Form 3160-5
(June 2015)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Carlsbad Field Office
OCD Hobbs

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

HOBBS OCD
FEB 07 2019
RECEIVED

5. Lease Serial No.
NMNM94186

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.
THISTLE UNIT 155H

2. Name of Operator
DEVON ENERGY PRODUCTION COMPAN
Contact: REBECCA DEAL
E-Mail: Rebecca.Deal@dvn.com

9. API Well No.
30-025-43658

3a. Address
333 WEST SHERIDAN AVE
OKLAHOMA CITY, OK 73102

3b. Phone No. (include area code)
Ph: 405-228-8429

10. Field and Pool or Exploratory Area
TRIPLE X; BONE SPRING

4. Location of Well *(Footage, Sec., T., R., M., or Survey Description)*
Sec 33 T23S R33E Mer NMP SWSE 150FSL 1889FEL

11. County or Parish, State
LEA 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.

Devon Energy Production Co. requests the following changes to the Thistle Unit 155H APD:

? BHL change from 2630 FSL & 2230 FEL to 20 FNL & 1885 FWL, both 28-23S-33E.

? MD/TVD change from Bone Spring 17,105/9637' to Upper Wolfcamp 22,807'/12,540'

? Casing design & Cement Volume changes

? Alternate casing design added to drilling plan

SEE ATTACHED FOR
CONDITIONS OF APPROVAL

Please see attached C-102, drilling plan, directional & AC plan and plot.

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

Electronic Submission #450697 verified by the BLM Well Information System
For DEVON ENERGY PRODUCTION COMPAN, sent to the Hobbs
Committed to AFMSS for processing by MUSTAFA HAQUE on 01/16/2019 ()

Name *(Printed/Typed)* REBECCA DEAL — Title REGULATORY COMPLIANCE PROFESSI

Signature (Electronic Submission) — Date 01/15/2019

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By mustafa Haque

Title Petroleum Engineer

Date 01-17-2019

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 Field Office

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)

**** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ****

Additional data for EC transaction #450697 that would not fit on the form

32. Additional remarks, continued

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

[1] API Number	[2] Pool Code	[3] Pool Name
30-025-43658	96689	BRINNINSTOOL;WOLFCAMP, WEST

[4] Property Code	[5] Property Name	[6] Well Number
	THISTLE UNIT	155H

[7] OGRID No.	[8] Operator Name	[9] Elevation
6137	DEVON ENERGY PRODUCTION COMPANY, L.P.	3653.2

[10] Surface Location

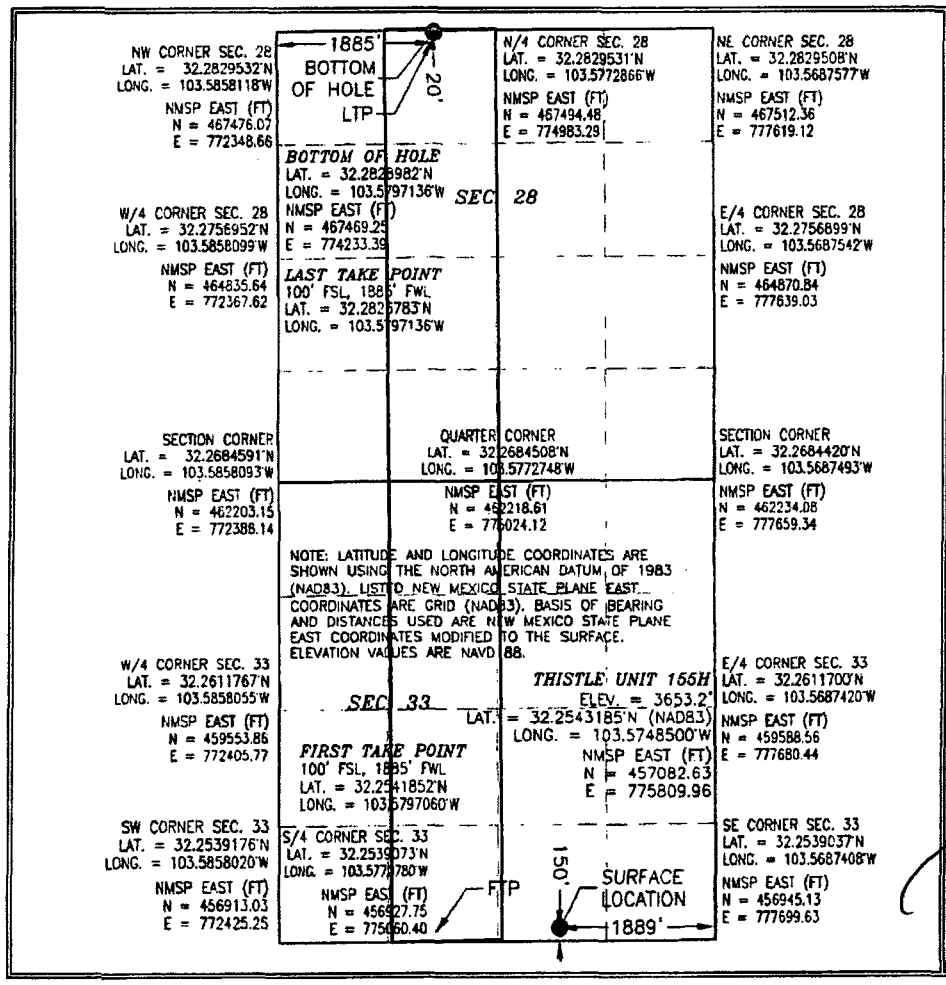
UL or lot no.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
O	33	23 S	33 E		150	SOUTH	1889	EAST	LEA

[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
C	28	23 S	33 E		20	NORTH	1885	WEST	LEA

[12] Dedicated Acres	[13] Joint or Infill	[14] Consolidation Code	[15] Order No.
320			

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.

Rebecca Deal — 1/9/2019
Signature — Date

Rebecca Deal, Regulatory Analyst
Printed Name

rebecca.deal@dvn.com
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.

JANUARY 4, 2019
Date of Survey

FILIMON F. JARAMILLO — NEW MEXICO — 12797 — REGISTERED PROFESSIONAL SURVEYOR

Signature and Seal of Professional Surveyor:

Certificate Number: FILIMON F. JARAMILLO, PLS 12797

SURVEY NO. 4715A

Intent [X] As Drilled [ ]

API #
30-025-43658

Operator Name:	Property Name:	Well Number
DEVON ENERGY PRODUCTION COMPANY, L.P.	THISTLE UNIT	155H

Kick Off Point (KOP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
	33	23S	33E		50	FSL	1885	FWL	LEA

Latitude	Longitude	NAD
32.254044	-103.579722	83

First Take Point (FTP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
N	33	23S	33E		100	SOUTH	1885	WEST	LEA

Latitude	Longitude	NAD
32.2541852	103.5797060	83

Last Take Point (LTP)

UL	Section	Township	Range	Lot	Feet	From N/S	Feet	From E/W	County
C	28	23S	33E		100	NORTH	1885	WEST	LEA

Latitude	Longitude	NAD
32.2826783	103.5797136	83

Is this well the defining well for the Horizontal Spacing Unit? [ ]

Is this well an infill well? [ ]

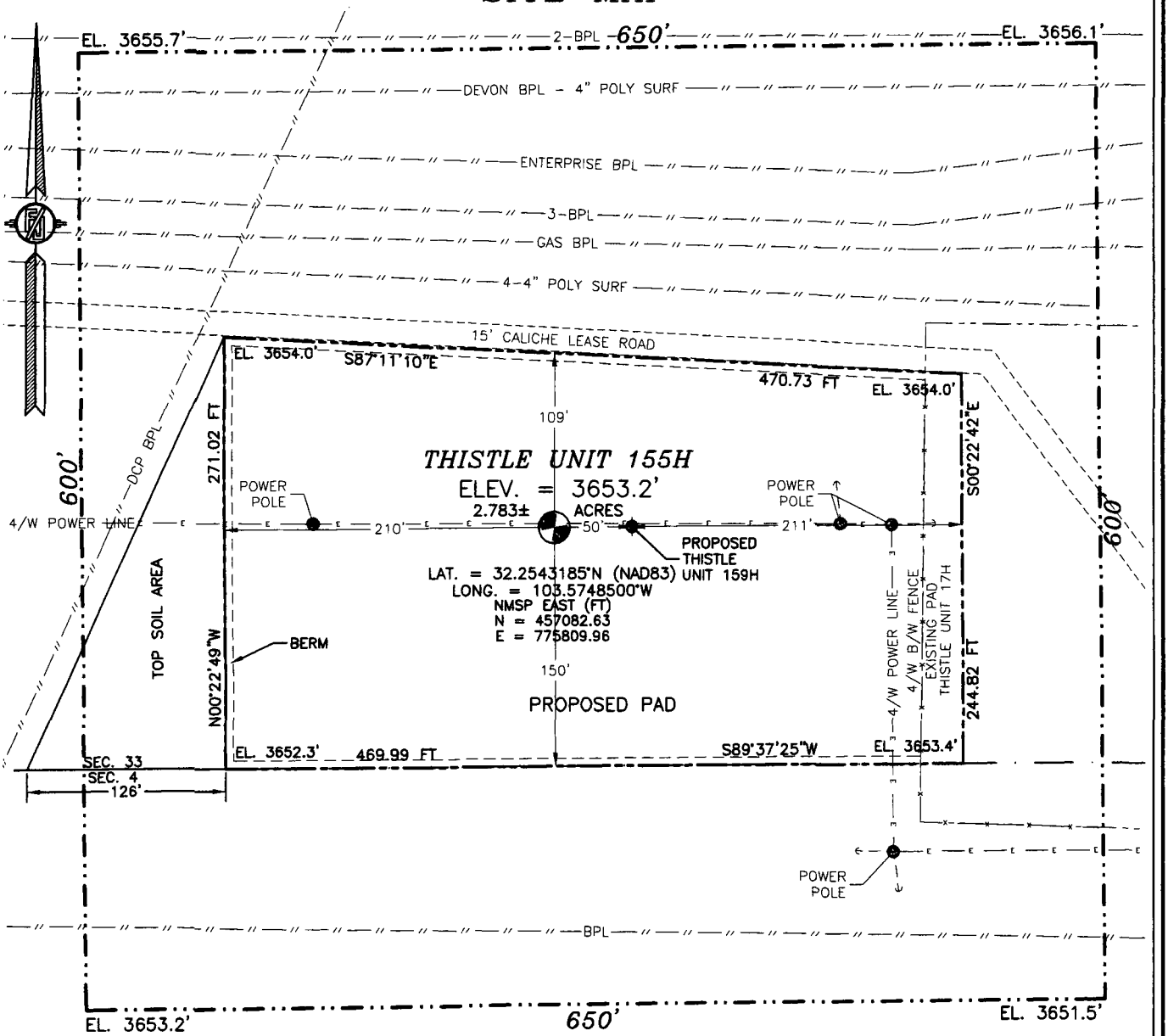
If infill is yes please provide API if available, Operator Name and well number for Defining well for Horizontal Spacing Unit.

API #

Operator Name:	Property Name:	Well Number

KZ 06/29/2018

SECTION 33, TOWNSHIP 23 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO
SITE MAP



NOTE: LATITUDE AND LONGITUDE COORDINATES ARE SHOWN USING THE NORTH AMERICAN DATUM OF 1983 (NAD83). LISTED NEW MEXICO STATE PLANE EAST COORDINATES ARE GRID (NAD83). BASIS OF BEARING AND DISTANCES USED ARE NEW MEXICO STATE PLANE EAST COORDINATES MODIFIED TO THE SURFACE. ELEVATION VALUES ARE NAVD 88.

010 50 100 200

SCALE 1" = 100'

DIRECTIONS TO LOCATION

FROM THE INTERSECTION OF HWY 128 & CR. J2 (BRININSTOOL ROAD) GO NORTH ON BRININSTOOL ROAD APPROX 3.0 MILES CROSS CATTLE GUARD TURN LEFT (WEST) GO 0.1 MILE PAST TANK BATTERY TO NORTHEAST CORNER TO LOCATION ON LEFT (SOUTH)

DEVON ENERGY PRODUCTION COMPANY, L.P.

THISTLE UNIT 155H

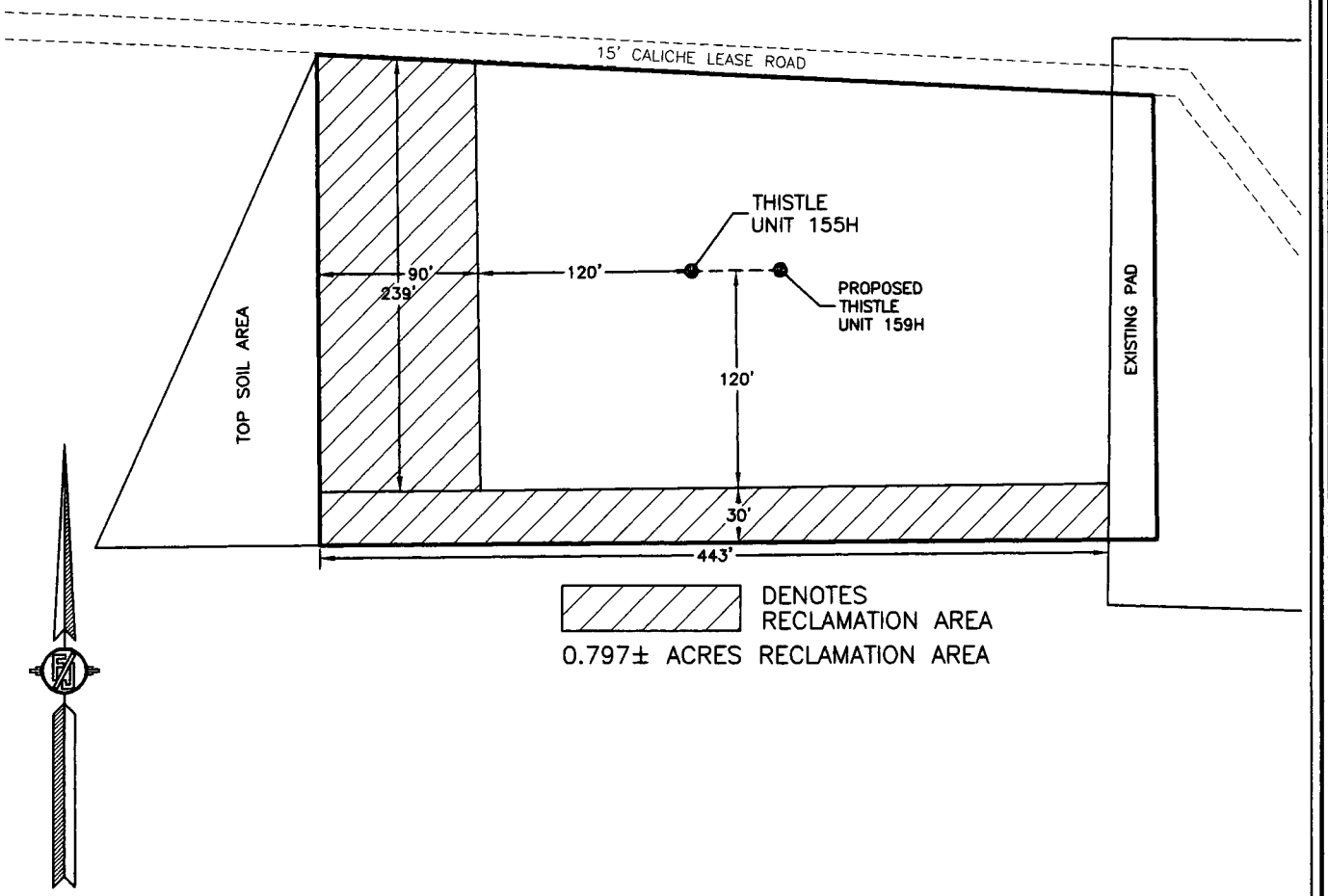
LOCATED 150 FT. FROM THE SOUTH LINE AND 1889 FT. FROM THE EAST LINE OF SECTION 33, TOWNSHIP 23 SOUTH, RANGE 33 EAST, N.M.P.M. LEA COUNTY, STATE OF NEW MEXICO

JANUARY 3, 2019

SURVEY NO. 4715A

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 *CARLSBAD, NEW MEXICO*

PROPOSED INTERIM SITE RECLAMATION
FOR THISTLE UNIT 155H
SECTION 33, TOWNSHIP 23 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO



010 50 100 200
SCALE 1" = 100'

DEVON ENERGY PRODUCTION COMPANY, L.P.

THISTLE UNIT 155H

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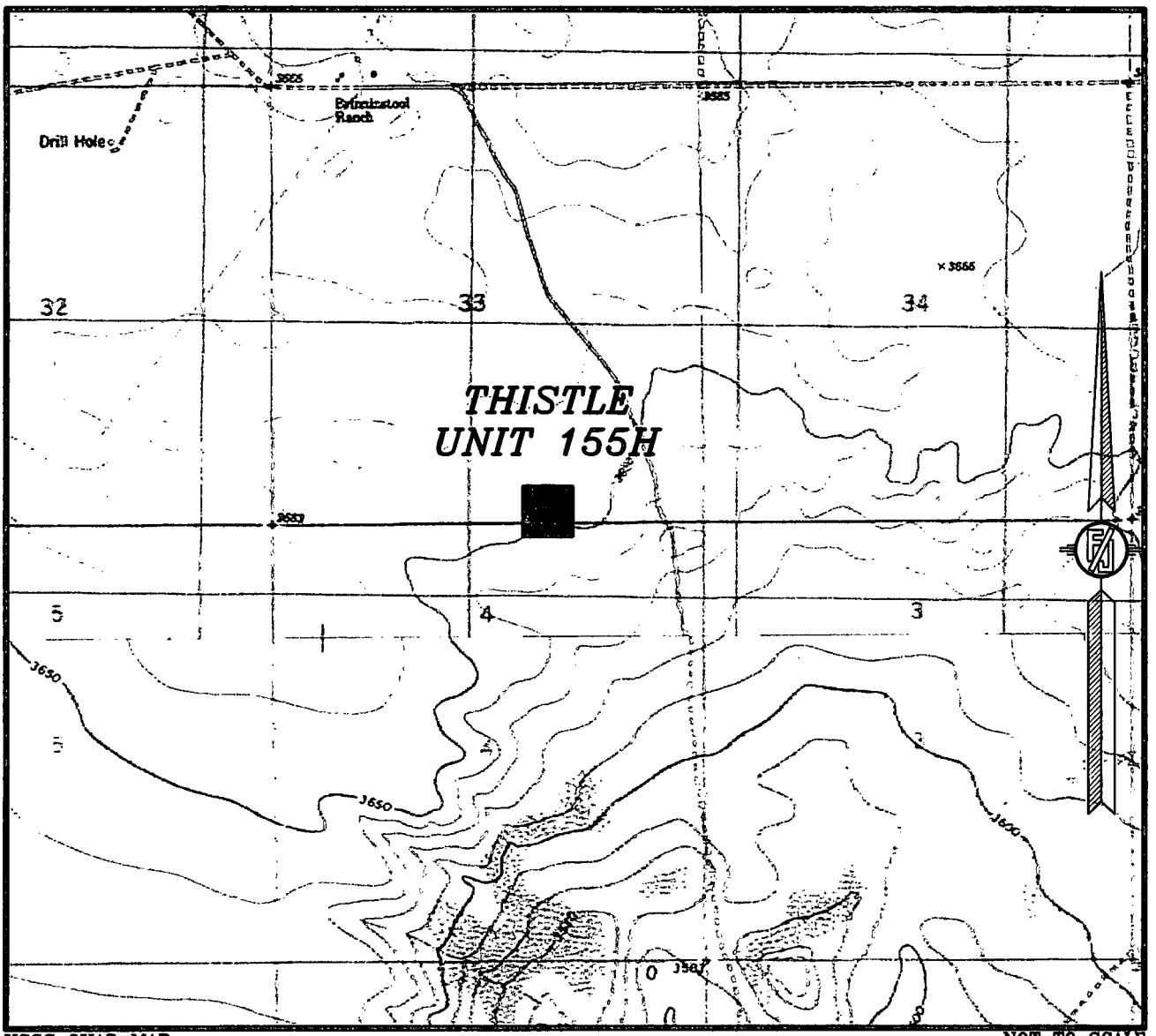
JANUARY 3, 2019

SURVEY NO. 4715A

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 *CARLSBAD, NEW MEXICO*

SECTION 33, TOWNSHIP 23 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

LOCATION VERIFICATION MAP



USGS QUAD MAP:
TIP TOP WELLS

NOT TO SCALE

DEVON ENERGY PRODUCTION COMPANY, L.P.

THISTLE UNIT 155H

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AND 1889 FT. FROM THE EAST LINE OF
SECTION 33, TOWNSHIP 23 SOUTH,
RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

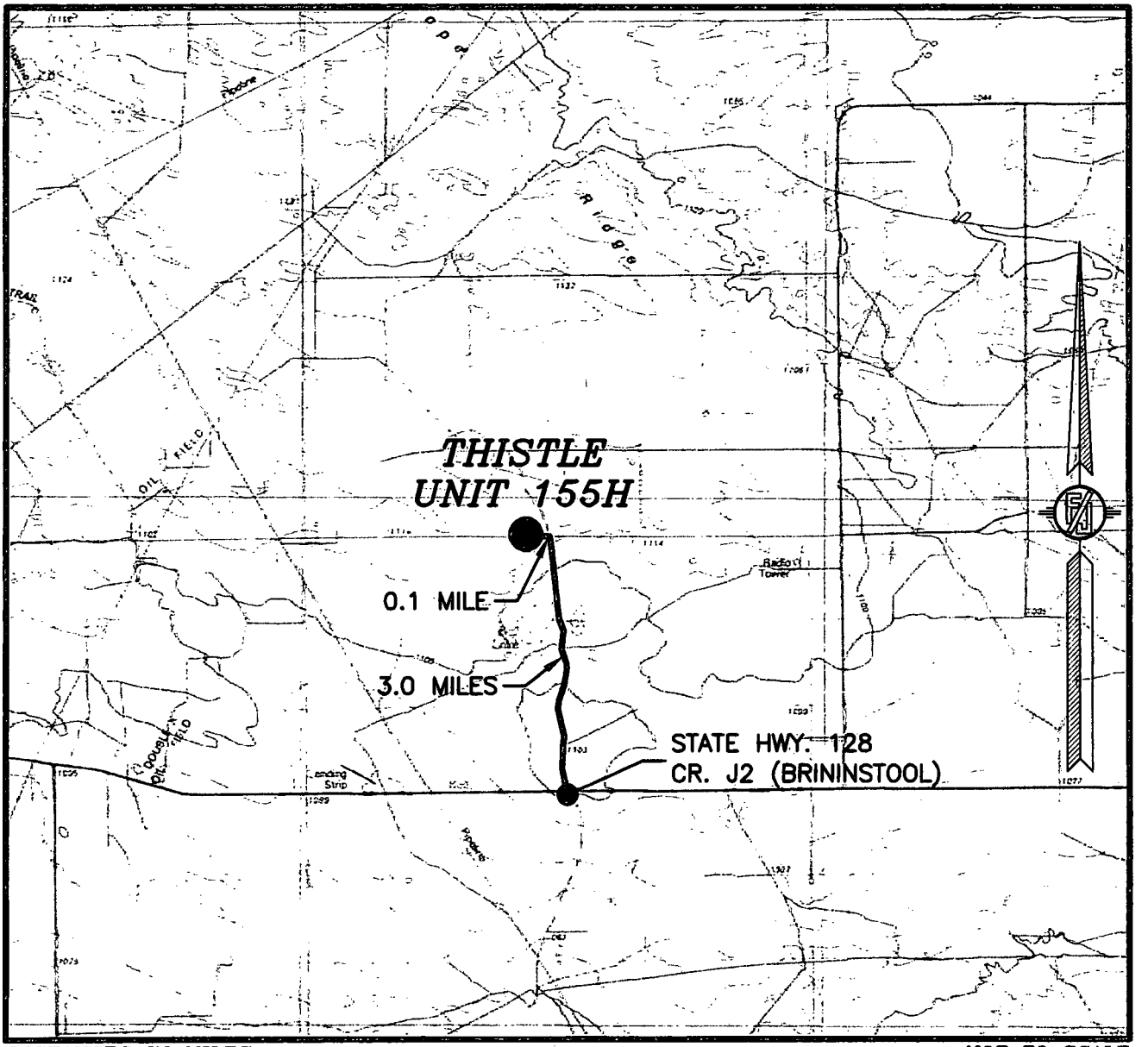
JANUARY 3, 2019

SURVEY NO. 4715A

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

SECTION 33, TOWNSHIP 23 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

VICINITY MAP



DISTANCES IN MILES *NOT TO SCALE*

DIRECTIONS TO LOCATION
FROM THE INTERSECTION OF HWY 128 & CR. J2 (BRININSTOOL ROAD) GO NORTH ON BRININSTOOL ROAD APPROX 3.0 MILES CROSS CATTLE GUARD TURN LEFT (WEST) GO 0.1 MILE PAST TANK BATTERY TO NORTHEAST CORNER TO LOCATION ON LEFT (SOUTH)

DEVON ENERGY PRODUCTION COMPANY, L.P.
THISTLE UNIT 155H
LOCATED 150 FT. FROM THE SOUTH LINE AND 1889 FT. FROM THE EAST LINE OF SECTION 33, TOWNSHIP 23 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

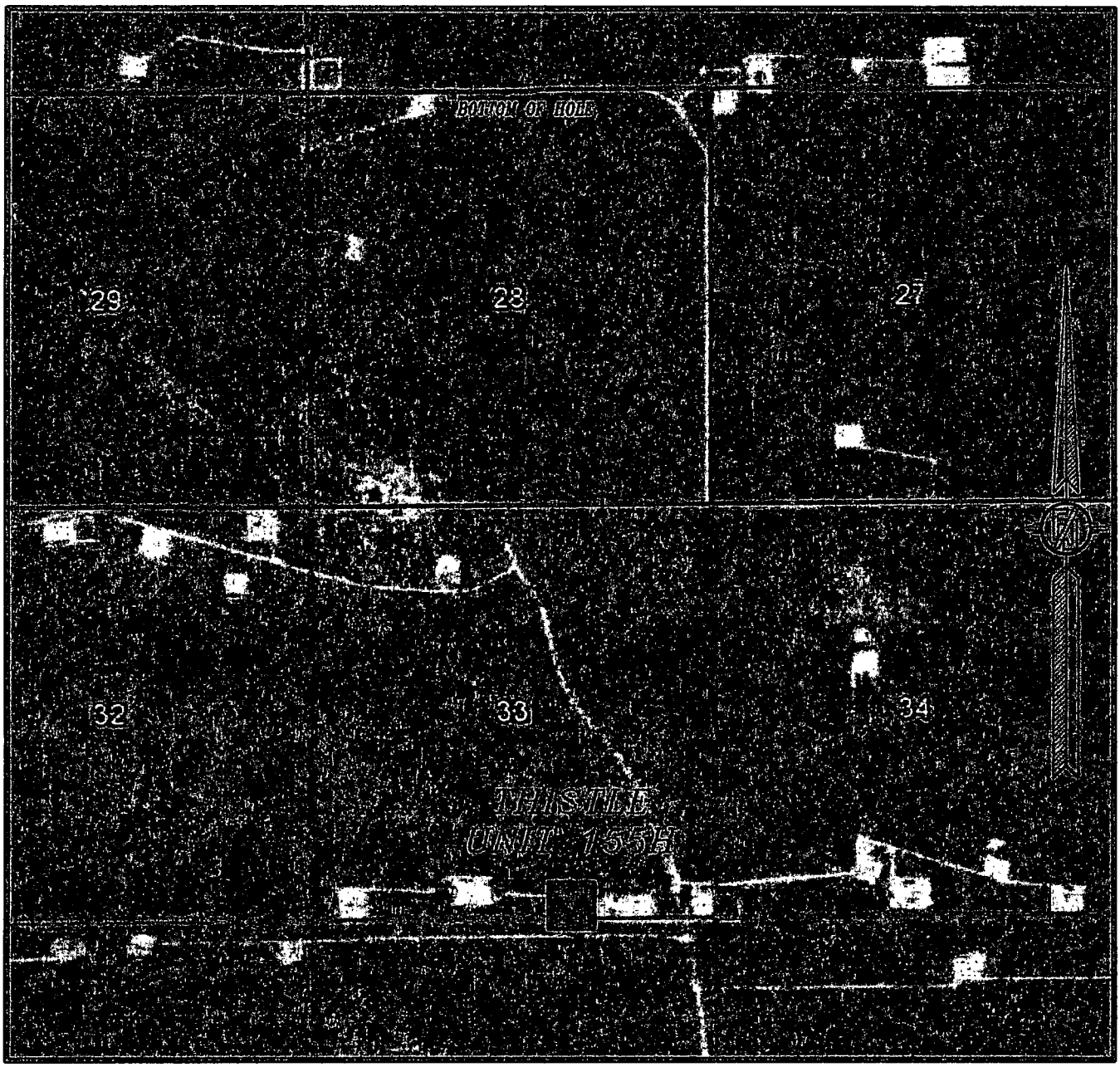
JANUARY 3, 2019

SURVEY NO. 4715A

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 *CARLSBAD, NEW MEXICO*

SECTION 33, TOWNSHIP 23 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

AERIAL PHOTO



NOT TO SCALE
AERIAL PHOTO:
GOOGLE EARTH
FEB. 2014

DEVON ENERGY PRODUCTION COMPANY, L.P.

THISTLE UNIT 155H

LOCATED 150 FT. FROM THE SOUTH LINE
AND 1889 FT. FROM THE EAST LINE OF
SECTION 33, TOWNSHIP 23 SOUTH,
RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

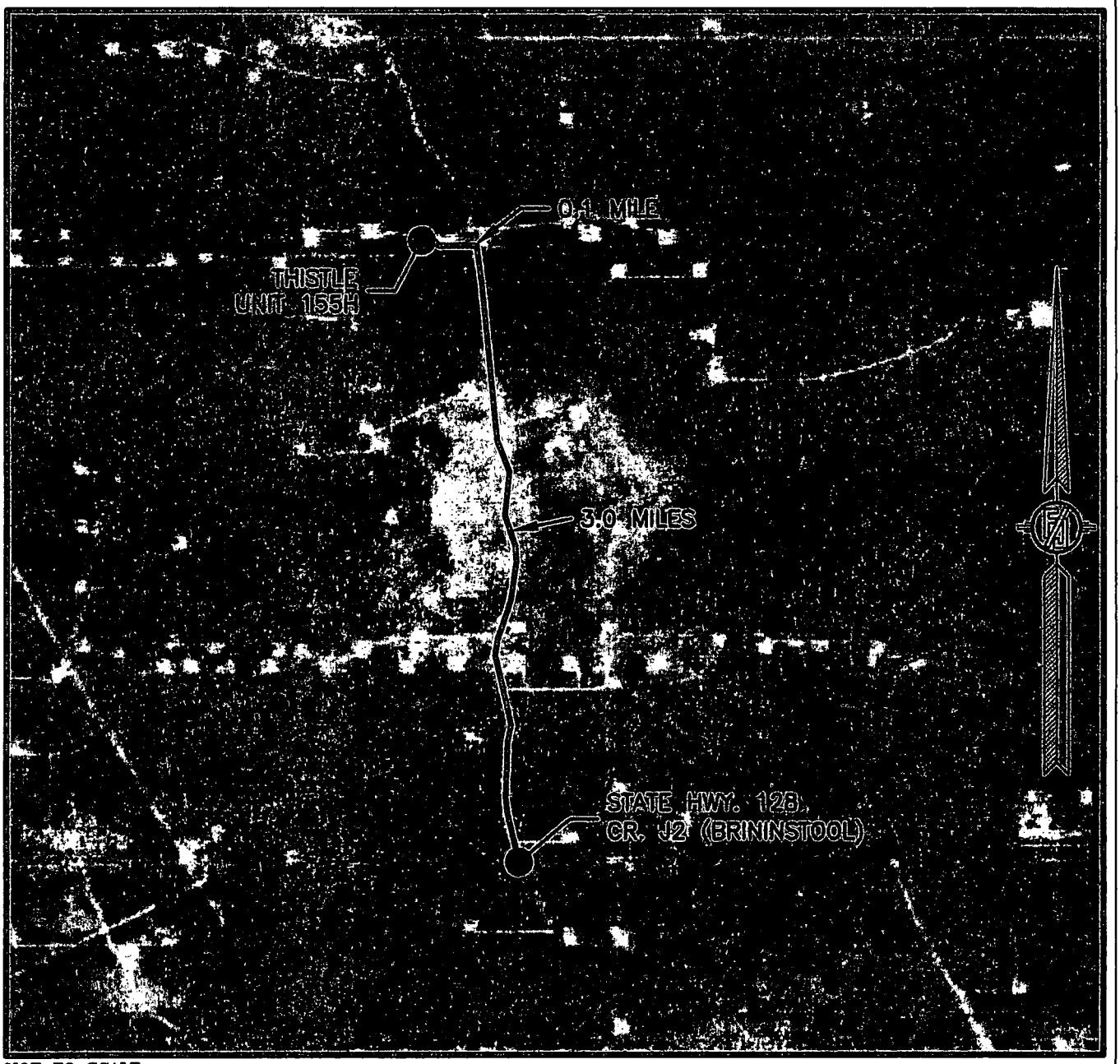
JANUARY 3, 2019

SURVEY NO. 4715A

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

SECTION 33, TOWNSHIP 23 SOUTH, RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

AERIAL ACCESS ROUTE MAP



NOT TO SCALE
AERIAL PHOTO:
GOOGLE EARTH
FEB. 2014

DEVON ENERGY PRODUCTION COMPANY, L.P.

THISTLE UNIT 155H

LOCATED 150 FT. FROM THE SOUTH LINE
AND 1889 FT. FROM THE EAST LINE OF
SECTION 33, TOWNSHIP 23 SOUTH,
RANGE 33 EAST, N.M.P.M.
LEA COUNTY, STATE OF NEW MEXICO

JANUARY 3, 2019

SURVEY NO. 4715A

MADRON SURVEYING, INC. 301 SOUTH CANAL (575) 234-3341 CARLSBAD, NEW MEXICO

Thistle Unit 155H

1. Geologic Formations

TVD of target	12540	Pilot hole depth	N/A
MD at TD:	22806	Deepest expected fresh water:	

Basin

Formation	Depth (TVD) from KB	Water/Mineral Bearing/ Target Zone?	Hazards*
Rustler	1225		
Salado	1735		
B/Salt	5150		
Delaware	5240		
Bone Spring	9150		
2BSSS	10920		
3rd BSPG Sand	11955		
WFMP	12325		

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

2. Casing Program (Primary Design)

Hole Size	Casing Interval		Csg. Size	Wt (PPF)	Grade	Conn	Min SF Collapse	Min SF Burst	Min SF Tension
	From	To							
14.75"	0	~~1250~~ 1450	10.75"	40.5	J-55	STC	1.125	1.25	1.6
9.875"	0	11980 TVD	7.625"	29.7	P110	BTC	1.125	1.25	1.6
6.75"	0	TD	5.5"	20	P110	Vam SG	1.125	1.25	1.6
				BLM Minimum Safety Factor			1.125	1.00	1.6 Dry 1.8 Wet

- All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h Must have table for contingency casing
- Rustler top will be validated via drilling parameters (i.e. reduction in ROP) and surface casing setting depth revised accordingly if needed.
- Int casing shoe will be selected based on drilling data / gamma, setting depth with be revised accordingly if needed.
- A variance is requested to wave the centralizer requirement for the Intermediate casing and production casing.

Casing Program (Alternate Design)

Hole Size	Casing Interval		Csg. Size	Wt. (PPF)	Grade	Conn	Min SF Collapse	Min SF Burst	Min SF Tension
	From	To							
17.5"	0	Same as above	13.375"	48	H-40	STC	1.125	1.25	1.6
10.625"	0	Same as above	8.625"	32	P110EC	BTC	1.125	1.25	1.6
7.875"	0	TD	5.5"	17	P110	BTC	1.125	1.25	1.6
				BLM Minimum Safety Factor			1.125	1.00	1.6 Dry 1.8 Wet

- All casing strings will be tested in accordance with Onshore Oil and Gas Order #2 III.B.1.h Must have table for contingency casing
- Rustler top will be validated via drilling parameters (i.e. reduction in ROP) and surface casing setting depth revised accordingly if needed.
- Int 1 casing shoe will be selected based on drilling data / gamma, setting depth with be revised accordingly if needed.
- Option to drill change intermediate 1 hole size to 9.625, (8.625" connection will change from BTC to TLW)
- Option to run 8.625" TLW connection for intermediate 1
- A variance is requested to wave the centralizer requirement for the Intermediate casing and production casing.
- Variance is requested for collapse rating on intermediate casing. Operator will keep pipe full while running casing. No losses are expected in subsequent hole section.

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

3. Cementing Program (Primary Design)

Casing	# Sks	TOC	Wt. (lb/gal)	Yld (ft3/sack)	Slurry Description
Surface	801	Surf	13.2	1.33	Lead: Class C Cement + additives
Int 1	1166	Surf	9	3.31	Lead: Class C Cement + additives
	847	4000' above shoe	13.2	1.33	Tail: Class H / C + additives
Int 1 Two Stage w DV @ ~4500	580	Surf	9	3.31	1st stage Lead: Class C Cement + additives
	55	500' above shoe	13.2	1.33	1st stage Tail: Class H / C + additives
	600	Surf	9	3.31	2st stage Lead: Class C Cement + additives
	55	500' above DV	13.2	1.33	2st stage Tail: Class H / C + additives
Int 1 Intermediate Squeeze	As Needed	Surf	13.2	1.33	Squeeze Lead: Class C Cement + additives
	1166	Surf	9	3.31	Lead: Class C Cement + additives
	847	4000' above shoe	13.2	1.33	Tail: Class H / C + additives
Production	791	500' tieback	13.2	1.33	Lead: Class H / C + additives

If a DV tool is ran the depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. Slurry weights will be adjusted based on estimated fracture gradient of the formation. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. If cement is not returned to surface during the primary cement job on the surface casing string, a planned top job will be conducted immediately after completion of the primary job.

Casing String	% Excess
Surface	50%
Intermediate 1	30%
Intermediate 1 (Two Stage)	25%
Prod	10%

Cementing Program (Alternate Design)

Casing	# Sks	TOC	Wt. (lb/gal)	Yld (ft3/sack)	Slurry Description
Surface	1020	Surf	13.2	1.33	Lead: Class C Cement + additives
Int 1	1305	Surf	9	3.31	Lead: Class C Cement + additives
	831	4000' above shoe	13.2	1.33	Tail: Class H / C + additives
Int 1 Two Stage w DV @ ~4500	650	Surf	9	3.31	1st stage Lead: Class C Cement + additives
	55	500' above shoe	13.2	1.33	1st stage Tail: Class H / C + additives
	670	Surf	9	3.31	2st stage Lead: Class C Cement + additives
	55	500' above DV	13.2	1.33	2st stage Tail: Class H / C + additives
Int 1 Intermediate Squeeze	As Needed	Surf	13.2	1.33	Squeeze Lead: Class C Cement + additives
	1305	Surf	9	3.31	Lead: Class C Cement + additives
	831	4000' above shoe	13.2	1.33	Tail: Class H / C + additives
Production	1437	500' tieback	13.2	1.33	Lead: Class H / C + additives

If a DV tool is ran the depth(s) will be adjusted based on hole conditions and cement volumes will be adjusted proportionally. Slurry weights will be adjusted based on estimated fracture gradient of the formation. DV tool will be set a minimum of 50 feet below previous casing and a minimum of 200 feet above current shoe. If cement is not returned to surface during the primary cement job on the surface casing string, a planned top job will be conducted immediately after completion of the primary job.

Casing String	% Excess
Surface	50%
Intermediate 1	30%
Intermediate 1 (Two Stage)	25%
Prod	10%

4. Pressure Control Equipment (Three String Design)

BOP installed and tested before drilling which hole?	Size?	Min. Required WP	Type	✓	Tested to:
Int 1	13-5/8"	5M	Annular	X	50% of rated working pressure
			Blind Ram	X	5M
			Pipe Ram		
			Double Ram	X	
			Other*		
Production	13-5/8"	10M	Annular (5M)	X	100% of rated working pressure
			Blind Ram	X	10M
			Pipe Ram		
			Double Ram	X	
			Other *		
			Annular		
			Blind Ram		
			Pipe Ram		
			Double Ram		
			Other *		
N	A variance is requested for the use of a diverter on the surface casing. See attached for schematic.				

5. Mud Program (3 String Design)

Section	Type	Weight (ppg)	Vis	Water Loss
Surface	FW Gel	8.5 - 9	28-34	N/C
Intermediate	DBE / Cut Brine	9 - 10	28-34	N/C
Production	OBM	10-10.5	28-34	N/C

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

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

6. Logging and Testing Procedures

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

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

7. Drilling Conditions

Condition	Specify what type and where?
BH Pressure at deepest TVD	6847 psi
Abnormal Temperature	No

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

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

8. Other facets of operation

Is this a walking operation? Potentially

1. If operator elects, drilling rig will batch drill the surface holes and run/cement surface casing; walking the rig to next wells on the pad.
2. The drilling rig will then batch drill the intermediate sections and run/cement intermediate casing; the wellbore will be isolated with a blind flange and pressure gauge installed for monitoring the well before walking to the next well.
3. The drilling rig will then batch drill the production hole sections on the wells with OBM, run/cement production casing, and install TA caps or tubing heads for completions.

NOTE: During batch operations the drilling rig will be moved from well to well however, it will not be removed from the pad until all wells have production casing run/cemented.

Will be pre-setting casing? Potentially

1. Spudder rig will move in and drill surface hole.
    a. Rig will utilize fresh water based mud to drill surface hole to TD. Solids control will be handled entirely on a closed loop basis.
2. After drilling the surface hole section, the spudder rig will run casing and cement following all of the applicable rules and regulations (OnShore Order 2, all COAs and NMOCD regulations).
3. The wellhead will be installed and tested once the surface casing is cut off and the WOC time has been reached.
4. A blind flange with the same pressure rating as the wellhead will be installed to seal the wellbore. Pressure will be monitored with a pressure gauge installed on the wellhead.
5. Spudder rig operations is expected to take 4-5 days per well on a multi well pad.
6. The NMOCD will be contacted and notified 24 hours prior to commencing spudder rig operations.
7. Drilling operations will be performed with the drilling rig. At that time an approved BOP stack will be nippled up and tested on the wellhead before drilling operations commences on each well.
    a. The NMOCD will be contacted / notified 24 hours before the drilling rig moves back on to the pad with the pre-set surface casing.

Attachments

_x_ Directional Plan

___ Other, describe

Devon Energy

WELL DETAILS: Thistle Unit 155H

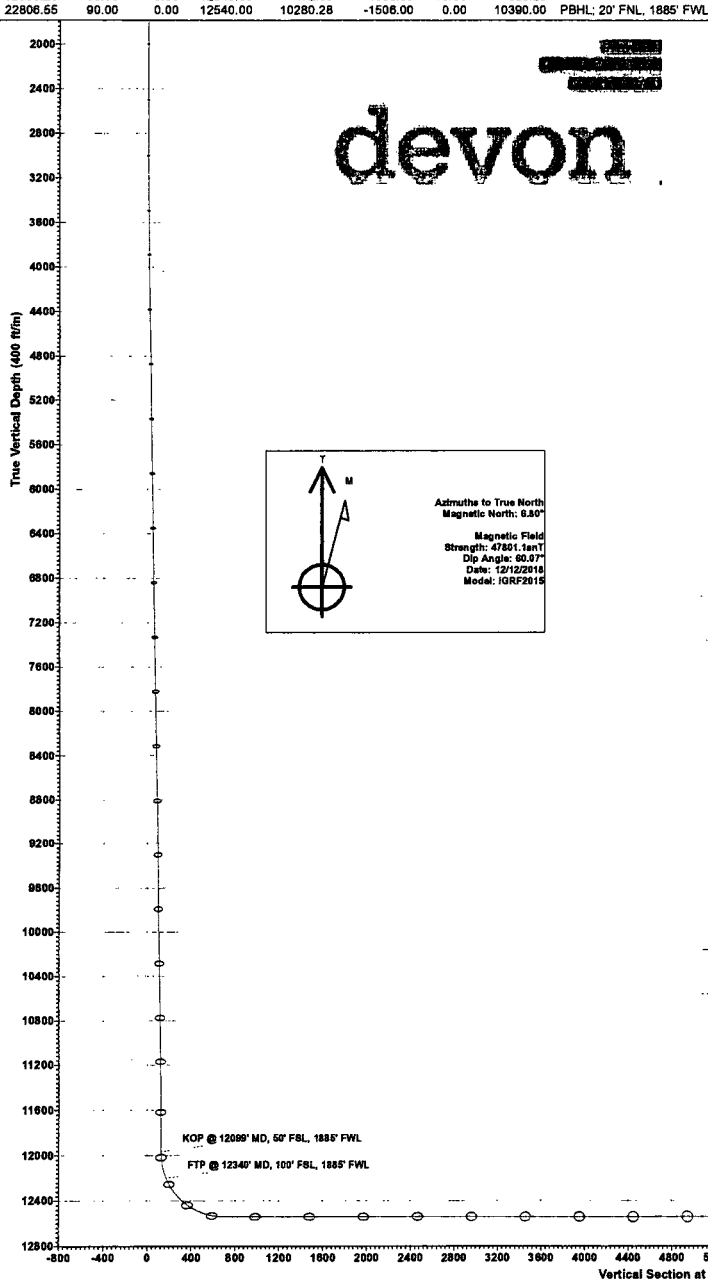
RKB @ 3678.20ft
3653.20

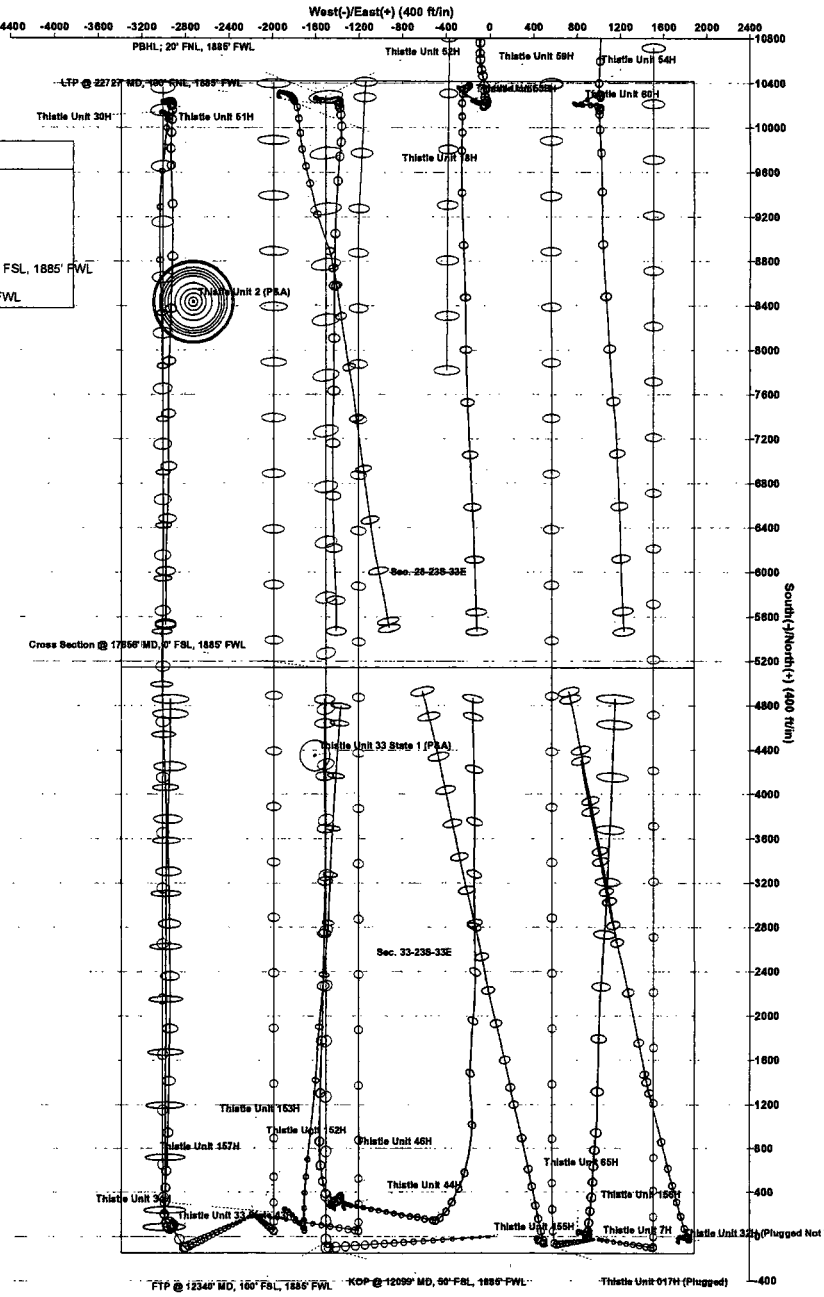
Northing	Easting	Latitude	Longitude
457082.63	775809.96	32.254319	-103.574850

SECTION DETAILS Prelim Plan 1

	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	VSect	Annotation
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	2500.00	0.00	0.00	2500.00	0.00	0.00	0.00	0.00	
	3536.66	10.37	266.20	3531.01	-6.20	-93.32	1.00	7.40	
	11058.08	10.37	266.20	10929.66	-95.87	-1443.79	0.00	114.42	
5	11749.19	0.00	0.00	11617.00	-100.00	-1506.00	1.50	119.35	
6	12099.23	0.00	0.00	11967.04	-100.00	-1506.00	0.00	119.35	KOP @ 12099' MD, 50' FSL, 1885' FWL
7	12999.23	90.00	0.00	12540.00	472.96	-1506.00	10.00	686.25	
8	22806.55	90.00	0.00	12540.00	10280.28	-1506.00	0.00	10390.00	PBHL; 20' FNL, 1885' FWL

devon





WCDSC Permian NM

Lea County (NAD83 New Mexico East)
Sec 33-T23S-R33E
Thistle Unit 155H

Wellbore #1

Plan: Prelim Plan 1

Standard Planning Report - Geographic

09 January, 2019

Database:	EDM r5000.141_Prod US	**Local Co-ordinate Reference:**	Well Thistle Unit 155H
Company:	WCDSC Permian NM	**TVD Reference:**	RKB @ 3678.20ft
Project:	Lea County (NAD83 New Mexico East)	**MD Reference:**	RKB @ 3678.20ft
Site:	Sec 33-T23S-R33E	**North Reference:**	True
Well:	Thistle Unit 155H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Prelim Plan 1		

Project Lea County (NAD83 New Mexico East)

Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site Sec 33-T23S-R33E

Site Position:		**Northing:**	462,265.86 usft	**Latitude:**	32.268581
From:	Lat/Long	**Easting:**	775,000.24 usft	**Longitude:**	-103.577351
Position Uncertainty:	0.00 ft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.40 °

Well Thistle Unit 155H

Well Position	**+N/-S**	0.00 ft	**Northing:**	457,082.63 usft	**Latitude:**	32.254319
	+E/-W	0.00 ft	**Easting:**	775,809.96 usft	**Longitude:**	-103.574850
Position Uncertainty		0.50 ft	**Wellhead Elevation:**		**Ground Level:**	3,653.20 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	12/12/2018	6.80	60.07	47,801.07024014

Design Prelim Plan 1

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	351.67

Plan Survey Tool Program **Date** 1/9/2019

	Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	22,806.55	Prelim Plan 1 (Wellbore #1)	MWD+HDGM	
				OWSG MWD + HDGM	

Plan Sections

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00	
3,536.66	10.37	266.20	3,531.01	-6.20	-93.32	1.00	1.00	0.00	266.20	
11,058.08	10.37	266.20	10,929.66	-95.87	-1,443.79	0.00	0.00	0.00	0.00	
11,749.19	0.00	0.00	11,617.00	-100.00	-1,506.00	1.50	-1.50	0.00	180.00	
12,099.23	0.00	0.00	11,967.04	-100.00	-1,506.00	0.00	0.00	0.00	0.00	
12,999.23	90.00	0.00	12,540.00	472.96	-1,506.00	10.00	10.00	0.00	0.00	
22,806.55	90.00	0.00	12,540.00	10,280.28	-1,506.00	0.00	0.00	0.00	0.00	

Database:	EDM r5000.141_Prod US	**Local Co-ordinate Reference:**	Well Thistle Unit 155H
Company:	WCDSC Permian NM	**TVD Reference:**	RKB @ 3678.20ft
Project:	Lea County (NAD83 New Mexico East)	**MD Reference:**	RKB @ 3678.20ft
Site:	Sec 33-T23S-R33E	**North Reference:**	True
Well:	Thistle Unit 155H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Prelim Plan 1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
100.00	0.00	0.00	100.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
200.00	0.00	0.00	200.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
300.00	0.00	0.00	300.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
400.00	0.00	0.00	400.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
500.00	0.00	0.00	500.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
600.00	0.00	0.00	600.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
700.00	0.00	0.00	700.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
800.00	0.00	0.00	800.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
900.00	0.00	0.00	900.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,000.00	0.00	0.00	1,000.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,100.00	0.00	0.00	1,100.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,200.00	0.00	0.00	1,200.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,300.00	0.00	0.00	1,300.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,400.00	0.00	0.00	1,400.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,500.00	0.00	0.00	1,500.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,600.00	0.00	0.00	1,600.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,700.00	0.00	0.00	1,700.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,800.00	0.00	0.00	1,800.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
1,900.00	0.00	0.00	1,900.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
2,000.00	0.00	0.00	2,000.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
2,100.00	0.00	0.00	2,100.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
2,200.00	0.00	0.00	2,200.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
2,300.00	0.00	0.00	2,300.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
2,400.00	0.00	0.00	2,400.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
2,500.00	0.00	0.00	2,500.00	0.00	0.00	457,082.63	775,809.96	32.254319	-103.574850
2,600.00	1.00	266.20	2,599.99	-0.06	-0.87	457,082.57	775,809.09	32.254318	-103.574853
2,700.00	2.00	266.20	2,699.96	-0.23	-3.48	457,082.37	775,806.48	32.254318	-103.574861
2,800.00	3.00	266.20	2,799.86	-0.52	-7.83	457,082.05	775,802.13	32.254317	-103.574876
2,900.00	4.00	266.20	2,899.68	-0.92	-13.93	457,081.61	775,796.04	32.254316	-103.574895
3,000.00	5.00	266.20	2,999.37	-1.44	-21.75	457,081.03	775,788.21	32.254315	-103.574921
3,100.00	6.00	266.20	3,098.90	-2.08	-31.32	457,080.33	775,778.65	32.254313	-103.574952
3,200.00	7.00	266.20	3,198.26	-2.83	-42.61	457,079.50	775,767.37	32.254311	-103.574988
3,300.00	8.00	266.20	3,297.40	-3.69	-55.64	457,078.54	775,754.35	32.254308	-103.575030
3,400.00	9.00	266.20	3,396.30	-4.67	-70.39	457,077.46	775,739.61	32.254306	-103.575078
3,500.00	10.00	266.20	3,494.93	-5.77	-86.85	457,076.25	775,723.15	32.254303	-103.575131
3,536.66	10.37	266.20	3,531.01	-6.20	-93.32	457,075.77	775,716.68	32.254302	-103.575152
3,600.00	10.37	266.20	3,593.32	-6.95	-104.69	457,074.94	775,705.32	32.254299	-103.575189
3,700.00	10.37	266.20	3,691.69	-8.14	-122.65	457,073.62	775,687.37	32.254296	-103.575247
3,800.00	10.37	266.20	3,790.05	-9.34	-140.60	457,072.30	775,669.42	32.254293	-103.575305
3,900.00	10.37	266.20	3,888.42	-10.53	-158.56	457,070.98	775,651.48	32.254290	-103.575363
4,000.00	10.37	266.20	3,986.79	-11.72	-176.51	457,069.66	775,633.53	32.254286	-103.575421
4,100.00	10.37	266.20	4,085.16	-12.91	-194.47	457,068.34	775,615.59	32.254283	-103.575479
4,200.00	10.37	266.20	4,183.53	-14.11	-212.42	457,067.02	775,597.64	32.254280	-103.575537
4,300.00	10.37	266.20	4,281.89	-15.30	-230.38	457,065.71	775,579.69	32.254277	-103.575595
4,400.00	10.37	266.20	4,380.26	-16.49	-248.33	457,064.39	775,561.75	32.254273	-103.575654
4,500.00	10.37	266.20	4,478.63	-17.68	-266.29	457,063.07	775,543.80	32.254270	-103.575712
4,600.00	10.37	266.20	4,577.00	-18.87	-284.24	457,061.75	775,525.86	32.254267	-103.575770
4,700.00	10.37	266.20	4,675.36	-20.07	-302.20	457,060.43	775,507.91	32.254263	-103.575828
4,800.00	10.37	266.20	4,773.73	-21.26	-320.15	457,059.11	775,489.96	32.254260	-103.575886
4,900.00	10.37	266.20	4,872.10	-22.45	-338.11	457,057.79	775,472.02	32.254257	-103.575944
5,000.00	10.37	266.20	4,970.47	-23.64	-356.06	457,056.47	775,454.07	32.254254	-103.576002
5,100.00	10.37	266.20	5,068.83	-24.84	-374.02	457,055.15	775,436.13	32.254250	-103.576060
5,200.00	10.37	266.20	5,167.20	-26.03	-391.97	457,053.83	775,418.18	32.254247	-103.576118
5,300.00	10.37	266.20	5,265.57	-27.22	-409.93	457,052.51	775,400.23	32.254244	-103.576176

Database:	EDM r5000.141_Prod US	**Local Co-ordinate Reference:**	Well Thistle Unit 155H
Company:	WCDSC Permian NM	**TVD Reference:**	RKB @ 3678.20ft
Project:	Lea County (NAD83 New Mexico East)	**MD Reference:**	RKB @ 3678.20ft
Site:	Sec 33-T23S-R33E	**North Reference:**	True
Well:	Thistle Unit 155H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Prelim Plan 1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,400.00	10.37	266.20	5,363.94	-28.41	-427.88	457,051.20	775,382.29	32.254240	-103.576234
5,500.00	10.37	266.20	5,462.31	-29.60	-445.84	457,049.88	775,364.34	32.254237	-103.576292
5,600.00	10.37	266.20	5,560.67	-30.80	-463.79	457,048.56	775,346.40	32.254234	-103.576350
5,700.00	10.37	266.20	5,659.04	-31.99	-481.75	457,047.24	775,328.45	32.254231	-103.576409
5,800.00	10.37	266.20	5,757.41	-33.18	-499.70	457,045.92	775,310.50	32.254227	-103.576467
5,900.00	10.37	266.20	5,855.78	-34.37	-517.66	457,044.60	775,292.56	32.254224	-103.576525
6,000.00	10.37	266.20	5,954.14	-35.57	-535.61	457,043.28	775,274.61	32.254221	-103.576583
6,100.00	10.37	266.20	6,052.51	-36.76	-553.57	457,041.96	775,256.67	32.254218	-103.576641
6,200.00	10.37	266.20	6,150.88	-37.95	-571.52	457,040.64	775,238.72	32.254214	-103.576699
6,300.00	10.37	266.20	6,249.25	-39.14	-589.48	457,039.32	775,220.77	32.254211	-103.576757
6,400.00	10.37	266.20	6,347.61	-40.33	-607.43	457,038.01	775,202.83	32.254208	-103.576815
6,500.00	10.37	266.20	6,445.98	-41.53	-625.39	457,036.69	775,184.88	32.254204	-103.576873
6,600.00	10.37	266.20	6,544.35	-42.72	-643.34	457,035.37	775,166.94	32.254201	-103.576931
6,700.00	10.37	266.20	6,642.72	-43.91	-661.30	457,034.05	775,148.99	32.254198	-103.576989
6,800.00	10.37	266.20	6,741.09	-45.10	-679.25	457,032.73	775,131.04	32.254195	-103.577047
6,900.00	10.37	266.20	6,839.45	-46.30	-697.21	457,031.41	775,113.10	32.254191	-103.577105
7,000.00	10.37	266.20	6,937.82	-47.49	-715.16	457,030.09	775,095.15	32.254188	-103.577164
7,100.00	10.37	266.20	7,036.19	-48.68	-733.12	457,028.77	775,077.21	32.254185	-103.577222
7,200.00	10.37	266.20	7,134.56	-49.87	-751.07	457,027.45	775,059.26	32.254181	-103.577280
7,300.00	10.37	266.20	7,232.92	-51.06	-769.03	457,026.13	775,041.31	32.254178	-103.577338
7,400.00	10.37	266.20	7,331.29	-52.26	-786.98	457,024.81	775,023.37	32.254175	-103.577396
7,500.00	10.37	266.20	7,429.66	-53.45	-804.94	457,023.50	775,005.42	32.254172	-103.577454
7,600.00	10.37	266.20	7,528.03	-54.64	-822.89	457,022.18	774,987.47	32.254168	-103.577512
7,700.00	10.37	266.20	7,626.39	-55.83	-840.85	457,020.86	774,969.53	32.254165	-103.577570
7,800.00	10.37	266.20	7,724.76	-57.03	-858.80	457,019.54	774,951.58	32.254162	-103.577628
7,900.00	10.37	266.20	7,823.13	-58.22	-876.76	457,018.22	774,933.64	32.254159	-103.577686
8,000.00	10.37	266.20	7,921.50	-59.41	-894.71	457,016.90	774,915.69	32.254155	-103.577744
8,100.00	10.37	266.20	8,019.86	-60.60	-912.67	457,015.58	774,897.74	32.254152	-103.577802
8,200.00	10.37	266.20	8,118.23	-61.79	-930.62	457,014.26	774,879.80	32.254149	-103.577860
8,300.00	10.37	266.20	8,216.60	-62.99	-948.58	457,012.94	774,861.85	32.254145	-103.577919
8,400.00	10.37	266.20	8,314.97	-64.18	-966.53	457,011.62	774,843.91	32.254142	-103.577977
8,500.00	10.37	266.20	8,413.34	-65.37	-984.48	457,010.31	774,825.96	32.254139	-103.578035
8,600.00	10.37	266.20	8,511.70	-66.56	-1,002.44	457,008.99	774,808.01	32.254136	-103.578093
8,700.00	10.37	266.20	8,610.07	-67.76	-1,020.39	457,007.67	774,790.07	32.254132	-103.578151
8,800.00	10.37	266.20	8,708.44	-68.95	-1,038.35	457,006.35	774,772.12	32.254129	-103.578209
8,900.00	10.37	266.20	8,806.81	-70.14	-1,056.30	457,005.03	774,754.18	32.254126	-103.578267
9,000.00	10.37	266.20	8,905.17	-71.33	-1,074.26	457,003.71	774,736.23	32.254122	-103.578325
9,100.00	10.37	266.20	9,003.54	-72.52	-1,092.21	457,002.39	774,718.28	32.254119	-103.578383
9,200.00	10.37	266.20	9,101.91	-73.72	-1,110.17	457,001.07	774,700.34	32.254116	-103.578441
9,300.00	10.37	266.20	9,200.28	-74.91	-1,128.12	456,999.75	774,682.39	32.254113	-103.578499
9,400.00	10.37	266.20	9,298.64	-76.10	-1,146.08	456,998.43	774,664.45	32.254109	-103.578557
9,500.00	10.37	266.20	9,397.01	-77.29	-1,164.03	456,997.11	774,646.50	32.254106	-103.578616
9,600.00	10.37	266.20	9,495.38	-78.49	-1,181.99	456,995.80	774,628.55	32.254103	-103.578674
9,700.00	10.37	266.20	9,593.75	-79.68	-1,199.94	456,994.48	774,610.61	32.254100	-103.578732
9,800.00	10.37	266.20	9,692.12	-80.87	-1,217.90	456,993.16	774,592.66	32.254096	-103.578790
9,900.00	10.37	266.20	9,790.48	-82.06	-1,235.85	456,991.84	774,574.72	32.254093	-103.578848
10,000.00	10.37	266.20	9,888.85	-83.25	-1,253.81	456,990.52	774,556.77	32.254090	-103.578906
10,100.00	10.37	266.20	9,987.22	-84.45	-1,271.76	456,989.20	774,538.82	32.254086	-103.578964
10,200.00	10.37	266.20	10,085.59	-85.64	-1,289.72	456,987.88	774,520.88	32.254083	-103.579022
10,300.00	10.37	266.20	10,183.95	-86.83	-1,307.67	456,986.56	774,502.93	32.254080	-103.579080
10,400.00	10.37	266.20	10,282.32	-88.02	-1,325.63	456,985.24	774,484.99	32.254077	-103.579138
10,500.00	10.37	266.20	10,380.69	-89.22	-1,343.58	456,983.92	774,467.04	32.254073	-103.579196
10,600.00	10.37	266.20	10,479.06	-90.41	-1,361.54	456,982.60	774,449.09	32.254070	-103.579254
10,700.00	10.37	266.20	10,577.42	-91.60	-1,379.49	456,981.29	774,431.15	32.254067	-103.579312
10,800.00	10.37	266.20	10,675.79	-92.79	-1,397.45	456,979.97	774,413.20	32.254063	-103.579371

Database:	EDM r5000.141_Prod US	**Local Co-ordinate Reference:**	Well Thistle Unit 155H
Company:	WCDSC Permian NM	**TVD Reference:**	RKB @ 3678.20ft
Project:	Lea County (NAD83 New Mexico East)	**MD Reference:**	RKB @ 3678.20ft
Site:	Sec 33-T23S-R33E	**North Reference:**	True
Well:	Thistle Unit 155H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Prelim Plan 1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
10,900.00	10.37	266.20	10,774.16	-93.98	-1,415.40	456,978.65	774,395.26	32.254060	-103.579429
11,000.00	10.37	266.20	10,872.53	-95.18	-1,433.36	456,977.33	774,377.31	32.254057	-103.579487
11,058.08	10.37	266.20	10,929.66	-95.87	-1,443.79	456,976.56	774,366.89	32.254055	-103.579520
11,100.00	9.74	266.20	10,970.94	-96.35	-1,451.09	456,976.03	774,359.59	32.254054	-103.579544
11,200.00	8.24	266.20	11,069.70	-97.39	-1,466.67	456,974.88	774,344.01	32.254051	-103.579594
11,300.00	6.74	266.20	11,168.85	-98.25	-1,479.68	456,973.93	774,331.01	32.254048	-103.579637
11,400.00	5.24	266.20	11,268.30	-98.94	-1,490.09	456,973.16	774,320.61	32.254047	-103.579670
11,500.00	3.74	266.20	11,367.99	-99.46	-1,497.89	456,972.59	774,312.81	32.254045	-103.579695
11,600.00	2.24	266.20	11,467.85	-99.81	-1,503.09	456,972.21	774,307.61	32.254044	-103.579712
11,700.00	0.74	266.20	11,567.82	-99.98	-1,505.68	456,972.02	774,305.02	32.254044	-103.579721
11,749.19	0.00	0.00	11,617.00	-100.00	-1,506.00	456,971.99	774,304.70	32.254044	-103.579722
11,800.00	0.00	0.00	11,667.81	-100.00	-1,506.00	456,971.99	774,304.70	32.254044	-103.579722
11,900.00	0.00	0.00	11,767.81	-100.00	-1,506.00	456,971.99	774,304.70	32.254044	-103.579722
12,000.00	0.00	0.00	11,867.81	-100.00	-1,506.00	456,971.99	774,304.70	32.254044	-103.579722
12,099.23	0.00	0.00	11,967.04	-100.00	-1,506.00	456,971.99	774,304.70	32.254044	-103.579722
KOP @ 12099' MD, 50' FSL, 1885' FWL									
12,100.00	0.08	0.00	11,967.81	-100.00	-1,506.00	456,971.99	774,304.70	32.254044	-103.579722
12,200.00	10.08	0.00	12,067.30	-91.16	-1,506.00	456,980.83	774,304.64	32.254068	-103.579722
12,300.00	20.08	0.00	12,163.73	-65.18	-1,506.00	457,006.81	774,304.46	32.254139	-103.579722
12,340.37	24.11	0.00	12,201.13	-50.00	-1,506.00	457,021.99	774,304.35	32.254181	-103.579722
FTP @ 12340' MD, 100' FSL, 1885' FWL									
12,400.00	30.08	0.00	12,254.19	-22.85	-1,506.00	457,049.14	774,304.16	32.254256	-103.579722
12,500.00	40.08	0.00	12,335.92	34.54	-1,506.00	457,106.53	774,303.75	32.254413	-103.579722
12,600.00	50.08	0.00	12,406.45	105.26	-1,506.00	457,177.25	774,303.25	32.254608	-103.579722
12,700.00	60.08	0.00	12,463.62	187.15	-1,506.00	457,259.13	774,302.68	32.254833	-103.579722
12,800.00	70.08	0.00	12,505.71	277.72	-1,506.00	457,349.70	774,302.04	32.255082	-103.579722
12,900.00	80.08	0.00	12,531.43	374.23	-1,506.00	457,446.21	774,301.35	32.255347	-103.579722
12,999.23	90.00	0.00	12,540.00	472.96	-1,506.00	457,544.94	774,300.66	32.255619	-103.579722
13,000.00	90.00	0.00	12,540.00	473.73	-1,506.00	457,545.71	774,300.65	32.255621	-103.579722
13,100.00	90.00	0.00	12,540.00	573.73	-1,506.00	457,645.71	774,299.94	32.255896	-103.579722
13,200.00	90.00	0.00	12,540.00	673.73	-1,506.00	457,745.70	774,299.24	32.256170	-103.579722
13,300.00	90.00	0.00	12,540.00	773.73	-1,506.00	457,845.70	774,298.53	32.256445	-103.579722
13,400.00	90.00	0.00	12,540.00	873.73	-1,506.00	457,945.70	774,297.82	32.256720	-103.579722
13,500.00	90.00	0.00	12,540.00	973.73	-1,506.00	458,045.69	774,297.12	32.256995	-103.579722
13,600.00	90.00	0.00	12,540.00	1,073.73	-1,506.00	458,145.69	774,296.41	32.257270	-103.579722
13,700.00	90.00	0.00	12,540.00	1,173.73	-1,506.00	458,245.69	774,295.70	32.257545	-103.579722
13,800.00	90.00	0.00	12,540.00	1,273.73	-1,506.00	458,345.69	774,295.00	32.257820	-103.579722
13,900.00	90.00	0.00	12,540.00	1,373.73	-1,506.00	458,445.68	774,294.29	32.258094	-103.579722
14,000.00	90.00	0.00	12,540.00	1,473.73	-1,506.00	458,545.68	774,293.59	32.258369	-103.579722
14,100.00	90.00	0.00	12,540.00	1,573.73	-1,506.00	458,645.68	774,292.88	32.258644	-103.579722
14,200.00	90.00	0.00	12,540.00	1,673.73	-1,506.00	458,745.68	774,292.17	32.258919	-103.579722
14,300.00	90.00	0.00	12,540.00	1,773.73	-1,506.00	458,845.67	774,291.47	32.259194	-103.579722
14,400.00	90.00	0.00	12,540.00	1,873.73	-1,506.00	458,945.67	774,290.76	32.259469	-103.579722
14,500.00	90.00	0.00	12,540.00	1,973.73	-1,506.00	459,045.67	774,290.05	32.259744	-103.579722
14,600.00	90.00	0.00	12,540.00	2,073.73	-1,506.00	459,145.67	774,289.35	32.260019	-103.579722
14,700.00	90.00	0.00	12,540.00	2,173.73	-1,506.00	459,245.66	774,288.64	32.260293	-103.579722
14,800.00	90.00	0.00	12,540.00	2,273.73	-1,506.00	459,345.66	774,287.93	32.260568	-103.579722
14,900.00	90.00	0.00	12,540.00	2,373.73	-1,506.00	459,445.66	774,287.23	32.260843	-103.579722
15,000.00	90.00	0.00	12,540.00	2,473.73	-1,506.00	459,545.65	774,286.52	32.261118	-103.579722
15,100.00	90.00	0.00	12,540.00	2,573.73	-1,506.00	459,645.65	774,285.81	32.261393	-103.579722
15,200.00	90.00	0.00	12,540.00	2,673.73	-1,506.00	459,745.65	774,285.11	32.261668	-103.579722
15,300.00	90.00	0.00	12,540.00	2,773.73	-1,506.00	459,845.65	774,284.40	32.261943	-103.579722
15,400.00	90.00	0.00	12,540.00	2,873.73	-1,506.00	459,945.64	774,283.69	32.262218	-103.579722
15,500.00	90.00	0.00	12,540.00	2,973.73	-1,506.00	460,045.64	774,282.99	32.262492	-103.579722

Database:	EDM r5000.141_Prod US	**Local Co-ordinate Reference:**	Well Thistle Unit 155H
Company:	WCDSC Permian NM	**TVD Reference:**	RKB @ 3678.20ft
Project:	Lea County (NAD83 New Mexico East)	**MD Reference:**	RKB @ 3678.20ft
Site:	Sec 33-T23S-R33E	**North Reference:**	True
Well:	Thistle Unit 155H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Prelim Plan 1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
15,600.00	90.00	0.00	12,540.00	3,073.73	-1,506.00	460,145.64	774,282.28	32.262767	-103.579722
15,700.00	90.00	0.00	12,540.00	3,173.73	-1,506.00	460,245.64	774,281.57	32.263042	-103.579722
15,800.00	90.00	0.00	12,540.00	3,273.73	-1,506.00	460,345.63	774,280.87	32.263317	-103.579722
15,900.00	90.00	0.00	12,540.00	3,373.73	-1,506.00	460,445.63	774,280.16	32.263592	-103.579722
16,000.00	90.00	0.00	12,540.00	3,473.73	-1,506.00	460,545.63	774,279.45	32.263867	-103.579722
16,100.00	90.00	0.00	12,540.00	3,573.73	-1,506.00	460,645.62	774,278.75	32.264142	-103.579722
16,200.00	90.00	0.00	12,540.00	3,673.73	-1,506.00	460,745.62	774,278.04	32.264417	-103.579722
16,300.00	90.00	0.00	12,540.00	3,773.73	-1,506.00	460,845.62	774,277.33	32.264691	-103.579722
16,400.00	90.00	0.00	12,540.00	3,873.73	-1,506.00	460,945.62	774,276.63	32.264966	-103.579722
16,500.00	90.00	0.00	12,540.00	3,973.73	-1,506.00	461,045.61	774,275.92	32.265241	-103.579722
16,600.00	90.00	0.00	12,540.00	4,073.73	-1,506.00	461,145.61	774,275.21	32.265516	-103.579722
16,700.00	90.00	0.00	12,540.00	4,173.73	-1,506.00	461,245.61	774,274.51	32.265791	-103.579722
16,800.00	90.00	0.00	12,540.00	4,273.73	-1,506.00	461,345.61	774,273.80	32.266066	-103.579722
16,900.00	90.00	0.00	12,540.00	4,373.73	-1,506.00	461,445.60	774,273.09	32.266341	-103.579722
17,000.00	90.00	0.00	12,540.00	4,473.73	-1,506.00	461,545.60	774,272.39	32.266616	-103.579722
17,100.00	90.00	0.00	12,540.00	4,573.73	-1,506.00	461,645.60	774,271.68	32.266890	-103.579722
17,200.00	90.00	0.00	12,540.00	4,673.73	-1,506.00	461,745.60	774,270.98	32.267165	-103.579722
17,300.00	90.00	0.00	12,540.00	4,773.73	-1,506.00	461,845.59	774,270.27	32.267440	-103.579722
17,400.00	90.00	0.00	12,540.00	4,873.73	-1,506.00	461,945.59	774,269.56	32.267715	-103.579722
17,500.00	90.00	0.00	12,540.00	4,973.73	-1,506.00	462,045.59	774,268.86	32.267990	-103.579722
17,600.00	90.00	0.00	12,540.00	5,073.73	-1,506.00	462,145.58	774,268.15	32.268265	-103.579722
17,656.00	90.00	0.00	12,540.00	5,129.73	-1,506.00	462,201.58	774,267.75	32.268419	-103.579722
Cross Section @ 17656' MD, 0' FSL, 1885' FWL									
17,700.00	90.00	0.00	12,540.00	5,173.73	-1,506.00	462,245.58	774,267.44	32.268540	-103.579722
17,800.00	90.00	0.00	12,540.00	5,273.73	-1,506.00	462,345.58	774,266.74	32.268814	-103.579722
17,900.00	90.00	0.00	12,540.00	5,373.73	-1,506.00	462,445.58	774,266.03	32.269089	-103.579722
18,000.00	90.00	0.00	12,540.00	5,473.73	-1,506.00	462,545.57	774,265.32	32.269364	-103.579722
18,100.00	90.00	0.00	12,540.00	5,573.73	-1,506.00	462,645.57	774,264.62	32.269639	-103.579722
18,200.00	90.00	0.00	12,540.00	5,673.73	-1,506.00	462,745.57	774,263.91	32.269914	-103.579722
18,300.00	90.00	0.00	12,540.00	5,773.73	-1,506.00	462,845.57	774,263.20	32.270189	-103.579722
18,400.00	90.00	0.00	12,540.00	5,873.73	-1,506.00	462,945.56	774,262.50	32.270464	-103.579723
18,500.00	90.00	0.00	12,540.00	5,973.73	-1,506.00	463,045.56	774,261.79	32.270739	-103.579723
18,600.00	90.00	0.00	12,540.00	6,073.73	-1,506.00	463,145.56	774,261.08	32.271013	-103.579723
18,700.00	90.00	0.00	12,540.00	6,173.73	-1,506.00	463,245.55	774,260.38	32.271288	-103.579723
18,800.00	90.00	0.00	12,540.00	6,273.73	-1,506.00	463,345.55	774,259.67	32.271563	-103.579723
18,900.00	90.00	0.00	12,540.00	6,373.73	-1,506.00	463,445.55	774,258.96	32.271838	-103.579723
19,000.00	90.00	0.00	12,540.00	6,473.73	-1,506.00	463,545.55	774,258.26	32.272113	-103.579723
19,100.00	90.00	0.00	12,540.00	6,573.73	-1,506.00	463,645.54	774,257.55	32.272388	-103.579723
19,200.00	90.00	0.00	12,540.00	6,673.73	-1,506.00	463,745.54	774,256.84	32.272663	-103.579723
19,300.00	90.00	0.00	12,540.00	6,773.73	-1,506.00	463,845.54	774,256.14	32.272938	-103.579723
19,400.00	90.00	0.00	12,540.00	6,873.73	-1,506.00	463,945.54	774,255.43	32.273212	-103.579723
19,500.00	90.00	0.00	12,540.00	6,973.73	-1,506.00	464,045.53	774,254.72	32.273487	-103.579723
19,600.00	90.00	0.00	12,540.00	7,073.73	-1,506.00	464,145.53	774,254.02	32.273762	-103.579723
19,700.00	90.00	0.00	12,540.00	7,173.73	-1,506.00	464,245.53	774,253.31	32.274037	-103.579723
19,800.00	90.00	0.00	12,540.00	7,273.73	-1,506.00	464,345.53	774,252.60	32.274312	-103.579723
19,900.00	90.00	0.00	12,540.00	7,373.73	-1,506.00	464,445.52	774,251.90	32.274587	-103.579723
20,000.00	90.00	0.00	12,540.00	7,473.73	-1,506.00	464,545.52	774,251.19	32.274862	-103.579723
20,100.00	90.00	0.00	12,540.00	7,573.73	-1,506.00	464,645.52	774,250.48	32.275137	-103.579723
20,200.00	90.00	0.00	12,540.00	7,673.73	-1,506.00	464,745.51	774,249.78	32.275411	-103.579723
20,300.00	90.00	0.00	12,540.00	7,773.73	-1,506.00	464,845.51	774,249.07	32.275686	-103.579723
20,400.00	90.00	0.00	12,540.00	7,873.73	-1,506.00	464,945.51	774,248.36	32.275961	-103.579723
20,500.00	90.00	0.00	12,540.00	7,973.73	-1,506.00	465,045.51	774,247.66	32.276236	-103.579723
20,600.00	90.00	0.00	12,540.00	8,073.73	-1,506.00	465,145.50	774,246.95	32.276511	-103.579723
20,700.00	90.00	0.00	12,540.00	8,173.73	-1,506.00	465,245.50	774,246.25	32.276786	-103.579723

Database:	EDM r5000.141_Prod US	**Local Co-ordinate Reference:**	Well Thistle Unit 155H
Company:	WCDSC Permian NM	**TVD Reference:**	RKB @ 3678.20ft
Project:	Lea County (NAD83 New Mexico East)	**MD Reference:**	RKB @ 3678.20ft
Site:	Sec 33-T23S-R33E	**North Reference:**	True
Well:	Thistle Unit 155H	**Survey Calculation Method:**	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Prelim Plan 1		

Planned Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
20,800.00	90.00	0.00	12,540.00	8,273.73	-1,506.00	465,345.50	774,245.54	32.277061	-103.579723
20,900.00	90.00	0.00	12,540.00	8,373.73	-1,506.00	465,445.50	774,244.83	32.277335	-103.579723
21,000.00	90.00	0.00	12,540.00	8,473.73	-1,506.00	465,545.49	774,244.13	32.277610	-103.579723
21,100.00	90.00	0.00	12,540.00	8,573.73	-1,506.00	465,645.49	774,243.42	32.277885	-103.579723
21,200.00	90.00	0.00	12,540.00	8,673.73	-1,506.00	465,745.49	774,242.71	32.278160	-103.579723
21,300.00	90.00	0.00	12,540.00	8,773.73	-1,506.00	465,845.48	774,242.01	32.278435	-103.579723
21,400.00	90.00	0.00	12,540.00	8,873.73	-1,506.00	465,945.48	774,241.30	32.278710	-103.579723
21,500.00	90.00	0.00	12,540.00	8,973.73	-1,506.00	466,045.48	774,240.59	32.278985	-103.579723
21,600.00	90.00	0.00	12,540.00	9,073.73	-1,506.00	466,145.48	774,239.89	32.279260	-103.579723
21,700.00	90.00	0.00	12,540.00	9,173.73	-1,506.00	466,245.47	774,239.18	32.279534	-103.579723
21,800.00	90.00	0.00	12,540.00	9,273.73	-1,506.00	466,345.47	774,238.47	32.279809	-103.579723
21,900.00	90.00	0.00	12,540.00	9,373.73	-1,506.00	466,445.47	774,237.77	32.280084	-103.579723
22,000.00	90.00	0.00	12,540.00	9,473.73	-1,506.00	466,545.47	774,237.06	32.280359	-103.579723
22,100.00	90.00	0.00	12,540.00	9,573.73	-1,506.00	466,645.46	774,236.35	32.280634	-103.579723
22,200.00	90.00	0.00	12,540.00	9,673.73	-1,506.00	466,745.46	774,235.65	32.280909	-103.579723
22,300.00	90.00	0.00	12,540.00	9,773.73	-1,506.00	466,845.46	774,234.94	32.281184	-103.579723
22,400.00	90.00	0.00	12,540.00	9,873.73	-1,506.00	466,945.46	774,234.23	32.281459	-103.579723
22,500.00	90.00	0.00	12,540.00	9,973.73	-1,506.00	467,045.45	774,233.53	32.281733	-103.579723
22,600.00	90.00	0.00	12,540.00	10,073.73	-1,506.00	467,145.45	774,232.82	32.282008	-103.579723
22,700.00	90.00	0.00	12,540.00	10,173.73	-1,506.00	467,245.45	774,232.11	32.282283	-103.579723
22,726.54	90.00	0.00	12,540.00	10,200.27	-1,506.00	467,271.99	774,231.93	32.282356	-103.579723
LTP @ 22727' MD, 100' FNL, 1885' FWL									
22,800.00	90.00	0.00	12,540.00	10,273.73	-1,506.00	467,345.44	774,231.41	32.282558	-103.579723
22,806.54	90.00	0.00	12,540.00	10,280.27	-1,506.00	467,351.98	774,231.36	32.282576	-103.579723
PBHL; 20' FNL, 1885' FWL									
22,806.55	90.00	0.00	12,540.00	10,280.28	-1,506.00	467,351.99	774,231.36	32.282576	-103.579723

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
PBHL - Thistle Unit 155H	0.00	0.00	0.00	10,397.52	-1,503.15	467,469.25	774,233.39	32.282898	-103.579714
- plan misses target center by 10505.61ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
12,099.23	11,967.04	-100.00	-1,506.00	KOP @ 12099' MD, 50' FSL, 1885' FWL
12,340.37	12,201.13	-50.00	-1,506.00	FTP @ 12340' MD, 100' FSL, 1885' FWL
17,656.00	12,540.00	5,129.73	-1,506.00	Cross Section @ 17656' MD, 0' FSL, 1885' FWL
22,726.54	12,540.00	10,200.27	-1,506.00	LTP @ 22727' MD, 100' FNL, 1885' FWL
22,806.54	12,540.00	10,280.27	-1,506.00	PBHL; 20' FNL, 1885' FWL

CASING PERFORMANCE Data Sheet

vallourec

O.D.	PE LB/FT	T&C LB/FT	GRADE
8.625	31.13	32.00	P110EC

Grade - Material Properties

Minimum Yield Strength:	125	ksi
Maximum Yield Strength:	140	ksi
Minimum Tensile Strength:	135	ksi

Pipe Body Data (PE)

Geometry

Nominal ID:	7.921	inch
Wall:	0.352	inch
Min. Wall % (API = 87.5%):	87.5	%
API Drift:	7.796	inch
Special Drift*:	7.875	inch

Performance

Pipe Body Yield Strength:	1,144	kips
Collapse Resistance:	3,470	psi
Internal Yield Pressure (*API Historical*):	8,930	psi

API Connection Data

SC Internal Pressure:	8,930	psi
SC Joint Strength:	793	kips
LC Internal Pressure:	8,930	psi
LC Joint Strength:	887	kips
BC Internal Pressure:	8,930	psi
BC Joint Strength:	1,121	kips

SC Torque (ft-lbs)

minimum:	optimum:	maximum:
5,950	7,933	9,916

LC Torque (ft-lbs)

minimum:	optimum:	maximum:
6,651	8,868	11,085

*Special drift must be ordered or API drift will be used for actual drifting of product.

**If above API connections do not suit your needs, VAM® premium connections are available up to 100% of pipe body ratings.

VAM® SG
Connection Data Sheet

O.D (in)	WEIGHT (lb/ft)	WALL (in)	GRADE	DRIFT	CONNECTION
5.500	20.00	0.361	VST P110EC	4.653	VAM® SG

PIPE PROPERTIES	
Material Grade	VST P110EC
Min. Yield Strength	125 ksi
Min. Tensile Strength	135 ksi
Nominal OD	5.500 in
Nominal ID	4.778 in
Nominal Area	5.828 sq. in
Yield Strength	729 kips
Ultimate Strength	787 kips
Min Internal Yield	14,360 psi
External Pressure	12,090 psi

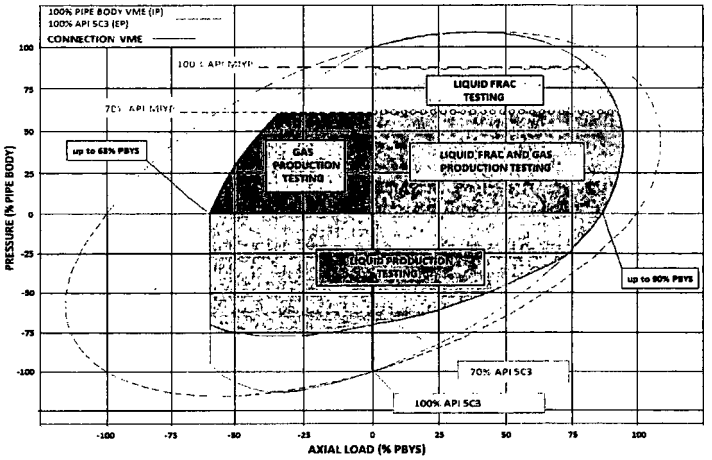
CONNECTION PROPERTIES	
Connection OD	5.697 in
Connection ID	4.711 in
Make up Loss	6.335 in
Connection Critical Area	5.071 sq. in
%PB Section Area	87.0%
Yield Strength	634 kips
Parting Load	685 kips
Min Internal Yield	14,360 psi
External Pressure	8,460 psi
Structural Collapse	12,090 psi
Working Compression	444 kips
Max. Bending w/ Sealability	40 °/100 ft

DOCUMENTATION	
Ref. Drawing	SI-PD 100954 Rev.A
Date	21-Jul-17
Time	3:19 PM
Email	tech.support@vam-usa.com

TORQUE VALUES	
Min Make Up Torque	8,100 ft-lb
Opt Make Up Torque	9,800 ft-lb
Max Make Up Torque	11,500 ft-lb
Max Torque w/ Sealability	12,500 ft-lb

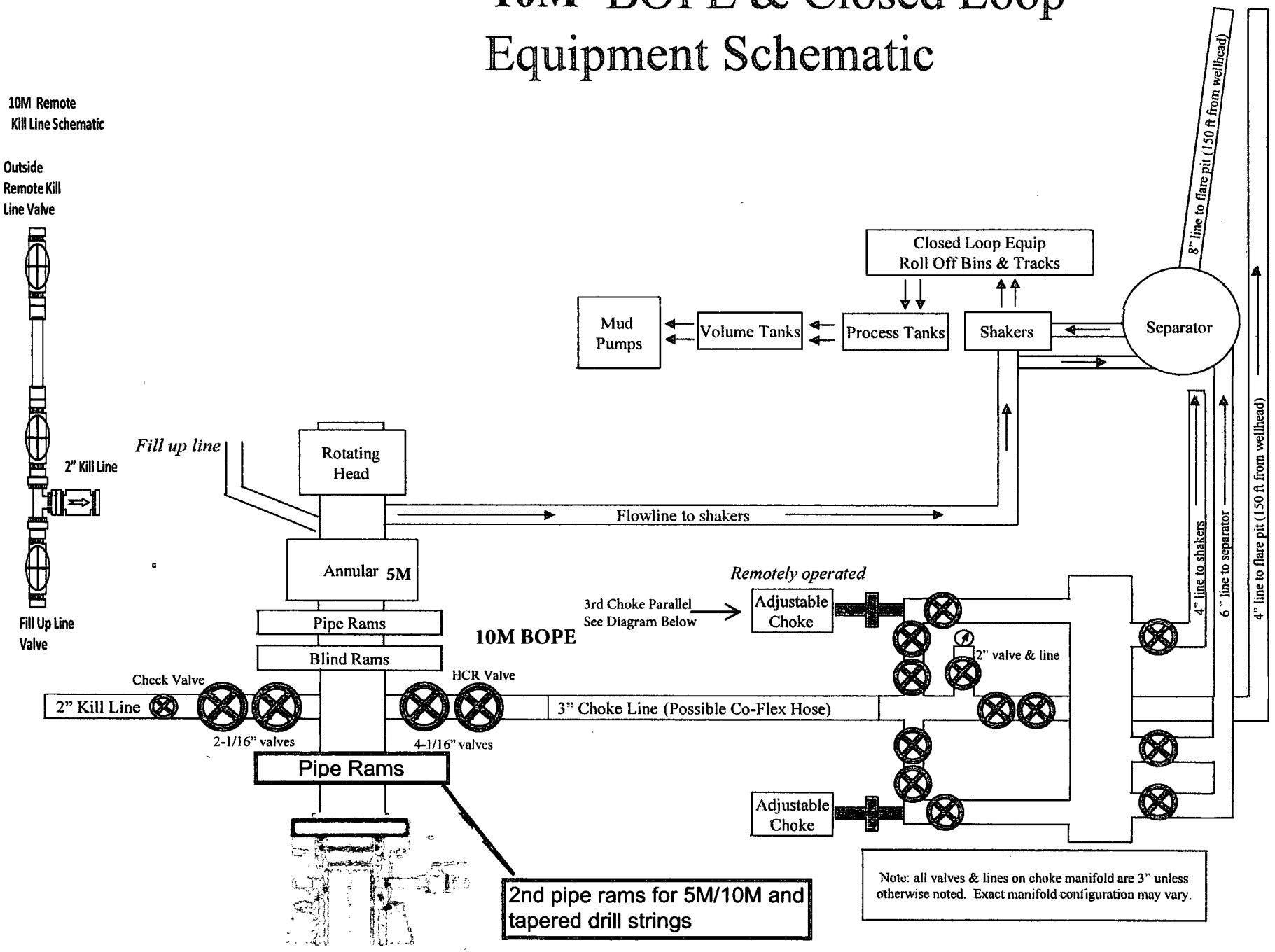
The single solution for Shale Play needs

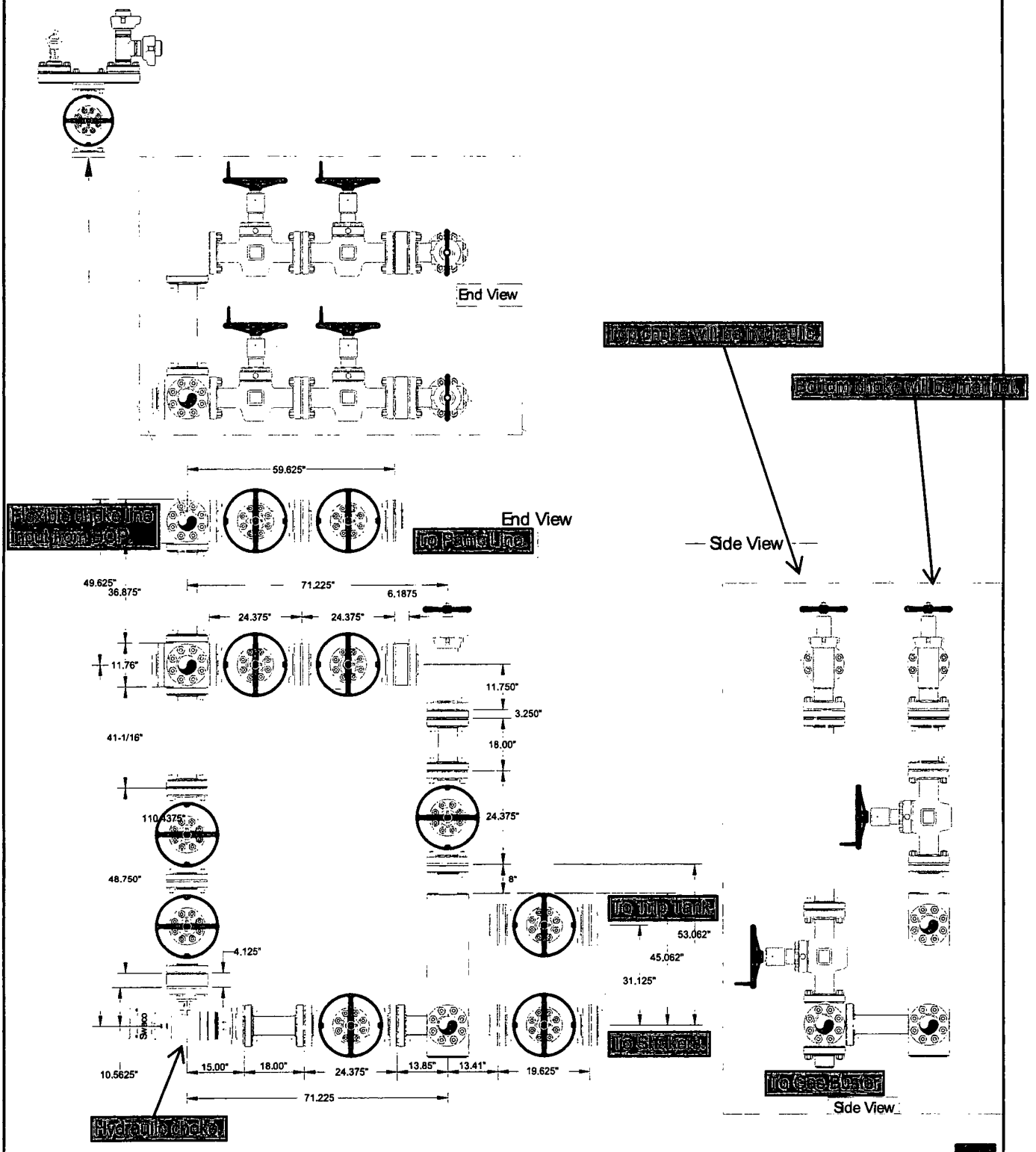
VAM® SG brings VAM® premium sealing performance to a semi-flush connection with extremely high Tension performance and increased Torque capacity, validated to the specific Shale drilling requirements, while remaining highly competitive in North American Shale play economics.



VAM USA

10M BOPE & Closed Loop Equipment Schematic





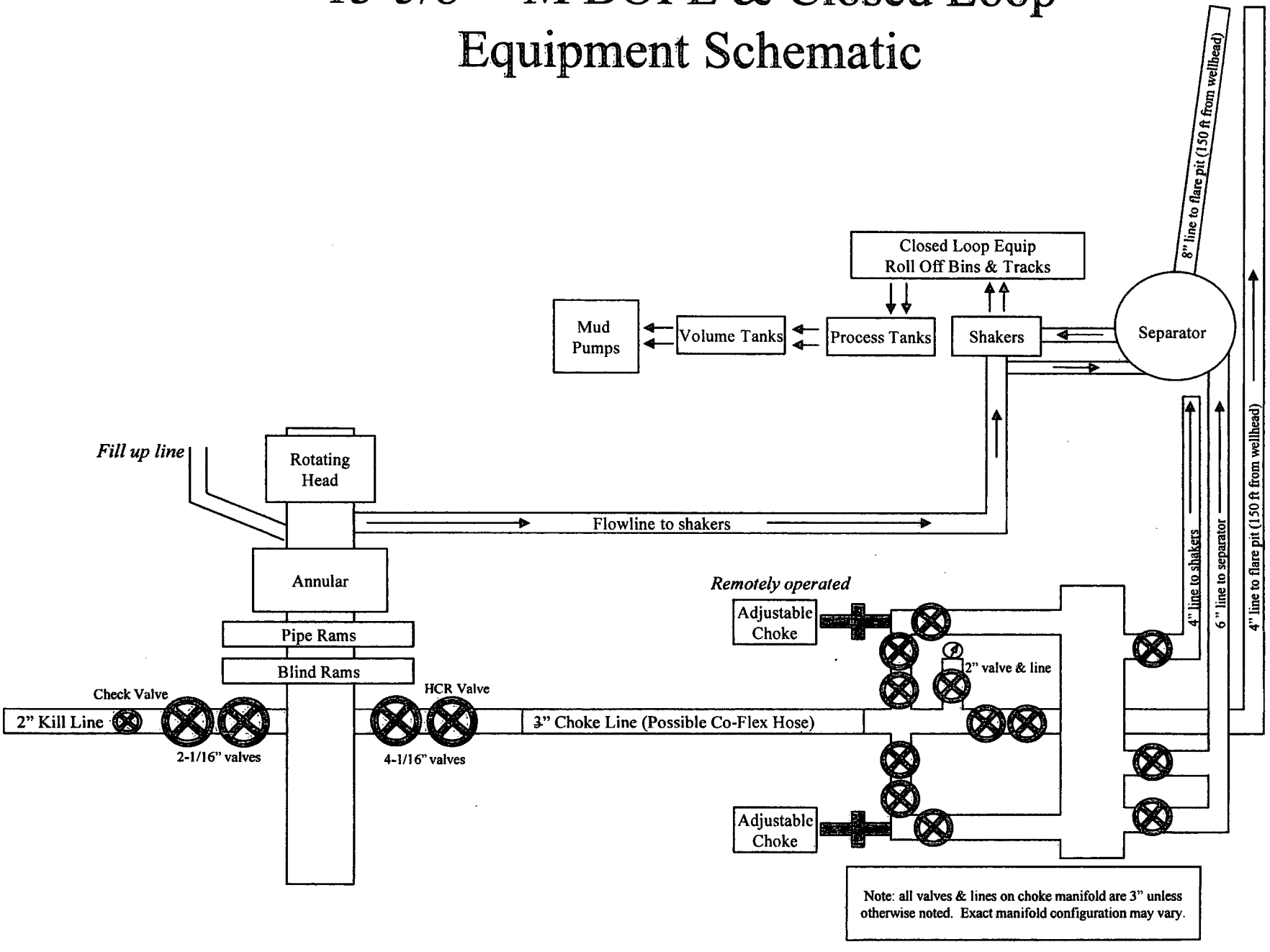
Helmerich & Payne

Flex 3 Rig w/ 3 Chokes

devon

Name:	Date:	Working Pressure:	
Mike Potts	6-23-2010	10M	J-5132-E

13-5/8" 5M BOPE & Closed Loop Equipment Schematic



Devon Energy Annular Preventer Summary

1. Component and Preventer Compatibility Table

The table below, which covers the drilling and casing of the 10M MASP portion of the well, outlines the tubulars and the compatible preventers in use. This table, combined with the mud program, documents that two barriers to flow can be maintained at all times, independent of the rating of the annular preventer.

6-3/4" Production hole section, 10M requirement

Component	OD	Preventer	RWP
Drillpipe	4.5"	Fixed lower 4.5" Upper 4.5-7" VBR	10M
HWDP	4.5"	Fixed lower 4.5" Upper 4.5-7" VBR	10M
Drill collars and MWD tools	4.75"	Upper 4.5-7" VBR	10M
Mud Motor	4.75"	Upper 4.5-7" VBR	10M
Production casing	5.5"	Upper 4.5-7" VBR	10M
ALL	0-13-5/8"	Annular	5M
Open-hole	-	Blind Rams	10M

VBR = Variable Bore Ram. Compatible range listed in chart.

2. Well Control Procedures

Well control procedures are specific to the rig equipment and the operation at the time the kick occurs. Below are the minimal high-level tasks prescribed to assure a proper shut-in while drilling, tripping, running casing, pipe out of the hole (open hole), and moving the BHA through the BOPs. The pressure at which control is swapped from the annular to another compatible ram is variable, but the operator will document in the submission their operating pressure limit. The operator may chose an operating pressure less than or equal to RWP, but in no case will it exceed the RWP of the annular preventer.

General Procedure While Drilling

1. Sound alarm (alert crew)
2. Space out drill string
3. Shut down pumps (stop pumps and rotary)
4. Shut-in Well (uppermost applicable BOP, typically annular preventer first. HCR and choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP and SICP
    b. Pit gain
    c. Time
8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach the RWP of the annular preventer, confirm spacing and swap to the upper pipe ram.

Devon Energy Annular Preventer Summary

General Procedure While Tripping

1. Sound alarm (alert crew)
2. Stab full opening safety valve and close
3. Space out drill string
4. Shut-in (uppermost applicable BOP, typically annular preventer first. HCR and choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP and SICP
    b. Pit gain
    c. Time
8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach the RWP of the annular preventer, confirm spacing and swap to the upper pipe ram.

General Procedure While Running Casing

1. Sound alarm (alert crew)
2. Stab crossover and full opening safety valve and close
3. Space out string
4. Shut-in (uppermost applicable BOP, typically annular preventer first. HCR and choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP and SICP
    b. Pit gain
    c. Time
8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach the RWP of the annular preventer, confirm spacing and swap to compatible pipe ram.

General Procedure With No Pipe In Hole (Open Hole)

1. Sound alarm (alert crew)
2. Shut-in with blind rams or BSR. (HCR and choke will already be in the closed position.)
3. Confirm shut-in
4. Notify toolpusher/company representative
5. Read and record the following:
    a. SICP
    b. Pit gain
    c. Time
6. Regroup and identify forward plan

Devon Energy Annular Preventer Summary

General Procedures While Pulling BHA thru Stack

1. PRIOR to pulling last joint of drillpipe thru the stack.
    a. Perform flowcheck, if flowing:
    b. Sound alarm (alert crew)
    c. Stab full opening safety valve and close
    d. Space out drill string with tool joint just beneath the upper pipe ram.
    e. Shut-in using upper pipe ram. (HCR and choke will already be in the closed position.)
    f. Confirm shut-in
    g. Notify toolpusher/company representative
    h. Read and record the following:
        i. SIDPP and SICP
        ii. Pit gain
        iii. Time
    i. Regroup and identify forward plan

2. With BHA in the stack and compatible ram preventer and pipe combo immediately available.
    a. Sound alarm (alert crew)
    b. Stab crossover and full opening safety valve and close
    c. Space out drill string with upset just beneath the compatible pipe ram.
    d. Shut-in using compatible pipe ram. (HCR and choke will already be in the closed position.)
    e. Confirm shut-in
    f. Notify toolpusher/company representative
    g. Read and record the following:
        i. SIDPP and SICP
        ii. Pit gain
        iii. Time
    h. Regroup and identify forward plan

3. With BHA in the stack and NO compatible ram preventer and pipe combo immediately available.
    a. Sound alarm (alert crew)
    b. If possible to pick up high enough, pull string clear of the stack and follow "Open Hole" scenario.
    c. If impossible to pick up high enough to pull the string clear of the stack:
    d. Stab crossover, make up one joint/stand of drillpipe, and full opening safety valve and close
    e. Space out drill string with tooljoint just beneath the upper pipe ram.
    f. Shut-in using upper pipe ram. (HCR and choke will already be in the closed position.)
    g. Confirm shut-in
    h. Notify toolpusher/company representative
    i. Read and record the following:
        i. SIDPP and SICP
        ii. Pit gain
        iii. Time
    j. Regroup and identify forward plan

PECOS DISTRICT
DRILLING OPERATIONS
CONDITIONS OF APPROVAL

OPERATOR'S NAME:	Devon Energy Production Company, LP
LEASE NO.:	NMNM94186
WELL NAME & NO.:	155H-Thistle Unit
SURFACE HOLE FOOTAGE:	150'/S & 1889'/W
BOTTOM HOLE FOOTAGE	20'/N & 1885'/W
LOCATION:	Section 33, T.23 S., R.33 E., NMPM
COUNTY:	Lea County, New Mexico

Potash	◉ None	○ Secretary	○ R-111-P
Cave/Karst Potential	◉ Low	○ Medium	○ High
Variance	○ None	◉ Flex Hose	○ Other
Wellhead	◉ Conventional	○ Multibowl	
Other	☐4 String Area	☐Capitan Reef	☐WIPP

All previous COAs still apply, except for the following:

A. CASING

Primary Casing Design

1. The **10-3/4** inch surface casing shall be set at approximately **1400** 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 **7-5/8** inch intermediate casing is:

Option 1 (Single Stage):

- Cement to surface. If cement does not circulate see B.1.a, c-d above.

Option 2:

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.

b. Second stage above DV tool:

- Cement to surface. If cement does not circulate, contact the appropriate BLM office.

Operator has proposed to pump down 10 3/4" X 7 5/8" annulus. Operator must run a CBL from TD of the 7 5/8" casing to surface. Submit results to BLM.

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. **Excess calculates to 15% - additional cement might be required.**

Alternate Casing Design:

4. The **13-3/8** inch surface casing shall be set at approximately **1400** 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.

Intermediate casing must be kept fluid filled to meet BLM minimum collapse requirement.

5. The minimum required fill of cement behind the alternate **8 5/8** inch intermediate casing is:

Option 1 (Single Stage):

- Cement to surface. If cement does not circulate see B.1.a, c-d above. **Excess calculates to 6% - additional cement will be required.**

Option 2:

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.

b. Second stage above DV tool:

- Cement to surface. If cement does not circulate, contact the appropriate BLM office.

Operator has proposed to pump down 13 3/8" X 8 5/8" annulus. Operator must run a CBL from TD of the 8 5/8" casing to surface. Submit results to BLM.

6. 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. **Excess calclulates to 1% - additional cement might be required.**

B. 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.

3. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the **9 5/8** intermediate casing shoe shall be **10,000 (10M)** psi. **Variance is approved to use 5M Annular which shall be tested to 5000 psi.**

MHH 01172019

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

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.

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.

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: 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. Whenever any seal subject to test pressure is broken, all the tests in OOGO2.III.A.2.i must be followed.
e. 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.

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.

   c. The tests shall be done by an independent service company utilizing a test plug not a cup or J-packer. The operator also has the option of utilizing an independent tester to test without a plug (i.e. against the casing) pursuant to Onshore Order 2 with the pressure not to exceed 70% of the burst rating for the casing. Any test against the casing must meet the WOC time for water basin (8 hours) or potash (24 hours) or 500 pounds compressive strength, whichever is greater, prior to initiating the test (see casing segment as lead cement may be critical item).

   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. The results of the test shall be reported to the appropriate BLM office.

f. 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.

g. 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 if test is done with a test plug and 30 minutes without a test plug. This test shall be performed prior to the test at full stack pressure.

h. 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.