



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. Huffiman, Cabinet Secretary
www.dep.wv.gov

May 15, 2014

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-10302979, issued to HG ENERGY, LLC, 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.

A blue ink signature of James Martin, Chief, is written over the text of the letter.

James Martin
Chief

Operator's Well No: N-5H
Farm Name: WV DNR
API Well Number: 47-10302979
Permit Type: Horizontal 6A Well
Date Issued: 05/15/2014

Promoting a healthy environment.

05/16/2014

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

47 103 02979

WW-6B
(9/13)

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: HG Energy, LLC 494497948 Wetzel Green Centerpoint 7.5'
Operator ID County District Quadrangle

103 5 286

2) Operator's Well Number: Stringtown 503 N-5H Well Pad Name: Stringtown 503

3) Farm Name/Surface Owner: WV DNR Public Road Access: SLR 56

4) Elevation, current ground: 1499' Elevation, proposed post-construction: 1474'

5) Well Type (a) Gas Oil Underground Storage
Other

(b) If Gas Shallow Deep
Horizontal

D-16
2-12-14

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus, Approximate TVD 7383 feet, approximate thickness 50 feet, associated pressure gradient @ 1.1 psi/foot

8) Proposed Total Vertical Depth: 7383 TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 14,327 TMD

11) Proposed Horizontal Leg Length: 8,833'

12) Approximate Fresh Water Strata Depths: 400'

13) Method to Determine Fresh Water Depths: Historical data based on surrounding wells

14) Approximate Saltwater Depths: 1575'

15) Approximate Coal Seam Depths: 1255'

16) Approximate Depth to Possible Void (coal mine, karst, other): -

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes No

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

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FEB 18 2014

Page 1 of 3

WW-6B
(9/13)

47 10302979

18)

CASING AND TUBING PROGRAM

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	20"	New	H-40	94#	60'	60'	NA (Drilled in)
Fresh Water	13 3/8"	New	J-55	54.5#	1424'	1424'	1400, CTS
Coal							
Intermediate	9 5/8"	New	J-55	40#	3475'	3475'	1550, CTS
Production	5 1/2"	New	P-110	20#	14327'	14327'	4000
Tubing	2 3/8"	New	L-80 or N-80	4.7#	NA	8000'	NA
Liners							

DMH
2-12-14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	20"	0.375"	1530#	NA	NA (Drilled in)
Fresh Water	13 3/8"	17 1/2"	0.38"	2740#	Class A	1.21
Coal	NA					
Intermediate	9 5/8"	12 1/4"	0.395"	3950 #	Gas Block - Class A	Tail - 1.18 Lead - 1.29
Production	5 1/2"	8 1/2"	0.361"	12640 #	50/50 - ASC	Tail - 1.5 Lead - 1.31
Tubing	2 3/8"	4.778"	0.19"	11200 #	NA	NA
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

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FEB 18 2014

Page 2 of 3

05/16/2014

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

Drill, case, cement and complete a horizontal Marcellus well.

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

Plan to hydraulically fracture/stimulate the well with "slickwater" frac technique. Will utilize a plug and perforation technique through cased hole.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 3.66 acres

22) Area to be disturbed for well pad only, less access road (acres): 2.43 acres

23) Describe centralizer placement for each casing string:

DmH 2-12-14

Conductor: NA
Surface: Centralizer every 3 joints or 120'
Intermediate: Centralizer every 3 joints or 120'
Production Centralizer Program: Run 1 spiral centralizer every 120'

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

Conductor: NA - Drilled in (Casing while drilling, no annulus)
Surface: Premium NE-1 (Class A Cement) (see attachment for complete description)
Intermediate: Lead: Class A Cement / Tail: Class A Cement (see attachment for complete description)
Production: Lead: Class A (50/50) / Tail: Class A (ASC) (see attachment for complete description)

25) Proposed borehole conditioning procedures:

The wellbore will be properly circulated at TD of each section until as much of the residual drill cuttings have been removed from the wellbore as possible, residual drilling gas has been circulated out and until the mud and wellbore are both constant and stable. Mud properties will be adjusted if needed. Hole cleaning times may vary from well to well, hole section to hole section.

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FEB 18 2014

*Note: Attach additional sheets as needed.

47 10302979

Cement Additives for WW-6B

Conductor: N/A – Drilled in / Sanded in (Casing While Drilling, no annulus)

Surface Casing:

Premium NE – 1 (Class A Cement) + 3% bwoc calcium
Chloride + 0.75 gals/100 sack FP-12L (ANTI-FOAM) + 0.25
Lbs/sack Cello Flake (Lost Circulation Material)

Intermediate Casing:

Lead:

Type 1 Cement + 0.75 gals/100 sack FP (ANTI-FOAM)
12L + 0.25 lbs/sack Cello Flake (Lost Circulation)

Tail: Gas-Blok Blend

Premium NE-1 (Class A Cement) + 0.55% bwoc BA-10A (Bonding Agent) + 1% bwoc
EC-1 (Bonding Agent) + 0.5% bwoc Sodium Metasilicate (Viscosifier) + 0.25 lbs/sack
Cello Flake (Lost Circulation) + 0.75 gals/100 sack FP-12L (Anti-Foam)

Production:

Lead #1

7411
2-12-14

(50:50) Poz (Fly Ash): Premium NE – 1 (Class A Cement) + 0.25% bwoc R-3 (Retarder) + 1% bwoc EC-1 (Bonding Agent)
+ 0.75 gals/100 0.25% bwoc R-3 (Retarder) + 1% bwoc EC-1 (Bonding Agent) + 0.75 gals/100 sack FP-12L (Anti-Foam) +
0.125 lbs/sack Cello Flake (Lost Circulation) + 0.5% bwoc MPA-170 (Multi Purpose Additive), ie Fluid Loss, Free Water
and Stabilization

Lead #2

676 sacks (50:50) Poz (Fly Ash): Premium NE-1 (Class A Cement) + 0.125 lbs/sack Cello Flake (Lost Circulation) + 0.3%
bwoc CD-32 (Dispersant) + 0.4% bwoc BA-59 (Bonding Agent) + 0.5% bwoc MPA-170 (Multi Purpose Additive), sack +
7.5 lbs/sack BA-90 (Bonding Agent) + 0.3% bwoc R-3 (Retarder) + 0.75 gals/100 sack FP-12L (Anti-Foam)

Lead #3

Premium NE-1 (Class A Cement) + 0.5% bwoc R-3 (Retarder) + 0.75 gals/100 sack FP-12L (Anti-foam) + 0.125 lbs/sack
Cello Flake (Lost Circulation) + 0.25% bwoc CD-32 (Dispersant) + 0.6% bwoc Sodium Metasilicate (Viscosifier) + 1.2%
bwoc BA-10A (Bonding Agent) + 10 lbs/sack ASCA-1 (Solubility Aid).

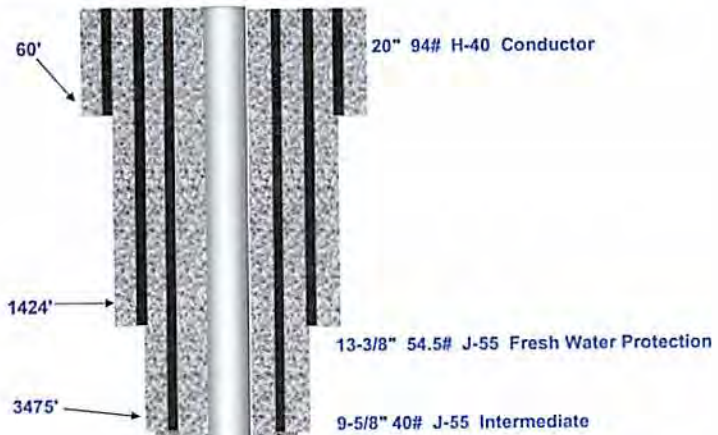
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FEB 18 2014
Office of Oil and Gas
WV Dept. of Environmental Protection
05/16/2014

WELL: Stringtown 503 N -5H

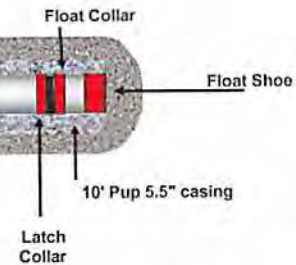
Horizontal Marcellus Casing Schematic

DRAWING NOT TO SCALE



DMH
2-12-14

Production Casing: Approx. 14,327' of 5-1/2" 20# P-110 Production



received

FEB 18 2014

47 10302979

47 10302979

WW-9
(9/13)

API Number 47 - _____ - _____
Operator's Well No. Stringtown 503 N-5H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name HG Energy, LLC OP Code 494497948

Watershed (HUC 10) Fluharty Fork, Piney Fork Watershed Quadrangle Centerpoint 7.5'

Elevation 1474' County Wetzel District Green

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

Will a pit be used? Yes No

If so, please describe anticipated pit waste: _____

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

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection (UIC Permit Number _____)
- Reuse (at API Number _____)
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain Closed Loop Disposal System)

Will closed loop system be used? If so, describe: Cuttings and fluids will be collected in a closed loop drilling system, re-used or hauled to an approved disposal site or landfill

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air, freshwater

-If oil based, what type? Synthetic, petroleum, etc. NA

Additives to be used in drilling medium? Water, soap, KCl, barite

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

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) _____

-Landfill or offsite name/permit number? Wetzel County Landfill (Permit # 1110222-WV52)

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 Diane White

Company Official (Typed Name) Diane White

Company Official Title Accountant

FEB 18 2014

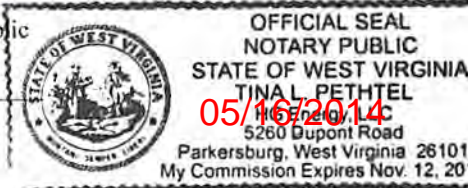
Office of Oil and Gas
WV Dept. of Environmental Protection

Subscribed and sworn before me this 13th day of February, 20 14

Tina L. Pethel

Notary Public

My commission expires Nov. 12, 2018



DAU
2-13-14

47 10302979

Form WW-9

Operator's Well No. Stringtown 503 N-5H

HG Energy, LLC

Proposed Revegetation Treatment: Acres Disturbed 3.67 Prevegetation pH _____

Lime 2 Tons/acre or to correct to pH 6.5

Fertilizer type 10/20/20

Fertilizer amount 500 lbs/acre

Mulch 2 Tons/acre

Seed Mixtures

Temporary

Permanent

Seed Type	lbs/acre
Tall Fescue	40
Ladino Clover	5

Seed Type	lbs/acre
Tall Fescue	40
Ladino Clover	5

Attach:

Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: 

Comments: _____

Received

Title: 0.1 + 6.0 Insects

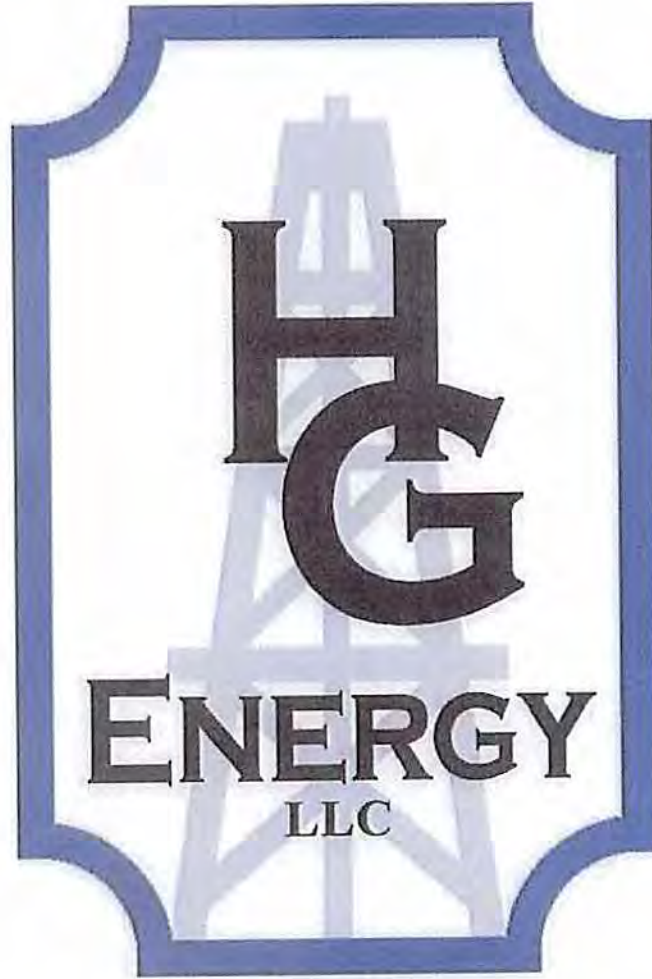
Date: 2-12-14

Field Reviewed? Yes

No

FEB 18 2014

503 Site Safety Plan



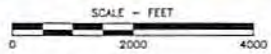
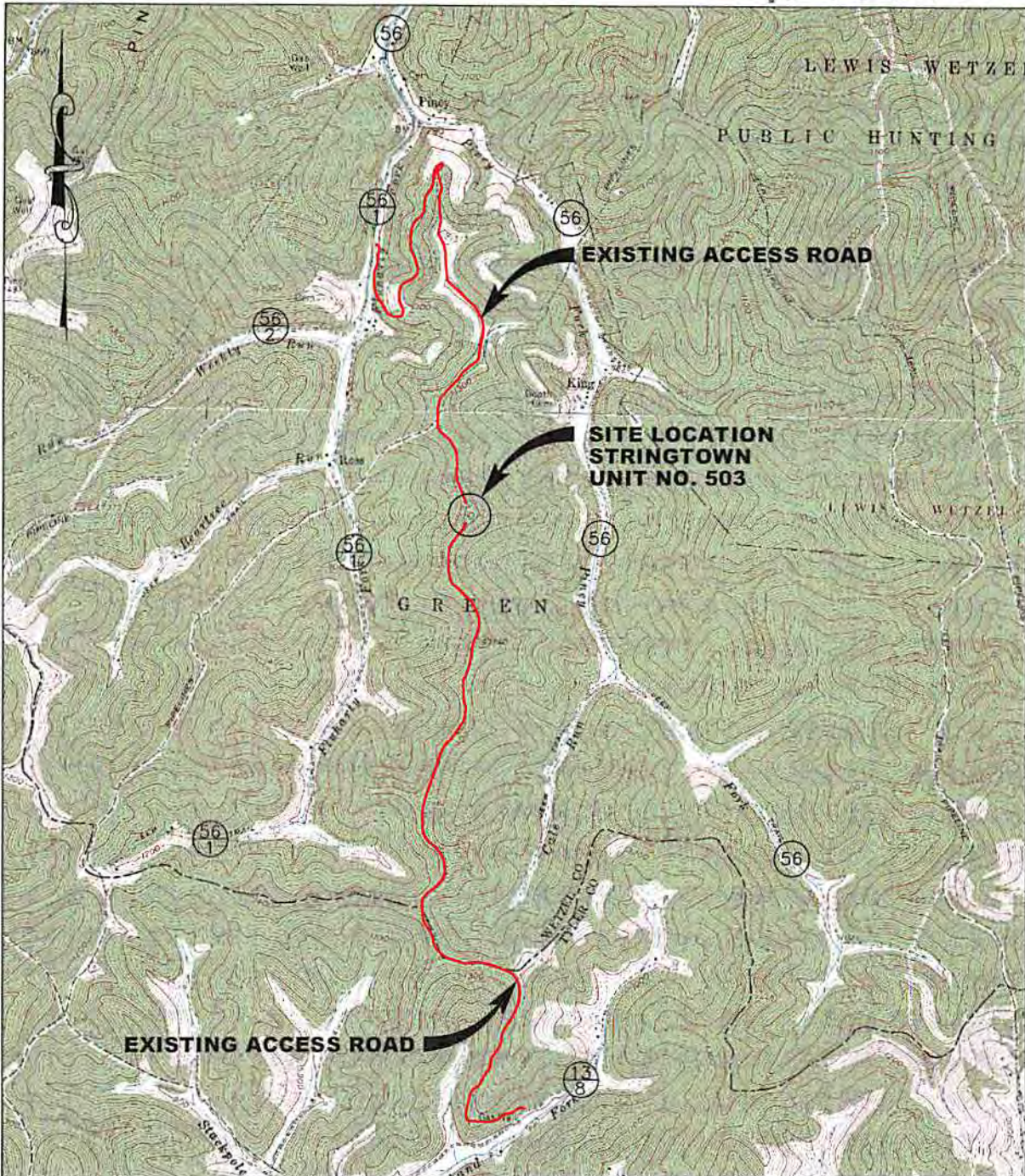
The Following includes a Well Drilling Procedures and Site Safety Plan submitted by:

Name: Matthew J. McGuire Date: _____

Title: HSE Manager, HG Energy, LLC.

WV DEP Approval by: [Signature] Date: 2-12-14

Title: Oil + Gas Inspector, West Virginia DEP **Received**



LOCATION MAP



QUADRANGLE LOCATION

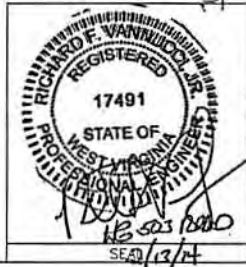
ACCESS ROAD MAP - STRINGTOWN UNIT NO. 503

GREEN TOWNSHIP
 WETZEL COUNTY, WEST VIRGINIA
 McELROY TOWNSHIP
 TYLER COUNTY, WEST VIRGINIA

Received

FEB 18 2014

PREPARED FOR
 HG ENERGY, LLC
 VIENNA, WEST VIRGINIA



APPROVED	RFV 02/13/2014
CHECKED	RFV 02/13/2014
DRAWN	MFR 02/13/2014
PROJECT No.	4000-PA006248
DRAWING NUMBER	PA006248-01
SHEET	1



Penn E&R
 Environmental & Remediation, Inc.

100 RYAN COURT, PITTSBURGH, PA 15204
 412-722-1222

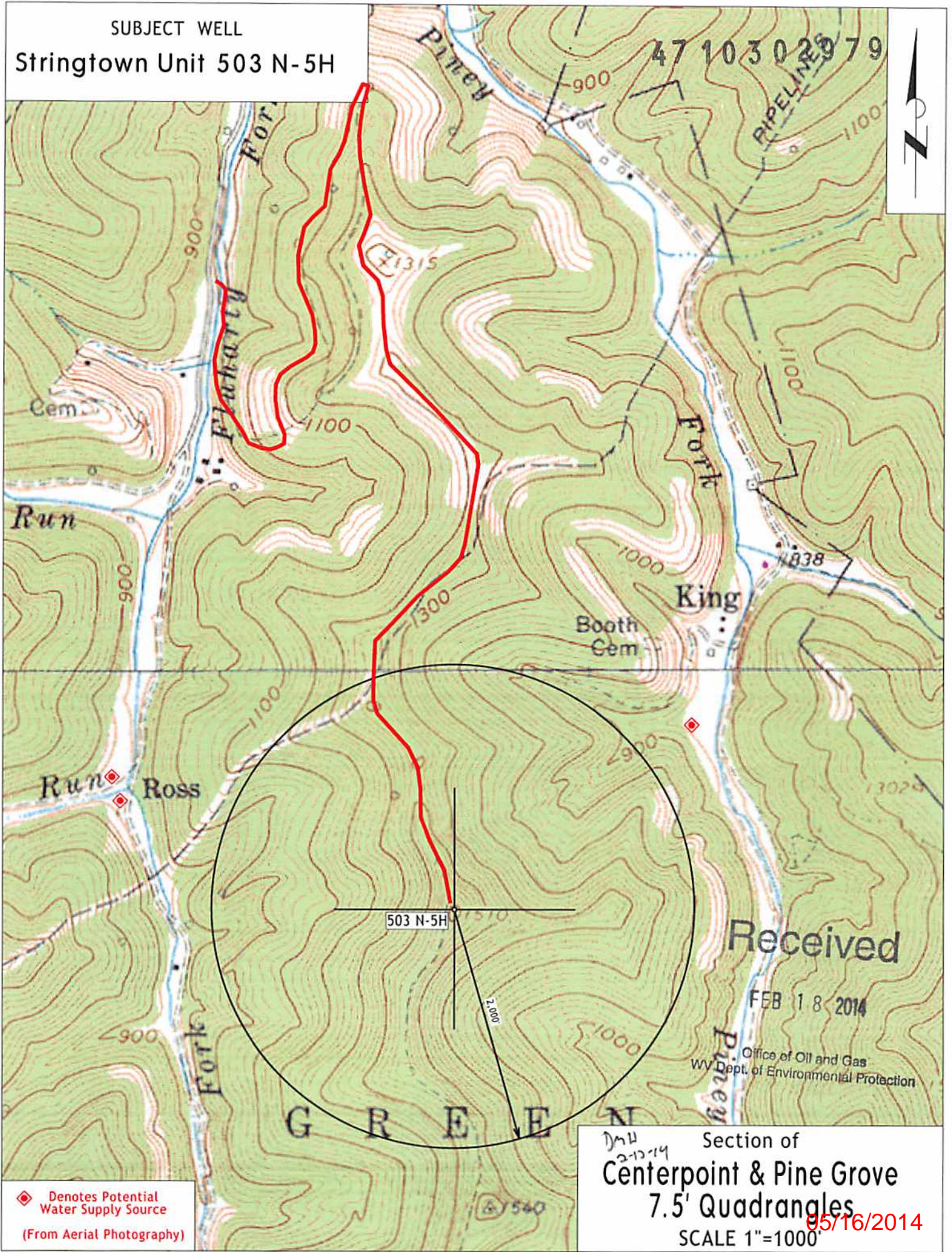
Office of Oil and Gas
 WV Dept. of Environmental Protection

05/16/2014

SYMPOLECT 11.15.000-PA006248-AC001 (Overseer) MVE 501, Site & Section (Rev. 2/13/2014) 12:16:00 PM

REFERENCE:
 USGS 7.5-MIN TOPOGRAPHIC QUADRANGLES
 CENTER POINT, WV, DATED 1961,
 PHOTOREVISED 1976;
 PINE GROVE, WV, DATED 1960,
 PHOTOREVISED 1976.

SUBJECT WELL
Stringtown Unit 503 N-5H



◆ Denotes Potential Water Supply Source
(From Aerial Photography)

Section of
Centerpoint & Pine Grove
7.5' Quadrangles
SCALE 1"=1000'
05/16/2014

(BOTTOM HOLE: -80°42'30.4")

LON: -80°41'23.6"

6550

LAT: 39°30'00"

LON: 80°40'00"

LAT: 39°29'40.9" (BOTTOM HOLE: 39°30'25.4")

SURVEY NOTES

1 - Well ties and Latitude and Longitude were measured by DGPS (Sub-meter Mapping Grade). Bearings are referenced to UTM Grid North (Zone 17 North - NAD 1983).

2 - Surface owners and adjoining information obtained from the Wetzel County Assessor's Office. Lease names, Acreages, and line mapping provided by HGE GIS system. Ends of unit lines mapped by MLS LLC & HGE.

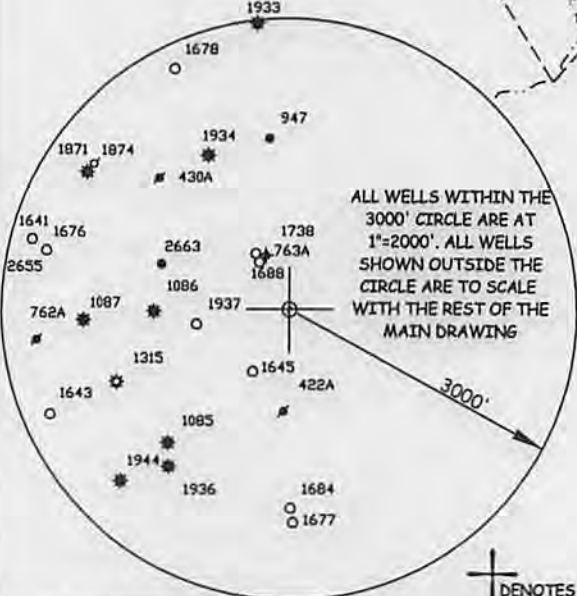
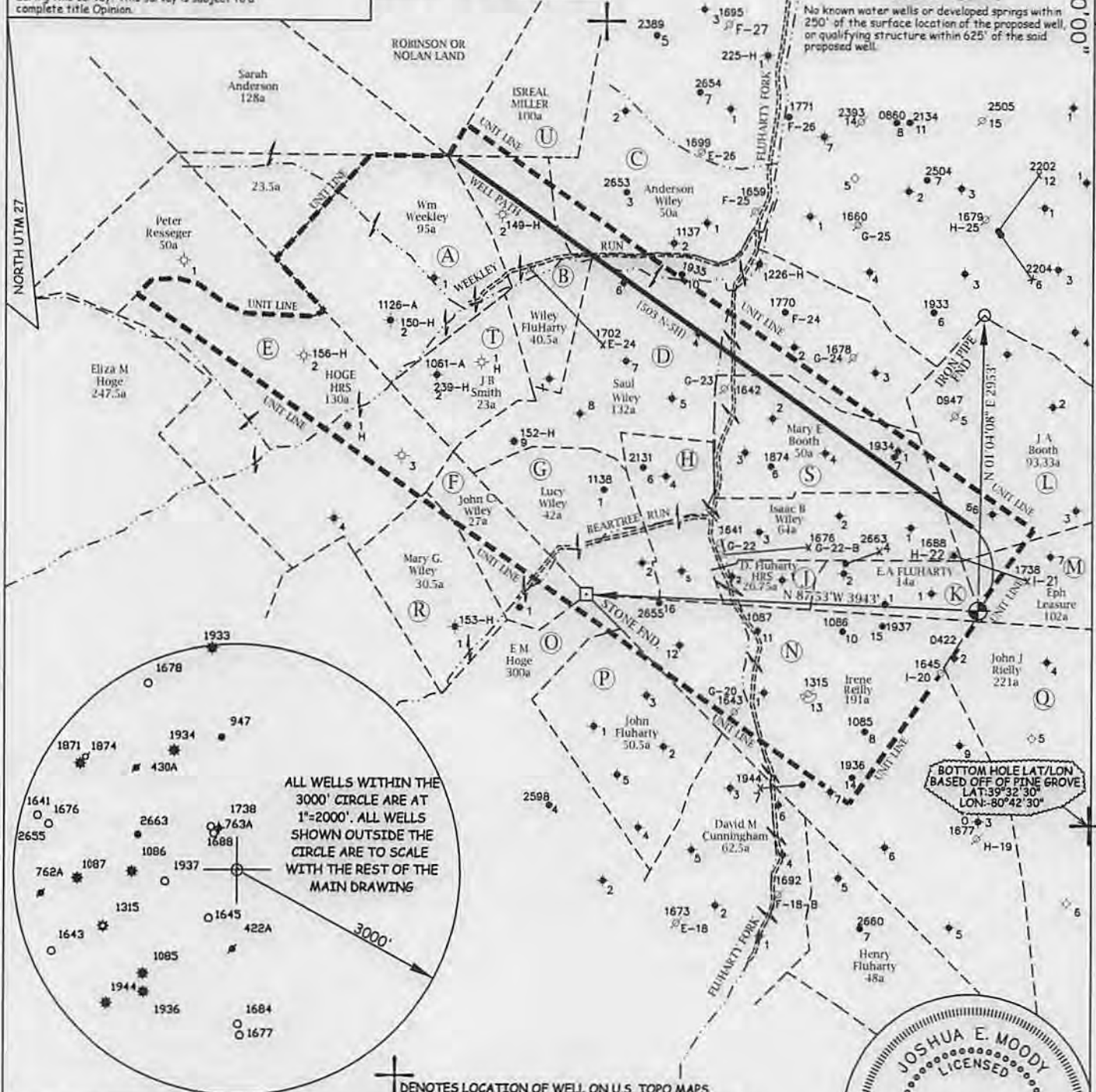
3 - No Title Opinion was provided to the Surveyor during this survey. This survey is subject to a complete title Opinion.

UTM Coordinates (Zone 17N-NAD 1983)	
Surface	N-4,371,732m. E-526,681m.
Bottom Hole	N-4,373,097m. E-525,080m.

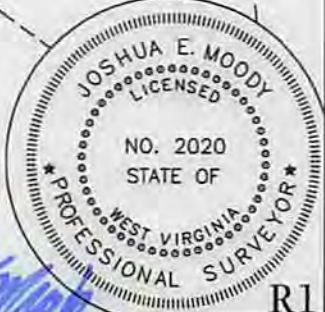
LOCATION REFERENCES	
UTM 27	S 16°50' E 300' SPIKE N 21°11' E 359' SPIKE

**MAP OF
H.G. ENERGY, LLC
-503 UNIT-**

No known water wells or developed springs within 250' of the surface location of the proposed well, or qualifying structure within 625' of the said proposed well.



† DENOTES LOCATION OF WELL ON U.S. TOPO MAPS.



JOB # 13-027
DWG # C/CP/13/HG/WP/503NTH/N-SHW
SCALE 1" = 1500'
MINIMUM DEGREE OF ACCURACY SUB-METER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

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 PERSCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



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

MOODY LAND SURVEYING, LLC
ST. MARYS, WV 26170

JOSHUA E. MOODY, P.S. 2020
DATE 12/04/2013
OPERATOR'S WELL # 503 N-5H

WEST VIRGINIA DEPARTMENT
OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL HORIZONTAL
(IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
LOCATION: ELEVATION 1474' WATERSHED FLUHARTY FORK, PINEY FORK API WELL # 47-103-02979 HGA
DISTRICT GREEN COUNTY WETZEL STATE COUNTY PERMIT
QUADRANGLE CENTER POINT 7.5'

SURFACE OWNER DALLISON LMB ETAL. ACREAGE 20.8 ACRES +/- SURFACE OWNER STATE OF WV DNR ACREAGE 190.35 ACRES +/-
SURFACE OWNER JS BOOTH EST ETAL. ACREAGE 21 ACRES +/- SURFACE OWNER STATE OF WV DNR ACREAGE 220 ACRES +/-

OIL&GAS ROYALTY OWNER Dale & Shirlene Fluharty ETAL. LEASE AC. 14 ACRES +/-

PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION PERFORATE NEW FORMATION
OTHER PHYSICAL CHANGE IN WELL (SPECIFY) _____
PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD= 7,383' MD= 14,327'
WELL OPERATOR H.G. ENERGY, LLC DESIGNATED AGENT MIKE KIRSCH
ADDRESS 5260 DuPONT ROAD ADDRESS 5260 DuPONT ROAD
PARKERSBURG, WV 26101 PARKERSBURG, WV 26101

05/16/2014