



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,

A handwritten signature in blue ink, appearing to read 'Gene Smith', is written over a large, light blue oval scribble.

Gene Smith
Assistant Chief of Permitting
Office of Oil and Gas



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. Regulatory Advisor – Marcellus
Attachment

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Environmental Protection

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

5) Existing Pad? Yes or No: Yes DMH7-24-14

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**

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MCD

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	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

<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"	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:				

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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.

DMH7-24-14

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Marcellus - Drilling Well Schematic

Well Name: Michael Kuhn 2H
 Field Name: Marcellus
 County: Wetzel
 API #: 4710302932

BHL: X = 539221.9 Y = 4396765.3
 SHL: X = 540260.3 Y = 4385159.0

GLE (ft): 1,507
 DF (ft): 22
 TVD (ft): 7,696
 TMD (ft): 13,437
 Profile: Horizontal
 AFE No: 0

Formations & Csg Points	Depth (ft)			Form. Temp. (F)	Pore Press. (EMW)	Frac Gradient (EMW)	Planned MW	Measure Depth (ft)	Program	Details
	MD	TVD	SS							
Conductor	100	100	1,429					100		20" Conductor
Pittsburgh Coal		0					8.6			17-1/2" Surface
Approximate Fresh Water Strata ~707'										
Casing Point	800	800	729	65				800		
Red Clay		1,387					5% KCl			12-1/4" Intermediate
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		
Berea Sand		3,313					SBM			8-1/2" Production
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								
Onondaga		7,761					13.0			

Profile: Vertical
 Bit Type: 5 1/2" Tri-Cone
 BHA: Rotary Assembly
 Mud: 8.6 ppg Fresh Water
 Surveys: n/a
 Logging: n/a
 Casing: 13.375 54.5-55 BTC at 600' MD/800' TVD
 Centralizers: 1 centralizer w/ stop collar 10 ft above float shoe. One Single flow every joint to 100ft below surface.
 Cement: 15.8 ppg Tail slurry w/ TOC @ Surface
 Potential Drilling Problems: Floating, Anti-Collision, Clay Swelling

FIT/LOT: 14.0 ppg EMW
 Profile: Plug and hold for anticollision
 Bit Type: 12-1/4" Kymers
 BHA: 8in 6-7 Lobe 4.0 Stg 1.5 ABH (0.17 rpg/620 DIF)
 Mud: 9.1 ppg 5% KCl
 Surveys: Gyro SS, MWD - EM Pulse
 Logging: n/a
 Casing/Liner: 9.625 36-55 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 4 jnts to 100ft below surface.
 Cement: 15.8 ppg Tail slurry w/ TOC @ Surface
 Potential Drilling Problems: Hole Cleaning, Bit Preservation,

LOT: 16.6 ppg EMW
 Profile: HZ - KOP @ 5848 md @ 13.95 deg Inc. w/ 10 DLS
 Bit Type: 8 1/2" PDC
 BHA: 6.75in 6/7 lobe 5.0 stg 1.95 FBH-29 rpg 715 DIF
 Mud: 8.6 - 13 ppg SBM
 Surveys: MWD - EM Pulse w/ 30ft surveys in curve, 100ft surveys in lat
 Logging: CR
 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
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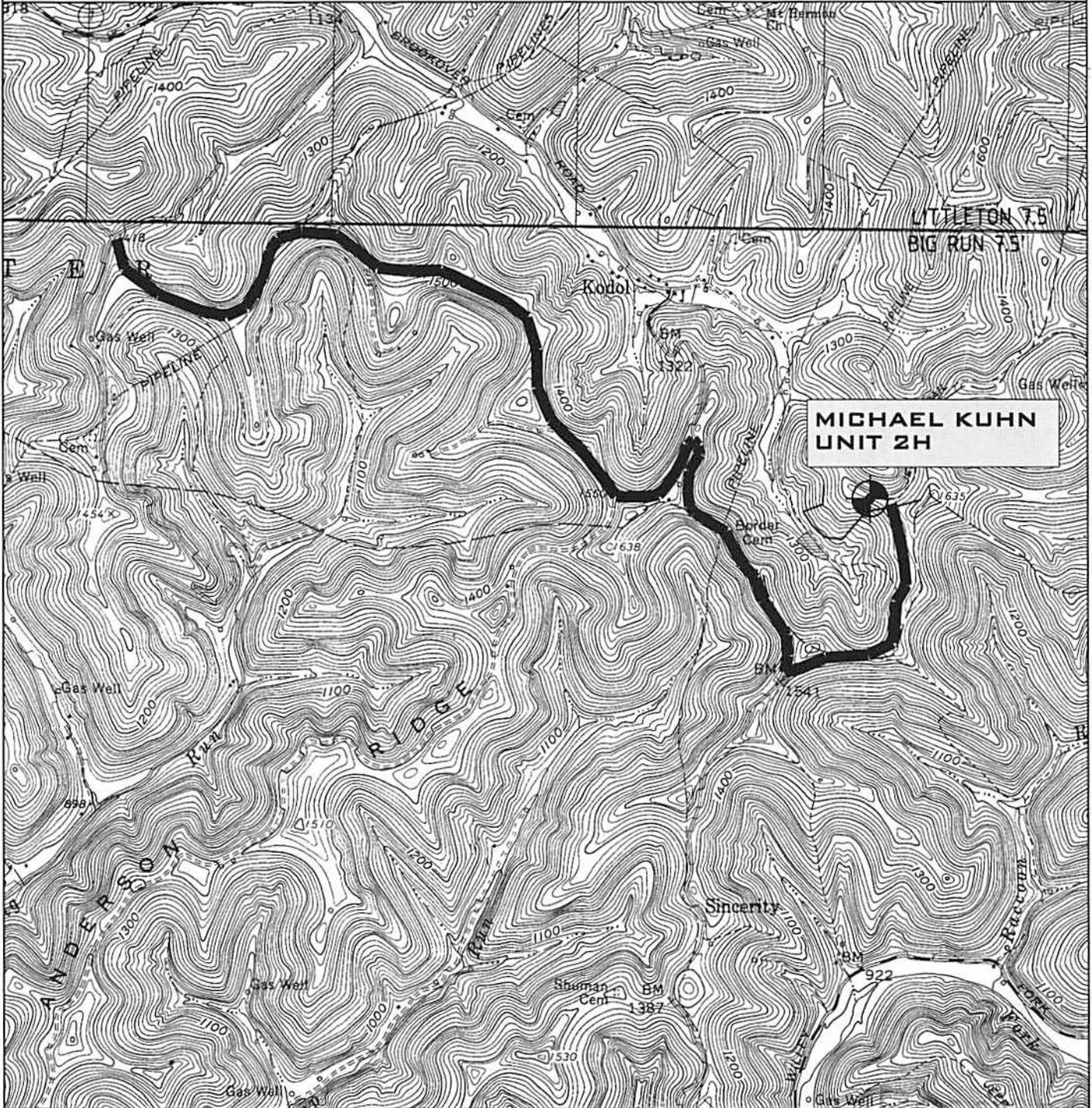
JUL 29 2014

Last Revision Date: 7/16/2014
 Revised by: George Manthos

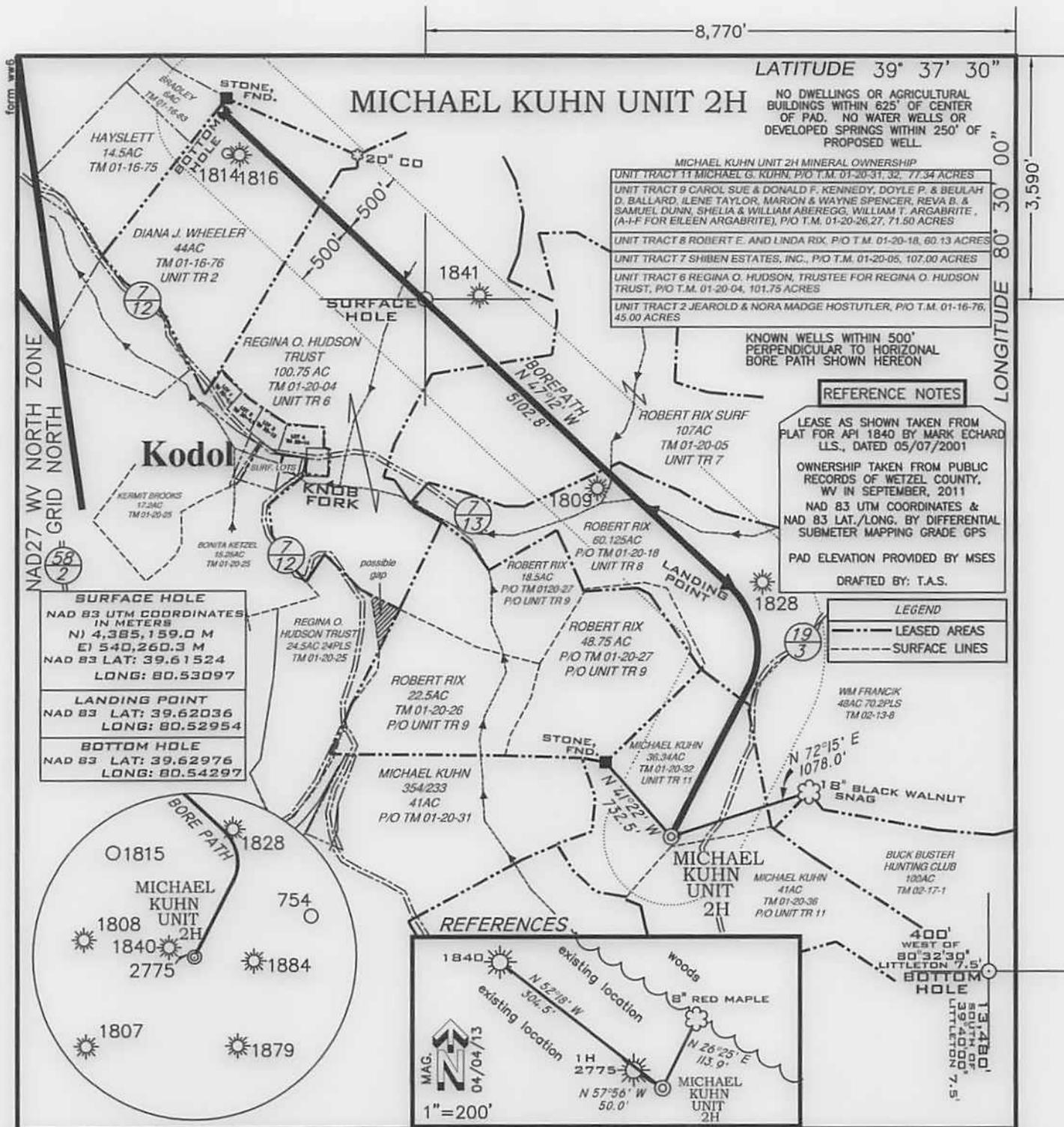
Note: Depths are referenced to RKB
 Note: Not Drawn to Scale

WV Department of Environmental Protection

MICHAEL KUHN UNIT 2H



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



LATITUDE 39° 37' 30"
 NO DWELLINGS OR AGRICULTURAL BUILDINGS WITHIN 625' OF CENTER OF PAD. NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250' OF PROPOSED WELL.

MICHAEL KUHN UNIT 2H MINERAL OWNERSHIP
 UNIT TRACT 11 MICHAEL G. KUHN, P/O T.M. 01-20-31, 32, 77.34 ACRES
 UNIT TRACT 9 CAROL SUE & DONALD F. KENNEDY, DOYLE P. & BEULAH D. BALLARD, ILENE TAYLOR, MARION & WAYNE SPENCER, REVA B. & SAMUEL DUNN, SHELIA & WILLIAM ABEREGG, WILLIAM T. ARGABRITE, (A-I-F FOR EILEEN ARGABRITE), P/O T.M. 01-20-26, 27, 71.50 ACRES
 UNIT TRACT 8 ROBERT E. AND LINDA RIX, P/O T.M. 01-20-18, 60.13 ACRES
 UNIT TRACT 7 SHIBEN ESTATES, INC., P/O T.M. 01-20-05, 107.00 ACRES
 UNIT TRACT 6 REGINA O. HUDSON, TRUSTEE FOR REGINA O. HUDSON TRUST, P/O T.M. 01-20-04, 101.75 ACRES
 UNIT TRACT 2 JEAROLD & NORA MADGE HOSTUTLER, P/O T.M. 01-16-76, 45.00 ACRES

KNOWN WELLS WITHIN 500' PERPENDICULAR TO HORIZONTAL BORE PATH SHOWN HEREON

REFERENCE NOTES

LEASE AS SHOWN TAKEN FROM PLAT FOR API 1840 BY MARK ECHARD LLS., DATED 05/07/2001
 OWNERSHIP TAKEN FROM PUBLIC RECORDS OF WETZEL COUNTY, WV IN SEPTEMBER, 2011
 NAD 83 UTM COORDINATES & NAD 83 LAT./LONG. BY DIFFERENTIAL SUBMETER MAPPING GRADE GPS
 PAD ELEVATION PROVIDED BY MSES
 DRAFTED BY: T.A.S.

LEGEND

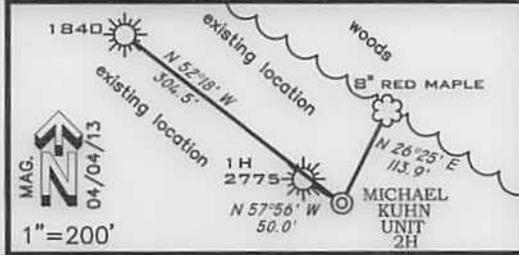
--- LEASED AREAS
 - - - SURFACE LINES

WM FRANCIK
 48AC 70.2PLS
 TM 02-13-8

BUCK BUSTER HUNTING CLUB
 100AC
 TM 02-17-1
 400' WEST OF 80° 32' 30" LITTLETON 7.5'
 BOTTOM HOLE
 13.480' SOUTH OF 89° 40' 00" LITTLETON 7.5'

SURFACE HOLE
 NAD 83 UTM COORDINATES IN METERS
 N) 4,385,159.0 M
 E) 540,260.3 M
 NAD 83 LAT: 39.61524
 LONG: 80.53097
LANDING POINT
 NAD 83 LAT: 39.62036
 LONG: 80.52954
BOTTOM HOLE
 NAD 83 LAT: 39.62976
 LONG: 80.54297

REFERENCES



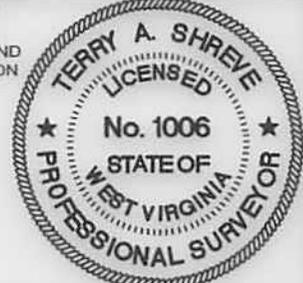
FILE NUMBER G110559(WB9-77)
 DRAWING NUMBER G110559WP2H.dwg
 SCALE 1" = 1000'
 MINIMUM DEGREE OF ACCURACY 1/200
 PROVEN SOURCE OF ELEVATION SUBMETER MAPPING GRADE GPS

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



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

COUNTY NAME
 PERMIT

A.R.L.S.