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**west virginia** department of environmental protection

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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: 47-10302890, 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-4H  
Farm Name: BROWN, FRANCIS D. & FREEDA  
**API Well Number: 47- 10302890**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 07/02/2013

**Promoting a healthy environment.**



# 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.

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- 4H      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 7355 feet, approximate thickness 50 feet

7) Proposed Total Vertical Depth: 7355 feet - TVD

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 11462 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.  
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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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(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#	11462'	11462'	To Surface
Tubing							
Liners							

*DmH 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						

**PACKERS**

Kind:				
Sizes:				
Depths Set:				

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(3/13)

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: Type 1+3%Gel + 0.5% CR-3 + 0.25 lb/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% R-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**

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

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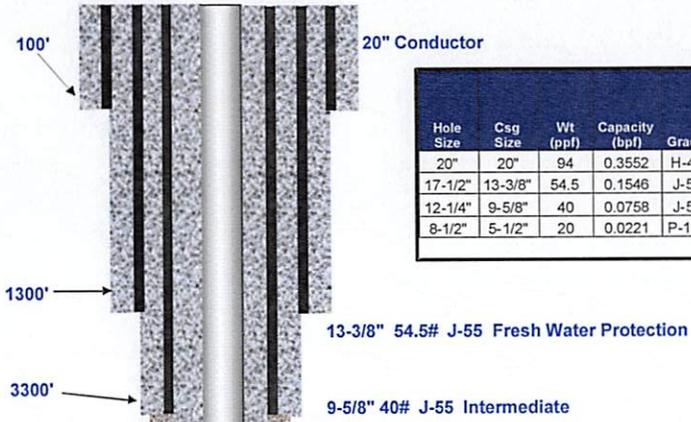
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WELL: Long 408 S - 4H

Horizontal Marcellus Casing Schematic

DRAWING NOT TO SCALE



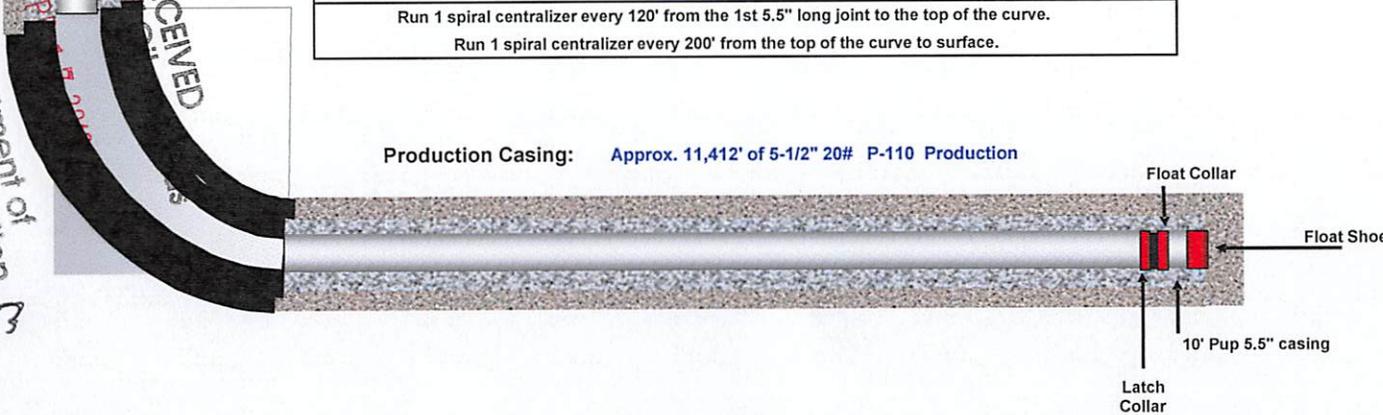
Hole Size	Csg Size	Wt (ppf)	Capacity (bpf)	Grade	Conn	Nom. ID (in)	Drift ID (in)	Burst Rating (psi)	Collapse Rating (psi)	Tube Tension Rating (k lb)	Conn. Tension Rating (k lb)
20"	20"	94	0.3552	H-40	weld	19.12	18.94	1530	520		
17-1/2"	13-3/8"	54.5	0.1546	J-55	STC	12.62	12.46	2730	1130	853	514
12-1/4"	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-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. 11,412' of 5-1/2" 20# P-110 Production



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103-2890

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 Pine Grove 7.5'

Elevation 1340' County Wetzel District Grant

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 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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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)

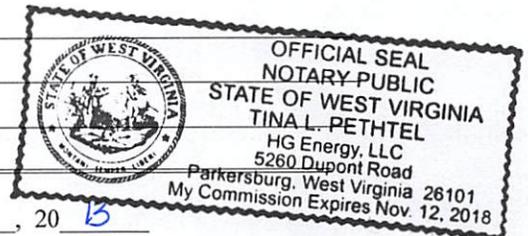
I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations 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 9 day of April 2013, 2013

Tina L Pethel

Notary Public

My commission expires November 12, 2018

DH  
4-15-13

Form WW-9

Operator's Well No. Long 408 S-4H

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 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: 4-15-13

Field Reviewed? (  ) Yes (  ) No

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## Water Management Plan: Primary Water Sources

WMP- 01171

API/ID Number:

047-103-02890

Operator:

HG Energy, LLC

Long 408 S-4H

### 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 intepreped 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](mailto:DEP.water.use@wv.gov).

**APPROVED MAY 24 2013**

## Source Summary

WMP-01171

API Number:

047-103-02890

Operator:

HG Energy, LLC

Long 408 S-4H

## 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>

## Source Detail

WMP- 01171

API/ID Number: 047-103-02890

Operator: HG Energy, LLC

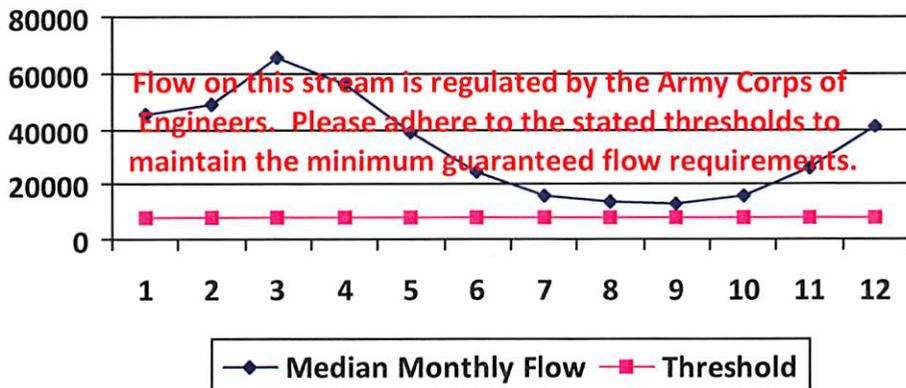
Long 408 S-4H

Source ID: 15918	Source Name: Rial #2 WSW Phillip Rial	Source Latitude: 39.61861	
		Source Longitude: -80.87972	
HUC-8 Code: 5030201		Anticipated withdrawal start date: 3/15/2013	
Drainage Area (sq. mi.): 25000	County: Wetzel	Anticipated withdrawal end date: 3/15/2014	
<input type="checkbox"/> Endangered Species?	<input checked="" type="checkbox"/> Mussel Stream?	Total Volume from Source (gal): 5,000,000	
<input type="checkbox"/> Trout Stream?	<input type="checkbox"/> Tier 3?	Max. Pump rate (gpm): 500	
<input checked="" type="checkbox"/> Regulated Stream?	Ohio River Min. Flow	Max. Simultaneous Trucks: <input type="text"/>	
<input type="checkbox"/> Proximate PSD?		Max. Truck pump rate (gpm): <input type="text"/>	
<input type="checkbox"/> 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):	<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.

## Source Detail

WMP- 01171      API/ID Number: 047-103-02890      Operator: HG Energy, LLC  
 Long 408 S-4H

Source ID: 15919      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)

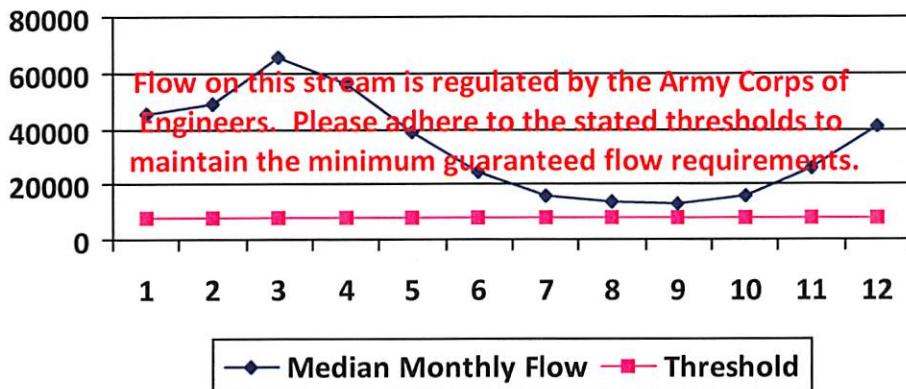
Gauged Stream?

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):

Headwater Safety (cfs):

Ungauged Stream Safety (cfs):

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.

## Source Detail

WMP-01171      API/ID Number: 047-103-02890      Operator: HG Energy, LLC  
 Long 408 S-4H

Source ID: 15920      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?

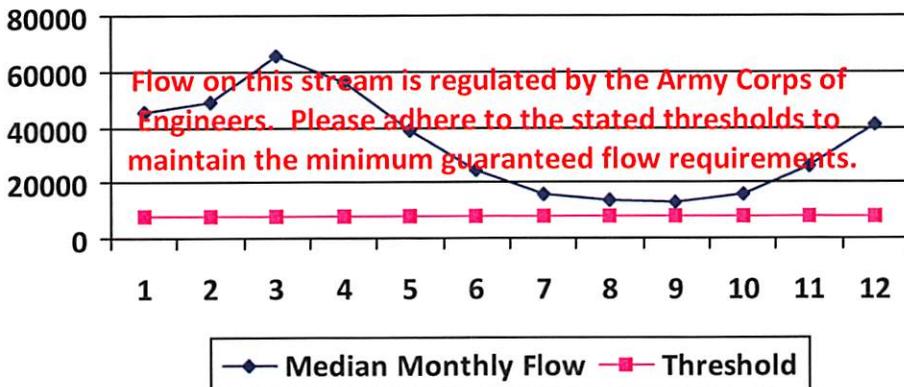
Reference Gaug: 9999999      Ohio River Station: Willow Island Lock & Dam

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

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.



## Water Management Plan: Secondary Water Sources



WMP-01171	API/ID Number	047-103-02890	Operator:	HG Energy, LLC
Long 408 S-4H				

**Important:**

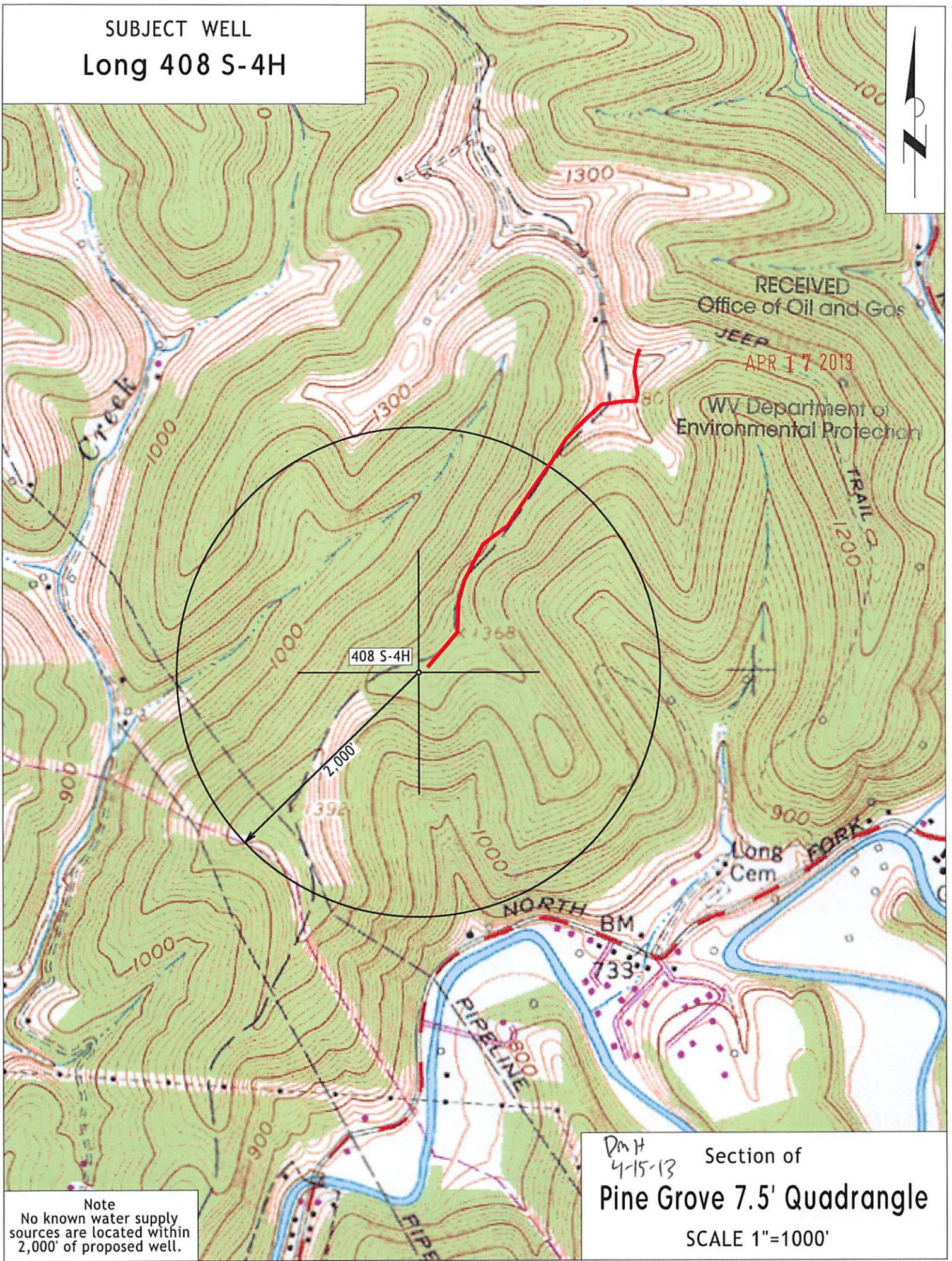
For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. 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:	15921	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-4H



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

DMH  
4-15-13 Section of  
**Pine Grove 7.5' Quadrangle**  
SCALE 1"=1000'

(BOTTOM HOLE: 80°40'06.2")

LON: -80°40'35.8"

2800'

LAT: 39°37'30"

LON: 80°40'00"

15,141'

LAT: 39°35'00.4" (BOTTOM HOLE: 39°34'17.6")

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

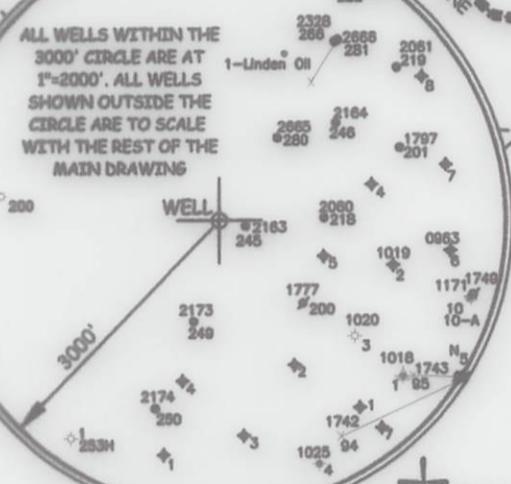
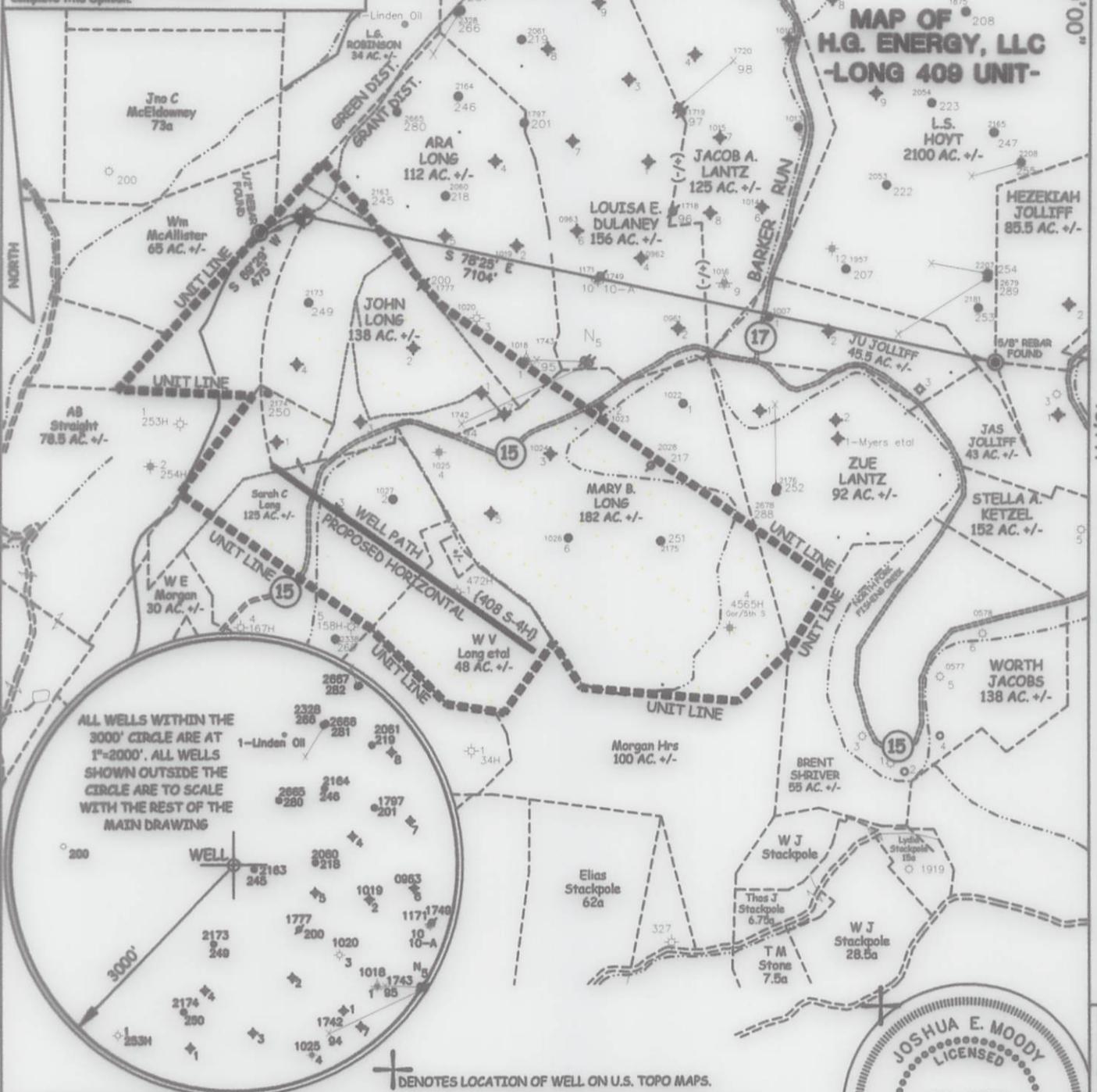
2 - Surface owners and adjacent information obtained from the Wetzel County Assessor's tax records.

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-4,381,584m. E-527,788m.
Bottom Hole	N-4,380,267m. E-528,499m.

LOCATION REFERENCES	
NAD 1983	
N	43°32' E 196' SPIKE
S	81°08' E 131' SPIKE

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



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

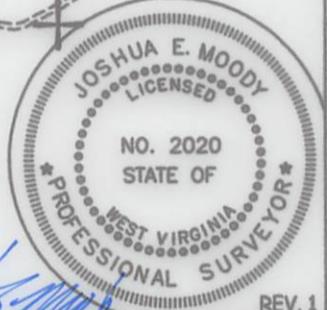
JOB # 12-025  
 DRAWING # 12HG409FOLDER  
 SCALE 1" = 1500'  
 MINIMUM DEGREE OF ACCURACY SUB-METER  
 PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

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. MARVS, WV 26170



WEST VIRGINIA DEPARTMENT  
OF ENVIRONMENTAL PROTECTION  
OFFICE OF OIL AND GAS

REV. 1  
 JOSHUA E. MOODY, P.S. 2020  
 DATE 1/31/13  
 OPERATOR'S WELL # 408 S-4H

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  HORIZONTAL   
 (IF "GAS") PRODUCTION  STORAGE  DEEP  SHALLOW   
 LOCATION: ELEVATION 1340' WATERSHED NORTH FOR, FISHING CREEK API WELL # H6A  
 DISTRICT GRANT COUNTY WETZEL STATE 47 COUNTY 103 PERMIT -2890  
 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 ESTIMATED DEPTH TVD= 7,355' MD= 11,462'  
 ADDRESS 5260 DuPONT ROAD DESIGNATED AGENT MIKE KIRSCH  
PARKERSBURG, WV 26101 ADDRESS 5260 DuPONT ROAD  
PARKERSBURG, WV 26101