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

January 28, 2015

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

Re: Permit Modification Approval for API Number 9502177 , Well #: BALL 9H
Revise intermediate casing and drilling fluid.

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,

per Gene Smith

Gene Smith
Assistant Chief of Permitting
Office of Oil and Gas

01/30/2015

4709502177 MOD

Statoil

December 16, 2014

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

Attention: Ms. Laura Cooper

Reference: Ball Unit 9H (47-095-02177)
WW-6B Casing Revision, Tyler County, WV

Ms. Cooper:

Attached for your approval please find the revised WW-6B and schematic for the Ball 9H (47-095-02177). Statoil is requesting approval to revise the intermediate casing setting depth.

Our standard well design in West Virginia was modified to set the Intermediate Casing below the base of the Big Injun. This change was as a result of successful field Leak-Off Tests in the general region, confirming design assumptions concerning subsurface characterization. This modification continues to allow for necessary well control while drilling the production hole section and is aligned with general practice in the region of offset operators.

In addition, the drilling fluid scheme was modified to include drilling with freshwater instead of air in the surface hole and drilling with air misting with 5%KCL and soap from surface casing shoe to TD of the pilot hole. The curve and lateral will be drilled with synthetic oil based mud.

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

Sincerely,

Received
Office of Oil & Gas
DEC 17 2014

Bekki Winfree
Sr. Regulatoy Advisor – Marcellus

01/30/2015

4709502177 MOD

WW-6B
(9/13)

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator:	Statoil USA Onshore Properties Inc.	494505083	Tyler	Ellsworth	Porter Falls
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: 9H Well Pad Name: Ball

3) Farm Name/Surface Owner: Ball Farm Public Road Access: CR 42/Scales Road

4) Elevation, current ground: 1169' Elevation, proposed post-construction: 1169' (as-built)

5) Well Type (a) Gas ■ Oil _____ Underground Storage _____
Other _____
(b)If Gas Shallow _____ Deep _____
Horizontal ■

6) Existing Pad: Yes or No Yes

MAC 12-16-14

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus, 6918', 50', 4500 psi

8) Proposed Total Vertical Depth: 6,942'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 13,500'

11) Proposed Horizontal Leg Length: 6100'

12) Approximate Fresh Water Strata Depths: 337'

13) Method to Determine Fresh Water Depths: Identify lowest elevation within 1500' of pad site and project 200' beyond that depth

14) Approximate Saltwater Depths: 587'

15) Approximate Coal Seam Depths: 395'-398', 855'-858'

16) Approximate Depth to Possible Void (coal mine, karst, other): N/A

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes ☐ No ☑

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

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WW-6B
(9/13)

18) **CASING AND TUBING PROGRAM**

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	20	New	H40	94.0	120	120	cement to surface
Fresh Water	13.375	New	J/K55	54.5	450	430	cement to surface - 456 cu ft
Coal							
Intermediate	9.625	New	J/K55	36.0	2612	2597	cement to surface - 1093 cu ft
Production	5.50	New	P110	20.0	13500	13490	cement to 1600' - 3013 cu ft
Tubing	2.375	New	L80	4.7		6500	production tubing
Liners							

MDG
12-16-14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20	24	0.438	1530	Class A	2.31
Fresh Water	13.375	17.5	0.380	2730	Class A-BondCem	2.31
Coal						
Intermediate	9.625	12.25	0.352	3520	Class A-BondCem	2.31
Production	5.50	8.50	0.361	12640	Class A-ShaleCem	1.37
Tubing	2.375		0.19	11200		
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

4709502177 MOD

WW-6B
(9/13)

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

20" conductor will be pre-set prior to start of operations and cemented in place to surface at approximately 120ft. The 17 ½" surface hole will be drilled with air to approximately 550'md/vd. 13 3/8" surface casing will be installed and cemented to surface in order to isolate fresh water zones and provide a competent shoe for well control while drilling deeper horizons. A 12 ¼" intermediate hole section will be drilled with Synthetic Based Mud (SBM) and a conventional mud motor to approximately 2800'md/vd through the base of the Big Injun and into the Berea Sand. 9 5/8" Intermediate casing will be installed and cemented to surface in order to isolate the Big Injun from lower hydrocarbon bearing zones and provide a competent shoe for well control while drilling deeper horizons. An 8 ½" hole section will be drilled vertically, deviated, and landed horizontally in the Marcellus Target horizon and extended laterally to total depth using SBM and conventional mud

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Well will fractured through the plug-n-perf method with +/- 25 fracturing stages per well. Each fracturing treatment will have 400,000 lbs of sand mixed in 7500 Bbls. of fresh water. The fracturing rate will be between 80 and 100 bpm at a pressure lower than a maximum pressure of 10,000 psi.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): Existing Pad - 16.88 acres

22) Area to be disturbed for well pad only, less access road (acres): Existing Pad - 5.53 acres

23) Describe centralizer placement for each casing string:

Surface - 1 centralizer w/ stop collar 10 ft above float shoe. One Single Bow every joint to 100ft below surface.
Intermediate – 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.
Production - 1 centek centralizer w/ stop collar 10ft above shoe. 1 centek centralizer 10ft above float collar. 1 centek centralizer every joint

24) Describe all cement additives associated with each cement type:

Surface - Class A + 3% CaCl2
Intermediate - Class A cmt, 0.05% Retarder, 0.25% Defoamer, 1% Accelerator, 0.25% Dispersant, 0.65% Retarder, 9.10 gal/sk Fresh Water.
Production - Class A cmt, 10% bwow Dispersent, 0.6% bwoc Fluid Loss, (See attached "Cement Additives" for remainder)

25) Proposed borehole conditioning procedures:

Surface – Drilled with air to section total depth. Prior to tripping, hole will be blown clean at 3000CFM then displaced with water.
Intermediate – Drilled with 8.6 ppg synthetic based mud to section total depth. At section total depth, pump 40bbl viscous pill and circulate hole clean.
Production - Drilled with 12.0-12.5 ppg synthetic based mud to section total depth. Approximately 500ft from total depth, pump 20 bbl heavy weight pill for hole cleaning. At section total depth pump another 20bbl heavy weight pill and continue to circulate at least bottoms up. Pump rates will be maintained in excess of 600 GPM, and rotation in excess of 100 RPM to assist cuttings transport. A 50 bbl weighted spacer will be pumped ahead of the cement to assist in mud removal and reduc

*Note: Attach additional sheets as needed.

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4709502177 MAD

Statoil — Marcellus - Drilling Well Schematic

Well Name:	Ball 9H			GLE (ft):	1,195	TVD(ft):	6,930
Field Name:	Marcellus			DF(ft):	22	TMD(ft):	15,100
County:	Tyler, WV	BHL:	X = 519956.26	Y=	4375246.90	Profile:	Horizontal
API #:	0	SHL:	X = 520988.06	Y=	4372965.72	AFE No.:	n/a

Formations & Csg Points	Depth, ft. MD	TVD	SS	Form. Temp. (F)	Pore Press. (EMW)	Frac Gradient (EMW)	Planned MW	Measure Depth (ft)	Program
Conductor	*120*	*120*	*1,097*	-				120	
Casing Point	*450*	*450*	*767*	*65*	-		*Air/ Mist*	450	
	Approximate fresh water strata ~337'						8.6		
				-	-	-	8.6		
Big Lime	2,057	2,057	*840*				8.6		
Big Injun (Base)	2,512	2,512	*1,295*				8.6		
Berea Sand	2,705	2,705	*1,488*						
Casing Point	*2,612*	*2,612*	*-1,395*	*82*	-	*>18.0*	*Air/Mist*	2,612	
Berea Sand	2,705	2,705	*1,488*						
Gordon Sand	2,944	2,944	*1,727*				8.6		
Riley	4,804	4,804	*-4,587*				8.6		
KOP1	6,140	6,140	*-4,923*		-	-	12.0		
Geneseo		6,823	*-5,606*		-	-	12.0		
Tully		6,848	*-5,631*	117	-	-	12.0		
Marcellus		6,918	*-5,701*	118	-	-	12.0		
Tgt Landing Point	7,983	6,930	*-5,713*	118			12.0		
Onondaga		7,000	*-5,783*	-	-	-	-		

20" Conductor

17 1/2" Surface

Profile: Vertical
Bit Type: 17-1/2" Hammer bit
BHA:
Mud: Air/ Mist
Surveys: n/a
Logging: n/a
Casing: 13.375in 54.5 # J-55 BTC set @ ~ 450 MD/450 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 BondCem gas tight single slurry tail design to surface
Potential Drilling Problems:

12 1/4" Intermediate

FIT/LOT: 14.0 ppg EMW

Profile: Nudge and hold for anticollission
Bit Type: PDC 7-blade, 16mm cutters; Smith MDSi716
BHA: 8" Directional Assy 6:7 Lobe 4.0 Stg 0.17 rpg, 620 DIFF
Mud: SBM
Surveys: Gyro MS, MWD EM Pulse
Logging: n/a
Casing/Liner: 9.625in 36# J55 BTC set at 2612MD/ 2612TVD.
Liner Hanger: n/a
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, BondCem gas tight, single slurry tail design to surface
Potential Drilling Problems: Slow ROP. DBR bit matrix

8 1/2" Production

FIT/LOT: 15.0 ppg EMW

Profile: KO from Vertical, Land HZ
Bit Type: 8 1/2" Security FXD65 (vert)
8 1/2" Smith SDi513 (curve & lateral)
BHA: Directional Assembly (Steerable Motor) + EM w/ GR
6.75in 7:8 Lobe, 2.9 Stg (0.17rpg, 560 Diff) - Vert
6.75in 6:7 Lobe, 5.0 Stg (1.95 deg Fixed, 0.29 rpg, 715 Diff) - HZ
Mud: SBM
Surveys: MWD EM Pulse
Logging: n/a
Casing/Liner: 5.5in 20# P110EC Vam Top HT to 0' to TD @ 15100 ft MD
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: 15.0 ppg Gas tight, single slurry tail design to surface
Potential Drilling Problems: Wellbore instability in lateral w/ MW < 11.5 ppg
Notes / Comments:

TMD: 15,100
TVD: 6,930

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