

District I

1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720

District II

811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720

District III

1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170

District IV

1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

State of New Mexico
Energy, Minerals and Natural Resources
Oil Conservation Division
1220 S. St Francis Dr.
Santa Fe, NM 87505

Form C-101
August 1, 2011

Permit 278706

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

1. Operator Name and Address NOVO OIL & GAS NORTHERN DELAWARE, LLC 1001 West Wilshire Blvd Oklahoma City, OK 73116		2. OGRID Number 372920
		3. API Number 30-015-46770
4. Property Code 327177	5. Property Name Astrodog Fee 0809	6. Well No. 236H

7. Surface Location

UL - Lot E	Section 8	Township 23S	Range 29E	Lot Idn E	Feet From 1970	N/S Line N	Feet From 200	E/W Line W	County Eddy
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8. Proposed Bottom Hole Location

UL - Lot I	Section 9	Township 23S	Range 29E	Lot Idn I	Feet From 2310	N/S Line S	Feet From 130	E/W Line E	County Eddy
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9. Pool Information

PURPLE SAGE;WOLFCAMP (GAS)	98220
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Additional Well Information

11. Work Type New Well	12. Well Type GAS	13. Cable/Rotary	14. Lease Type Private	15. Ground Level Elevation 3003
16. Multiple N	17. Proposed Depth 21399	18. Formation Wolfcamp	19. Contractor	20. Spud Date 3/6/2020
Depth to Ground water		Distance from nearest fresh water well		Distance to nearest surface water

☒ We will be using a closed-loop system in lieu of lined pits

21. Proposed Casing and Cement Program

Type	Hole Size	Casing Size	Casing Weight/ft	Setting Depth	Sacks of Cement	Estimated TOC
Surf	17.5	13.375	54.5	423	439	0
Int1	12.25	9.625	40	2980	625	0
Int2	8.75	7.625	29.7	9780	488	0
Prod	6.75	5.5	23	21399	706	9280

Casing/Cement Program: Additional Comments

Int 1 casing is technically a Salt Protect casing but there is no option for "other" type of casing. Casing grade for Int 2 is RYS-110; Casing grade for Production is P-110 HP. Operator will be using Eagle SFH SC USS semi-FJ joint for Int 2 and Prod casing.

22. Proposed Blowout Prevention Program

Type	Working Pressure	Test Pressure	Manufacturer
Annular	5000	5000	TBA
Double Ram	5000	5000	TBA

23. I hereby certify that the information given above is true and complete to the best of my knowledge and belief. I further certify I have complied with 19.15.14.9 (A) NMAC ☒ and/or 19.15.14.9 (B) NMAC ☒ if applicable.		OIL CONSERVATION DIVISION	
Signature:			
Printed Name:	Electronically filed by Kurt Shipley	Approved By:	Raymond Podany
Title:	Chief Operating Officer	Title:	Geologist
Email Address:	kshipley@novoog.com	Approved Date:	2/24/2020
Date:	2/21/2020	Expiration Date:	2/24/2022
Phone:	405-286-3916	Conditions of Approval Attached	

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State of New Mexico

Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

1220 South St. Francis Dr.

Santa Fe, NM 87505

Form C-102

Revised August 1, 2011

Submit one copy to appropriate

District Office

☐ AMENDED REPORT

WELL LOCATION AND ACREAGE DEDICATION PLAT

¹ API Number 30-015-	² Pool Code 98220	³ Pool Name PURPLE SAGE; WOLFCAMP (GAS)
⁴ Property Code	⁵ Property Name ASTRODOG FEE 0809	⁶ Well Number 236H
⁷ OGRID No. 372920	⁸ Operator Name NOVO OIL & GAS NORTHERN DELAWARE, LLC	⁹ Elevation 3003.0

¹⁰ Surface Location

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
E	8	23 S	29 E		1970	NORTH	200	WEST	EDDY

¹¹ Bottom Hole Location If Different From Surface

UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
I	9	23 S	29 E		2310	SOUTH	130	EAST	EDDY

¹² Dedicated Acres 640.00	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No.
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No allowable will be assigned to this completion until all interests have been consolidated or a non-standard unit has been approved by the division.

	¹⁷ OPERATOR CERTIFICATION I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unleased mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement of a compulsory pooling order heretofore entered by the division. <i>Brian Wood</i> 2-16-20 Signature BRIAN WOOD Date Printed Name brian@permitswest.com E-mail Address (505) 466-8120 ¹⁸ SURVEYOR CERTIFICATION I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief. FEBRUARY 4, 2020 Date of Survey Signature and Seal of Professional Surveyor <i>FILIMON F. JARAMILA</i> Certificate Number: FILIMON F. JARAMILA, PLS 12797 SURVEY NO. 7770
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Intent ☒ YES As Drilled ☐

API #		
Operator Name: NOVO OIL & GAS NORTHERN DELAWARE, LLC	Property Name: ASTRODOG FEE 0809	Well Number 236H

Kick Off Point (KOP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
Latitude					Longitude			NAD	

First Take Point (FTP)

UL L	Section 8	Township 23S	Range 29E	Lot	Feet 2310	From N/S SOUTH	Feet 330	From E/W WEST	County EDDY
Latitude 32.3187254					Longitude 104.0144695			NAD 83	

Last Take Point (LTP)

UL I	Section 9	Township 23S	Range 29E	Lot	Feet 2310	From N/S SOUTH	Feet 330	From E/W EAST	County EDDY
Latitude 32.3188095					Longitude 103.9822654			NAD 83	

Is this well the defining well for the Horizontal Spacing Unit? ☒ YESIs this well an infill well? ☒ NO

If infill is yes please provide API if available, Operator Name and well number for Defining well for Horizontal Spacing Unit.

API #		
Operator Name:	Property Name:	Well Number

KZ 06/29/2018

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GAS CAPTURE PLAN

Date: 2/24/2020

☒ Original

Operator & OGRID No.: [372920] NOVO OIL & GAS NORTHERN DELAWARE, LLC

☐ Amended - Reason for
Amendment:

This Gas Capture Plan outlines actions to be taken by the Operator to reduce well/production facility flaring/venting for new completion (new drill, recomple to new zone, re-frac) activity.

Note: Form C-129 must be submitted and approved prior to exceeding 60 days allowed by Rule (Subsection A of 19.15.18.12 NMAC).

Well(s)/Production Facility – Name of facility

The well(s) that will be located at the production facility are shown in the table below.

Well Name	API	Well Location (ULSTR)	Footages	Expected MCF/D	Flared or Vented	Comments
Astrodog Fee 0809 #236H	30-015-46770	E-8-23S-29E	1970N 0200W	7500	Flared	

Gathering System and Pipeline Notification

Well(s) will be connected to a production facility after flowback operations are complete, if gas transporter system is in place. The gas produced from production facility is dedicated to ENTERPRISE FIELD SERVICES L.L.C. and will be connected to ENTERPRISE FIELD SERVICES L.L.C. High Pressure gathering system located in Eddy County, New Mexico. It will require 75' of pipeline to connect the facility to High Pressure gathering system. NOVO OIL & GAS NORTHERN DELAWARE, LLC provides (periodically) to ENTERPRISE FIELD SERVICES L.L.C. a drilling, completion and estimated first production date for wells that are scheduled to be drilled in the foreseeable future. In addition, NOVO OIL & GAS NORTHERN DELAWARE, LLC and ENTERPRISE FIELD SERVICES L.L.C. have periodic conference calls to discuss changes to drilling and completion schedules. Gas from these wells will be processed at ENTERPRISE FIELD SERVICES L.L.C. Processing Plant located in Sec. 08, Twn. 23S, Rng. 29E, Eddy County, New Mexico. The actual flow of the gas will be based on compression operating parameters and gathering system pressures.

Flowback Strategy

After the fracture treatment/completion operations, well(s) will be produced to temporary production tanks and gas will be flared or vented. During flowback, the fluids and sand content will be monitored. When the produced fluids contain minimal sand, the wells will be turned to production facilities. Gas sales should start as soon as the wells start flowing through the production facilities, unless there are operational issues on ENTERPRISE FIELD SERVICES L.L.C. system at that time. Based on current information, it is NOVO OIL & GAS NORTHERN DELAWARE, LLC's belief the system can take this gas upon completion of the well(s).

Safety requirements during cleanout operations from the use of underbalanced air cleanout systems may necessitate that sand and non-pipeline quality gas be vented and/or flared rather than sold on a temporary basis.

Alternatives to Reduce Flaring

Below are alternatives considered from a conceptual standpoint to reduce the amount of gas flared.

- Power Generation – On lease
 - Only a portion of gas is consumed operating the generator, remainder of gas will be flared
- Compressed Natural Gas – On lease
 - Gas flared would be minimal, but might be uneconomical to operate when gas volume declines
- NGL Removal – On lease
 - Plants are expensive, residue gas is still flared, and uneconomical to operate when gas volume declines

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Form APD Comments

Permit 278706

PERMIT COMMENTS

Operator Name and Address: NOVO OIL & GAS NORTHERN DELAWARE, LLC [372920] 1001 West Wilshire Blvd Oklahoma City, OK 73116		API Number: 30-015-46770
		Well: Astrodog Fee 0809 #236H
Created By	Comment	Comment Date

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Form APD Conditions

Permit 278706

PERMIT CONDITIONS OF APPROVAL

Operator Name and Address: NOVO OIL & GAS NORTHERN DELAWARE, LLC [372920] 1001 West Wilshire Blvd Oklahoma City, OK 73116		API Number: 30-015-46770
		Well: Astrodog Fee 0809 #236H

OCD Reviewer	Condition
ksimmons	Will require a directional survey with the C-104
ksimmons	Cement is required to circulate on both surface and intermediate1 strings of casing
ksimmons	Before drilling or completing, operator will notify other operators with well(s) in same quarter-quarter section.



Company: Novo Oil & Gas, LLC
Well: Astrodog Fee 0809 236H
County: Eddy County, New Mexico (NAD 83)
Rig: 25' RKB
Wellbore: Wellbore #1
Design: Design #1
Created By: AAT
Date: 10:42, January 24 2020

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level



To convert a Magnetic Direction to a Grid Direction, Add 6.796°
To convert a Magnetic Direction to a True Direction, Add 6.967° East
To convert a True Direction to a Grid Direction, Subtract 0.170°



Azimuths to Grid North
True North: -0.17°
Magnetic North: 6.80°

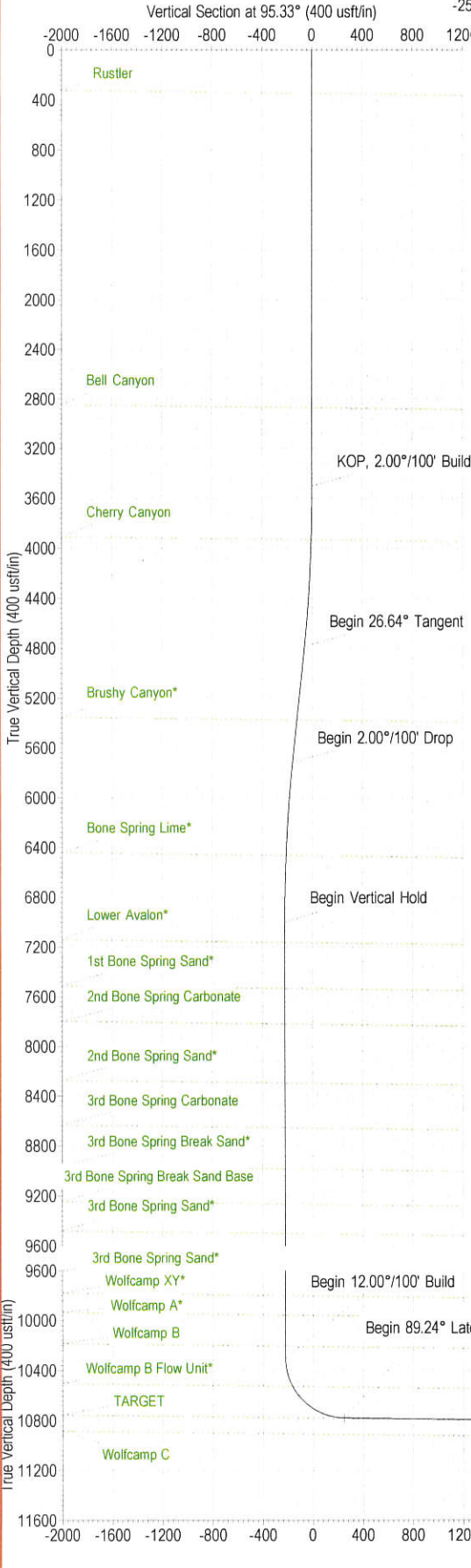
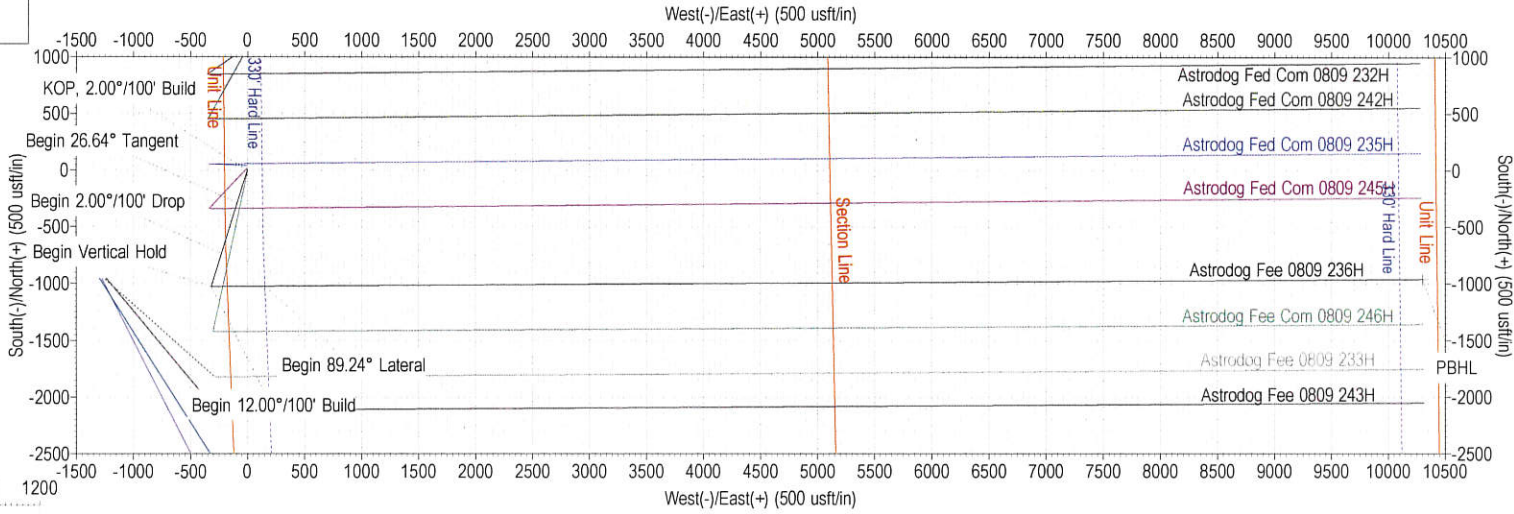
Magnetic Field
Strength: 47831.6nT
Dip Angle: 60.05°
Date: 5/1/2020
Model: HDGM2020

WELL DETAILS: Astrodog Fee 0809 236H

		GL @ 3003.00	WELL @ 3028.00usft (25' RKB)		
		Northing	Easting	Latitude	Longitude
+N/-S	+E/-W	480855.34	639684.94	32.321542	-104.014956
0.00	0.00				

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
PBHL	10913.00	-961.88	10301.45	479893.46	649986.39	32.318810	-103.981618
FTP	10778.00	-1024.23	153.31	479831.11	639838.25	32.318725	-104.014470

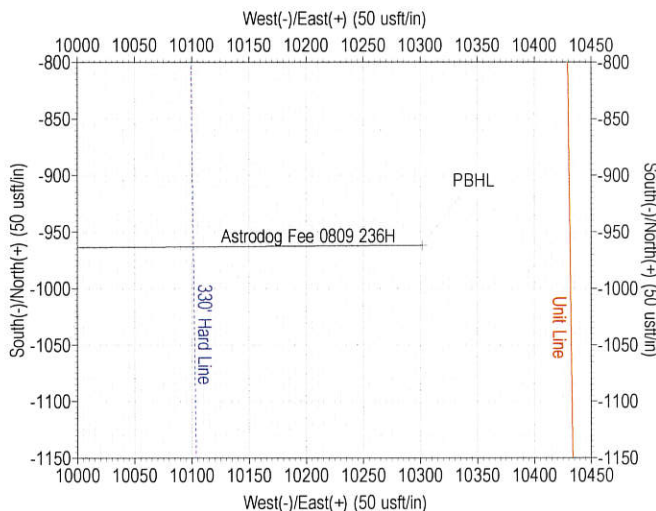
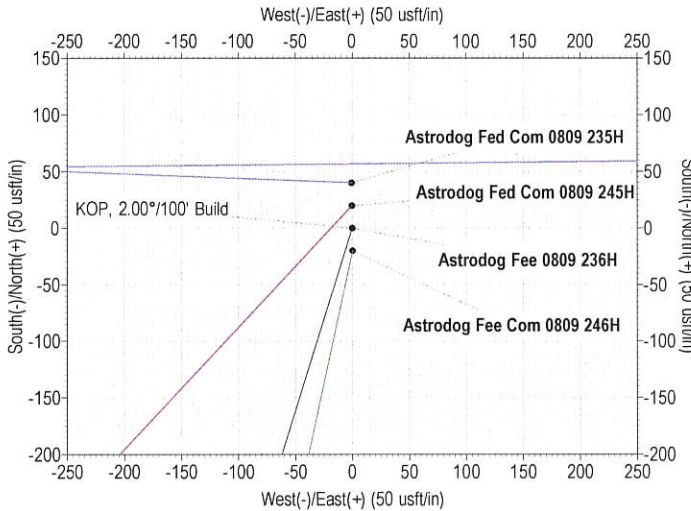


SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	0.00	
3500.00	0.00	0.00	3500.00	0.00	0.00	0.00	0.000	0.00	KOP, 2.00°/100' Build
4831.80	26.64	197.19	4784.34	-290.45	-89.87	2.00	197.193	-62.47	Begin 26.64° Tangent
5873.68	26.64	197.19	5715.66	-736.67	-227.93	0.00	0.000	-158.46	Begin 2.00°/100' Drop
7205.48	0.00	0.00	7000.00	-1027.12	-317.80	2.00	180.000	-220.93	Begin Vertical Hold
10506.06	0.00	0.00	10300.58	-1027.12	-317.80	0.00	0.000	-220.93	Begin 12.00°/100' Build
11249.71	89.24	89.65	10778.00	-1024.23	153.31	12.00	89.648	247.86	Begin 89.24° Lateral
21398.95	89.24	89.65	10913.00	-961.88	10301.45	0.00	0.000	10346.26	PBHL

SURVEY PROGRAM

Depth From	Depth To	Survey/Plan	Tool
0.00	21398.91	Design #1 (Wellbore #1)	MWD+HRGM





MS Directional Planning Report



Database: 5000.1 Conroe DB
Company: Novo Oil & Gas, LLC
Project: Eddy County, New Mexico (NAD 83)
Site: Astrodog Fed Com / Astrodog Fee
Well: Astrodog Fee 0809 236H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Astrodog Fee 0809 236H
TVD Reference: WELL @ 3028.00usft (25' RKB)
MD Reference: WELL @ 3028.00usft (25' RKB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Project	Eddy County, New Mexico (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Astrodog Fed Com / Astrodog Fee			
Site Position:		Northing:	480,875.34 usft	Latitude: 32.321597
From: Map		Easting:	639,684.65 usft	Longitude: -104.014957
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence: 0.170 °

Well	Astrodog Fee 0809 236H			
Well Position	+N/-S	-20.00 usft	Northing:	480,855.34 usft
	+E/-W	0.29 usft	Easting:	639,684.94 usft
Position Uncertainty	0.00 usft		Wellhead Elevation:	
			Ground Level:	3,003.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM2020	5/1/2020	6.967	60.050	47,831.60

Design	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	95.33

Plan Survey Tool Program	Date 1/24/2020			
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	21,398.91	Design #1 (Wellbore #1)	MWD+HRGM OWSG MWD + HRGM

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.000	
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.000	
4,831.80	26.64	197.19	4,784.34	-290.45	-89.87	2.00	2.00	0.00	197.193	
5,873.68	26.64	197.19	5,715.66	-736.67	-227.93	0.00	0.00	0.00	0.000	
7,205.48	0.00	0.00	7,000.00	-1,027.12	-317.80	2.00	-2.00	0.00	180.000	
10,506.06	0.00	0.00	10,300.58	-1,027.12	-317.80	0.00	0.00	0.00	0.000	
11,249.71	89.24	89.65	10,778.00	-1,024.23	153.31	12.00	12.00	0.00	89.648	
21,398.95	89.24	89.65	10,913.00	-961.88	10,301.45	0.00	0.00	0.00	0.000	PBHL - Astrodog Fe



MS Directional Planning Report



Database: 5000.1 Conroe DB
Company: Novo Oil & Gas, LLC
Project: Eddy County, New Mexico (NAD 83)
Site: Astrodog Fed Com / Astrodog Fee
Well: Astrodog Fee 0809 236H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Astrodog Fee 0809 236H
TVD Reference: WELL @ 3028.00usft (25' RKB)
MD Reference: WELL @ 3028.00usft (25' RKB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
348.00	0.00	0.00	348.00	0.00	0.00	0.00	0.00	0.00	0.00
Rustler									
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,873.00	0.00	0.00	2,873.00	0.00	0.00	0.00	0.00	0.00	0.00
Base of Salt - Bell Canyon									
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, 2.00°/100' Build									
3,600.00	2.00	197.19	3,599.98	-1.67	-0.52	-0.36	2.00	2.00	0.00
3,700.00	4.00	197.19	3,699.84	-6.67	-2.06	-1.43	2.00	2.00	0.00
3,800.00	6.00	197.19	3,799.45	-14.99	-4.64	-3.22	2.00	2.00	0.00
3,900.00	8.00	197.19	3,898.70	-26.63	-8.24	-5.73	2.00	2.00	0.00
3,934.53	8.69	197.19	3,932.87	-31.42	-9.72	-6.76	2.00	2.00	0.00
Cherry Canyon									
4,000.00	10.00	197.19	3,997.47	-41.58	-12.86	-8.94	2.00	2.00	0.00
4,100.00	12.00	197.19	4,095.62	-59.81	-18.50	-12.86	2.00	2.00	0.00
4,200.00	14.00	197.19	4,193.06	-81.29	-25.15	-17.49	2.00	2.00	0.00
4,300.00	16.00	197.19	4,289.64	-106.02	-32.80	-22.80	2.00	2.00	0.00
4,400.00	18.00	197.19	4,385.27	-133.95	-41.44	-28.81	2.00	2.00	0.00
4,500.00	20.00	197.19	4,479.82	-165.05	-51.07	-35.50	2.00	2.00	0.00
4,600.00	22.00	197.19	4,573.17	-199.28	-61.66	-42.87	2.00	2.00	0.00



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Wellbore: Wellbore #1
Design: Design #1

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North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,700.00	24.00	197.19	4,665.21	-236.61	-73.21	-50.89	2.00	2.00	0.00
4,800.00	26.00	197.19	4,755.84	-276.98	-85.70	-59.58	2.00	2.00	0.00
4,831.80	26.64	197.19	4,784.34	-290.45	-89.87	-62.47	2.00	2.00	0.00
Begin 26.64° Tangent									
4,900.00	26.64	197.19	4,845.31	-319.66	-98.90	-68.76	0.00	0.00	0.00
5,000.00	26.64	197.19	4,934.69	-362.49	-112.16	-77.97	0.00	0.00	0.00
5,100.00	26.64	197.19	5,024.08	-405.31	-125.41	-87.18	0.00	0.00	0.00
5,200.00	26.64	197.19	5,113.47	-448.14	-138.66	-96.40	0.00	0.00	0.00
5,300.00	26.64	197.19	5,202.86	-490.97	-151.91	-105.61	0.00	0.00	0.00
5,400.00	26.64	197.19	5,292.24	-533.80	-165.16	-114.82	0.00	0.00	0.00
5,493.25	26.64	197.19	5,375.60	-573.74	-177.52	-123.41	0.00	0.00	0.00
Brushy Canyon*									
5,500.00	26.64	197.19	5,381.63	-576.63	-178.41	-124.03	0.00	0.00	0.00
5,600.00	26.64	197.19	5,471.02	-619.46	-191.67	-133.25	0.00	0.00	0.00
5,700.00	26.64	197.19	5,560.41	-662.29	-204.92	-142.46	0.00	0.00	0.00
5,800.00	26.64	197.19	5,649.79	-705.12	-218.17	-151.67	0.00	0.00	0.00
5,873.68	26.64	197.19	5,715.66	-736.67	-227.93	-158.46	0.00	0.00	0.00
Begin 2.00°/100' Drop									
5,900.00	26.11	197.19	5,739.23	-747.84	-231.39	-160.86	2.00	-2.00	0.00
6,000.00	24.11	197.19	5,829.78	-788.38	-243.93	-169.58	2.00	-2.00	0.00
6,100.00	22.11	197.19	5,921.75	-825.87	-255.53	-177.64	2.00	-2.00	0.00
6,200.00	20.11	197.19	6,015.03	-860.28	-266.18	-185.05	2.00	-2.00	0.00
6,300.00	18.11	197.19	6,109.52	-891.55	-275.85	-191.77	2.00	-2.00	0.00
6,400.00	16.11	197.19	6,205.09	-919.65	-284.55	-197.82	2.00	-2.00	0.00
6,500.00	14.11	197.19	6,301.63	-944.55	-292.25	-203.17	2.00	-2.00	0.00
6,600.00	12.11	197.19	6,399.02	-966.22	-298.96	-207.83	2.00	-2.00	0.00
6,666.21	10.79	197.19	6,463.90	-978.77	-302.84	-210.53	2.00	-2.00	0.00
Bone Spring Lime*									
6,700.00	10.11	197.19	6,497.14	-984.63	-304.65	-211.79	2.00	-2.00	0.00
6,800.00	8.11	197.19	6,595.87	-999.75	-309.33	-215.05	2.00	-2.00	0.00
6,900.00	6.11	197.19	6,695.10	-1,011.58	-312.99	-217.59	2.00	-2.00	0.00
7,000.00	4.11	197.19	6,794.69	-1,020.08	-315.62	-219.42	2.00	-2.00	0.00
7,100.00	2.11	197.19	6,894.54	-1,025.27	-317.23	-220.53	2.00	-2.00	0.00
7,205.48	0.00	0.00	7,000.00	-1,027.12	-317.80	-220.93	2.00	-2.00	0.00
Begin Vertical Hold									
7,300.00	0.00	0.00	7,094.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
7,369.18	0.00	0.00	7,163.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
Lower Avalon*									
7,400.00	0.00	0.00	7,194.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
7,500.00	0.00	0.00	7,294.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
7,600.00	0.00	0.00	7,394.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
7,700.00	0.00	0.00	7,494.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
7,739.18	0.00	0.00	7,533.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
1st Bone Spring Sand*									
7,800.00	0.00	0.00	7,594.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
7,900.00	0.00	0.00	7,694.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
8,000.00	0.00	0.00	7,794.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
8,024.18	0.00	0.00	7,818.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
2nd Bone Spring Carbonate									
8,100.00	0.00	0.00	7,894.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
8,200.00	0.00	0.00	7,994.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
8,300.00	0.00	0.00	8,094.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
8,400.00	0.00	0.00	8,194.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00



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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,499.18	0.00	0.00	8,293.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
2nd Bone Spring Sand*									
8,500.00	0.00	0.00	8,294.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
8,600.00	0.00	0.00	8,394.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
8,700.00	0.00	0.00	8,494.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
8,800.00	0.00	0.00	8,594.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
8,859.18	0.00	0.00	8,653.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
3rd Bone Spring Carbonate									
8,900.00	0.00	0.00	8,694.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,000.00	0.00	0.00	8,794.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,100.00	0.00	0.00	8,894.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,189.18	0.00	0.00	8,983.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
3rd Bone Spring Break Sand*									
9,200.00	0.00	0.00	8,994.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,300.00	0.00	0.00	9,094.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,400.00	0.00	0.00	9,194.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,469.18	0.00	0.00	9,263.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
3rd Bone Spring Break Sand Base									
9,500.00	0.00	0.00	9,294.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,600.00	0.00	0.00	9,394.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,700.00	0.00	0.00	9,494.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,704.18	0.00	0.00	9,498.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
3rd Bone Spring Sand*									
9,800.00	0.00	0.00	9,594.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
9,900.00	0.00	0.00	9,694.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
10,000.00	0.00	0.00	9,794.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
10,004.18	0.00	0.00	9,798.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
Wolfcamp XY*									
10,100.00	0.00	0.00	9,894.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
10,159.18	0.00	0.00	9,953.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
Wolfcamp A*									
10,200.00	0.00	0.00	9,994.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
10,300.00	0.00	0.00	10,094.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
10,400.00	0.00	0.00	10,194.52	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
10,409.18	0.00	0.00	10,203.70	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
Wolfcamp B									
10,506.06	0.00	0.00	10,300.58	-1,027.12	-317.80	-220.93	0.00	0.00	0.00
Begin 12.00°/100' Build									
10,525.00	2.27	89.65	10,319.51	-1,027.12	-317.42	-220.56	12.00	12.00	0.00
10,550.00	5.27	89.65	10,344.46	-1,027.11	-315.78	-218.92	12.00	12.00	0.00
10,575.00	8.27	89.65	10,369.28	-1,027.09	-312.83	-215.99	12.00	12.00	0.00
10,600.00	11.27	89.65	10,393.91	-1,027.06	-308.59	-211.77	12.00	12.00	0.00
10,625.00	14.27	89.65	10,418.29	-1,027.03	-303.06	-206.27	12.00	12.00	0.00
10,650.00	17.27	89.65	10,442.35	-1,026.99	-296.27	-199.51	12.00	12.00	0.00
10,675.00	20.27	89.65	10,466.01	-1,026.94	-288.22	-191.50	12.00	12.00	0.00
10,700.00	23.27	89.65	10,489.23	-1,026.88	-278.95	-182.28	12.00	12.00	0.00
10,725.00	26.27	89.65	10,511.93	-1,026.82	-268.48	-171.85	12.00	12.00	0.00
10,739.06	27.96	89.65	10,524.44	-1,026.78	-262.07	-165.48	12.00	12.00	0.00
Wolfcamp B Flow Unit*									
10,750.00	29.27	89.65	10,534.04	-1,026.75	-256.83	-160.26	12.00	12.00	0.00
10,775.00	32.27	89.65	10,555.52	-1,026.67	-244.04	-147.54	12.00	12.00	0.00
10,800.00	35.27	89.65	10,576.30	-1,026.58	-230.15	-133.71	12.00	12.00	0.00



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10,825.00	38.27	89.65	10,596.32	-1,026.49	-215.18	-118.82	12.00	12.00	0.00
10,850.00	41.27	89.65	10,615.54	-1,026.39	-199.19	-102.91	12.00	12.00	0.00
10,875.00	44.27	89.65	10,633.89	-1,026.29	-182.22	-86.02	12.00	12.00	0.00
10,900.00	47.27	89.65	10,651.32	-1,026.18	-164.31	-68.19	12.00	12.00	0.00
10,925.00	50.27	89.65	10,667.80	-1,026.06	-145.51	-49.48	12.00	12.00	0.00
10,950.00	53.27	89.65	10,683.26	-1,025.94	-125.87	-29.94	12.00	12.00	0.00
10,975.00	56.27	89.65	10,697.68	-1,025.82	-105.45	-9.62	12.00	12.00	0.00
11,000.00	59.27	89.65	10,711.01	-1,025.69	-84.30	11.42	12.00	12.00	0.00
11,025.00	62.27	89.65	10,723.22	-1,025.55	-62.49	33.12	12.00	12.00	0.00
11,050.00	65.27	89.65	10,734.27	-1,025.41	-40.07	55.44	12.00	12.00	0.00
11,075.00	68.27	89.65	10,744.12	-1,025.27	-17.10	78.30	12.00	12.00	0.00
11,100.00	71.27	89.65	10,752.77	-1,025.13	6.36	101.64	12.00	12.00	0.00
11,125.00	74.27	89.65	10,760.17	-1,024.98	30.23	125.39	12.00	12.00	0.00
11,150.00	77.27	89.65	10,766.31	-1,024.83	54.46	149.51	12.00	12.00	0.00
11,175.00	80.27	89.65	10,771.18	-1,024.68	78.98	173.90	12.00	12.00	0.00
11,200.00	83.27	89.65	10,774.76	-1,024.53	103.72	198.52	12.00	12.00	0.00
11,225.00	86.27	89.65	10,777.04	-1,024.38	128.61	223.29	12.00	12.00	0.00
11,249.71	89.24	89.65	10,778.00	-1,024.23	153.31	247.86	12.00	12.00	0.00
Begin 89.24° Lateral									
11,300.00	89.24	89.65	10,778.67	-1,023.92	203.59	297.90	0.00	0.00	0.00
11,400.00	89.24	89.65	10,780.00	-1,023.30	303.58	397.40	0.00	0.00	0.00
11,500.00	89.24	89.65	10,781.33	-1,022.69	403.57	496.90	0.00	0.00	0.00
11,600.00	89.24	89.65	10,782.66	-1,022.07	503.55	596.39	0.00	0.00	0.00
11,700.00	89.24	89.65	10,783.99	-1,021.46	603.54	695.89	0.00	0.00	0.00
11,800.00	89.24	89.65	10,785.32	-1,020.85	703.53	795.39	0.00	0.00	0.00
11,900.00	89.24	89.65	10,786.65	-1,020.23	803.52	894.89	0.00	0.00	0.00
12,000.00	89.24	89.65	10,787.98	-1,019.62	903.51	994.39	0.00	0.00	0.00
12,100.00	89.24	89.65	10,789.31	-1,019.00	1,003.50	1,093.89	0.00	0.00	0.00
12,200.00	89.24	89.65	10,790.64	-1,018.39	1,103.49	1,193.39	0.00	0.00	0.00
12,300.00	89.24	89.65	10,791.97	-1,017.77	1,203.48	1,292.89	0.00	0.00	0.00
12,400.00	89.24	89.65	10,793.30	-1,017.16	1,303.47	1,392.39	0.00	0.00	0.00
12,500.00	89.24	89.65	10,794.63	-1,016.55	1,403.46	1,491.89	0.00	0.00	0.00
12,600.00	89.24	89.65	10,795.96	-1,015.93	1,503.45	1,591.39	0.00	0.00	0.00
12,700.00	89.24	89.65	10,797.29	-1,015.32	1,603.44	1,690.88	0.00	0.00	0.00
12,800.00	89.24	89.65	10,798.62	-1,014.70	1,703.43	1,790.38	0.00	0.00	0.00
12,900.00	89.24	89.65	10,799.95	-1,014.09	1,803.41	1,889.88	0.00	0.00	0.00
13,000.00	89.24	89.65	10,801.28	-1,013.47	1,903.40	1,989.38	0.00	0.00	0.00
13,100.00	89.24	89.65	10,802.62	-1,012.86	2,003.39	2,088.88	0.00	0.00	0.00
13,200.00	89.24	89.65	10,803.95	-1,012.25	2,103.38	2,188.38	0.00	0.00	0.00
13,300.00	89.24	89.65	10,805.28	-1,011.63	2,203.37	2,287.88	0.00	0.00	0.00
13,400.00	89.24	89.65	10,806.61	-1,011.02	2,303.36	2,387.38	0.00	0.00	0.00
13,500.00	89.24	89.65	10,807.94	-1,010.40	2,403.35	2,486.88	0.00	0.00	0.00
13,600.00	89.24	89.65	10,809.27	-1,009.79	2,503.34	2,586.38	0.00	0.00	0.00
13,700.00	89.24	89.65	10,810.60	-1,009.17	2,603.33	2,685.88	0.00	0.00	0.00
13,800.00	89.24	89.65	10,811.93	-1,008.56	2,703.32	2,785.37	0.00	0.00	0.00
13,900.00	89.24	89.65	10,813.26	-1,007.95	2,803.31	2,884.87	0.00	0.00	0.00
14,000.00	89.24	89.65	10,814.59	-1,007.33	2,903.30	2,984.37	0.00	0.00	0.00
14,100.00	89.24	89.65	10,815.92	-1,006.72	3,003.29	3,083.87	0.00	0.00	0.00
14,200.00	89.24	89.65	10,817.25	-1,006.10	3,103.28	3,183.37	0.00	0.00	0.00
14,300.00	89.24	89.65	10,818.58	-1,005.49	3,203.26	3,282.87	0.00	0.00	0.00
14,400.00	89.24	89.65	10,819.91	-1,004.87	3,303.25	3,382.37	0.00	0.00	0.00
14,500.00	89.24	89.65	10,821.24	-1,004.26	3,403.24	3,481.87	0.00	0.00	0.00
14,600.00	89.24	89.65	10,822.57	-1,003.65	3,503.23	3,581.37	0.00	0.00	0.00
14,700.00	89.24	89.65	10,823.90	-1,003.03	3,603.22	3,680.87	0.00	0.00	0.00



MS Directional Planning Report



Database: 5000.1 Conroe DB
Company: Novo Oil & Gas, LLC
Project: Eddy County, New Mexico (NAD 83)
Site: Astrodog Fed Com / Astrodog Fee
Well: Astrodog Fee 0809 236H
Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Astrodog Fee 0809 236H
TVD Reference: WELL @ 3028.00usft (25' RKB)
MD Reference: WELL @ 3028.00usft (25' RKB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
14,800.00	89.24	89.65	10,825.23	-1,002.42	3,703.21	3,780.37	0.00	0.00	0.00
14,900.00	89.24	89.65	10,826.56	-1,001.80	3,803.20	3,879.87	0.00	0.00	0.00
15,000.00	89.24	89.65	10,827.89	-1,001.19	3,903.19	3,979.36	0.00	0.00	0.00
15,100.00	89.24	89.65	10,829.22	-1,000.57	4,003.18	4,078.86	0.00	0.00	0.00
15,200.00	89.24	89.65	10,830.55	-999.96	4,103.17	4,178.36	0.00	0.00	0.00
15,300.00	89.24	89.65	10,831.88	-999.35	4,203.16	4,277.86	0.00	0.00	0.00
15,400.00	89.24	89.65	10,833.21	-998.73	4,303.15	4,377.36	0.00	0.00	0.00
15,500.00	89.24	89.65	10,834.54	-998.12	4,403.14	4,476.86	0.00	0.00	0.00
15,600.00	89.24	89.65	10,835.87	-997.50	4,503.13	4,576.36	0.00	0.00	0.00
15,700.00	89.24	89.65	10,837.20	-996.89	4,603.11	4,675.86	0.00	0.00	0.00
15,800.00	89.24	89.65	10,838.53	-996.27	4,703.10	4,775.36	0.00	0.00	0.00
15,900.00	89.24	89.65	10,839.86	-995.66	4,803.09	4,874.86	0.00	0.00	0.00
16,000.00	89.24	89.65	10,841.19	-995.05	4,903.08	4,974.36	0.00	0.00	0.00
16,100.00	89.24	89.65	10,842.52	-994.43	5,003.07	5,073.85	0.00	0.00	0.00
16,200.00	89.24	89.65	10,843.85	-993.82	5,103.06	5,173.35	0.00	0.00	0.00
16,300.00	89.24	89.65	10,845.18	-993.20	5,203.05	5,272.85	0.00	0.00	0.00
16,400.00	89.24	89.65	10,846.51	-992.59	5,303.04	5,372.35	0.00	0.00	0.00
16,500.00	89.24	89.65	10,847.84	-991.97	5,403.03	5,471.85	0.00	0.00	0.00
16,600.00	89.24	89.65	10,849.17	-991.36	5,503.02	5,571.35	0.00	0.00	0.00
16,700.00	89.24	89.65	10,850.50	-990.75	5,603.01	5,670.85	0.00	0.00	0.00
16,800.00	89.24	89.65	10,851.83	-990.13	5,703.00	5,770.35	0.00	0.00	0.00
16,900.00	89.24	89.65	10,853.16	-989.52	5,802.99	5,869.85	0.00	0.00	0.00
17,000.00	89.24	89.65	10,854.49	-988.90	5,902.97	5,969.35	0.00	0.00	0.00
17,100.00	89.24	89.65	10,855.82	-988.29	6,002.96	6,068.85	0.00	0.00	0.00
17,200.00	89.24	89.65	10,857.15	-987.67	6,102.95	6,168.34	0.00	0.00	0.00
17,300.00	89.24	89.65	10,858.48	-987.06	6,202.94	6,267.84	0.00	0.00	0.00
17,400.00	89.24	89.65	10,859.81	-986.45	6,302.93	6,367.34	0.00	0.00	0.00
17,500.00	89.24	89.65	10,861.14	-985.83	6,402.92	6,466.84	0.00	0.00	0.00
17,600.00	89.24	89.65	10,862.47	-985.22	6,502.91	6,566.34	0.00	0.00	0.00
17,700.00	89.24	89.65	10,863.80	-984.60	6,602.90	6,665.84	0.00	0.00	0.00
17,800.00	89.24	89.65	10,865.13	-983.99	6,702.89	6,765.34	0.00	0.00	0.00
17,900.00	89.24	89.65	10,866.46	-983.37	6,802.88	6,864.84	0.00	0.00	0.00
18,000.00	89.24	89.65	10,867.79	-982.76	6,902.87	6,964.34	0.00	0.00	0.00
18,100.00	89.24	89.65	10,869.12	-982.15	7,002.86	7,063.84	0.00	0.00	0.00
18,200.00	89.24	89.65	10,870.45	-981.53	7,102.85	7,163.34	0.00	0.00	0.00
18,300.00	89.24	89.65	10,871.78	-980.92	7,202.84	7,262.83	0.00	0.00	0.00
18,400.00	89.24	89.65	10,873.11	-980.30	7,302.82	7,362.33	0.00	0.00	0.00
18,500.00	89.24	89.65	10,874.44	-979.69	7,402.81	7,461.83	0.00	0.00	0.00
18,600.00	89.24	89.65	10,875.77	-979.07	7,502.80	7,561.33	0.00	0.00	0.00
18,700.00	89.24	89.65	10,877.10	-978.46	7,602.79	7,660.83	0.00	0.00	0.00
18,800.00	89.24	89.65	10,878.43	-977.85	7,702.78	7,760.33	0.00	0.00	0.00
18,900.00	89.24	89.65	10,879.76	-977.23	7,802.77	7,859.83	0.00	0.00	0.00
19,000.00	89.24	89.65	10,881.09	-976.62	7,902.76	7,959.33	0.00	0.00	0.00
19,100.00	89.24	89.65	10,882.42	-976.00	8,002.75	8,058.83	0.00	0.00	0.00
19,200.00	89.24	89.65	10,883.75	-975.39	8,102.74	8,158.33	0.00	0.00	0.00
19,300.00	89.24	89.65	10,885.08	-974.77	8,202.73	8,257.83	0.00	0.00	0.00
19,400.00	89.24	89.65	10,886.41	-974.16	8,302.72	8,357.32	0.00	0.00	0.00
19,500.00	89.24	89.65	10,887.74	-973.55	8,402.71	8,456.82	0.00	0.00	0.00
19,600.00	89.24	89.65	10,889.07	-972.93	8,502.70	8,556.32	0.00	0.00	0.00
19,700.00	89.24	89.65	10,890.40	-972.32	8,602.69	8,655.82	0.00	0.00	0.00
19,800.00	89.24	89.65	10,891.73	-971.70	8,702.67	8,755.32	0.00	0.00	0.00
19,900.00	89.24	89.65	10,893.06	-971.09	8,802.66	8,854.82	0.00	0.00	0.00
20,000.00	89.24	89.65	10,894.39	-970.47	8,902.65	8,954.32	0.00	0.00	0.00
20,100.00	89.24	89.65	10,895.72	-969.86	9,002.64	9,053.82	0.00	0.00	0.00



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Wellbore: Wellbore #1
Design: Design #1

Local Co-ordinate Reference: Well Astrodog Fee 0809 236H
TVD Reference: WELL @ 3028.00usft (25' RKB)
MD Reference: WELL @ 3028.00usft (25' RKB)
North Reference: Grid
Survey Calculation Method: Minimum Curvature

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
20,200.00	89.24	89.65	10,897.05	-969.25	9,102.63	9,153.32	0.00	0.00	0.00
20,300.00	89.24	89.65	10,898.38	-968.63	9,202.62	9,252.82	0.00	0.00	0.00
20,400.00	89.24	89.65	10,899.71	-968.02	9,302.61	9,352.32	0.00	0.00	0.00
20,500.00	89.24	89.65	10,901.04	-967.40	9,402.60	9,451.82	0.00	0.00	0.00
20,600.00	89.24	89.65	10,902.37	-966.79	9,502.59	9,551.31	0.00	0.00	0.00
20,700.00	89.24	89.65	10,903.70	-966.17	9,602.58	9,650.81	0.00	0.00	0.00
20,800.00	89.24	89.65	10,905.03	-965.56	9,702.57	9,750.31	0.00	0.00	0.00
20,900.00	89.24	89.65	10,906.36	-964.95	9,802.56	9,849.81	0.00	0.00	0.00
21,000.00	89.24	89.65	10,907.69	-964.33	9,902.55	9,949.31	0.00	0.00	0.00
21,100.00	89.24	89.65	10,909.02	-963.72	10,002.53	10,048.81	0.00	0.00	0.00
21,200.00	89.24	89.65	10,910.35	-963.10	10,102.52	10,148.31	0.00	0.00	0.00
21,300.00	89.24	89.65	10,911.68	-962.49	10,202.51	10,247.81	0.00	0.00	0.00
21,398.95	89.24	89.65	10,913.00	-961.88	10,301.45	10,346.26	0.00	0.00	0.00
PBHL									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
FTP - Astrodog Fee 0.	0.00	0.00	10,778.00	-1,024.23	153.31	479,831.11	639,838.25	32.318725	-104.014470
- plan hits target center									
- Point									
PBHL - Astrodog Fee	0.00	0.00	10,913.00	-961.88	10,301.45	479,893.46	649,986.39	32.318810	-103.981618
- plan hits target center									
- Point									



MS Directional Planning Report



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 Site: Astrodog Fed Com / Astrodog Fee
 Well: Astrodog Fee 0809 236H
 Wellbore: Wellbore #1
 Design: Design #1

Local Co-ordinate Reference: Well Astrodog Fee 0809 236H
 TVD Reference: WELL @ 3028.00usft (25' RKB)
 MD Reference: WELL @ 3028.00usft (25' RKB)
 North Reference: Grid
 Survey Calculation Method: Minimum Curvature

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
348.00	348.00	Rustler		0.760	89.65
2,873.00	2,873.00	Base of Salt		0.760	89.65
2,873.00	2,873.00	Bell Canyon		0.760	89.65
3,934.53	3,932.87	Cherry Canyon		0.760	89.65
5,493.25	5,375.60	Brushy Canyon*		0.760	89.65
6,666.21	6,463.90	Bone Spring Lime*		0.760	89.65
7,369.18	7,163.70	Lower Avalon*		0.760	89.65
7,739.18	7,533.70	1st Bone Spring Sand*		0.760	89.65
8,024.18	7,818.70	2nd Bone Spring Carbonate		0.760	89.65
8,499.18	8,293.70	2nd Bone Spring Sand*		0.760	89.65
8,859.18	8,653.70	3rd Bone Spring Carbonate		0.760	89.65
9,189.18	8,983.70	3rd Bone Spring Break Sand*		0.760	89.65
9,469.18	9,263.70	3rd Bone Spring Break Sand Base		0.760	89.65
9,704.18	9,498.70	3rd Bone Spring Sand*		0.760	89.65
10,004.18	9,798.70	Wolfcamp XY*		0.760	89.65
10,159.18	9,953.70	Wolfcamp A*		0.760	89.65
10,409.18	10,203.70	Wolfcamp B		0.760	89.65
10,739.06	10,524.44	Wolfcamp B Flow Unit*		0.760	89.65

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
3,500.00	3,500.00	0.00	0.00	KOP, 2.00°/100' Build
4,831.80	4,784.34	-290.45	-89.87	Begin 26.64° Tangent
5,873.68	5,715.66	-736.67	-227.93	Begin 2.00°/100' Drop
7,205.48	7,000.00	-1,027.12	-317.80	Begin Vertical Hold
10,506.06	10,300.58	-1,027.12	-317.80	Begin 12.00°/100' Build
11,249.71	10,778.00	-1,024.23	153.31	Begin 89.24° Lateral
21,398.95	10,913.00	-961.88	10,301.45	PBHL



U. S. Steel Tubular Products

8/2/2018 2:37:48 PM

5.500" 23.00lbs/ft (0.415" Wall) P110 HP USS-EAGLE SFH™

MECHANICAL PROPERTIES			
	Pipe	USS-EAGLE SFH™	
Minimum Yield Strength	125,000	--	psi
Maximum Yield Strength	140,000	--	psi
Minimum Tensile Strength	130,000	--	psi
DIMENSIONS			
	Pipe	USS-EAGLE SFH™	
Outside Diameter	5.500	5.830	in.
Wall Thickness	0.415	--	in.
Inside Diameter	4.670	4.585	in.
Standard Drift	4.545	4.545	in.
Alternate Drift	--	4.545	in.
Nominal Linear Weight, T&C	23.00	--	lbs/ft
Plain End Weight	22.56	--	lbs/ft
SECTION AREA			
	Pipe	USS-EAGLE SFH™	
Critical Area	6.630	5.507	sq. in.
Joint Efficiency	--	83.1	%
PERFORMANCE			
	Pipe	USS-EAGLE SFH™	
Minimum Collapse Pressure	16,470	16,470	psi
External Pressure Leak Resistance	--	10,000	psi
Minimum Internal Yield Pressure	16,500	16,500	psi
Minimum Pipe Body Yield Strength	829,000	--	lbs
Joint Strength	--	688,000	lbs
Compression Rating	--	688,000	lbs
Reference Length	--	20,332	ft
Maximum Uniaxial Bend Rating	--	86.5	deg/100 ft
MAKE-UP DATA			
	Pipe	USS-EAGLE SFH™	
Make-Up Loss	--	7.00	in.
Minimum Make-Up Torque	--	16,600	ft-lbs
Maximum Make-Up Torque	--	19,800	ft-lbs
Maximum Operating Torque	--	29,800	ft-lbs

Legal Notice

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U. S. Steel Tubular Products
460 Wildwood Forest Drive, Suite 300S
Spring, Texas 77380

1-877-893-9461
connections@uss.com
www.usstubular.com



U. S. Steel Tubular Products

8/2/2018 2:37:48 PM

5.500" 23.00lbs/ft (0.415" Wall) P110 HP USS-EAGLE SFH™

MECHANICAL PROPERTIES			
	Pipe	USS-EAGLE SFH™	
Minimum Yield Strength	125,000	--	psi
Maximum Yield Strength	140,000	--	psi
Minimum Tensile Strength	130,000	--	psi
DIMENSIONS			
	Pipe	USS-EAGLE SFH™	
Outside Diameter	5.500	5.830	in.
Wall Thickness	0.415	--	in.
Inside Diameter	4.670	4.585	in.
Standard Drift	4.545	4.545	in.
Alternate Drift	--	4.545	in.
Nominal Linear Weight, T&C	23.00	--	lbs/ft
Plain End Weight	22.56	--	lbs/ft
SECTION AREA			
	Pipe	USS-EAGLE SFH™	
Critical Area	6.630	5.507	sq. in.
Joint Efficiency	--	83.1	%
PERFORMANCE			
	Pipe	USS-EAGLE SFH™	
Minimum Collapse Pressure	16,470	16,470	psi
External Pressure Leak Resistance	--	10,000	psi
Minimum Internal Yield Pressure	16,500	16,500	psi
Minimum Pipe Body Yield Strength	829,000	--	lbs
Joint Strength	--	688,000	lbs
Compression Rating	--	688,000	lbs
Reference Length	--	20,332	ft
Maximum Uniaxial Bend Rating	--	86.5	deg/100 ft
MAKE-UP DATA			
	Pipe	USS-EAGLE SFH™	
Make-Up Loss	--	7.00	in.
Minimum Make-Up Torque	--	16,600	ft-lbs
Maximum Make-Up Torque	--	19,800	ft-lbs
Maximum Operating Torque	--	29,800	ft-lbs

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U. S. Steel Tubular Products
460 Wildwood Forest Drive, Suite 300S
Spring, Texas 77380

1-877-893-9461
connections@uss.com
www.usstubular.com