Rennick, Kenneth <krennick@blm.gov>

Sundry NOI - Casing Change - Thor 21 Fed Com 703H & 704H

Rennick, Kenneth <krennick@blm.gov> Thu, Mar 31, 2016 at 8:35 AM
To: Steve Munsell <Steve_Munsell@eogresources.com>

Good Morning Mr. Steve Munsell,

I assume this conversation on the BOPs for these Thor wells relates to the Orrtanna wells?

If you can confirm this, that will be greatly appreciated!

Best Regards,

Kenny Rennick
[Quoted text hidden]

APR 18 2016

Rennick, Kenneth <krennick@blm.gov>

Sundry NOI - Casing Change - Thor 21 Fed Com 703H & 704H

Steve Munsell <Steve_Munsell@eogresources.com> Thu, Mar 31, 2016 at 8:53 AM
To: "Rennick, Kenneth" <krennick@blm.gov>

Kenneth,

Yes Sir. It will be the same for all four wells.

From: Rennick, Kenneth [mailto:krennick@blm.gov]
Sent: Thursday, March 31, 2016 9:36 AM
To: Steve Munsell <Steve_Munsell@eogresources.com>

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Rennick, Kenneth <krennick@blm.gov>

Sundry NOI - Casing Change - Thor 21 Fed Com 703H & 704H

Rennick, Kenneth <krennick@blm.gov> Wed, Mar 30, 2016 at 8:58 AM
To: Stan Wagner <Stan_Wagner@eogresources.com>
Cc: Bruce Coit <Bruce_Coit@eogresources.com>, Steve Munsell <Steve_Munsell@eogresources.com>

Hello Gentlemen,

I already communicated with Mr. Steve Munsell about the addition of information about centralizers in the notifications. But there is another issue that I identified.

I am reviewing on the 703H, I was doing my calculations and I noticed a 10M BOP & BOPE system is actually required below the intermediate casing. As of now the the Drilling Program only proposes a 5M system.

My calculation follows:

12,520 [Max TVD in Sundry] * (12.00 [Max MW at that Depth in Sundry] /19.25-0.22 [Assumed Gas Gradient]) = 5045.543 > 5000. Therefore BOP & BOPE needs to be rated, as well as tested, to a 10M System.

Because of this, I am requesting EOG to review the BOP and BOPE for this notification to address this issue.

You may also want to check the other wells that you sent notifications for. I just started on the one with the closest spud date.

Best Regards,

Kenny Rennick

[Quoted text hidden]

—
Kenneth Rennick

Petroleum Engineer
Bureau of Land Management
Carlsbad Field Office
(575) 234-5964
krennick@blm.gov

Rennick, Kenneth <krennick@blm.gov>

Sundry NOI - Casing Change - Thor 21 Fed Com 703H & 704H

Steve Munsell <Steve_Munsell@eogresources.com> Wed, Mar 30, 2016 at 9:27 AM
To: "Rennick, Kenneth" <krennick@blm.gov>, Stan Wagner <Stan_Wagner@eogresources.com>
Cc: Bruce Coit <Bruce_Coit@eogresources.com>

Kenneth,

We will resubmit and change the anticipated mud weight range to 10.0 to 11.5 ppg. Normally we drill these laterals with mud weights ranging from 9.5 to 11.5 ppg. Almost always we get it done with 10.5 ppg or less.

So the 11.5 ppg maximum anticipated MW keeps us below the 5000 psi shut in surface pressure scenario.

I'm very comfortable with this. All of our rigs are equipped with 10,000 psi BOPs and chokes. The only piece of equipment that is not rated for 10,000 psi is the annular BOP.

Also we have all rigs equipped with two sets of pipe rams and one set of blinds (single BOP, mud cross, dual BOP, annular).

Thanks for your help.

>>>Munsell

From: Rennick, Kenneth [mailto:krennick@blm.gov]
Sent: Wednesday, March 30, 2016 9:59 AM
To: Stan Wagner <Stan_Wagner@eogresources.com>
Cc: Bruce Coit <Bruce_Coit@eogresources.com>; Steve Munsell <Steve_Munsell@eogresources.com>
Subject: Re: Sundry NOI - Casing Change - Thor 21 Fed Com 703H & 704H

** External email. Use caution.**

Hello Gentlemen,

[Quoted text hidden]
[Quoted text hidden]

EOG RESOURCES, INC.
ORRTANNA 20 FED NO. 701H

1. GEOLOGIC NAME OF SURFACE FORMATION:

Permian

2. ESTIMATED TOPS OF IMPORTANT GEOLOGICAL MARKERS:

Rustler	783'
Top of Salt	1,138'
Base of Salt / Top Anhydrite	4,843'
Lamar	4,843'
Bell Canyon	4,883'
Cherry Canyon	5,763'
Brushy Canyon	7,573'
Bone Spring Lime	9,003'
1st Bone Spring Sand	10,000'
2nd Bone Spring Lime	10,360'
2nd Bone Spring Sand	10,520'
3rd Bone Spring Sand	11,650'
Wolfcamp	12,060'
TD	12,280'

3. ESTIMATED DEPTHS OF ANTICIPATED FRESH WATER, OIL OR GAS:

Upper Permian Sands	0- 400'	Fresh Water
Cherry Canyon	5,763'	Oil
Brushy Canyon	7,573'	Oil
1st Bone Spring Sand	10,000'	Oil
2nd Bone Spring Lime	10,360'	Oil
2nd Bone Spring Sand	10,520'	Oil
3rd Bone Spring Sand	11,650'	Oil
Wolfcamp	12,060'	Oil

No other Formations are expected to give up oil, gas or fresh water in measurable quantities. Surface fresh water sands will be protected by setting 10.75" casing at 875' and circulating cement back to surface.

4. CASING PROGRAM - NEW

SEE COA

Hole Size	Interval	Csg OD	Weight	Grade	Conn	DF_{min} Collapse	DF_{min} Burst	DF_{min} Tension
14.75"	0 – 875'	10.75"	40.5#	J55	STC	1.125	1.25	1.60
9.875"	0-8,000'	7.625"	29.7#	HCP-110	LTC	1.125	1.25	1.60
8.75"	8,000' – 10,900'	7.625"	29.7#	HCP-110	Ultra FJ	1.125	1.25	1.60
6.75"	0'-17,052'	5.5"	23#	HCP-110	ULT SFII	1.125	1.25	1.60

SEE COA

Variance is requested to wave the centralizer requirements for the 7-5/8" FJ casing in the 8-3/4" hole size. An expansion additive will be utilized, in the cement slurry, for the entire length of the 8-3/4" hole interval to maximize cement bond and zonal isolation. Centralizers will be placed in the 9-7/8" hole interval at least one every third joint.

Variance is also requested to wave any centralizer requirements for the 5-1/2" FJ casing in the 6-3/4" hole size. An expansion additive will be utilized, in the cement slurry, for the entire length of the 6-3/4" hole interval to maximize cement bond and zonal isolation.

Cementing Program:

Depth	No. Sacks	Wt. ppg	Yld Ft^3/ft	Mix Water Gal/sk	Slurry Description
10-3/4" 875	325	13.5	1.73	9.13	Class C + 4.0% Bentonite + 0.6% CD-32 + 0.5% $CaCl_2$ + 0.25 lb/sk Cello-Flake (TOC @ Surface)
	200	14.8	1.34	6.34	Class C + 0.6% FL-62 + 0.25 lb/sk Cello-Flake + 0.2% Sodium Metasilicate
7-5/8" 10,900'	750	9.0	2.50	9.06	Class C + 0.6% ASM-3 + 0.15% CDF-4P + 0.6% LTR + 0.5% SCA-6 + 0.13 pps LCL-11 + 0.13 pps LDP-c-0215
	500	12.5	1.71	9.06	Class C + 0.6% LTR + 0.5% SCA-6 + 0.6% ASM-3 + 0.15% CDF-4P + 0.13% LCL-11 + 0.13% LCF-7
	250	15.6	1.19	5.20	Class H + 0.2% ASM-3 + 0.3% SCA-6 + 0.65% LTR + 0.3% SPC-2
5-1/2" 17,052'	575	14.1	1.26	5.80	Class H + 0.1% C-20 + 0.05% CSA-1000 + 0.20% C-49 + 0.40% C-17

Note: Cement volumes based on bit size plus at least 25% excess in the open hole plus 10% excess in the cased-hole overlap section.

5. MINIMUM SPECIFICATIONS FOR PRESSURE CONTROL:

SEE COA

Variance is requested to use a co-flex line between the BOP and choke manifold (instead of using a 4" OD steel line).

The minimum blowout preventer equipment (BOPE) shown in Exhibit #1 will consist of a single ram, mud cross and double ram-type (10,000 psi WP) preventer and an annular preventer (5000-psi WP). Both units will be hydraulically operated and the ram-type will be equipped with blind rams on bottom and drill pipe rams on top. All BOPE will be tested in accordance with Onshore Oil & Gas order No. 2.

Before drilling out of the surface casing, the ram-type BOP and accessory equipment will be tested to 5000/ 250 psig and the annular preventer to 5000/ 250 psig. The surface casing will be tested to 1500 psi for 30 minutes.

Before drilling out of the intermediate casing, the ram-type BOP and accessory equipment will be tested to 5000/ 250 psig and the annular preventer to 5000/ 250 psig. The intermediate casing will be tested to 2000 psi for 30 minutes.

Pipe rams will be operationally checked each 24-hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets.

A hydraulically operated choke will be installed prior to drilling out of the intermediate casing shoe.

6. TYPES AND CHARACTERISTICS OF THE PROPOSED MUD SYSTEM:

During this procedure we plan to use a Closed-Loop System and haul contents to the required disposal.

The applicable depths and properties of the drilling fluid systems are as follows.

Depth	Type	Weight (ppg)	Viscosity	Water Loss
0 – 875'	Fresh - Gel	8.6-8.8	28-34	N/c
875' – 10,900'	Brine	8.8-10.0	28-34	N/c
10,900' – 17,052' Lateral	Oil Base	10.0-11.5	58-68	3 - 6

An electronic pit volume totalizer (PVT) will be utilized on the circulating system, to monitor pit volume, flow rate, pump pressure and stroke rate.

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept at the wellsite at all times.

7. AUXILIARY WELL CONTROL AND MONITORING EQUIPMENT:

(A) A kelly cock will be kept in the drill string at all times.

(B) A full opening drill pipe-stabbing valve (inside BOP) with proper drill pipe connections will be on the rig floor at all times.

(C) H_2S monitoring and detection equipment will be utilized from surface casing point to TD.

8. LOGGING, TESTING AND CORING PROGRAM:

SEE COA

Open-hole logs are not planned for this well.

GR–CCL Will be run in cased hole during completions phase of operations.

9. ABNORMAL CONDITIONS, PRESSURES, TEMPERATURES AND POTENTIAL HAZARDS:

SEE COA

The estimated bottom-hole temperature (BHT) at TD is 179 degrees F with an estimated maximum bottom-hole pressure (BHP) at TD of 7343 psig. No hydrogen sulfide or other hazardous gases or fluids have been encountered, reported or are known to exist at this depth in this area. Severe loss circulation is expected from 7,300' to Intermediate casing point.

10. ANTICIPATED STARTING DATE AND DURATION OF OPERATIONS:

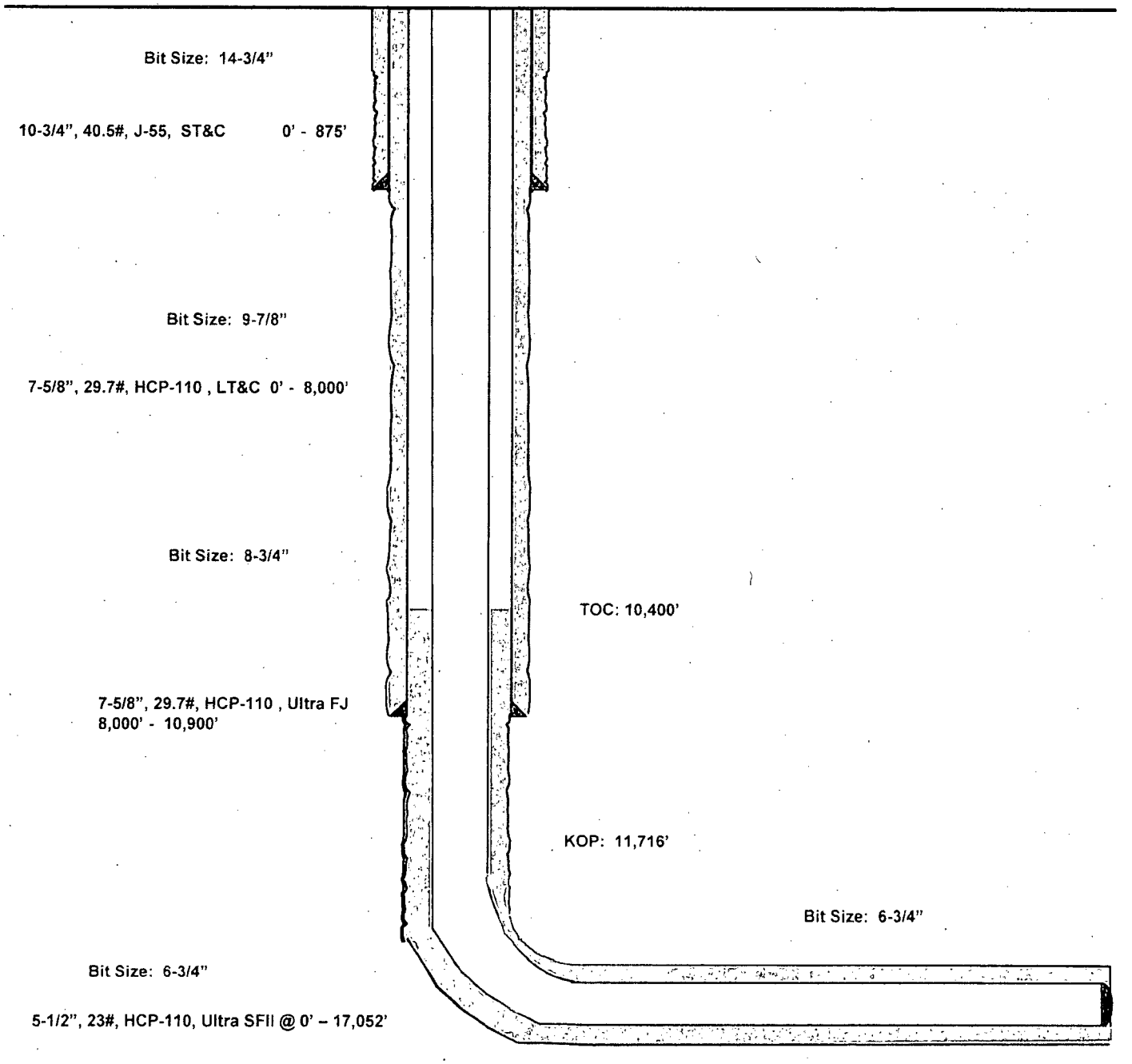
The drilling operation should be finished in approximately one month. If the well is productive, an additional 60-90 days will be required for completion and testing before a decision is made to install permanent facilities.

Orrtanna 20 Fed #701H

220' FSL
950' FWL
Section 20
T-26-S, R-33-E

Lea County, New Mexico
Proposed Wellbore
Revised 3/29/16
API: 30-025-42936

KB: 3,248'
GL: 3,218'



Lateral: 17,052' MD, 12,280' TVD
Upper Most Perf:
330' FSL & 330' FWL Sec. 20
Lower Most Perf:
330' FNL & 330' FWL Sec. 20
BH Location: 230' FNL & 330' FWL
Section 20
T-26-S, R-33-E

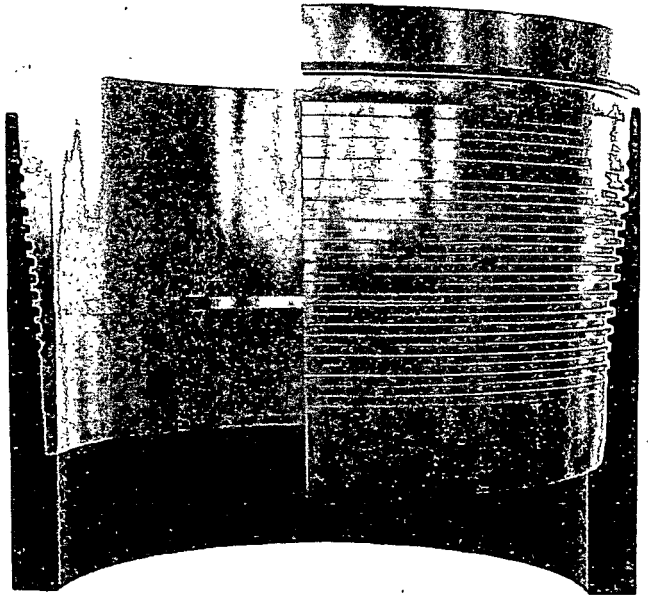
PERFORMANCE DATA

TMK UP ULTRA™ FJ **7.625 in** **29.70 lbs/ft** **P110 HC - EVRAZ**
Technical Data Sheet

Tubular Parameters					
Size	7.625	in	Minimum Yield	110,000	psi
Nominal Weight	29.70	lbs/ft	Minimum Tensile	125,000	psi
Grade	10 HC - EVRAZ		Yield Load	939,000	lbs
PE Weight	29.04	lbs/ft	Tensile Load	1,067,000	lbs
Wall Thickness	0.375	in	Min. Internal Yield Pressure	9,420	psi
Nominal ID	6.875	in	Collapse Pressure	7,610	psi
Drift Diameter	6.750	in			
Nom. Pipe Body Area	8.541	in²			

Connection Parameters		
Connection OD	7.625	in
Connection ID	6.881	in
Make-Up Loss	4.022	in
Critical Section Area	5.316	in²
Tension Efficiency	62.2	%
Compression Efficiency	62.2	%
Yield Load In Tension	584,000	lbs
Min. Internal Yield Pressure	9,470	psi
Collapse Pressure	7,610	psi
Uniaxial Bending	41	°/ 100 ft

Make-Up Torques		
Min. Make-Up Torque	17,700	ft-lbs
Opt. Make-Up Torque	19,700	ft-lbs
Max. Make-Up Torque	21,700	ft-lbs
Yield Torque	31,500	ft-lbs



PREMIUM CONNECTIONS PERFORMANCE DATA

Size 5.500 **NomWt** 23.0 **Grade** P-110 HC

TMK UP ULTRA™ SFII

5.500in 23.0lbs/ft P-110 HC

Technical Data Sheet

Tubular Parameters

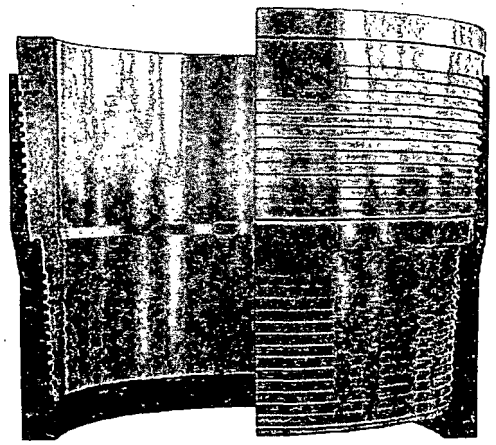
Size	5.500	in	Minimum Yield	110,000	psi
Nominal Weight	23.0	lbs/ft	Minimum Tensile	125,000	psi
Grade	P-110 HC		Yield Load	729,000	lbs
PE Weight	22.54	lbs/ft	Tensile Load	828,000	lbs
Wall Thickness	0.415	in	Min. Internal Yield Pressure	14,500	psi
Nominal ID	4.670	in	Collapse Pressure	15,110	psi
Drift Diameter	4.545	in			
Nom. Pipe Body Area	6.630	in²			

Connection Parameters

Connection OD	5.726	in
Connection ID	4.626	in
Make - Up Loss	5.653	in
Critical Section Area	5.817	in²
Efficiency - Tension	85%	%
Efficiency - Compression	73%	%
Yield Load In Tension	621,000	lbs
Min. Internal Yield Pressure	14,500	psi
Collapse Pressure	15,110	psi
Uniaxial Bending	78	°/ 100 ft

Make-Up Torques

Min. Make-Up Torque	15,500	ft-lbs
Optimum Make-Up Torque	16,300	ft-lbs
Max. Make-Up Torque	18,700	ft-lbs
Yield Torque	24,800	ft-lbs



TMK