Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018

SUNDRY NOTICES AND REPORTS ON WELLS

Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

SUBMIT IN TRIPLICATE - Other instructions on page 2

5. Lease Serial No.
NMNM94651

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

1. Type of Well
☒ Oil Well ☐ Gas Well ☐ Other

8. Well Name and No.
CEDAR CANYON 20 FEDERAL COM 25H

2. Name of Operator
OXY USA INCORPORATED

Contact: DAVID STEWART
E-Mail: david_stewart@oxy.com

9. API Well No.
30-015-44519-00-X1

Carlsbad Field Office
OCD Artesia

3a. Address
5 GREENWAY PLAZA SUITE 110
HOUSTON, TX 77046-0521

3b. Phone No. (include area code)
Ph: 432-685-5717

10. Field and Pool or Exploratory Area
PIERCE CROSSING
Bone Spring

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*

Sec 29 T24S R29E NWNE 110FNL 1390FEL
32.195396 N Lat, 104.002563 W Lon

11. County or Parish, State

EDDY COUNTY, NM

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other Change to Original APD
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recomplete horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompletion in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

OXY USA Inc. respectfully requests approval for the following changes from the approved permit:

1. The horizontal lateral will increase to ~7500', amended C-102, directional plan and plot attached.
Surface - 110 FNL 1390 FEL NWNE 29-24S 29E - Lat. 32.1953966 Long. 104.0025643
KOP - 50 FSL 1390 FEL SWSE 20-24S 29E - Lat. 32.1958364 Long. 104.0025627
PPP - 340 FSL 13911 FEL SWSE 20-24S-29E - Lat. 32.1966336 Long. 104.0025599
Amd Exit - 2313 FSL 1391 FEL NWSE 17-24S-29E - Lat. 32.2166464 Long. 104.0024897
Amd BHL - 2473 FSL 1390 FEL NWSE 17-24S-29E - Lat. 32.2170862 Long. 104.0024881

SEE ATTACHED FOR CONDITIONS OF APPROVAL

2. A multibowl or a unionized multibowl wellhead system will be employed. The wellhead and connection to the BOPE will meet all API 6A requirements. See attached for amended BOP diagrams.

RECLAMATION
ARTESIA DISTRICT
MAR 28 2018

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #397175 verified by the BLM Well Information System
For OXY USA INCORPORATED, sent to the Carlsbad
Committed to AFMSS for processing by PRISCILLA PEREZ on 12/11/2017 (18PP0454SE)

RECEIVED

Name *(Printed/Typed)* DAVID STEWART — Title REGULATORY ADVISOR

Signature (Electronic Submission) — Date 12/06/2017

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By ZOTA STEVENS — Title PETROLEUM ENGINEER — Date 03/21/2018

Conditions of approval, if any, are attached. Approval of this notice 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.

Office Carlsbad

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.

(Instructions on page 2)

**** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ** BLM REVISED ****

RJP 3-28-18

Additional data for EC transaction #397175 that would not fit on the form

32. Additional remarks, continued

3. Change Production Casing from liner to full casing string, see attached for amended drilling plan.
5-1/2" 20# P-110 DQX casing @ 0-16112'.

4. Change cementing program, see attached for amended drilling plan.

a. Surface - 332sx CL C w/ accelerator @ 14.2ppg, 1.68 yield, 100% excess, TOC-Surface

b. Intermediate - 1st stage 508sx Pozzolan/C cmt w/ retarder @ 10.2ppg, 3.05 yield, 20% excess from 2836-6954' followed by 228sx Cl H cmt w/ retarder, dispersant, salt @ 13.2ppg, 1.65 yield, 20% excess from 6954-7954'. 2nd stage 741sx CL C cmt w/ accelerator, retarder @ 12.9ppg, 1.85 yield, 75% excess from 0-2436' followed by 142sx CL C @ 14.8ppg, 1.33 yield, 20% Excess from 2436-2936'.

c. Production - 1406sx Cl H w/ retarder, dispersant, salt @ 13.2ppg, 1.63 yield, 15% Excess from 7454-16112'.

5. Change in the Mud Program.

Depth	Fluid Type	Mud Weight
0-400'	Water-Based Mud	8.4-8.6
400-2936'	Water-Based Mud	9.8-10.0
2936-7954'	Water-Based Mud	8.8-9.6
7954-16112'	Oil-Based Mud	8.8-9.6

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 Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

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

API Number	Pool Code	Pool Name
30-015-44519	50371	Pierce Crossing; Bone Spring

Property Code	Property Name	Well Number
319809	CEDAR CANYON "20" FEDERAL COM	25H

OGRID No	Operator Name	Elevation
16696	OXY USA INC.	2954.4'

Surface Location

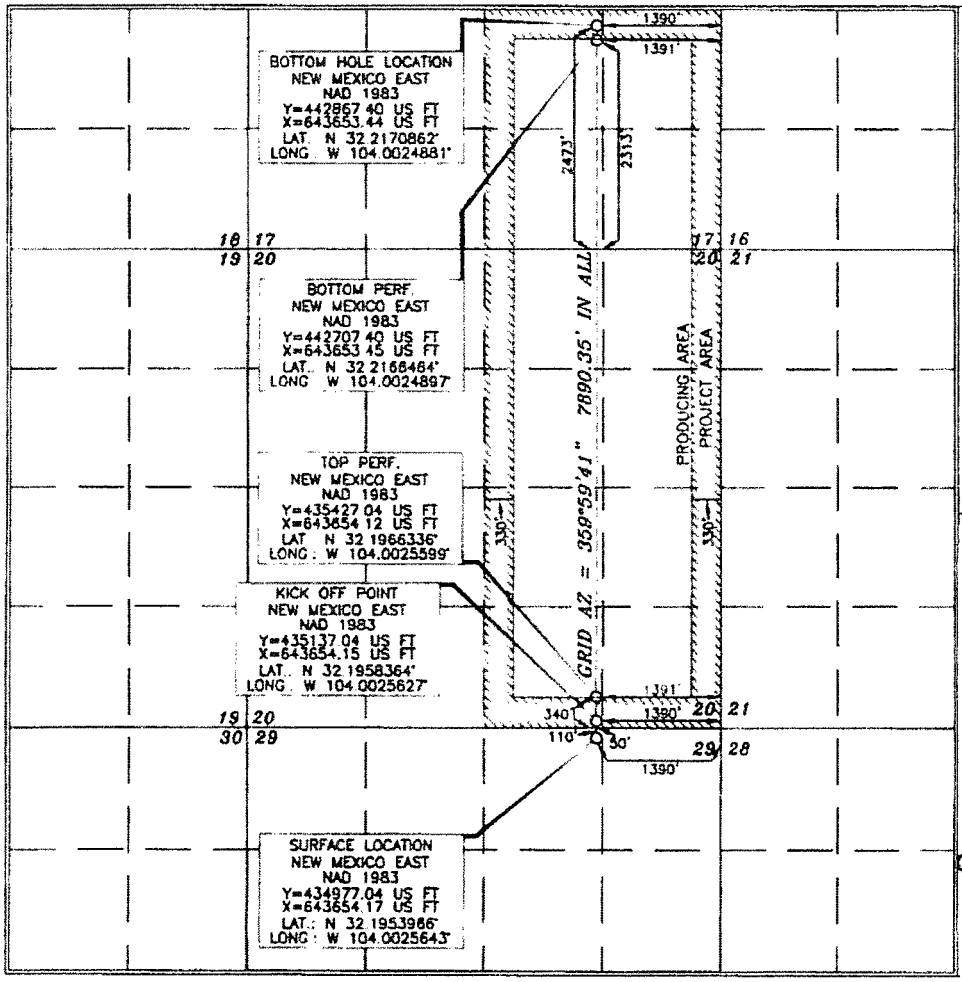
UL or lot no	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
B	29	24 SOUTH	29 EAST, N.M.P.M.		110'	NORTH	1390'	EAST	EDDY

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
J	17	24 SOUTH	29 EAST, N.M.P.M.		2473'	SOUTH	1390'	EAST	EDDY

Dedicated Acres	Joint or Infill	Consolidation Code	Order No
480	Y		

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.



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 — Date: 12/6/17

David Stewart
Printed Name

david_stewart@oxy.com
E-mail Address

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.

GERRY J. ASEL
NEW MEXICO
15079
REGISTERED PROFESSIONAL LAND SURVEYOR

FEBRUARY 14, 2017
Date of Survey

Signature and Seal of Professional Surveyor

9/29/2017

15079
Certificate Number

WO# 160920WL-b (Rev B) (KA)

OXY USA Inc. - Cedar Canyon 20 Federal Com 25H – Amended Drilling Plan

1. Geologic Formations

TVD of target	8643'	Pilot Hole Depth	N/A
MD at TD:	16112'	Deepest Expected fresh water:	336'

Delaware Basin

Formation	TVD - RKB	Expected Fluids
Rustler	336	Brine
Salado	731	Losses
Castile	1344	
Lamar/Delaware	2886	
Bell Canyon	2918	Water
Cherry Canyon	3799	Oil/Gas
Brushy Canyon	5046	Oil/Gas/Losses
Bone Spring	6628	Oil/Gas
1st Bone Spring	7358	Oil/Gas
2nd Bone Spring	**7785**	**Oil/Gas**

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

2. Casing Program

Hole Size (in)	Casing Interval From (ft)	Casing Interval To (ft)	Csg. Size (in)	Weight (lbs)	Grade	Conn.	SF Collapse	SF Burst	Buoyant Body SF Tension	Buoyant Joint SF Tension
17.5	0	400	13.375	54.5	J55	BTC	1.125	1.2	1.4	1.4
12.25	0	7500	9.625	43.5	HCL-80	BTC	1.125	1.2	1.4	1.4
12.25	7500	7954	9.625	47	HCL-80	BTC	1.125	1.2	1.4	1.4
8.5	0	16112	5.5	20	P-110	DQX	1.125	1.2	1.4	1.4
							SF Values will meet or Exceed			

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

*OXY requests the option to set casing shallower yet still below the salts if losses or hole conditions require this. Cement volumes may be adjusted if casing is set shallower and a DV tool may be run in case hole conditions merit pumping a second stage cement job to comply with permitted top of cement. If cement circulated to surface during first stage we will drop a cancelation cone and not pump the second stage.

	Y or N
Is casing new? If used, attach certification as required in Onshore Order #1	Y
Does casing meet API specifications? If no, attach casing specification sheet.	Y
Is premium or uncommon casing planned? If yes attach casing specification sheet.	Y
Does the above casing design meet or exceed BLM's minimum standards? If not provide justification (loading assumptions, casing design criteria).	Y
Will the intermediate pipe be kept at a minimum 1/3 fluid filled to avoid approaching the collapse pressure rating of the casing?	Y

Is well located within Capitan Reef?	N
If yes, does production casing cement tie back a minimum of 50' above the Reef?	
Is well within the designated 4 string boundary.	
Is well located in SOPA but not in R-111-P?	N
If yes, are the first 2 strings cemented to surface and 3rd string cement tied back 500' into previous casing?	
Is well located in R-111-P and SOPA?	N
If yes, are the first three strings cemented to surface?	
Is 2nd string set 100' to 600' below the base of salt?	
Is well located in high Cave/Karst?	N
If yes, are there two strings cemented to surface?	
(For 2 string wells) If yes, is there a contingency casing if lost circulation occurs?	
Is well located in critical Cave/Karst?	N
If yes, are there three strings cemented to surface?	

3. Cementing Program

Casing	# Sks	Wt. (lb/gal)	Yld (ft3/sack)	H20 (gal/sk)	500# Comp. Strength (hours)	Slurry Description
Surface	332	14.2	1.68	6.53	6:50	Class C Cement, Accelerator
1st Stage	508	10.2	3.05	15.63	15:07	Pozzolan Cement, Retarder
Intermediate	228	13.2	1.65	8.45	12:57	Class H Cement, Retarder, Dispersant, Salt
DV/ECP Tool @ 2936' (We request the option to cancel the second stage if cement is circulated to surface during the first stage of cement operations)						
2nd Stage Int	741	12.9	1.85	9.86	12:44	Class C Cement, Accelerator, Retarder
Casing	142	14.8	1.33	6.34	6:31	Class C Cement
Production Casing	1406	13.2	1.631	8.37	15:15	Class H Cement, Retarder, Dispersant, Salt

Casing String	Top of Lead (ft)	Bottom of Lead (ft)	Top of Tail (ft)	Bottom of Tail (ft)	% Excess Lead	% Excess Tail
Surface	N/A	N/A	0	400	N/A	100%
1st Stage Intermediate Casing	2836	6954	6954	7954	20%	20%
2nd Stage Intermediate Casing	0	2436	2436	2936	75%	20%
Production Casing	N/A	N/A	7454	16112	N/A	15%

4. Pressure Control Equipment

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	✓	Tested to:
12.25" Hole	13-5/8"	5M	Annular	✓	70% of working pressure
			Blind Ram	✓	250/5000psi
			Pipe Ram		
			Double Ram	✓	
			Other*		

*Specify if additional ram is utilized.

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

Pipe rams will be operationally checked each 24 hour period. Blind rams will be operationally checked on each trip out of the hole. These checks will be noted on the daily tour sheets. Other accessories to the BOP equipment will include a Kelly cock and floor safety valve (inside BOP) and choke lines and choke manifold. See attached schematics.

	Formation integrity test will be performed per Onshore Order #2. On Exploratory wells or on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.i.
	A variance is requested for the use of a flexible choke line from the BOP to Choke Manifold. See attached for specs and hydrostatic test chart.
	Y | Are anchors required by manufacturer?
	A multibowl or a unionized multibowl wellhead system will be employed. The wellhead and connection to the BOPE will meet all API 6A requirements. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested. We will test the flange connection of the wellhead with a test port that is directly in the flange. We are proposing that we will run the wellhead through the rotary prior to cementing surface casing as discussed with the BLM on October 8, 2015. See attached schematics.

5. Mud Program

Depth		Type	Weight (ppg)	Viscosity	Water Loss
From (ft)	To (ft)				
0	400	Water-Based Mud	8.4-8.6	40-60	N/C
400	2936	Water-Based Mud	9.8-10.0	35-45	N/C
2936	7954	Water-Based Mud	8.8-9.6	38-50	N/C
7954	16112	Oil Based Mud	8.8-9.6	35-50	N/C

Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times. The following is a general list of products: Barite, Bentonite, Gypsum, Lime, Soda Ash, Caustic Soda, Nut Plug, Cedar Fiber, Cotton Seed Hulls, Drilling Paper, Salt Water Clay, CACL2. Oxy will use a closed mud system.

OXY proposes to drill out the 13-3/8" surface casing shoe with a saturated brine system from 400-2936', which is the base of the salt system. At this point we will swap fluid systems to a high viscosity mixed metal hydroxide system or a fully saturated brine direct emulsion system. We will drill with this system to the intermediate TD @ 7954'.

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

6. Logging and Testing Procedures

Logging, Coring and Testing.	
Yes	Will run GR from TD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.
No	Logs are planned based on well control or offset log information.
No	Drill stem test? If yes, explain
No	Coring? If yes, explain

Additional logs planned		Interval
No	Resistivity	
No	Density	
No	CBL	
Yes	Mud log	ICP - TD
No	PEX	

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	4315 psi
Abnormal Temperature	No
BH Temperature at deepest TVD	150°F

Pump high viscosity sweeps as needed for hole cleaning. The mud system will be monitored visually/manually as well as with an electronic PVT. The necessary mud products for additional weight and fluid loss control will be on location at all times. Appropriately weighted mud will be used to isolate potential gas, oil, and water zones until such time as casing can be cemented into place for zonal isolation.

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

8. Other facets of operation

	Yes/No
Will the well be drilled with a walking/skidding operation? If yes, describe. • We plan to drill the three well pad in batch by section: all surface sections, intermediate sections and production sections. The wellhead will be secured with a night cap whenever the rig is not over the well.	Yes
Will more than one drilling rig be used for drilling operations? If yes, describe. • OXY requests the option to contract a Surface Rig to drill, set surface casing, and cement for this well. If the timing between rigs is such that Oxy would not be able to preset surface, the Primary Rig will MIRU and drill the well in its entirety per the APD. Please see the attached document for information on the spudder rig.	Yes

Total estimated cuttings volume: 1792.8 bbls.

9. Company Personnel

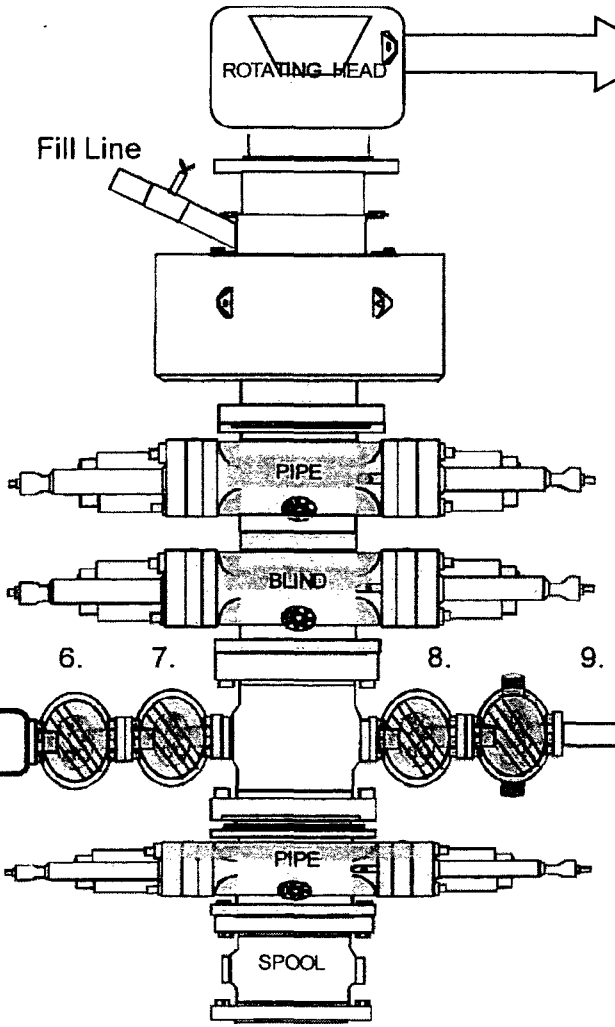
Name	Title	Office Phone	Mobile Phone
Philippe Haffner	Drilling Engineer	713-985-6379	832-767-9047
Diego Tellez	Drilling Engineer Supervisor	713-350-4602	713-303-4932
Simon Benavides	Drilling Superintendent	713-522-8652	281-684-6897
John Willis	Drilling Manager	713-366-5556	713-259-1417

5M BOP Stack

Mud Cross Valves:

5. 5M Check Valve
6. Outside 5M Kill Line Valve
7. Inside 5M Kill Line
8. Outside 5M Kill Line Valve
9. 5M HCR Valve

*Minimum ID = 2-1/16" on Kill Line side and 3" minimum ID on choke line side



To Kill Line

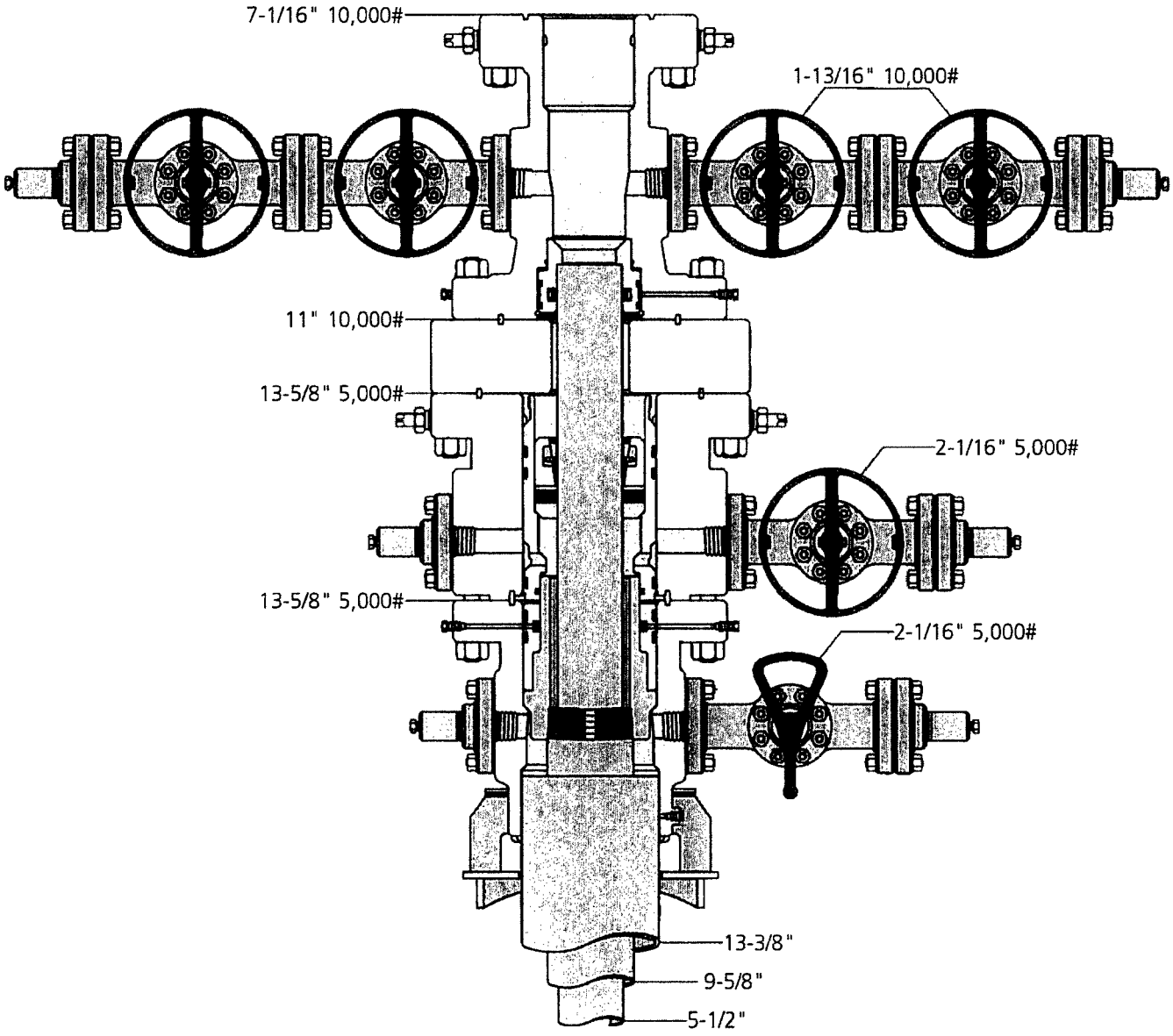
To Co-Flex and Choke Manifold

1. 5000 psi Annular (13-5/8" ID)

2. 5,000 psi Upper Pipe Ram (13-5/8" ID)

3. 5,000 psi Blind Ram (13-5/8" ID)

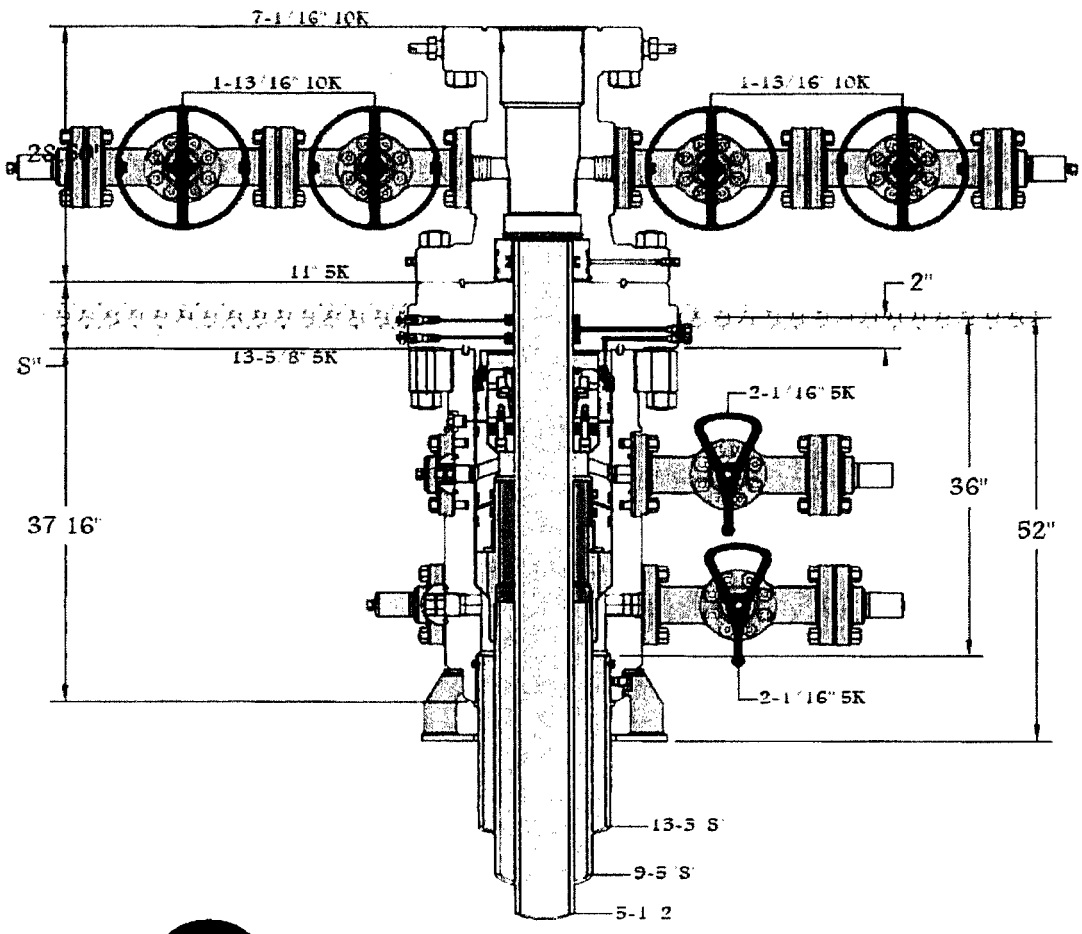
4. 5,000 psi Lower Pipe Ram (13-5/8" ID)



13" 5K MBS SL2 Wellhead

CAMERON
A Schlumberger Company

Name	Jeanette	Date	7-12-16	Working Pressure	#	J-9786-4



13-5/8" 5K MN-DS

Brandon	5-10-17		# 1505172

OXY

PRD NM DIRECTIONAL PLANS (NAD 1983)
CEDAR CANYON 20 FED COM
Cedar Canyon 20 Fed Com 25H

WB00

Plan: Permitting Plan

Standard Planning Report

10 October, 2017

Database:	HOPSPP	**Local Co-ordinate Reference**	Well Cedar Canyon 20 Fed Com 25H
Company:	ENGINEERING DESIGNS	**TVD Reference:**	DATUM @ 2980.90ft
Project:	PRD NM DIRECTIONAL PLANS (NAD 1983)	**MD Reference:**	DATUM @ 2980.90ft
Site:	CEDAR CANYON 20 FED COM	**North Reference:**	Grid
Well:	Cedar Canyon 20 Fed Com 25H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	WB00		
Design:	Permitting Plan		

Project	PRD NM DIRECTIONAL PLANS (NAD 1983)		
Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		Using geodetic scale factor

Site	CEDAR CANYON 20 FED COM				
Site Position:		**Northing:**	434,977.15 usft	**Latitude:**	32° 11' 43.429845 N
From:	Map	**Easting:**	643,624.17 usft	**Longitude:**	104° 0' 9.580464 W
Position Uncertainty:	0.00 ft	**Slot Radius:**	13.200 in	**Grid Convergence:**	0.18 °

Well	Cedar Canyon 20 Fed Com 25H					
Well Position	**+N/-S**	-0.11 ft	**Northing:**	434,977.04 usft	**Latitude:**	32° 11' 43.427843 N
	+E/-W	30.00 ft	**Easting:**	643,654.17 usft	**Longitude:**	104° 0' 9.231331 W
Position Uncertainty		0.00 ft	**Wellhead Elevation:**	0.00 ft	**Ground Level:**	2,954.40 ft

Wellbore	WB00				
Magnetics	**Model Name**	**Sample Date**	**Declination (°)**	**Dip Angle (°)**	**Field Strength (nT)**
	HDGM	10/10/2017	7.12	59.98	48,083

Design	Permitting Plan				
Audit Notes:					
Version:		**Phase:**	PROTOTYPE	**Tie On Depth:**	0.00
Vertical Section:	**Depth From (TVD) (ft)**	**+N/-S (ft)**	**+E/-W (ft)**	**Direction (°)**	
	0.00	0.00	0.00	359.99	

Plan Sections

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
6,634.50	0.00	0.00	6,634.50	0.00	0.00	0.00	0.00	0.00	0.00	
7,134.75	10.00	359.99	7,132.21	43.57	-0.01	2.00	2.00	0.00	359.99	
7,554.25	10.00	359.99	7,545.33	116.45	-0.01	0.00	0.00	0.00	0.00	
8,054.50	0.00	359.99	8,043.04	160.01	-0.02	2.00	-2.00	0.00	180.00	CC_20_Fed_Com_
8,952.50	89.80	359.99	8,616.00	730.97	-0.07	10.00	10.00	0.00	-0.01	
16,112.58	89.77	359.99	8,643.00	7,891.00	-0.73	0.00	0.00	0.00	180.00	CC_20_Fed_Com_

Database:	HOPSPP	**Local Co-ordinate Reference**	Well Cedar Canyon 20 Fed Com 25H
Company:	ENGINEERING DESIGNS	**TVD Reference:**	DATUM @ 2980.90ft
Project:	PRD NM DIRECTIONAL PLANS (NAD 1983)	**MD Reference:**	DATUM @ 2980.90ft
Site:	CEDAR CANYON 20 FED COM	**North Reference:**	Grid
Well:	Cedar Canyon 20 Fed Com 25H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	WB00		
Design:	Permitting Plan		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
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
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
2,900.00	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
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00

Database:	HOPSPP	**Local Co-ordinate Reference**	Well Cedar Canyon 20 Fed Com 25H
Company:	ENGINEERING DESIGNS	**TVD Reference:**	DATUM @ 2980.90ft
Project:	PRD NM DIRECTIONAL PLANS (NAD 1983)	**MD Reference:**	DATUM @ 2980.90ft
Site:	CEDAR CANYON 20 FED COM	**North Reference:**	Grid
Well:	Cedar Canyon 20 Fed Com 25H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	WB00		
Design:	Permitting Plan		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00
5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00
6,634.50	0.00	0.00	6,634.50	0.00	0.00	0.00	0.00	0.00	0.00
6,700.00	1.31	359.99	6,699.99	0.75	0.00	0.75	2.00	2.00	0.00
6,800.00	3.31	359.99	6,799.91	4.78	0.00	4.78	2.00	2.00	0.00
6,900.00	5.31	359.99	6,899.62	12.29	0.00	12.29	2.00	2.00	0.00
7,000.00	7.31	359.99	6,999.01	23.28	0.00	23.28	2.00	2.00	0.00
7,100.00	9.31	359.99	7,097.95	37.74	0.00	37.74	2.00	2.00	0.00
7,134.75	10.00	359.99	7,132.21	43.57	-0.01	43.57	2.00	2.00	0.00
7,200.00	10.00	359.99	7,196.47	54.90	-0.01	54.90	0.00	0.00	0.00
7,300.00	10.00	359.99	7,294.95	72.28	-0.01	72.28	0.00	0.00	0.00
7,400.00	10.00	359.99	7,393.43	89.65	-0.01	89.65	0.00	0.00	0.00
7,500.00	10.00	359.99	7,491.91	107.02	-0.01	107.02	0.00	0.00	0.00
7,554.25	10.00	359.99	7,545.33	116.45	-0.01	116.45	0.00	0.00	0.00
7,600.00	9.09	359.99	7,590.45	124.04	-0.02	124.04	2.00	-2.00	0.00
7,700.00	7.09	359.99	7,689.45	138.11	-0.02	138.11	2.00	-2.00	0.00
7,800.00	5.09	359.99	7,788.88	148.72	-0.02	148.72	2.00	-2.00	0.00
7,900.00	3.09	359.99	7,888.62	155.85	-0.02	155.85	2.00	-2.00	0.00
8,000.00	1.09	359.99	7,988.55	159.49	-0.02	159.49	2.00	-2.00	0.00
8,054.50	0.00	359.99	8,043.04	160.01	-0.02	160.01	2.00	-2.00	0.00
8,100.00	4.55	359.99	8,088.50	161.82	-0.02	161.82	10.00	10.00	0.00
8,200.00	14.55	359.99	8,186.98	178.39	-0.02	178.39	10.00	10.00	0.00
8,300.00	24.55	359.99	8,281.10	211.81	-0.02	211.81	10.00	10.00	0.00
8,400.00	34.55	359.99	8,367.98	261.07	-0.03	261.07	10.00	10.00	0.00
8,500.00	44.55	359.99	8,444.99	324.66	-0.04	324.66	10.00	10.00	0.00
8,600.00	54.55	359.99	8,509.79	400.66	-0.04	400.66	10.00	10.00	0.00
8,700.00	64.55	359.99	8,560.40	486.76	-0.05	486.76	10.00	10.00	0.00
8,800.00	74.55	359.99	8,595.30	580.34	-0.06	580.34	10.00	10.00	0.00
8,900.00	84.55	359.99	8,613.41	678.55	-0.07	678.55	10.00	10.00	0.00
8,952.50	89.80	359.99	8,616.00	730.97	-0.07	730.97	10.00	10.00	0.00
9,000.00	89.80	359.99	8,616.16	778.47	-0.08	778.47	0.00	0.00	0.00
9,100.00	89.80	359.99	8,616.51	878.47	-0.09	878.47	0.00	0.00	0.00
9,200.00	89.80	359.99	8,616.86	978.47	-0.10	978.47	0.00	0.00	0.00
9,300.00	89.80	359.99	8,617.21	1,078.47	-0.10	1,078.47	0.00	0.00	0.00
9,400.00	89.80	359.99	8,617.57	1,178.47	-0.11	1,178.47	0.00	0.00	0.00
9,500.00	89.80	359.99	8,617.92	1,278.47	-0.12	1,278.47	0.00	0.00	0.00
9,600.00	89.80	359.99	8,618.27	1,378.47	-0.13	1,378.47	0.00	0.00	0.00
9,700.00	89.80	359.99	8,618.63	1,478.47	-0.14	1,478.47	0.00	0.00	0.00
9,800.00	89.80	359.99	8,618.98	1,578.47	-0.15	1,578.47	0.00	0.00	0.00
9,900.00	89.80	359.99	8,619.34	1,678.47	-0.16	1,678.47	0.00	0.00	0.00
10,000.00	89.80	359.99	8,619.70	1,778.47	-0.17	1,778.47	0.00	0.00	0.00

Database:	HOPSPP	**Local Co-ordinate Reference**	Well Cedar Canyon 20 Fed Com 25H
Company:	ENGINEERING DESIGNS	**TVD Reference:**	DATUM @ 2980.90ft
Project:	PRD NM DIRECTIONAL PLANS (NAD 1983)	**MD Reference:**	DATUM @ 2980.90ft
Site:	CEDAR CANYON 20 FED COM	**North Reference:**	Grid
Well:	Cedar Canyon 20 Fed Com 25H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	WB00		
Design:	Permitting Plan		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
10,100.00	89.79	359.99	8,620.05	1,878.47	-0.18	1,878.47	0.00	0.00	0.00
10,200.00	89.79	359.99	8,620.41	1,978.46	-0.19	1,978.46	0.00	0.00	0.00
10,300.00	89.79	359.99	8,620.77	2,078.46	-0.20	2,078.46	0.00	0.00	0.00
10,400.00	89.79	359.99	8,621.13	2,178.46	-0.21	2,178.46	0.00	0.00	0.00
10,500.00	89.79	359.99	8,621.49	2,278.46	-0.21	2,278.46	0.00	0.00	0.00
10,600.00	89.79	359.99	8,621.85	2,378.46	-0.22	2,378.46	0.00	0.00	0.00
10,700.00	89.79	359.99	8,622.22	2,478.46	-0.23	2,478.46	0.00	0.00	0.00
10,800.00	89.79	359.99	8,622.58	2,578.46	-0.24	2,578.46	0.00	0.00	0.00
10,900.00	89.79	359.99	8,622.94	2,678.46	-0.25	2,678.46	0.00	0.00	0.00
11,000.00	89.79	359.99	8,623.31	2,778.46	-0.26	2,778.46	0.00	0.00	0.00
11,100.00	89.79	359.99	8,623.67	2,878.46	-0.27	2,878.46	0.00	0.00	0.00
11,200.00	89.79	359.99	8,624.04	2,978.46	-0.28	2,978.46	0.00	0.00	0.00
11,300.00	89.79	359.99	8,624.41	3,078.46	-0.29	3,078.46	0.00	0.00	0.00
11,400.00	89.79	359.99	8,624.77	3,178.46	-0.30	3,178.46	0.00	0.00	0.00
11,500.00	89.79	359.99	8,625.14	3,278.46	-0.31	3,278.46	0.00	0.00	0.00
11,600.00	89.79	359.99	8,625.51	3,378.46	-0.32	3,378.46	0.00	0.00	0.00
11,700.00	89.79	359.99	8,625.88	3,478.45	-0.32	3,478.45	0.00	0.00	0.00
11,800.00	89.79	359.99	8,626.25	3,578.45	-0.33	3,578.45	0.00	0.00	0.00
11,900.00	89.79	359.99	8,626.63	3,678.45	-0.34	3,678.45	0.00	0.00	0.00
12,000.00	89.79	359.99	8,627.00	3,778.45	-0.35	3,778.45	0.00	0.00	0.00
12,100.00	89.79	359.99	8,627.37	3,878.45	-0.36	3,878.45	0.00	0.00	0.00
12,200.00	89.79	359.99	8,627.75	3,978.45	-0.37	3,978.45	0.00	0.00	0.00
12,300.00	89.78	359.99	8,628.12	4,078.45	-0.38	4,078.45	0.00	0.00	0.00
12,400.00	89.78	359.99	8,628.50	4,178.45	-0.39	4,178.45	0.00	0.00	0.00
12,500.00	89.78	359.99	8,628.87	4,278.45	-0.40	4,278.45	0.00	0.00	0.00
12,600.00	89.78	359.99	8,629.25	4,378.45	-0.41	4,378.45	0.00	0.00	0.00
12,700.00	89.78	359.99	8,629.63	4,478.45	-0.42	4,478.45	0.00	0.00	0.00
12,800.00	89.78	359.99	8,630.01	4,578.45	-0.43	4,578.45	0.00	0.00	0.00
12,900.00	89.78	359.99	8,630.39	4,678.45	-0.44	4,678.45	0.00	0.00	0.00
13,000.00	89.78	359.99	8,630.77	4,778.45	-0.44	4,778.45	0.00	0.00	0.00
13,100.00	89.78	359.99	8,631.15	4,878.44	-0.45	4,878.44	0.00	0.00	0.00
13,200.00	89.78	359.99	8,631.53	4,978.44	-0.46	4,978.44	0.00	0.00	0.00
13,300.00	89.78	359.99	8,631.91	5,078.44	-0.47	5,078.44	0.00	0.00	0.00
13,400.00	89.78	359.99	8,632.30	5,178.44	-0.48	5,178.44	0.00	0.00	0.00
13,500.00	89.78	359.99	8,632.68	5,278.44	-0.49	5,278.44	0.00	0.00	0.00
13,600.00	89.78	359.99	8,633.07	5,378.44	-0.50	5,378.44	0.00	0.00	0.00
13,700.00	89.78	359.99	8,633.45	5,478.44	-0.51	5,478.44	0.00	0.00	0.00
13,800.00	89.78	359.99	8,633.84	5,578.44	-0.52	5,578.44	0.00	0.00	0.00
13,900.00	89.78	359.99	8,634.23	5,678.44	-0.53	5,678.44	0.00	0.00	0.00
14,000.00	89.78	359.99	8,634.61	5,778.44	-0.54	5,778.44	0.00	0.00	0.00
14,100.00	89.78	359.99	8,635.00	5,878.44	-0.55	5,878.44	0.00	0.00	0.00
14,200.00	89.78	359.99	8,635.39	5,978.44	-0.55	5,978.44	0.00	0.00	0.00
14,300.00	89.78	359.99	8,635.78	6,078.44	-0.56	6,078.44	0.00	0.00	0.00
14,400.00	89.78	359.99	8,636.18	6,178.44	-0.57	6,178.44	0.00	0.00	0.00
14,500.00	89.78	359.99	8,636.57	6,278.43	-0.58	6,278.43	0.00	0.00	0.00
14,600.00	89.77	359.99	8,636.96	6,378.43	-0.59	6,378.43	0.00	0.00	0.00
14,700.00	89.77	359.99	8,637.35	6,478.43	-0.60	6,478.43	0.00	0.00	0.00
14,800.00	89.77	359.99	8,637.75	6,578.43	-0.61	6,578.43	0.00	0.00	0.00
14,900.00	89.77	359.99	8,638.14	6,678.43	-0.62	6,678.43	0.00	0.00	0.00
15,000.00	89.77	359.99	8,638.54	6,778.43	-0.63	6,778.43	0.00	0.00	0.00
15,100.00	89.77	359.99	8,638.94	6,878.43	-0.64	6,878.43	0.00	0.00	0.00
15,200.00	89.77	359.99	8,639.33	6,978.43	-0.65	6,978.43	0.00	0.00	0.00
15,300.00	89.77	359.99	8,639.73	7,078.43	-0.66	7,078.43	0.00	0.00	0.00

Database:	HOPSPP	**Local Co-ordinate Reference**	Well Cedar Canyon 20 Fed Com 25H
Company:	ENGINEERING DESIGNS	**TVD Reference:**	DATUM @ 2980.90ft
Project:	PRD NM DIRECTIONAL PLANS (NAD 1983)	**MD Reference:**	DATUM @ 2980.90ft
Site:	CEDAR CANYON 20 FED COM	**North Reference:**	Grid
Well:	Cedar Canyon 20 Fed Com 25H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	WB00		
Design:	Permitting Plan		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
15,400.00	89.77	359.99	8,640.13	7,178.43	-0.66	7,178.43	0.00	0.00	0.00
15,500.00	89.77	359.99	8,640.53	7,278.43	-0.67	7,278.43	0.00	0.00	0.00
15,600.00	89.77	359.99	8,640.93	7,378.43	-0.68	7,378.43	0.00	0.00	0.00
15,700.00	89.77	359.99	8,641.34	7,478.42	-0.69	7,478.42	0.00	0.00	0.00
15,800.00	89.77	359.99	8,641.74	7,578.42	-0.70	7,578.42	0.00	0.00	0.00
15,900.00	89.77	359.99	8,642.14	7,678.42	-0.71	7,678.42	0.00	0.00	0.00
16,000.00	89.77	359.99	8,642.54	7,778.42	-0.72	7,778.42	0.00	0.00	0.00
16,100.00	89.77	359.99	8,642.95	7,878.42	-0.73	7,878.42	0.00	0.00	0.00
16,112.58	89.77	359.99	8,643.00	7,891.00	-0.73	7,891.00	0.00	0.00	0.00

Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
CC_20_Fed_Com_25 - plan hits target center - Point	0.00	0.00	8,043.04	160.01	-0.02	435,137.04	643,654.15	32° 11' 45.011195 N	104° 0' 9.225836 W
CC_20_Fed_Com_25 - plan hits target center - Point	0.00	0.00	8,643.00	7,891.00	-0.73	442,867.40	643,653.44	32° 13' 1.510296 N	104° 0' 8.957222 W

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
6,634.50	6,634.50	0.00	0.00	STEP OUT DLS 2.00
7,134.75	7,132.21	43.57	-0.01	HOLD 10 DEG TANGENT
7,554.25	7,545.33	116.45	-0.01	DROP BACK TO VERTICAL DLS 2.00
8,054.50	8,043.04	160.01	-0.02	BUILD CURVE 10 DEG / 100
8,952.50	8,616.00	730.97	-0.07	LANDING POINT
16,112.58	8,643.00	7,891.00	-0.73	TD at 16112.58

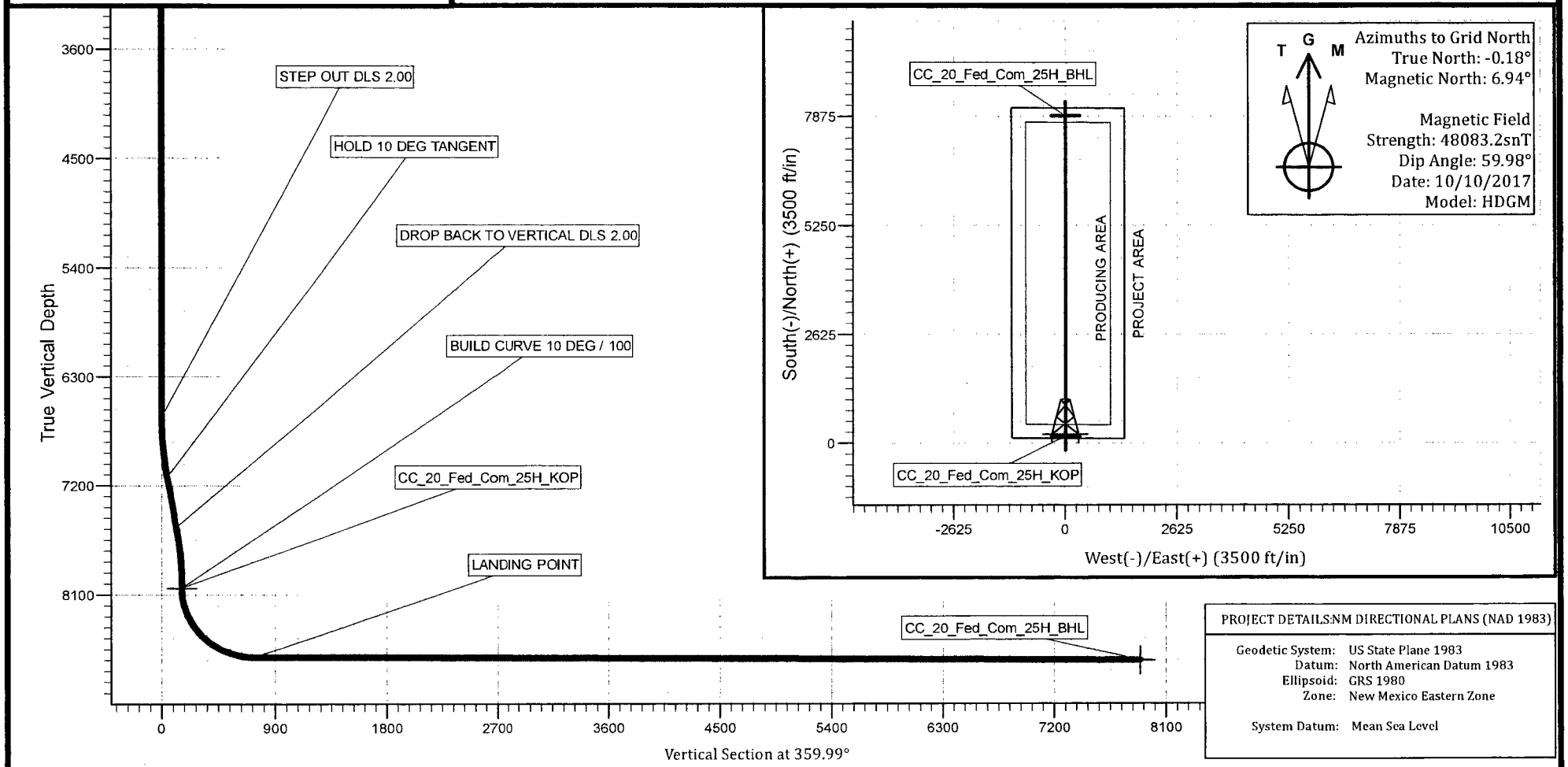
Project: PRD NM DIRECTIONAL PLANS (NAD 1983)
Site: CEDAR CANYON 20 FED COM
Well: Cedar Canyon 20 Fed Com 25H
Wellbore: WB00
Design: Permitting Plan

WELL DETAILS: Cedar Canyon 20 Fed Com 25H

Ground Level: 2954.40

+N/-S	+E/-W	Northing	Easting	Latittude	Longitude
0.00	0.00	434977.04	643654.17	32° 11' 43.427843 N	104° 0' 9.231331 W

DATUM @ 2980.90ft



Azimuths to Grid North
True North: -0.18°
Magnetic North: 6.94°

Magnetic Field
Strength: 48083.2snT
Dip Angle: 59.98°
Date: 10/10/2017
Model: HDGM

PROJECT DETAILS:NM DIRECTIONAL PLANS (NAD 1983)

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

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
2	6634.50	0.00	0.00	6634.50	0.00	0.00	0.00	0.00	0.00		STEP OUT DLS 2.00
3	7134.75	10.00	359.99	7132.21	43.57	-0.01	2.00	359.99	43.57		HOLD 10 DEG TANGENT
4	7554.25	10.00	359.99	7545.33	116.45	-0.01	0.00	0.00	116.45		DROP BACK TO VERTICAL DLS 2.00
5	8054.50	0.00	359.99	8043.04	160.01	-0.02	2.00	180.00	160.01	CC_20_Fed_Com_25H_KOP	BUILD CURVE 10 DEG / 100
6	8952.50	89.80	359.99	8616.00	730.97	-0.07	10.00	-0.01	730.97		LANDING POINT
7	16112.58	89.77	359.99	8643.00	7891.00	-0.73	0.00	180.00	7891.00	CC_20_Fed_Com_25H_BHL	TD at 16112.58

PERFORMANCE DATA

TMK UP DQX **5.500 in** **20.00 lbs/ft** **P-110**
Technical Data Sheet

Tubular Parameters

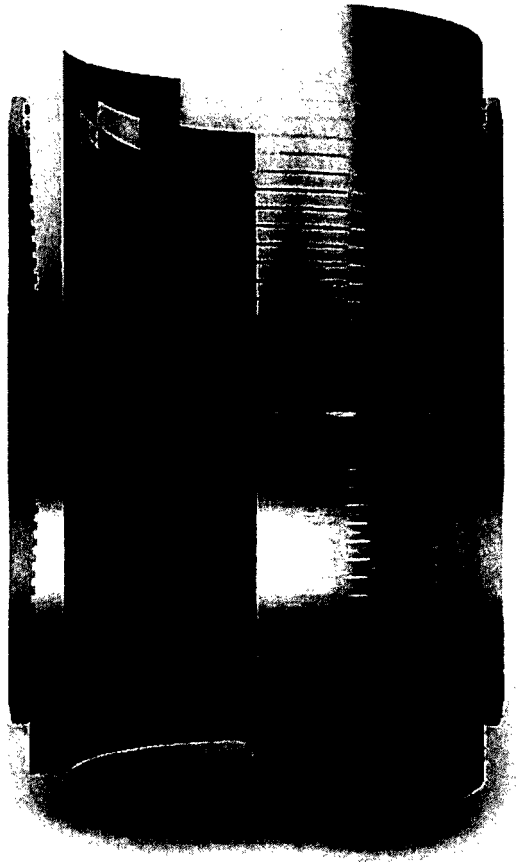
Size	5.500	in	Minimum Yield	110,000	psi
Nominal Weight	20.00	lbs/ft	Minimum Tensile	125,000	psi
Grade	P-110		Yield Load	641,000	lbs
PE Weight	19.81	lbs/ft	Tensile Load	729,000	lbs
Wall Thickness	0.361	in	Min. Internal Yield Pressure	12,600	psi
Nominal ID	4.778	in	Collapse Pressure	11,100	psi
Drift Diameter	4.653	in			
Nom. Pipe Body Area	5.828	in²			

Connection Parameters

Connection OD	6.050	in
Connection ID	4.778	in
Make-Up Loss	4.122	in
Critical Section Area	5.828	in²
Tension Efficiency	100.0	%
Compression Efficiency	100.0	%
Yield Load In Tension	641,000	lbs
Min. Internal Yield Pressure	12,600	psi
Collapse Pressure	11,100	psi

Make-Up Torques

Min. Make-Up Torque	11,600	ft-lbs
Opt. Make-Up Torque	12,900	ft-lbs
Max. Make-Up Torque	14,100	ft-lbs
Yield Torque	20,600	ft-lbs



Printed on: July-29-2014

IPSCO

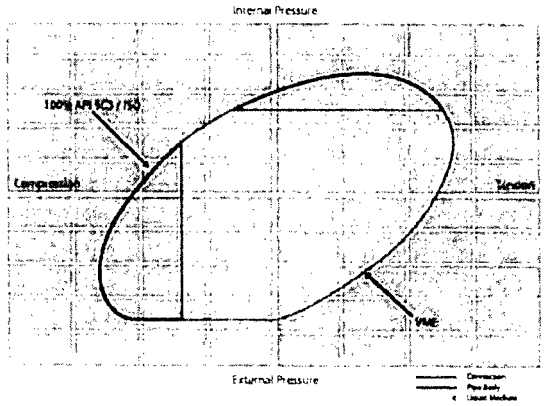
TECHNICAL DATA SHEET TMK UP DQX 5.5 X 20 P110

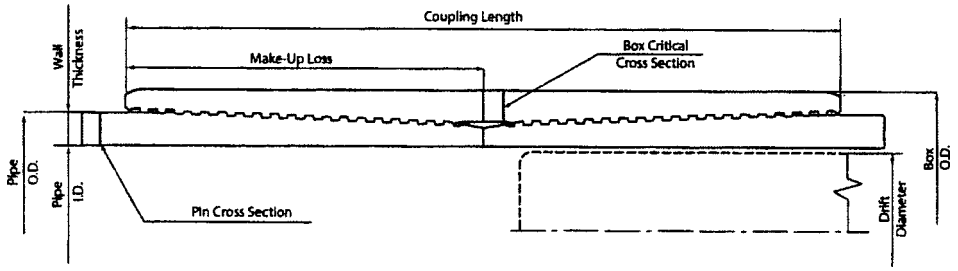
TUBULAR PARAMETERS	
Nominal OD, (inch)	5.500
Wall Thickness, (inch)	0.361
Pipe Grade	P110
Coupling	Regular
Coupling Grade	P110
Drift	Standard

CONNECTION PARAMETERS	
Connection OD (inch)	6.05
Connection ID, (inch)	4.778
Make-Up Loss, (inch)	4.122
Connection Critical Area, (sq inch)	5.828
Yield Strength in Tension, (klbs)	641
Yeld Strength in Compression, (klbs)	641
Tension Efficiency	100%
Compression Efficiency	100%
Min. Internal Yield Pressure, (psi)	12 640
Collapse Pressure, (psi)	11 110
Uniaxial Bending (deg/100ft)	91.7

MAKE-UP TORQUES	
Yield Torque, (ft-lb)	20 600
Minimum Make-Up Torque, (ft-lb)	11 600
Optimum Make-Up Torque, (ft-lb)	12 900
Maximum Make-Up Torque, (ft-lb)	14 100

PIPE BODY PROPERTIES	
PE Weight, (lbs/ft)	19.81
Nominal Weight, (lbs/ft)	20.00
Nominal ID, (inch)	4.778
Drift Diameter, (inch)	4.653
Nominal Pipe Body Area, (sq inch)	5.828
Yield Strength in Tension, (klbs)	641
Min. Internal Yield Pressure, (psi)	12 640
Collapse Pressure, (psi)	11 110





PECOS DISTRICT
DRILLING CONDITIONS OF APPROVAL

OPERATOR'S NAME:	**OXY USA INCORPORATED**
LEASE NO.:	**NMNM94651**
WELL NAME & NO.:	**CEDAR CANYON 20 FEDERAL COM 25H**
SURFACE HOLE FOOTAGE:	**110' FNL & 1390' FEL**
BOTTOM HOLE FOOTAGE	**2473' FSL & 1390' FEL; Sec. 17**
LOCATION:	**Section 29, T. 24 S., R 29 E., NMPM**
COUNTY:	**Eddy County, New Mexico**

COA

All pervious COAs still apply expect the following:

H2S	○ Yes	◉ No	
Potash	◉ None	○ Secretary	○ R-111-P
Cave/Karst Potential	◉ Low	○ Medium	○ High
Variance	○ None	◉ Flex Hose	○ Other
Wellhead	○ Conventional	◉ Multibowl	○ Both
Other	☐ 4 String Area	☐ Capitan Reef	☐ WIPP

A. Hydrogen Sulfide

Hydrogen Sulfide (H2S) monitors shall be installed prior to drilling out the surface shoe. If H2S is detected in concentrations greater than 100 ppm, the Hydrogen Sulfide area shall meet Onshore Order 6 requirements, which includes equipment and personnel/public protection items. If Hydrogen Sulfide is encountered, provide measured values and formations to the BLM.

B. CASING

1. The **13-3/8** inch surface casing shall be set at approximately **400** feet (a minimum of 25 feet into the Rustler Anhydrite and above the salt) and cemented to the surface.

    a. If cement does not circulate to the surface, the appropriate BLM office shall be notified and a temperature survey utilizing an electronic type temperature survey with surface log readout will be used or a cement bond log shall be run to verify the top of the cement. Temperature survey will be run a minimum of six hours after pumping cement and ideally between 8-10 hours after completing the cement job.
    b. Wait on cement (WOC) time for a primary cement job will be a minimum of **8 hours** or 500 pounds compressive strength, whichever is greater. (This is to include the lead cement).

c. Wait on cement (WOC) time for a remedial job will be a minimum of 4 hours after bringing cement to surface or 500 pounds compressive strength, whichever is greater.
d. If cement falls back, remedial cementing will be done prior to drilling out that string.

2. The minimum required fill of cement behind the **9-5/8** inch intermediate casing is:
Wait on cement (WOC) time for a primary cement job is to include the lead cement slurry due to cave/karst or potash.
Operator has proposed a DV tool, the depth may be adjusted as long as the cement is changed proportionally. The DV tool may be cancelled if cement circulates to surface on the first stage.

a. First stage to DV tool: Cement to circulate. If cement does not circulate off the DV tool, contact the appropriate BLM office before proceeding with second stage cement job.**Additional cement maybe required. Excess calculated to 21%.**

b. Second stage above DV tool:Cement to surface. If cement does not circulate, contact the appropriate BLM office.

3. The minimum required fill of cement behind the **5-1/2** inch production casing is:
- Cement should tie-back at least 200 feet into previous casing string. Operator shall provide method of verification. **Additional cement maybe required. Excess calculated to 19%.**

C. PRESSURE CONTROL

1. Variance approved to use flex line from BOP to choke manifold. Manufacturer's specification to be readily available. No external damage to flex line. Flex line to be installed as straight as possible (no hard bends).

2. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be **5000 (5M)** psi.

GENERAL REQUIREMENTS

The BLM is to be notified in advance for a representative to witness:

a. Spudding well (minimum of 24 hours)
b. Setting and/or Cementing of all casing strings (minimum of 4 hours)
c. BOPE tests (minimum of 4 hours)

☒ Chaves and Roosevelt Counties
Call the Roswell Field Office, 2909 West Second St., Roswell NM 88201.
During office hours call (575) 627-0272.
After office hours call (575)

☒ Eddy County
Call the Carlsbad Field Office, 620 East Greene St., Carlsbad, NM 88220, (575) 361-2822

☒ Lea County
Call the Hobbs Field Station, 414 West Taylor, Hobbs NM 88240, (575) 393-3612

1. Unless the production casing has been run and cemented or the well has been properly plugged, the drilling rig shall not be removed from over the hole without prior approval.
   a. In the event the operator has proposed to drill multiple wells utilizing a skid/walking rig. Operator shall secure the wellbore on the current well, after installing and testing the wellhead, by installing a blind flange of like pressure rating to the wellhead and a pressure gauge that can be monitored while drilling is performed on the other well(s).
   b. When the operator proposes to set surface casing with Spudder Rig
      - Notify the BLM when moving in and removing the Spudder Rig.
      - Notify the BLM when moving in the 2nd Rig. Rig to be moved in within 90 days of notification that Spudder Rig has left the location.
      - BOP/BOPE test to be conducted per Onshore Oil and Gas Order No. 2 as soon as 2nd Rig is rigged up on well.

2. Floor controls are required for 3M or Greater systems. These controls will be on the rig floor, unobstructed, readily accessible to the driller and will be operational at all times during drilling and/or completion activities. Rig floor is defined as the area immediately around the rotary table; the area immediately above the substructure on which the draw works are located, this does not include the dog house or stairway area.

3. The record of the drilling rate along with the GR/N well log run from TD to surface (horizontal well – vertical portion of hole) shall be submitted to the BLM office as

well as all other logs run on the borehole 30 days from completion. If available, a digital copy of the logs is to be submitted in addition to the paper copies. The Rustler top and top and bottom of Salt are to be recorded on the Completion Report.

A. CASING

1. Changes to the approved APD casing program need prior approval if the items substituted are of lesser grade or different casing size or are Non-API. The Operator can exchange the components of the proposal with that of superior strength (i.e. changing from J-55 to N-80, or from 36# to 40#). Changes to the approved cement program need prior approval if the altered cement plan has less volume or strength or if the changes are substantial (i.e. Multistage tool, ECP, etc.). The initial wellhead installed on the well will remain on the well with spools used as needed.

2. Wait on cement (WOC) for Potash Areas: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi for all cement blends, 2) until cement has been in place at least 24 hours. WOC time will be recorded in the driller's log. The casing intergrity test can be done (prior to the cement setting up) immediately after bumping the plug.

3. Wait on cement (WOC) for Water Basin: After cementing but before commencing any tests, the casing string shall stand cemented under pressure until both of the following conditions have been met: 1) cement reaches a minimum compressive strength of 500 psi at the shoe, 2) until cement has been in place at least 8 hours. WOC time will be recorded in the driller's log. See individual casing strings for details regarding lead cement slurry requirements. The casing intergrity test can be done (prior to the cement setting up) immediately after bumping the plug.

4. Provide compressive strengths including hours to reach required 500 pounds compressive strength prior to cementing each casing string. Have well specific cement details onsite prior to pumping the cement for each casing string.

5. No pea gravel permitted for remedial or fall back remedial without prior authorization from the BLM engineer.

6. On that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. 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.

7. If hardband drill pipe is rotated inside casing, returns will be monitored for metal. If metal is found in samples, drill pipe will be pulled and rubber protectors which have a

larger diameter than the tool joints of the drill pipe will be installed prior to continuing drilling operations.

8. Whenever a casing string is cemented in the R-111-P potash area, the NMOCD requirements shall be followed.

B. PRESSURE CONTROL

1. All blowout preventer (BOP) and related equipment (BOPE) shall comply with well control requirements as described in Onshore Oil and Gas Order No. 2 and API RP 53 Sec. 17.

2. If a variance is approved for a flexible hose to be installed from the BOP to the choke manifold, the following requirements apply: The flex line must meet the requirements of API 16C. Check condition of flexible line from BOP to choke manifold, replace if exterior is damaged or if line fails test. Line to be as straight as possible with no hard bends and is to be anchored according to Manufacturer's requirements. The flexible hose can be exchanged with a hose of equal size and equal or greater pressure rating. Anchor requirements, specification sheet and hydrostatic pressure test certification matching the hose in service, to be onsite for review. These documents shall be posted in the company man's trailer and on the rig floor.

3. 5M or higher system requires an HCR valve, remote kill line and annular to match. The remote kill line is to be installed prior to testing the system and tested to stack pressure.

4. If the operator has proposed a multi-bowl wellhead assembly in the APD. The following requirements must be met:
    a. Wellhead shall be installed by manufacturer's representatives, submit documentation with subsequent sundry.
    b. If the welding is performed by a third party, the manufacturer's representative shall monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
    c. Manufacturer representative shall install the test plug for the initial BOP test.
    d. If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head shall be cut off, cementing operations performed and another wellhead installed.
    e. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.

5. The appropriate BLM office shall be notified a minimum of 4 hours in advance for a representative to witness the tests.

a. In a water basin, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. The casing cut-off and BOP installation can be initiated four hours after installing the slips, which will be approximately six hours after bumping the plug. For those casing strings not using slips, the minimum wait time before cut-off is eight hours after bumping the plug. BOP/BOPE testing can begin after cut-off or once cement reaches 500 psi compressive strength (including lead when specified), whichever is greater. However, if the float does not hold, cut-off cannot be initiated until cement reaches 500 psi compressive strength (including lead when specified).

b. In potash areas, for all casing strings utilizing slips, these are to be set as soon as the crew and rig are ready and any fallback cement remediation has been done. For all casing strings, casing cut-off and BOP installation can be initiated at twelve hours after bumping the plug. However, **no tests** shall commence until the cement has had a minimum of 24 hours setup time, except the casing pressure test can be initiated immediately after bumping the plug (only applies to single stage cement jobs).

c. The tests shall be done by an independent service company utilizing a test plug. The results of the test shall be reported to the appropriate BLM office.

d. The test shall be run on a 5000 psi chart for a 2-3M BOP/BOP, on a 10000 psi chart for a 5M BOP/BOPE and on a 15000 psi chart for a 10M BOP/BOPE. If a linear chart is used, it shall be a one hour chart. A circular chart shall have a maximum 2 hour clock. If a twelve hour or twenty-four hour chart is used, tester shall make a notation that it is run with a two hour clock.

e. All tests are required to be recorded on a calibrated test chart. A copy of the BOP/BOPE test chart and a copy of independent service company test will be submitted to the appropriate BLM office.

f. The BOP/BOPE test shall include a low pressure test from 250 to 300 psi. The test will be held for a minimum of 10 minutes. This test shall be performed prior to the test at full stack pressure.

g. BOP/BOPE must be tested by an independent service company within 500 feet of the top of the Wolfcamp formation if the time between the setting of the intermediate casing and reaching this depth exceeds 20 days. This test does not exclude the test prior to drilling out the casing shoe as per Onshore Order No. 2.

C. DRILLING MUD

Mud system monitoring equipment, with derrick floor indicators and visual and audio alarms, shall be operating before drilling into the Wolfcamp formation, and shall be used until production casing is run and cemented.

D. WASTE MATERIAL AND FLUIDS

All waste (i.e. drilling fluids, trash, salts, chemicals, sewage, gray water, etc.) created as a result of drilling operations and completion operations shall be safely contained and disposed of properly at a waste disposal facility. No waste material or fluid shall be disposed of on the well location or surrounding area.

Porto-johns and trash containers will be on-location during fracturing operations or any other crew-intensive operations.

Waste Minimization Plan (WMP)

In the interest of resource development, submission of additional well gas capture development plan information is deferred but may be required by the BLM Authorized Officer at a later date.

ZS 032118

242929 SUNDRY-397175 Cedar Canyon 20 Federal Com 25H 30015 NM94651 Oxy v12.52 03.21.2018 ZS

High Cave Karst: two casing strings, both to circulate cement to surface.

13 3/8	surface csg in a		17 1/2	inch hole.		Design Factors		SURFACE	
Segment	**#/ft**	**Grade**		**Coupling**	**Body**	**Collapse**	**Burst**	**Length**	**Weight**
"A"	54.50	J 55		BUTT	39.14	6.32	0.66	400	21,800
"B"								**0**	**0**
w/8.4#/g mud, 30min Sfc Csg Test psig:	1,500			Tail Cmt	does	circ to sfc.	Totals:	400	21,800

Comparison of Proposed to Minimum Required Cement Volumes

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
17 1/2	0.6946	**332**	558	**332**	68	**8.60**	2382	**3M**	1.56

Class 'C' tail cmt yield above 1.35.

Burst Frac Gradient(s) for Segment(s) A, B = , b All > 0.70, OK.

9 5/8	casing inside the		13 3/8			Design Factors		INTERMEDIATE	
Segment	**#/ft**	**Grade**		**Coupling**	**Body**	**Collapse**	**Burst**	**Length**	**Weight**
"A"	43.50	HCL 80		BUTT	2.89	1.44	1.47	7,500	326,250
"B"	**47.00**	**HCL 80**		**BUTT**	50.89	**1.72**	**1.59**	**454**	**21,338**
w/8.4#/g mud, 30min Sfc Csg Test psig:							Totals:	7,954	347,588
The cement volume(s) are intended to achieve a top of					0	ft from surface or a		**400**	overlap.

Hole Size	Annular Volume	1 Stage Cmt Sx	1 Stage CuFt Cmt	Min Cu Ft	1 Stage % Excess	Drilling Mud Wt	Calc MASP	Req'd BOPE	Min Dist Hole-Cplg
12 1/4	0.3132	look ↘	0	**2529**		**10.00**	2409	**3M**	0.81
D V Tool(s):			2936				sum of sx	Σ CuFt	Σ%excess
t by stage % :		**21**	66				1619	3485	38

Class 'H' tail cmt yld > 1.20

Tail cmt

5 1/2	casing inside the		9 5/8			Design Factors		PRODUCTION	
Segment	**#/ft**	**Grade**		**Coupling**	**Joint**	**Collapse**	**Burst**	**Length**	**Weight**
"A"	20.00	P 110		**DQX**	3.71	2.76	2.92	8,055	161,100
"B"	**20.00**	**P 110**		**DQX**	7.91	**2.27**	**2.92**	**8,057**	**161,140**
w/8.4#/g mud, 30min Sfc Csg Test psig:	1,772						Totals:	16,112	322,240
B would be:					54.51	2.58	if it were a vertical wellbore.		

	MTD	Max VTD	sg JD	Curve KOP	Dooleg	Se...ity	MEOC
	16112	8643	8643	8055	90	10	8953

The cement volume(s) are intended to achieve a top of					7754	ft from surface or a		200	overlap.
Hole Size	**Annular Volume**	**1 Stage Cmt Sx**	**1 Stage CuFt Cmt**	**Min Cu Ft**	**1 Stage % Excess**	**Drilling Mud Wt**	**Calc MASP**	**Req'd BOPE**	**Min Dist Hole-Cplg**
8 1/2	0.2291	**1406**	2292	**1925**	19	**9.60**			1.23

Class 'H' tail cmt yld > 1.20