

State of New Mexico
Energy, Minerals and Natural Resources Department

Michelle Lujan Grisham
Governor

Sarah Cottrell Propst
Cabinet Secretary

Todd E. Leahy, JD, PhD
Deputy Secretary

Adrienne Sandoval, Division Director
Oil Conservation Division



New Mexico Oil Conservation Division approval and conditions listed below are made in accordance with OCD Rule 19.15.7.11 and are in addition to the actions approved by BLM on the following 3160-3 APD form.

Operator Signature Date: 12/9/2019

Well information:

Operator QVR, Well Name and Number North Hamito Unit 403H

API# 30-045-38184, Section 36, Township 23N/S, Range 8 E/W

Conditions of Approval: (See the below checked and handwritten conditions)

- ☒ Notify Aztec OCD 24hrs prior to casing & cement.
- ☒ If cement doesn't circulate on any casing string or stage tool a CBL will be required. Contact the regulatory agencies prior to proceeding.
- ☒ Hold C-104 for directional survey & "As Drilled" Plat
 - ☐ Hold C-104 for: NSL, NSP, DHC, 5.9 Compliance
 - ☐ Spacing rule violation. Operator must follow up with change of status notification on other well to be shut in or abandoned
 - ☐ Regarding the use of a pit, closed loop system or below grade tank, the operator must comply with the following as applicable:
 - A pit requires a complete C-144 be submitted and approved prior to the construction or use of the pit, pursuant to 19.15.17.8.A
 - A closed loop system requires notification prior to use, pursuant to 19.15.17.9.A
 - A below grade tank requires a registration be filed prior to the construction or use of the below grade tank, pursuant to 19.15.17.8.C
 - ☐ Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string
 - ☐ Submit Gas Capture Plan form prior to spudding or initiating recompletion operations
- ☒ Regarding Hydraulic Fracturing, review EPA Underground Injection Control Guidance 84
- ☒ Oil base muds are not to be used until fresh water zones are cased and cemented providing isolation from the oil or diesel. This includes synthetic oils. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system.
- ☒ Well-bore communication is regulated under 19.15.29 NMAC. This requires well-bore Communication to be reported in accordance with 19.15.29.8.

Bob Bell
NMOCD Approved by Signature

3/6/20
Date

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
APPLICATION FOR PERMIT TO DRILL OR REENTER

1a. Type of work: ☒ DRILL ☐ REENTER		5. Lease Serial No. NMNM117143
1b. Type of Well: ☒ Oil Well ☐ Gas Well ☐ Other		6. If Indian, Allottee or Tribe Name
1c. Type of Completion: ☐ Hydraulic Fracturing ☐ Single Zone ☒ Multiple Zone		7. If Unit or CA Agreement, Name and No. /1/NORTH ALAMITO UNIT / NMNM13522
2. Name of Operator DJR OPERATING LLC		8. Lease Name and Well No. NORTH ALAMITO UNIT 403H
3a. Address 1600 Broadway #1960 Denver CO 80202	3b. Phone No. (include area code) (505)632-3476	9. API Well No. 30-645-38184
4. Location of Well (Report location clearly and in accordance with any State requirements. *) At surface SESE / 414 FSL / 626 FEL / LAT 36.1771866 / LONG -107.6264819 At proposed prod. zone NWSW / 2550 FSL / 346 FWL / LAT 36.1831161 / LONG -107.6408395		10. Field and Pool, or Exploratory NORTH ALAMITO UNIT / MANGOS OIL
11. Sec., T. R. M. or Blk. and Survey or Area SEC 36 / T23N / R8W / NMP		
14. Distance in miles and direction from nearest town or post office* 47 miles		12. County or Parish SAN JUAN
13. State NM		
15. Distance from proposed* location to nearest property or lease line, ft. (Also to nearest drig. unit line, if any) 414 feet	16. No of acres in lease 962.4	17. Spacing Unit dedicated to this well 360.6
18. Distance from proposed location* to nearest well, drilling, completed, applied for, on this lease, ft. 36 feet	19. Proposed Depth 5024 feet / 10213 feet	20. BLM/BIA Bond No. in file FED: NMB001464
21. Elevations (Show whether DF, KDB, RT, GL, etc.) 6949 feet	22. Approximate date work will start* 04/01/2020	23. Estimated duration 10 days
24. Attachments		

The following, completed in accordance with the requirements of Onshore Oil and Gas Order No. 1, and the Hydraulic Fracturing rule per 43 CFR 3162.3-3 (as applicable)

- | | |
|--|---|
| 1. Well plat certified by a registered surveyor. | 4. Bond to cover the operations unless covered by an existing bond on file (see Item 20 above). |
| 2. A Drilling Plan. | 5. Operator certification. |
| 3. A Surface Use Plan (if the location is on National Forest System Lands, the SUPO must be filed with the appropriate Forest Service Office). | 6. Such other site specific information and/or plans as may be requested by the BLM. |

25. Signature (Electronic Submission)	Name (Printed/Typed) Shaw-Marie N. Ford / Ph: (505)632-3476	Date 12/09/2019
Title Regulatory Specialist		
Approved by (Signature) (Electronic Submission)	Name (Printed/Typed) Dave Mankiewicz / Ph: (505)564-7761	Date 02/10/2020
Title AFM-Minerals		
Office FARMINGTON		

Application approval does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Conditions of approval, if any, are attached.

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

NMOCG

FEB 13 2020

DISTRICT III

(Continued on page 2)

APPROVED WITH CONDITIONS
Approval Date: 02/10/2020

*(Instructions on page 2)

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

DISTRICT II
811 S. First St., Artesia, N.M. 88210
Phone: (575) 748-1283 Fax: (575) 748-9720

DISTRICT III
1000 Rio Brazos Rd., Aztec, N.M. 87410
Phone: (505) 334-8178 Fax: (505) 334-6170

DISTRICT IV
1220 S. St. Francis Dr., Santa Fe, N.M. 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, N.M. 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 30-045-38184	² Pool Code 98174	³ Pool Name North Alamito Unit Mancos Oil Pool
⁴ Property Code 325267	⁵ Property Name North Alamito Unit	⁶ Well Number 403H
⁷ GRID No. 371838	⁸ Operator Name DJR Operating, LLC	⁹ Elevation 6949

¹⁰ Surface Location

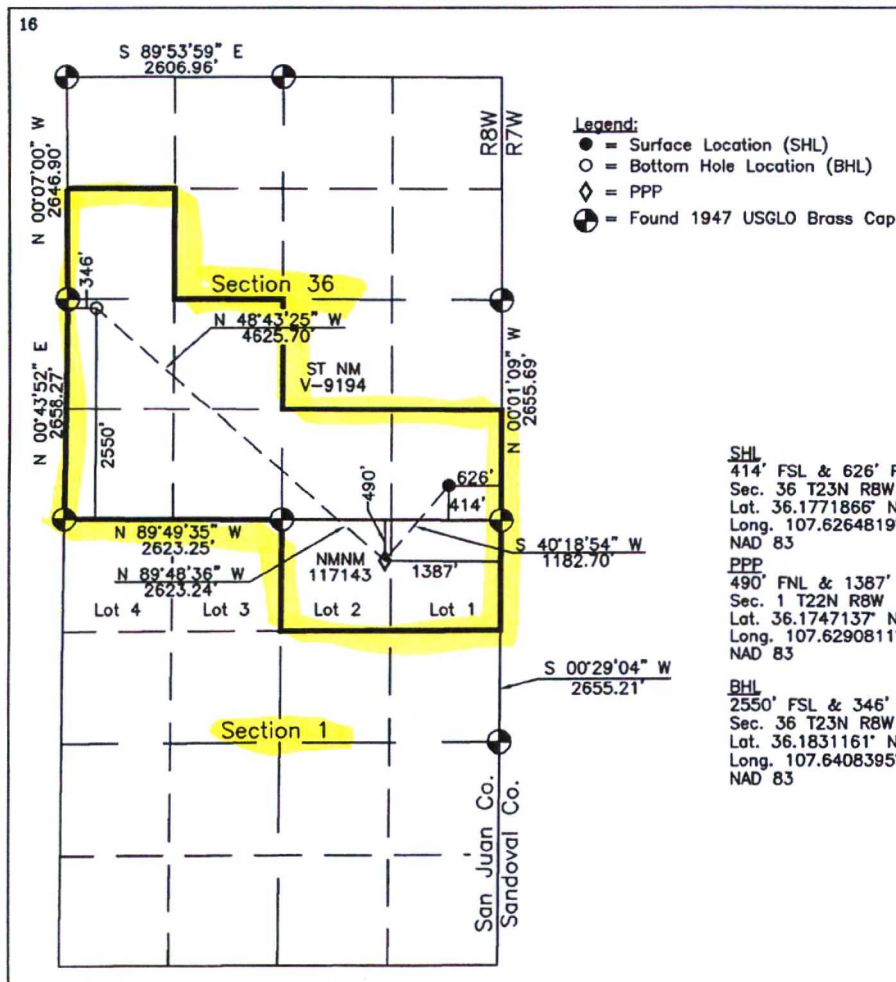
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
P	36	23 N	8 W		414	South	626	East	San Juan

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
L	36	23 N	8 W		2550	South	346	West	San Juan

¹² Dedicated Acres SEC. 36=SW/NW, SW, S/2 SE, SEC. 1=LOT 1 (40.15 AC.), LOT 2 (40.45 AC.) TOTAL = 360.60 ACRES	¹³ Joint or Infill	¹⁴ Consolidation Code	¹⁵ Order No. R-14081, R-14081A
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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 or a compulsory pooling order heretofore entered by the division.

Signature

11-4-19

Date

Printed Name

E-mail Address

18 SURVEYOR CERTIFICATION

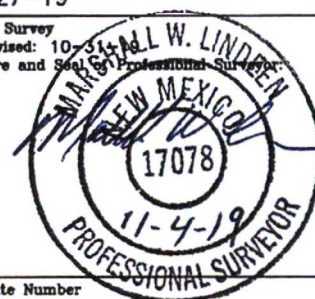
I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my belief.

3-27-19

Date of Survey

Plat Revised: 10-31-18

Signature and Seal of Professional Surveyor



Certificate Number

Surface = Shute

DRILLING PLAN **NAU 403H** **Sandoval County, New Mexico**

Surface Location

626-ft FEL & 414-ft FSL
 Sec 36 T23N R8W
 Graded Elevation 6948' MSL
 RKB Elevation 6962' (14' KB)

SHL Geographical Coordinates (NAD-83)

Latitude 36.1771866° N
 Longitude 107.6264819° W

Kick Off Point for Horizontal Build Curve

4472-ft MD
 4282-ft TVD

Local Coordinates (from SHL)

1153-ft South
 159-ft West

Heel Location (Pay zone entry)

1387-ft FEL & 490-ft FNL
 Sec 1 T22N R8W

Heel Geographical Coordinates (NAD-83)

Latitude 36.1747137° N
 Longitude 107.62908110° W

Bottom Hole Location (TD)

346-ft FWL & 2550-ft FSL
 Sec 36 T23N R8W

BHL Geographical Coordinates (NAD-83)

Latitude 36.1831161° N
 Longitude 107.6408395° W

Well objectives

This well is planned as a 4620-ft lateral in the Gallup C sand.

Bottom Hole temperature and pressure

The temperature in the Gallup C horizontal objective is 138°F. Bottom hole pressure in the Gallup C is forecast to be 1985 psi.

Formation Tops (Sd = Sand; Sh = Shale; Siltstone = Slt, Coal = C; W = water; O = oil; G = gas; NP = no penetration)

Name	MD (ft)	TVD (ft)	Lithology	Pore fluid	Expected Pore Pressure (ppg)	Planned Mud Weight (ppg)
Ojo Alamo	861	860	Sd	W	8.3	8.4 – 8.8
Kirtland	1047	1043	Sh	-	8.3	8.4 – 8.8
Fruitland	1133	1128	C	G	8.3	9.0 - 9.5
Pictured Cliffs	1391	1377	Sd	W	8.3	9.0 - 9.5
Lewis	1573	1549	Sh	-		9.0 - 9.5
Chacra	2168	2110	Sd	-	8.3	9.0 - 9.5
Menefee	2983	2878	Sd, C	G	8.3	9.0 - 9.5
Point Lookout	3917	3758	Sd	-	8.3	9.0 - 9.5
Mancos	4089	3921	Sh	-		9.0 - 9.5
Mancos Silt	4462	4272	Slt	O/G	6.6	9.0 - 9.5
Gallup A	4973	4740	Slt	O/G	6.6	9.0 - 9.5
Gallup B	5020	4776	Sd	O/G	6.6	8.8 - 9.0
Gallup C	5164	4873	Sd	O/G	6.6	8.8 - 9.0
Target	5587	5005	Sd	O/G	6.6	8.8 - 9.0

Casing Program

Casing OD	Hole Size	Weight (#/ft)	Grade	Coupling	MD Top	MD Bottom	TVD Top	TVD Bottom	Top of Cement
9-5/8"	12-1/4"	36	K-55	STC	surf	350	surf	350	surface
7"	8-3/4"	26	K-55	LTC	surf	5532	surf	5002	surface
4-1/2"	6-1/8"	11.6	P-110	BTC	5241	10213	4915	5024	5241

Note: all casing will be new

Casing Design Load Cases

		Casing String		
	Description	9-5/8" Surface	7" Intermediate	4-1/2" Production Liner
Collapse	Full internal evacuation ¹	✓	✓	✓
	Cementing	✓	✓	✓
Burst	Pressure test	✓ ²	✓ ²	✓
	Gas kick		✓ ³	
	Fracture at shoe, 1/3 BHP at surface		✓ ⁴	
	Injection down casing			✓ ⁵
Axial	Dynamic load on casing coupling ⁶	✓	✓	✓
Axial	Overpull ⁷	✓	✓	✓

Note

- 1 Fluid level at shoe, air column to surface, pore pressure outside
- 2 Tested to 80% of minimum internal yield with freshwater inside, pore pressure outside
- 3 50 bbl kick at TD, 0.50 ppg intensity, 4" drill pipe, 9.0 ppg mud, fracture gradient at shoe
- 4 2060 psi BHP, 687 psi surface pressure, 12.5 ppg EMW shoe integrity
- 5 Surface stimulation pressure of 8000 psi on 8.3 ppg fluid column. Stimulation will be down frac string, so load does not apply to 7" intermediate casing.
- 6 Shock load from abrupt pipe deceleration, evaluated against coupling rating
- 7 Overpull values as follows: Surface casing 20,000 lbs, Intermediate & Production 100,000 lbs

Casing Design Factors

		Design Factors			
Casing string	Casing OD	Burst	Collapse	Axial	Triaxial
Surface	9-5/8"	1.25	13.38	8.16	1.56
Intermediate	7"	1.25	1.50	1.68	1.34
Production liner	4-1/2"	1.37	3.68	1.88	1.69

Cement Design

Additives: A=Accelerator; B=Bond Enhancer; De=Defoamer; Di=Dispersant; Ex=Extender; FI=Fluid Loss L=Lost Circulation; R=Retarder; SA=Suspending Agent; THX=Thixotropic Additive; V=Viscosifier

9-5/8" Surface Casing	Lead
Name	Redi-Mix
Type	I-II
Additives	20% Fly Ash
Planned top	Surface
Density (ppg)	14.50
Yield (cf/sx)	1.61
Mix water (gal/sx)	7.41
Volume (sx)	114
Volume (bbls)	33
Volume (cu. ft.)	185
Excess %	50

<u>7" Intermediate Casing</u>		<u>Lead</u>	<u>Tail</u>
Name	BJ Services	BJ Services	
Type	III	Poz/G	
Additives	FI, De, R	De, FI, Ex	
Planned top	Surface	3972-ft	
Density (ppg)	12.30	13.50	
Yield (cf/sx)	2.34	7.20	
Mix water (gal/sx)	13.26	5.64	
Volume (sx)	358	319	
Volume (bbls)	149	85	
Volume (cu.ft.)	838	476	
Excess %	60	60	

<u>4-1/2" Production Liner</u>		<u>Lead</u>	
Name	BJ Services		
Type	Poz/G		
Additives	De, R, FI, Ex		
Planned top	5241-ft		
Density (ppg)	13.3		
Yield (cf/sx)	1.56		
Mix water (gal/sx)	7.71		
Volume (sx)	417		
Volume (bbls)	116		
Volume (cu.ft)	651		
Excess %	40		

Wellhead & Pressure Control

The well head will be an 11" 5M multi-bowl system. A 3M BOPE conforming to Onshore Order #2 will be installed on the surface casing. The BOP and accumulator will meet API 16D and 16E respectively.

A PVT mud monitoring system and a trip tank will be rigged up and operational for all hole intervals. An electronic geograph will be employed to monitor and record drilling data (ROP, WOB, SPM, Pressure, RPM and torque).

Mud Program

Surface hole will be drilled with a fresh water, native mud system. In intermediate hole, a low weight 7% KCL LSND drilling fluid will be used, with KCL providing chemical stability for the young shales and clays present in the interval. In production hole a LSND system with polymer and lubricant additives is programmed. Sufficient drill water and mud additives will be on hand to maintain adequate pit volumes and maintain well control.

Hole Section	Fluid type	Interval (MD)	Density (ppg)	Funnel Viscosity	Yield Point	Fluid Loss (cc/30 min)
Surface	Fresh water spud mud	0 – 350	8.4 – 8.8	32 – 44	2 – 12	NC
Intermediate	7% KCL Low solids, non-dispersed	350 – 5532	9.0 – 9.5	38 – 45	8 – 14	<20
Production	Low solids, non-dispersed	5532 – 10213	8.8 – 9.2	34 – 38	6 – 8	6 – 8

Cores, tests and logs

Wellbore surveying: Drift (inclination only) surveys will be obtained in surface hole. MWD directional surveys will be taken in intermediate and production hole.

Logging while drilling: None in surface hole. MWD GR in intermediate and production hole.

Mud logging: a two-person mud logging unit with C1 – C4 gas analysis will be operational in intermediate and production hole.

Electric logging: No open hole electric logs are programmed. A cased hole GR/CCL will be run during completions for perforating depth control.

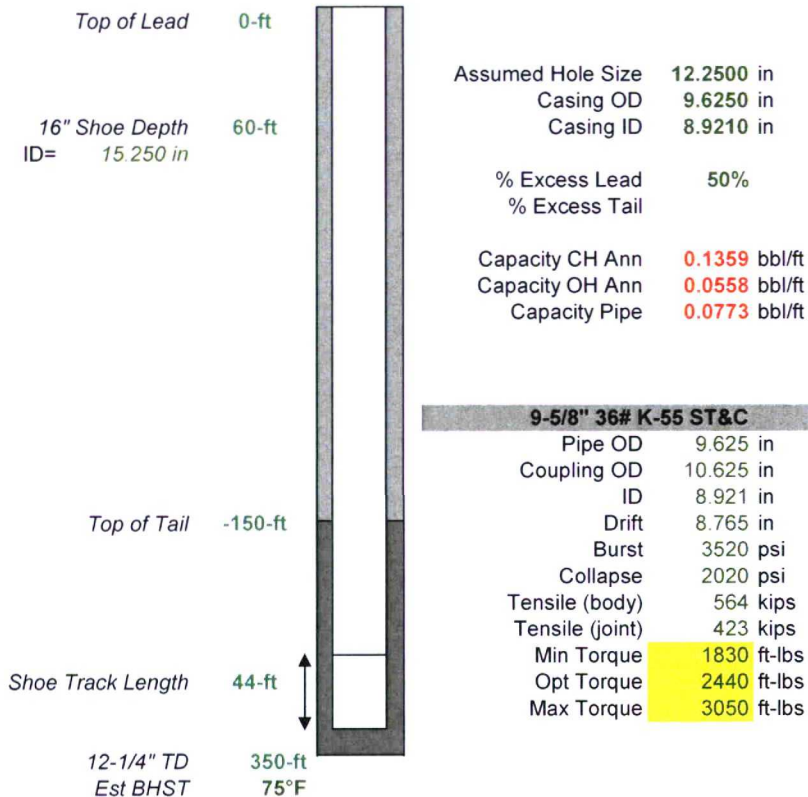
✓ **Cuttings and drilling fluids management**

A closed loop, steel tank-based circulating system will be used. In addition to the rig solids control equipment, a dewatering centrifuge and chemical flocculation system will be operational to strip solids from the whole mud. All solids will be collected in 3-sided bins and will then be put into transports with a bucket loader. Drying agents will be used if necessary. The solids will be taken to a licensed commercial disposal facility. Whole mud will be dewatered back to drill water and used as make up for subsequent wells or hauled off for disposal. A diagram of the closed loop system is included.

Completion

It is envisioned that this well will be completed with a multi-stage sand frac, using the plug and perf technique. After drilling out the plugs, the current plan is to install a 2-7/8" plunger-assisted gas lift tubing string. The stimulation and completion plan will be sundried at a later date.

9-5/8" Surface Casing & Cementing



Lead Slurry		Properties	
Redi Mix Type I/II		Density	14.50 ppg
20% Fly Ash		Yield	1.61 cf/sk
		Total Mix Fluid	7.41 gal/sk
		Est pump time (70Bc)	NA
		8-hr compressive	475 psi
		24-hr compressive	1375 psi
Tail Slurry		Properties	
		Density	ppg
		Yield	cf/sk
		Total Mix Fluid	gal/sk
		Est pump time (70Bc)	
		50 psi strength in	
		24/72 hr strength	psi
Volumes			
Lead Volume	33 bbls	114 sx	
Tail Volume	bbls	sx	
Displacement	24 bbls		
Total Volume	56 bbls		

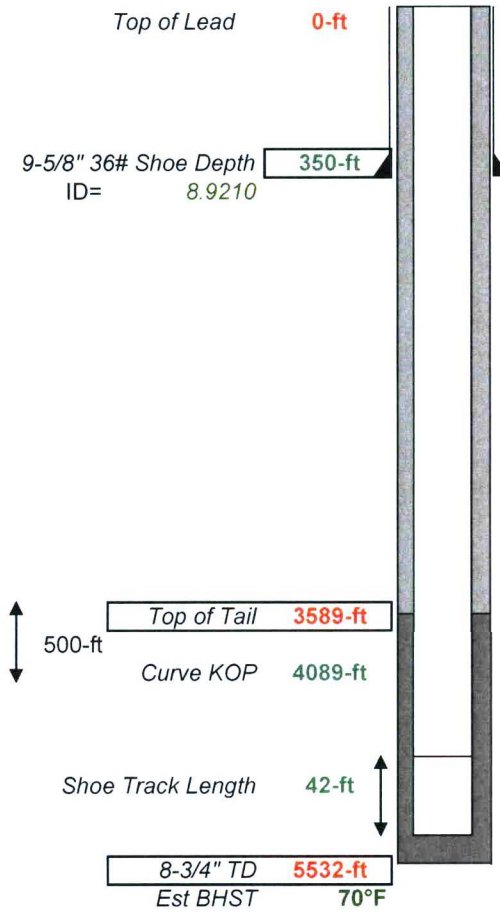
Casing Jewelry and Pump Schedule

Run guide shoe, 1 joint, then float collar. Centralize with 1 one bow spring per joint for the first 500-ft, then 1 every third joint to surface. Bottom centralizer to be 10-ft above guide shoe with stop collar above, thereafter around the coupling. Thread lock guide shoe, shoe track and float collar.

Pump schedule: 40 bbls fresh water, drop bottom plug, lead, tail, top plug, displace with water. Land wellhead housing on u-plate.

403H

7" Intermediate Casing & Cementing NAU 403H



Assumed Hole Size Lead	8.7500	in
Assumed Hole Size Tail	8.7500	in
Casing OD	7.0000	in
Casing ID	6.2760	in

% OH Excess Lead	60%
% OH Excess Tail	60%

Capacity CH Ann	0.0297	bbl/ft
Capacity OH Ann Lead	0.0268	bbl/ft
Capacity OH Ann Tail	0.0268	bbl/ft
Capacity Pipe	0.0383	bbl/ft

7" 26# K-55 LT&C

Pipe OD	7.000	in
Weight	26	lbs/ft
Grade	K-55	
Coupling	LTC	
Coupling OD	7.656	in
ID	6.276	in
Drift	6.151	in
Burst	4980	psi
Collapse	4330	psi
Tensile (body)	415	kips
Tensile (joint)	367	kips
Min Torque		ft-lbs
Opt Torque		ft-lbs
Max Torque		ft-lbs

BJ Lead Slurry		Properties	
Type III		Density	12.30 ppg
BA-90	5 lb/sx%	Yield	2.3404 cf/sk
KCI	3.00%	Total Mix Fluid	13.26 gal/sk
GW-86	0.10%	Thickening Time	3:11 hr:min
FL-66	0.20%	Time to 50 psi (80°F)	5:10 hr:min
R-3	0.50%	24-hr UCA (80°F)	659 psi
FP-25	0.30%		

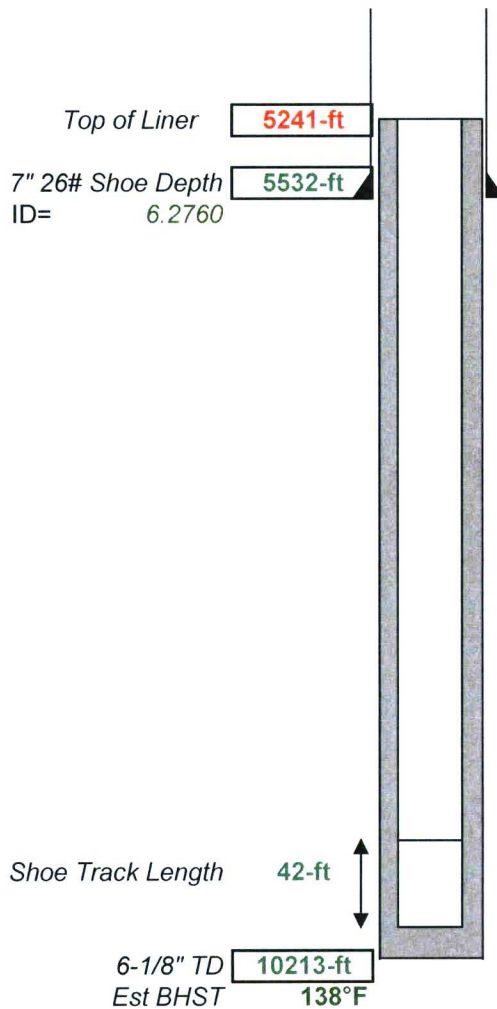
BJ Tail Slurry		Properties	
G+Pozz	50:50	Density	13.50 ppg
BA-90	3 lb/sx	Yield	1.4946 cf/sk
FL-66	0.40%	Total Mix Fluid	7.24 gal/sk
FP-25	0.30%	Thickening Time	3:26 hr:min
Sod. Met	0.50%	Time to 50 psi (135°F)	2:55 hr:min
Gyp	3.00%	Time to 500 psi (135°F)	6:40 hr:min

Volumes

Lead Volume	149	bbls	358	sx
Tail Volume	85	bbls	319	sx
Approx Displacement	210	bbls		
Total Volume	444	bbls		

403H

4-1/2" Liner Cementing
NAU 403H



Assumed Hole Size 6.1250 in

Casing OD 4.5000 in

Casing ID 4.0000 in

% Excess Open Hole 40%

Capacity CH Ann 0.0186 bbl/ft

Capacity OH Ann 0.0168 bbl/ft

Capacity Pipe 0.0155 bbl/ft

4-1/2" 11.6# P-110 LT&C

Pipe OD 4.500 in

Weight 11.6 lbs/ft

Grade P-110

Coupling LTC

Coupling OD 5.000 in

ID 4.000 in

Drift 3.875 in

Burst 10690 psi

Collapse 7580 psi

Tensile (body) 367 kips

Tensile (joint) 279 kips

Min Torque ft-lbs

Opt Torque ft-lbs

Max Torque ft-lbs

BJ Lead Slurry		Properties	
G+Pozz	50:50	Density	13.30 ppg
BA-90	3 lb/sx	Yield	1.5629 cf/sk
GW-86	0.10%	Total Mix Fluid	7.70 gal/sk
R-3	0.40%	Thickening Time	6:04 hr:min
FP-25	30.00%	Time to 50 psi (147°F)	7:15 hr:min
FL-24	0.40%	24-hr UCA (147°F)	1293 psi
Gel	4.00%		

Volumes

Lead Volume 116 bbls 417 sx

Approx Displacement 110 bbls

Total Volume 226 bbls



Company: DJR Operating
Project: North Alamito Unit
Site: P36 2308
Well: NAU 403H
Wellbore: Original drilling
Design: APD rev 1

PROJECT DETAILS: North Alamito Unit

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



Azimuths to True North
Magnetic North: 8.98°

Magnetic Field
Strength: 49558.5snT
Dip Angle: 62.86°
Date: 1/24/2019
Model: IGRF2015

WELL DETAILS: NAU 403H

GL 6948' & RKB 14' @ 6962.00usft (Aztec 920)
+N/-S +E/-W Northing Easting Latitude Longitude
0.00 0.00 1883857.98 2784138.59 36.1771866 -107.6264819

Plan: APD rev 1 (NAU 403H/Original drilling)

Created By: Janie Collins Date: 11:18, November 04 2019

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
403H heel rev 1	5005.01	-900.17	-767.11	1882956.17	2783373.40	36.1747137	-107.6290811
403H toe rev 1	5024.01	2158.77	-4236.97	1886007.71	2779897.03	36.1831161	-107.6408395

SECTION DETAILS

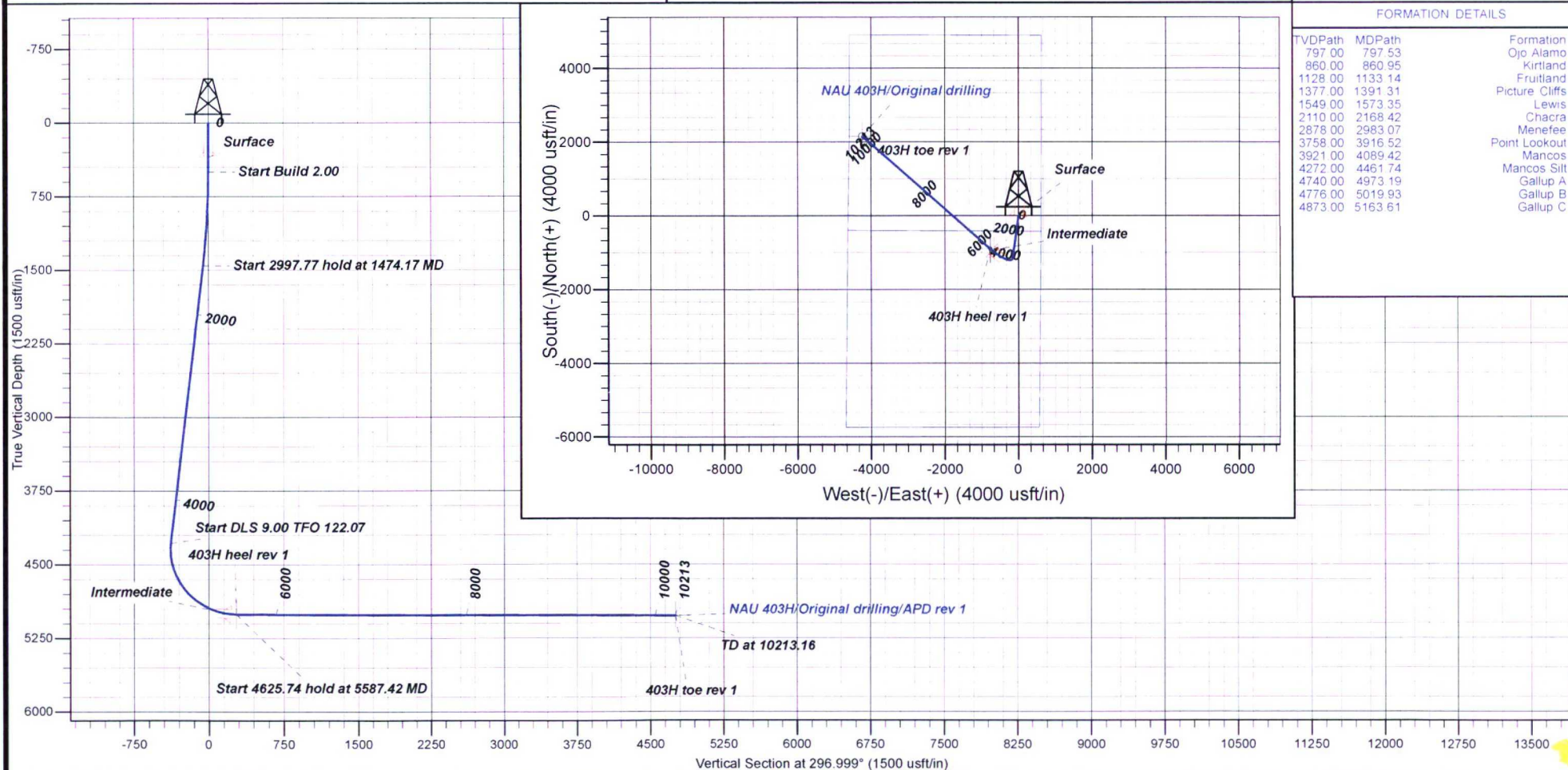
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.000	500.00	0.00	0.00	0.00	0.00	0.00	
1474.17	19.48	187.860	1455.50	-162.50	-22.43	2.00	187.86	-53.78	
4471.94	19.48	187.860	4281.62	-1152.97	-159.17	0.00	0.00	-381.60	
5587.42	89.76	311.399	5005.01	-900.17	-767.11	9.00	122.07	274.85	403H heel rev 1
10213.16	89.76	311.399	5024.01	2158.77	-4236.97	0.00	0.00	4755.23	403H toe rev 1

CASING DETAILS

TVD	MD	Name
350.00	350.00	Surface
5002.48	5532.20	Intermediate

FORMATION DETAILS

TVDPath	MDPath	Formation
797.00	797.53	Ojo Alamo
860.00	860.95	Kirtland
1128.00	1133.14	Fruitland
1377.00	1391.31	Picture Cliffs
1549.00	1573.35	Lewis
2110.00	2168.42	Chacra
2878.00	2983.07	Menefee
3758.00	3916.52	Point Lookout
3921.00	4089.42	Mancos
4272.00	4461.74	Mancos Silt
4740.00	4973.19	Gallup A
4776.00	5019.93	Gallup B
4873.00	5163.61	Gallup C





DJR Operating

North Alamito Unit

P36 2308

NAU 403H

Original drilling

Plan: APD rev 1

Standard Planning Report

04 November, 2019



www.scientificdrilling.com

Database: Grand Junction District
Company: DJR Operating

Project: North Alamito Unit

Site: P36 2308
Well: NAU 403H
Wellbore: Original drilling
Design: APD rev 1

Local Co-ordinate Reference: Well NAU 403H
TVD Reference: GL 6948' & RKB 14' @ 6962.00usft (Aztec 920)
MD Reference: GL 6948' & RKB 14' @ 6962.00usft (Aztec 920)
North Reference: True
Survey Calculation Method: Minimum Curvature

Project	North Alamito Unit		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Western Zone		

Site	P36 2308		
Site Position:		Northing:	1,883,911.47 usft
From:	Lat/Long	Easting:	2,784,111.65 usft
Position Uncertainty:	0.00 usft	Slot Radius:	16.00 in
		Latitude:	36.1773337
		Longitude:	-107.6265728
		Grid Convergence:	0.12 °

Well	NAU 403H		
Well Position	+N/-S	-53.55 usft	Northing: 1,883,857.98 usft
	+E/-W	26.83 usft	Easting: 2,784,138.59 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	36.1771866
		Longitude:	-107.6264819
		Ground Level:	6,948.00 usft

Wellbore	Original drilling				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/24/2019	8.98	62.86	49,559

Design	APD rev 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	296.999	

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	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.000	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,474.17	19.48	187.860	1,455.51	-162.50	-22.43	2.00	2.00	0.00	187.86	
4,471.94	19.48	187.860	4,281.62	-1,152.97	-159.17	0.00	0.00	0.00	0.00	
5,587.42	89.76	311.399	5,005.01	-900.17	-767.11	9.00	6.30	11.07	122.07	403H heel rev 1
10,213.16	89.76	311.399	5,024.01	2,158.77	-4,236.97	0.00	0.00	0.00	0.00	403H toe rev 1

Database: Grand Junction District
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Project: North Alamito Unit

Site: P36 2308
Well: NAU 403H
Wellbore: Original drilling
Design: APD rev 1

Local Co-ordinate Reference: Well NAU 403H
TVD Reference: GL 6948' & RKB 14' @ 6962.00usft (Aztec 920)
MD Reference: GL 6948' & RKB 14' @ 6962.00usft (Aztec 920)
North Reference: True
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	0.000	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.000	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.000	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.000	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.000	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.000	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	2.00	187.860	599.98	-1.73	-0.24	-0.57	2.00	2.00	0.00
700.00	4.00	187.860	699.84	-6.91	-0.95	-2.29	2.00	2.00	0.00
800.00	6.00	187.860	799.45	-15.55	-2.15	-5.15	2.00	2.00	0.00
900.00	8.00	187.860	898.70	-27.62	-3.81	-9.14	2.00	2.00	0.00
1,000.00	10.00	187.860	997.47	-43.11	-5.95	-14.27	2.00	2.00	0.00
1,100.00	12.00	187.860	1,095.62	-62.01	-8.56	-20.53	2.00	2.00	0.00
1,200.00	14.00	187.860	1,193.06	-84.30	-11.64	-27.90	2.00	2.00	0.00
1,300.00	16.00	187.860	1,289.64	-109.94	-15.18	-36.39	2.00	2.00	0.00
1,400.00	18.00	187.860	1,385.27	-138.90	-19.18	-45.97	2.00	2.00	0.00
1,474.17	19.48	187.860	1,455.51	-162.50	-22.43	-53.78	2.00	2.00	0.00
1,500.00	19.48	187.860	1,479.85	-171.04	-23.61	-56.61	0.00	0.00	0.00
1,600.00	19.48	187.860	1,574.13	-204.08	-28.17	-67.54	0.00	0.00	0.00
1,700.00	19.48	187.860	1,668.40	-237.12	-32.74	-78.48	0.00	0.00	0.00
1,800.00	19.48	187.860	1,762.68	-270.16	-37.30	-89.41	0.00	0.00	0.00
1,900.00	19.48	187.860	1,856.95	-303.20	-41.86	-100.35	0.00	0.00	0.00
2,000.00	19.48	187.860	1,951.22	-336.24	-46.42	-111.28	0.00	0.00	0.00
2,100.00	19.48	187.860	2,045.50	-369.28	-50.98	-122.22	0.00	0.00	0.00
2,200.00	19.48	187.860	2,139.77	-402.32	-55.54	-133.16	0.00	0.00	0.00
2,300.00	19.48	187.860	2,234.04	-435.36	-60.10	-144.09	0.00	0.00	0.00
2,400.00	19.48	187.860	2,328.32	-468.40	-64.66	-155.03	0.00	0.00	0.00
2,500.00	19.48	187.860	2,422.59	-501.44	-69.23	-165.96	0.00	0.00	0.00
2,600.00	19.48	187.860	2,516.87	-534.48	-73.79	-176.90	0.00	0.00	0.00
2,700.00	19.48	187.860	2,611.14	-567.52	-78.35	-187.83	0.00	0.00	0.00
2,800.00	19.48	187.860	2,705.41	-600.56	-82.91	-198.77	0.00	0.00	0.00
2,900.00	19.48	187.860	2,799.69	-633.60	-87.47	-209.70	0.00	0.00	0.00
3,000.00	19.48	187.860	2,893.96	-666.64	-92.03	-220.64	0.00	0.00	0.00
3,100.00	19.48	187.860	2,988.23	-699.68	-96.59	-231.57	0.00	0.00	0.00
3,200.00	19.48	187.860	3,082.51	-732.72	-101.16	-242.51	0.00	0.00	0.00
3,300.00	19.48	187.860	3,176.78	-765.76	-105.72	-253.44	0.00	0.00	0.00
3,400.00	19.48	187.860	3,271.06	-798.80	-110.28	-264.38	0.00	0.00	0.00
3,500.00	19.48	187.860	3,365.33	-831.84	-114.84	-275.31	0.00	0.00	0.00
3,600.00	19.48	187.860	3,459.60	-864.88	-119.40	-286.25	0.00	0.00	0.00
3,700.00	19.48	187.860	3,553.88	-897.92	-123.96	-297.18	0.00	0.00	0.00
3,800.00	19.48	187.860	3,648.15	-930.96	-128.52	-308.12	0.00	0.00	0.00
3,900.00	19.48	187.860	3,742.42	-964.00	-133.08	-319.06	0.00	0.00	0.00
4,000.00	19.48	187.860	3,836.70	-997.04	-137.65	-329.99	0.00	0.00	0.00
4,100.00	19.48	187.860	3,930.97	-1,030.08	-142.21	-340.93	0.00	0.00	0.00
4,200.00	19.48	187.860	4,025.25	-1,063.12	-146.77	-351.86	0.00	0.00	0.00
4,300.00	19.48	187.860	4,119.52	-1,096.16	-151.33	-362.80	0.00	0.00	0.00
4,400.00	19.48	187.860	4,213.79	-1,129.20	-155.89	-373.73	0.00	0.00	0.00
4,471.94	19.48	187.860	4,281.62	-1,152.97	-159.17	-381.60	0.00	0.00	0.00
4,500.00	18.26	194.702	4,308.17	-1,161.86	-160.93	-384.07	9.00	-4.35	24.39
4,600.00	16.44	224.602	4,403.80	-1,187.15	-174.87	-383.13	9.00	-1.82	29.90
4,700.00	19.09	253.127	4,499.20	-1,202.00	-200.51	-367.02	9.00	2.65	28.53
4,800.00	24.83	271.906	4,592.02	-1,206.06	-237.22	-336.15	9.00	5.73	18.78
4,900.00	32.02	283.360	4,679.97	-1,199.22	-284.10	-291.28	9.00	7.20	11.45

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Site: P36 2308
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Wellbore: Original drilling
Design: APD rev 1

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MD Reference: GL 6948' & RKB 14' @ 6962.00usft (Aztec 920)
North Reference: True
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)
5,000.00	39.90	290.830	4,760.89	-1,181.65	-339.98	-233.52	9.00	7.87	7.47
5,100.00	48.11	296.144	4,832.79	-1,153.79	-403.50	-164.27	9.00	8.21	5.31
5,200.00	56.51	300.227	4,893.88	-1,116.32	-473.09	-85.26	9.00	8.40	4.08
5,300.00	65.03	303.580	4,942.68	-1,070.16	-547.03	1.58	9.00	8.51	3.35
5,400.00	73.60	306.494	4,977.98	-1,016.45	-623.51	94.11	9.00	8.58	2.91
5,500.00	82.22	309.161	4,998.90	-956.52	-700.64	190.04	9.00	8.61	2.67
5,587.42	89.76	311.399	5,005.01	-900.17	-767.11	274.85	9.00	8.63	2.56
5,600.00	89.76	311.399	5,005.06	-891.86	-776.55	287.03	0.00	0.00	0.00
5,700.00	89.76	311.399	5,005.47	-825.73	-851.56	383.89	0.00	0.00	0.00
5,800.00	89.76	311.399	5,005.88	-759.60	-926.57	480.75	0.00	0.00	0.00
5,900.00	89.76	311.399	5,006.29	-693.47	-1,001.59	577.61	0.00	0.00	0.00
6,000.00	89.76	311.399	5,006.70	-627.34	-1,076.60	674.46	0.00	0.00	0.00
6,100.00	89.76	311.399	5,007.11	-561.21	-1,151.61	771.32	0.00	0.00	0.00
6,200.00	89.76	311.399	5,007.52	-495.08	-1,226.62	868.18	0.00	0.00	0.00
6,300.00	89.76	311.399	5,007.93	-428.95	-1,301.64	965.04	0.00	0.00	0.00
6,400.00	89.76	311.399	5,008.35	-362.83	-1,376.65	1,061.90	0.00	0.00	0.00
6,500.00	89.76	311.399	5,008.76	-296.70	-1,451.66	1,158.75	0.00	0.00	0.00
6,600.00	89.76	311.399	5,009.17	-230.57	-1,526.67	1,255.61	0.00	0.00	0.00
6,700.00	89.76	311.399	5,009.58	-164.44	-1,601.68	1,352.47	0.00	0.00	0.00
6,800.00	89.76	311.399	5,009.99	-98.31	-1,676.70	1,449.33	0.00	0.00	0.00
6,900.00	89.76	311.399	5,010.40	-32.18	-1,751.71	1,546.18	0.00	0.00	0.00
7,000.00	89.76	311.399	5,010.81	33.95	-1,826.72	1,643.04	0.00	0.00	0.00
7,100.00	89.76	311.399	5,011.22	100.08	-1,901.73	1,739.90	0.00	0.00	0.00
7,200.00	89.76	311.399	5,011.63	166.21	-1,976.74	1,836.76	0.00	0.00	0.00
7,300.00	89.76	311.399	5,012.04	232.33	-2,051.76	1,933.62	0.00	0.00	0.00
7,400.00	89.76	311.399	5,012.45	298.46	-2,126.77	2,030.47	0.00	0.00	0.00
7,500.00	89.76	311.399	5,012.86	364.59	-2,201.78	2,127.33	0.00	0.00	0.00
7,600.00	89.76	311.399	5,013.27	430.72	-2,276.79	2,224.19	0.00	0.00	0.00
7,700.00	89.76	311.399	5,013.68	496.85	-2,351.80	2,321.05	0.00	0.00	0.00
7,800.00	89.76	311.399	5,014.10	562.98	-2,426.82	2,417.90	0.00	0.00	0.00
7,900.00	89.76	311.399	5,014.51	629.11	-2,501.83	2,514.76	0.00	0.00	0.00
8,000.00	89.76	311.399	5,014.92	695.24	-2,576.84	2,611.62	0.00	0.00	0.00
8,100.00	89.76	311.399	5,015.33	761.36	-2,651.85	2,708.48	0.00	0.00	0.00
8,200.00	89.76	311.399	5,015.74	827.49	-2,726.86	2,805.34	0.00	0.00	0.00
8,300.00	89.76	311.399	5,016.15	893.62	-2,801.88	2,902.19	0.00	0.00	0.00
8,400.00	89.76	311.399	5,016.56	959.75	-2,876.89	2,999.05	0.00	0.00	0.00
8,500.00	89.76	311.399	5,016.97	1,025.88	-2,951.90	3,095.91	0.00	0.00	0.00
8,600.00	89.76	311.399	5,017.38	1,092.01	-3,026.91	3,192.77	0.00	0.00	0.00
8,700.00	89.76	311.399	5,017.79	1,158.14	-3,101.92	3,289.62	0.00	0.00	0.00
8,800.00	89.76	311.399	5,018.20	1,224.27	-3,176.94	3,386.48	0.00	0.00	0.00
8,900.00	89.76	311.399	5,018.61	1,290.40	-3,251.95	3,483.34	0.00	0.00	0.00
9,000.00	89.76	311.399	5,019.02	1,356.52	-3,326.96	3,580.20	0.00	0.00	0.00
9,100.00	89.76	311.399	5,019.44	1,422.65	-3,401.97	3,677.05	0.00	0.00	0.00
9,200.00	89.76	311.399	5,019.85	1,488.78	-3,476.98	3,773.91	0.00	0.00	0.00
9,300.00	89.76	311.399	5,020.26	1,554.91	-3,552.00	3,870.77	0.00	0.00	0.00
9,400.00	89.76	311.399	5,020.67	1,621.04	-3,627.01	3,967.63	0.00	0.00	0.00
9,500.00	89.76	311.399	5,021.08	1,687.17	-3,702.02	4,064.49	0.00	0.00	0.00
9,600.00	89.76	311.399	5,021.49	1,753.30	-3,777.03	4,161.34	0.00	0.00	0.00
9,700.00	89.76	311.399	5,021.90	1,819.43	-3,852.05	4,258.20	0.00	0.00	0.00
9,800.00	89.76	311.399	5,022.31	1,885.56	-3,927.06	4,355.06	0.00	0.00	0.00
9,900.00	89.76	311.399	5,022.72	1,951.68	-4,002.07	4,451.92	0.00	0.00	0.00
10,000.00	89.76	311.399	5,023.13	2,017.81	-4,077.08	4,548.77	0.00	0.00	0.00

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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)
10,100.00	89.76	311.399	5,023.54	2,083.94	-4,152.09	4,645.63	0.00	0.00	0.00
10,200.00	89.76	311.399	5,023.95	2,150.07	-4,227.11	4,742.49	0.00	0.00	0.00
10,213.16	89.76	311.399	5,024.01	2,158.77	-4,236.97	4,755.23	0.00	0.00	0.00

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
403H heel rev 1 - plan hits target center - Circle (radius 50.00)	0.00	0.000	5,005.01	-900.17	-767.11	1,882,956.17	2,783,373.40	36.1747137	-107.6290811
403H toe rev 1 - plan hits target center - Circle (radius 100.00)	0.00	0.000	5,024.01	2,158.77	-4,236.97	1,886,007.72	2,779,897.03	36.1831161	-107.6408395

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (in)	Hole Diameter (in)
350.00	350.00	Surface	9.62	13.50
5,532.20	5,002.49	Intermediate	7.00	8.75

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
797.53	797.00	Ojo Alamo		0.00	0.000
860.95	860.00	Kirtland		0.00	0.000
1,133.14	1,128.00	Fruitland		0.00	0.000
1,391.31	1,377.00	Picture Cliffs		0.00	0.000
1,573.35	1,549.00	Lewis		0.00	0.000
2,168.42	2,110.00	Chacra		0.00	0.000
2,983.07	2,878.00	Menefee		0.00	0.000
3,916.52	3,758.00	Point Lookout		0.00	0.000
4,089.42	3,921.00	Mancos		0.00	0.000
4,461.74	4,272.00	Mancos Silt		0.00	0.000
4,973.19	4,740.00	Gallup A		0.00	0.000
5,019.93	4,776.00	Gallup B		0.00	0.000
5,163.61	4,873.00	Gallup C		0.00	0.000



Scientific Drilling, Intl
Planning Report



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Project: North Alamito Unit
Site: P36 2308
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Wellbore: Original drilling
Design: APD rev 1

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MD Reference: GL 6948' & RKB 14' @ 6962.00usft (Aztec 920)
North Reference: True
Survey Calculation Method: Minimum Curvature

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
500.00	500.00	0.00	0.00	Start Build 2.00
1,474.17	1,455.51	-162.50	-22.43	Start 2997.77 hold at 1474.17 MD
4,471.94	4,281.62	-1,152.97	-159.17	Start DLS 9.00 TFO 122.07
5,587.42	5,005.01	-900.17	-767.11	Start 4625.74 hold at 5587.42 MD
10,213.16	5,024.01	2,158.77	-4,236.97	TD at 10213.16



DJR Operating

North Alamito Unit
P36 2308
NAU 403H

Original drilling
APD rev 1

Anticollision Report

04 November, 2019



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Company:	DJR Operating	Local Co-ordinate Reference:	Well NAU 403H
Project:	North Alamito Unit	TVD Reference:	GL 6948' & RKB 14' @ 6962.00usft (Aztec 920)
Reference Site:	P36 2308	MD Reference:	GL 6948' & RKB 14' @ 6962.00usft (Aztec 920)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	NAU 403H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	Original drilling	Database:	Grand Junction District
Reference Design:	APD rev 1	Offset TVD Reference:	Offset Datum

Reference	APD rev 1		
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria		
Interpolation Method:	MD + Stations Interval 100.00usft	Error Model:	ISCWSA
Depth Range:	Unlimited	Scan Method:	Closest Approach 3D
Results Limited by:	Maximum center-center distance of 15,000.00 usft	Error Surface:	Elliptical Conic
Warning Levels Evaluated at:	2.00 Sigma	Casing Method:	Not applied

Survey Tool Program	Date 11/4/2019		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
0.00	10,213.13	APD rev 1 (Original drilling)	MWD+IGRF
			Description
			OWSG MWD + IGRF or WMM

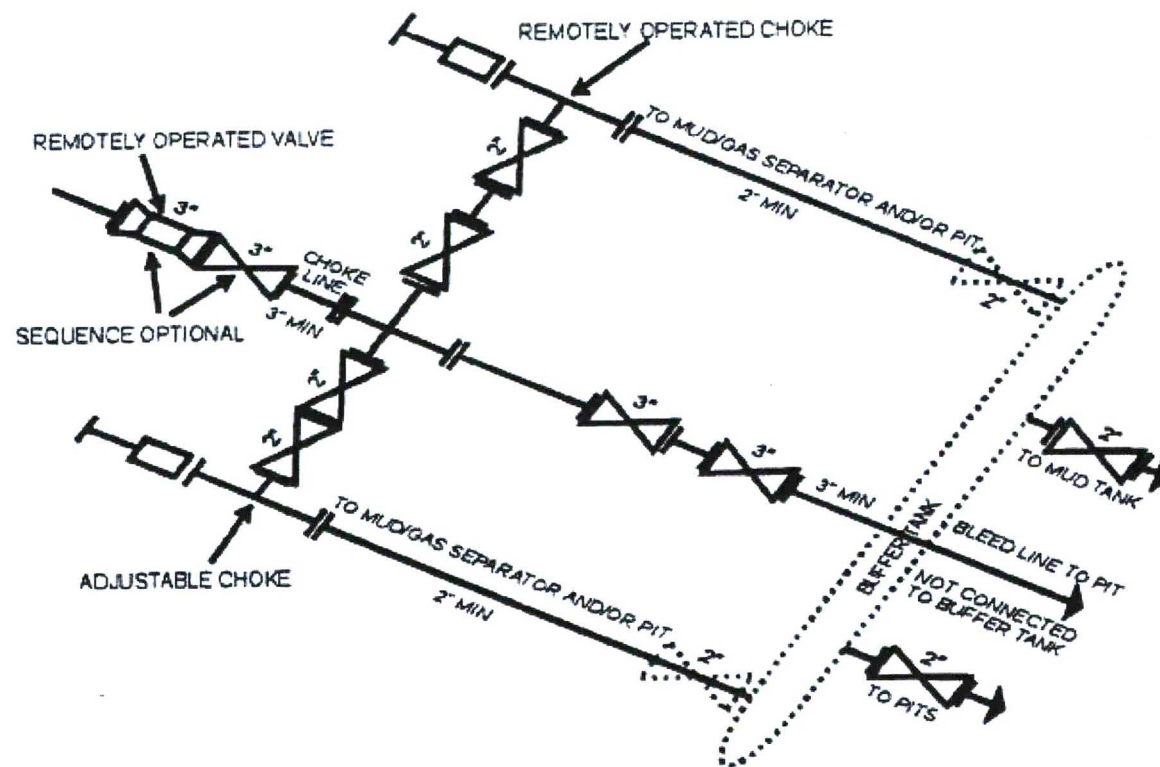
Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
P36 2308						
NAU 401H - Original drilling - APD Rev 1	500.00	500.00	39.92	36.74	12.569	CC, ES
NAU 401H - Original drilling - APD Rev 1	10,213.16	9,240.01	1,224.89	983.89	5.083	SF
NAU 402H - Original drilling - APD rev 1	403.33	403.33	59.89	57.41	24.121	CC
NAU 402H - Original drilling - APD rev 1	500.00	498.97	60.32	57.14	18.957	ES
NAU 402H - Original drilling - APD rev 1	700.00	693.65	76.37	71.67	16.232	SF
NAU 404H - Original drilling - APD rev 1	596.10	596.63	18.12	14.29	4.731	CC
NAU 404H - Original drilling - APD rev 1	600.00	600.53	18.12	14.27	4.699	ES
NAU 404H - Original drilling - APD rev 1	700.00	700.57	19.27	14.73	4.245	SF

Offset Design P36 2308 - NAU 401H - Original drilling - APD Rev 1												
Survey Program: 0-MWD+IGRF												
Reference		Offset		Semi Major Axis			Distance					
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor
0.00	0.00	0.00	0.00	0.00	0.00	-26.66	35.67	-17.91	39.92			
100.00	100.00	100.00	100.00	0.15	0.15	-26.66	35.67	-17.91	39.92	39.61	0.31	129.488
200.00	200.00	200.00	200.00	0.51	0.51	-26.66	35.67	-17.91	39.92	38.89	1.03	38.937
300.00	300.00	300.00	300.00	0.87	0.87	-26.66	35.67	-17.91	39.92	38.18	1.74	22.913
400.00	400.00	400.00	400.00	1.23	1.23	-26.66	35.67	-17.91	39.92	37.46	2.46	16.233
500.00	500.00	500.00	500.00	1.59	1.59	-26.66	35.67	-17.91	39.92	36.74	3.18	12.569 CC, ES
600.00	599.98	599.04	599.02	1.93	1.94	146.48	36.91	-18.77	42.87	38.98	3.89	11.033
700.00	699.84	698.78	698.74	2.27	2.30	149.35	38.77	-20.05	49.52	44.95	4.58	10.825
800.00	799.45	798.23	798.16	2.62	2.65	153.10	40.62	-21.32	59.36	54.09	5.27	11.254
900.00	898.70	897.25	897.16	2.99	3.01	156.87	42.46	-22.59	72.57	66.59	5.98	12.134
1,000.00	997.47	995.73	995.61	3.39	3.36	160.22	44.29	-23.86	89.24	82.55	6.69	13.338
1,100.00	1,095.62	1,093.54	1,093.40	3.83	3.71	163.02	46.11	-25.11	109.41	102.01	7.40	14.780
1,200.00	1,193.06	1,190.57	1,190.41	4.30	4.06	165.30	47.92	-26.36	133.06	124.94	8.12	16.395
1,300.00	1,289.64	1,286.70	1,286.51	4.82	4.41	167.14	49.70	-27.59	160.15	151.32	8.83	18.140
1,400.00	1,385.27	1,381.82	1,381.60	5.39	4.75	168.63	51.47	-28.81	190.65	181.11	9.54	19.980
1,474.17	1,455.51	1,451.64	1,451.41	5.85	5.00	169.55	52.77	-29.70	215.44	205.36	10.07	21.390
1,500.00	1,479.85	1,475.84	1,475.60	6.01	5.09	169.87	53.22	-30.01	224.39	214.13	10.26	21.876

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation

Choke Manifold

Actual system to conform with Onshore Order 2



Proposed BOP stack
11" 3M RRA



Double gate with integral choke/kill outlets

Kill line
2" minimum diameter

Choke line
3" minimum diameter

Low pressure rotating head

Flowline

3M Annular preventer

3M Pipe rams

3M Blind rams

Tie-down flange
(moves with BOP)

11" 5M Multi-bowl casing head

