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west virginia department of environmental protection

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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](http://www.dep.wv.gov)

## PERMIT MODIFICATION APPROVAL

October 16, 2014

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

Re: Permit Modification Approval for API Number 10302928, Well #: GREEN DOT UNIT II 5H  
**Freshwater casing revised**

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



August 13, 2014

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

Attention: Ashley LeMasters

Reference: Green Dot II 5H (API No. 47-103-02928)  
Casing Revision & Secondary Containment Modification

Ms. LeMasters:

Attached please find revised WW-6B and Wellbore Schematic for the Green Dot Unit II 5H (API No. 47-103-02928) revising the freshwater casing setting depth (signed by the inspector). Statoil is preparing to commence drilling operations on the Green Dot wells on or about November 14, 2014 after drilling the Jolliffe wells.

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 763' 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.

Additionally, per my conversation with Gene Smith on 8/12/14, in order to reduce the footprint, Statoil will not be installing earthen berms around the perimeter of our existing locations. The current plans for secondary containment are as follows:

1. Remove the top surface layer of stone and place a liner down over the entire area of the pad and then re-place the stone back over the liner.

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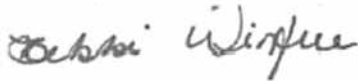
10/17/2014

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2. We will then install either a Jersey Barrier or HDPE pipe around the perimeter of the low areas of the pad to take the place of the earthen berms (Which will take up less space). The liner will overlap either the barrier or pipe and will be toed in on the opposite side to ensure nothing leave the site.

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

Sincerely,



Bekki Winfree  
Sr. Regulatoy Advisor – Marcellus

Attachment

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WV Department of  
Environmental Protection 10/17/2014

4710302928

MOD

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

1) Well Operator: Statoil USA Onshore Properties Inc. 494505083 Wetzel Clay Littleton 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: Green Dot Unit II 5H Well Pad Name: Green Dot Unit II

3 Elevation, current ground: 1476' Elevation, proposed post-construction: 1476' \*\*already built\*\*

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

5) Existing Pad? Yes or No: Yes *DMH 8-11-14*

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):  
Marcellus Shale; Formation Top - 7591' TVD, 50' Thick, 0.62 psi/ft

7) Proposed Total Vertical Depth: 7673'

8) Formation at Total Vertical Depth: Marcellus Shale

9) Proposed Total Measured Depth: 14,339'

10) Approximate Fresh Water Strata Depths: 130' - 320', 763'

11) Method to Determine Fresh Water Depth: Local water well data & 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): 2.18 ac \*\*pad already built\*\*

19) Area to be disturbed for well pad only, less access road (acres): 1.83 ac \*\*pad already built\*\*

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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#	850'	850'	Cement to surface 832 cu. 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 1172 cu. ft.
Production	5-1/2"	New	P-110	20#	14,339'	14,339'	Cement to 1835 ft, 3188 cu. ft.
Tubing							
Liners							

DMH 8-11-14

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"	.38"	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"	.362"	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.

DMH 8-11-14

Conductor - None

Fresh Water - Class A Cement with 3% Calcium Chloride

Intermediate - Accelerator (CaCl<sub>2</sub>), 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.

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# Marcellus - Drilling Well Schematic

## 4710302928 MOD

Well Name: Green Dot II 5H  
 Field Name: Marcellus  
 County: Wetzel Co.  
 API #: 47-10302928

BHL: X = 4391122.7  
 SHL: X = 4392660.0  
 GLE (ft): 1,476  
 DF (ft): 22  
 Y = 539918.5  
 Y = 538822.9

TVD (ft): 7,673  
 TMD (ft): 14,339  
 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	1,398	-	-	-	-	100		20" Conductor
Pittsburgh Coal		0		-	-	-	9.2			17-1/2" Surface
Red Clay		0		-	-	-	9.2			
Approximate Fresh Water Strata ~763'										
Casing Point	850	850	648	65	-	-	-	850		
1st Salt Sand		0		-	-	-	9.2			12-1/4" Intermediate
2nd Salt Sand		0		-	-	-	9.2			
3rd Salt Sand		2,403		-	-	-	9.2			
Maxton Sand		0		-	-	-	9.2			
Keener Sand		0		-	-	-	9.2			TOC @ 1850
Big Lime		0		-	-	-	9.2			
Base Big Injun		2,748		-	-	-	9.2			
Casing Point	2,850	2,850	-1,352	82	-	>18.0	-	2,850		
Berea Sand		3,112		-	-	-	8.6			8-1/2" Production
Gordon Sand		3,349		-	-	-	8.6			
Java		5,712		-	-	-	8.6			
Angola		0		-	-	-	8.6			
Rhinestreet		0		-	-	-	8.6			
Cashaqua		0		-	-	-	8.6			
Middlesex		0		-	-	-	8.6			
KOP	7,153	7,025		-	-	-	13.0			
West River		7,402		-	-	-	13.0			
Genesco		7,479		-	-	-	13.0			
Marcellus		7,640		-	-	-	13.0			
Landing point	8,129	7,663		-	-	-	13.0			
Cherry Valley		7,670		-	-	-	13.0			
Onondaga		7,690		-	-	-	13.0			

**20" Conductor**

**17-1/2" Surface**

Profile: Vertical  
 Bit Type: 17-1/2" Tri-Cone  
 BHA: Rotary Assembly  
 Mud: 9.2 ppg Fresh Water  
 Surveys: n/a  
 Logging: n/a  
 Casing: 13.375 54.5 J-35 BTC at 850' MD/850' 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:** Stuck Pipe, Floating, Collision

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**FIT/LOT: 14.0 ppg EMW**

Profile: Nudge and hold for anticollision  
 Bit Type: 12-1/4" Kymera  
 BHA: Bin 6-7 Lobe 4.0 Stg 1.5 ABH (0.17 rpg/620 Diff)  
 Mud: 9.2 ppg 5% KCl  
 Surveys: Gyro SS, MWD - EM Pulse  
 Logging: n/a  
 Casing/Liner: 9.625 36 J-55 BTC at 2850' MD/2850' 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, Poor ROP, Buckling

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**FIT: 15.8 ppg EMW**

Profile: 8-1/2" PDC  
 Bit Type: 8-1/2" PDC  
 BHA: 6.75in 6/7 lobe 5.0 stg 1.95 FBH .29 rpg 715 DIFF  
 Mud: 8.6 - 13 ppg SBM  
 Surveys: MWD - EM Pulse w/ 30ft surveys in curve, 100ft surveys in lateral  
 Logging: GR  
 Casing/Liner: 5.5 20 P110EC VAM TOP HT at 14339 ft MD/7673 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'vd

**Potential Drilling Problems:** Bit Preservation, Hole Cleaning, ..

Notes / Comments:

Last Revision Date: 8/5/2014  
 Revised by: George Manthos

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

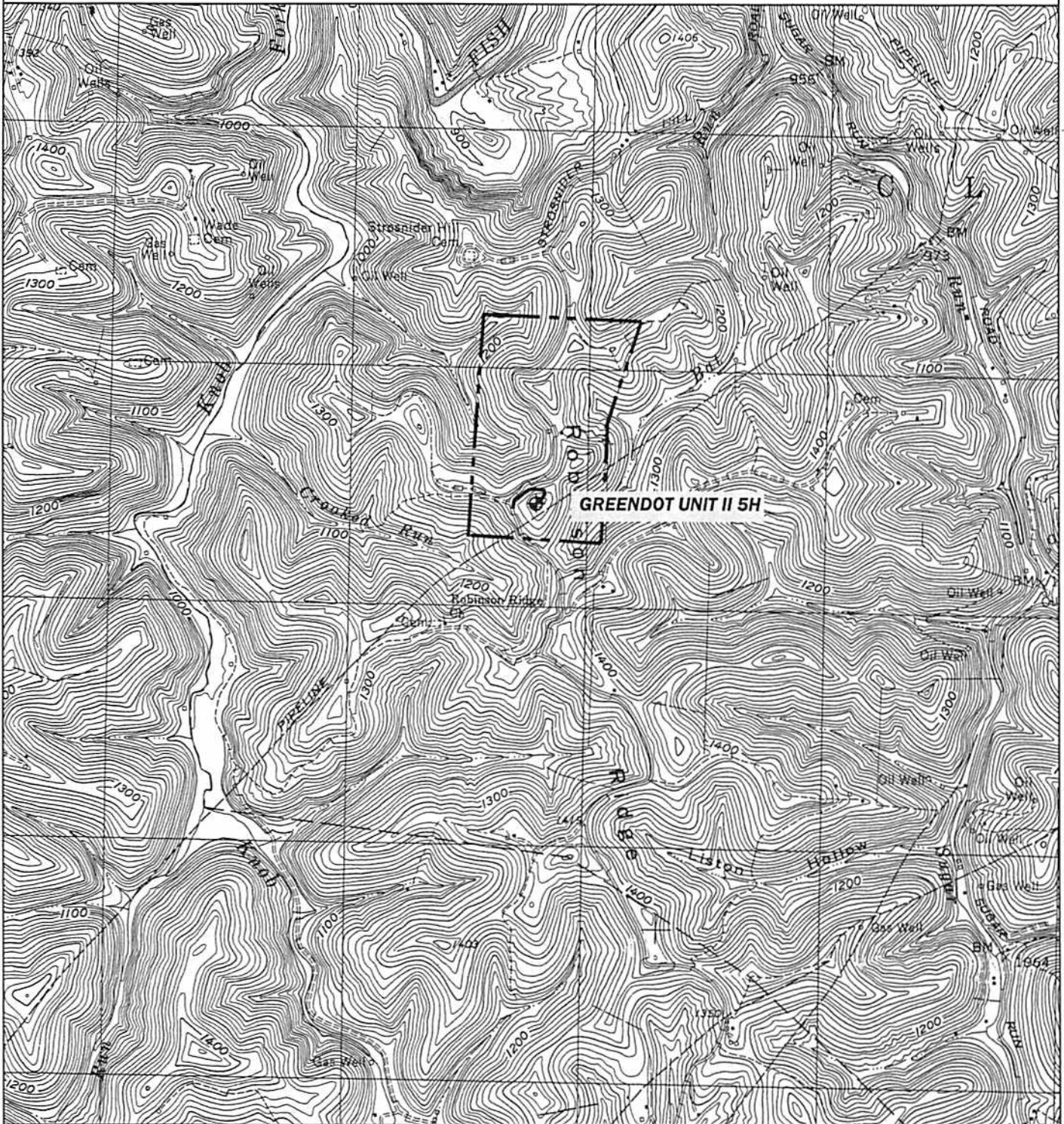
Cement Outside Casing  
 AUG 13 2014



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# GREENDOT UNIT II 5H

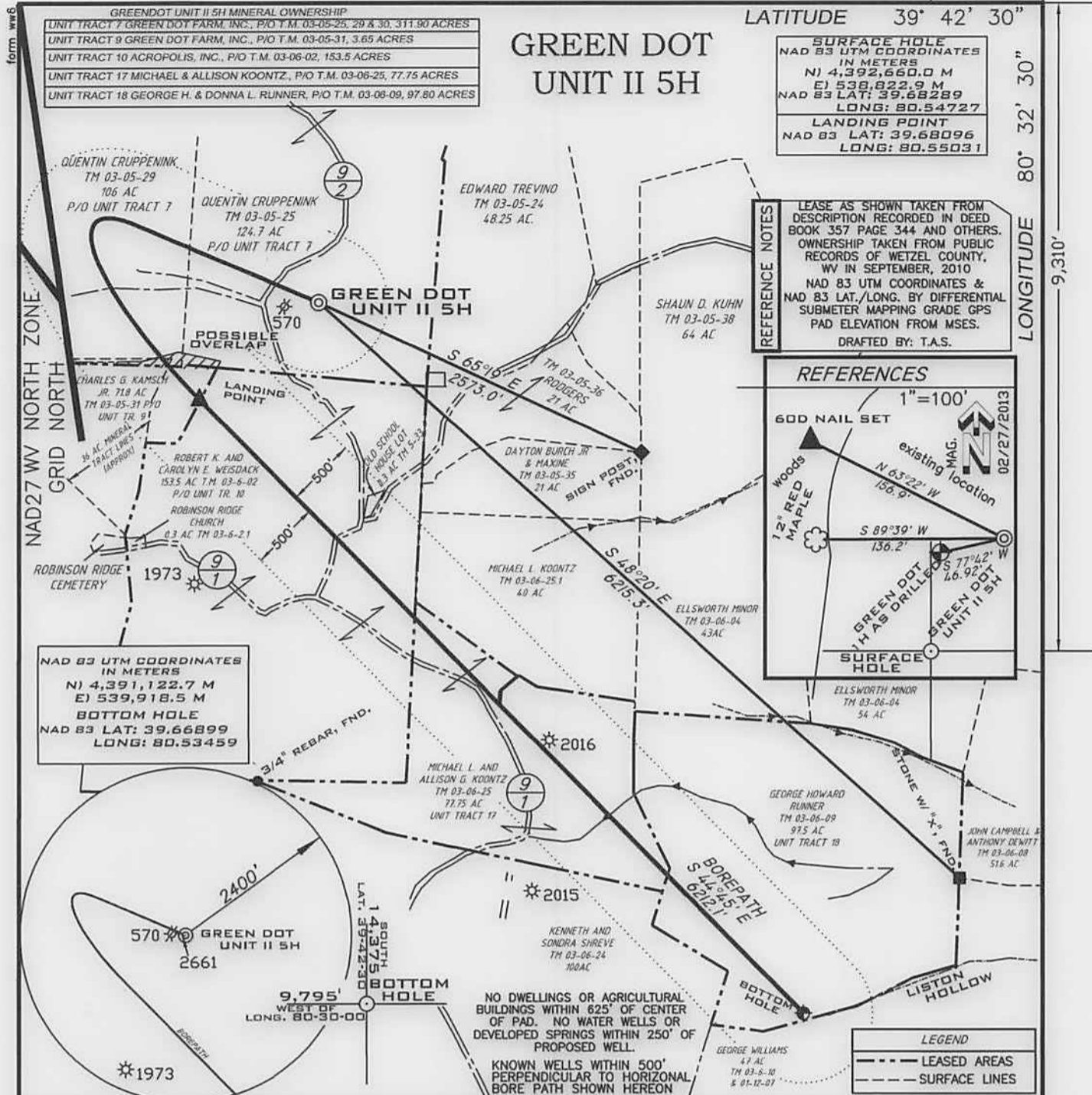


<p>PREPARED BY: <i>DmH 6-14-13</i></p> <p>ANGLE RIGHT LAND SURVEYING, LLC          PO BOX 681          GRANTSVILLE, WV 26147          (304) 354-0065</p>	<p>OPERATOR</p> <p>STATOIL USA ONSHORE          PROPERTIES INC.          2103 CITYWEST BLVD., STE. 800          HOUSTON, TX 77042</p>	<p>TOPO SECTION</p> <p>LITTLETON 7.5'</p> <p>SCALE:</p> <p>1"=2000'</p>	<p>WELL NAME</p> <p>GREENDOT UNIT II 5H</p> <p>DATE:</p> <p>04/29/13</p>
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G100488

10/17/2014





FILE NUMBER G100488(WB9-76)  
 DRAWING NUMBER G100488WP\_5\_REV110713.dwg  
 SCALE 1" = 1000'  
 MINIMUM DEGREE OF ACCURACY 1/200  
 PROVEN SOURCE OF ELEVATION SUB METER 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*



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

REVISED DATE: NOVEMBER 7, 2013  
 DATE: JULY 8, 2013

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL   
 (IF "GAS") PRODUCTION  STORAGE  DEEP  SHALLOW   
 LOCATION ELEVATION 1476' WATERSHED CROOKED RUN AND BAT RUN  
 DISTRICT CLAY COUNTY WETZEL  
 QUADRANGLE LITTLETON 7.5' LEASE NUMBER                     

OPERATORS WELL NO. GREEN DOT UNIT II 5H  
 API WELL NO. REV  
47-103-02928 H6A  
 STATE COUNTY PERMIT

SURFACE OWNER QUENTIN CRUPPENINK ACREAGE 124.7±  
 OIL & GAS ROYALTY OWNER GREEN DOT FARMS, INC. LEASE ACREAGE OWNERSHIP TABLE

PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION   
 PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE (SPECIFY)                       
 PLUG & ABANDON  CLEAN OUT & REPLUG   
 TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7617' + 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., WEIRTON, WV 26062

A.R.L.S. form ww6

10/17/2014