



**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

July 02, 2013

**WELL WORK PERMIT**

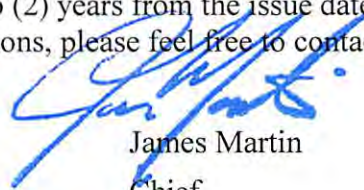
**Horizontal 6A Well**

This permit, API Well Number: 47-10302887, 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: 408 S-1H  
Farm Name: BROWN, FRANCIS D. & FREEDA  
**API Well Number: 47-10302887**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 07/02/2013

Promoting a healthy environment.

07/05/2013

# 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

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1. 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.
2. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the fill material shall be within plus or minus 2% (unless soil test results show a greater range of moisture content is appropriate and 95% compaction can still be achieved) of the optimum moisture content as determined by the standard proctor density test, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. Each lift must meet 95 % compaction of the optimum density based on results from the standard proctor density test of the actual soils used in specific engineered fill sites. 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.
3. 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.
4. 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.
5. 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.

07/05/2013

WW - 6B  
(3/13)

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

103 04 548

1) Well Operator: HG Energy, LLC 494497948 Wetzel Grant Pine Grove 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: 408 S-1H Well Pad Name: Long 408

3 Elevation, current ground: 1360' Elevation, proposed post-construction: 1340'

4) Well Type: (a) Gas  Oil  Underground Storage

Other \_\_\_\_\_  
(b) If Gas: Shallow \_\_\_\_\_ Deep \_\_\_\_\_  
Horizontal

5) Existing Pad? Yes or No: No

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):  
Marcellus, Approximate TVD 7396 feet, approximate thickness 50 feet.

7) Proposed Total Vertical Depth: 7396 feet - TVD

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 13163 feet - TMD

10) Approximate Fresh Water Strata Depths: 470'

11) Method to Determine Fresh Water Depth: Best judgement based on drilling history in nearby wells

12) Approximate Saltwater Depths: 2000'

13) Approximate Coal Seam Depths: 1180'

14) Approximate Depth to Possible Void (coal mine, karst, other): NA

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine: NA

16) Describe proposed well work: Drill, case, cement and complete a horizontal Marcellus well.

17) Describe fracturing/stimulating methods in detail:  
Plan to hydraulically fracture/stimulate the well with "slickwater" frac technique. Will utilize a plug and perforation technique through cased hole.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 10.0 acres

19) Area to be disturbed for well pad only, less access road (acres): Approximately 5.4 acres

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NA WV Department of  
Environmental Protection  
NA

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WW - 6B  
(3/13)

20)

**CASING AND TUBING PROGRAM**

<b>TYPE</b>	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per 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#	100'	100'	NA
Fresh Water	13-3/8"	New	J-55	54.5#	1300'	1300'	To Surface
Coal							
Intermediate	9 5/8"	New	J-55	40#	3300'	3300'	To Surface
Production	5 1/2"	New	P-110	20#	13163'	13163'	To Surface
Tubing							
Liners							

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4-15-13

<b>TYPE</b>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield</u>
Conductor	20"	20"	0.438	1530	NA	NA
Fresh Water	13 3/8"	17 1/2"	0.380	2730	Gas Block	1.29 cu ft/sk
Coal						
Intermediate	9 5/8"	12 1/4"	0.395	3950	Type 1 & Gas Block	1.29 cu ft/sk
Production	5 1/2"	8 1/2"	0.361	12640	Type 1 & Acid Soluble	1.67 cu ft/sk
Tubing						
Liners						

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Kind:				
Sizes:				
Depths Set:				

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WW - 6B  
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21) 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

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

See Attachment "Cement Additives" for complete description

✓ Conductor: NA - Drilled in/Sanded in (Casing while drilling, no annulus)

Surface: Cement Slurry Description - Gas Block - 2% CaCl<sub>2</sub> + 0.25 lb/sk Unicele

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

Tail: Tail Slurry - Gas Block - 2%CaCl<sub>2</sub> +0.3% CR-3 + 0.25 lb/sk Unicele

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

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

23) 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.

\*Note: Attach additional sheets as needed.

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Cement Additives for WW-6B

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

Surface:**Cement Slurry Description**

**Gas Block- 2% CaCl<sub>2</sub> + 0.25 lb/sk Unicele**

Note: CaCl<sub>2</sub> 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% CaCl<sub>2</sub> + 0.3% CR-3 + 0.25 lb/sk Unicele**

Note: CaCl<sub>2</sub> 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**

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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

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**Tail:**

WV Dept  
Environmental

**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

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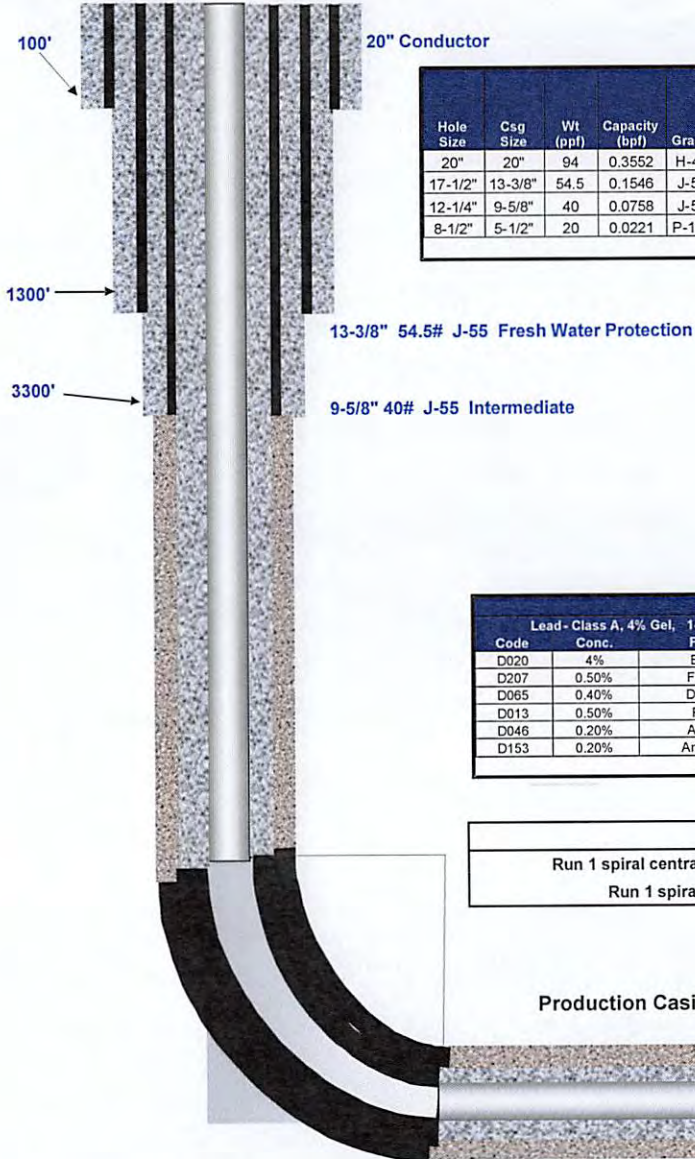
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103-02887

WELL: Long 408 S - 1H

Horizontal Marcellus Casing Schematic

DRAWING NOT TO SCALE



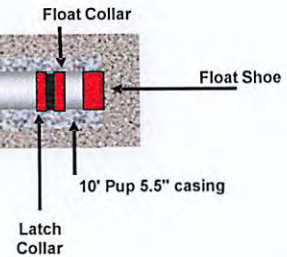
Hole Size	Csg Size	Wt (ppf)	Capacity (bpf)	Grade	Conn	Nom. ID (in)	Drift ID (in)	Burst Rating (psi)	Collapse Rating (psi)	Tube Tension Rating (k lb)	Conn. Tension Rating (k lb)
20"	20"	94	0.3552	H-40	weld	19.12	18.94	1530	520		
17-1/2"	13-3/8"	54.5	0.1546	J-55	STC	12.62	12.46	2730	1130	853	514
12-1/4"	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	TTRS1	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 <sub>2</sub> + .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 <sub>2</sub> + .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 <sub>3</sub> 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-Setting			

**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. 13,113' of 5-1/2" 20# P-110 Production



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Form WW-9

Operator's Well No. \_\_\_\_\_

**HG Energy, LLC**

Proposed Revegetation Treatment: Acres Disturbed Approximately 10 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 2 Tons/acre

Seed Mixtures

Area I		Area II	
Seed Type	lbs/acre	Seed Type	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: 4-15-13

Field Reviewed?  Yes  No

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# Water Management Plan: Primary Water Sources



WMP-01168

API/ID Number: 047-103-02887

Operator:

HG Energy, LLC

Long 408 S-1H

**Important:**

For each proposed primary water source (including source intakes for purchased water sources) identified in your water management plan, and summarized herein, DEP has made an evaluation concerning water availability over the specified date range. DEP's assessment is based on the following considerations:

- Statistical analysis of historical USGS stream gauge data (transferred to un-gauged locations as necessary);
- Identification of sensitive aquatic life (endangered species, mussels, etc.);
- Quantification of known existing demands on the water supply (Large Quantity Users);
- Minimum flows required by the Army Corps of Engineers; and
- Designated stream uses.

Based on these factors, DEP has provided, for each intake location (and origination point for purchased water), a reference gauge location and discharge flow reading which must be surpassed prior to withdrawals. Additionally, DEP has established a minimum passby flow at the withdrawal location which must also be surpassed prior to withdrawals. These thresholds are considered terms of the permit and are enforceable as such.

**DEP is aware that some intake points will be used for mutiple wells and well sites. In these cases, the thresholds set by the Water Management Plan are to be interepreted as total withdrawal limits for each location over the specified date range regardless of how many wells are supported by that intake.**

For all purchased water intakes, determinations of water availability are made at the original source intake location. It is the responsibility of the Oil and Gas Operator, not the seller, to cease withdrawal of water from the seller when flows are less than the minimum gauge reading at the stream gauge referenced by the Water Management Plan in order to protect stream uses.

Note that the determinations made herein are based on the best available data, but it is impossible to predict water availability in the future. While the DEP has carefully established these minimum withdrawal thresholds, it remains the operator's responsibility to protect aquatic life at all times. Approval to withdrawal is contingent upon permission from the land owner. It is the responsibility of the operator to secure and maintain permission prior to any withdrawals.

The operator is reminded that 24-48 hours prior to withdrawing (or purchasing) water, DEP must be notified by email at DEP.water.use@wv.gov.

APPROVED MAY 24 2013

07/05/2013

## Source Summary

WMP-01168

API Number:

047-103-02887

Operator:

HG Energy, LLC

Long 408 S-1H

## Ground Water

● Source **Rial #2 WSW** Owner: **Phillip Rial**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/15/2013	3/15/2014	5,000,000		39.61861	-80.87972

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): **500** Min. Gauge Reading (cfs): Min. Passby (cfs)

DEP Comments: This alluvial groundwater well is, to some extent, under the influence of the Ohio River. Please adhere to stated minimum flow requirements on the Ohio River for withdrawals. <http://www.erh.noaa.gov/er/ohrfc/flows.shtml>

● Source **WSW #3 (New Martinsville Plant)** Owner: **CSX Real Property, Inc.**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/15/2013	3/15/2014	2,250,000		39.619329	-80.878867

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): **400** Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: This alluvial groundwater well is, to some extent, under the influence of the Ohio River. Please adhere to stated minimum flow requirements on the Ohio River for withdrawals. <http://www.erh.noaa.gov/er/ohrfc/flows.shtml>

● Source **WSW #4 (New Martinsville Plant)** Owner: **CSX Real Property, Inc.**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
3/15/2013	3/15/2014	4,000,000		39.169788	-80.878281

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): **400** Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: This alluvial groundwater well is, to some extent, under the influence of the Ohio River. Please adhere to stated minimum flow requirements on the Ohio River for withdrawals. <http://www.erh.noaa.gov/er/ohrfc/flows.shtml>

**07/05/2013**

### Source Detail

WMP-01168

API/ID Number: 047-103-02887

Operator: HG Energy, LLC

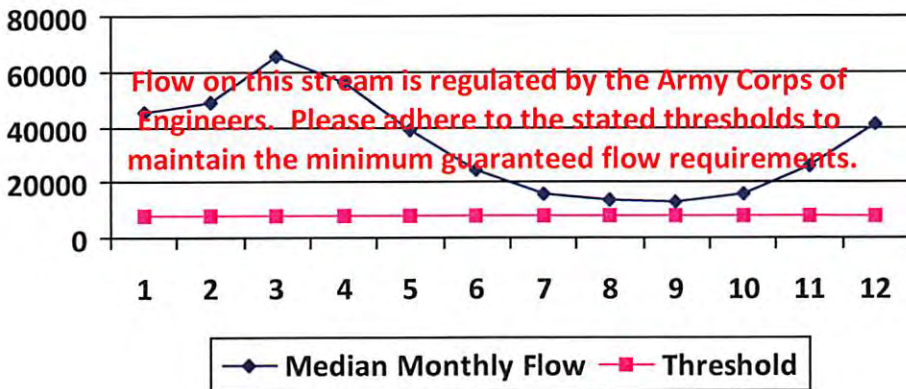
Long 408 S-1H

Source ID: 15906	Source Name: Rial #2 WSW Phillip Rial	Source Latitude: 39.61861	Source Longitude: -80.87972
HUC-8 Code: 5030201	Drainage Area (sq. mi.): 25000	County: Wetzel	Anticipated withdrawal start date: 3/15/2013
<input type="checkbox"/> Endangered Species?	<input checked="" type="checkbox"/> Mussel Stream?		Anticipated withdrawal end date: 3/15/2014
<input type="checkbox"/> Trout Stream?	<input type="checkbox"/> Tier 3?		Total Volume from Source (gal): 5,000,000
<input checked="" type="checkbox"/> Regulated Stream?	Ohio River Min. Flow		Max. Pump rate (gpm): 500
<input type="checkbox"/> Proximate PSD?			Max. Simultaneous Trucks: <input type="text"/>
<input type="checkbox"/> Gauged Stream?			Max. Truck pump rate (gpm): <input type="text"/>

Reference Gaug: 9999999	Ohio River Station: Willow Island Lock & Dam
Drainage Area (sq. mi.): 25,000.00	Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

### Water Availability Profile



#### Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	<input type="text"/>
Downstream Demand (cfs):	6,468.00
Pump rate (cfs):	1.11
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	1,617.00
<hr/>	
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

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## Source Detail

WMP-01168

API/ID Number: 047-103-02887

Operator: HG Energy, LLC

Long 408 S-1H

Source ID: 15907    Source Name: WSW #3 (New Martinsville Plant)  
 CSX Real Property, Inc.    Source Latitude: 39.619329  
 Source Longitude: -80.878867

HUC-8 Code: 5030101

Drainage Area (sq. mi.): 25000    County: Wetzel

Anticipated withdrawal start date: 3/15/2013

Anticipated withdrawal end date: 3/15/2014

Endangered Species?     Mussel Stream?

Total Volume from Source (gal): 2,250,000

Trout Stream?     Tier 3?

Max. Pump rate (gpm): 400

Regulated Stream?    Ohio River Min. Flow

Max. Simultaneous Trucks:

Proximate PSD?

Max. Truck pump rate (gpm)

Gauged Stream?

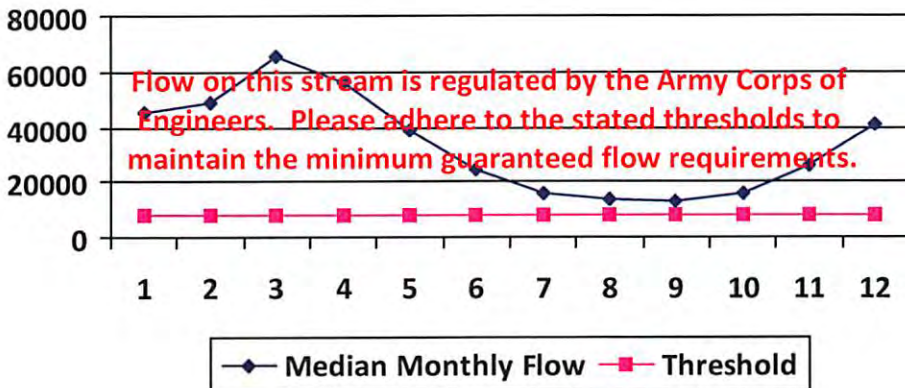
Reference Gaug: 9999999    Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.): 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs):

Downstream Demand (cfs):

Pump rate (cfs): 0.89

Headwater Safety (cfs): 0.00

Ungauged Stream Safety (cfs): 1,617.00

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Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

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## Source Detail

WMP- 01168

API/ID Number: 047-103-02887

Operator: HG Energy, LLC

Long 408 S-1H

Source ID: 15908 Source Name: WSW #4 (New Martinsville Plant)  
CSX Real Property, Inc.

Source Latitude: 39.169788  
Source Longitude: -80.878281

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 25000 County: Wetzel

Anticipated withdrawal start date: 3/15/2013

Anticipated withdrawal end date: 3/15/2014

Endangered Species?  Mussel Stream?

Total Volume from Source (gal): 4,000,000

Trout Stream?  Tier 3?

Max. Pump rate (gpm): 400

Regulated Stream? Ohio River Min. Flow

Max. Simultaneous Trucks:

Proximate PSD?

Max. Truck pump rate (gpm)

Gauged Stream?

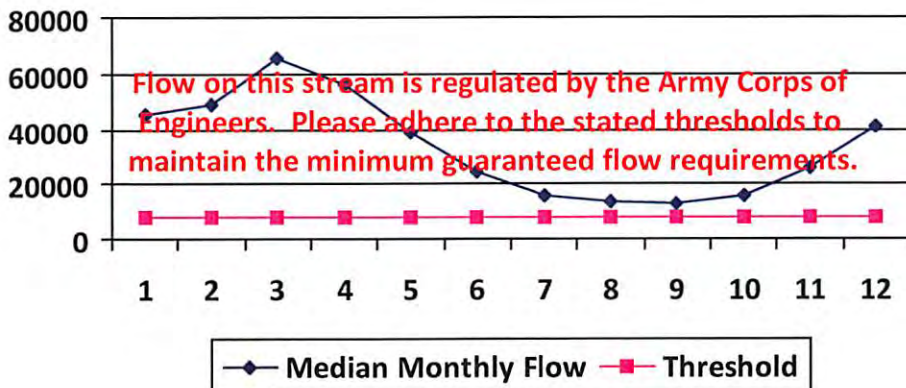
Reference Gaug: 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.): 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs):

Downstream Demand (cfs):

Pump rate (cfs): 0.89

Headwater Safety (cfs): 0.00

Ungauged Stream Safety (cfs): 1,617.00

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Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

07/05/2013



## Water Management Plan: Secondary Water Sources



WMP-01168

API/ID Number

047-103-02887

Operator:

HG Energy, LLC

Long 408 S-1H

### Important:

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

### Recycled Frac Water

Source ID: 15909

Source Name: Various

Source start date: 3/15/2013

Source end date: 3/15/2014

Source Lat:

Source Long:

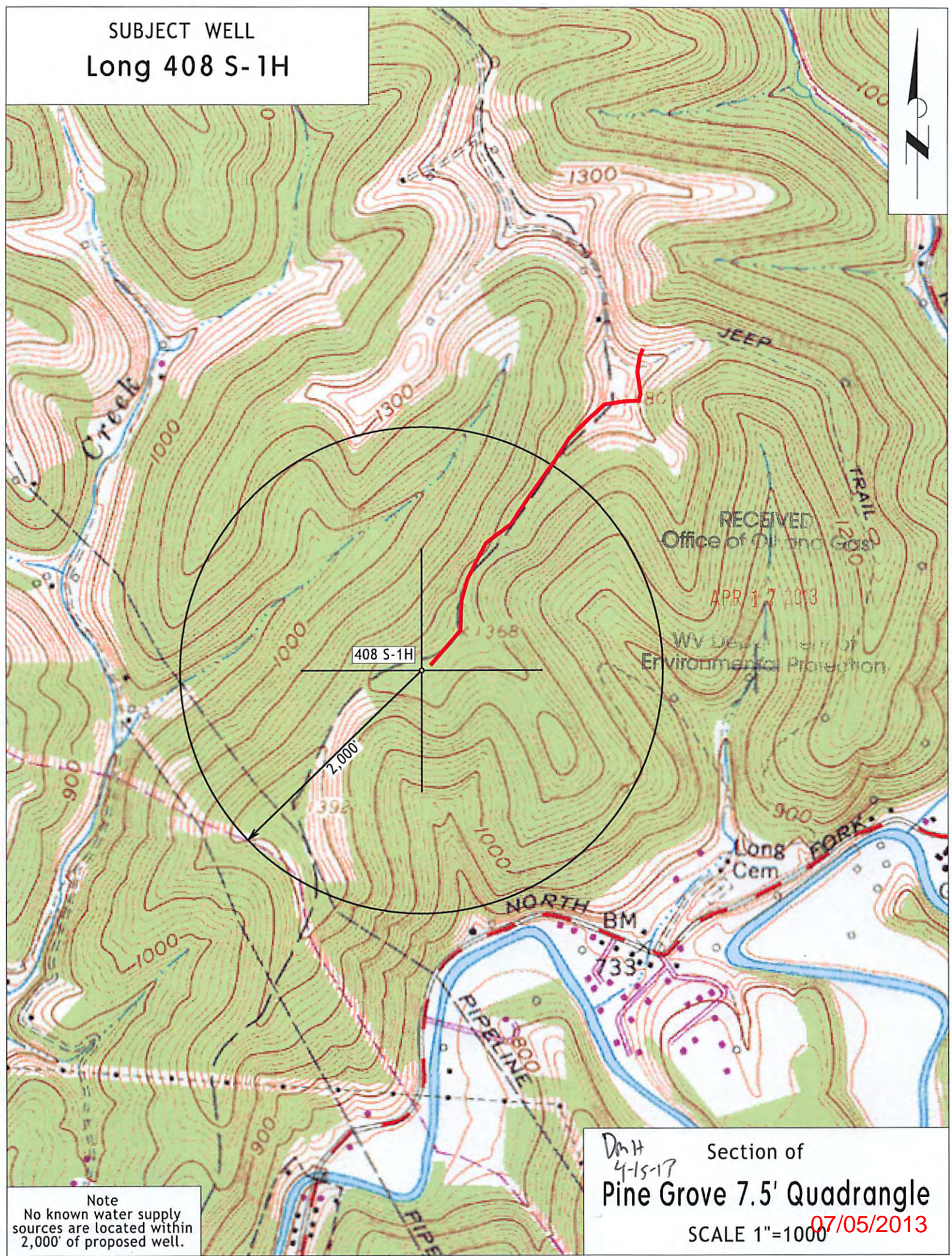
County

Max. Daily Purchase (gal)

Total Volume from Source (gal): 14,000,000

DEP Comments:

SUBJECT WELL  
Long 408 S-1H



Note  
No known water supply  
sources are located within  
2,000' of proposed well.

DmH  
4-15-17  
Section of  
**Pine Grove 7.5' Quadrangle**  
SCALE 1"=1000  
**07/05/2013**

RECEIVED  
Office of Oil and Gas  
APR 17 2013  
WV Department of  
Environmental Protection



(BOTTOM HOLE: 80°39'31.4")

LON: -80°40'35.2"

LAT: 39°37'30"

LON: 80°40'00"

15,132'

LAT: 39°35'00.5"

(BOTTOM HOLE: 39°34'22.2")

1 - Well Site and Latitude and Longitude were measured by DGPS (Sub-meter Mapping Grade). Bearings are referenced to UTM 61N North (Zone 17 North - NAD 1983).

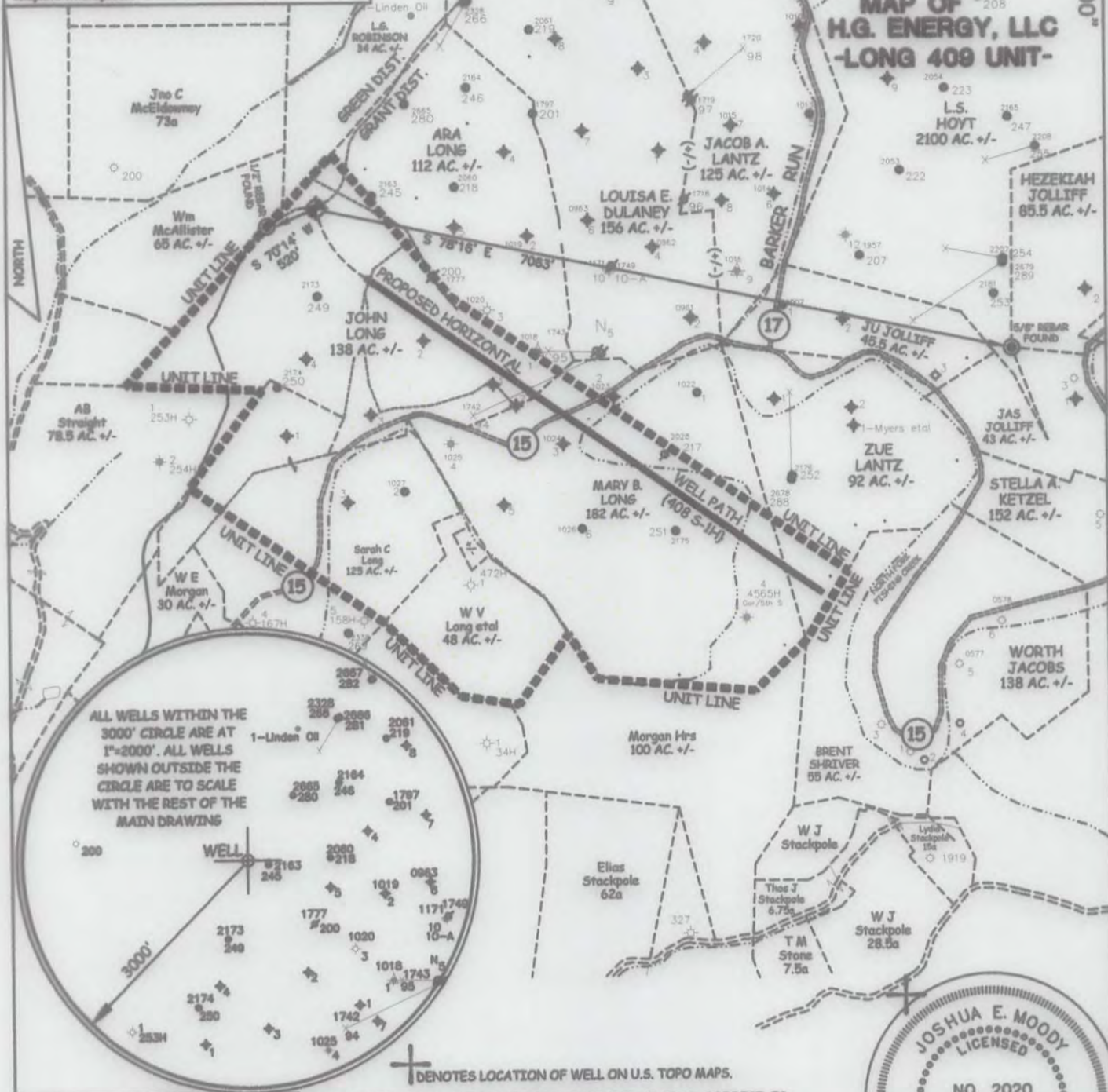
2 - Surface owners and adjacent information obtained from the Wetzel County Assessor's tax records.

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-4,381,567m. E-527,801m.
Bottom Hole	N-4,380,412m. E-529,328m.

LOCATION REFERENCES	
NAD 1983	
Surface	N 80°13' E 234' SPIKE S 86°30' E 174' SPIKE

**MAP OF  
H.G. ENERGY, LLC  
-LONG 409 UNIT-**



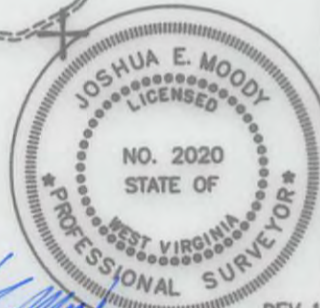
⊕ DENOTES LOCATION OF WELL ON U.S. TOPO MAPS.

JOB # 12-025  
DRAWING # 12HG409FOLDER  
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 1/31/13  
OPERATOR'S WELL #408 S-1H

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  API WELL # **HGA 2887**  
LOCATION: ELEVATION 1340' WATERSHED NORTH FOR, FISHING CREEK 47 - 103 STATE COUNTY PERMIT  
DISTRICT GRANT COUNTY WETZEL QUADRANGLE PINE GROVE 7.5'

SURFACE OWNER FRANCIS D. & FREEDA M. BROWN (surface hole) ACREAGE 103 ACRES +/-  
OIL & GAS ROYALTY OWNER ROBERT B. MYERS ET AL LEASE ACREAGE 419 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  
ADDRESS 5260 DuPONT ROAD PARKERSBURG, WV 26101  
ESTIMATED DEPTH TVD= 7,396' MD= 13,163'  
DESIGNATED AGENT MIKE KIRSCH  
ADDRESS 5260 DuPONT ROAD PARKERSBURG, WV 26101  
LEASE # 31950-50 et al

07/05/2013