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

December 12, 2013

WELL WORK PERMIT

Rework/Horizontal 6A Well

This permit, API Well Number: 47-5101408, issued to CHESAPEAKE APPALACHIA, L.L.C., 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: RAY BAKER #1H (832774)
Farm Name: BAKER, DONALD RAY
API Well Number: 47-5101408
Permit Type: Rework/Horizontal 6A Well
Date Issued: 12/12/2013

Promoting a healthy environment.

API Number: 51-01408

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. 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.

2. 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.

3. 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.

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WW-6B
(9/13)

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

4 370

1) Well Operator: Chesapeake Appalachia, LLC | 49447757 | 51-Marshall | Liberty | Glen Easton

Operator ID | County | District | Quadrangle

2) Operator's Well Number: Ray Baker 1H Well Pad Name: Ray Baker Pad

3) Farm Name/Surface Owner: Ray Baker Public Road Access: Greenfield Ridge Road

4) Elevation, current ground: 1298' Elevation, proposed post-construction: 1298'

5) Well Type (a) Gas ■ Oil ____ Underground Storage ____

Other ____

(b)If Gas Shallow ____ Deep ____

Horizontal ■

6) Existing Pad: Yes or No ____

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

Target formation- Marcellus Target top TVD- 7062' Target base TVD- 7114' Anticipated thickness- 52' Associated Pressure-4731

8) Proposed Total Vertical Depth: 6981'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 13,550'

11) Proposed Horizontal Leg Length: 6373'

12) Approximate Fresh Water Strata Depths: 395'

13) Method to Determine Fresh Water Depths: From analysis of nearby water wells, streams, and ponds.

14) Approximate Saltwater Depths: 1180'

15) Approximate Coal Seam Depths: 375'

16) Approximate Depth to Possible Void (coal mine, karst, other): None that we are aware of.

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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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	J-55	94#	100'	100	CTS
Fresh Water	13 3/8"	New	J-55	54.5#	1,232'	1,232'	848sx/CTS
Coal	9 5/8"	New	J-55	40#	2665'	2665'	1150sx/CTS
Intermediate	7"	New	P-110	20#	If Needed	If Needed	If Needed/As Needed
Production	5 1/2"	New	P-110	20#	12,400'	12,400'	Tail 2580 sx/100' inside Intermediate
Tubing	2 3/8"	New	N-80	4.7#	Approx. 7,343'	Approx. 7,343'	
Liners							

AEL for GK

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	30"	0.25	2120	Class A	1.19/50% Excess
Fresh Water	13 3/8"	17.5"	0.380	2740	Class A	1.19/50% Excess
Coal	9 5/8"	12 1/4"	0.395	3950	Class A	1.19/50% Excess
Intermediate	7"	8 3/4"	0.317	4360	Class A	1.20/15% Excess
Production	5 1/2"	8 3/4"	0.361	12360	Class A	1.20/15% Excess
Tubing	2 3/8"	4.778"	0.190			
Liners						

PACKERS

Kind:	10K Arrowset AS1-X			
Sizes:	5 1/2"			
Depths Set:	Approx. 6,197'			

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

We are re-permitting this well in order to frac it.

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

Well will be perforated within the target formation and stimulated with a slurry of water, sand, and chemical additives at a high rate. This will be performed in stages with the plug and perf method along the wellbore until the entire lateral has been stimulated within the target formation. All stage plugs are then drilled out and the well is flowed back to surface. The well is produced through surface facilities consisting of high pressure production units, vertical separation units, water and oil storage tanks. Max press and anticipated max rate-9000 lbs @ 80 barrells a minute.

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

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

23) Describe centralizer placement for each casing string:

All casing strings will be ran with a centralizer at a minimum of 1 per every 3 joints of casing.

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

**Please see attached sheets for Chemical Listing of Cement & Additives for Chesapeake Energy wells.

25) Proposed borehole conditioning procedures:

All boreholes will be conditioned with circulation and rotation for a minimum of one bottoms up and continuing until operator is satisfied with borehole conditions.

*Note: Attach additional sheets as needed.

51-01408

SLB Cement Additives

	Product Name	Product Use
Surface	D046	antifoam
	D130	polyester flake - lcm
	S001	calcium chloride
	SPACER	
	D130	polyester flake - lcm
	D020	bentonite extender
Intermediate	D046	antifoam
	D130	polyester flake - lcm
	D044	granulated salt
	D153	Anti-Settling Agent
	SPACER	
	D020	bentonite extender
	D130	polyester flake - lcm
Kick Off Plug	D080	cement liquid dispersant
	D801	mid-temp retarder
	D047	antifoam agent
	SPACER	
	B389	MUDPUSH* Express
	D206	Antifoaming Agent
	D031	barite
	B220	surfactant
Production - Lead	D167	UNIFLAC* S
	D154	low-temperature extender
	D400	EasyBLOK
	D046	antifoam
	D201	basic cements enabler
	D202	low-temperature solid dispersant
	D046	antifoam
	D167	UNIFLAC* S
	D065	TIC* Dispersant

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D201	basic cements enabler
D153	Anti-Settling Agent
SPACER	
B389	MUDPUSH* Express
D206	Antifoaming Agent
D031	barite
B220	surfactant

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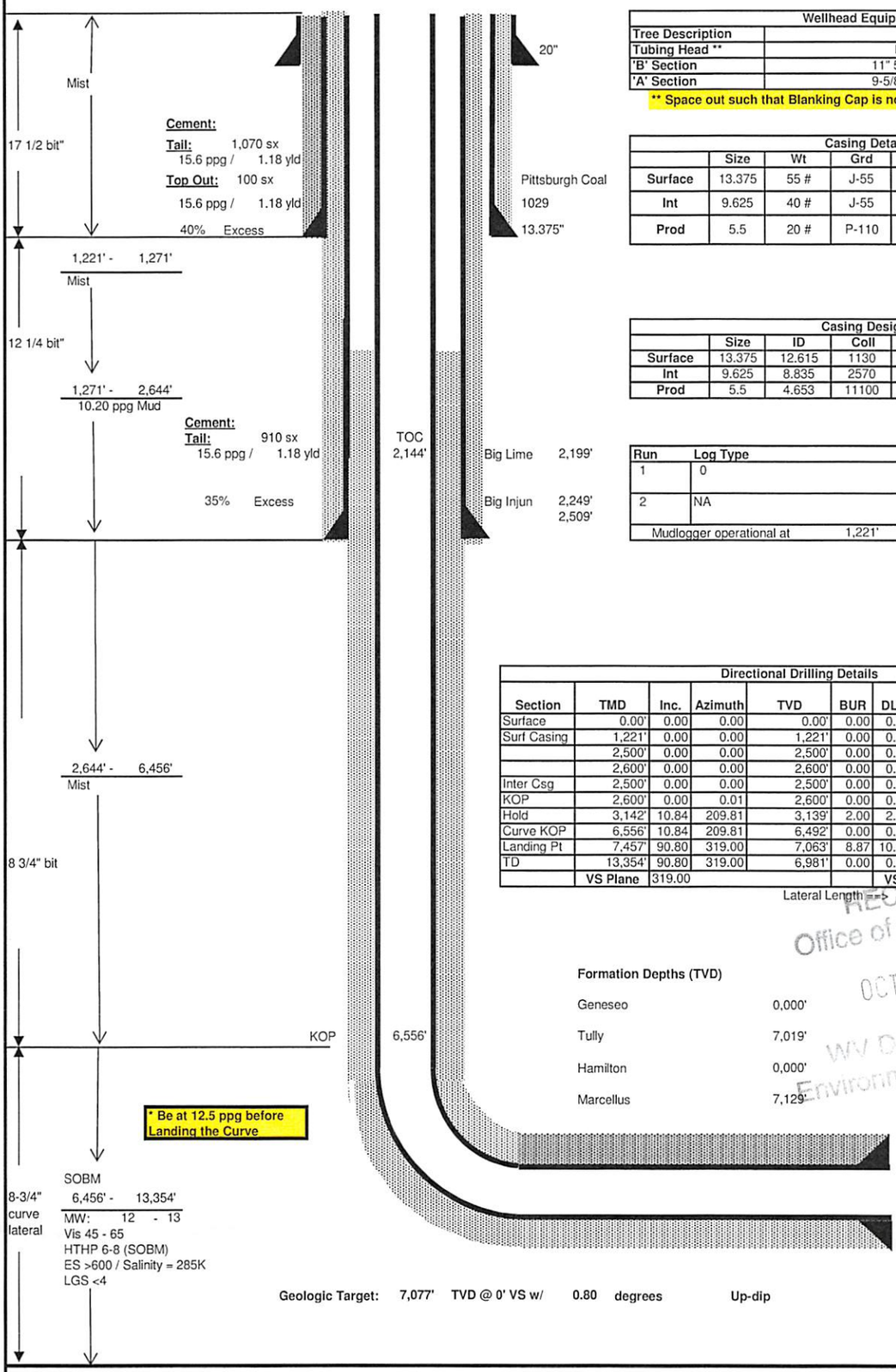
Chesapeake Energy		Well Name:	Ray Baker 1H			Drilling Rig:	Nomac 290
						Well #:	832774
						AFE #:	154664
Drilling Engineer:	Casey McDonough	Formation:	Marcellus			Directional Drilling:	Weatherford
Superintendent:	John Melville	County, State:	Marshall, WV			Drilling Mud:	Baker
Asset Manager:	Samson Tesfaselassie	Surface Latitude:	39.752878	Surface Longitude:	-80.650110	Cement Surface:	Schlumberger
Geologist:	Matthew Herrin	BHL Latitude:	39.764291	BHL Longitude:	-80.666931	Cement Longstrings:	Schlumberger
Land:	George Bradley	KB Elevation:	1329'	Ground Elevation:	1310'	Wellhead:	Weatherford



Wellhead Equipment	
Tree Description	
Tubing Head **	Blanking Cap
'B' Section	11" 5M x 7-1/16" 10M
'A' Section	9-5/8" SOW x 11" 5M

** Space out such that Blanking Cap is no more than 30" above grade.

Casing Detail	Size	Wt	Grd	Conn.	From:	To:
Surface	13.375	55 #	J-55	LTC	0'	1,221'
Int	9.625	40 #	J-55	LTC	0'	2,644'
Prod	5.5	20 #	P-110	GBCD	0'	13,354'

Casing Design	Size	ID	Coll	Burst	Tens	MU torq
Surface	13.375	12.615	1130	2730	514	5140
Int	9.625	8.835	2570	3950	520	5200
Prod	5.5	4.653	11100	12640	641	8530

Run	Log Type	Interval
1	0	0' - 0'
2	NA	
Mudlogger operational at	1,221'	Toledo

Directional Drilling Details								
Section	TMD	Inc.	Azimuth	TVD	BUR	DLS	+N/-S	+E/-W
Surface	0.00'	0.00	0.00	0.00'	0.00	0.00	0.0'	0.0'
Surf Casing	1,221'	0.00	0.00	1,221'	0.00	0.00	0.0'	0.0'
	2,500'	0.00	0.00	2,500'	0.00	0.00	0.0'	0.0'
	2,600'	0.00	0.00	2,600'	0.00	0.00	0.0'	0.0'
Inter Csg	2,500'	0.00	0.00	2,500'	0.00	0.00	0.0'	0.0'
KOP	2,600'	0.00	0.01	2,600'	0.00	0.00	0.0'	0.0'
Hold	3,142'	10.84	209.81	3,139'	2.00	2.00	-44.4'	-25.4'
Curve KOP	6,556'	10.84	209.81	6,492'	0.00	0.00	-601.5'	-344.6'
Landing Pt	7,457'	90.80	319.00	7,063'	8.87	10.47	-252.3'	-787.0'
TD	13,354'	90.80	319.00	6,981'	0.00	0.00	4,197.9'	-4,655.3'
	VS Plane	319.00				VS Length	6,222.29'	

Lateral Length --> 5,897

Formation Depths (TVD)

Geneseo	0,000'
Tully	7,019'
Hamilton	0,000'
Marcellus	7,129'

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Geologic Target: 7,077' TVD @ 0' VS w/ 0.80 degrees Up-dip

PBHL 5.5"
TMD: 13,354'
TVD: 6,981'
Inclination: 90.80 deg

Permit Date ???
Plat Date Sept 29,2010
Drawn by: Casey McDonough
Date: 9/3/2013

Notes

No Geologic WL logs

WW-9
(9/13)

API Number 47 - 51 - 01408
Operator's Well No. Ray Baker 1H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Chesapeake Appalachia, LLC OP Code 49447757

Watershed (HUC 10) Fish Creek Quadrangle Glen Easton

Elevation 1298' County Marshall District Liberty

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: Closed loop system in place at this time- cuttings will be taken to a permitted landfill.

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 2D0072539/ 2D0413175/ 2D0610306/ 2D0610317)
- ■ Reuse (at API Number at next anticipated well, API# will be included with the WR-34/DDMR &/or permit addendum.)
- ____ Off Site Disposal (Supply form WW-9 for disposal location)
- ■ Other (Explain Flow back fluids will be put in steel tanks and reused or taken to a permitted disposal facility.

Will closed loop system be used? If so, describe: yes

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

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

Additives to be used in drilling medium? see attached sheets

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

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

-Landfill or offsite name/permit number? Meadowfill SWF-1032, SS Grading SWF-4902, Northwestern SWF-1025, Short Creek 1034/WV0109517/CID28726, Carbon Limestone 28726/CID 28726
Arden Landfill 100172, American 02-12954, Country Wide 38390/CID 38390, Pine Grove 13688

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.

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Company Official Signature

Company Official (Typed Name) Danielle Southall

Company Official Title Regulatory Analyst

Subscribed and sworn before me this 26th day of September, 2013

Brittany R Woody Notary Public

My commission expires 11/27/22

OFFICIAL SEAL
Notary Public, State of West Virginia
BRITTANY R WOODY
3302 Old Elkins Road
Buckhannon, WV 26201
My commission expires November 27, 2022

51-01408

Form WW-9

Operator's Well No. Ray Baker 1H

Chesapeake Appalachia, LLC

Proposed Revegetation Treatment: Acres Disturbed 10+/- Prevegetation pH _____

Lime as determined by pH test min. 2 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 600 lbs/acre

Mulch Hay/Straw 2.5 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
White Clover	15	White Clover	15
Red Top	15	Red Top	15
Orchard Grass	20	Orchard Grass	20

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: Gayne J Knitt

Comments: Verify casing and elevations of freshwater casing and saltwater depths

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Title: Oil and Gas Inspector Date: 10/2/2013

Field Reviewed? (☒) Yes ( ) No

Water Management Plan:
Primary Water Sources

WMP- 01655	API/ID Number:	047-051-01408	Operator:	Chesapeake Energy

Ray Baker #1H - 832774

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 DEC 0 3 2013

Source Summary

WMP-01655 API Number: 047-051-01408 Operator: Chesapeake Energy

Ray Baker #1H - 832774

Stream/River

Source **Ohio River WP 1 (Beech Bottom Staging Area)** Brooke Owner: **Brownlee Land Ventures**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
10/15/2013	10/15/2014	6,000,000		40.226889	-80.658972

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

Max. Pump rate (gpm): 6,000 **Min. Gauge Reading (cfs): 6,468.00** **Min. Passby (cfs)**

DEP Comments: **Refer to the specified station on the National Weather Service's Ohio River forecast website: http://www.erh.noaa.gov/ohrfc//flows.shtml**

Source **Little Wheeling Creek WP 1 (Rt. 40 Staging Area)** Ohio Owner: **JDS Investments, LLC**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
10/15/2013	10/15/2014	6,000,000		40.078324	-80.591145

☐ Regulated Stream? Ref. Gauge ID: **3112000** **WHEELING CREEK AT ELM GROVE, WV**

Max. Pump rate (gpm): 2,000 **Min. Gauge Reading (cfs): 64.80** **Min. Passby (cfs) 2.83**

DEP Comments:

Source Summary

WMP- 01655	API Number:	047-051-01408	Operator:	Chesapeake Energy

Ray Baker #1H - 832774

Purchased Water

- Source **Ohio River @ J&R Excavating** Marshall Owner: **J&R Excavating**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
10/15/2013	10/15/2014	6,000,000	1,890,000	39.998509	-80.737336

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

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

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: http://www.erh.noaa.gov/ohrfc//flows.shtml

- Source **The Village of Valley Grove** Ohio Owner: **The Village of Valley Grove**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
10/15/2013	10/15/2014	6,000,000	720,000	-	-

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

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

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: http://www.erh.noaa.gov/ohrfc//flows.shtml

- Source **Ohio County PSD** Ohio Owner: **Ohio county PSD**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
10/15/2013	10/15/2014	6,000,000	720,000	-	-

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

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

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: http://www.erh.noaa.gov/ohrfc//flows.shtml

Source Detail

WMP-01655 | API/ID Number: 047-051-01408 | Operator: Chesapeake Energy

Ray Baker #1H - 832774

Source ID: 30580 | Source Name: Ohio River @ J&R Excavating
J&R Excavating

Source Latitude: 39.998509
Source Longitude: -80.737336

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 | County: Marshall

Anticipated withdrawal start date: 10/15/2013
Anticipated withdrawal end date: 10/15/2014
Total Volume from Source (gal): 6,000,000
Max. Pump rate (gpm):
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm)

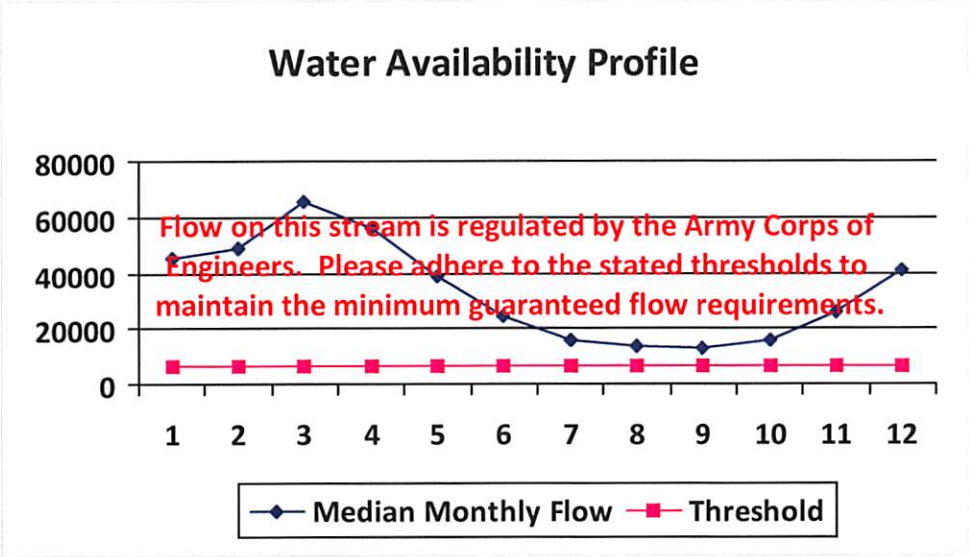
- [ ] Endangered Species?
- [ ] Trout Stream?
- [x] Regulated Stream?
- [ ] Proximate PSD?
- [x] Gauged Stream?
- [x] Mussel Stream?
- [ ] Tier 3?

Ohio River Min. Flow

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 Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
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.

Source Detail

WMP- 01655 | API/ID Number: 047-051-01408 | Operator: Chesapeake Energy

Ray Baker #1H - 832774

Source ID: 30581 | Source Name: The Village of Valley Grove

The Village of Valley Grove

Source Latitude: -

Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 | County: Ohio

Anticipated withdrawal start date: 10/15/2013

Anticipated withdrawal end date: 10/15/2014

Total Volume from Source (gal): 6,000,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

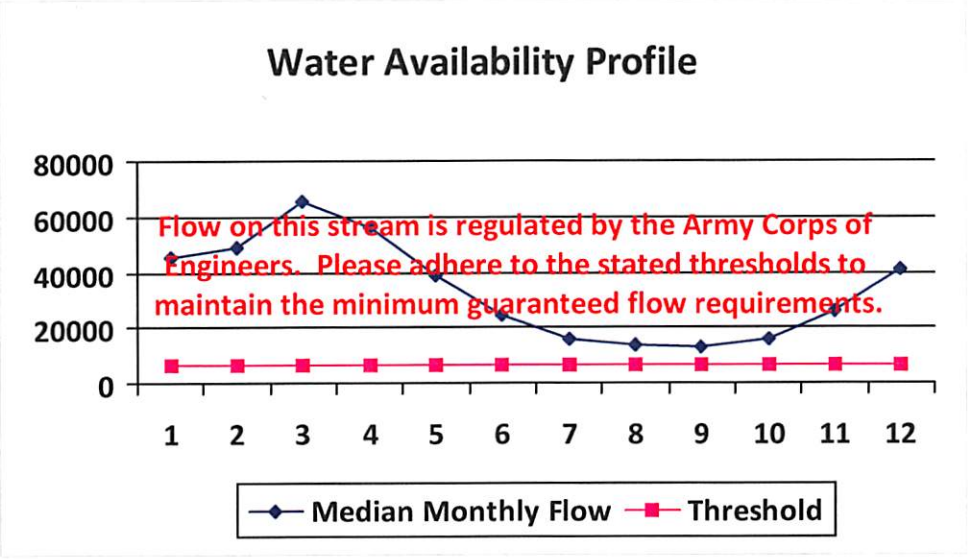
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Ohio River Min. Flow
- [x] Proximate PSD? — Wheeling Water Department
- [x] Gauged Stream?

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 Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	
Downstream Demand (cfs):	
Pump rate (cfs):	
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
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.

Source Detail

WMP- 01655 | API/ID Number: 047-051-01408 | Operator: Chesapeake Energy

Ray Baker #1H - 832774

Source ID: 30582 | Source Name: Ohio County PSD

Ohio county PSD

Source Latitude: -

Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 | County: Ohio

Anticipated withdrawal start date: 10/15/2013

Anticipated withdrawal end date: 10/15/2014

Total Volume from Source (gal): 6,000,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

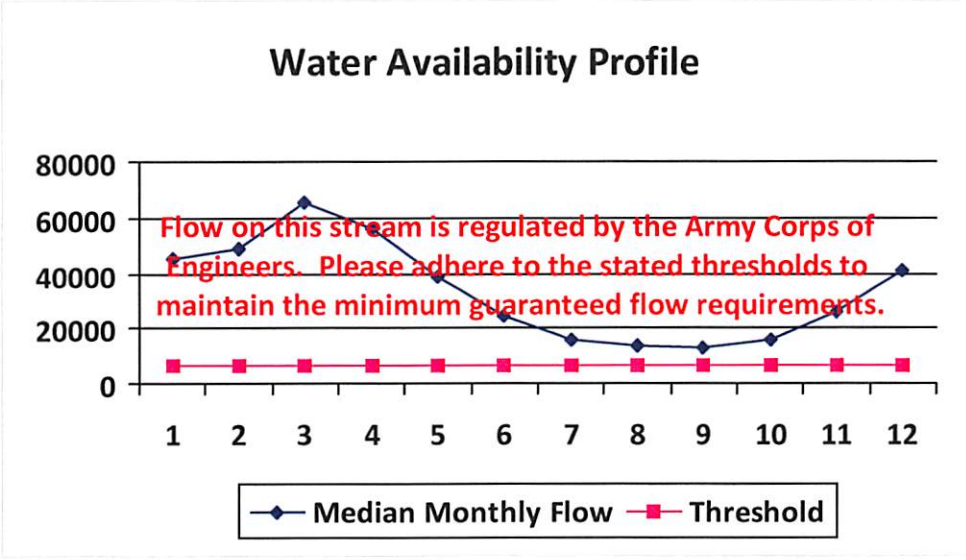
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Ohio River Min. Flow
- [x] Proximate PSD? — Wheeling Water Department
- [x] Gauged Stream?

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 Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	
Downstream Demand (cfs):	
Pump rate (cfs):	
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
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.

Source Detail

WMP- 01655 | API/ID Number: 047-051-01408 | Operator: Chesapeake Energy

Ray Baker #1H - 832774

Source ID: 30578 | Source Name: Ohio River WP 1 (Beech Bottom Staging Area)
Brownlee Land Ventures

Source Latitude: 40.226889
Source Longitude: -80.658972

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 | County: Brooke

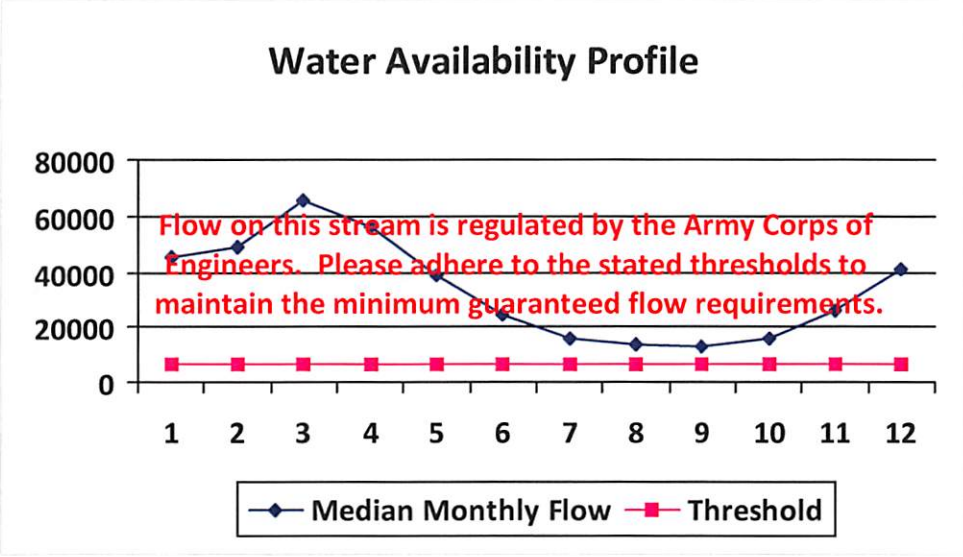
Anticipated withdrawal start date: 10/15/2013
Anticipated withdrawal end date: 10/15/2014
Total Volume from Source (gal): 6,000,000
Max. Pump rate (gpm): 6,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? Ohio River Min. Flow
- [x] Proximate PSD? Beech Bottom Water Dept.
- [x] 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 Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	
Downstream Demand (cfs):	
Pump rate (cfs):	13.37
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
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.

Source Detail

WMP- 01655 | API/ID Number: 047-051-01408 | Operator: Chesapeake Energy

Ray Baker #1H - 832774

Source ID: 30579 | Source Name: Little Wheeling Creek WP 1 (Rt. 40 Staging Area)
JDS Investments, LLC

Source Latitude: 40.078324
Source Longitude: -80.591145

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 13.94 | County: Ohio

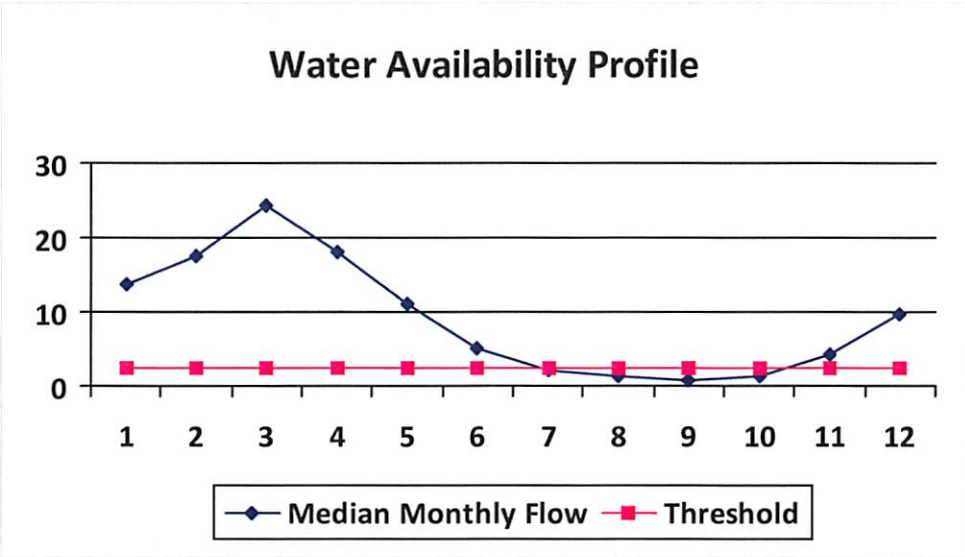
Anticipated withdrawal start date: 10/15/2013
Anticipated withdrawal end date: 10/15/2014
Total Volume from Source (gal): 6,000,000
Max. Pump rate (gpm): 2,000
Max. Simultaneous Trucks:
Max. Truck pump rate (gpm)

- ☐ Endangered Species?
- ☐ Trout Stream?
- ☐ Regulated Stream?
- ☐ Proximate PSD?
- ☐ Gauged Stream?
- ☑ Mussel Stream?
- ☐ Tier 3?

Reference Gaug: 3112000 | WHEELING CREEK AT ELM GROVE, WV

Drainage Area (sq. mi.): 281.00 | Gauge Threshold (cfs): 38

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	13.81	10.62	3.55
2	17.62	10.62	7.36
3	24.44	10.62	14.18
4	18.14	10.62	7.88
5	11.06	10.62	0.80
6	5.03	10.62	-5.23
7	2.22	10.62	-8.03
8	1.30	10.62	-8.96
9	0.83	10.62	-9.43
10	1.37	10.62	-8.89
11	4.31	10.62	-5.95
12	9.77	10.62	-0.49



Water Availability Assessment of Location

Base Threshold (cfs):	1.89
Upstream Demand (cfs):	3.34
Downstream Demand (cfs):	0.00
Pump rate (cfs):	4.46
Headwater Safety (cfs):	0.47
Ungauged Stream Safety (cfs):	0.47
Min. Gauge Reading (cfs):	**64.80**
Passby at Location (cfs):	**2.83**

"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- 01655	API/ID Number	047-051-01408	Operator:	Chesapeake Energy

Ray Baker #1H - 832774

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.

Multi-site impoundment

Source ID:	30585	Source Name	Schostag Freshwater Impoundment (Chesapeake En Industrial Facility	Source start date:	10/15/2013
				Source end date:	10/15/2014
Source Lat:	39.72385	Source Long:	-80.664395	County	Marshall
Max. Daily Purchase (gal)	864,000	Total Volume from Source (gal):	6,000,000		

DEP Comments:

The intake identified above has been defined in a previous water management plan. The thresholds established in that plan govern this water management plan unless otherwise noted.

Reference: WMP-77

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.

Purchased Water

Source ID: 30583 Source Name: Pennsylvania American Water
Public Water Provider
Source start date: 10/15/2013
Source end date: 10/15/2014
Source Lat: Source Long: County
Max. Daily Purchase (gal): 720,000 Total Volume from Source (gal): 6,000,000
DEP Comments: Please ensure that the sourcing of this water confirms to all rules and guidance provided by PA DEP.

Source ID: 30584 Source Name: Elite Gasfield Services, Midland Borough
Commercial Supplier
Source start date: 10/15/2013
Source end date: 10/15/2014
Source Lat: 40.644598 Source Long: -80.469382 County
Max. Daily Purchase (gal): 8,640,000 Total Volume from Source (gal): 6,000,000
DEP Comments: Please ensure that the sourcing of this water confirms to all rules and guidance provided by PA DEP.

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: 30586 Source Name Various

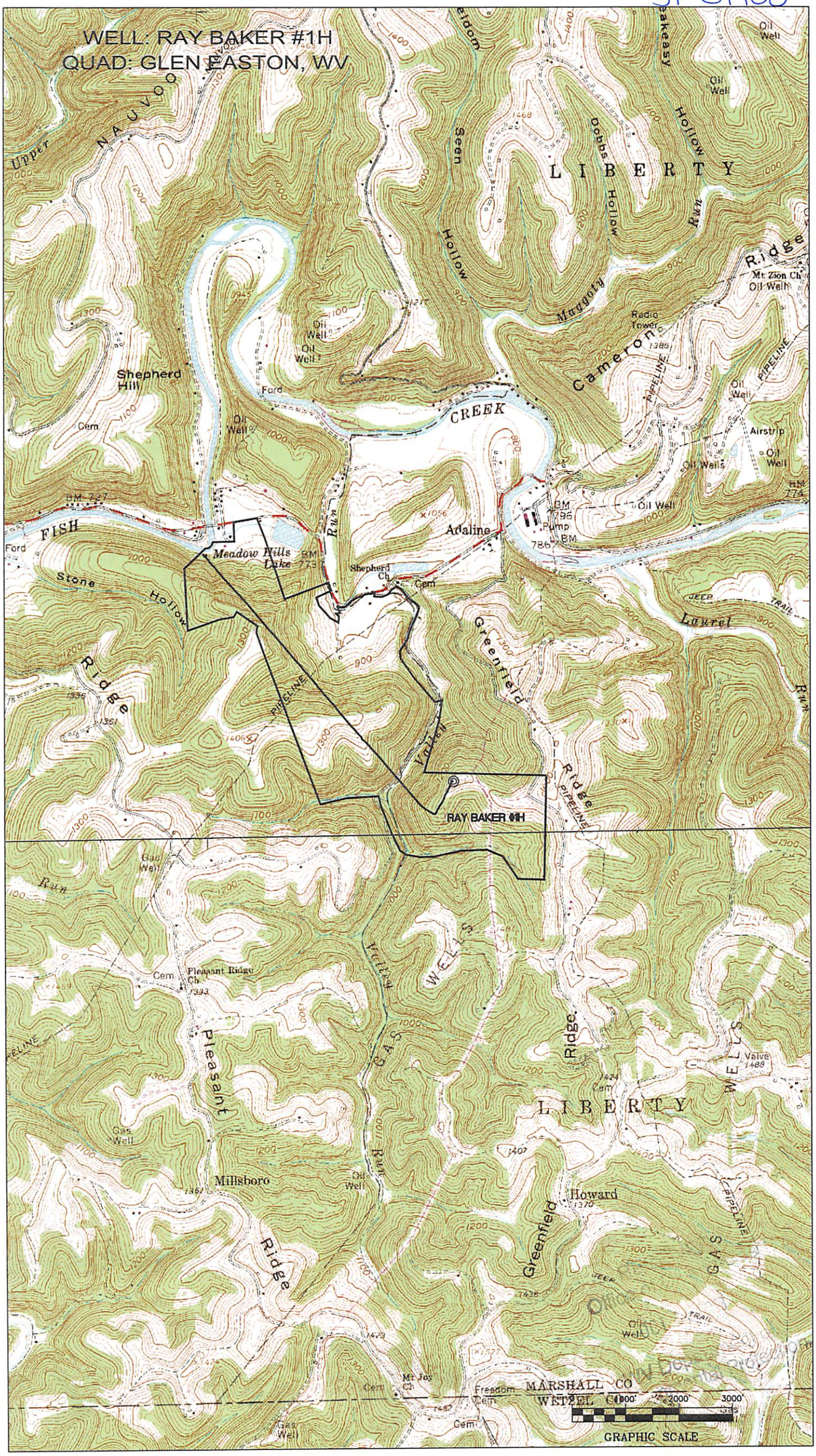
Source start date: 10/15/2013
Source end date: 10/15/2014

Source Lat: Source Long: County

Max. Daily Purchase (gal) Total Volume from Source (gal): 6,000,000

DEP Comments: Sources include, but are not limited to, Robert Baxter WTZ 6H

51-01408



WELL: RAY BAKER #1H
QUAD: GLEN EASTON, WV
RAY BAKER #1H
LIBERTY
Shepherd Hill
Meadow Hills Lake
Adaline
Greenfield
Pleasant Ridge
Millsboro
Howard
Cameron
Ridge
Laurel
Run
Valley
Hollow
Dobbs Hollow
Seen Hollow
Maggoty
Stone Hollow
FISH CREEK
Oil Well
Oil Wells
Airstrip
Radio Tower
Mt Zion Ch
Pump
Shepherd Ch
Pleasant Ridge Ch
Mt Joy Ch
Freedom Cem
Gas Well
Valve
Cem
Ford
Upper NAUVOO
PIPELINE
JEEP TRAIL
MARSHALL CO
WETZEL CO
GRAPHIC SCALE
1000' 2000' 3000'

SURFACE HOLE DEC. LONG: 80.650097
SURVEYED LONG: 80° 39' 00.3"

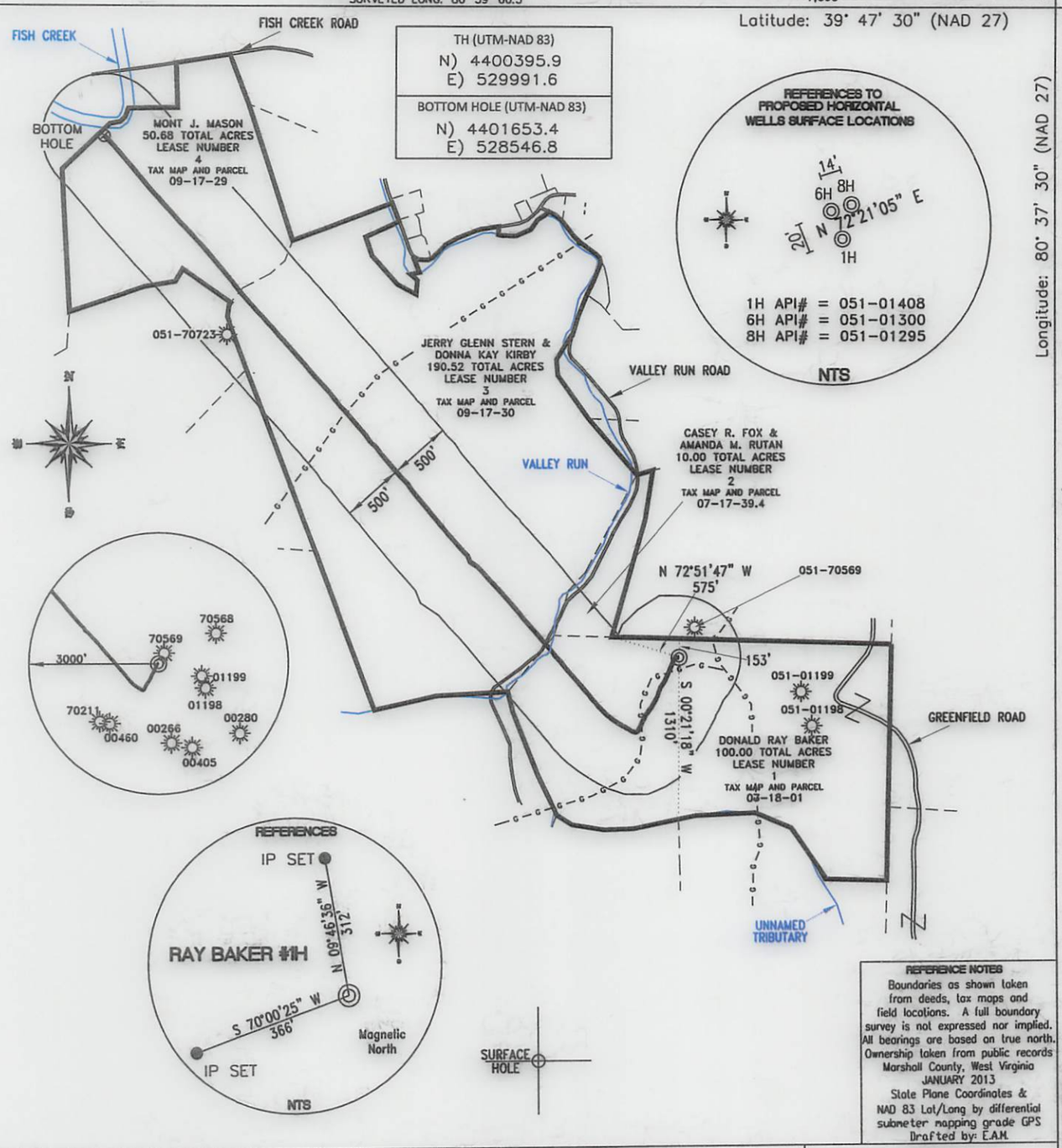
7,060'

Latitude: 39° 47' 30" (NAD 27)

Longitude: 80° 37' 30" (NAD 27)

14,160'

SURFACE HOLE DEC. LAT: 39.752867
SURVEYED LAT: 39° 45' 10.3"



REFERENCE NOTES
Boundaries as shown taken from deeds, tax maps and field locations. A full boundary survey is not expressed nor implied. All bearings are based on true north. Ownership taken from public records Marshall County, West Virginia JANUARY 2013
State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS
Drafted by: E.A.M.

FILE #: CHE 039
DRAWING #: 2283
SCALE: 1"=1200'
MINIMUM DEGREE OF ACCURACY: 1/200
PROVEN SOURCE OF ELEVATION: 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 PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed:

L.L.S. #2124 : Ernest J. Benchek III

ERNEST J. BENCHEK III
LICENSED
No. 2124
STATE OF WEST VIRGINIA
PROFESSIONAL SURVEYOR

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: SEPTEMBER 25, 2013

OPERATOR'S WELL #: RAY BAKER #1H

API WELL #: 47 (STATE) 51 (COUNTY) 01408 (PERMIT) H6A

Well Type: ☐ Oil ☐ Waste Diposal ☐ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: FISH CREEK
ELEVATION: 1297.7'
COUNTY/DISTRICT: MARSHALL/LIBERTY
QUADRANGLE: GLEN EASTON WV.
SURFACE OWNER: DONALD RAY BAKER
ACREAGE: 100.00 +/-
OIL & GAS ROYALTY OWNER: DONALD RAY BAKER
ACREAGE: 543.24 +/-
LEASE NUMBERS:

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☒
PLUG OFF FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐
CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY):

TARGET FORMATION: MARCELLUS
ESTIMATED DEPTH: TVD: 6,981' TMD: 13,354'
WELL OPERATOR : CHESAPEAKE APPALACHIA, LLC.
DESIGNATED AGENT : ERIC B. GILLESPIE
ADDRESS: PO BOX 18496
ADDRESS: Po Box 6070
CITY: OKLAHOMA CITY STATE: OK ZIP CODE: 73154-0496
CITY: CHARLESTON STATE: WV ZIP CODE: 25301