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,

for

Gene Smith
Regulatory/Compliance Manager
Office of Oil and Gas

08/09/2013

51-1581 Mod

WW - 6B
(1/12)

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
	API# 47-51-01581	Operator ID	County	District	Quadrangle

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

RECEIVED
Office of Oil and Gas
FEB 13 2013
WV Department of
Environmental Protection

DMH 2-4-13

08/09/2013

SI-1581 MOD

WW - 6B
(1/12)

20) **CASING AND TUBING PROGRAM**

TYPE	Size	New or Used	Grade	Weight per 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#	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

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
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

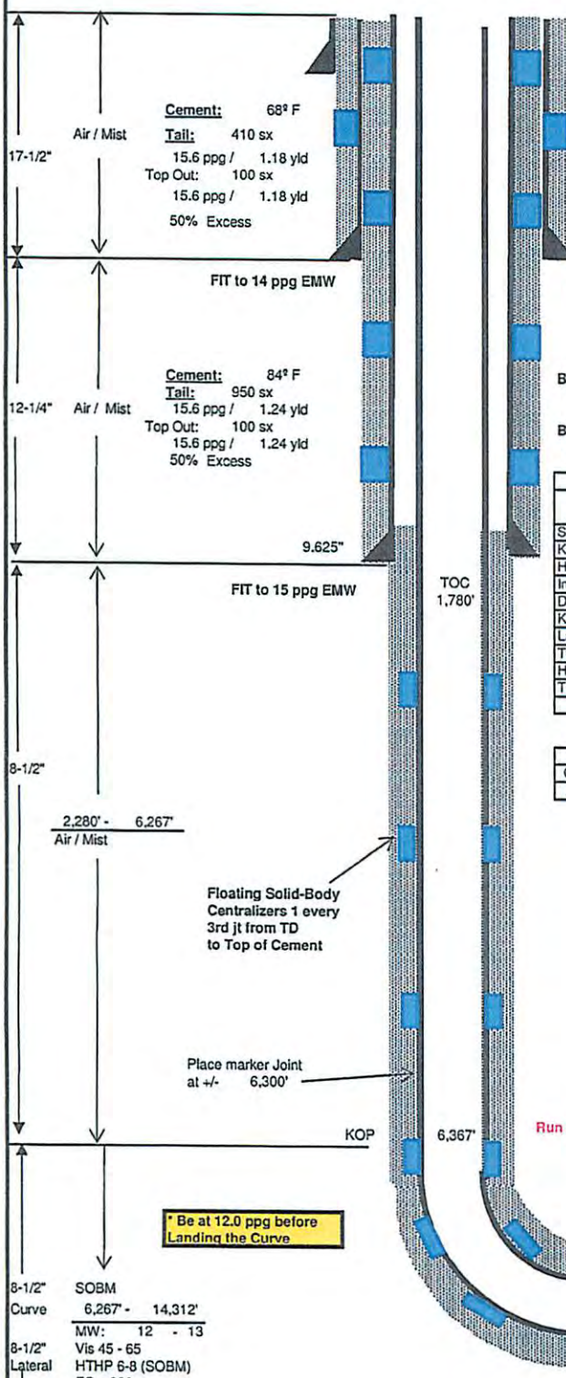
Kind:	10K Arrowset AS1-X			
Sizes:	5 1/2"			
Depths Set:	Approx. 6,197'			

08/09/2013

SI-1581MOD

Chesapeake Energy

Well Name:	**Michael Dunn MSH 10H**			**Drilling Rig:**	**Nomac 25**
				Directional Drilling:	**Sperry**
Drilling Engineer:	Chase Dwiggins	**Formation:**	Marcellus		
Superintendent:	R. Harless / J. Melville	**County, State:**	Marshall, WV	**Drilling Mud:**	Nova
Asset Manager:	Kurt Hibbard	**Surface Latitude:**	39.897105	**Surface Longitude:**	-80.554235	**Cement Surface:**	Schlumberger
Geologist:	Keith Coffindaffer	**BH Latitude:**	39.87924	**BH Longitude:**	-80.540361	**Cement Longstrings:**	Schlumberger
Land:	Monty Mayfield	**KB Elevation:**	1278'	**Ground Elevation:**	1260'	**Wellhead:**	Weatherford
						AFE #: 171951	**Well #:** 836175



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'	430'
Interm	9.625	40 #	J-55	LTC	0'	2,280'
Prod	5.5	20 #	P-110	GBCD	0'	14,312'

Report any Water flows and/or gas flows. Catch liquid sample if possible.

Casing Design	Size	ID	Coll	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'

Logging Program

Run	Log Type	Interval
1	None	Surface
2	None	Intermediate to Surf. Csg
	CBL	Over Surface Casing
3	None	KOP to Int. Csg
	CBL	Over Intermediate Casing
Mudlogger operational at		Surface

Formation Depths (TVD)

GENESEO	6,628'
TULLY	6,651'
HAMILTON	6,578'
MARCELLUS	6,790'
ONONDAGA	6,843'

DMH 2-4-13

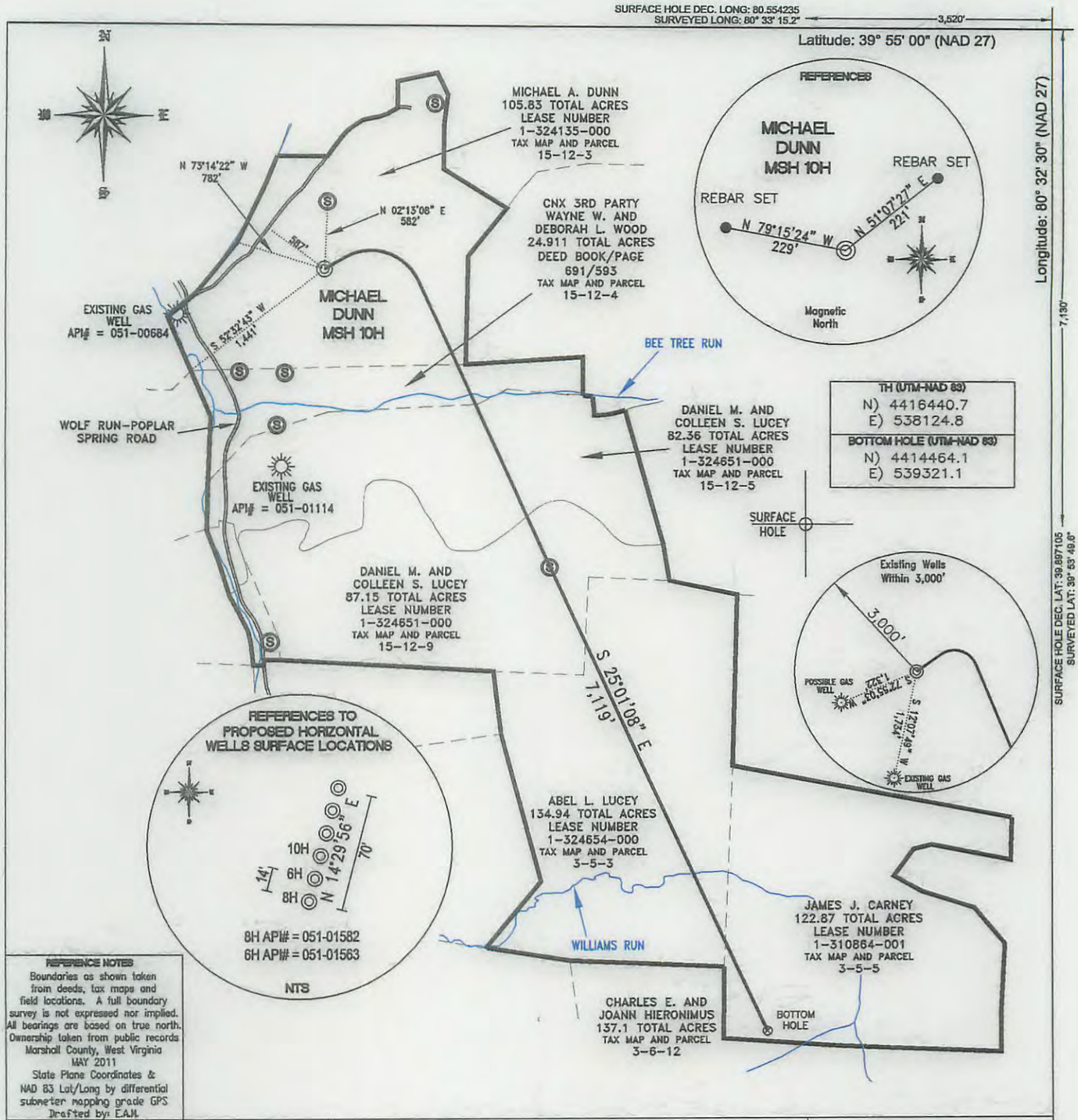
Cement: 124º F
Lead: 900 sx
15.0 ppg / 1.34 yld
Tail: 1,812 sx
15.8 ppg / 1.16 yld
15% Excess
Pump-time: 5 hours
Ensure Gas Block Additive is in Lead Slurry
PBHL 5.5"
TMD: 14,312'
TVD: 6,883'
Inclination: 89.50 deg

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

08/09/2013



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: E.A.M.

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

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: FEBRUARY 7, 2013

OPERATOR'S WELL #: MICHAEL DUNN MSH 10H

API WELL #: 47 (STATE) 51 (COUNTY) MOD 1581 H6A (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: _____

08/09/2013

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

51-1581/Mod

Chesapeake ENERGY

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# 47-051-01581

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,

Dee Southall

Enclosure(s)

Chesapeake Energy Corporation
P.O. Box 1300 • 179 Chesapeake Drive • Jane Lew, WV 26378
304-517-1416 ext.86024 • fax 304-471-2497 • danielle.southall@chk.com