



NorthSTAR Agency User Manual

Application for Permit to Drill

This manual contains detailed information on how to enter information into NorthStar based off operator's documents. The permit which was utilized was approved by the NDIC Oil & Gas Division January 12, 2018. NDIC File No. 34478.

Operator Information → Required to submit the NorthSTAR application.

NDIC Oil & Gas Division Staff verification → Agency will verify and correct as needed.

Step 3: Well Information

Note: You may fill in the Associated Bond (if known). The Associated Field Inspector may be found on our GIS Map Server. The Permit Fee is \$100 for an APD.

{NDIC Pierre Top pick & Min Required Surface Casing are NDIC Oil & Gas Division Staff fields}

HELLO TODD L. HOEWEGER, NORTH DAKOTA OIL & GAS DIVISION

Application for Permit - WHITING OIL AND GAS CORP (3204)

Help

Form ID: 570

Form Navigation [Hide Form Navigation]

- 1. Form Information
- 2. Operator Information
- 3. Well Information
- 4. Geologic Information
- 5. UIC
- 6. Area of Review
- 7. Features & Cement
- 8. Completion & Perforation
- 9. Proposed Work
- 10. Document Upload
- 11. Operator Assertions
- 12. Form Submit
- 13. Confirmation
- 14. Plan View
- 15. Stipulations
- 16. Review Checklist
- 17. Review Comments

API:	File No.:	Field:	Type of Well:	Type of Work:
N/A	N/A	N/A	Oil & Gas	New Well - Horizontal

Please enter information on the proposed Well operation below. Grey highlighted fields are informational only. * Indicates Required Field

Associate Bond	Associated Inspector	Permit Fee
W360		

Confidential Status *	Proposed Start Date *
<input type="radio"/> Yes <input checked="" type="radio"/> No	01/16/2020

Well Name *	Well Number *
Moen	41-2-5TFH

Wellhead Location

Surface Owner

Private

Footages From Nearest Section Line

Footage 1: *	365	Feet From	N	Line
Footage 2: *	525	Feet From	E	Line

NDIC Pierre Top Pick	Feet SS	Min Required Surface Casing

Step 3: Well Information Continued

The Multi-Well Pad Number is a NDIC Oil & Gas Division Staff field. The Magnetic Declination may be found at this web address: <https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml#declination>

Multi-Well Pad Number		Magnetic Declination ⓘ		
<input type="text" value=""/>		<input type="text" value="7.75"/>		
Qtr-Qtr or Lot: *	Section: *	Township: *	Range: *	County: *
<input type="text" value="NE NE"/>	<input type="text" value="02"/>	<input type="text" value="154"/> N	<input type="text" value="99"/> W	<input type="text" value="Williams"/>
Latitude of Well Head (NAD 83): *	Longitude of Well Head (NAD 83): *			
<input type="text" value="48.196882"/>	<input type="text" value="-103.369170"/>			
Ground Elevation (Ft above SL): * ⓘ	Graded Pad Elevation (Ft above SL):			
<input type="text" value="2298"/>	<input type="text" value="2296"/>			

Surface Owner/Tenant		
Name *		
<input type="text" value="Ivan Moen"/>		
Mailing Address *		
<input type="text" value="1000 Roosevelt Drive"/>		
City *	State *	Zip *
<input type="text" value="Killdeer"/>	<input type="text" value="ND"/>	<input type="text" value="58640"/>

Surface Comments (Max of 2000 Characters)

Spill Prevention and Monitoring Controls (Max of 2000 Characters)

On file.

Step 4: Geologic Information

Note that although the applicant may request a waiver for Density/Porosity & Resistivity on this form, a formal request must be made via NorthSTAR Sundry Notice. The director may consider waiving open hole logs based on viable logs within one mile of the permitted well location.

Application for Permit - WHITING OIL AND GAS CORP (3204)

Help

Form ID: 570

Form Navigation

1. Form Information
2. Operator Information
3. Well Information ✓
4. Geologic Information
5. UIC
6. Area of Review
7. Features & Cement
8. Completion & Perforation
9. Proposed Work
10. Document Upload
11. Operator Assertions
12. Form Submit
13. Confirmation
14. Plan View
15. Stipulations
16. Review Checklist
17. Review Comments
18. Review

[Hide Form Navigation]

API:	File No.:	Field:	Type of Well:	Type of Work:
N/A	N/A	N/A	Oil & Gas	New Well - Horizontal

Please verify or enter location information on the Well below. * Indicates Required Field

Deepest Formation to Penetrate *

Three Forks First Bench (B1) ▼

Proposed Logs *

Logs	Yes	No	Request Waiver
Acoustic/Sonic	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Cased Hole	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Casing Evaluation	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Cement Evaluation (Required Type)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Density/Porosity (Required Type)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Drilling/Mud	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Engineered/Advanced	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Gamma to Ground Level (Required Type)	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Geologic Interpretation	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Resistivity (Required Type)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

*"YES" is the only acceptable answer on → Cement Evaluation (required type) and Gamma to ground level (required type).

**"YES" or "Request Waiver" are acceptable answers on → Density/Porosity (Required Type) or Resistivity (required type).

Step 4: Geologic Information Continued

The applicant must enter all geologic zones of significance.

Other Proposed Logs, Cores or Tests

NA

Zones of Significance ⓘ

Advanced Filtering Actions ⚙

Zone Name	Zone Category ↑	Top TVD (ft)	Bottom TVD (ft)	Actions
Pierre Fm.	Geologic Top	2137		Actions▼
Greenhorn Fm.	Geologic Top	4830		Actions▼

Back Next Save

Zone of Significance ×

* Indicates Required Field

Zone Category * Geologic Top ▼ **Zone Name *** Mowry Fm. ▼ **Estimated/Actual** Estimated ▼

Other Zone Category ⓘ **Other Zone Name** ⓘ

Top TVD (ft) 5230 Top MD (ft) Bottom TVD (ft) Bottom MD (ft)

Pressure (PSI) **Oil/Gas Show** ▼

Cancel Save

*Minimum info required.

Zones of Significance ⓘ

Advanced Filtering

Actions ▾



Zone Name	Zone Category	Top TVD (ft) ↑	Bottom TVD (ft)	Actions
Lodgepole Fm.	Geologic Top	10395		Actions▾
False Bakkn	Geologic Top	11101		Actions▾
Upper Bakken Shale	Geologic Top	11114		Actions▾
Middle Bakken	Geologic Top	11132		Actions▾
Three Forks Fm.	Geologic Top	11197		Actions▾
Three Forks First Bench (B1)	Geologic Top	11217		Actions▾
Pierre Fm.	Geologic Top	2137		Actions▾
Greenhorn Fm.	Geologic Top	4830		Actions▾

Back

Next

Save



Mowry Fm.	Geologic Top	5230		Actions▼
Swift Fm.	Geologic Top	6140		Actions▼
Rierdon Fm.	Geologic Top	6612		Actions▼
Dunham Salt	Geologic Top	7157		Actions▼
Pine Salt Member	Geologic Top	7441		Actions▼
Minnekahta Fm	Geologic Top	7551		Actions▼
Opeche Fm.	Geologic Top	7585		Actions▼
Opeche A Salt	Geologic Top	7633		Actions▼

Amsden Fm.	Geologic Top	7911		Actions▼
Tyler Fm.	Geologic Top	8088		Actions▼
Kibbey Lime	Geologic Top	8665		Actions▼
Charles Fm.	Geologic Top	8810		Actions▼
Base Of Last Salt	Base of Last Salt	9563		Actions▼
Mission Canyon Fm.	Geologic Top	9781		Actions▼

****Note: Zone Categories should basically indicate "Geologic Top" unless "Base of Last Salt". In the case of BLS, the bottom TVD must be indicated.**

Step 7: Features & Cement

It would be advisable to have all information ready at your disposal before starting this section, because the feature may “time out” after a certain amount non-use time. Also, it is a good practice to click “Save” for Step 7 after each section is completed.

Application for Permit - WHITING OIL AND GAS CORP (3204)

Help

Form ID: 570

Form Navigation

1. Form Information
2. Operator Information
3. Well Information ✓
4. Geologic Information ✓
5. UIC ✓
6. Area of Review
- 7. Features & Cement**
8. Completion & Perforation
9. Proposed Work
10. Document Upload
11. Operator Assertions
12. Form Submit
13. Confirmation
14. Plan View
15. Stipulations
16. Review Checklist
17. Review Comments

Features & Cement [Hide Form Navigation]

API: N/A **File No.:** N/A **Field:** N/A **Type of Well:** Oil & Gas **Type of Work:** New Well - Horizontal

Please enter information on the Wellbore, Wellbore Construction Features, Cement, and Cement classes below.

Wellbore Information

Advanced Filtering Actions ⌵ ⚙

Wellbore Type ↑	Wellb... Code (API-12)	Con... Status	Rec... Status	Well... Star... (MD...)	Total Depth (MD ft)	Total Depth (TVD ft)	Hole Size (in)	Actions
-----------------	------------------------	---------------	---------------	-------------------------	---------------------	----------------------	----------------	---------

Wellbore Construction Feature

Step 7: Features & Cement Continued

Below is the minimum information needed to process the application for the “Surface Hole”.

Wellbore Information					
* Indicates Required Field					
Wellbore Type *	Wellbore Sequence # *	Wellbore Code (API-12)			
Surface Hole	00				
Wellbore Construction Status *					
Not Installed					
Record Status	Parent Wellbore *				
New					
Wellbore Start Depth (ft MD) *	Kick Off Point (MD ft)				
0					
Azimuth°	Total Depth (MD ft) *		Total Depth (TVD ft) *		
	2275		2275		
Drilling Mud Type *	MWD Contractor		Hole Size (in)		
Fresh Water	Weatherford		13.5		
Legal Entry Point into Pool & Spacing Unit - Entry Point Coordinates from Well Head					
	From WH		(N/S)		From WH
					(E/W)
KOP Footages From Nearest Section Line					
		Line			Line
Feet From			Feet From		
Qtr-Qtr/Lot	Section	Township	Range	County	
			N		W

Step 7: Features & Cement Continued

Below is the minimum information needed to process the application for the “Surface Hole”. *There is no need to indicate the Bottom Hole Footages From Nearest Section, because the NDIC Oil & Gas Division does not allow intentional deviation of the surface hole. However we will not return the application if it is populated.*

Bottom Hole Coordinates From Well Head

<input type="text" value="0"/>	From WH*	<input type="text" value="N"/>	(N/S)*	<input type="text" value="0"/>	From WH*	<input type="text" value="E"/>
						(E/W)*

Bottom Hole Footages From Nearest Section

<input type="text"/>	<input type="text"/>	Line	<input type="text"/>	<input type="text"/>	Line
Feet From			Feet From		
Qtr-Qtr	Section	Township	Range	County	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
		N	W		

Description

Cancel

Save

Below is the minimum information needed to process the application for the “Vertical & Curve”.

***Legal Entry Point into Pool & Spacing Unit:** This info may be filled in by the operator, but is evaluated and corrected by Oil & Gas Division staff. It is an interpolated point between two survey stations. In this case, the well head is already at a legal point (with no back build)-so we need only be concerned with the Bakken Pool (strat limit: 50’ above the top of the Bakken). *(This point will be verified by TLH or NHE).*

* Indicates Required Field

Wellbore Type *	Wellbore Sequence # *	Wellbore Code (API-12)
<input type="text" value="Vertical & Curve"/>	<input type="text" value="01"/>	<input type="text"/>
Wellbore Construction Status *		
<input type="text" value="Not Installed"/>		
Record Status	Parent Wellbore *	
<input type="text" value="New"/>	<input type="text" value="Surface Hole 1"/>	
Wellbore Start Depth (ft MD) *	Kick Off Point (MD ft)	
<input type="text" value="0"/>	<input type="text" value="10696"/>	
Azimuth*	Total Depth (MD ft) *	Total Depth (TVD ft) *
<input type="text" value="0"/>	<input type="text" value="11514"/>	<input type="text" value="11217"/>
Drilling Mud Type *	MWD Contractor	Hole Size (in)
<input type="text" value="Invert"/>	<input type="text" value="Weatherford"/>	<input type="text" value="8.75"/>

Legal Entry Point into Pool & Spacing Unit - Entry Point Coordinates from Well Head ⓘ

148	From WH	S	(N/S)	16	From WH	W	(E/W)
------------	---------	----------	-------	-----------	---------	----------	-------

KOP Footages From Nearest Section Line

<input type="text" value="365"/>	Feet From	<input type="text" value="N"/>	Line	<input type="text" value="525"/>	Feet From	<input type="text" value="E"/>	Line
----------------------------------	-----------	--------------------------------	------	----------------------------------	-----------	--------------------------------	------

Qtr-Qtr/Lot	Section	Township	Range	County
<input type="text" value="LOT 1"/>	<input type="text" value="02"/>	<input type="text" value="154"/>	<input type="text" value="N 99"/>	<input type="text" value="W Williams"/>

10,700.00	0.43	186.00	10,700.00	-0.01	0.00	0.01	11.00	11.00	0.00
10,800.00	11.43	186.00	10,799.31	-10.27	-1.08	10.27	11.00	11.00	0.00
10,900.00	22.43	186.00	10,894.83	-39.18	-4.12	39.20	11.00	11.00	0.00
11,000.00	33.43	186.00	10,983.05	-85.68	-9.01	85.74	11.00	11.00	0.00
11,100.00	44.43	186.00	11,060.73	-148.07	-15.56	148.18	11.00	11.00	0.00
11,159.89	51.01	186.00	11,101.00	-192.11	-20.19	192.26	11.00	11.00	0.00
False Bakken									
11,169.54	52.07	186.00	11,107.00	-199.63	-20.98	199.78	11.00	11.00	0.00
Scallion									
11,181.09	53.35	186.00	11,114.00	-208.77	-21.94	208.93	11.00	11.00	0.00
Upper Bakken									
11,200.00	55.43	186.00	11,125.01	-224.08	-22.55	224.22	11.00	11.00	0.00

*(pertaining to the directional plan above) Well head is legal with no back build, so we are compliant with the Spacing Unit setbacks. However, the legal entry point into the Bakken Pool is 50’ above the Upper Bakken Shale: 11,114’TVD minus 50’=11,106’TVD; which is between 111060.73TVD and 11101TVD. We will use aforementioned TVD’s to get the coordinates for N/S & E/W.

Step 7: Features & Cement Continued

Below is the minimum information needed to process the application for the “Vertical & Curve”.

Bottom Hole Coordinates From Well Head					
518	From WH *	S	(N/S) *	54	From WH * (E/W) *

Bottom Hole Footages From Nearest Section					
883	N	Line	579	W	Line
Feet From			Feet From		
Qtr-Qtr	Section	Township	Range	County	
LOT 1	02	154 N	99 W	Williams	

Description

Cancel Save

Step 7: Features & Cement Continued

Below is the minimum information needed to process the application for the “Vertical & Curve”.

*The **Bottom Hole Coordinates from Well Head** indicate the End Of the Curve.

Based on the directional plan the EOC is:

Lower Bakken Silt									
11,369.50	74.07	186.00	11,197.00	-375.85	-39.50	376.13	11.00	11.00	0.00
Three Forks									
11,400.00	77.43	186.00	11,204.51	-405.24	-42.59	405.55	11.00	11.00	0.00
11,500.00	88.43	186.00	11,216.80	-503.79	-52.95	504.17	11.00	11.00	0.00
11,514.31	90.00	186.00	11,217.00	-518.02	-54.45	518.41	11.00	11.00	0.00
LP @ 90° Inc, Hold - Three Forks B1 Target - 7"									
11,554.31	90.00	186.00	11,217.00	-557.80	-58.63	558.22	0.00	0.00	0.00
Turn 2°/100'									
11,600.00	90.00	185.09	11,217.00	-603.27	-63.04	603.72	2.00	0.00	-2.00
11,700.00	90.00	183.09	11,217.00	-703.01	-70.17	703.51	2.00	0.00	-2.00
11,800.00	90.00	181.09	11,217.00	-802.94	-73.81	803.47	2.00	0.00	-2.00
11,854.10	90.00	180.00	11,217.00	-857.04	-74.32	857.57	2.00	0.00	-2.00

DRAFT

Step 7: Features & Cement Continued

Below is the minimum info needed to process the Lateral “wellbore type”

Wellbore Information

* Indicates Required Field

Wellbore Type * Lateral	Wellbore Sequence # * 02	Wellbore Code (API-12)
Wellbore Construction Status * Not Installed		
Record Status New	Parent Wellbore * ⓘ Vertical & Curve 1	
Wellbore Start Depth (ft MD) * 11514	Kick Off Point (MD ft) (only if multiple laterals) 	
Azimuth° @ TD 186	Total Depth (MD ft) * 21108	Total Depth (TVD ft) * 11217
Drilling Mud Type * Produced Water	MWD Contractor Weatherford	Hole Size (in) 6

Legal Entry Point into Pool & Spacing Unit - Entry Point Coordinates from Well Head ⓘ

<input type="text"/>	From WH	<input type="text"/>	(N/S)	<input type="text"/>	From WH	<input type="text"/>	(E/W)
----------------------	---------	----------------------	-------	----------------------	---------	----------------------	-------

Not required-unless multiple laterals or re-entry

KOP Footages From Nearest Section Line

<input type="text"/>	<input type="text"/>	Line	<input type="text"/>	<input type="text"/>	Line
Feet From			Feet From		
Qtr-Qtr/Lot	Section	Township	Range	County	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	

Not required-unless multiple laterals or re-entry

Bottom Hole Coordinates From Well Head

10111 From WH* S (N/S)* 75 From WH* W (E/W)*

Bottom Hole Footages From Nearest Section

*It is acceptable if BHL footages are close/not exact as long as they are legal.

87 S Line 600 E Line
Feet From Feet From
Qtr-Qtr Section Township Range County
SE SE 11 154 N 99 W Williams

Description

Cancel Save

DRAFT

- 7. Features & Cement
- 8. Completion & Perforation
- 9. Proposed Work
- 10. Document Upload
- 11. Operator Assertions
- 12. Form Submit
- 13. Confirmation
- 14. Plan View
- 15. Stipulations
- 16. Review Checklist
- 17. Review Comments
- 18. Review

Type	(API-12)	Status	Status	(MD...	(MD ft...	(TVD ft)	(in)	Actions
Vertical & Curve 1		Not Installed	New	0	11514	11217	8.75	Actions-
Lateral 1		Not Installed	New	11514	21108	11217	6	Actions-
Surface Hole 1		Not Installed	New	0	2275	2275	13.5	Actions-

Wellbore Construction Feature

Advanced Filtering Actions - ⚙️

Feature ID ↑	Install Status	Record Status	Feature Top MD (ft)	Feature Bottom MD (ft)	Outsi... Diam... (deci... inch...	Form... Isola...	Actions

DRAFT

Wellbore Construction Feature



* Indicates Required Field

Feature *

Construction Status *

Record Status

Wellbore Start * ⓘ

Wellbore End * ⓘ

Feature Top MD (ft) *

Feature Bottom MD (ft) *

Outside Diameter (decimal inches)

Inside Diameter (decimal inches)

Weight (lbs)

Grade/Type

Burst Pressure (psi)

Feature Condition

Install Date

Remove Date

Pulled

Connection Type

Description

Cancel

Save

Wellbore Construction Feature: Casing. While it is preferred that the casing is segmented into Weight and Grade/Type, it is not required at this time. We will not return the permit if the weights and grade/types are combined into one record. However, make sure all the wells on the pad are consistently reporting the same info.

Wellbore Construction Feature ✕

* Indicates Required Field

Feature * Production Casing	Construction Status * Not Installed	Record Status New	
Wellbore Start * ⓘ Surface Hole 1	Wellbore End * ⓘ Vertical & Curve 1		
Feature Top MD (ft) * 0	Feature Bottom MD (ft) * 8650	Outside Diameter (decimal inches) 7	Inside Diameter (decimal inches)
Weight (lbs) 29	Grade/Type HCP-110	Burst Pressure (psi) 11220	
Feature Condition New	Install Date	Remove Date	
Pulled	Connection Type		
Description			

Cancel Save

* Indicates Required Field

Feature *

Production Casing

Construction Status *

Not Installed

Record Status

New

Wellbore Start * ⓘ

Vertical & Curve 1

Wellbore End * ⓘ

Vertical & Curve 1

Feature Top MD (ft) *

8650

Feature Bottom MD (ft) *

11400

Outside Diameter (decimal inches)

7

Inside Diameter (decimal inches)

Weight (lbs)

32

Grade/Type

HCP-110

Burst Pressure (psi)

11220

Feature Condition

New

Install Date

Remove Date

Pulled

Connection Type

Description

Cancel

Save

* Indicates Required Field

Feature *


Production Casing

Construction Status *

Not Installed

Record Status

New

Wellbore Start * 

Vertical & Curve 1

Wellbore End * 

Vertical & Curve 1

Feature Top MD (ft) *

11400

Feature Bottom MD (ft) *

11514

Outside Diameter (decimal inches)

7

Inside Diameter (decimal inches)

Weight (lbs)

29

Grade/Type

HCP-110

Burst Pressure (psi)

12460

Feature Condition

New

Install Date



Remove Date



Pulled

Connection Type

Description

Cancel

Save

Wellbore Construction Feature
✕

* Indicates Required Field

Feature * <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="Production Liner"/>	Construction Status * <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="Not Installed"/>	Record Status <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="New"/>
Wellbore Start * ⓘ <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="Vertical & Curve 1"/>	Wellbore End * ⓘ <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="Lateral 1"/>	
Feature Top MD (ft) * <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="11696"/>	Feature Bottom MD (ft) * <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="21108"/>	Outside Diameter (decimal inches) <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="4.5"/>
		Inside Diameter (decimal inches) <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text"/>
Weight (lbs) <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="11.6"/>	Grade/Type <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="HCP-110"/>	Burst Pressure (psi) <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="10690"/>
Feature Condition <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text" value="New"/>	Install Date <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text"/>	Remove Date <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text"/>
Pulled <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text"/>	Connection Type <input style="width: 90%; border: 1px solid gray; padding: 2px 5px;" type="text"/>	
Description <div style="border: 1px solid gray; height: 40px; margin-top: 5px;"></div>		

The above info is based off the operator's Casing Design Parameters as noted after this section.

B. Casing Design Parameters:

Surface Casing

<u>Interval</u>	<u>Description</u>	<u>Burst (psi)^a/SF</u>	<u>Collapse (psi)^b/SF</u>	<u>Tension (klb)^c/SF</u>
0'-2275'	9½" 36PPF J-55 LTC	3520/2.29	2020/1.95	453/6.59

- a. based on frac gradient at shoe of 14 ppg
- b. based on full evacuation with 9 ppg fluid on backside
- c. based on casing string weight in 9 ppg mud
String Weight in 9 ppg mud ≈ 68690 lbs

Production Casing

<u>Interval</u>	<u>Size</u>	<u>Burst (psi)^a/SF</u>	<u>Collapse (psi)^b/SF</u>	<u>Tension (klb)^c/SF</u>
2275'-8650'	7" 29# HCP-110 LTC	11220/1.6	8530/1.52	797/2.79
8650'-11400'	7" 32# HCP-110 LTC	11220/1.78	8530/1.09	897/11.76
11400'-11514'	7" 29# HCP-110 LTC	12460/1.6	12397/1.19	797/288.68

- a. based on 7000 psi frac pressure.
- b. based on full evacuation with 12.5 ppg pore pressure on backside
- c. based on casing string weight in 10.8 ppg mud
String Weight in 10.8 ppg mud ≈ 285739 lbs.

Production Liner

<u>Interval</u>	<u>Size</u>	<u>Burst (psi)^a/SF</u>	<u>Collapse (psi)^b/SF</u>	<u>Tension (klb)^c/SF</u>
10696'-21108'	4½" 11.6# HCP-110 LTC	10690/1.67	8830/1.21	279/3.12

- a. based on 7000 psi frac pressure.
- b. based on full evacuation with 0 ppg pore pressure on backside
- c. based on casing string weight in 8.33 ppg mud
String Weight in 8.33 ppg mud ≈ 102340 lbs.

DRAFT

***Make sure the "Verify Method" is BLANK. This is for NDIC Oil & Gas Division staff geologists.**

Minimum info for permitting required is noted.

Cement Segment X

* Indicates Required Field

Associated Feature * Surface Casing 1	Inside/Outside Casing? * Outside	Construction Status * ⓘ Not Installed
Record Status New	Top MD (ft) 0	Bottom MD (ft) 2275
Verify Method <input type="text"/>	Cementing Company Schlumberger	
Install Date <input type="text"/>	Remove Date <input type="text"/>	
Description <input type="text"/>		

Cement Segment



* Indicates Required Field

Associated Feature *

Production Liner 1

Inside/Outside Casing? *

Outside

Construction Status * ⓘ

Not Installed

Record Status

New

Top MD (ft)

10696

Bottom MD (ft)

21108

Verify Method

Cementing Company

Schlumberger

Install Date

Remove Date

Description

Cancel

Save



Cement Segment



* Indicates Required Field

Associated Feature *

Production Casing 1 ▼

Inside/Outside Casing? *

Outside ▼

Construction Status * ⓘ

Not Installed ▼

Record Status

New

Top MD (ft)

4230

Bottom MD (ft)

11514

Verify Method

▼

Cementing Company

Schlumberger

Install Date

📅

Remove Date

📅

Description

Cancel

Save



Volume (sacks) are required. Ask that the operator fills out the Yield (cu ft per sack)

Cement Class ✕

* Indicates Required Field

Associated Cement Segment *	Cement Type *	Construction Status * ⓘ	
<input type="text" value="C1"/>	<input type="text" value="Class A Cement"/>	<input type="text" value="Not Installed"/>	
Record Status	Compressive Strength (psi)	Weight (lbs/gal)	Slurry Consistency (Bu)
<input type="text" value="New"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Lead/Tail	Volume (Sacks)	Yield (cu ft per sack)	
<input type="text" value="Lead"/>	<input type="text" value="509"/>	<input type="text" value="2.92"/>	
Description			
<input type="text" value="Accelerator + 2.00 lb/sk AXE-30 Extender + ACL-10 2.0 lb/sk Accelerator + 0.25 lb/sk ALC-10 (LCM). T.O.C. = SURFACE. Water Req = 17.8 gal/sk."/>			

DRAFT

Cement Class X

* Indicates Required Field

Associated Cement Segment * **Cement Type *** **Construction Status * ⓘ**

C1 Class A Cement Not Installed

Record Status **Compressive Strength (psi)** **Weight (lbs/gal)** **Slurry Consistency (Bu)**

New

Lead/Tail **Volume (Sacks)** **Yield (cu ft per sack)**

Tail 247 1.98

Description

247 sxs of ALTCem S100-12 + 5% ACL-20 Accelerator + 2.00 lb/sk AXE-30 Extender + ACL-10 2.0 lb/sk Accelerator + 0.25 lb/sk ALC-10 (LCM). T.O.C. = 1880. Water Req = 10.8 gal/sx.

Cancel Save

Cement Class X

* Indicates Required Field

Associated Cement Segment * **Cement Type *** **Construction Status * ⓘ**

C2 Class G Cement Not Installed

Record Status **Compressive Strength (psi)** **Weight (lbs/gal)** **Slurry Consistency (Bu)**

New

Lead/Tail **Volume (Sacks)** **Yield (cu ft per sack)**

Lead 148 2.54

Description

148 sxs of ALTCem 165-X1 + 6.0 % AVS-50 Viscosifer + 0.25 lb/sk ALC-10 (LCM) + 0.70% AR-10 Retarder + 0.20 % AFL-10 Fluidloss. T.O.C. = 3939. Water Req = 6.4 gal/sx.

Cancel Save

Cement Class X

* Indicates Required Field

Associated Cement Segment * **Cement Type *** **Construction Status * ⓘ**

C2 Class G Cement Not Installed

Record Status **Compressive Strength (psi)** **Weight (lbs/gal)** **Slurry Consistency (Bu)**

New

Lead/Tail **Volume (Sacks)** **Yield (cu ft per sack)**

Tail 653 1.56

Description

653 sxs of ALTcem 100-X1 + 6.0 % AVS-50
 Viscosifer + 0.25 lb/sk ALC-10 (LCM) + 0.70%
 AR-10 Retarder + 0.20 % AFL-10 Fluidloss +
 .20% ASR-20 Silica. T.O.C. = 6300. Water Req =

Cancel Save

Cement Class X

* Indicates Required Field

Associated Cement Segment * **Cement Type *** **Construction Status * ⓘ**

C3 Class G Cement Not Installed

Record Status **Compressive Strength (psi)** **Weight (lbs/gal)** **Slurry Consistency (Bu)**

New

Lead/Tail **Volume (Sacks)** **Yield (cu ft per sack)**

Tail 599 1.91

Description

599 sxs of ALTcem P50-X1 + 4.0 % AVS-50
 Viscosifer + 20.0 % Strength Retrogression + 0.5
 % AFL-10 Fluidloss + 0.6% ADF-10 Defoamer+
 0.50% AR-20 Retarder + 0.30% AR-30 Retarder =

Cancel Save

The above info is based off the operator's Proposed Cementing Program as noted below.

Surface Casing

CASING	SLURRY	FT. of FILL	CEMENT TYPE	XC	WEIGHT	YIELD
				(%)	(ppg)	(ft ³ /sx)
9-5/8"	Lead	1750	509 sx/s of ALTCem S100-12 + 5% ACL-20 Accelerator + 2.00 lb/sk AXE-30 Extender + ACL-10 2.0 lb/sk Accelerator + 0.25 lb/sk ALC-10 (LCM). T.O.C. = SURFACE. Water Req = 17.8 gal/sx.	40%	11.5	2.92
9-5/8"	Tail	500	247 sx/s of ALTCem S100-12 + 5% ACL-20 Accelerator + 2.00 lb/sk AXE-30 Extender + ACL-10 2.0 lb/sk Accelerator + 0.25 lb/sk ALC-10 (LCM). T.O.C. = 1880. Water Req = 10.8 gal/sx.	40%	13	1.98

- A cement top job is required if cement fallback is greater than 10' below ground level.
- Top plugs shall be used to reduce contamination of cement by displacement fluid
- A bottom plug or other acceptable technique, such as a pre-flush fluid, inner string cement method shall be utilized to help isolate the cement from contamination by the mud fluid being displaced ahead of the cement slurry
- Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole

Production Casing

CASING	SLURRY	FT. of FILL	CEMENT TYPE	XC	WEIGHT	YIELD
				(%)	(ppg)	(ft ³ /sx)
7"	Lead	1882	148 sx/s of ALTCem 165-X1 + 6.0 % AVS-50 Viscosifer + 0.25 lb/sk ALC-10 (LCM) + 0.70% AR-10 Retarder + 0.20 % AFL-10 Fluidloss. T.O.C. = 3939. Water Req = 6.4 gal/sx.	25%	12	2.54
7"	Tail	5402	653 sx/s of ALTCem 100-X1 + 6.0 % AVS-50 Viscosifer + 0.25 lb/sk ALC-10 (LCM) + 0.70% AR-10 Retarder + 0.20 % AFL-10 Fluidloss + .20% ASR-20 Silica. T.O.C. = 6300. Water Req = 6.4 gal/sx.	25%	15.6	1.56

Cement volumes for the 7" Production Casing will be calculated to provide a top of cement of 4230'. Actual cement volumes may vary due to variations in the actual hole size and may be determined by caliper log, if available.

All waiting on cement (WOC) times will be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

Production Liner

CASING	SLURRY	FT. of FILL	CEMENT TYPE	XC	WEIGHT	YIELD
				(%)	(ppg)	(ft ³ /sx)
4-1/2" Liner	Tail	10,412	599 sx/s of ALTCem P50-X1 + 4.0 % AVS-50 Viscosifer + 20.0 % Strength Retrogression + 0.5 % AFL-10 Fluidloss + 0.6% ADF-10 Defoamer+ 0.50% AR-20 Retarder + 0.30% AR-30 Retarder = .20% ASR-2-Silica. T.O.C. = 9817. Water Req = 9.4 gal/sx. See Cement Proposal.	15%	13.5	1.91

Form Navigation 8

Note:

-If top the top coordinates of the completion interval (7" casing point-AKA production casing) are the same as Longstring Casing Point section, then there is no need to add them again.

-Note whether or not the surface reservation boundary is intersected by Spacing/Drilling Unit.

The screenshot shows a web form titled "Completion Interval" with a sidebar on the left containing 18 numbered menu items. The main form area is divided into several sections:

- Wellbore ***: Lateral 1
- Completion Interval Type ***: Oil & Gas
- Pool Status**: Permitted to Drill
- Interval Construction Status ***: Not Installed
- Record Status**: New
- Top MD (ft) ***: 11514
- Top TVD (ft)**: 11217
- Bottom MD (ft) ***: 21108
- Bottom TVD (ft)**: 11217
- Top Coordinates (ft) ***: 518 (From WH S, N/S), 54 (From WH W, E/W)
- Bottom Coordinates (ft) ***: 10111 (From WH S, N/S), 75 (From WH W, E/W)
- Longstring Casing Point**:
 - Footages**: 883 (Feet From N, Line), 579 (Feet From E, Line)
 - Coordinates (ft)**: (From WH), (From WH)
 - Qtr-Qtr**: LOT 1
 - Section**: 02
 - Township**: 154 N
 - Range**: 99 W
 - County**: Williams
- Enhanced Recovery Unit**: (Redacted)
- Field**: STOCKYARD CREEK
- Pool**: BAKKEN
- Spacing/Drilling Unit Type**: Spacing
- Permit Classification**: Development
- Acres in Unit**: 1280
- Industrial Commission Order**: 28191
- Legal Description of the Spacing/Drilling Unit**: Sections 2 & 11-154N-99W
- Reservation Surface Boundary Intersected by Spacing/Drilling Unit**: (Redacted)

Typical "Bakken" single laterals: 7" (production) casing point will be the "top" of the completion interval, and bottom will be dependent upon the type toe isolation.

Examples include:

Wet shoe with the ability to frac out the shoe: Bottom completion coordinates would be the TD of the well.


Wet shoe with no ability to frac out the shoe: Bottom completion coordinates would be the closest proposed survey point to the location the Bridge Plug in the toe.

Cemented Liner with no ability to frac out the shoe: Bottom completion coordinate would be the top of the cemented shoe.

No Liner: Bottom completion coordinate would be the TD of the well.

Completion Open Hole or Perforation ✕

* Indicates Required Field

Associated Completion Interval * <input type="text" value="C1"/>	Construction Status * ⓘ <input type="text" value="Not Installed"/>	Record Status <input type="text" value="New"/>
Type * <input type="text" value="Perforation"/>	Open Hole or Perforation Status * <input type="text" value="Proposed"/>	
Top MD (ft) * @ 7" casing point <input type="text" value="11514"/>	Bottom MD (ft) * (see addendum) <input type="text" value="20923"/>	
Perforation Diameter (inches) <input type="text"/>	Perforation Spacing (ft) <input type="text"/>	
Number of Shots (per foot) <input type="text"/>	Perforated Date <input type="text" value=""/> 	
Objective Horizons * <input type="text" value="Three Forks First Bench (B1) ✕"/>		
Description <input type="text"/>		

Note: Enter the following info if it is known at the time of permitting: Perforation Diameter, Perforation Spacing & Number of shots. The information displayed is the minimum we would allow. We would prefer that the operator indicate the top & bottom MD perforations. This information should be found on the Bakken Completion Schematic.

Form Navigation
Proposed Work
[Hide Form Navigati

API:	File No.:	Field:	Type of Well:	Type of Work:
N/A	N/A	N/A	Oil & Gas	New Well - Horizontal

Please enter information on proposed work below. * Indicates Required Field

Proposed Work, Comments and Additional Information
 (2000 characters maximum. If additional information is needed, please upload additional documentation):

Back
Next
Save

1. Form Information
2. Operator Information
3. Well Information
4. Geologic Information
5. UIC
6. Area of Review
7. Features & Cement ✓
8. Completion & Perforation ✓
9. Proposed Work
10. Document Upload
11. Operator Assertions
12. Form Submit
13. Confirmation
14. Plan View
15. Stipulations
16. Review Checklist
17. Review Comments
18. Review

**This is extra space to explain the permit application. It may be used as a cover letter or otherwise it may remain blank.*

It may also be used to indicate the deposition of the cuttings.

Form Navigation 10. Operator Assertions.

Form ID: 590

Form Navigation

- Form Information
- Operator Information
- Well Information
- Geologic Information
- UIC
- Area of Review
- Features & Cement
- Completion & Perforation
- Proposed Work
- 10. Document Upload**
- Operator Assertions
- Form Submit
- Confirmation
- Plan View
- Stipulations
- Review Checklist
- Review Comments
- Review

Document Upload [Hide Form Navigation]

API: N/A File No.: N/A Field: N/A Type of Well: Oil & Gas Type of Work: New Well - Horizontal

Select documents to be uploaded, if applicable. Click Add New and complete all required fields to upload a document.

Uploaded Documents

Upload Date	Uploaded By	Type	Description	Filename	Actions
01/28/2020	Alice Yaeger	APD-Attachments	Driving Directions	Directions Carus State 24X-36 10-01-2018.pdf	Actions
01/28/2020	Alice Yaeger	APD-Attachments	Drilling Prognosis Datasheet	Drilling Prognosis Datasheet Carus State 24X-36HXE2 02-06-2019.pdf	Actions
01/28/2020	Alice Yaeger	APD-Attachments	Drilling Plan	Drilling Plan Carus State 24X-36HXE2 11-29-2018.pdf	Actions
01/28/2020	Alice Yaeger	APD-Attachments	CTB Quantities	CTB Quantities Carus State 24X-36 10-01-	Actions

Comments

Add

Separate the permitting documents into a minimum of 3 “Descriptive” groups & maximum of 6.

Example:

Type: APD Attachments, Description: Plats (upload all).

Type: APD Attachments, Description: Directional plot & plan.

Type: APD Attachments, Description: Casing, Mud & Cementing Detail.

Type: APD Attachments, Description: Geologic Prognosis.

Type: APD Attachments, Description: Affidavits & Gas Capture Plan (if required).

Type: APD Attachments, Description: Anti-collision plan (if required).

Form Navigation 11. Operator Assertions. Call the operator and discuss if there are only one or two that appear incorrect. Send the form back if there appear to be multiple issues.

1. Form Information
2. Operator Information
3. Well Information ✓
4. Geologic Information ✓
5. UIC
6. Area of Review
7. Features & Cement ✓
8. Completion & Perforation ✓
9. Proposed Work ✓
10. Document Upload ✓
11. Operator Assertions
12. Form Submit
13. Confirmation
14. Plan View
15. Stipulations
16. Review Checklist
17. Review Comments
18. Review

API: N/A **File No.:** N/A **Field:** N/A **Type of Well:** Oil & Gas **Type of Work:** New Well - Horizontal

Please enter information below.

* Indicates Required Field

Operator Assertions *			
Assertions	Yes	No	N/A
Are the well and production facility on the same pad?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Do you acknowledge that you will provide prior written notice, up to ten days and not less than seven business days, to any operator of a well completed in the same pool, if publicly available information indicates or if the operator is made aware, if the completion intervals are within one thousand three hundred twenty (1,320) feet or (402.34 meters) of one another as applicable?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Does the operator acknowledge they will contact the NDIC Field Inspector to seek proper plug back procedures in the event of a sidetrack?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Does the operator understand that effective June 1, 2014 a covered leak-proof container (with placard) for filter sock disposal must be maintained on the well site beginning when the well is spud and must remain on-site during clean-out, completion, and flow-back whenever filtration operations are conducted?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Does the well pad block any drainages?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Has the operator confirmed with the NDIC Oil & Gas Division the method of payment to be used for any fees associated with the processing of this application?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Has the operator provided notice to the owner of any permanently occupied dwelling located within 1320 feet of the proposed oil or gas well?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Has the operator reviewed any wells within 500' of the proposed wellbore and addressed anti-collision concerns?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
If the well is within 1000 feet of an occupied dwelling: Are the proposed production facilities located at a greater distance from the occupied dwelling than the wellbore?	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Is the pad between 2,640 feet and 10,000 feet from the end of a public use airport runway?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>

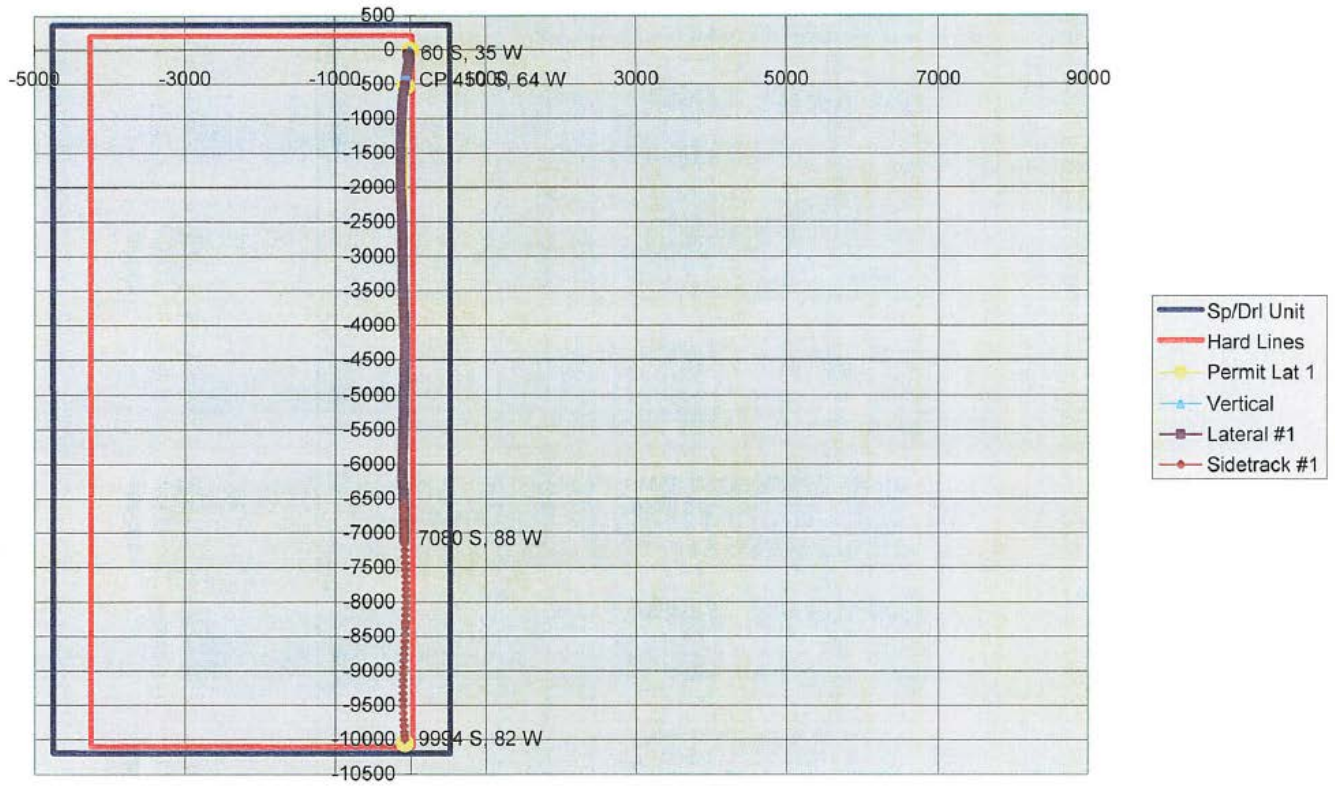


Is the well located off-spacing and if so, has a surface use agreement been executed with the landowner?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well or production facility closer than 500' to an occupied dwelling?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad located on an aquifer?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad located on/adjacent to unstable soils or areas with a high potential for soil instability (mapped or unmapped)?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad located on/near surface coal, sand or gravel deposit?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad located within 33 feet of a section line?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad located within a city's extra territorial boundary?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad located within a county, state or fed designated historic site, recreation area or wildlife management area?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad within 2,640 feet from the end of a public use airport runway (If yes, there is a 45-day comment period required)?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad within 200 feet of the centerline of a state or federal highway on flat land or 400 feet in rough topography?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad within a 100-year (or less) floodplain?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well pad within a well head protection area?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is the well within a planned bypass route that has been proposed in an approved ten year, or less, county, state, or federal road master plan?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is this well or completion interval located within the external boundaries of the Fort Berthold Indian Reservation?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is this well within 1,320 feet of a military facility?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Is this well within an area of interest as it relates to public lands pursuant to NDIC PP 2.01 (If yes, a 10-day comment period required)?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Pursuant to the NDIC 43-02-03-31 (Well Log, Completion, and Workover Reports), the operator understands and will run porosity and resistivity logs on this well unless otherwise approved by the Director.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

Water Appropriation Permit Number *

You may add a zero in the Water Appropriate Permit Number if it is NA.

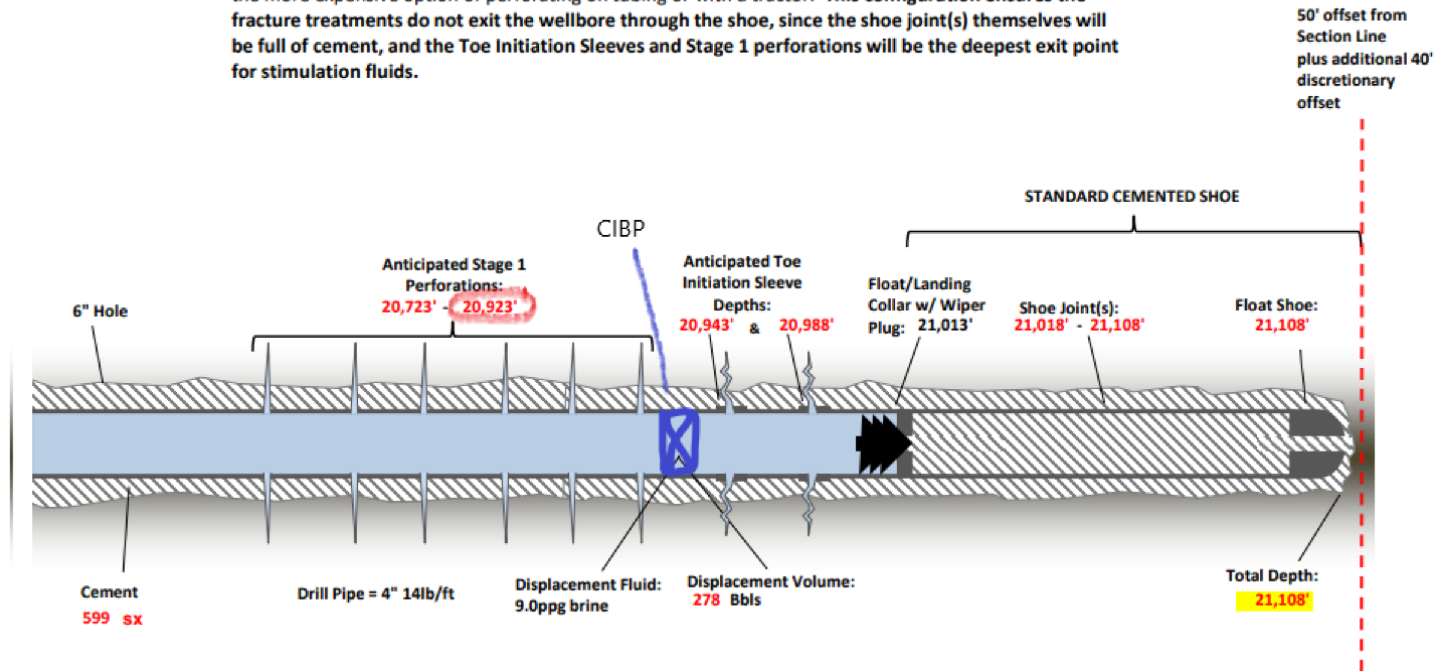
#34478 MOEN 41-2-5TFH LOT1 2-154-99 365 FNL 525 FEL



Addendum

Discussion

The standard cemented shoe configuration involves a cemented liner, whereby redundant Toe Initiation Sleeves are run above the Float Collar, in addition to the standard float equipment. The wiper plug is designed to be pumped past the Toe Initiation Sleeve, exposing it to the wellbore for future use as a toe initiation point. In short, using the Toe Initiation Sleeves in conjunction with a standard cemented shoe configuration allows the operator to pump-down the first stage perforating guns on wireline, avoiding the more expensive option of perforating on tubing or with a tractor. **This configuration ensures the fracture treatments do not exit the wellbore through the shoe, since the shoe joint(s) themselves will be full of cement, and the Toe Initiation Sleeves and Stage 1 perforations will be the deepest exit point for stimulation fluids.**



DRAFT

- (c) Proposed toe of the lateral including the location of the deepest perforation, completion sleeve, and/or external isolation packer.

(12) The Completion Report (Form 6) for a horizontal well completed in the Banks-Bakken Pool shall include a well schematic which depicts the:

- (a) Production casing setting depth at the heel relative to the spacing unit boundary;
- (b) Completion style as open hole lateral, cemented liner or casing in the lateral, liner or casing externally isolated in the lateral by the use of packers, or other completion style; and
- (c) Toe of the lateral including the location of the deepest perforation, completion sleeve, and/or external isolation packer.

(13) The proper spacing for the development of Zone I in the Banks-Bakken Pool is hereby set at one horizontal well per 640-acre spacing unit.

(14) Spacing units hereafter created in Zone I in the Banks-Bakken Pool shall consist of a governmental section.

(15) Zone I in the Banks-Bakken Pool shall not be extended except by further order of the Commission after due notice and hearing.

(16) The proper spacing for the development of Zone II in the Banks-Bakken Pool is hereby set at one horizontal well per standup 960-acre spacing unit.

(17) Section 10 and the S/2 of Section 3; and Section 11 and the S/2 of Section 2, Township 152 North, Range 99 West, McKenzie County, North Dakota, are hereby designated standup 960-acre spacing units in Zone II in the Banks-Bakken Pool.

(18) Spacing units hereafter created in Zone II in the Banks-Bakken Pool shall be standup spacing units designated by the Commission.

(19) Zone II in the Banks-Bakken Pool shall not be extended except by further order of the Commission after due notice and hearing.

(20) The proper spacing for the development of Zone III in the Banks-Bakken Pool is hereby set at one horizontal well per standup 1280-acre spacing unit.

(21) Sections 6 and 7, Township 153 North, Range 97 West, McKenzie County, North Dakota, are hereby designated a standup 1280-acre spacing unit in Zone III in the Banks-Bakken Pool.

(22) Spacing units hereafter created in Zone III in the Banks-Bakken Pool shall be standup spacing units consisting of two adjacent governmental sections.

- (a) Measurement inaccuracies in the directional survey equipment need not be considered except when deemed necessary by the Director.
- (b) The lateral, heel portion of the lateral, or toe portion of the lateral in horizontal well bores shall be no closer than 500 feet to the most nearly parallel spacing unit boundary.
- (c) The Director is hereby authorized to reduce the setback from 500 feet to 200 feet for horizontal well bores where the angle of the heel portion of the lateral and the respective spacing unit boundary is less than 45° through the issuance of permit stipulations, whenever, in his opinion, the applicant has demonstrated that correlative rights will be protected.
- (d) The heel portion of the lateral in horizontal well bores where the angle of such is greater than 45° from the respective most nearly perpendicular spacing unit boundary, shall be no closer than 150 feet to said boundary.
- (e) The lateral or toe portion of the lateral in horizontal well bores where the angle of such is greater than 45° from the respective most nearly perpendicular spacing unit boundary, shall adhere to the following:
 - (i) For horizontal wells completed open hole, the total depth of the well bore shall be no closer than 150 feet to the boundary of the spacing unit;
 - (ii) For horizontal wells completed with the production liner or casing cemented in the lateral, the total depth of the well bore shall be no closer than 50 feet to the boundary of the spacing unit, unless the horizontal well is stimulated through the shoe at the toe of the lateral whereby the total depth of the well bore shall be no closer than 150 feet to the boundary of the spacing unit; and
 - (iii) For horizontal wells completed with the production liner or casing externally isolated in the lateral by the use of packers, the total depth of the well bore shall be no closer than 100 feet to the boundary of the spacing unit unless the horizontal well is stimulated through the shoe at the toe of the lateral whereby the total depth of the well bore shall be no closer than 150 feet to the boundary of the spacing unit.

(11) The Application for Permit to Drill (Form 1) for a horizontal well to be completed in the Banks-Bakken Pool shall include a well schematic which depicts the:

- (a) Proposed production casing setting depth at the heel relative to the spacing unit boundary;
- (b) Proposed completion style as open hole lateral, cemented liner or casing in the lateral, liner or casing externally isolated in the lateral by the use of packers, or other completion style; and

"Typical" Whiting wet shoe digram
2/14/2020

Details of Standard Wet Shoe

Roggenbuck Federal 41-24-3TFX

Discussion

The "wet shoe" configuration involves a standard cemented liner, whereby the cement job is intentionally over-displaced by 5 barrels of displacement fluid, creating approximately 150' of uncemented annulus around the toe-portion of the liner. The wiper plug pumped to displace the cement contains a 'rupture disc' engineered to fail at a certain pressure, with the purpose of providing an economic method for toe initiation. In short, the wet shoe configuration allows the operator to pump-down the first stage perforating guns on wireline, avoiding the more expensive option of perforating on tubing or with a tractor. **To ensure the fracture treatments do not exit the wellbore through the wet-shoe, a frac-plug will be set below the lowermost perforation and above the rupture disc, effectively sealing the wet shoe and forcing the fracture treatment out the perforations.** fluids.

200' offset from Section Line plus additional 40' discretionary offset

