'			
	-Speechley	3376 -	3428
3,500'			
3,750'	-Balltown A	3738 -	3746
4,000'			
4,250'			
4,500'			
4,750'	-Benson	4745 -	4807
	Int. csg pt	4857	
5,000'			
	-Alexander	5113 -	5154
5,250'			
5,500'			
5,750'	-Sonyea	6196 -	6384
	-Middlesex	6384 -	6437
6,000'	-Genesee	6437 -	6521
	-Geneseo	6521 -	6550
6,250'	-Tully	6550 -	6574
	-Hamilton	6574 -	6612
6,500'	Marcellus top	6612	
	Target Inside Marcellus	**6634**	
6,750'	Marcellus Bottom	6623	
7,000'			



Land curve @ 6,634' ft TVD
8,109' ft MD

Est. TD @ 6,634' ft TVD
13,123' ft MD

5,014' ft Lateral

Hole Size (inches)	Casing Type	Size (inches)	Wt (ppf)/Grade
24	Conductor	20	81#/MC-50
17 1/2	Surface	13 3/8	54.5#/J-55
12 3/8	Intermediate	9 5/8	40#/A-500
8 1/2	Production Casing	5 1/2	20#/P-110

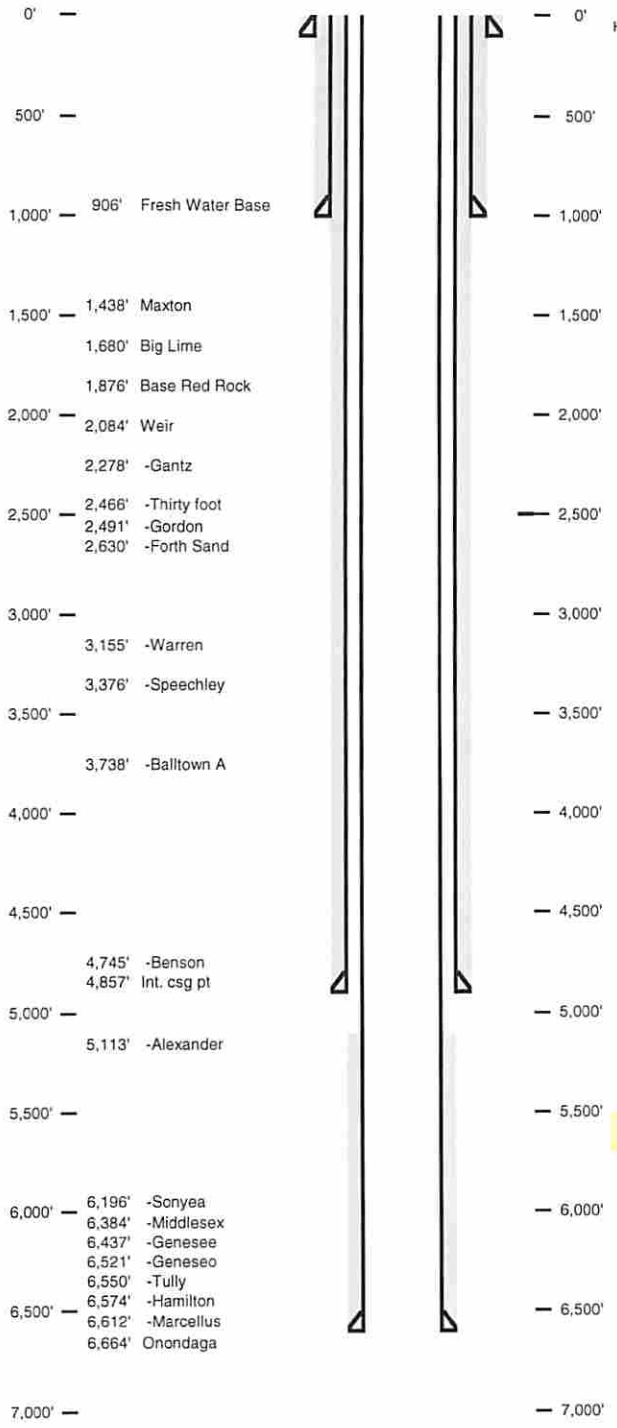
Proposed Well Work:
Drill and complete a new horizontal well in the Marcellus formation.
The vertical drill to go down to an approximate depth of 5582'.
Then kick off the horizontal leg into the Marcellus using a slick water frac.

47095022220

Well Schematic
EQT Production

Well Name	514463 (SHR60H4)
County	Tyler
State	West Virgina

Elevation KB:	1024
Target	Marcellus
Prospect	
Azimuth	157
Vertical Section	5952



Hole Size 24" - 20" Conductor at 40'
Bit Size 17.5"

TOC @ Surface
13 3/8", MC-50, 54.5# @ 992' ft MD
Bit Size 12.375"

TOC @ Surface
9 5/8", MC-50, 40# @ 4,857' ft MD
Bit Size 8.5"

KOP = 5,582' ft MD
10 Deg DLS

Land @ 8,109' ft MD
6,634' ft TVD

5 1/2", P-110, 20# 13,123' ft MD
6,634' ft TVD

4709502220

west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
dep.wv.gov

March 18, 2014

Nabors Completion & Production Services Company
1380 Route 286 Hwy E #121
Indiana PA 15701

Re: Cement Variance Request

Dear Sir or Madam,

This agency is approving a variance request for the cement blend listed below to be used on surface and coal protection strings for the drilling of oil and gas wells in the state of West Virginia. The variance cannot be used without requesting its use on a permit application and approval by this agency:

- Type 1 (2% Calcium Chloride-Accelerator, 0.25% Super Flake-Lost Circulation, 5.2% Water, 94% Type "1" Cement)

If you have any questions regarding this matter feel free to contact me at 304-926-0499, ext. 1653.

Sincerely,

James Peterson by GCS

James Peterson
Environmental Resources Specialist / Permitting

Promoting a healthy environment.

Received

MAR 10 2015

Office of Oil and Gas
WV Dept. of Environmental Protection

03/27/2015

4709502220

west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, SE
Charleston, WV 25304
(304) 926-0450
(304) 926-0452 fax

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
dep.wv.gov

BEFORE THE OFFICE OF OIL AND GAS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
STATE OF WEST VIRGINIA

IN THE MATTER OF A VARIANCE FROM	)	**ORDER NO. 2014 - 17**
REGULATION 35 CSR § 4-11.4/11.5/14.1	)	
AND 35 CSR § 8-9.2.h. 4/5/6/8 OF THE	)	
THE OPERATIONAL	)	
REGULATIONS OF CEMENTING OIL	)	
AND GAS WELLS	)	

REPORT OF THE OFFICE

Nabors Completion & Production Services Co. requests approval of a different cement blend for use in cementing surface and coal protection casing of oil and gas wells.

FINDINGS OF FACT

1.) Nabors Completion & Production Services Co. proposes the following cement blend:

- 2% Calcium Chloride (Accelerator)
- 0.25 % Super Flake (Lost Circulation)
- 94% Type "1" Cement
- 5.20 % Water

2.) Laboratory testing results indicate that the blend listed in Fact No.1 will achieve a 500 psi compressive strength within 6 hours and a 2,435 psi compressive strength within 24 hours.

CONCLUSIONS OF LAW

Pursuant to Articles 6 and 6A, Chapter 22 of the Code of West Virginia, the Office of Oil and Gas has jurisdiction over the subject matter embraced in said notice, and the persons interested therein, and jurisdiction to promulgate the hereinafter prescribed Order.

Pursuant to 35 CSR § 4-11.5 and 35 CSR § 8-9.2.h.8 the Chief of the Office of Oil and Gas may approve different cement blends upon the well operator providing satisfactory proof that different cement types are adequate.

ORDER

It is ordered that Nabors Completion & Production Services Co. may use the cement blend listed in Findings of Fact No.1 for the cementing of surface and coal protection casing of oil and gas wells in the State as may be requested by oil and gas operators. The waiting time on the cement blend shall be **8** hours. The cement blend shall be mixed in strict accordance with the specifications for each blend and weight measurements made on-site to assure the cement slurries meet the minimum weight specifications. A sample shall be collected and, if after **8** hours the cement is not set up, additional time will be required. Nabors Completion & Production Services Co. shall keep a record of cement blend jobs in which the cement blend approved under this order is to be used and made available to the Office of Oil and Gas upon request.

Dated this, the 18th day of March, 2014.

IN THE NAME OF THE STATE OF WEST VIRGINIA

OFFICE OF OIL AND GAS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OF THE STATE OF WEST VIRGINIA

James Martin, Chief
Office of Oil and Gas

4709502220

WW-9
(5/13)

Page 1 of 2
API No. 47 - 095 - 0
Operator's Well No. 514463

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

Fluids/Cuttings Disposal & Reclamation Plan

Operator Name EQT Production Company OP Code

Watershed (HUC10) Morris Run of McElroy Creek Quadrangle Shirley 7.5'

Elevation 1011.0 County Tyler District McElroy

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes x No

Will a pit be used ? Yes: X No:

If so please describe anticipated pit waste: flowback water & residual solids

Will a synthetic liner be used in the pit? Yes X No If so, what ml.? 60

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- • Underground Injection (UIC Permit Number 0014, 8462, 4037)
- • Reuse (at API Number Various)
- • Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain)

Will closed loop system be used ? Yes, The closed loop system will remove drill cuttings from the drilling fluid. The drill cuttings are then prepared for transportation to an off-site disposal facility.

MAG
1-9-2015

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Air is used to drill the top-hole sections of the wellbore, Surface, Intermediate, and Pilot hole sections, water based mud is used to drill the curve and lateral.

If oil based, what type? Synthetic, petroleum, etc

Additives to be used in drilling medium? MILBAR, Viscosifer, Alkalinity Control, Lime, Chloride Salts,Rate Filtration Control, Deflocculant, Lubricant, Detergent, Defoaming, Walnut Shell, X-Cide, SOLTEX Terra. Of the listed chemicals the following are generally used when drilling on air: lubricant, detergent, defoaming. Water based fluids use the following chemicals: MILBAR, viscosifer, alkalinity control, lime, chloride salts, rate filtration control, deflocculant, lubricant, detergent, defoaming, walnut shell, x-cide, SOLTEX terra

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Landfill

- If left in pit and plan to solidify what medium will be used? (Cement, Line, sawdust) n/a
- Landfill or offsite name/permit number? See Attached List

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature
Company Official (Typed Name) Victoria J. Roark
Company Official Title Permitting Supervisor

Received
Office of Oil & Gas
NOV 16 2015

Subscribed and sworn before me this 12 day of November, 20 14

Notary Public

My commission expires 7-27-2018

OFFICIAL SEAL
STATE OF WEST VIRGINIA
NOTARY PUBLIC
Nicholas L. Bumgardner
Rt. 1, Box 4
Liberty, WV 25124
My Commission Expires July 27, 2018

03/27/2015

4709502220

WW-9

Operator's Well No. 514463

Proposed Revegetation Treatment: Acres Disturbed 31.93 Prevegetation pH 6.3

Lime 3 Tons/acre or to correct to pH 6.5

Fertilize type

Fertilizer Amount 1/3 lbs/acre (500 lbs minimum)

Mulch 2 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
KY-31	40	Orchard Grass	15
Alsike Clover	5	Alsike Clover	5
Annual Rye	15		

Attach:
Drawing(s) of road, location,pit and proposed area for land application.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Michael Daff

Comments: Reseed & Mulch any disturbed areas.
Maintain & Upgrade E-n-S as necessary

Title: Oil & Gas Inspector Date: 1-9-2015

Field Reviewed? (✓) Yes ( ) No

Received
Office of Oil & Gas
JAN 16 2015

03/27/2015

EQT Production Water plan
Offsite disposals for Marcellus wells

4709502220

CWS TRUCKING INC.
P.O. Box 391
Williamstown, WV 26187
740-516-3586
Noble County/Noble Township
Permit # 3390

LAD LIQUID ASSETS DISPOSAL INC.
226 Rankin Road
Washington, PA 15301
724-350-2760
724-222-6080
724-229-7034 fax
Ohio County/Wheeling
Permit # USEPA WV 0014

TRI COUNTY WASTE WATER MANAGEMENT, INC.
1487 Toms Run Road
Holbrook, PA 15341
724-627-7178 Plant
724-499-5647 Office
Greene County/Waynesburg
Permit # TC-1009

Waste Management - Meadowfill Landfill
Rt. 2, Box 68 Dawson Drive
Bridgeport, WV 26330
304-326-6027
Permit #SWF-1032-98
Approval #100785WV

Waste Management - Northwestern Landfill
512 E. Dry Road
Parkersburg, WV 26104
304-428-0602
Permit #SWF-1025 WV-0109400
Approval #100833WV

BROAD STREET ENERGY LLC
37 West Broad Street
Suite 1100
Columbus, Ohio 43215
740-516-5381
Washington County/Belpre Twp.
Permit # 8462

TRIAD ENERGY
P.O. Box 430
Reno, OH 45773
740-516-6021 Well
740-374-2940 Reno Office Jennifer
Nobel County/Jackson Township
Permit # 4037

KING EXCAVATING CO.
Advanced Waste Services
101 River Park Drive
New Castle, Pa. 16101
Facility Permit# PAR000029132

4709502220

EQT

Where energy meets innovation.™

Site Specific Safety Plan

EQT SHR 60 Pad

Shirley
Tyler County, WV

For Wells:

_514460___ __514462__ __514463__ _514464___ _514465___ _515434__ _515435___

__515436__ ___515437_ _____ _____ _____ _____ _____

_____ _____ _____ _____ _____ _____ _____

Date Prepared: October 24, 2014

EQT Production

Permitting Supervisor
Title

11-12-14
Date

Michael Duff
WV Oil and Gas Inspector

Oil & Gas Inspector
Title

1-9-2015
Date

Received
Office of Oil & Gas
JAN 16 2015

03/27/2015

WEST VIRGINIA GEOLOGICAL PROGNOSIS

Horizontal Well
514463 (SHR60H4)

47095022200

Drilling Objectives:	Marcellus					
County:	Tyler					
Quad:	Shirley					
Elevation:	1024 KB			1011 GL		
Surface location	Northing:	328537.21	Easting:	1629438.95		
Landing Point	Northing:	327227.96	Easting:	1628858.02	TVD:	6634
Toe location	Northing:	322612.99	Easting:	1630016.96	TVD:	6634
Recommended Azimuth	157 Degrees			Recommended LP to TD:		5,014'

Proposed Logging Suite:

@Intermediate Casing Point: The open hole logs need to consist of Gamma Ray, Neutron, Density, and Induction. CONTACT LUKE SCHANKEN PRIOR TO LOGGING (412.580.8016)
@ Pilothole TD - Run OH logs for evaluation of uphole zones.
An elog should be run for the first well on every horizontal well pad.
Mudloggers to be on location at kickoff point to run samples and measure gas thru both the curve and lateral sections.

Recommended Gas Tests:

1800, 2050, 2600, Imm Csg. Pt., 3400, 4900, 5250, KOP, (Gas test at any mine void)
Gas test during any trip or significant downtime while drilling the lateral section.

ESTIMATED FORMATION TOPS

Formation	Top (TVD)	Base (TVD)	Lithology	Comments	Top RR	Base RR
Fresh Water Zone	1	906		FW @ 83,133,570,906. .	23	559
Coal	19	23	Coal		57	67
Coal	420	424	Coal	SW @ 1198.1865. .	326	345
Coal	686	690	Coal		391	402
Coal	875	879	Coal		425	665
Coal	1315	1319	Coal	No past, present, or current mining	533	990
Maxton	1438	1452	Sandstone		686	701
Big Lime	1680	1909	Limestone		741	752
Weir	2084	2196	Sandstone		836	845
Top Devonian	2278				907	937
-Gantz	2278	2328	Silty Sand	Storage is NOT of concern. Pad is located 350' outside of the Shirley storage	968	972
-Thirty foot	2466	2491	Silty Sand	field protective boundary	1285	1315
-Gordon	2491	2522	Silty Sand		1833	1876
-Forth Sand	2630	2746	Silty Sand			
-Warren	3155	3229	Silty Sand			
-Speechley	3376	3428	Silty Sand			
-Balltown A	3738	3746	Silty Sand			
-Benson	4745	4807	Silty Sand			
Int. csg pt	4857			Preliminarily 50' below base of Benson		
-Alexander	5113	5154	Silty Sand	Base of Offset Well Perforations at 5027' TVD		
-Elks	5154	6196	Gray Shales and Silts			
-Sonyea	6196	6384	Gray shale			
-Middlesex	6384	6437	Shale			
-Genesee	6437	6521	with black shale			
-Geneseo	6521	6550	Black Shale			
-Tully	6550	6574	Limestone			
-Hamilton	6574	6612	calcareous shales			
-Marcellus	6612	6664	Black Shale			
-Purcell	6619	6622	Limestone			
-Lateral Zone	6634	6634		Start Lateral at 6634 ft, drill to 6634 ft		
-Cherry Valley	6644	6648	Limestone			
Onondaga	6664		Limestone			

Target Thickness	52 feet
Max Anticipated Rock Pressure	2747 PSI

Comments:

Note that this is a TVD prog for a horizontal well (azimuth of 157 degrees, target formation = Marcellus). All measurements taken from estimated KB elevation. Water and coal information estimated from surrounding well data.

Intermediate casing point is recommended 50' beneath the Benson to shut off any water production from the Upper Devonian sands. Intermediate casing should be cemented into the surface string, per WV regulations.

The estimated TD is the TVD landing point for the horizontal section of well, with the plan to then drill to a final TVD of 6634' at the toe of the lateral. The geologic structure is unknown at this time.

LATERAL DRILLING TOLERANCES

Manview - Left of borehole:	Deviate as little as possible left to avoid planned lateral 515437
Manview - Right of borehole:	Deviate as little as possible right to avoid planned lateral 515434
Manview - TD:	DO NOT EXTEND beyond recommended wellbore to avoid leaseline

RECOMMENDED CASING POINTS

Fresh Water/Coal	CSG OD	13 3/8	CSG DEPTH:	992	20' below base of red ro
Intermediate 1:	CSG OD	9 5/8	CSG DEPTH:	4857	Preliminarily 50' below
Production:	CSG OD	5 1/2	CSG DEPTH:	@ TD	

J. Dereume/ E. Glick	Author	Date Created	Plat Date
Prog created	JMD	10/21/2014	10/13/2014
Extended lateral length	EVG	2/27/2015	2/24/2015

- [x] COAL
- [x] PILOT HOLE
- [x] CASING PROGRAM
- [x] STORAGE

03/27/2015

4709502220

Well Number: 514463 (SHR60H4)

Casing and Cementing					Deepest Fresh Water: 906'
Type	**Conductor**	**Mine Protection**	**Surface**	**Intermediate**	**Production**
Hole Size, In.	24		17 1/2	12 3/8	8 1/2
Casing Size, OD In.	20	-	13 3/8	9 5/8	5 1/2
Casing Wall Thickness, In.	0.375	-	0.380	0.395	0.361
Depth, MD	**40'**	**-**	**992'**	**4,857'**	**13,623'**
Depth, TVD	**40'**	**-**	**992'**	**4,857'**	**6,634'**
Centralizers Used	Yes	-	Yes	Yes	Yes
Weight/Grade	81#/MC-50	-	54.5#/J-55	40#/A-500	20#/P-110
New or Used	New	-	New	New	New
Pressure Testing	-	-	20% Greater than exp. Pressure	20% Greater than exp. Pressure	20% greater than exp. fracture pressure
After Fracture Pressure Testing	-	-	-	-	20% greater than exp. shut pressure
ID, in	19.25	-	12.615	8.835	4.778
Burst (psi)	-	-	2,730	3,950	12,640
Collapse (psi)	-	-	1,130	2,570	11,100
Tension (mlbs)	-	-	514	493	587
Cement Class	-	-	-	-	H
Cement Type	Construction	-	1	1	-
Cement Yield	1.18	-	1.21	1.21	1.27/1.86
Meets API Standards	-	-	Yes	Yes	Yes
WOC Time	-	-	Min. 8 hrs	Min. 8 hrs	Min. 8 hrs
Top of Cement (Planned)	Surface	-	Surface	Surface	5,057'
Fill (ft.)	40'	-	992'	4,857'	8,066'
Percent Excess	-	-	20	20	10
Est. Volume (cu ft)	38	-	862	1,907	2,046
Est. Volume (BBLS)	7	-	153	340	364

03/27/2015

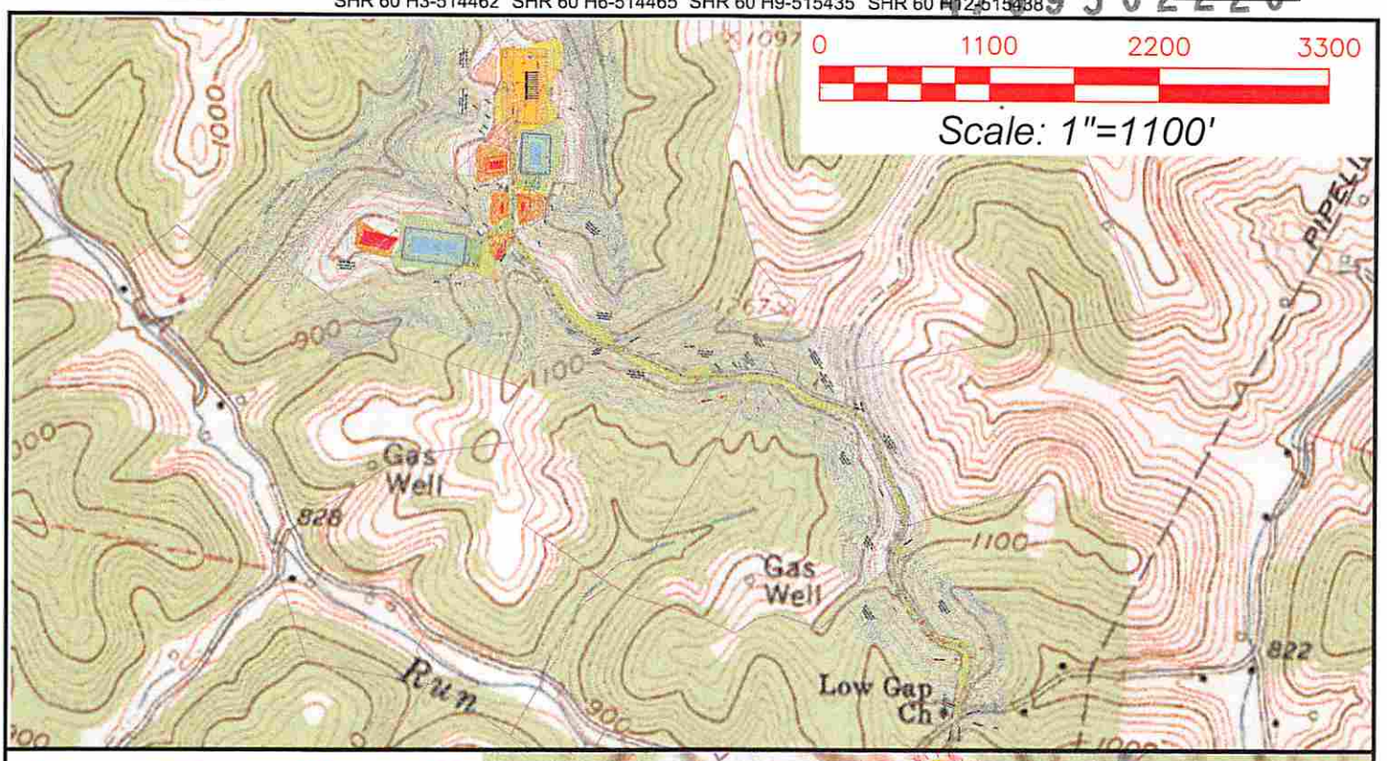
SSP P926A

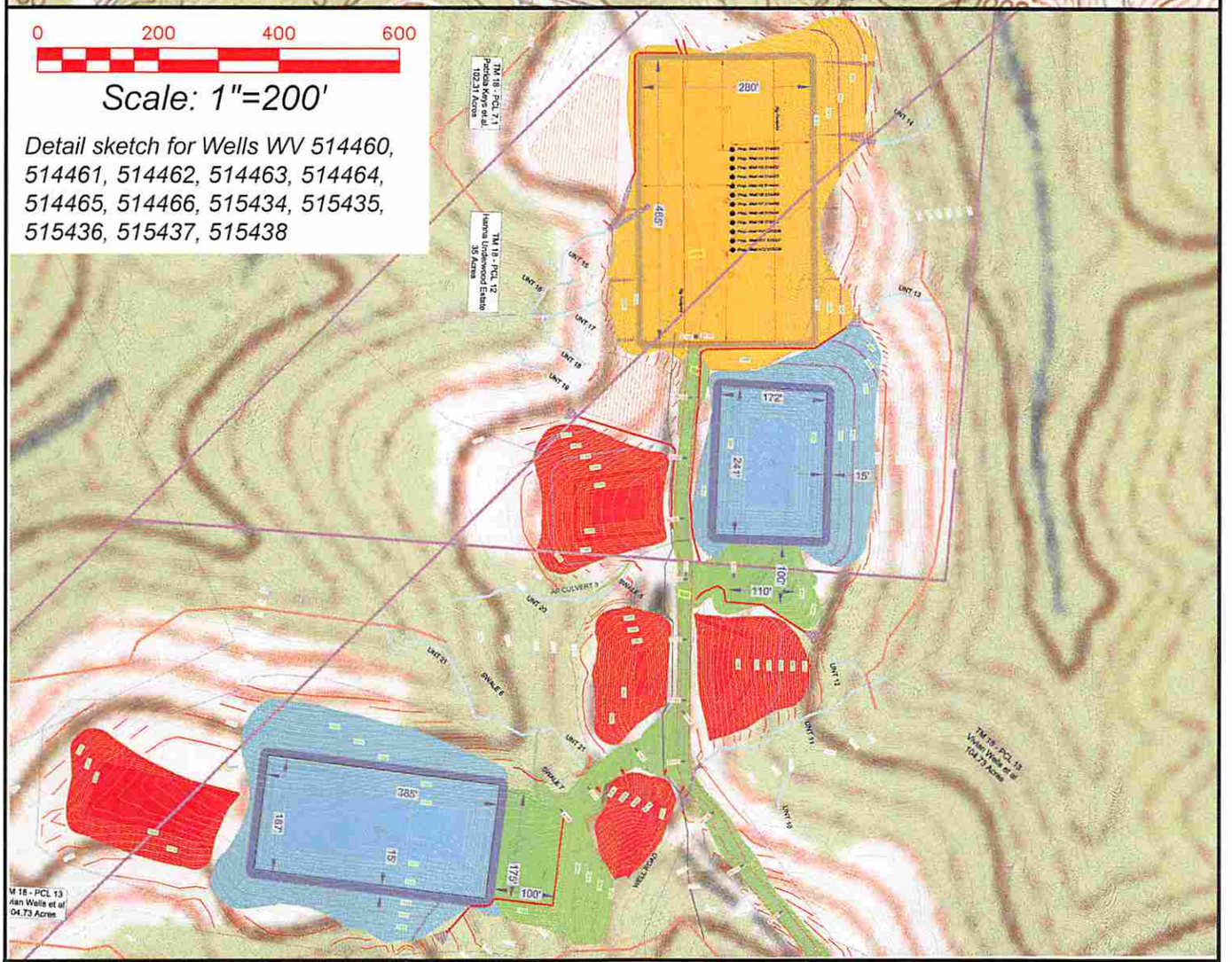
WW-9

SHR 60 H1-514460 SHR 60 H4-514463 SHR 60 H7-514466 SHR 60 H10-515436
SHR 60 H2-514461 SHR 60 H5-514464 SHR 60 H8-515434 SHR 60 H11-515437
SHR 60 H3-514462 SHR 60 H6-514465 SHR 60 H9-515435 SHR 60 H12-515438

API 47 095 02220

PAGE 1 OF 1





Shirley 7.5' USGS QUADRANGLE		Proposed Disturbance Area	
Projected culvert inventory. (for bid purposes only)		Well Site Location	See Site Plan
15" minimum diameter culverts	See Site Plan	Proposed Access Road	See Site Plan
24" minimum diameter culverts	See Site Plan	Approximate Total Disturbance	See Site Plan
DRAWN BY: Dale Tomlin PS	DATE: October 24, 2014	FILE NO. 208-13	DRAWING FILE NO. ACAD-208-13-Rec Plan

Note: SEE SITE PLAN OF SHR 60 FOR COMPLETE GRADING & DRAINAGE CONSTRUCTION INCLUDING EROSION & SEDIMENT CONTROL DETAILS, ETC.

03/27/2015

Received
Office of Oil & Gas
NOV 17 2014

SURVEYING AND MAPPING SERVICES PERFORMED BY:

ALLEGHENY SURVEYS, INC.

1-800-482-8606

Birch River Office
Phone: (304) 649-8606
Fax: (304) 649-8608

237 Birch River Road
P.O. Box 438
Birch River, WV 26610

Topo Quad: Shirley 7.5' Scale: 1"=1000'

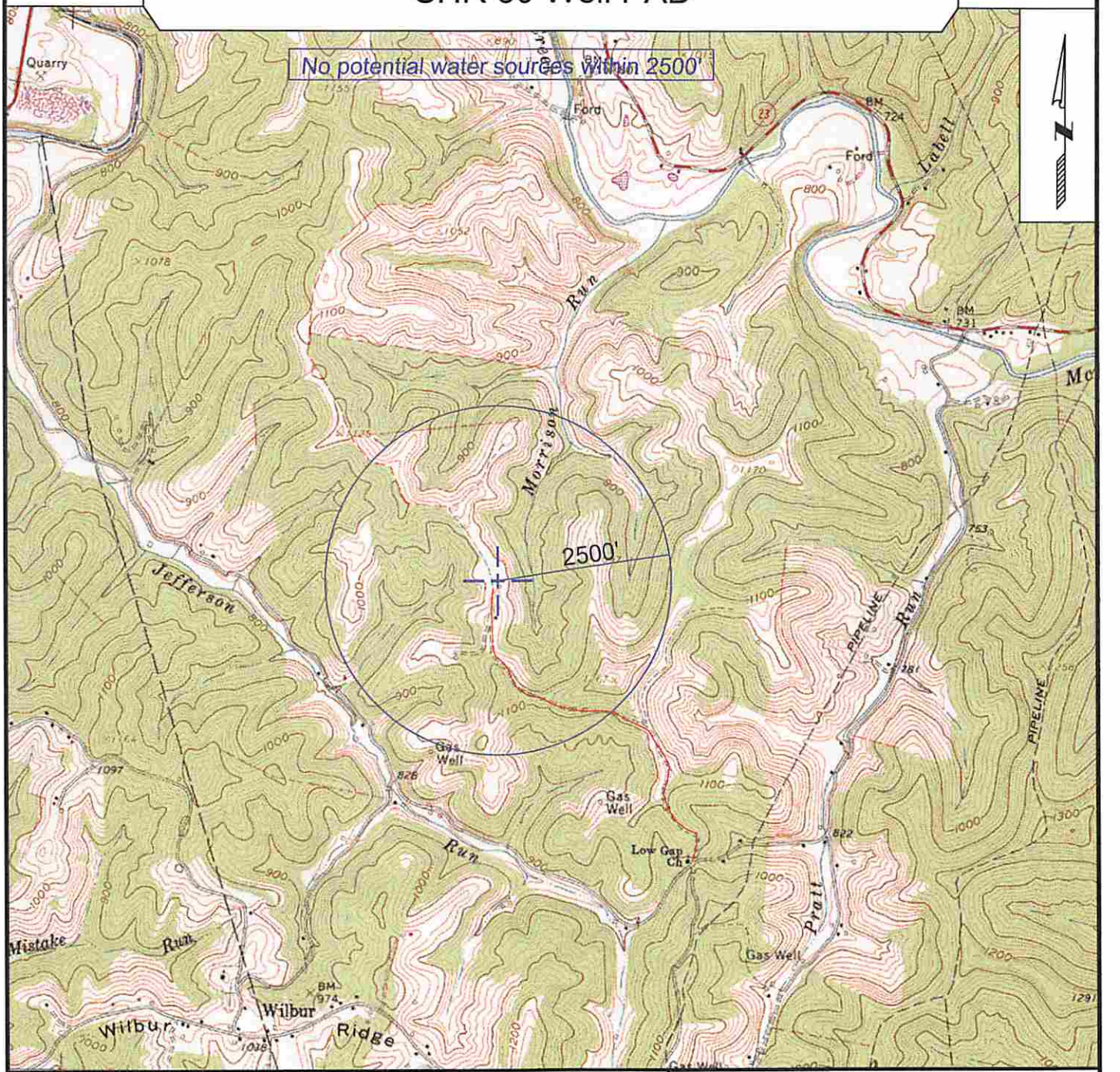
County: Tyler Date: October 30, 2014

District: McElroy Project No: 208-12-C-13

4709502220

Water

SHR 60 Well PAD



SURVEYING AND MAPPING SERVICES PERFORMED BY:

ALLEGHENY SURVEYS, INC.

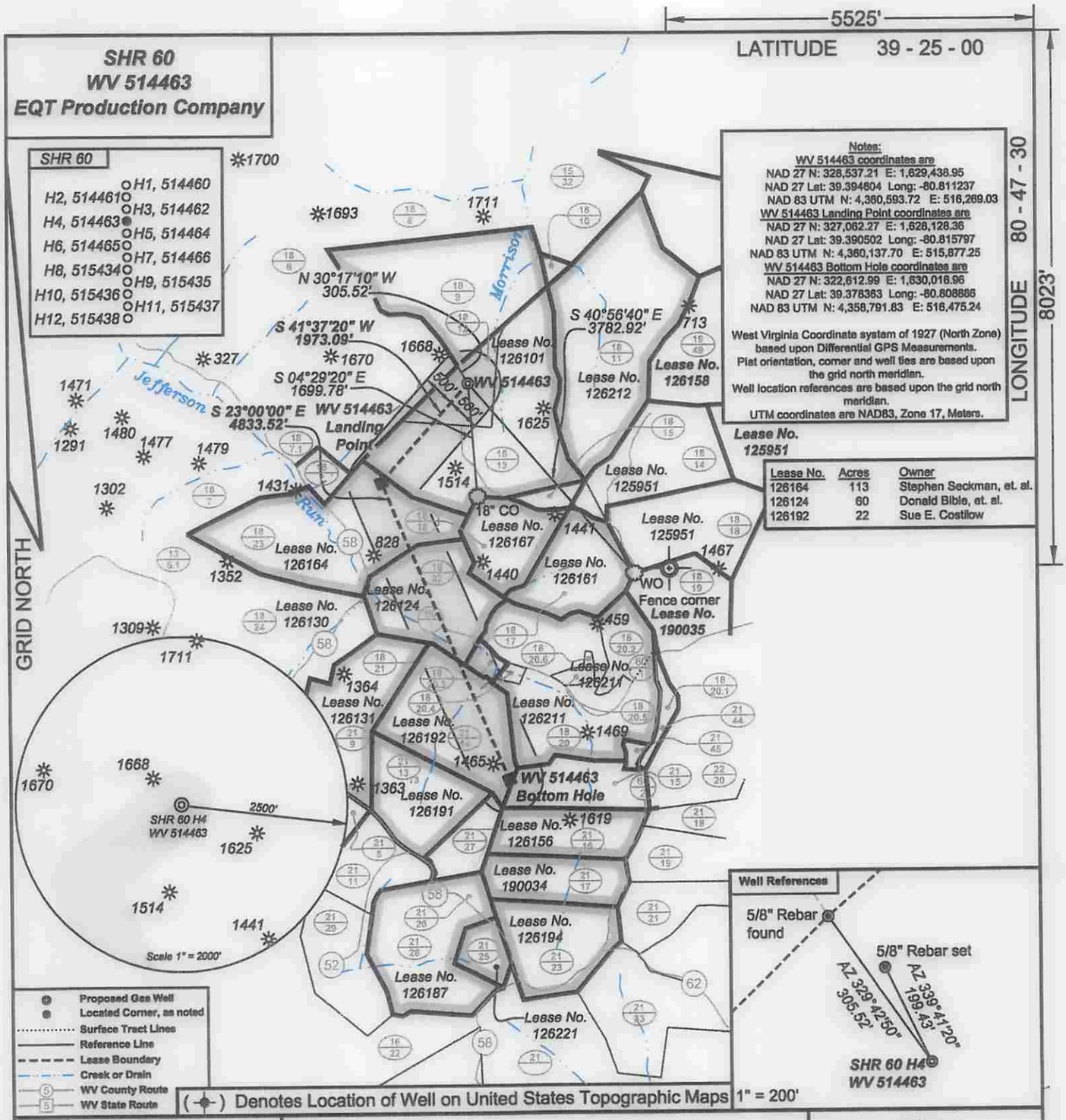
1-800-482-8606
237 Birch River Road
Birch River, WV 26610
PH: (304) 649-8606
FAX: (304) 649-8608

PREPARED FOR:

EQT Production Company

P.O. Box 280
Bridgeport, WV 26330

03/27/2015



ALLEGHENY SURVEYS, INC.

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 Department of Environmental Protection.

Ben Singleton
P.S. 2092

Ben R. Singleton LICENSED NO. 2092 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR SEAL

FILE NO: 208-13
DRAWING NO: 208-13 SHR 60 H4
SCALE: 1" = 2000'
MINIMUM DEGREE OF ACCURACY: 1:2500
PROVEN SOURCE OF ELEVATION: NGS CORS Station

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

DATE: March 18 20 15
OPERATOR'S WELL NO.: WV 514463
API WELL NO
47 - 95 - 02220 H6A
STATE COUNTY PERMIT

WELL TYPE: ☐ OIL ☒ GAS ☐ LIQUID INJECTION ☐ WASTE DISPOSAL
(IF GAS) PRODUCTION : ☐ STORAGE ☐ DEEP ☒ SHALLOW
LOCATION: ELEVATION: Ground 1,015' Proposed 1,011' WATERSHED Morrison Run of McElroy Creek QUADRANGLE: Shirley
DISTRICT: McElroy COUNTY: Tyler
SURFACE OWNER: Vivian J. Wells, et al. ACREAGE: 33.36
ROYALTY OWNER: George Birklein, et al. LEASE NO: 126101 ACREAGE: 240
PROPOSED WORK: ☒ DRILL ☐ CONVERT ☐ DRILL DEEPER ☒ FRACTURE OR STIMULATE ☐ PLUG OFF OLD FORMATION
☐ PERFORATE NEW FORMATION ☐ OTHER PHYSICAL CHANGE IN WELL (SPECIFY)
☐ PLUG AND ABANDON ☐ CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus ESTIMATED DEPTH: TVD 6,634'

03/27/2015

WELL OPERATOR: EQT Production Company
ADDRESS: 115 Professional Place PO Box 280, Bridgeport, WV 26330
DESIGNATED AGENT: Rex C. Ray
ADDRESS: 115 Professional Place PO Box 280, Bridgeport, WV 26330