



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

PERMIT MODIFICATION APPROVAL

August 05, 2013

CHESAPEAKE APPALACHIA, L.L.C.
POST OFFICE BOX 6070
CHARLESTON, WV 25362

Re: Permit Modification Approval for API Number 5101581 , Well #: MICHAEL DUNN MSH 1
extended lateral

Oil and Gas Operator:

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

Gene Smith
Regulatory/Compliance Manager
Office of Oil and Gas

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION

1) Well Operator: Chesapeake Appalachia, LLC 494477557 51-Marshall 9-Webster 453-Majorsville
Operator ID County District Quadrangle
API# 47-51-01581

2) Operator's Well Number: Michael Dunn MSH 10H Well Pad Name: Michael Dunn MSH Pad

3 Elevation, current ground: 1260' Elevation, proposed post-construction: 1256'

4) Well Type: (a) Gas Oil
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):
Proposed Target Formation- Marcellus, Marcellus top-6796' TVD, Marcellus Base-6846' TVD, Thickness- 50', Anticipated Pressure-4281

7) Proposed Total Vertical Depth: 6819'

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: ~~13,000'~~ 14,500'

10) Approximate Fresh Water Strata Depths: 330'

11) Method to Determine Fresh Water Depth: Data was gathered from e-logs, drillers logs and from wells within a 2500' radius

12) Approximate Saltwater Depths: 1156'

13) Approximate Coal Seam Depths: 666'

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

15) Does land contain coal seams tributary or adjacent to, active mine? yes

16) Describe proposed well work:
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)

17) Describe fracturing/stimulating methods in detail:
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.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 13.7

19) Area to be disturbed for well pad only, less access road (acres): 7.2

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Environmental Protection

WW - 6B
(1/12)

20)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<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	J-55	94#	100'	100'	CTS
Fresh Water	13 3/8"	New	J-55	54.5#	430'	430'	410 sx
Coal	9 5/8"	New	J-55	40#	2300'	2300'	950 sx
Intermediate	7"	New	P-110	20#	If Needed	If Needed	If Needed/As Needed
Production	5 1/2"	New	P-110	20#	14,500"	14,500'	Lead 900 sx Tail 1812 sx/100' inside intermediate
Tubing	2 3/8"	New	N-80	4.7#	Approx. 7113'	Approx. 7113'	
Liners							

DMH 2-4-13

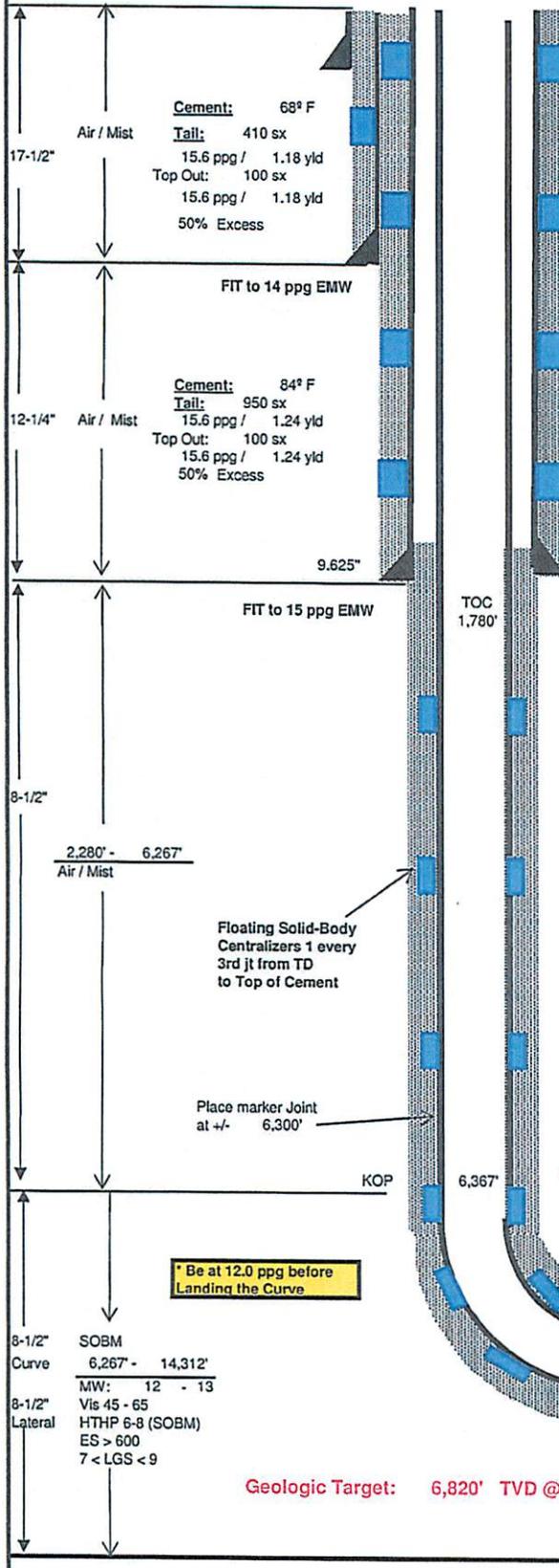
<u>TYPE</u>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield</u>
Conductor	20"	30"	0.25"	2120	15.6 ppg	1.19/50% Excess
Fresh Water	13 3/8"	17.5"	0.380	2740	15.6 ppg	1.19/50% Excess
Coal	9 5/8"	12 1/4"	0.395	3950	15.6 ppg	1.19/50% Excess
Intermediate	7"	8 3/4"	.0317	4360	15.6 ppg	1.20/15% Excess
Production	5 1/2"	8 3/4"	0.361	12360	15.6 ppg	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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		Well Name: Michael Dunn MSH 10H	Drilling Rig: Nomac 25
Drilling Engineer: Chase Dwiggins	Formation: Marcellus	Directional Drilling: Sperry	
Superintendent: R. Harless / J. Melville	County, State: Marshall, WV	Drilling Mud: Nova	
Asset Manager: Kurt Hibbard	Surface Latitude: 39.897105	Cement Surface: Schlumberger	
Geologist: Keith Coffindaffer	BH Latitude: 39.87924	Cement Longstrings: Schlumberger	
Land: Monty Mayfield	KB Elevation: 1278'	Wellhead: Weatherford	
	Surface Longitude: -80.554235	AFE #: 171951	Well #: 836175
	BH Longitude: -80.540361		
	Ground Elevation: 1260'		



Wellhead Equipment					
Tree Description	Blanking Cap				
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' 430'
Interm	9.625	40 #	J-55	LTC	0' 2,280'
Prod	5.5	20 #	P-110	GBCD	0' 14,312'

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

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'
KOP 1	530'	0.00	0.00	530'	0.00	0.00	0.0'	0.0'
Hold	1,030'	10.00	50.00	1,027'	2.00	2.00	28.0'	33.3'
Interm Csg	2,300'	10.00	50.00	2,278'	0.00	0.00	169.7'	202.3'
Drop	2,800'	0.00	0.00	2,776'	-2.00	2.00	197.7'	235.6'
KOP	6,367'	0.00	0.00	6,343'	0.00	0.00	197.7'	235.6'
Landing Pt	7,113'	89.50	142.36	6,820'	12.00	12.00	-177.1'	524.6'
Turn	8,113'	89.50	142.36	6,829'	0.00	0.00	-968.9'	1,135.3'
Hold	8,744'	89.50	154.98	6,834'	0.00	2.00	-1,506.8'	1,462.7'
TD	14,312'	89.50	154.98	6,883'	0.00	0.00	-6,552.1'	3,817.6'
VS Plane	154.98			VS Length		7,551.82'		
Lateral Length ==>							7,199.00'	

Plat Date	7/5/2012
Gplat Date	1/29/2013
AFE Date	12/11/2012

Permit VS. Actual	0'
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Logging Program		
Run	Log Type	Interval
1	None	Surface
2	None	Intermediate to Surf. Csg
3	CBL	Over Surface Casing
	None	KOP to Int. Csg
	CBL	Over Intermediate Casing
Mudlogger operational at		Surface

Formation Depths (TVD)	
GENESECO	6,628'
TULLY	6,651'
HAMILTON	6,678'
MARCELLUS	6,790'
ONONDAGA	6,843'

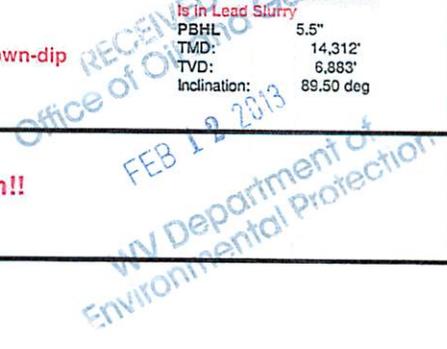
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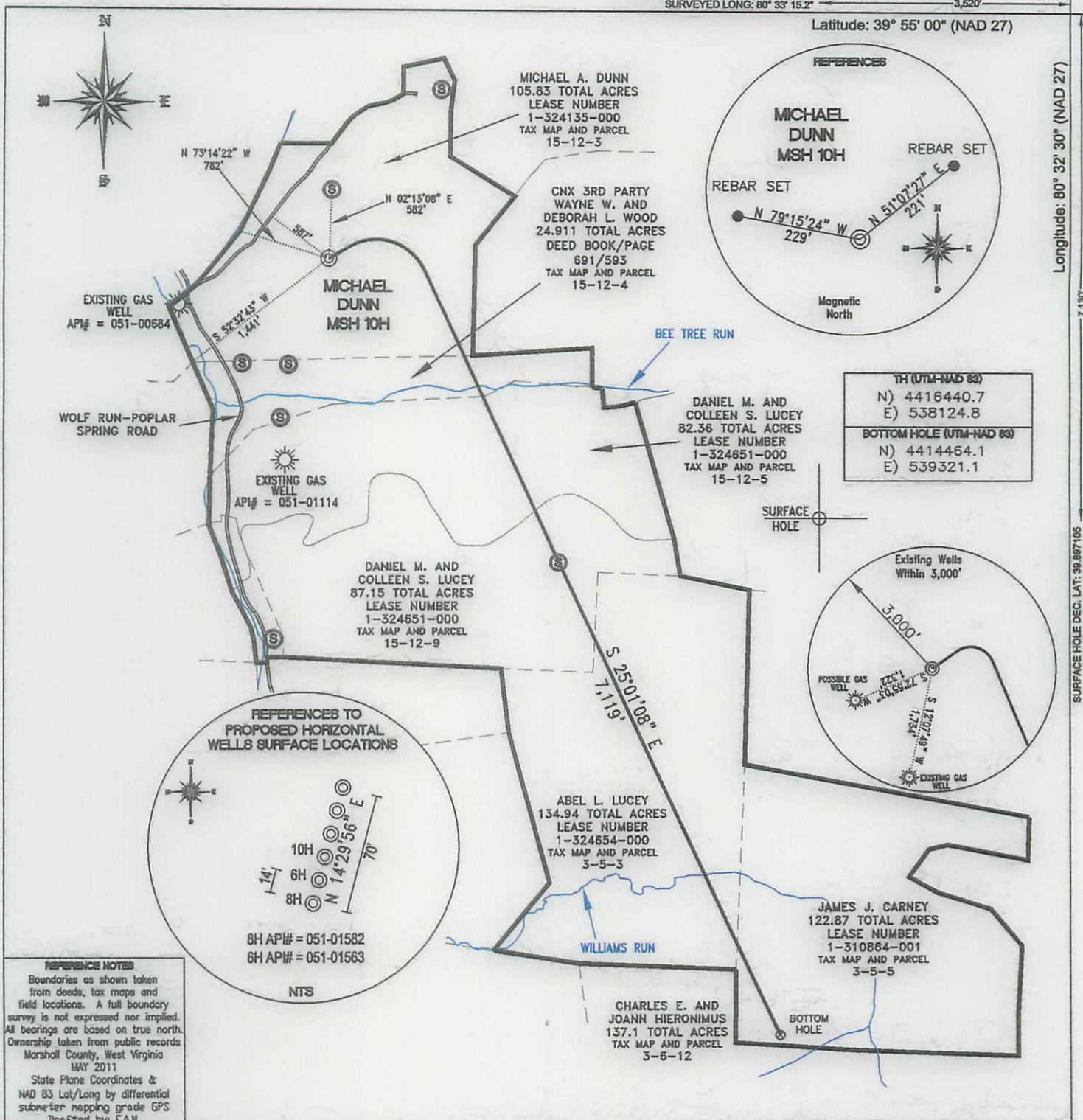
Cement: 124° F
 Lead: 900 sx
 15.0 ppg / 1.34 yld
 Tail: 1,812 sx
 15.8 ppg / 1.16 yld
 15% Excess
 Pump-time: 5 hours
 Ensure Gas Block Additive is in Lead Slurry
 PBHL: 5.5"
 TMD: 14,312'
 TVD: 6,883'
 Inclination: 89.50 deg

Geologic Target: 6,820' TVD @ 0° VS w/ 0.50 degrees/100 ft Down-dip

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

Drawn by: Chase
 Date: 1/31/2013





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 MAY 2011
 State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS
 Drafted by EAJ

FILE #: CHE 070
 DRAWING #: 2079
 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



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

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

DATE: FEBRUARY 7, 2013

OPERATOR'S WELL #: MICHAEL DUNN MSH 10H

API WELL #: 47 51 MOD 1581 HGA
 STATE COUNTY PERMIT

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

WATERSHED: UPPER OHIO SOUTH ELEVATION: 1,258'

COUNTY/DISTRICT: MARSHALL / WEBSTER QUADRANGLE: MAJORSVILLE, WV.

SURFACE OWNER: MICHAEL A. DUNN ACREAGE: 105.83 +/-

OIL & GAS ROYALTY OWNER: MICHAEL A. DUNN ACREAGE: 435.19 +/-

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: 6,883' TMD: 14,312'

WELL OPERATOR: CHESAPEAKE APPALACHIA, LLC. DESIGNATED AGENT: ERIC 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



Danielle Southall
Regulatory Analyst II

February 5, 2013

Ms. Laura Cooper
Office of Oil & Gas
601 57th Street
Charleston, WV 25304

#836175

Re: Modification for Michael Dunn MSH 10H
API# 47-051-0158!

Dear Laura:

Enclosed please find a modification request for the above captioned well. We would like to extend the lateral. This well is situated on the Dunn's property, in Webster District, Marshall County, West Virginia.

If you have any questions or require additional information, please contact me at 304-517-1416 ext 86024.

Sincerely,

A handwritten signature in blue ink, appearing to be "Dee Southall", written over a circular scribble.

Dee Southall

Enclosure(s)

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Office of Oil and Gas
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WV Department of
Environmental Protection