



**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

August 28, 2014

**WELL WORK PERMIT**

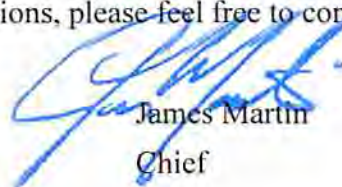
**Horizontal 6A Well**

This permit, API Well Number: 47-6900178, 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: ALICE EDGE OHI 5H  
Farm Name: EDGE, ALICE MAE  
**API Well Number: 47-6900178**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 08/28/2014

Promoting a healthy environment.

08/29/2014

## PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

### CONDITIONS

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1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.
9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.



47-6900178

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

1) Well Operator: Chesapeake Appalachia, LLC 49447757 69-Ohio 3-Liberty 648-Valley Grove  
Operator ID County District Quadrangle

2) Operator's Well Number: Alice Edge OHI 5H Well Pad Name: Alice Edge Pad

3) Farm Name/Surface Owner: Alice Mae Edge Public Road Access: State Route 40

4) Elevation, current ground: 1198' Elevation, proposed post-construction: 1198'

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

(b) If Gas Shallow  Deep   
Horizontal

*MDK 6/25/2014*

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):  
Target formation- Marcellus Target top TVD- 6394' Target base TVD- 6455' Anticipated thickness-61' Associated Pressure- 4176

8) Proposed Total Vertical Depth: 6309'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 15,500'

11) Proposed Horizontal Leg Length: 8312'

12) Approximate Fresh Water Strata Depths: 425'

13) Method to Determine Fresh Water Depths: from log analysis of nearby wells

14) Approximate Saltwater Depths: 1050'

15) Approximate Coal Seam Depths: 580'

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: Tunnel Ridge  
Depth: 558'  
Seam: Pittsburgh #8  
Owner: Tunnel Ridge

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WW-6B  
(9/13)

47 - 6900178

18)

**CASING AND TUBING PROGRAM**

<b>TYPE</b>	<b>Size</b>	<b>New or Used</b>	<b>Grade</b>	<b>Weight per ft. (lb/ft)</b>	<b>FOOTAGE: For Drilling</b>	<b>INTERVALS: Left in Well</b>	<b>CEMENT: Fill-up (Cu. Ft.)</b>
Conductor	20"	New	J-55	94#	100'	100'	CTS
Fresh Water	13 3/8"	New	J-55	54.5#	650'	650'	600 sx/CTS
Coal	9 5/8"	New	J-55	40#	2110'	2110'	790 sx/CTS
Intermediate	7"	New	P-110	20#	If Needed	If Needed	If Needed/As Needed
Production	5 1/2"	New	P-110	20#	15,450'	15,450'	Lead: 1050 sx Tail: 2000 sx/100' inside
Tubing	2 3/8"	New	N-80	4.7#	Approx. 6902'	Approx. 6902'	
Liners							

*MSJK 6/24/14*

<b>TYPE</b>	<b>Size</b>	<b>Wellbore Diameter</b>	<b>Wall Thickness</b>	<b>Burst Pressure</b>	<b>Cement Type</b>	<b>Cement Yield (cu. ft./k)</b>
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:				

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Page 2 of 3  
08/29/2014

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

Drill and stimulate any potential zones between and including the Benson to the Marcellus. \*\*If we should encounter a void, place basket above and below void area - balance cement to bottom of void and grout from basket to surface. Run casing not less than 20' below void nor more than 50' below void. (\*If freshwater is encountered deeper than anticipated it must be protected, set casing 50' below and cts)

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): 18.4

22) Area to be disturbed for well pad only, less access road (acres): 6.1

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:

See Attachment\*\*

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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.





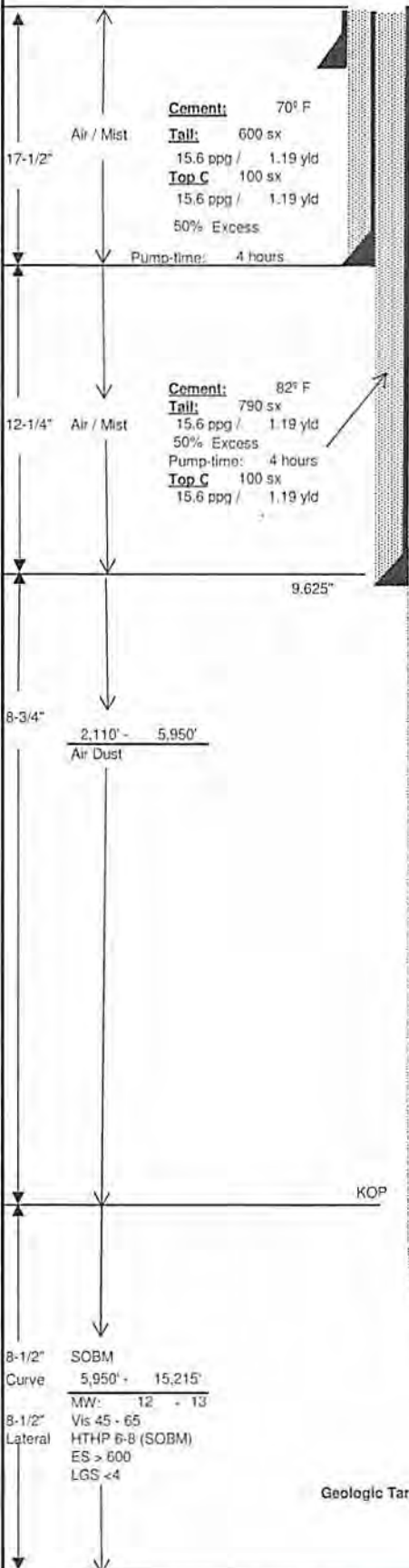
Well Name: Alice Edge OHI 5H

Drilling Rig: N/A

Drilling Engineer: TBD  
 Superintendent: N/A  
 Asset Manager: N/A  
 Geologist: N/A  
 Land: N/A

Formation: Marcellus  
 County, State: Ohio, WV  
 Surface Latitude: 40.099817 Surface Longitude: -80.560547  
 BH Latitude: 40.1205 BH Longitude: -80.5686  
 KB Elevation: 1240' Ground Elevation: 1220'

Directional Drilling: N/A  
 Drilling Mud: N/A  
 Cement Surface: N/A  
 Cement Longstrings: N/A  
 Wellhead: N/A  
 AFE #: N/A



Wellhead Equipment	
Tree Description	
Tubing Head **	Blanking Cap
'B' Section	11" x 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	54.5 #	J-55	STC	0'	650'
Interm	9.625	40 #	J-55	LTC	0'	2,110'
Prod	5.5	20 #	P-110	GBCD	0'	15,215'

Report any water or gas flows. Catch liquid sample if possible.

Casing Design						
	Size	ID	Coil	Burst	Tens	MU torq
Surface	13.375	12.615	1130	2740	514	5140
Interm	9.625	8.835	2570	3950	520	5200
Prod	5.5	4.778	12200	12360	641	8530

BIG INJUN 1,748' KBTVD  
 BASE BIG INJUN 1,958' KBTVD

Surface Nudge for Anti-Collision purposes.

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'
Surface	100'	0.00	0.00	100'	0.00	0.00	0.0'	0.0'
Surface	200'	0.00	0.00	200'	0.00	0.00	0.0'	0.0'
Surface	300'	0.00	0.00	300'	0.00	0.00	0.0'	0.0'
Surface	400'	0.00	0.00	400'	0.00	0.00	0.0'	0.0'
Hold	650'	0.00	0.00	650'	0.00	0.00	0.0'	0.0'
Hold	1,477'	16.54	110.67	1,466'	2.00	2.00	-41.8'	110.9'
KOP	6,050'	16.54	110.67	5,849'	0.00	0.00	-501.4'	1,329.0'
Landing Pt	6,902'	90.70	335.80	6,410'	8.70	12.00	-20.5'	1,243.9'
TD	15,215'	90.70	335.80	6,309'	0.00	0.00	7,560.6'	-2,163.2'
VS Plane	335.80						VS Length	7,782.96'

Lateral Length ==> 8,312.20'

Plat Date 6/5/14

Logging Program		
Run	Log Type	Interval
1	TBD	TBD
2	TBD	TBD

Mudlogger operational at Surface

Formation Depths (TVD)

BASE BIG INJUN 1,958'  
 GENESEO 6,212'  
 TULLY 6,226'  
 HAMILTON 6,409'  
 MARCELLUS 6,380'  
 ONONDAGA 6,440'

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Cement: 2,060 sx  
 Lead: 1.20 yld  
 Fall: 15.6 ppg / 1.20 yld  
 15% Excess  
 Pump-time: 6 hours

Geologic Target: 6,410' TVD @ 0° VS w/ 0.70 degrees/100 ft Up-dip

PBHL 5.5'  
 TMD: 15,215'  
 TVD: 6,309'  
 Inclination: 90.70 deg

08/29/2014

Gyro the 1st well on the pad at KOP.  
 Ensure all Surveys are referenced to Grid North!!

Drawn by: TBD  
 Date: 6/23/2014



WW-9  
(9/13)

API Number 47 - 69  
Operator's Well No. Alice Edge OHI 5H

47 - 6900178

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) Upper Ohio South Quadrangle 648-Valley Grove

Elevation 1198' County 69-Ohio District 3-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/WV0199517/CID28726, Carbon Limestone 28726/CID 28726  
Arden Landfill 100/2, 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 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 [Signature]

Company Official (Typed Name) Dee Southall

Company Official Title Regulatory Analyst II

Subscribed and sworn before me this 1st day of July, 2014

[Signature] Notary Public

My commission expires 11/27/22

08/29/2014

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Form WW-9

Operator's Well No. Alice Edge OHI 5H

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
White Clover	15
Red Top	15
Orchard Grass	20

Seed Type	lbs/acre
White Clover	15
Red Top	15
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: [Signature]

Comments: \_\_\_\_\_

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Title: Oil and Gas Inspector

Date: 6/25/2014

Field Reviewed?  Yes  No

08/29/2014



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**Marcellus Well Drilling Procedures  
And Site Safety Plan**

Chesapeake Appalachia, LLC

47 - 69 -

Well name: Alice Edge OHI 5H  
Valley Grove, Quad  
Liberty, District  
Ohio County, West Virginia

*MSG/K  
6/25/2014*

Submitted by:



6/10/2014

Dee Southall

Date:

Title Regulatory Analyst II

Chesapeake Appalachia, LLC

Approved by:

Date:

Title:

Approved by:

Date:

Title:

Chesapeake Appalachia, L.L.C. – Confidential

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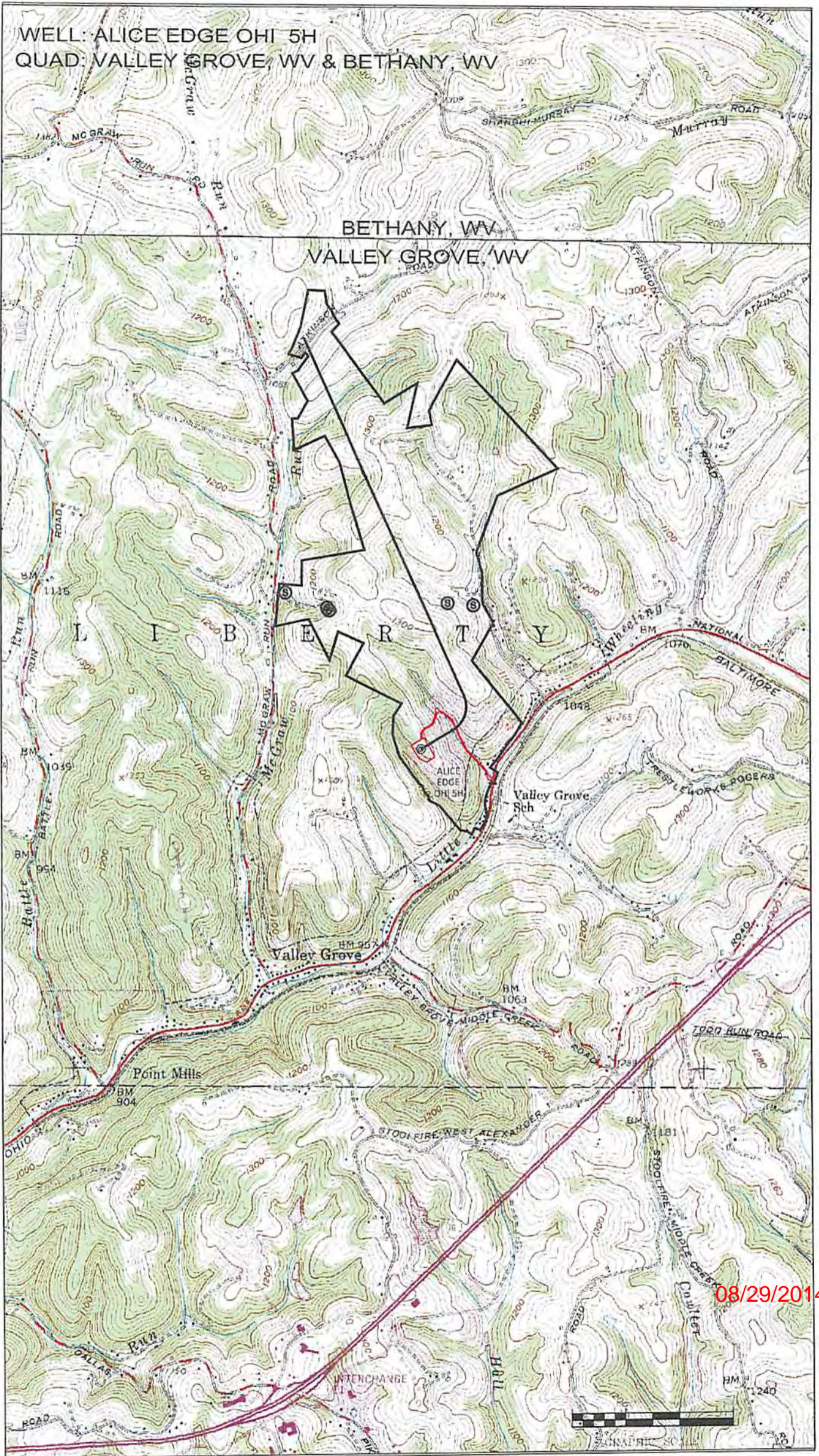
08/29/2014



WELL: ALICE EDGE OHI 5H  
QUAD: VALLEY GROVE, WV & BETHANY, WV

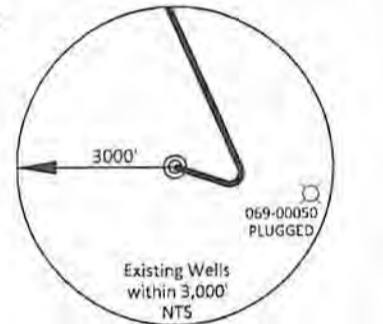
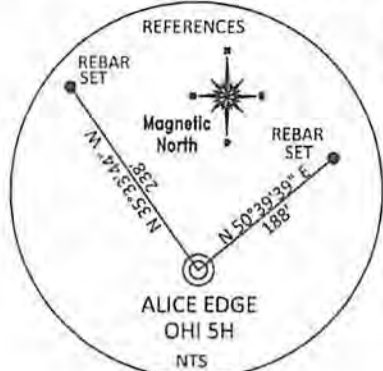
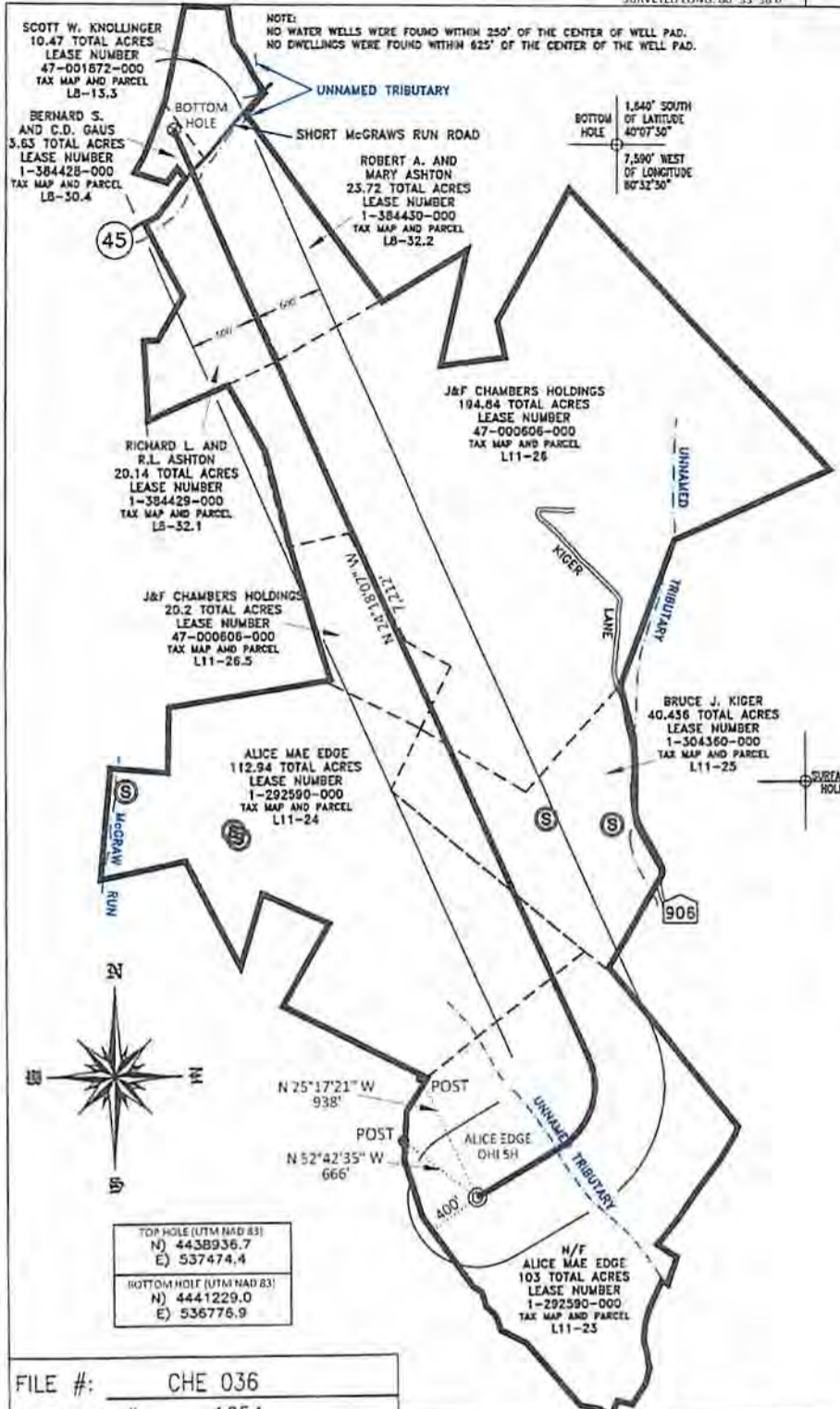
BETHANY, WV

VALLEY GROVE, WV



08/29/2014





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 OHIO County, West Virginia JUNE 2013  
State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS drafted by EAM



FILE #: CHE 036

DRAWING #: 1654

SCALE: PLAT: 1" = 1200'  
TICK MARK: 1" = 2000'

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: *[Signature]*  
L.L.S. #2124; Ernest J. Benček III

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WYDEP  
OFFICE OF OIL & GAS  
601 57TH STREET  
CHARLESTON, WV 25304

Well Type:  Oil  Waste Dipsal  Production  Deep  
 Gas  Liquid Injection  Storage  Shallow

WATERSHED: UPPER OHIO SOUTH ELEVATION: 1,198'

COUNTY/DISTRICT: OHIO / LIBERTY QUADRANGLE: VALLEY GROVE, WV

SURFACE OWNER: ALICE MAE EDGE ACREAGE: 103 +/-

OIL & GAS ROYALTY OWNER: ALICE MAE EDGE ACREAGE: 529.376 +/-

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: 6,410' TMD: 15,209'

WELL OPERATOR: CHESAPEAKE OPERATING 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: 25362

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