



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 14, 2014

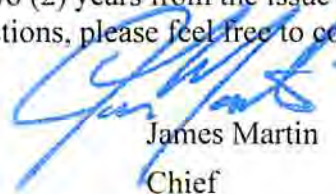
WELL WORK PERMIT
Horizontal 6A Well

This permit, API Well Number: 47-10302977, 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.



James Martin
Chief

Operator's Well No: 405 N-2H
Farm Name: YOHO, BERNARD LEE, JR.
API Well Number: 47-10302977
Permit Type: Horizontal 6A Well
Date Issued: 03/14/2014

Promoting a healthy environment.

03/14/2014

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 (USACOE). Through this permit, you are hereby being advised to consult with USACOE 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.

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 Grant Pine Grove 7.5'
Operator ID County District Quadrangle

2) Operator's Well Number: WJ Criswell 405 N-2H Well Pad Name: WJ Criswell 405

3) Farm Name/Surface Owner: WJ Criswell Public Road Access: SLS 58

4) Elevation, current ground: 1415' Elevation, proposed post-construction: 1393'

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 Thickness and Associated Pressure(s):
Marcellus, Approximate TVD 7222 feet, approximate thickness 50 feet, associated pressure gradient @ 1.1 psi/foot

8) Proposed Total Vertical Depth: 7382 feet TVD

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 17186 feet TMD

11) Proposed Horizontal Leg Length: 9804 feet

12) Approximate Fresh Water Strata Depths: 774 feet

13) Method to Determine Fresh Water Depths: Based on drilling history in nearby wells

14) Approximate Saltwater Depths: 1495 feet

15) Approximate Coal Seam Depths: 1199-1209 feet

16) Approximate Depth to Possible Coal Seam Depths: NA

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: _____

WW-6B
(9/13)

18)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill-up (Cu. Ft.)</u>
Conductor	20"	New	H-40	94#	60'	60'	NA, CTS
Fresh Water	13 3/8"	New	J-55	54.5#	1350'	1350'	1400, CTS
Coal							
Intermediate	9 5/8"	New	J-55	40 #	3500'	3500'	1550, CTS
Production	5 1/2"	New	P-110	20#	17095'	17095'	4390
Tubing	2 3/8"	New	L-80 or N-80	4.7#	NA	8000'	NA
Liners							

*DAH
10-27-17*

<u>TYPE</u>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	20"	20"	0.438"	1530#	NA	NA
Fresh Water	13 3/8"	17 1/2"	0.38"	2740#	Gas Block	1.21
Coal						
Intermediate	9 5/8"	12 1/4"	0.395"	3950#	Gas Block	Tail 1.30 Lead 1.33
Production	5 1/2"	8 1/2"	0.361"	12640#	ASC/Gas Block	Tail 1.49 Lead 1.23
Tubing	2 3/8"	4.778"	0.19"	11200#	NA	NA
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

Received

JAN 21 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): 14.9 acres

22) Area to be disturbed for well pad only, less access road (acres): 5.9 acres

23) Describe centralizer placement for each casing string:

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' from the 1st 5.5" long joint to the top of the curve
Run 1 spiral centralizer every 200' from the top of the curve to surface

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

Conductor: NA - Drilled in/Sanded in (Casing while drilling, no annulus) (See Attach "Cement Additives" for complete desc)
Surface: Cement Slurry Description - Gas Block - 2% CaCl₂ + 0.25 lb/sk Unicele
Intermediate: Lead: Type 1+3%Gel + 0.5% CR-3 + 0.25 lb/sk Unicele
Production: Lead: Type 1 +3% Gel + 0.5% R-3+0.5% CFL - 117+0.25% Foam Chek + 1/8 lb/sk Unicele

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.

DMA
10-23-13

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*Note: Attach additional sheets as needed.

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

Surface:

Cement Slurry Description

Gas Block- 2% CaCl₂ + 0.25 lb/sk Unicele

Note: CaCl₂ is an Accelerator and Unicele is a Lost Circulation additive

Intermediate:

Lead:

Lead Slurry - Type 1 + 2% Gel + 0.25% CR-3 + 0.25 lb/sk Unicele

Note: Gel is an extender and Unicele is a Lost Circulation additive and CR-3 is a retarder/dispersant

Tail:

Tail Slurry -Gas Block- 2% CaCl₂ + 0.3% CR-3 + 0.25 lb/sk Unicele

Note: CaCl₂ is an Accelerator and Unicele is a Lost Circulation additive and CR-3 is a retarder/dispersant

Production:

Lead:

**Type 1 + 3% Gel + 0.5% CR-3 + 0.5% CFL-117 + 0.25% Foam Chek + 1/8
lb/sk Unicele**

Note: Gel is an extender and Unicele is a Lost Circulation additive and CR-3 is a retarder/dispersant and CFL-117 is for fluid loss and Foam Chek is a defoamer

Tail:

Acid Soluble Cement + 0.75% CR-3 + 0.75% CFL-117 + 1/8 lb/sk Unicele

Note: Unicele is a Lost Circulation additive and CR-3 is a retarder/dispersant and CFL-117 is for fluid loss

DMH
10-27-13

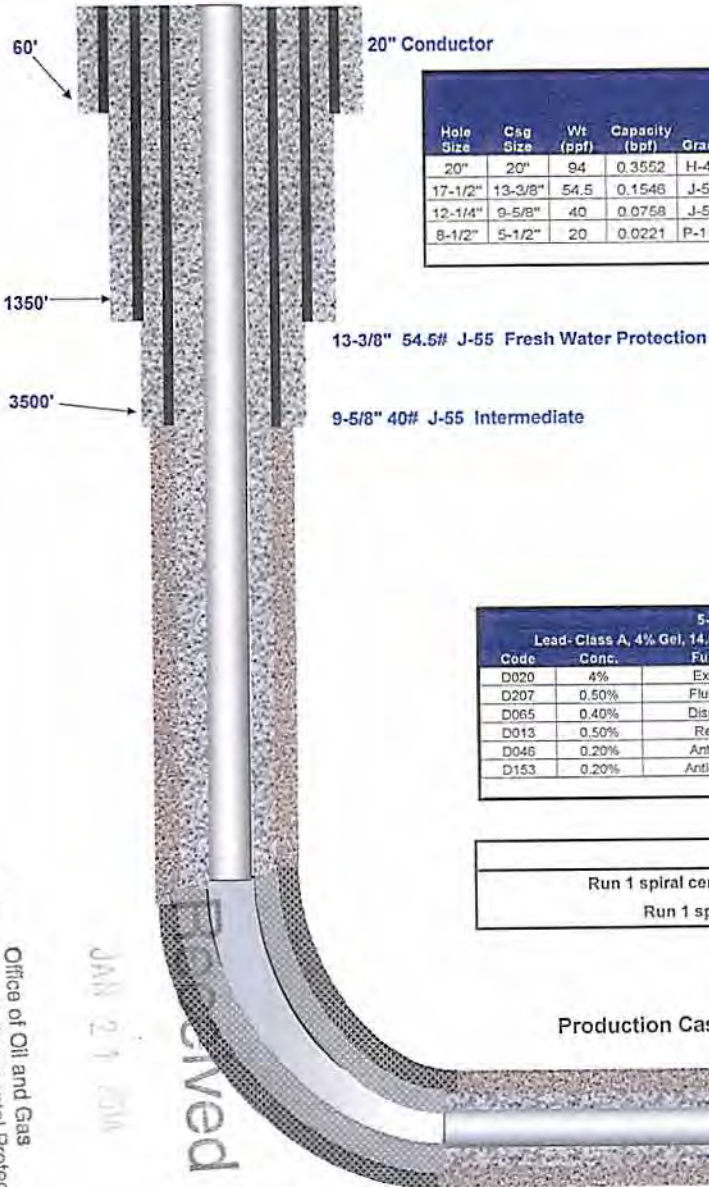
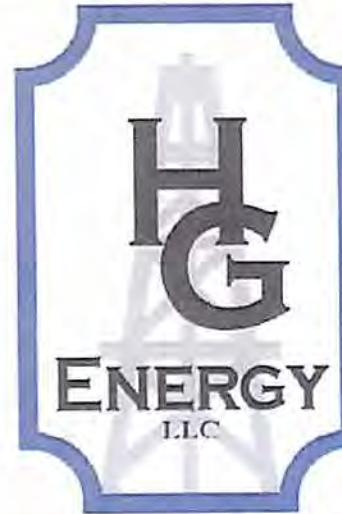
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WELL: W.J. Criswell 405 N -3H

Horizontal Marcellus Casing Schematic

DRAWING NOT TO SCALE



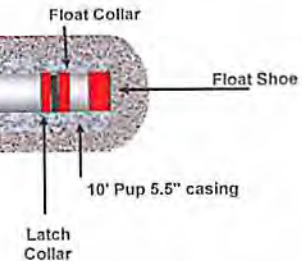
Hole Size	Csg Size	Wt (ppf)	Capacity (bpf)	Grade	Conn	Nom. ID (in)	Drift ID (in)	Burst Rating (psi)	Collapse Rating (psi)	Tube Tension Rating (k lb)	Conn. Tension Rating (k lb)
20"	20"	94	0.3552	H-40	weld	19.12	18.94	1530	520		
17-1/2"	13-3/8"	54.5	0.1548	J-55	STC	12.62	12.46	2730	1130	853	514
12-1/4"	9-5/8"	40	0.0758	J-55	LTC	8.835	8.679	3950	2570	630	520
8-1/2"	5-1/2"	20	0.0221	P-110	TTRST	4.778	4.653	12640	11080	641	667

Casing	Hole Size	Top of Cement	Cement Type	Float Equipment
20"	20"	N/A	Sanded in/ Drilled in (dual rotary)	N/A
13-3/8"	17-1/2"	surface	Gas Block + 2% CaCl ₂ + .3% CR-2 + .25 lb/sx Unicele cemented with 50% excess	Cement nosed guide shoe, centralizer every 3 joints or 120', insert goes in top of first joint in hole
9-5/8"	12-1/4"	surface	Gas Block + 2% CaCl ₂ + .3% CR-3 + .25 lb/sx Unicele cemented with 50% excess	Cement nosed guide shoe, centralizer every 3 joints or 120', insert goes in top of first joint in hole

5-1/2" Production Casing Cement Plan					
Lead- Class A, 4% Gel, 14.5 ppg			Tail- Acid Soluble, 14.8 ppg, 20% OHE		
Code	Conc.	Function	Code	Conc.	Function
D020	4%	Extender	D151	30%	CaCO ₃ Weight
D207	0.50%	Fluid Loss	D207	0.50%	Fluid Loss
D065	0.40%	Dispersant	D046	0.20%	Anti-Foam
D013	0.50%	Retarder	D013	0.50%	Retarder
D046	0.20%	Anti-Foam	D065	0.40%	Dispersant
D153	0.20%	Anti-Settling			

Production Centralizer Program
 Run 1 spiral centralizer every 120' from the 1st 5.5" long joint to the top of the curve.
 Run 1 spiral centralizer every 200' from the top of the curve to surface.

Production Casing: Approx. 17,095' of 5-1/2" 20# P-110 Production



Office of Oil and Gas
WV Dept. of Environmental Protection

JAN 21 2014

Approved

DMH
10-23-13

103 02977

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) North Fork of Fishing Creek Quadrangle Big Run 7.5'

Elevation 1393' County Wetzel District Grant

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

Will a pit be used for drill cuttings? Yes _____ No X

If so, please describe anticipated pit waste: NA

Will a synthetic liner be used in the pit? Yes _____ No X 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 NA)

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Office of Oil and Gas
West Virginia Department of Environmental Protection

Will closed loop system be used? Yes _____

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Air, Fresh water

-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) NA

-Landfill or offsite name/permit number? All cuttings to be shipped to the Wetzel County Landfill (Permit # 1110222-WV52)

DmH
10-23-13

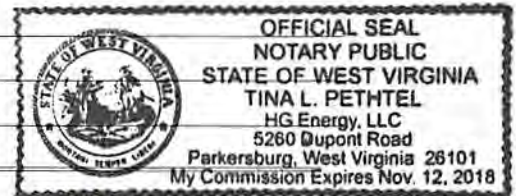
I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations 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



Subscribed and sworn before me this 23 day of October, 2013

[Signature] Notary Public

My commission expires Nov. 12, 2018

03/14/2014

103 02977

Form WW-9

Operator's Well No. WJ Criswell 405 N-2H

HG Energy, LLC

Proposed Revegetation Treatment: Acres Disturbed Approximately 14.9 Prevegetation pH _____

Lime 2 Tons/acre or to correct to pH 6.5

Fertilizer (10-20-20 or equivalent) 500 lbs/acre (500 lbs minimum)

Mulch Straw 2 Tons/acre

Seed Mixtures

Seed Type	Area I lbs/acre	Seed Type	Area II lbs/acre
Tall Fescue	40	Tall Fescue	40
Ladino Clover	5	Ladino Clover	5

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

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [Signature]

Comments: _____

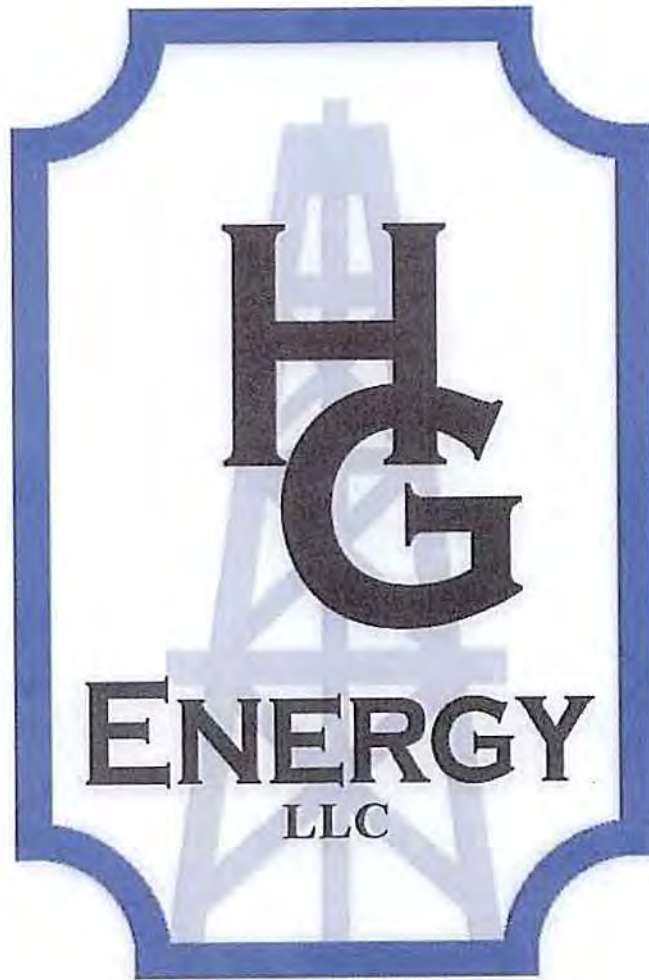
Title: Oil & Gas Inspector Date: 10-23-13

Field Reviewed? Yes No

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Office of Oil and Gas
WV Dept. of Environmental Protection
03/14/2014

405 Site Safety Plan



Received

JAN 21 2014

Office of Oil and Gas
Environmental Protection

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

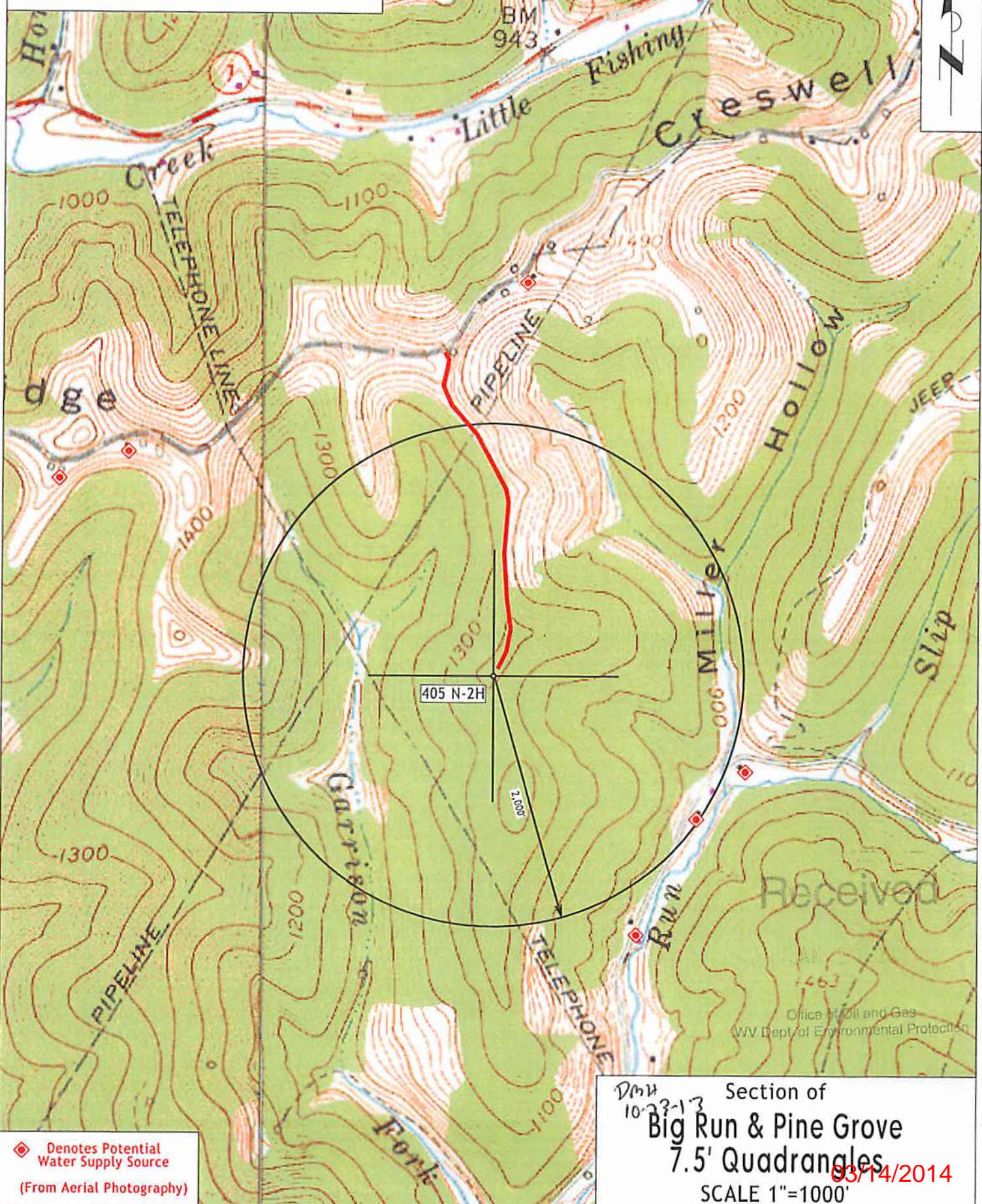
Name: Matthew J. McGuire Date: _____

Title: HSE Manager, HG Energy, LLC.

WV DEP Approval by: [Signature] Date: 10-23-13

Title: Oil + Gas Inspector, West Virginia DEP

SUBJECT WELL
W.J. Criswell 405 N-2H



◆ Denotes Potential Water Supply Source
(From Aerial Photography)

DMH 10-23-13 Section of
Big Run & Pine Grove
7.5' Quadrangles
03/14/2014
SCALE 1"=1000'

Office of Oil and Gas
WV Dept. of Environmental Protection

BOTTOM HOLE: LON: -80°38'43.0"

LON: -80°37'06.4"

9890

LAT: 39°37'30"

MAP OF H.G. ENERGY, LLC -CRISWELL 405 UNIT-

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 1927).

2 - Surface owners & adjoining information obtained from Wetzel Co. Assessors Office. Lease names, & 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)

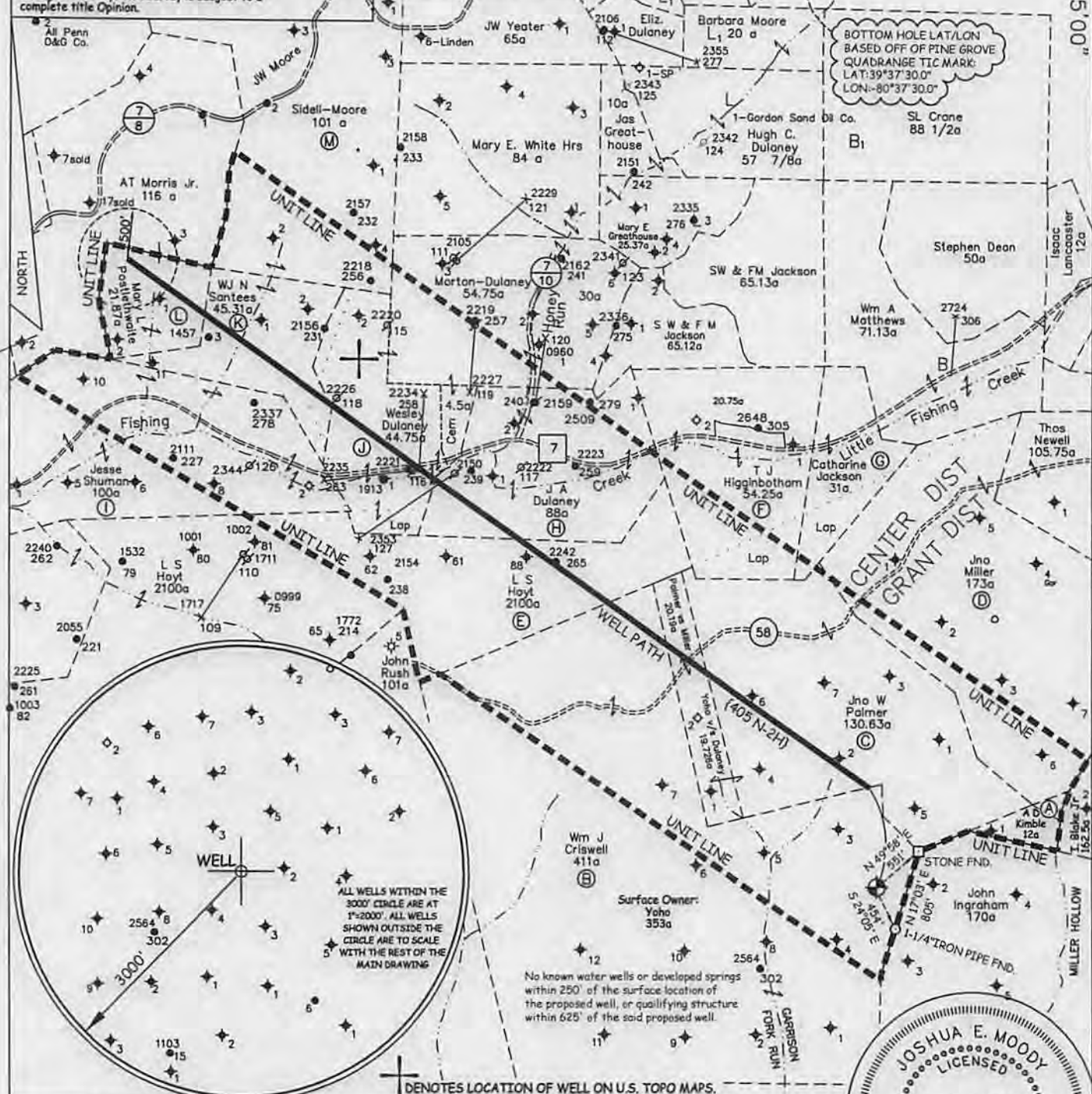
Surface N-4,384,254m.
E-532,772m.

Bottom Hole N-4,386,158m.
E-530,461m.

UTM 27 LOCATION REFERENCES

N 49°58' E 551' STONE FOUND
S 24°05' E 454' IRON PIPE FOUND

BOTTOM HOLE LAT/LON BASED OFF OF PINE GROVE QUADRANGLE TIC MARK:
LAT: 39°37'30.0"
LON: -80°37'30.0"



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

JOB # 13-001
DRAWING # 13HG405B 406B
SCALE 1" = 1500'
MINIMUM DEGREE OF ACCURACY 1/200'
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



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION OFFICE OF OIL AND GAS

REV 1
JOSHUA E. MOODY, P.S. 2020
DATE 9/27/13
OPERATOR'S WELL # 405 N-2H

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL HORIZONTAL
(IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
LOCATION: ELEVATION 1393' WATERSHED NORTH FOR, FISHING CREEK API WELL # 47-103-02977H6A
DISTRICT GRANT COUNTY WETZEL STATE 47 COUNTY 103 PERMIT 02977H6A
QUADRANGLE BIG RUN 7.5'

SURFACE OWNER BERNARD LEE YOHO, JR. (surface hole) ACREAGE 353 ACRES +/-
OIL & GAS ROYALTY OWNER OXY USA, INC. ET AL. LEASE ACREAGE 490.45 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
WELL OPERATOR H.G. ENERGY, LLC ESTIMATED DEPTH TVD= 7,222' MD= 17,186'
ADDRESS 5260 DuPONT ROAD DESIGNATED AGENT MIKE KIRSCH
PARKERSBURG, WV 26101 ADDRESS 5260 DuPONT ROAD
PARKERSBURG, WV 26101

03/14/2014