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

July 30, 2014

STATOIL USA ONSHORE PROPERTIES, INC.
2103 CITYWEST BOULEVARD - SUITE 800
HOUSTON, TX 77042

Re: Permit Modification Approval for API Number 10302932, Well #: MICHAEL KUHN UNIT 2
Extended Freshwater Casing

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
Assistant Chief of Permitting
Office of Oil and Gas

08/01/2014

47 103 02932 MOD

Statoil

July 28, 2014

West Virginia Department of Environmental Protection
Office of Oil and Gas
601 57th Street, SE
Charleston, WV 23504-2345

Attention: Ashley LeMasters

Reference: Michael Kuhn Unit 2-H (API No. 47-103-02932)
Casing Revision

Ms. LeMasters:

Attached please find revised WW-6B and Wellbore Schematic for the Michael Kuhn 2H (API No. 47-103-02932) revising the freshwater casing setting depth (signed by the inspector). Statoil is preparing to commence drilling operations on the Michael Kuhn 2H in Wetzel County in approximately 4 weeks - expectations are to move from the Shreve-Watson 2H to the Michael Kuhn 2H by August 25, 2014.

Currently the freshwater casing is permitted to 500'; however, there was a study done by the state of WV (1980 Fresh & Saline Groundwater of WV by James B. Foster) that indicates the freshwater depth is actually deeper, at 707' in lieu of 320'. Though there is no evidence other than the study that the freshwater is deeper, as a prudent operator Statoil would like approval to set the casing deeper than originally permitted. Since a revision to the freshwater casing was required, Statoil took the opportunity to also revise the intermediate casing depth to set through the Big Injun.

If you have any questions or require additional information, please contact the undersigned at 713-485-2640 or at BEKW@statoil.com.

Sincerely,

Bekki Winfree
Sr. Regulatoy Advisor – Marcellus
Attachment

RECEIVED
Office of Oil and Gas
JUL 29 2014
WV Department of
Environmental Protection

08/01/2014

WW - 6B
(1/12)

47 10302932
MOD

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:	Statoil USA Onshore Properties Inc.	494505083	Wetzel	Center	Big Run 7.5'
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: Michael Kuhn Unit 2H Well Pad Name: Michael Kuhn Unit

3 Elevation, current ground: 1507' Elevation, proposed post-construction: 1507' **already built**

4) Well Type: (a) Gas ■ Oil _____
Other _____
(b) If Gas: Shallow ■ Deep _____
Horizontal ■

DMH 7-24-14

5) Existing Pad? Yes or No: Yes

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Marcellus Shale; Formation Top - 7713' TVD, 50' Thick, 0.67 psi/ft

7) Proposed Total Vertical Depth: 7696'
8) Formation at Total Vertical Depth: Marcellus Shale
9) Proposed Total Measured Depth: 13,437'
10) Approximate Fresh Water Strata Depths: 130' - 320', 707'
11) Method to Determine Fresh Water Depth: 1980 study "Freshwater & Saline Groundwater of WV" by James Foster
12) Approximate Saltwater Depths: 2150'
13) Approximate Coal Seam Depths: 755'
14) Approximate Depth to Possible Void (coal mine, karst, other): N/A
15) Does land contain coal seams tributary or adjacent to, active mine? No
16) Describe proposed well work: Drill and stimulate a horizontal well in the Marcellus Shale.

17) Describe fracturing/stimulating methods in detail:
The well will be stimulated by multi-stage fracturing using a slickwater fluid.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 4.09 ac **pad already built**

19) Area to be disturbed for well pad only, less access road (acres): 1.73 ac **pad already built**

08/01/2014

WW - 6B
(1/12)

4710302932

MOD

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	H-40	94#	100'	100'	Grouted to surface 120 cu. ft.
Fresh Water	13-3/8"	New	J-55	54.5#	800'	800'	Cement to surface 731cu. ft.
Coal	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Intermediate	9-5/8"	New	J-55	36#	2850'	2850"	Cement to surface 1206 cu. ft.
Production	5-1/2"	New	P-110	20#	13437'	13437'	Cement to 2000 ft, 2945 cu. ft.
Tubing							
Liners							

DMH 7-24-14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	26"	.438"	1530 psi	Class "A"	1.3 cuft/sk
Fresh Water	13-3/8"	17-1/2"	.380"	2730 psi	Class "A"	2.31 cuft/sk
Coal	N/A	N/A	N/A	N/A	N/A	N/A
Intermediate	9-5/8"	12-1/4"	.352"	3520 psi	Class "A"	2.31 cuft/sk
Production	5-1/2"	8-1/2"	.361"	12,640 psi	Class "A"	1.37 cuft/sk
Tubing						
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

WW - 6B
(1/12)

4710302932 MOD

21) Describe centralizer placement for each casing string.

Conductor - None

Fresh Water - 1 bow spring centralizer 10' from shoe, 1 bow spring centralizer every 4 joints to surface

Intermediate - 1 bow spring centralizer 10' from shoe, 1 bow spring centralizer every 3 joints to surface

Production - 1 spiroglide centralizer 10' from shoe, 1 spiroglide centralizer mid joint on second joint

1 spiroglide centralizer every joint to 45 deg, 1 bowspring centralizer every other joint to KOP, double bow spring centralizers every fourth joint to 2000'.

22) Describe all cement additives associated with each cement type.

Conductor - None

Fresh Water - Class A Cement with 3% Calcium Chloride

Intermediate - Accelerator (CaCl2), Expansion / Thixotropic (W-60), Retarder (HR-7)

Production (lead) - Gel / Extender (Bentonite), Fluid Loss / Gas Migration (CFL-117), Retarder (HR-7), Defoamer

Production (tail) - Gel / Extender (Bentonite), Fluid Loss / Gas Migration (CFL-117), Retarder (HR-7), solubility enhancer (for acid solubility)

Note Names and types of additives may vary depending on vendor availability

23) Proposed borehole conditioning procedures.

Conductor - Circulate clean

Fresh Water - Circ. hole clean at TD, Fill casing with water, Pump 20 bbl water, 25 bbl gel spacer, and 5 bbl water.

Intermediate - Circ. hole clean at TD, Fill casing with water, Pump 20 bbl water, 25 bbl gel spacer, and 5 bbl water.

Production - Circ. hole clean at TD, Pump 50 bbl tuned spacer, 5 bbl water

Note tuned spacer is a combination gelled / weighted mud flush spacer, can be substituted with alternating gelled spacers and weighted mud flushes. Borehole conditioning will be dictated by hole conditions.

*Note: Attach additional sheets as needed.

DMH 7-24-14

08/01/2014

4710302932

110D

Statoil — Marcellus - Drilling Well Schematic

Well Name:	Michael Kuhn 2H			GLE (ft):	1,507	TVD(ft):	7,696
Field Name:	Marcellus			DF(ft):	22	TMD(ft):	13,437
County:	Wetzel	BHL:	X = 539221.9	Y=	4386765.3	Profile:	Horizontal
API #:	4710302932	SHL:	X = 540260.3	Y=	4385159.0	AFE No.	0

Formations & Csg Points	Depth, ft MD	Depth, ft TVD	Depth, ft SS	Form. Temp. (F)	Pore Press. (EMW)	Frac Gradient (EMW)	Planned MW	Measure Depth (ft)
Conductor	*100*	*100*	*1,429*				*Fresh Water*	100
Pittsburgh Coal		0					8.6	
Approximate Fresh Water Strata ~707'								
Casing Point	*800*	*800*	*729*	65				800
							5% KCl	
Red Clay		1,387					0	
1st Salt Sand		0					9.1	
2nd Salt Sand		0					9.1	
3rd Salt Sand		0					9.1	
Maxton Sand		0					9.1	
Keener Sand		0					9.1	TOC @ 1850
Big Lime		0					9.1	
Big Injun		0					9.1	
Base Big Injun		2,759					9.1	
Casing Point	*2,850*	*2,850*	*-1,321*	82		>18.0		2,850
							SBM	
Berea Sand		3,313					8.6	
Gordon Sand		6,100					8.6	
Java		6,100					8.6	
Angola		6,266					8.6	
Rhinestreet		7,271					8.6	
Cashaqua		7,271					8.6	
KOP	7,502	7,237						
Middlesex		7,662					13.0	
West River		7,452					13.0	
Genesco		7,518					13.0	
Marcellus		7,712					13.0	
Cherry Valley		7,719					13.0	
Landing point	8,352	7,726					13.0	TMD 13,437 / TVD 7,696
Onondaga		7,761					13.0	

20" Conductor

17-1/2" Surface

Program	Details
Profile:	Vertical
Bit Type:	17 1/2" Tri-Cone
BHA:	Rotary Assembly
Mud:	8.6 ppg Fresh Water
Surveys:	n/a
Logging:	n/a
Casing:	13.375 54.5 J-55 BTC at 800' MD/800' TVD
Centralizers:	1 centralizer w/ stop collar 10 ft above float shoe. One Single Bow every joint to 100ft below surface.
Cement:	15.8 ppg Tail slurry w/ TOC @ Surface
Potential Drilling Problems:	Flosting, Anti-Collision, Clay Swelling,

12-1/4" Intermediate

FIT/LOT: 14.0 ppg EMW

Program	Details
Profile:	Nudge and hold for anticollission
Bit Type:	12-1/4" Kymera
	0
BHA:	8in 6/7 Lobe 4.0 Stg 1.5 AIH (0.17 rpg/620 Diff)
	0
Mud:	9.1 ppg 5% KCl
Surveys:	Gyro SS, MWD - EM Pulse
Logging:	n/a
Casing/Liner:	9.625 36 J-55 BTC at ' MD/' TVD
Csg Hanger:	Fluted Mandrel Hanger
Centralizers:	1 centek centralizer w/ stop collar 10 ft above float shoe. 1 centek centralizer w/ stop collar 10 ft above float collar. 1 centralizer every joint for the first 15 joints. One centralizer every 3 jnts to 100ft below surface
Cement:	15.8 ppg Tail slurry w/ TOC @ Surface
Potential Drilling Problems:	Hole Cleaning , Bit Preservation, ,

8-1/2" Production

LOT: 16.6 ppg EMW

Program	Details
Profile:	HZ - KOP @ 5848'md @ 13.95 deg Inc. w/ 10 DLS
Bit Type:	8 1/2" PDC
	0
BHA:	6.75in 6/7 lobe 5.0 stg 1.95 FBH .29 rpg 715 DIFF
	0
Mud:	8.6 - 13 ppg SBM
Surveys:	MWD - EM Pulse w/ 30ft surveys in curve, 100ft surveys in lat
Logging:	GR
Casing/Liner:	5.5 20 P110EC VAM TOP HT at ft MD/ ft TVD
Csg Hanger:	Fluted Mandrel Hanger
Centralizers:	1 centek centralizer w/ stop collar 10ft above shoe. 1 centek centralizer 10ft above float collar. 1 centek centralizer every joint (floating) until KOP. 1 centek centralizer every 3 joints (floating) until 200ft inside intermediate shoe. 1 centek centralizer 50ft below mandrel hanger.
Cement:	15 ppg Tail slurry w/ TOC @ 1850'
Potential Drilling Problems:	Bit Preservation, Hole Cleaning , ,
Notes / Comments:	

DMH 7-24-14

RECEIVED
Office of Oil and Gas
JUL 29 2014
WV Department of Environmental Protection

Last Revision Date:	7/16/2014	Note: Depths are referenced to RKB	Cement Outside Casing
Revised by:	George Manthos	Note: Not Drawn to Scale	

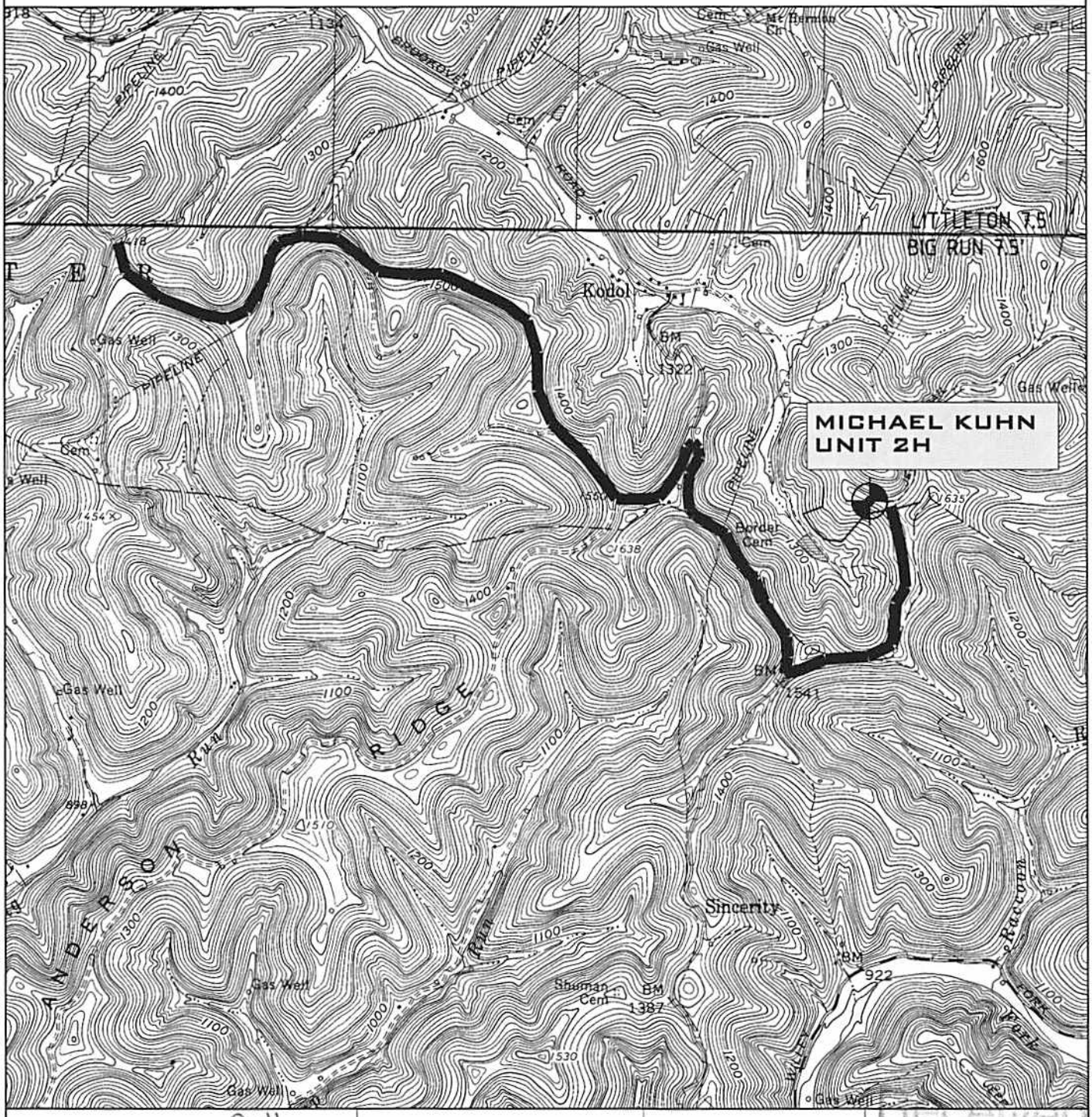
08/01/2014

WW9

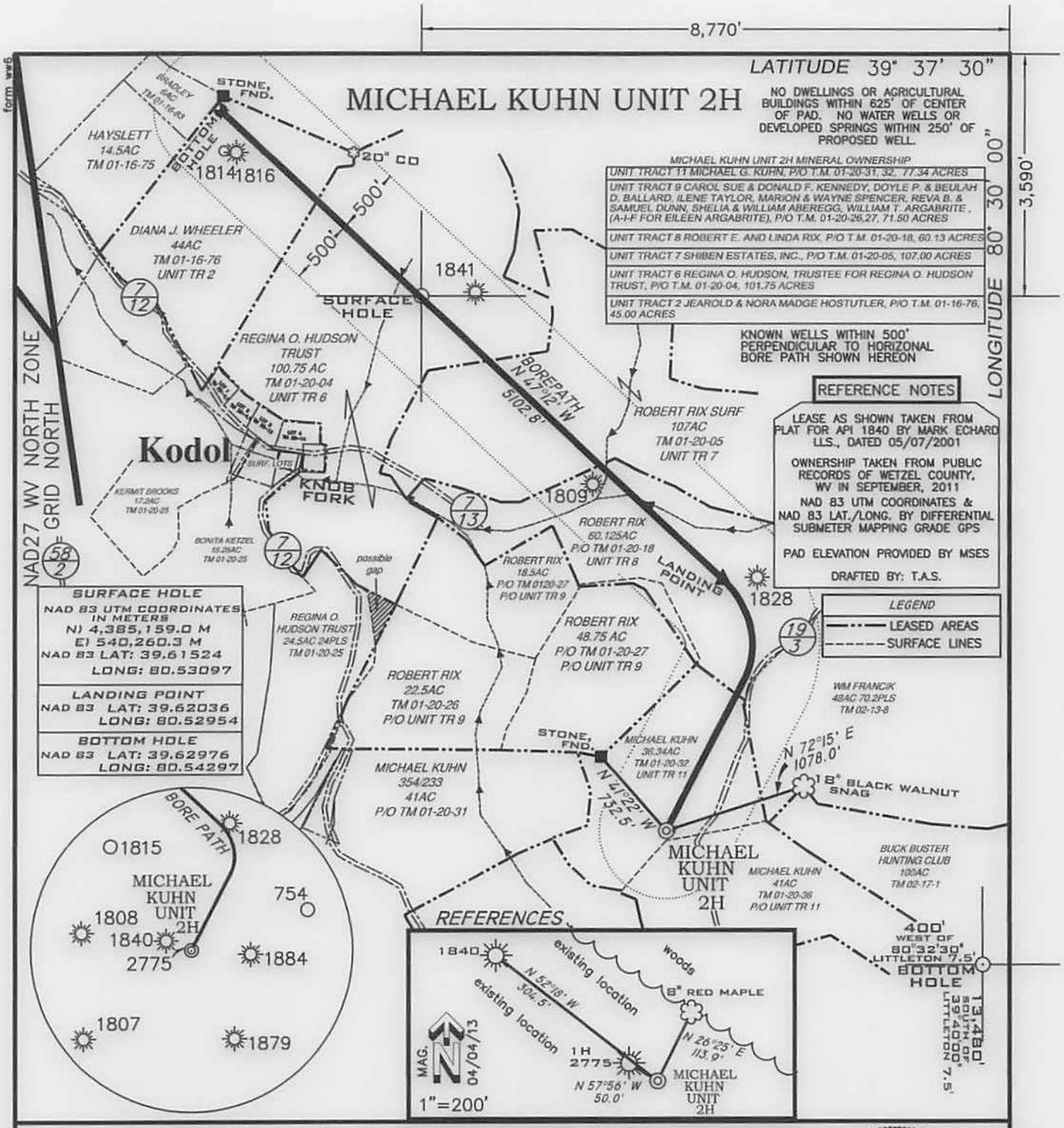
MICHAEL KUHN UNIT 2H

PAGE 1 OF

02932



PREPARED BY:	OPERATOR	TOPO SECTION	WELL NAME
DMH 1-2-13			
ANGLE RIGHT LAND SURVEYING, LLC PO BOX 681 GRANTSVILLE, WV 26147 (304) 354-0065 G110559	STATOIL USA ONSHORE PROPERTIES INC. 2103 CITYWEST BLVD., STE. 800 HOUSTON, TX 77042	LITTLETON 7.5' SCALE: 1"=2000'	MICHAEL KUHN UNIT 2H DATE: 04/27/13



FILE NUMBER G110559(WB9-77)

DRAWING NUMBER G110559WP2H.dwg

SCALE 1" = 1000'

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

P.S. 1006 _____

TERRY A. SHREVE LICENSED No. 1006 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

ANGLE RIGHT LAND SURVEYING, LLC. P.O. BOX 681 GRANTSVILLE, WV 26147 (304) 354-0065

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

REVISED DATE: NOVEMBER 7, 2013
DATE: APRIL 26, 2013
OPERATORS WELL NO. MICHAEL KUHN UNIT 2H
API WELL NO. REV
47 - 103 - 02932 H6A
STATE COUNTY PERMIT

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

LOCATION ELEVATION 1507' WATERSHED KNOB FORK

DISTRICT CENTER COUNTY WETZEL

QUADRANGLE surface hole BIG RUN 7.5' bottom hole LITTLETON 7.5' LEASE NUMBER TRACT 420

SURFACE OWNER MICHAEL G. KUHN ACREAGE 36.34±

OIL & GAS ROYALTY OWNER MICHAEL G. KUHN et al LEASE ACREAGE SEE MINERAL OWNERSHIP TABLE

PROPOSED WORK: DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ___
PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE (SPECIFY) _____
PLUG & ABANDON ___ CLEAN OUT & REPLUG ___

TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7739' + Horizontal Leg

WELL OPERATOR STATOIL USA ONSHORE PROPERTIES INC. DESIGNATED AGENT WILLIAM T. FAHEY II

ADDRESS 2103 CITYWEST BLVD., STE. 800 HOUSTON, TX 77042 ADDRESS FAHEY LAW OFFICE, 2116 PENNSYLVANIA AVE. WHEELING, WV 26062

08/01/2014

form ww6

COUNTY PERMIT

A.R.L.S