Devon Energy, North Thistle 2 State 1H

30-025-42533

1. Geologic Formations

TVD of target:	9,525'	Pilot hole depth	N/A
MD at TD:	13,835'	Deepest expected fresh water:	

Basin

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Rustler	936		
Top of Salt	1,331		
Base of Salt	4,847		
Delaware	4,966		
Cherry Canyon	5,845		
Lower Brushey	8,701		
Bone Spring	8,873		
Leonard	9,014		
Middle Leonard Base	9,341		
Leonard B Target top	9,435		
Lower Leonard Base	9,577		

*H2S, water flows, loss of circulation, abnormal pressures, etc.

2. Casing Program

Hole Size	Casing Interval		Csg. Size	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	SF Tension
	From	To							
17.5"	0	1,000'	13.375"	54.5	J-55	BTC	1.32	2.98	7.77
12.25"	0	4,300'	9.625"	40	J-55	BTC	1.12	1.73	4.46
12.25"	4,300'	5,000'	9.625"	40	HCK-55	BTC	1.48	1.38	23.15
8.75"	0	13,835'	5.5"	17	P-110	BTC	1.75	2.17	2.74
				BLM Minimum Safety Factor			1.125	1.00	1.6 Dry 1.8 Wet

All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h

Must have table for contingency casing

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	N
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y
Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

3. Cementing Program

Casing	# Sks	Wt. lb/ gal	H_20 gal/sk	Yld ft3/ sack	500# Comp. Strength (hours)	Slurry Description
13-3/8" Surf	1070	14.8	6.32	1.33	6	Tail: Class C Cement + 0.125 lbs/sack Poly-E-Flake
9-5/8" Inter.	1070	12.9	9.81	1.85	14	Lead: (65:35) Class C Cement: Poz (Fly Ash): 6% BWOC Bentonite + 5% BWOW Sodium Chloride + 0.125 lbs/sack Poly-E-Flake
	430	14.8	6.32	1.33	6	Tail: Class C Cement + 0.125 lbs/sack Poly-E-Flake
5-1/2" Prod Single Stage	570	11.9	12.89	2.31	n/a	Lead: (50:50) Class H Cement: Poz (Fly Ash) + 10% BWOC Bentonite + 1 lb/sk of Kol-Seal + 0.3% BWOC HR-601 + 0.5lb/sk D-Air 5000
	1260	14.5	5.31	1.2	25	Tail: (50:50) Class H Cement: Poz (Fly Ash) + 0.5% bwoc HALAD-344 + 0.4% bwoc CFR-3 + 0.2% BWOC HR-601 + 2% bwoc Bentonite
5-1/2" Prod Two Stage	540	11.9	12.89	2.31	n/a	1st Stage Lead: (50:50) Class H Cement: Poz (Fly Ash) + 10% BWOC Bentonite + 1 lb/sk of Kol-Seal + 0.3% BWOC HR-601 + 0.5lb/sk D-Air 5000
	1260	14.5	5.31	1.2	25	1st Stage Tail: (50:50) Class H Cement: Poz (Fly Ash) + 0.5% bwoc HALAD-344 + 0.4% bwoc CFR-3 + 0.2% BWOC HR-601 + 2% bwoc Bentonite
	DV Tool = 5050ft					
	20	11	14.81	2.55	22	2nd Stage Lead: Tuned Light® Cement + 0.125 lb/sk Pol-E-Flake
	30	14.8	6.32	1.33	6	2nd Stage Tail: Class C Cement + 0.125 lbs/sack Poly-E-Flake

DV tool depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. Lab reports with the 500 psi compressive strength time for the cement will be onsite for review.

Casing String	TOC	% Excess
13-3/8" Surface	0'	100%
9-5/8" Intermediate	0'	75%
5-1/2" Production Casing Single Stage Option	4800'	25%
5-1/2" Production Casing Two Stage Option	1st Stage = 5050' / 2nd Stage = 4800'	25%

4. Pressure Control Equipment

N	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	✓	Tested to:
12-1/4"	13-5/8"	3M	Annular	x	50% of working pressure
			Blind Ram		3M
			Pipe Ram		
			Double Ram	x	
			Other*		
8-3/4"	13-5/8"	3M	Annular	x	50% testing pressure
			Blind Ram		3M
			Pipe Ram		
			Double Ram	x	
			Other *		
			Annular		50% testing pressure
			Blind Ram		
			Pipe Ram		
			Double Ram		
			Other *		

*Specify if additional ram is utilized.

BOP/BOPE will be tested by an independent service company to 250 psi low and the high pressure indicated above per Onshore Order 2 requirements. The System may be upgraded to a higher pressure but still tested to the working pressure listed in the table above. If the system is upgraded all the components installed will be functional and tested.

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. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

Y	Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.

Y	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.	
	Y	Are anchors required by manufacturer?
Y	A multibowl wellhead is being used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested. Devon proposes using a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be 3000 (3M) psi. • Wellhead will be installed by the vendor's representatives. • If the welding is performed by a third party, the vendor's representative will monitor the temperature to verify that it does not exceed the maximum temperature of the seal. • Vendor representative will install the test plug for the initial BOP test. • Vendor will install a solid steel body pack-off to completely isolate the lower head after cementing intermediate casing. After installation of the pack-off, the pack-off and the lower flange will be tested to 3M, as shown on the attached schematic. Everything above the pack-off will not have been altered whatsoever from the initial nipple up. Therefore the BOP components will not be retested at that time. • If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head will be cut and top out operations will be conducted. • Devon will pressure test all seals above and below the mandrel (but still above the casing) to full working pressure rating. • Devon will test the casing to 0.22 psi/ft or 1500 psi, whichever is greater, as per Onshore Order #2. After running the 13-3/8" surface casing, a 13-5/8" BOP/BOPE system with a minimum rating of 3M will be installed on the wellhead system and will undergo a 250 psi low pressure test followed by a 3,000 psi high pressure test. The 3,000 psi high and 250 psi low test will cover testing requirements a maximum of 30 days, as per Onshore Order #2. If the well is not complete within 30 days of this BOP test, another full BOP test will be conducted, as per Onshore Order #2. After running the 9-5/8' intermediate casing with a mandrel hanger, the 13-5/8" BOP/BOPE system with a minimum rating of 3M will already be installed on the wellhead. The pipe rams will be operated and checked each 24 hour period and each time the drill pipe is out of the hole. These tests will be logged in the daily driller's log. A 2" kill line and 3" choke line will be incorporated into the drilling spool below the ram BOP. In addition to the rams and annular preventer, additional BOP accessories include a kelly cock, floor safety valve, choke lines, and choke manifold rated at 3,000 psi WP.	

	Devon requests a variance to use a flexible line with flanged ends between the BOP and the choke manifold (choke line). The line will be kept as straight as possible with minimal turns. See attached schematic.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From	To				
0	1,000'	FW Gel	8.6-8.8	28-34	N/C
1,000'	5,000'	Saturated Brine	10.0-10.2	28-34	N/C
5,000'	13,835'	Cut Brine	8.5-9.3	28-34	N/C

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

What will be used to monitor the loss or gain of fluid?	PVT/Pason/Visual Monitoring

6. Logging and Testing Procedures

Logging, Coring and Testing.	
x	Will run GR/CNL fromTD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
	Plan to log the Leonard shale interval with Quad combo prior to drilling lateral section.
	Drill stem test? If yes, explain
	Coring? If yes, explain

Additional logs planned		Interval
	Resistivity	Int. shoe to KOP
	Density	Int. shoe to KOP
X	CBL	Production casing
X	Mud log	Intermediate shoe to TD
	PEX	

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	4606 psi
Abnormal Temperature	No

Mitigation measure for abnormal conditions: Lost circulation material/sweeps/mud scavengers.

Hydrogen Sulfide (H2S) monitors will be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the operator will comply with the provisions of Onshore Oil and Gas Order #6. If Hydrogen Sulfide is encountered, measured values and formations will be provided to the BLM.	
N	H2S is present
Y	H2S Plan attached

8. Other facets of operation

Is this a walking operation? No.
Will be pre-setting casing? No.

Attachments
_x_ Directional Plan
___ Other, describe

devon

North Thistle 2 State 1H
Lea Co, NM

Weatherford

Plan Data for North Thistle 2 State 1H

Plan Point Information:
DogLeg Severity Unit: °/100.00ft Position offsets from Slot centre

MD (USft)	Inc (°)	Az (°)	TVD (USft)	+N/-S (USft)	+E/-W (USft)	Northing (USft)	Easting (USft)	VSec (USft)	DLS (DLSU)
0.00	0.00	0.00	0.00	0.00	0.00	488169.11	785990.45	0.00	0.00
4300.00	0.00	0.00	4300.00	0.00	0.00	488169.11	785990.45	0.00	0.00
4900.00	6.00	345.75	4898.90	30.42	-7.73	488199.53	785982.72	-29.98	1.00
5400.00	6.00	345.75	5396.16	81.08	-20.59	488250.19	785969.86	-79.89	0.00
6000.00	0.00	0.00	5995.07	111.50	-28.32	488280.61	785962.13	-109.86	1.00
8979.83	0.00	0.00	8974.90	111.50	-28.32	488280.61	785962.13	-109.86	0.00
9179.83	20.00	182.57	9170.86	76.98	-29.87	488245.09	785960.58	-75.31	10.00
9758.48	89.44	182.57	9485.00	-366.56	-49.76	487882.55	785940.69	368.66	12.00
13834.89	89.44	182.57	9525.00	-4438.68	-232.40	483730.43	785758.05	4444.76	0.00

Plan Data for North Thistle 2 State 1H

Slot: North Thistle 2 State 1H
Position:
Offset is from Site centre
+N/-S: -0.35USft Northing: 488169.11USft Latitude: 32°20'22.4"
+E/-W: -50.06USft Easting: 785990.45USft Longitude: -103°32'28.2"
Elevation Above VRD: 3515.00USft

Plan Data for North Thistle 2 State 1H

Target Set Information:
Name: North Thistle 2 State 1H Tgt
Position offsets from Slot centre

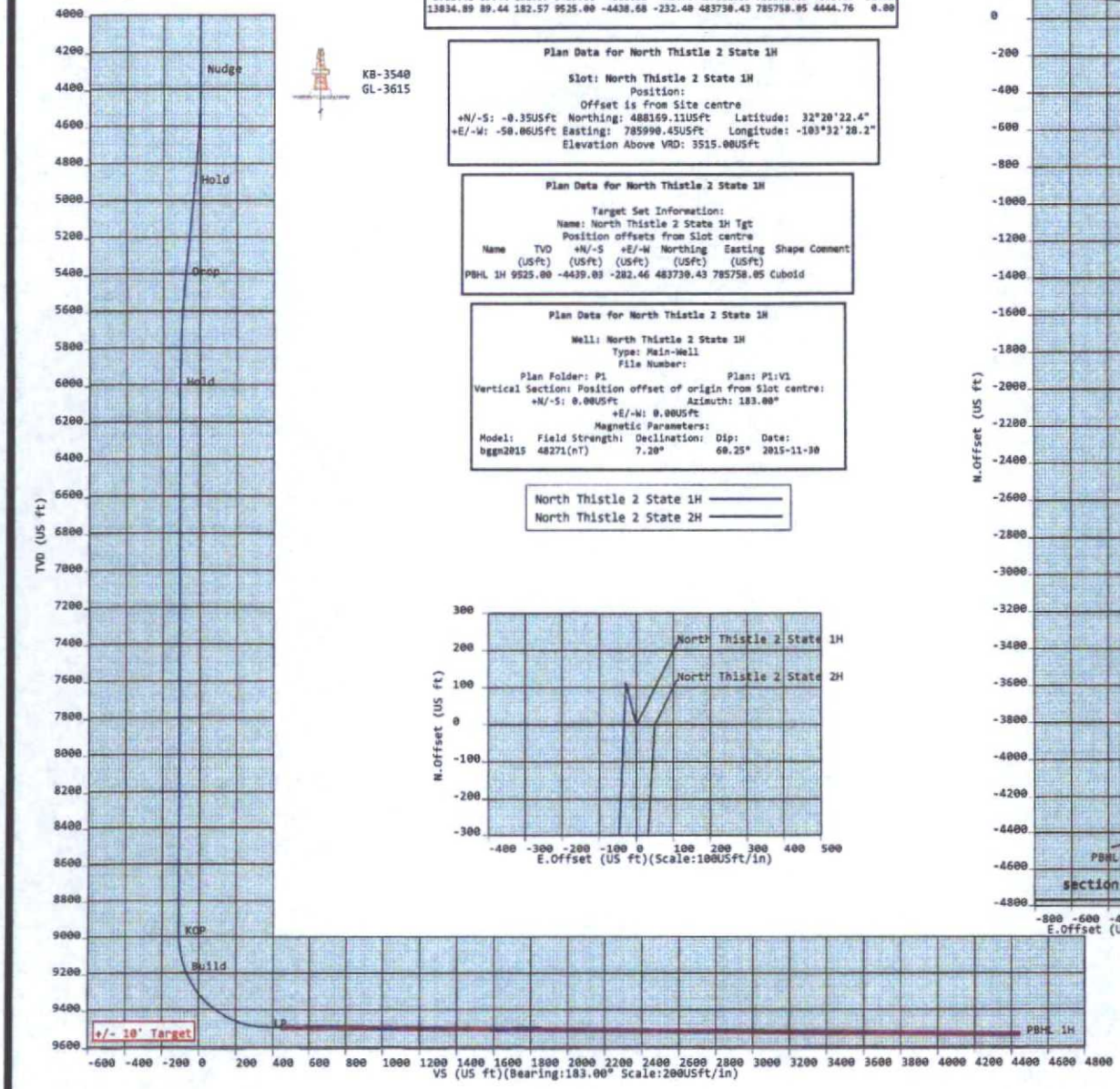
Name	TVD (USft)	+N/-S (USft)	+E/-W (USft)	Northing (USft)	Easting (USft)	Shape	Comment
PBHL 1H	9525.00	-4439.03	-282.46	483730.43	785758.05	Cuboid	

Plan Data for North Thistle 2 State 1H

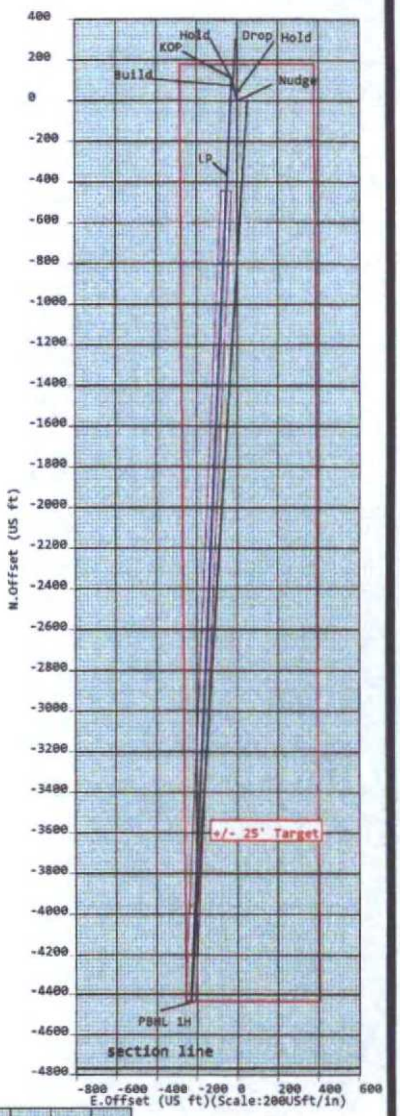
Well: North Thistle 2 State 1H
Type: Main-Well
File Number:
Plan Folder: P1 Plan: P1:V1
Vertical Section: Position offset of origin from Slot centre:
+N/-S: 0.00USft Azimuth: 183.00°
+E/-W: 0.00USft
Magnetic Parameters:

Model:	Field Strength:	Declination:	Dip:	Date:
bggm2015	48271(nT)	7.20°	60.25°	2015-11-30

North Thistle 2 State 1H
North Thistle 2 State 2H



KB-3540
GL-3615



devon

5D Plan Report

Devon Energy

Field Name: *Lea Co, NM Nad 83 NMEZ*
Site Name: *North Thistle 2 State 2H, 1H*
Well Name: *North Thistle 2 State 1H*
Plan: *P1:V1*

30 September 2015

Weatherford®

North Thistle 2 State 1H

Field Name: Lea Co, NM Nad 83 NMEZ

Map Units: US ft **Company Name:** Devon Energy
Vertical Reference Datum (VRD): Mean Sea Level
Projected Coordinate System: NAD83 / New Mexico East (ftUS)
Comment:

Site: North Thistle 2 State 2H, 1H

Units: US ft **North Reference:** Grid **Convergence Angle:** 0.42
Position: **Northing:** 488169.46US ft **Latitude:** 32° 20' 22.42"
Easting: 786040.51US ft **Longitude:** -103° 32' 27.66"
Elevation above MSL: 3515.00 US ft
Comment:

Slot: North Thistle 2 State 1H

Position (Relative to Site Centre)
+N/-S: -0.35US ft **Northing:** 488169.11US ft **Latitude:** 32°20'22.42"
+E/-W: -50.06US ft **Easting:** 785990.45US ft **Longitude:** -103°32'28.24"
Slot TVD Reference: Ground Elevation
Elevation above MSL: 3515.00US ft
Comment:

Well: North Thistle 2 State 1H

Type: Main well **UWI:** **Plan:** P1:V1
File Number: **Comment:**
Closure Distance: 4444.76US ft **Closure Azimuth:** 183.00°
Vertical Section: Position of Origin (Relative to Slot centre)
+N/-S: 0.00US ft **+E/-W:** 0.00US ft **Az:** 183.00°
Magnetic Parameters:
Model: bggm2015 **Field Strength:** 48271.8nT **Declination:** 7.20° **Dip:** 60.25° **Date:** 30/Nov/2015

Drill floor: Plan: P1:V1
Rig Height (Kelly Bushing): 25.00US ft **Elevation above MSL:** 3540.00US ft **Inclination:** 0.00° **Azimuth:** 0.00°

Target set: North Thistle 2 State 1H Tgt Comment:

Target Name:	Shape:	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Northing (USFt)	Easting (USFt)	Comment
PBHL 1H	Cuboid	9525.00	-4438.68	-232.40	483730.43	785758.05	

Wellpath created using minimum curvature.

Tie Point:
MD: 0.00USFt **Inclination:** 0.00° **Azimuth:** 0.00° **TVD:** 0.00USFt **North Offset:** 0.00USFt **East Offset:** 0.00USFt

5D Plan Report

Salient Points: (Relative to Slot centre)(TVD relative to Kelly Bushing)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	Vs (US ft)	DLS (°/100US ft)	B.Rate (°/100US ft)	T.Rate (°/100US ft)	T.Face (°)	Comment
0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	
4300.00	0.00	0.00	4300.00	0.00	0.00	-0.00	0.00	0.00	0.00	0.00	Nudge
4900.00	6.00	345.75	4898.90	30.42	-7.73	-29.98	1.00	1.00	0.00	345.75	Hold
5400.00	6.00	345.75	5396.16	81.08	-20.59	-79.89	0.00	0.00	0.00	0.00	Drop
6000.00	0.00	0.00	5995.07	111.50	-28.32	-109.86	1.00	-1.00	0.00	180.00	Hold
8979.83	0.00	0.00	8974.90	111.50	-28.32	-109.86	0.00	0.00	0.00	0.00	KOP
9179.83	20.00	182.57	9170.86	76.98	-29.87	-75.31	10.00	10.00	0.00	182.57	Build
9758.48	89.44	182.57	9485.00	-366.56	-49.76	368.66	12.00	12.00	-0.00	360.00	LP
13834.89	89.44	182.57	9525.00	-4438.68	-232.40	4444.76	0.00	0.00	0.00	0.00	PBHL 1H

Interpolated Points: (Relative to Slot centre)(TVD relative to Kelly Bushing)

MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	DLS (°/100US ft)	Northing (US ft)	Easting (US ft)	Comment
0.00	0.00	0.00	0.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
100.00	0.00	0.00	100.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
200.00	0.00	0.00	200.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
300.00	0.00	0.00	300.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
400.00	0.00	0.00	400.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
500.00	0.00	0.00	500.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
600.00	0.00	0.00	600.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
700.00	0.00	0.00	700.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
800.00	0.00	0.00	800.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
900.00	0.00	0.00	900.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1000.00	0.00	0.00	1000.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1100.00	0.00	0.00	1100.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1200.00	0.00	0.00	1200.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1300.00	0.00	0.00	1300.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1400.00	0.00	0.00	1400.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1500.00	0.00	0.00	1500.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1600.00	0.00	0.00	1600.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1700.00	0.00	0.00	1700.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1800.00	0.00	0.00	1800.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
1900.00	0.00	0.00	1900.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2000.00	0.00	0.00	2000.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2100.00	0.00	0.00	2100.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2200.00	0.00	0.00	2200.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2300.00	0.00	0.00	2300.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2400.00	0.00	0.00	2400.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2500.00	0.00	0.00	2500.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2600.00	0.00	0.00	2600.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2700.00	0.00	0.00	2700.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2800.00	0.00	0.00	2800.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
2900.00	0.00	0.00	2900.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3000.00	0.00	0.00	3000.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3100.00	0.00	0.00	3100.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3200.00	0.00	0.00	3200.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3300.00	0.00	0.00	3300.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3400.00	0.00	0.00	3400.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3500.00	0.00	0.00	3500.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3600.00	0.00	0.00	3600.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3700.00	0.00	0.00	3700.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3800.00	0.00	0.00	3800.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
3900.00	0.00	0.00	3900.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
4000.00	0.00	0.00	4000.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
4100.00	0.00	0.00	4100.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
4200.00	0.00	0.00	4200.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	
4300.00	0.00	0.00	4300.00	0.00	0.00	-0.00	0.00	488169.11	785990.45	Nudge
4400.00	1.00	345.75	4399.99	0.85	-0.21	-0.83	1.00	488169.96	785990.24	
4500.00	2.00	345.75	4499.96	3.38	-0.86	-3.33	1.00	488172.49	785989.59	

5D Plan Report

Interpolated Points: (Relative to Slot centre)(TVD relative to Kelly Bushing)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	DLS (°/100US ft)	Northing (US ft)	Easting (US ft)	Comment
4600.00	3.00	345.75	4599.86	7.61	-1.93	-7.50	1.00	488176.72	785988.52	
4700.00	4.00	345.75	4699.68	13.53	-3.44	-13.33	1.00	488182.64	785987.01	
4800.00	5.00	345.75	4799.37	21.13	-5.37	-20.82	1.00	488190.24	785985.08	
4900.00	6.00	345.75	4898.90	30.42	-7.73	-29.98	1.00	488199.53	785982.72	Hold
5000.00	6.00	345.75	4998.36	40.55	-10.30	-39.96	0.00	488209.66	785980.15	
5100.00	6.00	345.75	5097.81	50.68	-12.87	-49.94	0.00	488219.79	785977.58	
5200.00	6.00	345.75	5197.26	60.82	-15.45	-59.92	0.00	488229.93	785975.00	
5300.00	6.00	345.75	5296.71	70.95	-18.02	-69.91	0.00	488240.06	785972.43	
5400.00	6.00	345.75	5396.16	81.08	-20.59	-79.89	0.00	488250.19	785969.86	Drop
5500.00	5.00	345.75	5495.70	90.37	-22.95	-89.04	1.00	488259.48	785967.50	
5600.00	4.00	345.75	5595.39	97.97	-24.88	-96.54	1.00	488267.08	785965.57	
5700.00	3.00	345.75	5695.21	103.89	-26.38	-102.37	1.00	488273.00	785964.07	
5800.00	2.00	345.75	5795.11	108.12	-27.46	-106.53	1.00	488277.23	785962.99	
5900.00	1.00	345.75	5895.07	110.65	-28.10	-109.03	1.00	488279.76	785962.35	
6000.00	0.00	0.00	5995.07	111.50	-28.32	-109.86	1.00	488280.61	785962.13	Hold
6100.00	0.00	0.00	6095.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
6200.00	0.00	0.00	6195.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
6300.00	0.00	0.00	6295.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
6400.00	0.00	0.00	6395.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
6500.00	0.00	0.00	6495.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
6600.00	0.00	0.00	6595.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
6700.00	0.00	0.00	6695.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
6800.00	0.00	0.00	6795.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
6900.00	0.00	0.00	6895.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7000.00	0.00	0.00	6995.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7100.00	0.00	0.00	7095.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7200.00	0.00	0.00	7195.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7300.00	0.00	0.00	7295.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7400.00	0.00	0.00	7395.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7500.00	0.00	0.00	7495.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7600.00	0.00	0.00	7595.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7700.00	0.00	0.00	7695.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7800.00	0.00	0.00	7795.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
7900.00	0.00	0.00	7895.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8000.00	0.00	0.00	7995.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8100.00	0.00	0.00	8095.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8200.00	0.00	0.00	8195.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8300.00	0.00	0.00	8295.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8400.00	0.00	0.00	8395.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8500.00	0.00	0.00	8495.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8600.00	0.00	0.00	8595.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8700.00	0.00	0.00	8695.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8800.00	0.00	0.00	8795.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8900.00	0.00	0.00	8895.07	111.50	-28.32	-109.86	0.00	488280.61	785962.13	
8979.83	0.00	0.00	8974.90	111.50	-28.32	-109.86	0.00	488280.61	785962.13	KOP
9000.00	2.02	182.57	8995.06	111.14	-28.33	-109.51	10.00	488280.25	785962.12	
9100.00	12.02	182.57	9094.19	98.96	-28.88	-97.31	10.00	488268.07	785961.57	
9179.83	20.00	182.57	9170.86	76.98	-29.87	-75.31	10.00	488246.09	785960.58	Build
9200.00	22.42	182.57	9189.66	69.69	-30.19	-68.02	12.00	488238.80	785960.26	
9300.00	34.42	182.57	9277.45	22.23	-32.32	-20.51	12.00	488191.34	785958.13	
9400.00	46.42	182.57	9353.44	-42.42	-35.22	44.21	12.00	488126.69	785955.23	
9500.00	58.42	182.57	9414.32	-121.45	-38.77	123.31	12.00	488047.66	785951.68	
9600.00	70.42	182.57	9457.42	-211.39	-42.80	213.34	12.00	487957.72	785947.65	
9700.00	82.42	182.57	9480.85	-308.32	-47.15	310.37	12.00	487860.79	785943.30	
9758.48	89.44	182.57	9485.00	-366.56	-49.76	368.66	12.00	487802.55	785940.69	LP
9800.00	89.44	182.57	9485.41	-408.04	-51.62	410.18	0.00	487761.07	785938.83	
9900.00	89.44	182.57	9486.39	-507.93	-56.10	510.17	0.00	487661.18	785934.35	
10000.00	89.44	182.57	9487.37	-607.83	-60.58	610.16	0.00	487561.28	785929.87	
10100.00	89.44	182.57	9488.35	-707.72	-65.06	710.16	0.00	487461.39	785925.39	

Interpolated Points: (Relative to Slot centre)(TVD relative to Kelly Bushing)										
MD (US ft)	Inc (°)	Az (°)	TVD (US ft)	N.Offset (US ft)	E.Offset (US ft)	VS (US ft)	DLS (°/100US ft)	Northing (US ft)	Easting (US ft)	Comment
10200.00	89.44	182.57	9489.33	-807.61	-69.54	810.15	0.00	487361.50	785920.91	
10300.00	89.44	182.57	9490.32	-907.51	-74.03	910.14	0.00	487261.60	785916.42	
10400.00	89.44	182.57	9491.30	-1007.40	-78.51	1010.13	0.00	487161.71	785911.94	
10500.00	89.44	182.57	9492.28	-1107.30	-82.99	1110.12	0.00	487061.81	785907.46	
10600.00	89.44	182.57	9493.26	-1207.19	-87.47	1210.12	0.00	486961.92	785902.98	
10700.00	89.44	182.57	9494.24	-1307.09	-91.95	1310.11	0.00	486862.02	785898.50	
10800.00	89.44	182.57	9495.22	-1406.98	-96.43	1410.10	0.00	486762.13	785894.02	
10900.00	89.44	182.57	9496.20	-1506.88	-100.91	1510.09	0.00	486662.23	785889.54	
11000.00	89.44	182.57	9497.18	-1606.77	-105.39	1610.09	0.00	486562.34	785885.06	
11100.00	89.44	182.57	9498.17	-1706.67	-109.87	1710.08	0.00	486462.44	785880.58	
11200.00	89.44	182.57	9499.15	-1806.56	-114.35	1810.07	0.00	486362.55	785876.10	
11300.00	89.44	182.57	9500.13	-1906.46	-118.83	1910.06	0.00	486262.65	785871.62	
11400.00	89.44	182.57	9501.11	-2006.35	-123.31	2010.06	0.00	486162.76	785867.14	
11500.00	89.44	182.57	9502.09	-2106.25	-127.79	2110.05	0.00	486062.86	785862.66	
11600.00	89.44	182.57	9503.07	-2206.14	-132.27	2210.04	0.00	485962.97	785858.18	
11700.00	89.44	182.57	9504.05	-2306.04	-136.75	2310.03	0.00	485863.07	785853.70	
11800.00	89.44	182.57	9505.03	-2405.93	-141.23	2410.03	0.00	485763.18	785849.22	
11900.00	89.44	182.57	9506.01	-2505.83	-145.71	2510.02	0.00	485663.28	785844.74	
12000.00	89.44	182.57	9507.00	-2605.72	-150.19	2610.01	0.00	485563.39	785840.26	
12100.00	89.44	182.57	9507.98	-2705.62	-154.67	2710.00	0.00	485463.49	785835.78	
12200.00	89.44	182.57	9508.96	-2805.51	-159.15	2809.99	0.00	485363.60	785831.30	
12300.00	89.44	182.57	9509.94	-2905.40	-163.63	2909.99	0.00	485263.71	785826.82	
12400.00	89.44	182.57	9510.92	-3005.30	-168.11	3009.98	0.00	485163.81	785822.34	
12500.00	89.44	182.57	9511.90	-3105.19	-172.59	3109.97	0.00	485063.92	785817.86	
12600.00	89.44	182.57	9512.88	-3205.09	-177.07	3209.96	0.00	484964.02	785813.38	
12700.00	89.44	182.57	9513.86	-3304.98	-181.55	3309.96	0.00	484864.13	785808.90	
12800.00	89.44	182.57	9514.85	-3404.88	-186.03	3409.95	0.00	484764.23	785804.42	
12900.00	89.44	182.57	9515.83	-3504.77	-190.51	3509.94	0.00	484664.34	785799.94	
13000.00	89.44	182.57	9516.81	-3604.67	-194.99	3609.93	0.00	484564.44	785795.46	
13100.00	89.44	182.57	9517.79	-3704.56	-199.47	3709.93	0.00	484464.55	785790.98	
13200.00	89.44	182.57	9518.77	-3804.46	-203.95	3809.92	0.00	484364.65	785786.50	
13300.00	89.44	182.57	9519.75	-3904.35	-208.44	3909.91	0.00	484264.76	785782.01	
13400.00	89.44	182.57	9520.73	-4004.25	-212.92	4009.90	0.00	484164.86	785777.53	
13500.00	89.44	182.57	9521.71	-4104.14	-217.40	4109.90	0.00	484064.97	785773.05	
13600.00	89.44	182.57	9522.70	-4204.04	-221.88	4209.89	0.00	483965.07	785768.57	
13700.00	89.44	182.57	9523.68	-4303.93	-226.36	4309.88	0.00	483865.18	785764.09	
13800.00	89.44	182.57	9524.66	-4403.83	-230.84	4409.87	0.00	483765.28	785759.61	
13834.89	89.44	182.57	9525.00	-4438.68	-232.40	4444.76	0.00	483730.43	785758.05	PBHL 1H

devon

5D Anti-Collision Report

Devon Energy

Field Name: *Lea Co, NM Nad 83 NMEZ*
Site Name: *North Thistle 2 State 2H, 1H*
Well Name: *North Thistle 2 State 1H*

30 September 2015

Weatherford®

devon

North Thistle 2 State 1H

Field Name: Lea Co, NM Nad 83 NMEZ	**Map Units:** US ft	**Company Name:** Devon Energy
	Vertical Reference Datum (VRD): Mean Sea Level	
	Projected Coordinate System: NAD83 / New Mexico East (ftUS)	
	Comment:	

Site: North Thistle 2 State 2H, 1H	**Units:** US ft	**North Reference:** Grid	**Convergence Angle:** 0.42
	Position:	**Northing:** 488169.46US ft	**Latitude:** 32° 20' 22.42"
		Easting: 786040.51US ft	**Longitude:** -103° 32' 27.66"
	Elevation above MSL: 3515.00 US ft		
	Comment:		

Slot: North Thistle 2 State 1H	**Position (Relative to Site Centre)**		
	+N/-S: -0.35US ft	**Northing:** 488169.11US ft	**Latitude:** 32°20'22.42"
	+E/-W: -50.06US ft	**Easting:** 785990.45US ft	**Longitude:** -103°32'28.24"
	Slot TVD Reference: Ground Elevation		
	Elevation above MSL: 3515.00US ft		
	Comment:		

Well: North Thistle 2 State 1H	**Type:** Main well	**UWI:**	**Plan:** Working Plan	
	File Number:	**Comment:**		
	Closure Distance: 4444.76US ft	**Closure Azimuth:** 183.00°		
	Vertical Section: Position of Origin (Relative to Slot centre)			
	+N/-S: 0.00US ft	**+E/-W:** 0.00US ft	**Az:** 183.00°	
	Magnetic Parameters:			
	Model: bggm2015	**Field Strength:** 48271.8nT	**Declination:** 7.20°	**Dip:** 60.25° **Date:** 30/Nov/2015

Drill floor: Plan: Working Plan

Rig Height (Kelly Bushing):	**Elevation above MSL:**	**Inclination:**	**Azimuth:**
25.00us ft	3540.00us ft	0.00°	0.00°

Collision / Uncertainty Analysis

Primary Well	Start MD (USFt)	End MD (USFt)	Collision Risk Interval	No. of Std. Deviations in Error Computation
North Thistle 2 State 1H (p)	0.00	30000.00	100.00	2

Secondary Well Names:

North Thistle 2 State 2H (p)

Anti-Collision Report Terminology

S.Minor, S.Major: Radii of the ellipse of uncertainty at the current location as seen in the along hole direction.
PHI: Angle between high-side vector and semi-minor axis
TVD Spread: Total TVD range of the ellipsoid of uncertainty at the current location.
ES: Distance between the extremities of the primary and secondary uncertainty ellipsoids in the direction Cr-Cr.
T.Face to Sec: Angle between the Hi-Side vector of the primary well at the current location and line of closest approach between the two wells.

AC Filter Info: the following filter has been applied: Depth Range.

Separation factors calculated using Pedal Curve (Independent Uncertainty). Surface Uncertainty (S.U.) Not Applied. Wellpath created using minimum curvature.

Anti-Collision Summary (TVD relative to Kelly Bushing)

SF

Secondary Well Name	Pri MD (US ft)	TVD (US ft)	Sec MD (US ft)	ES (US ft)	CC (US ft)	SF	Risk
North Thistle 2 State 2H (p)	9335.16	9305.70	9305.70	41.72	83.33	2.00	

Primary Well: North Thistle 2 State 1H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)

MD (US ft)	TVD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	Nearest Well	ES (US ft)	CC (US ft)	SF	Risk
0.00	0.00	89.60	0.00	0.00	0.00	North Thistle 2 State 2H (p)	49.49	50.06	88.35	
100.00	100.00	89.60	0.11	0.11	4.60	North Thistle 2 State 2H (p)	49.27	50.06	63.59	
200.00	200.00	89.60	0.34	0.34	4.62	North Thistle 2 State 2H (p)	48.82	50.06	40.48	
300.00	300.00	89.60	0.56	0.56	4.65	North Thistle 2 State 2H (p)	48.37	50.06	29.69	
400.00	400.00	89.60	0.79	0.79	4.70	North Thistle 2 State 2H (p)	47.93	50.06	23.44	
500.00	500.00	89.60	1.01	1.01	4.75	North Thistle 2 State 2H (p)	47.48	50.06	19.36	
600.00	600.00	89.60	1.24	1.24	4.82	North Thistle 2 State 2H (p)	47.03	50.06	16.49	
700.00	700.00	89.60	1.46	1.46	4.89	North Thistle 2 State 2H (p)	46.58	50.06	14.37	
800.00	800.00	89.60	1.69	1.69	4.98	North Thistle 2 State 2H (p)	46.13	50.06	12.72	
900.00	900.00	89.60	1.91	1.91	5.07	North Thistle 2 State 2H (p)	45.68	50.06	11.42	
1000.00	1000.00	89.60	2.14	2.14	5.17	North Thistle 2 State 2H (p)	45.23	50.06	10.36	
1100.00	1100.00	89.60	2.36	2.36	5.28	North Thistle 2 State 2H (p)	44.78	50.06	9.48	
1200.00	1200.00	89.60	2.59	2.59	5.39	North Thistle 2 State 2H (p)	44.33	50.06	8.73	
1300.00	1300.00	89.60	2.81	2.81	5.51	North Thistle 2 State 2H (p)	43.88	50.06	8.10	
1400.00	1400.00	89.60	3.03	3.03	5.64	North Thistle 2 State 2H (p)	43.43	50.06	7.55	
1500.00	1500.00	89.60	3.26	3.26	5.77	North Thistle 2 State 2H (p)	42.98	50.06	7.07	
1600.00	1600.00	89.60	3.48	3.48	5.90	North Thistle 2 State 2H (p)	42.53	50.06	6.65	
1700.00	1700.00	89.60	3.71	3.71	6.04	North Thistle 2 State 2H (p)	42.08	50.06	6.27	
1800.00	1800.00	89.60	3.93	3.93	6.19	North Thistle 2 State 2H (p)	41.63	50.06	5.94	
1900.00	1900.00	89.60	4.16	4.16	6.33	North Thistle 2 State 2H (p)	41.18	50.06	5.64	
2000.00	2000.00	89.60	4.38	4.38	6.48	North Thistle 2 State 2H (p)	40.73	50.06	5.37	

Primary Well: North Thistle 2 State 1H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)

MD (US ft)	TVD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	Nearest Well	ES (US ft)	CC (US ft)	SF	Risk
2100.00	2100.00	89.60	4.61	4.61	6.64	North Thistle 2 State 2H (p)	40.28	50.06	5.12	
2200.00	2200.00	89.60	4.83	4.83	6.80	North Thistle 2 State 2H (p)	39.83	50.06	4.89	
2300.00	2300.00	89.60	5.06	5.06	6.96	North Thistle 2 State 2H (p)	39.38	50.06	4.69	
2400.00	2400.00	89.60	5.28	5.28	7.12	North Thistle 2 State 2H (p)	38.93	50.06	4.50	
2500.00	2500.00	89.60	5.51	5.51	7.29	North Thistle 2 State 2H (p)	38.48	50.06	4.32	
2600.00	2600.00	89.60	5.73	5.73	7.45	North Thistle 2 State 2H (p)	38.03	50.06	4.16	
2700.00	2700.00	89.60	5.96	5.96	7.63	North Thistle 2 State 2H (p)	37.59	50.06	4.01	
2800.00	2800.00	89.60	6.18	6.18	7.80	North Thistle 2 State 2H (p)	37.14	50.06	3.87	
2900.00	2900.00	89.60	6.41	6.41	7.98	North Thistle 2 State 2H (p)	36.69	50.06	3.74	
3000.00	3000.00	89.60	6.63	6.63	8.15	North Thistle 2 State 2H (p)	36.24	50.06	3.62	
3100.00	3100.00	89.60	6.86	6.86	8.34	North Thistle 2 State 2H (p)	35.79	50.06	3.51	
3200.00	3200.00	89.60	7.08	7.08	8.52	North Thistle 2 State 2H (p)	35.34	50.06	3.40	
3300.00	3300.00	89.60	7.31	7.31	8.71	North Thistle 2 State 2H (p)	34.89	50.06	3.30	
3400.00	3400.00	89.60	7.53	7.53	8.90	North Thistle 2 State 2H (p)	34.44	50.06	3.20	
3500.00	3500.00	89.60	7.76	7.76	9.09	North Thistle 2 State 2H (p)	33.99	50.06	3.11	
3600.00	3600.00	89.60	7.98	7.98	9.28	North Thistle 2 State 2H (p)	33.54	50.06	3.03	
3700.00	3700.00	89.60	8.20	8.20	9.48	North Thistle 2 State 2H (p)	33.09	50.06	2.95	
3800.00	3800.00	89.60	8.43	8.43	9.68	North Thistle 2 State 2H (p)	32.64	50.06	2.87	
3900.00	3900.00	89.60	8.65	8.65	9.88	North Thistle 2 State 2H (p)	32.19	50.06	2.80	
4000.00	4000.00	89.60	8.88	8.88	10.08	North Thistle 2 State 2H (p)	31.74	50.06	2.73	
4100.00	4100.00	89.60	9.10	9.10	10.29	North Thistle 2 State 2H (p)	31.29	50.06	2.67	
4200.00	4200.00	89.60	9.33	9.33	10.50	North Thistle 2 State 2H (p)	30.84	50.06	2.60	
4300.00	4300.00	89.60	9.55	9.55	10.72	North Thistle 2 State 2H (p)	30.39	50.06	2.55	
4400.00	4399.99	104.81	9.78	9.78	10.93	North Thistle 2 State 2H (p)	30.17	50.28	2.50	
4500.00	4499.96	107.65	10.00	10.00	11.15	North Thistle 2 State 2H (p)	30.46	51.01	2.48	
4600.00	4599.86	112.17	10.22	10.22	11.38	North Thistle 2 State 2H (p)	31.50	52.50	2.50	

Primary Well: North Thistle 2 State 1H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)										
MD (US ft)	TVD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	Nearest Well	ES (US ft)	CC (US ft)	SF	Risk
4700.00	4699.68	118.03	10.45	10.43	11.60	North Thistle 2 State 2H (p)	33.70	55.09	2.57	
4800.00	4799.37	124.70	10.67	10.65	11.83	North Thistle 2 State 2H (p)	37.33	59.19	2.71	
4900.00	4898.90	131.59	10.90	10.86	12.06	North Thistle 2 State 2H (p)	42.80	65.14	2.92	
5000.00	4998.36	137.76	11.13	11.08	12.30	North Thistle 2 State 2H (p)	49.76	72.52	3.19	
5100.00	5097.81	142.75	11.36	11.31	12.54	North Thistle 2 State 2H (p)	57.35	80.59	3.47	
5200.00	5197.26	146.81	11.59	11.53	12.78	North Thistle 2 State 2H (p)	65.49	89.15	3.77	
5300.00	5296.71	150.15	11.83	11.76	13.03	North Thistle 2 State 2H (p)	73.99	98.07	4.07	
5400.00	5396.16	152.93	12.07	11.98	13.28	North Thistle 2 State 2H (p)	82.72	107.28	4.37	
5500.00	5495.70	155.12	12.28	12.19	13.54	North Thistle 2 State 2H (p)	90.92	115.90	4.64	
5600.00	5595.39	156.69	12.47	12.37	13.80	North Thistle 2 State 2H (p)	97.68	123.07	4.85	
5700.00	5695.21	157.78	12.66	12.55	14.07	North Thistle 2 State 2H (p)	102.92	128.70	4.99	
5800.00	5795.11	158.51	12.84	12.73	14.34	North Thistle 2 State 2H (p)	106.58	132.75	5.07	
5900.00	5895.07	158.93	13.02	12.91	14.61	North Thistle 2 State 2H (p)	108.63	135.19	5.09	
6000.00	5995.07	144.81	13.19	13.08	14.89	North Thistle 2 State 2H (p)	109.05	136.00	5.04	
6100.00	6095.07	144.81	13.39	13.28	15.17	North Thistle 2 State 2H (p)	108.62	136.00	4.97	
6200.00	6195.07	144.81	13.61	13.50	15.46	North Thistle 2 State 2H (p)	108.18	136.00	4.89	
6300.00	6295.07	144.81	13.83	13.73	15.75	North Thistle 2 State 2H (p)	107.73	136.00	4.81	
6400.00	6395.07	144.81	14.06	13.95	16.05	North Thistle 2 State 2H (p)	107.28	136.00	4.74	
6500.00	6495.07	144.81	14.28	14.17	16.35	North Thistle 2 State 2H (p)	106.84	136.00	4.66	
6600.00	6595.07	144.81	14.50	14.40	16.65	North Thistle 2 State 2H (p)	106.39	136.00	4.59	
6700.00	6695.07	144.81	14.72	14.62	16.96	North Thistle 2 State 2H (p)	105.94	136.00	4.52	
6800.00	6795.07	144.81	14.94	14.85	17.27	North Thistle 2 State 2H (p)	105.50	136.00	4.46	
6900.00	6895.07	144.81	15.17	15.07	17.59	North Thistle 2 State 2H (p)	105.05	136.00	4.39	
7000.00	6995.07	144.81	15.39	15.29	17.92	North Thistle 2 State 2H (p)	104.61	136.00	4.33	
7100.00	7095.07	144.81	15.61	15.52	18.25	North Thistle 2 State 2H (p)	104.16	136.00	4.27	
7200.00	7195.07	144.81	15.83	15.74	18.58	North Thistle 2 State 2H (p)	103.71	136.00	4.21	

Primary Well: North Thistle 2 State 1H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)										
MD (US ft)	TVD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	Nearest Well	ES (US ft)	CC (US ft)	SF	Risk
7300.00	7295.07	144.81	16.06	15.97	18.92	North Thistle 2 State 2H (p)	103.27	136.00	4.15	
7400.00	7395.07	144.81	16.28	16.19	19.27	North Thistle 2 State 2H (p)	102.82	136.00	4.10	
7500.00	7495.07	144.81	16.50	16.41	19.62	North Thistle 2 State 2H (p)	102.38	136.00	4.04	
7600.00	7595.07	144.81	16.73	16.64	19.97	North Thistle 2 State 2H (p)	101.93	136.00	3.99	
7700.00	7695.07	144.81	16.95	16.86	20.33	North Thistle 2 State 2H (p)	101.49	136.00	3.94	
7800.00	7795.07	144.81	17.17	17.09	20.70	North Thistle 2 State 2H (p)	101.04	136.00	3.89	
7900.00	7895.07	144.81	17.39	17.31	21.07	North Thistle 2 State 2H (p)	100.59	136.00	3.84	
8000.00	7995.07	144.81	17.62	17.54	21.44	North Thistle 2 State 2H (p)	100.15	136.00	3.79	
8100.00	8095.07	144.81	17.84	17.76	21.83	North Thistle 2 State 2H (p)	99.70	136.00	3.75	
8200.00	8195.07	144.81	18.06	17.98	22.21	North Thistle 2 State 2H (p)	99.26	136.00	3.70	
8300.00	8295.07	144.81	18.29	18.21	22.61	North Thistle 2 State 2H (p)	98.81	136.00	3.66	
8400.00	8395.07	144.81	18.51	18.43	23.01	North Thistle 2 State 2H (p)	98.37	136.00	3.61	
8500.00	8495.07	144.81	18.73	18.66	23.41	North Thistle 2 State 2H (p)	97.92	136.00	3.57	
8600.00	8595.07	144.81	18.96	18.88	23.82	North Thistle 2 State 2H (p)	97.48	136.00	3.53	
8700.00	8695.07	144.81	19.18	19.10	24.23	North Thistle 2 State 2H (p)	97.04	136.00	3.49	
8800.00	8795.07	144.81	19.40	19.33	24.66	North Thistle 2 State 2H (p)	96.59	136.00	3.45	
8900.00	8895.07	144.81	19.63	19.55	25.08	North Thistle 2 State 2H (p)	96.15	136.00	3.41	
9000.00	8995.06	322.13	19.84	19.76	25.51	North Thistle 2 State 2H (p)	95.42	135.72	3.37	
9100.00	9094.19	318.12	19.98	19.67	25.94	North Thistle 2 State 2H (p)	85.49	126.31	3.09	
9200.00	9189.66	306.09	20.10	19.19	26.31	North Thistle 2 State 2H (p)	64.87	106.06	2.57	
9300.00	9277.45	280.20	20.22	18.22	26.65	North Thistle 2 State 2H (p)	43.82	85.24	2.06	
9400.00	9353.44	248.93	20.35	16.97	26.92	North Thistle 2 State 2H (p)	53.67	95.41	2.29	
9500.00	9414.32	231.69	20.56	15.65	27.14	North Thistle 2 State 2H (p)	108.74	150.75	3.59	
9600.00	9457.42	229.04	20.86	14.53	27.37	North Thistle 2 State 2H (p)	189.01	231.21	5.48	
9700.00	9480.85	243.65	21.29	13.92	27.61	North Thistle 2 State 2H (p)	281.25	323.62	7.64	
9800.00	9485.41	267.22	21.83	13.95	27.90	North Thistle 2 State 2H (p)	378.51	420.85	9.94	

Primary Well: North Thistle 2 State 1H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)										
MD (US ft)	TVD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	Nearest Well	ES (US ft)	CC (US ft)	SF	Risk
9900.00	9486.39	266.54	22.50	14.13	28.27	North Thistle 2 State 2H (p)	476.89	519.25	12.26	
10000.00	9487.37	265.87	23.30	14.35	28.71	North Thistle 2 State 2H (p)	575.80	618.16	14.59	
10100.00	9488.35	265.20	24.21	14.60	29.21	North Thistle 2 State 2H (p)	675.00	717.37	16.93	
10200.00	9489.33	264.53	25.21	14.88	29.77	North Thistle 2 State 2H (p)	774.39	816.77	19.27	
10300.00	9490.32	263.86	26.31	15.20	30.40	North Thistle 2 State 2H (p)	873.91	916.30	21.62	
10400.00	9491.30	263.20	27.48	15.54	31.09	North Thistle 2 State 2H (p)	973.53	1015.92	23.96	
10500.00	9492.28	262.53	28.71	15.90	31.82	North Thistle 2 State 2H (p)	1073.21	1115.61	26.31	
10600.00	9493.26	261.87	30.01	16.30	32.61	North Thistle 2 State 2H (p)	1172.95	1215.35	28.67	
10700.00	9494.24	261.21	31.36	16.71	33.44	North Thistle 2 State 2H (p)	1272.74	1315.13	31.02	
10800.00	9495.22	260.55	32.75	17.15	34.31	North Thistle 2 State 2H (p)	1372.55	1414.94	33.38	
10900.00	9496.20	259.90	34.18	17.60	35.23	North Thistle 2 State 2H (p)	1472.34	1514.77	35.70	
11000.00	9497.18	182.01	35.65	18.08	36.18	North Thistle 2 State 2H (p)	1483.49	1522.75	38.78	
11100.00	9498.17	181.94	37.15	18.57	37.16	North Thistle 2 State 2H (p)	1483.07	1523.22	37.94	
11200.00	9499.15	181.87	38.67	19.08	38.18	North Thistle 2 State 2H (p)	1482.65	1523.69	37.13	
11300.00	9500.13	181.80	40.22	19.60	39.22	North Thistle 2 State 2H (p)	1482.10	1524.16	36.24	
11400.00	9501.11	181.73	41.80	20.13	40.29	North Thistle 2 State 2H (p)	1481.61	1524.63	35.45	
11500.00	9502.09	181.66	43.39	20.68	41.38	North Thistle 2 State 2H (p)	1481.17	1525.10	34.71	
11600.00	9503.07	181.59	45.00	21.24	42.50	North Thistle 2 State 2H (p)	1480.61	1525.58	33.93	
11700.00	9504.05	181.52	46.62	21.81	43.64	North Thistle 2 State 2H (p)	1480.14	1526.06	33.23	
11800.00	9505.03	181.45	48.26	22.38	44.79	North Thistle 2 State 2H (p)	1479.46	1526.54	32.42	
11900.00	9506.01	181.38	49.91	22.97	45.97	North Thistle 2 State 2H (p)	1478.92	1527.02	31.75	
12000.00	9507.00	181.30	51.57	23.57	47.16	North Thistle 2 State 2H (p)	1478.19	1527.51	30.98	
12100.00	9507.98	181.23	53.24	24.17	48.36	North Thistle 2 State 2H (p)	1477.58	1527.99	30.31	
12200.00	9508.96	181.16	54.92	24.78	49.58	North Thistle 2 State 2H (p)	1476.83	1528.48	29.59	
12300.00	9509.94	181.09	56.61	25.40	50.82	North Thistle 2 State 2H (p)	1476.25	1528.98	29.00	
12400.00	9510.92	181.02	58.30	26.02	52.06	North Thistle 2 State 2H (p)	1475.53	1529.47	28.36	

Primary Well: North Thistle 2 State 1H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)										
MD (US ft)	TVD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	Nearest Well	ES (US ft)	CC (US ft)	SF	Risk
12500.00	9511.90	180.95	60.01	26.65	53.32	North Thistle 2 State 2H (p)	1474.82	1529.97	27.74	
12600.00	9512.88	180.88	61.72	27.28	54.58	North Thistle 2 State 2H (p)	1474.13	1530.47	27.17	
12700.00	9513.86	180.81	63.43	27.92	55.86	North Thistle 2 State 2H (p)	1473.44	1530.97	26.61	
12800.00	9514.85	180.74	65.16	28.56	57.15	North Thistle 2 State 2H (p)	1472.71	1531.47	26.06	
12900.00	9515.83	180.67	66.88	29.21	58.44	North Thistle 2 State 2H (p)	1471.98	1531.98	25.53	
13000.00	9516.81	180.60	68.61	29.86	59.74	North Thistle 2 State 2H (p)	1471.25	1532.49	25.02	
13100.00	9517.79	180.53	70.35	30.51	61.05	North Thistle 2 State 2H (p)	1470.51	1533.00	24.53	
13200.00	9518.77	180.46	72.09	31.17	62.37	North Thistle 2 State 2H (p)	1469.76	1533.51	24.06	
13300.00	9519.75	180.39	73.83	31.83	63.69	North Thistle 2 State 2H (p)	1469.01	1534.03	23.59	
13400.00	9520.73	180.32	75.58	32.50	65.02	North Thistle 2 State 2H (p)	1468.22	1534.55	23.14	
13500.00	9521.71	180.25	77.33	33.16	66.36	North Thistle 2 State 2H (p)	1467.43	1535.07	22.69	
13600.00	9522.70	180.18	79.08	33.83	67.70	North Thistle 2 State 2H (p)	1466.63	1535.59	22.27	
13700.00	9523.68	180.11	80.84	34.51	69.04	North Thistle 2 State 2H (p)	1465.84	1536.11	21.86	
13800.00	9524.66	180.04	82.60	35.18	70.39	North Thistle 2 State 2H (p)	1465.04	1536.64	21.46	
13834.89	9525.00	180.02	83.21	35.42	70.86	North Thistle 2 State 2H (p)	1464.76	1536.82	21.33	

Secondary Well: North Thistle 2 State 2H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)										
Pri MD (US ft)	TVD (US ft)	Sec MD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	ES (US ft)	CC (US ft)	SF	Risk
0.00	0.00	0.00	89.60	0.00	0.00	0.00	49.49	50.06	88.35	
100.00	100.00	100.00	89.60	0.11	0.11	4.60	49.27	50.06	63.59	
200.00	200.00	200.00	89.60	0.34	0.34	4.62	48.82	50.06	40.48	
300.00	300.00	300.00	89.60	0.56	0.56	4.65	48.37	50.06	29.69	
400.00	400.00	400.00	89.60	0.79	0.79	4.70	47.93	50.06	23.44	
500.00	500.00	500.00	89.60	1.01	1.01	4.75	47.48	50.06	19.36	
600.00	600.00	600.00	89.60	1.24	1.24	4.82	47.03	50.06	16.49	
700.00	700.00	700.00	89.60	1.46	1.46	4.89	46.58	50.06	14.37	
800.00	800.00	800.00	89.60	1.69	1.69	4.98	46.13	50.06	12.72	
900.00	900.00	900.00	89.60	1.91	1.91	5.07	45.68	50.06	11.42	
1000.00	1000.00	1000.00	89.60	2.14	2.14	5.17	45.23	50.06	10.36	
1100.00	1100.00	1100.00	89.60	2.36	2.36	5.28	44.78	50.06	9.48	
1200.00	1200.00	1200.00	89.60	2.59	2.59	5.39	44.33	50.06	8.73	
1300.00	1300.00	1300.00	89.60	2.81	2.81	5.51	43.88	50.06	8.10	
1400.00	1400.00	1400.00	89.60	3.03	3.03	5.64	43.43	50.06	7.55	
1500.00	1500.00	1500.00	89.60	3.26	3.26	5.77	42.98	50.06	7.07	
1600.00	1600.00	1600.00	89.60	3.48	3.48	5.90	42.53	50.06	6.65	
1700.00	1700.00	1700.00	89.60	3.71	3.71	6.04	42.08	50.06	6.27	
1800.00	1800.00	1800.00	89.60	3.93	3.93	6.19	41.63	50.06	5.94	
1900.00	1900.00	1900.00	89.60	4.16	4.16	6.33	41.18	50.06	5.64	
2000.00	2000.00	2000.00	89.60	4.38	4.38	6.48	40.73	50.06	5.37	

Secondary Well: North Thistle 2 State 2H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)										
Pri MD (US ft)	TVD (US ft)	Sec MD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	ES (US ft)	CC (US ft)	SF	Risk
2100.00	2100.00	2100.00	89.60	4.61	4.61	6.64	40.28	50.06	5.12	
2200.00	2200.00	2200.00	89.60	4.83	4.83	6.80	39.83	50.06	4.89	
2300.00	2300.00	2300.00	89.60	5.06	5.06	6.96	39.38	50.06	4.69	
2400.00	2400.00	2400.00	89.60	5.28	5.28	7.12	38.93	50.06	4.50	
2500.00	2500.00	2500.00	89.60	5.51	5.51	7.29	38.48	50.06	4.32	
2600.00	2600.00	2600.00	89.60	5.73	5.73	7.45	38.03	50.06	4.16	
2700.00	2700.00	2700.00	89.60	5.96	5.96	7.63	37.59	50.06	4.01	
2800.00	2800.00	2800.00	89.60	6.18	6.18	7.80	37.14	50.06	3.87	
2900.00	2900.00	2900.00	89.60	6.41	6.41	7.98	36.69	50.06	3.74	
3000.00	3000.00	3000.00	89.60	6.63	6.63	8.15	36.24	50.06	3.62	
3100.00	3100.00	3100.00	89.60	6.86	6.86	8.34	35.79	50.06	3.51	
3200.00	3200.00	3200.00	89.60	7.08	7.08	8.52	35.34	50.06	3.40	
3300.00	3300.00	3300.00	89.60	7.31	7.31	8.71	34.89	50.06	3.30	
3400.00	3400.00	3400.00	89.60	7.53	7.53	8.90	34.44	50.06	3.20	
3500.00	3500.00	3500.00	89.60	7.76	7.76	9.09	33.99	50.06	3.11	
3600.00	3600.00	3600.00	89.60	7.98	7.98	9.28	33.54	50.06	3.03	
3700.00	3700.00	3700.00	89.60	8.20	8.20	9.48	33.09	50.06	2.95	
3800.00	3800.00	3800.00	89.60	8.43	8.43	9.68	32.64	50.06	2.87	
3900.00	3900.00	3900.00	89.60	8.65	8.65	9.88	32.19	50.06	2.80	
4000.00	4000.00	4000.00	89.60	8.88	8.88	10.08	31.74	50.06	2.73	
4100.00	4100.00	4100.00	89.60	9.10	9.10	10.29	31.29	50.06	2.67	
4200.00	4200.00	4200.00	89.60	9.33	9.33	10.50	30.84	50.06	2.60	
4300.00	4300.00	4300.00	89.60	9.55	9.55	10.72	30.39	50.06	2.55	
4400.00	4399.99	4399.99	104.81	9.78	9.78	10.93	30.17	50.28	2.50	
4500.00	4499.96	4499.96	107.65	10.00	10.00	11.16	30.46	51.01	2.48	
4600.00	4599.86	4599.86	112.17	10.23	10.23	11.38	31.50	52.50	2.50	
4700.00	4699.68	4699.68	118.03	10.45	10.45	11.61	33.70	55.09	2.57	
4800.00	4799.37	4799.37	124.70	10.68	10.68	11.83	37.33	59.19	2.71	
4900.00	4898.90	4898.90	131.59	10.90	10.90	12.07	42.80	65.14	2.92	
5000.00	4998.36	4998.36	137.76	11.12	11.12	12.30	49.76	72.52	3.19	
5100.00	5097.81	5097.81	142.75	11.35	11.35	12.54	57.35	80.59	3.47	
5200.00	5197.26	5197.26	146.81	11.57	11.57	12.79	65.49	89.15	3.77	
5300.00	5296.71	5296.71	150.15	11.79	11.79	13.04	73.99	98.07	4.07	
5400.00	5396.16	5396.16	152.93	12.02	12.02	13.29	82.72	107.28	4.37	
5500.00	5495.70	5495.70	155.12	12.24	12.24	13.54	90.92	115.90	4.64	
5600.00	5595.39	5595.39	156.69	12.47	12.47	13.80	97.68	123.07	4.85	
5700.00	5695.21	5695.21	157.78	12.69	12.69	14.07	102.92	128.70	4.99	
5800.00	5795.11	5795.11	158.51	12.91	12.91	14.33	106.58	132.75	5.07	
5900.00	5895.07	5895.07	158.93	13.14	13.14	14.61	108.63	135.19	5.09	
6000.00	5995.07	5995.07	144.81	13.36	13.36	14.88	109.05	136.00	5.04	
6100.00	6095.07	6095.07	144.81	13.59	13.59	15.17	108.62	136.00	4.97	
6200.00	6195.07	6195.07	144.81	13.81	13.81	15.45	108.18	136.00	4.89	
6300.00	6295.07	6295.07	144.81	14.04	14.04	15.74	107.73	136.00	4.81	
6400.00	6395.07	6395.07	144.81	14.26	14.26	16.04	107.28	136.00	4.74	
6500.00	6495.07	6495.07	144.81	14.49	14.49	16.34	106.84	136.00	4.66	
6600.00	6595.07	6595.07	144.81	14.71	14.71	16.64	106.39	136.00	4.59	
6700.00	6695.07	6695.07	144.81	14.94	14.94	16.95	105.94	136.00	4.52	
6800.00	6795.07	6795.07	144.81	15.16	15.16	17.27	105.50	136.00	4.46	
6900.00	6895.07	6895.07	144.81	15.39	15.39	17.59	105.05	136.00	4.39	
7000.00	6995.07	6995.07	144.81	15.61	15.61	17.91	104.61	136.00	4.33	
7100.00	7095.07	7095.07	144.81	15.84	15.84	18.24	104.16	136.00	4.27	
7200.00	7195.07	7195.07	144.81	16.06	16.06	18.58	103.71	136.00	4.21	
7300.00	7295.07	7295.07	144.81	16.29	16.29	18.92	103.27	136.00	4.15	
7400.00	7395.07	7395.07	144.81	16.51	16.51	19.26	102.82	136.00	4.10	
7500.00	7495.07	7495.07	144.81	16.74	16.74	19.61	102.38	136.00	4.04	
7600.00	7595.07	7595.07	144.81	16.96	16.96	19.97	101.93	136.00	3.99	
7700.00	7695.07	7695.07	144.81	17.19	17.19	20.33	101.49	136.00	3.94	
7800.00	7795.07	7795.07	144.81	17.41	17.41	20.69	101.04	136.00	3.89	

Secondary Well: North Thistle 2 State 2H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)										
Pri MD (US ft)	TVD (US ft)	Sec MD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	ES (US ft)	CC (US ft)	SF	Risk
7900.00	7895.07	7895.07	144.81	17.63	17.63	21.06	100.59	136.00	3.84	
8000.00	7995.07	7995.07	144.81	17.86	17.86	21.44	100.15	136.00	3.79	
8100.00	8095.07	8095.07	144.81	18.08	18.08	21.82	99.70	136.00	3.75	
8200.00	8195.07	8195.07	144.81	18.31	18.31	22.21	99.26	136.00	3.70	
8300.00	8295.07	8295.07	144.81	18.53	18.53	22.60	98.81	136.00	3.66	
8400.00	8395.07	8395.07	144.81	18.76	18.76	23.00	98.37	136.00	3.61	
8500.00	8495.07	8495.07	144.81	18.98	18.98	23.41	97.92	136.00	3.57	
8600.00	8595.07	8595.07	144.81	19.21	19.21	23.82	97.48	136.00	3.53	
8700.00	8695.07	8695.07	144.81	19.43	19.43	24.23	97.04	136.00	3.49	
8800.00	8795.07	8795.07	144.81	19.66	19.66	24.65	96.59	136.00	3.45	
8900.00	8895.07	8895.07	144.81	19.88	19.88	25.08	96.15	136.00	3.41	
9000.00	8995.06	8995.06	322.13	20.11	20.11	25.51	95.42	135.72	3.37	
9100.00	9094.19	9094.19	318.12	20.33	20.33	25.94	85.49	126.31	3.09	
9200.00	9189.66	9189.66	306.09	20.54	20.54	26.37	64.87	106.06	2.57	
9300.00	9277.45	9277.45	280.20	20.74	20.74	26.76	43.82	85.24	2.06	
9400.00	9353.44	9353.44	248.93	20.91	20.91	27.11	53.67	95.41	2.29	
9500.00	9414.32	9414.32	231.69	21.05	21.05	27.39	108.74	150.75	3.59	
9600.00	9457.42	9457.42	229.04	21.15	21.15	27.58	189.01	231.21	5.48	
9700.00	9480.85	9480.85	243.65	21.20	21.20	27.69	281.25	323.62	7.64	
9800.00	9485.41	9485.41	267.22	21.21	21.21	27.71	378.51	420.85	9.94	
9900.00	9486.39	9486.39	266.54	21.21	21.21	27.72	476.89	519.25	12.26	
10000.00	9487.37	9487.37	265.87	21.21	21.21	27.72	575.80	618.16	14.59	
10100.00	9488.35	9488.35	265.20	21.22	21.22	27.73	675.00	717.37	16.93	
10200.00	9489.33	9489.33	264.53	21.22	21.22	27.73	774.39	816.77	19.27	
10300.00	9490.32	9490.32	263.86	21.22	21.22	27.74	873.91	916.30	21.62	
10400.00	9491.30	9491.30	263.20	21.22	21.22	27.74	973.53	1015.92	23.96	
10500.00	9492.28	9492.28	262.53	21.22	21.22	27.75	1073.21	1115.61	26.31	
10600.00	9493.26	9493.26	261.87	21.23	21.23	27.75	1172.95	1215.35	28.67	
10700.00	9494.24	9494.24	261.21	21.23	21.23	27.75	1272.74	1315.13	31.02	
10800.00	9495.22	9495.22	260.55	21.23	21.23	27.76	1372.55	1414.94	33.38	
10900.00	9496.20	9496.20	259.90	21.23	21.23	27.76	1472.34	1514.77	35.70	
11000.00	11018.84	12382.93	182.01	37.25	20.59	41.21	1483.49	1522.75	38.78	
11100.00	11020.35	12482.91	181.94	38.64	20.99	42.01	1483.07	1523.22	37.94	
11200.00	11021.86	12582.89	181.87	40.07	21.41	42.84	1482.65	1523.69	37.13	
11300.00	11023.37	12682.87	181.80	41.52	21.84	43.70	1482.10	1524.16	36.24	
11400.00	11024.88	12782.86	181.73	43.01	22.29	44.60	1481.61	1524.63	35.45	
11500.00	11026.39	12882.84	181.66	44.51	22.75	45.53	1481.17	1525.10	34.71	
11600.00	11027.90	12982.82	181.59	46.04	23.23	46.48	1480.61	1525.58	33.93	
11700.00	11029.41	13082.80	181.52	47.59	23.71	47.46	1480.14	1526.06	33.23	
11800.00	11030.92	13182.78	181.45	49.16	24.22	48.47	1479.46	1526.54	32.42	
11900.00	11032.43	13282.76	181.38	50.74	24.73	49.50	1478.92	1527.02	31.75	
12000.00	11033.94	13382.74	181.30	52.34	25.26	50.55	1478.19	1527.51	30.98	
12100.00	11035.45	13482.72	181.23	53.96	25.79	51.62	1477.58	1527.99	30.31	
12200.00	11036.96	13582.70	181.16	55.58	26.33	52.71	1476.83	1528.48	29.59	
12300.00	11038.47	13682.69	181.09	57.22	26.89	53.81	1476.25	1528.98	29.00	
12400.00	11039.98	13782.67	181.02	58.86	27.45	54.94	1475.53	1529.47	28.36	
12500.00	11041.49	13882.65	180.95	60.52	28.02	56.08	1474.82	1529.97	27.74	
12600.00	11043.00	13982.63	180.88	62.19	28.60	57.23	1474.13	1530.47	27.17	
12700.00	11044.51	14082.61	180.81	63.86	29.18	58.40	1473.44	1530.97	26.61	
12800.00	11046.02	14182.59	180.74	65.54	29.77	59.58	1472.71	1531.47	26.06	
12900.00	11047.53	14282.57	180.67	67.23	30.37	60.78	1471.98	1531.98	25.53	
13000.00	11049.04	14382.55	180.60	68.92	30.97	61.98	1471.25	1532.49	25.02	
13100.00	11050.55	14482.53	180.53	70.62	31.58	63.20	1470.51	1533.00	24.53	
13200.00	11052.06	14582.52	180.46	72.33	32.19	64.43	1469.76	1533.51	24.06	
13300.00	11053.57	14682.50	180.39	74.04	32.81	65.66	1469.01	1534.03	23.59	
13400.00	11055.08	14782.48	180.32	75.75	33.43	66.91	1468.22	1534.55	23.14	
13500.00	11056.59	14882.46	180.25	77.47	34.06	68.16	1467.43	1535.07	22.69	
13600.00	11058.10	14982.44	180.18	79.20	34.69	69.43	1466.63	1535.59	22.27	

Secondary Well: North Thistle 2 State 2H (p)(TVD relative to Kelly Bushing)(All Azimuth Relative to GRID NORTH)										
Pri MD (US ft)	TVD (US ft)	Sec MD (US ft)	T.Face to Sec (°)	S.Major (US ft)	S.Minor (US ft)	TVD Spread (US ft)	ES (US ft)	CC (US ft)	SF	Risk
13700.00	11059.61	15082.42	180.11	80.92	35.33	70.70	1465.84	1536.11	21.86	
13800.00	11061.12	15182.40	180.04	82.66	35.97	71.98	1465.04	1536.64	21.46	
13834.89	11061.65	15217.29	180.02	83.26	36.19	72.42	1464.76	1536.82	21.33	

Weatherford

Weatherford Drilling Services

GeoDec4 v2.1.0.0

Report Date:	September 30, 2015
Job Number:	
Customer:	Devon Energy
Well Name:	North Thistle 2 State 1H
API Number:	
Rig Name:	
Location:	Lea Co, NM Nad83 NME
Block:	
Engineer:	

NAD83 / New Mexico East (ftUS)
Projected Coordinate System
Datum: North American Datum 1983 (1986)
Ellipsoid: GRS 1980
EPSG: 2257
North: 488169.11 US Survey Foot
East: 785990.45 US Survey Foot
Convergence: 0.42°
Declination: 7.20°
Total Correction: 6.78°
Datum Transformation: none

NAD83 (1986)
Geodetic Coordinate System
Datum: North American Datum 1983 (1986)
Ellipsoid: GRS 1980
EPSG: 4269
Latitude: 32.339561 Degree
Longitude: -103.541177 Degree

Geodetic Location WGS84

MSL Elevation	=	0 m
Latitude	=	32° 20' 22.42" N
Longitude	=	103° 32' 28.24" W

Magnetic Declination	=	7.20 deg	[True North Offset]		
Local Gravity	=	.9988 g	CheckSum	=	6643
Local Field Strength	=	48272 nT	Magnetic Vector X	=	23764 nT
Magnetic Dip	=	60.25 deg	Magnetic Vector Y	=	3002 nT
Magnetic Model	=	bggm2015.dat	Magnetic Vector Z	=	41910 nT
Run Date	=	November 30, 2015	Magnetic Vector H	=	23953 nT

Signed:_____ Date:_____