

District I1625 N. French Dr., Hobbs, NM 88240
Phone:(575) 393-6161 Fax:(575) 393-0720**District II**811 S. First St., Artesia, NM 88210
Phone:(575) 748-1283 Fax:(575) 748-9720**District III**1000 Rio Brazos Rd., Aztec, NM 87410
Phone:(505) 334-6178 Fax:(505) 334-6170**District IV**1220 S. St Francis Dr., Santa Fe, NM 87505
Phone:(505) 476-3470 Fax:(505) 476-3462

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

Form C-101
August 1, 2011

Permit 274661

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

1. Operator Name and Address MANZANO LLC P.O. Box 1737 Roswell, NM 88202		2. OGRID Number 231429
		3. API Number 30-025-46513
4. Property Code 326332	5. Property Name VINDICATOR 15 STATE	6. Well No. 001H

7. Surface Location

UL - Lot C	Section 15	Township 17S	Range 36E	Lot Idn C	Feet From 100	N/S Line N	Feet From 2295	E/W Line W	County Lea
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8. Proposed Bottom Hole Location

UL - Lot N	Section 15	Township 17S	Range 36E	Lot Idn N	Feet From 50	N/S Line S	Feet From 2295	E/W Line W	County Lea
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9. Pool Information

WC-025 G-09 S173615C;UPPER PENN	98333
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Additional Well Information

11. Work Type New Well	12. Well Type OIL	13. Cable/Rotary	14. Lease Type State	15. Ground Level Elevation 3853
16. Multiple N	17. Proposed Depth 17200	18. Formation Canyon	19. Contractor	20. Spud Date 11/25/2019
Depth to Ground water		Distance from nearest fresh water well		Distance to nearest surface water

☒ We will be using a closed-loop system in lieu of lined pits**21. Proposed Casing and Cement Program**

Type	Hole Size	Casing Size	Casing Weight/ft	Setting Depth	Sacks of Cement	Estimated TOC
Surf	17.5	13.375	54.5	2100	1200	0
Int1	12.25	10.75	45.5	5100	900	0
Int2	9.875	7.625	29.7	12300	1300	0
Prod	6.75	5	18	17200	1100	0

Casing/Cement Program: Additional Comments

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22. Proposed Blowout Prevention Program

Type	Working Pressure	Test Pressure	Manufacturer
Double Ram	5000	5000	CAMERON
Annular	5000	5000	SHAFFER

23. I hereby certify that the information given above is true and complete to the best of my knowledge and belief. I further certify I have complied with 19.15.14.9 (A) NMAC ☒ and/or 19.15.14.9 (B) NMAC ☒ if applicable.	OIL CONSERVATION DIVISION	
Signature:		
Printed Name: Electronically filed by Michael Hanagan	Approved By: Paul F Kautz	
Title: Manager	Title: Geologist	
Email Address: debbi@manzanoenergy.com	Approved Date: 11/18/2019	Expiration Date: 11/18/2021
Date: 11/13/2019	Phone: 505-623-1996	Conditions of Approval Attached

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Form C-102
August 1, 2011

Permit 274661

WELL LOCATION AND ACREAGE DEDICATION PLAT

1. API Number 30-025-46513	2. Pool Code 98333	3. Pool Name WC-025 G-09 S173615C;UPPER PENN
4. Property Code 326332	5. Property Name VINDICATOR 15 STATE	6. Well No. 001H
7. OGRID No. 231429	8. Operator Name MANZANO LLC	9. Elevation 3853

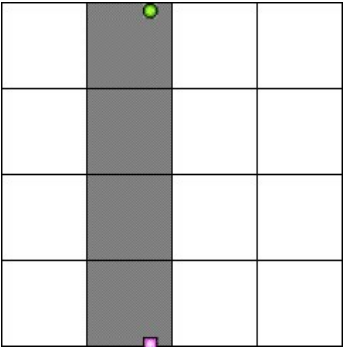
10. Surface Location

UL - Lot C	Section 15	Township 17S	Range 36E	Lot Idn C	Feet From 100	N/S Line N	Feet From 2295	E/W Line W	County Lea
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11. Bottom Hole Location If Different From Surface

UL - Lot N	Section 15	Township 17S	Range 36E	Lot Idn N	Feet From 50	N/S Line S	Feet From 2295	E/W Line W	County Lea
12. Dedicated Acres 160.00	13. Joint or Infill	14. Consolidation Code	15. Order No.						

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>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(s) 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.</i> E-Signed By: Michael Hanagan Title: Manager Date: 11/13/2019 SURVEYOR CERTIFICATION <i>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.</i> Surveyed By: GARY JONES Date of Survey: 10/16/2019 Certificate Number: 7977
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GAS CAPTURE PLAN

Date: 11/18/2019

☒ Original

Operator & OGRID No.: [231429] MANZANO LLC

☐ Amended - Reason for
Amendment: _____

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

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

Well(s)/Production Facility – Name of facility

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

Well Name	API	Well Location (ULSTR)	Footages	Expected MCF/D	Flared or Vented	Comments
VINDICATOR 15 STATE #001H	30-025-46513	C-15-17S-36E	0100N 2295W	1000	Flared	GAS WILL BE FLARED FOR SHORT TIME UNTIL CONNECTION

Gathering System and Pipeline Notification

Well(s) will be connected to a production facility after flowback operations are complete, if gas transporter system is in place. The gas produced from production facility is dedicated to TARGA MIDSTREAM SERVICES LLC and will be connected to TARGA MIDSTREAM SERVICES LLC Low Pressure gathering system located in Lea County, New Mexico. It will require 10000' of pipeline to connect the facility to Low Pressure gathering system. MANZANO LLC provides (periodically) to TARGA MIDSTREAM SERVICES LLC a drilling, completion and estimated first production date for wells that are scheduled to be drilled in the foreseeable future. In addition, MANZANO LLC and TARGA MIDSTREAM SERVICES LLC have periodic conference calls to discuss changes to drilling and completion schedules. Gas from these wells will be processed at TARGA MIDSTREAM SERVICES LLC Processing Plant located in Sec. 09, Twn. 16S, Rng. 35E, Lea County, New Mexico. The actual flow of the gas will be based on compression operating parameters and gathering system pressures.

Flowback Strategy

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

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

Alternatives to Reduce Flaring

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

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

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Form APD Comments

Permit 274661

PERMIT COMMENTS

Operator Name and Address: MANZANO LLC [231429] P.O. Box 1737 Roswell, NM 88202	API Number: 30-025-46513
	Well: VINDICATOR 15 STATE #001H

Created By	Comment	Comment Date
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Form APD Conditions

Permit 274661

PERMIT CONDITIONS OF APPROVAL

Operator Name and Address: MANZANO LLC [231429] P.O. Box 1737 Roswell, NM 88202	API Number: 30-025-46513
	Well: VINDICATOR 15 STATE #001H

OCD Reviewer	Condition
pkautz	Will require a directional survey with the C-104
pkautz	1) SURFACE & INTERMEDIATE1 CASING - Cement must circulate to surface -- 2) INTERMEDIATE2 CASING - Cement must tie back into intermediate1 casing -- 3) PRODUCTION CASING - Cement must tie back into intermediate2 casing --
pkautz	If cement does not circulate to surface, must run temperature survey or other log to determine top of cement
pkautz	Surface casing must be set 25' below top of Rustler Anhydrite in order to seal off protectable water
pkautz	1)- The Operator is to notify NMOCD by sundry (Form C-103) within ten (10) days of the well being spud 2)- Drilling Sundries Form C-103 (Casing and Cement test are to be submitted within 10 days 3)- Completion Reports & Logs are to be submitted within 45 days 4)- Deviation / Directional Drill Survey are to be filed with or prior to C-104
pkautz	It is the operator's responsibility to monitor cancellation dates of approved APDs. APD's are good for 2 years and may be extended for one year. Only one 1 year extension will be granted if submitted by C-103 before expiration date. After expiration date or after a 1 year extension must submit new APD. If an APD expires and if site construction has occurred, site remediation is required.
pkautz	Stage Tool 1) Must notify OCD Hobbs Office prior to running Stage Tool at 5753703186 2) If using Stage Tool on Surface casing, Stage Tool must be set greater than 350' from surface and a minimum of 200 feet above surface shoe. 3) When using a Stage Tool on Intermediate or Production Casing Stage must be a minimum of 50 feet below previous casing shoe.

Manzano, LLC

DrilTech, LLC

Lea County, NM (NAD 83)
Vindicator 15 ST 1H
Wellbore #1
Plan #1



SURFACE LOCATION

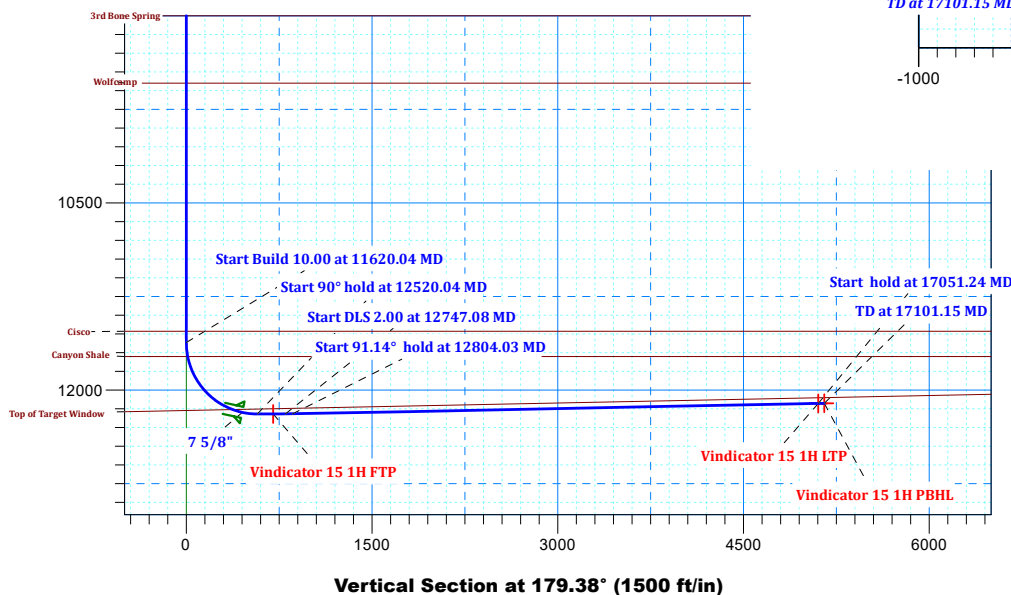
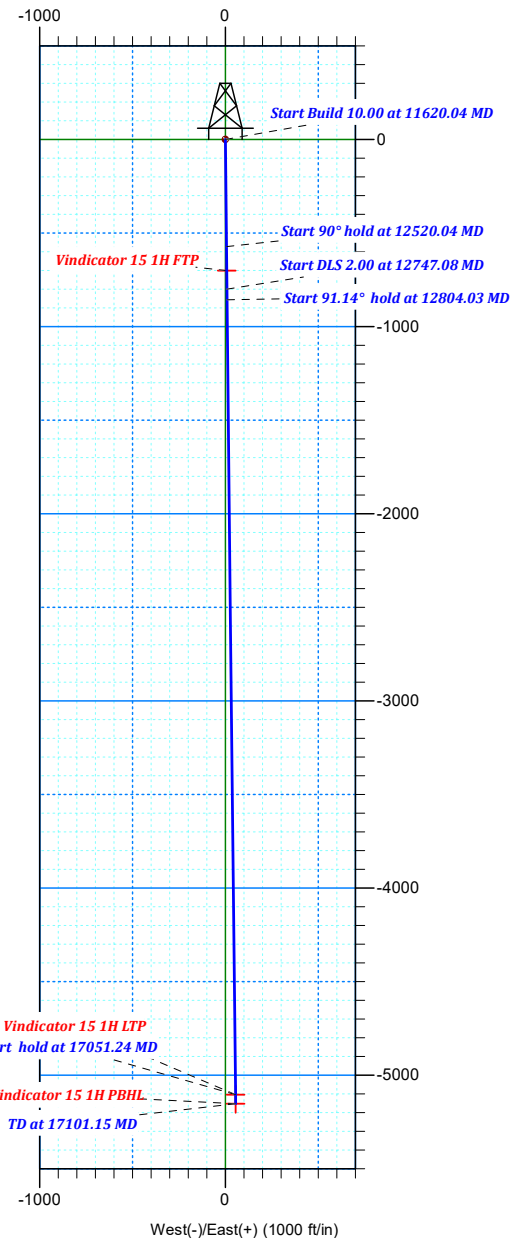
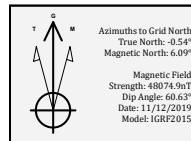
US State Plane 1983
New Mexico Eastern Zone
Elevation: GL 3853' + 20' RKB @ 3873.00ft
Northing 671489.80 Easting 845323.60 Latitude 32° 50' 31.329 N Longitude 103° 20' 36.828 W

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11620.04	0.00	0.00	11620.04	0.00	0.00	0.00	0.00	0.00
12520.04	90.00	179.38	12193.00	-572.92	6.20	10.00	179.38	572.96
12747.08	90.00	179.38	12193.00	-799.95	8.66	0.00	0.00	800.00
12804.03	91.14	179.38	12192.43	-856.90	9.27	2.00	-0.05	856.95
17051.24	91.14	179.38	12108.00	-5103.01	55.30	0.00	0.00	5103.31
17101.15	91.14	179.38	12107.01	-5152.91	55.84	0.00	0.00	5153.21

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting
Vindicator 15 1H FTP	12193.00	-700.00	7.60	670789.80	845331.20
Vindicator 15 1H LTP	12108.00	-5103.01	55.30	666386.80	845378.90
Vindicator 15 1H PBHL	12107.01	-5152.91	55.90	666336.90	845379.50



Manzano, LLC

Lea County, NM (NAD 83)

Vindicator 15 State 1H

Vindicator 15 ST 1H

Wellbore #1

Plan: Plan #1

Standard Planning Report

12 November, 2019

Planning Report

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

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

Site		Vindicator 15 State 1H			
Site Position:		Northing:	671,489.80 usft	Latitude:	32° 50' 31.329 N
From:	Map	Easting:	845,323.60 usft	Longitude:	103° 20' 36.828 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.54 °

Well	Vindicator 15 ST 1H					
Well Position	+N/-S	0.00 ft	Northing:	671,489.80 usft	Latitude:	32° 50' 31.329 N
	+E/-W	0.00 ft	Easting:	845,323.60 usft	Longitude:	103° 20' 36.828 W
Position Uncertainty		0.00 ft	Wellhead Elevation:		Ground Level:	3,853.00 ft

Wellbore	Wellbore #1				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/12/2019	6.63	60.63	48,074.93048026

Design	Plan #1			
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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	179.38

Plan Survey Tool Program	Date	11/12/2019		
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	17,101.10	Plan #1 (Wellbore #1)	

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	
11,620.04	0.00	0.00	11,620.04	0.00	0.00	0.00	0.00	0.00	0.00	
12,520.04	90.00	179.38	12,193.00	-572.92	6.20	10.00	10.00	0.00	179.38	
12,747.08	90.00	179.38	12,193.00	-799.95	8.66	0.00	0.00	0.00	0.00	
12,804.03	91.14	179.38	12,192.43	-856.90	9.27	2.00	2.00	0.00	-0.05	
17,051.24	91.14	179.38	12,108.00	-5,103.01	55.30	0.00	0.00	0.00	0.00	Vindicator 15 1H LT
17,101.15	91.14	179.38	12,107.01	-5,152.91	55.84	0.00	0.00	0.00	0.00	Vindicator 15 1H PE

Planning Report

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

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	
80.00	0.00	0.00	80.00	0.00	0.00	0.00	0.00	0.00	0.00	
20"										
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	
2,010.00	0.00	0.00	2,010.00	0.00	0.00	0.00	0.00	0.00	0.00	
Rustler Anhydrite										
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00	
13 3/8"										
2,120.00	0.00	0.00	2,120.00	0.00	0.00	0.00	0.00	0.00	0.00	
Base Anhydrite										
2,165.00	0.00	0.00	2,165.00	0.00	0.00	0.00	0.00	0.00	0.00	
Top Salt										
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	
7 Rivers										
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	

Planning Report

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

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)
4,280.00	0.00	0.00	4,280.00	0.00	0.00	0.00	0.00	0.00	0.00
Queen									
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
5,025.00	0.00	0.00	5,025.00	0.00	0.00	0.00	0.00	0.00	0.00
San Andres									
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
9 5/8"									
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00
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
6,670.00	0.00	0.00	6,670.00	0.00	0.00	0.00	0.00	0.00	0.00
Glorieta									
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00
6,780.00	0.00	0.00	6,780.00	0.00	0.00	0.00	0.00	0.00	0.00
Yeso									
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,400.00	0.00	0.00	0.00	0.00	0.00	0.00
7,500.00	0.00	0.00	7,500.00	0.00	0.00	0.00	0.00	0.00	0.00
7,520.00	0.00	0.00	7,520.00	0.00	0.00	0.00	0.00	0.00	0.00
2nd Bone Spring									
7,570.00	0.00	0.00	7,570.00	0.00	0.00	0.00	0.00	0.00	0.00
Abo Dolomite									
7,600.00	0.00	0.00	7,600.00	0.00	0.00	0.00	0.00	0.00	0.00
7,700.00	0.00	0.00	7,700.00	0.00	0.00	0.00	0.00	0.00	0.00
7,800.00	0.00	0.00	7,800.00	0.00	0.00	0.00	0.00	0.00	0.00
7,900.00	0.00	0.00	7,900.00	0.00	0.00	0.00	0.00	0.00	0.00
8,000.00	0.00	0.00	8,000.00	0.00	0.00	0.00	0.00	0.00	0.00
8,100.00	0.00	0.00	8,100.00	0.00	0.00	0.00	0.00	0.00	0.00
8,200.00	0.00	0.00	8,200.00	0.00	0.00	0.00	0.00	0.00	0.00

Planning Report

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

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)
8,300.00	0.00	0.00	8,300.00	0.00	0.00	0.00	0.00	0.00	0.00
8,400.00	0.00	0.00	8,400.00	0.00	0.00	0.00	0.00	0.00	0.00
8,500.00	0.00	0.00	8,500.00	0.00	0.00	0.00	0.00	0.00	0.00
8,600.00	0.00	0.00	8,600.00	0.00	0.00	0.00	0.00	0.00	0.00
8,700.00	0.00	0.00	8,700.00	0.00	0.00	0.00	0.00	0.00	0.00
8,800.00	0.00	0.00	8,800.00	0.00	0.00	0.00	0.00	0.00	0.00
8,900.00	0.00	0.00	8,900.00	0.00	0.00	0.00	0.00	0.00	0.00
9,000.00	0.00	0.00	9,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3rd Bone Spring									
9,100.00	0.00	0.00	9,100.00	0.00	0.00	0.00	0.00	0.00	0.00
9,200.00	0.00	0.00	9,200.00	0.00	0.00	0.00	0.00	0.00	0.00
9,300.00	0.00	0.00	9,300.00	0.00	0.00	0.00	0.00	0.00	0.00
9,400.00	0.00	0.00	9,400.00	0.00	0.00	0.00	0.00	0.00	0.00
9,500.00	0.00	0.00	9,500.00	0.00	0.00	0.00	0.00	0.00	0.00
9,540.00	0.00	0.00	9,540.00	0.00	0.00	0.00	0.00	0.00	0.00
Wolfcamp									
9,600.00	0.00	0.00	9,600.00	0.00	0.00	0.00	0.00	0.00	0.00
9,700.00	0.00	0.00	9,700.00	0.00	0.00	0.00	0.00	0.00	0.00
9,800.00	0.00	0.00	9,800.00	0.00	0.00	0.00	0.00	0.00	0.00
9,900.00	0.00	0.00	9,900.00	0.00	0.00	0.00	0.00	0.00	0.00
10,000.00	0.00	0.00	10,000.00	0.00	0.00	0.00	0.00	0.00	0.00
10,100.00	0.00	0.00	10,100.00	0.00	0.00	0.00	0.00	0.00	0.00
10,200.00	0.00	0.00	10,200.00	0.00	0.00	0.00	0.00	0.00	0.00
10,300.00	0.00	0.00	10,300.00	0.00	0.00	0.00	0.00	0.00	0.00
10,400.00	0.00	0.00	10,400.00	0.00	0.00	0.00	0.00	0.00	0.00
10,500.00	0.00	0.00	10,500.00	0.00	0.00	0.00	0.00	0.00	0.00
10,600.00	0.00	0.00	10,600.00	0.00	0.00	0.00	0.00	0.00	0.00
10,700.00	0.00	0.00	10,700.00	0.00	0.00	0.00	0.00	0.00	0.00
10,800.00	0.00	0.00	10,800.00	0.00	0.00	0.00	0.00	0.00	0.00
10,900.00	0.00	0.00	10,900.00	0.00	0.00	0.00	0.00	0.00	0.00
11,000.00	0.00	0.00	11,000.00	0.00	0.00	0.00	0.00	0.00	0.00
11,100.00	0.00	0.00	11,100.00	0.00	0.00	0.00	0.00	0.00	0.00
11,200.00	0.00	0.00	11,200.00	0.00	0.00	0.00	0.00	0.00	0.00
11,300.00	0.00	0.00	11,300.00	0.00	0.00	0.00	0.00	0.00	0.00
11,400.00	0.00	0.00	11,400.00	0.00	0.00	0.00	0.00	0.00	0.00
11,500.00	0.00	0.00	11,500.00	0.00	0.00	0.00	0.00	0.00	0.00
11,530.00	0.00	0.00	11,530.00	0.00	0.00	0.00	0.00	0.00	0.00
Cisco									
11,600.00	0.00	0.00	11,600.00	0.00	0.00	0.00	0.00	0.00	0.00
11,620.04	0.00	0.00	11,620.04	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 10.00 at 11620.04 MD									
11,700.00	8.00	179.38	11,699.74	-5.57	0.06	5.57	10.00	10.00	0.00
11,732.73	11.27	179.38	11,732.00	-11.04	0.12	11.05	10.00	10.00	0.00
Canyon Shale									
11,800.00	18.00	179.38	11,797.06	-28.03	0.30	28.03	10.00	10.00	0.00
11,900.00	28.00	179.38	11,888.99	-67.04	0.73	67.05	10.00	10.00	0.00
12,000.00	38.00	179.38	11,972.76	-121.43	1.31	121.44	10.00	10.00	0.00
12,100.00	48.00	179.38	12,045.80	-189.53	2.05	189.54	10.00	10.00	0.00
12,200.00	58.00	179.38	12,105.91	-269.29	2.91	269.30	10.00	10.00	0.00
12,300.00	68.00	179.38	12,151.26	-358.27	3.88	358.29	10.00	10.00	0.00
12,317.43	69.74	179.38	12,157.55	-374.52	4.05	374.55	10.00	10.00	0.00
Top of Target Window									
12,400.00	78.00	179.38	12,180.47	-453.77	4.91	453.79	10.00	10.00	0.00

Planning Report

Database:	EDM	Local Co-ordinate Reference:				Well Vindicator 15 ST 1H			
Company:	Manzano, LLC					GL 3853' + 20' RKB @ 3873.00ft			
Project:	Lea County, NM (NAD 83)					GL 3853' + 20' RKB @ 3873.00ft			
Site:	Vindicator 15 State 1H					Grid			
Well:	Vindicator 15 ST 1H					Minimum Curvature			
Wellbore:	Wellbore #1								
Design:	Plan #1								
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)
12,500.00	88.00	179.38	12,192.65	-552.89	5.98	552.92	10.00	10.00	0.00
12,520.04	90.00	179.38	12,193.00	-572.92	6.20	572.96	10.00	10.00	0.00
Start 90° hold at 12520.04 MD									
12,600.00	90.00	179.38	12,193.00	-652.88	7.07	652.92	0.00	0.00	0.00
12,647.13	90.00	179.38	12,193.00	-700.00	7.58	700.04	0.00	0.00	0.00
Vindicator 15 1H FTP									
12,700.00	90.00	179.38	12,193.00	-752.87	8.15	752.92	0.00	0.00	0.00
12,747.08	90.00	179.38	12,193.00	-799.95	8.66	800.00	0.00	0.00	0.00
Start DLS 2.00 at 12747.08 MD									
12,800.00	91.06	179.38	12,192.51	-852.86	9.23	852.91	2.00	2.00	0.00
12,804.03	91.14	179.38	12,192.43	-856.90	9.27	856.95	2.00	2.00	0.00
Start 91.14° hold at 12804.03 MD									
12,900.00	91.14	179.38	12,190.52	-952.84	10.31	952.90	0.00	0.00	0.00
13,000.00	91.14	179.38	12,188.54	-1,052.81	11.40	1,052.88	0.00	0.00	0.00
13,100.00	91.14	179.38	12,186.55	-1,152.79	12.48	1,152.86	0.00	0.00	0.00
13,200.00	91.14	179.38	12,184.56	-1,252.76	13.56	1,252.84	0.00	0.00	0.00
13,300.00	91.14	179.38	12,182.57	-1,352.74	14.65	1,352.82	0.00	0.00	0.00
13,400.00	91.14	179.38	12,180.58	-1,452.71	15.73	1,452.80	0.00	0.00	0.00
13,500.00	91.14	179.38	12,178.60	-1,552.69	16.82	1,552.78	0.00	0.00	0.00
13,600.00	91.14	179.38	12,176.61	-1,652.66	17.90	1,652.76	0.00	0.00	0.00
13,700.00	91.14	179.38	12,174.62	-1,752.63	18.98	1,752.74	0.00	0.00	0.00
13,800.00	91.14	179.38	12,172.63	-1,852.61	20.07	1,852.72	0.00	0.00	0.00
13,900.00	91.14	179.38	12,170.64	-1,952.58	21.15	1,952.70	0.00	0.00	0.00
14,000.00	91.14	179.38	12,168.66	-2,052.56	22.23	2,052.68	0.00	0.00	0.00
14,100.00	91.14	179.38	12,166.67	-2,152.53	23.32	2,152.66	0.00	0.00	0.00
14,200.00	91.14	179.38	12,164.68	-2,252.51	24.40	2,252.64	0.00	0.00	0.00
14,300.00	91.14	179.38	12,162.69	-2,352.48	25.49	2,352.62	0.00	0.00	0.00
14,400.00	91.14	179.38	12,160.71	-2,452.45	26.57	2,452.60	0.00	0.00	0.00
14,500.00	91.14	179.38	12,158.72	-2,552.43	27.65	2,552.58	0.00	0.00	0.00
14,600.00	91.14	179.38	12,156.73	-2,652.40	28.74	2,652.56	0.00	0.00	0.00
14,700.00	91.14	179.38	12,154.74	-2,752.38	29.82	2,752.54	0.00	0.00	0.00
14,800.00	91.14	179.38	12,152.75	-2,852.35	30.90	2,852.52	0.00	0.00	0.00
14,900.00	91.14	179.38	12,150.77	-2,952.33	31.99	2,952.50	0.00	0.00	0.00
15,000.00	91.14	179.38	12,148.78	-3,052.30	33.07	3,052.48	0.00	0.00	0.00
15,100.00	91.14	179.38	12,146.79	-3,152.28	34.15	3,152.46	0.00	0.00	0.00
15,200.00	91.14	179.38	12,144.80	-3,252.25	35.24	3,252.44	0.00	0.00	0.00
15,300.00	91.14	179.38	12,142.81	-3,352.22	36.32	3,352.42	0.00	0.00	0.00
15,400.00	91.14	179.38	12,140.83	-3,452.20	37.41	3,452.40	0.00	0.00	0.00
15,500.00	91.14	179.38	12,138.84	-3,552.17	38.49	3,552.38	0.00	0.00	0.00
15,600.00	91.14	179.38	12,136.85	-3,652.15	39.57	3,652.36	0.00	0.00	0.00
15,700.00	91.14	179.38	12,134.86	-3,752.12	40.66	3,752.34	0.00	0.00	0.00
15,800.00	91.14	179.38	12,132.87	-3,852.10	41.74	3,852.32	0.00	0.00	0.00
15,900.00	91.14	179.38	12,130.89	-3,952.07	42.82	3,952.30	0.00	0.00	0.00
16,000.00	91.14	179.38	12,128.90	-4,052.04	43.91	4,052.28	0.00	0.00	0.00
16,100.00	91.14	179.38	12,126.91	-4,152.02	44.99	4,152.26	0.00	0.00	0.00
16,200.00	91.14	179.38	12,124.92	-4,251.99	46.08	4,252.24	0.00	0.00	0.00
16,300.00	91.14	179.38	12,122.93	-4,351.97	47.16	4,352.22	0.00	0.00	0.00
16,400.00	91.14	179.38	12,120.95	-4,451.94	48.24	4,452.20	0.00	0.00	0.00
16,500.00	91.14	179.38	12,118.96	-4,551.92	49.33	4,552.18	0.00	0.00	0.00
16,600.00	91.14	179.38	12,116.97	-4,651.89	50.41	4,652.16	0.00	0.00	0.00
16,700.00	91.14	179.38	12,114.98	-4,751.87	51.49	4,752.14	0.00	0.00	0.00
16,800.00	91.14	179.38	12,112.99	-4,851.84	52.58	4,852.12	0.00	0.00	0.00
16,900.00	91.14	179.38	12,111.01	-4,951.81	53.66	4,952.10	0.00	0.00	0.00
17,000.00	91.14	179.38	12,109.02	-5,051.79	54.74	5,052.08	0.00	0.00	0.00

Planning Report

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

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)
17,051.24	91.14	179.38	12,108.00	-5,103.01	55.30	5,103.31	0.00	0.00	0.00
Start hold at 17051.24 MD - Vindicator 15 1H LTP									
17,100.00	91.14	179.38	12,107.03	-5,151.76	55.83	5,152.07	0.00	0.00	0.00
17,101.15	91.14	179.38	12,107.01	-5,152.91	55.84	5,153.21	0.00	0.00	0.00
TD at 17101.15 MD - Vindicator 15 1H PBHL									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Vindicator 15 1H PBH	0.00	0.00	12,107.01	-5,152.91	55.90	666,336.90	845,379.50	32° 49' 40.343 N	103° 20' 36.739 W
- plan misses target center by 0.06ft at 17101.15ft MD (12107.01 TVD, -5152.91 N, 55.84 E)									
- Point									
Vindicator 15 1H LTP	0.00	0.00	12,108.00	-5,103.01	55.30	666,386.80	845,378.90	32° 49' 40.837 N	103° 20' 36.740 W
- plan hits target center									
- Point									
Vindicator 15 1H FTP	0.00	0.00	12,193.00	-700.00	7.60	670,789.80	845,331.20	32° 50' 24.403 N	103° 20' 36.816 W
- plan misses target center by 0.03ft at 12647.12ft MD (12193.00 TVD, -700.00 N, 7.58 E)									
- Point									

Casing Points				
Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
	12,180.00	7 5/8"	7.625	7.625
	17,101.15	5 1/2"	5.500	6.000
80.00	80.00	20"	20.000	26.000
2,100.00	2,100.00	13 3/8"	13.375	17.500
5,100.00	5,100.00	9 5/8"	9.625	12.250

Planning Report

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,010.00	2,010.00	Rustler Anhydrite		0.00	179.38
2,120.00	2,120.00	Base Anhydrite		0.00	179.38
2,165.00	2,165.00	Top Salt		0.00	179.38
3,600.00	3,600.00	7 Rivers		0.00	179.38
4,280.00	4,280.00	Queen		0.00	179.38
5,025.00	5,025.00	San Andres		0.00	179.38
6,670.00	6,670.00	Glorieta		0.00	179.38
6,780.00	6,780.00	Yeso		0.00	179.38
7,520.00	7,520.00	2nd Bone Spring		0.00	179.38
7,570.00	7,570.00	Abo Dolomite		0.00	179.38
9,000.00	9,000.00	3rd Bone Spring		0.00	179.38
9,540.00	9,540.00	Wolfcamp		0.00	179.38
11,530.00	11,530.00	Cisco		0.00	179.38
11,732.73	11,732.00	Canyon Shale		0.00	179.38
12,317.43	12,157.55	Top of Target Window		-1.14	179.38

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
11,620.04	11,620.04	0.00	0.00	Start Build 10.00 at 11620.04 MD
12,520.04	12,193.00	-572.92	6.20	Start 90° hold at 12520.04 MD
12,747.08	12,193.00	-799.95	8.66	Start DLS 2.00 at 12747.08 MD
12,804.03	12,192.43	-856.90	9.27	Start 91.14° hold at 12804.03 MD
17,051.24	12,108.00	-5,103.01	55.30	Start hold at 17051.24 MD
17,101.15	12,107.01	-5,152.91	55.84	TD at 17101.15 MD

Manzano, LLC

Lea County, NM (NAD 83)

Vindicator 15 State 1H

Vindicator 15 ST 1H

Wellbore #1

Plan: Plan #1

Standard Planning Report - Geographic

12 November, 2019

Planning Report - Geographic

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

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

Site		Vindicator 15 State 1H			
Site Position:		Northing:	671,489.80 usft	Latitude:	32° 50' 31.329 N
From:	Map	Easting:	845,323.60 usft	Longitude:	103° 20' 36.828 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.54 °

Well	Vindicator 15 ST 1H					
Well Position	+N/-S	0.00 ft	Northing:	671,489.80 usft	Latitude:	32° 50' 31.329 N
	+E/-W	0.00 ft	Easting:	845,323.60 usft	Longitude:	103° 20' 36.828 W
Position Uncertainty		0.00 ft	Wellhead Elevation:		Ground Level:	3,853.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/12/2019	6.63	60.63	48,074.93048026

Design	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	179.38

Plan Survey Tool Program	Date	11/12/2019		
Depth From (ft)	Depth To (ft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	17,101.10 Plan #1 (Wellbore #1)		

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	
11,620.04	0.00	0.00	11,620.04	0.00	0.00	0.00	0.00	0.00	0.00	
12,520.04	90.00	179.38	12,193.00	-572.92	6.20	10.00	10.00	0.00	179.38	
12,747.08	90.00	179.38	12,193.00	-799.95	8.66	0.00	0.00	0.00	0.00	
12,804.03	91.14	179.38	12,192.43	-856.90	9.27	2.00	2.00	0.00	-0.05	
17,051.24	91.14	179.38	12,108.00	-5,103.01	55.30	0.00	0.00	0.00	0.00	Vindicator 15 1H LT
17,101.15	91.14	179.38	12,107.01	-5,152.91	55.84	0.00	0.00	0.00	0.00	Vindicator 15 1H PT

Planning Report - Geographic

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
80.00	0.00	0.00	80.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
20"									
100.00	0.00	0.00	100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
200.00	0.00	0.00	200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
300.00	0.00	0.00	300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
400.00	0.00	0.00	400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
500.00	0.00	0.00	500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
600.00	0.00	0.00	600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
700.00	0.00	0.00	700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
800.00	0.00	0.00	800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
900.00	0.00	0.00	900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,000.00	0.00	0.00	1,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,100.00	0.00	0.00	1,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,200.00	0.00	0.00	1,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,300.00	0.00	0.00	1,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,400.00	0.00	0.00	1,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,500.00	0.00	0.00	1,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,600.00	0.00	0.00	1,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,700.00	0.00	0.00	1,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,800.00	0.00	0.00	1,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
1,900.00	0.00	0.00	1,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2,000.00	0.00	0.00	2,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2,010.00	0.00	0.00	2,010.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Rustler Anhydrite									
2,100.00	0.00	0.00	2,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
13 3/8"									
2,120.00	0.00	0.00	2,120.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Base Anhydrite									
2,165.00	0.00	0.00	2,165.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Top Salt									
2,200.00	0.00	0.00	2,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2,300.00	0.00	0.00	2,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2,400.00	0.00	0.00	2,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2,500.00	0.00	0.00	2,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2,600.00	0.00	0.00	2,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2,700.00	0.00	0.00	2,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2,800.00	0.00	0.00	2,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2,900.00	0.00	0.00	2,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3,000.00	0.00	0.00	3,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3,100.00	0.00	0.00	3,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3,200.00	0.00	0.00	3,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3,300.00	0.00	0.00	3,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3,400.00	0.00	0.00	3,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3,500.00	0.00	0.00	3,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3,600.00	0.00	0.00	3,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7 Rivers									
3,700.00	0.00	0.00	3,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3,800.00	0.00	0.00	3,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3,900.00	0.00	0.00	3,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
4,000.00	0.00	0.00	4,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
4,100.00	0.00	0.00	4,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
4,200.00	0.00	0.00	4,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W

Planning Report - Geographic

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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
4,280.00	0.00	0.00	4,280.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Queen									
4,300.00	0.00	0.00	4,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
4,400.00	0.00	0.00	4,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
4,500.00	0.00	0.00	4,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
4,600.00	0.00	0.00	4,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
4,700.00	0.00	0.00	4,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
4,800.00	0.00	0.00	4,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
4,900.00	0.00	0.00	4,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
5,000.00	0.00	0.00	5,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
5,025.00	0.00	0.00	5,025.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
San Andres									
5,100.00	0.00	0.00	5,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9 5/8"									
5,200.00	0.00	0.00	5,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
5,300.00	0.00	0.00	5,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
5,400.00	0.00	0.00	5,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
5,500.00	0.00	0.00	5,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
5,600.00	0.00	0.00	5,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
5,700.00	0.00	0.00	5,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
5,800.00	0.00	0.00	5,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
5,900.00	0.00	0.00	5,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,000.00	0.00	0.00	6,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,100.00	0.00	0.00	6,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,200.00	0.00	0.00	6,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,300.00	0.00	0.00	6,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,400.00	0.00	0.00	6,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,500.00	0.00	0.00	6,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,600.00	0.00	0.00	6,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,670.00	0.00	0.00	6,670.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Glorieta									
6,700.00	0.00	0.00	6,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,780.00	0.00	0.00	6,780.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Yeso									
6,800.00	0.00	0.00	6,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
6,900.00	0.00	0.00	6,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,000.00	0.00	0.00	7,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,100.00	0.00	0.00	7,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,200.00	0.00	0.00	7,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,300.00	0.00	0.00	7,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,400.00	0.00	0.00	7,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,500.00	0.00	0.00	7,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,520.00	0.00	0.00	7,520.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
2nd Bone Spring									
7,570.00	0.00	0.00	7,570.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Abo Dolomite									
7,600.00	0.00	0.00	7,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,700.00	0.00	0.00	7,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,800.00	0.00	0.00	7,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
7,900.00	0.00	0.00	7,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
8,000.00	0.00	0.00	8,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
8,100.00	0.00	0.00	8,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
8,200.00	0.00	0.00	8,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
8,300.00	0.00	0.00	8,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W

Planning Report - Geographic

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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
8,400.00	0.00	0.00	8,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
8,500.00	0.00	0.00	8,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
8,600.00	0.00	0.00	8,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
8,700.00	0.00	0.00	8,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
8,800.00	0.00	0.00	8,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
8,900.00	0.00	0.00	8,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9,000.00	0.00	0.00	9,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
3rd Bone Spring									
9,100.00	0.00	0.00	9,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9,200.00	0.00	0.00	9,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9,300.00	0.00	0.00	9,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9,400.00	0.00	0.00	9,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9,500.00	0.00	0.00	9,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9,540.00	0.00	0.00	9,540.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Wolfcamp									
9,600.00	0.00	0.00	9,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9,700.00	0.00	0.00	9,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9,800.00	0.00	0.00	9,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
9,900.00	0.00	0.00	9,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,000.00	0.00	0.00	10,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,100.00	0.00	0.00	10,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,200.00	0.00	0.00	10,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,300.00	0.00	0.00	10,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,400.00	0.00	0.00	10,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,500.00	0.00	0.00	10,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,600.00	0.00	0.00	10,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,700.00	0.00	0.00	10,700.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,800.00	0.00	0.00	10,800.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
10,900.00	0.00	0.00	10,900.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
11,000.00	0.00	0.00	11,000.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
11,100.00	0.00	0.00	11,100.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
11,200.00	0.00	0.00	11,200.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
11,300.00	0.00	0.00	11,300.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
11,400.00	0.00	0.00	11,400.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
11,500.00	0.00	0.00	11,500.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
11,530.00	0.00	0.00	11,530.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Cisco									
11,600.00	0.00	0.00	11,600.00	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
11,620.04	0.00	0.00	11,620.04	0.00	0.00	671,489.80	845,323.60	32° 50' 31.329 N	103° 20' 36.828 W
Start Build 10.00 at 11620.04 MD									
11,700.00	8.00	179.38	11,699.74	-5.57	0.06	671,484.22	845,323.66	32° 50' 31.274 N	103° 20' 36.828 W
11,732.73	11.27	179.38	11,732.00	-11.04	0.12	671,478.75	845,323.72	32° 50' 31.220 N	103° 20' 36.828 W
Canyon Shale									
11,800.00	18.00	179.38	11,797.06	-28.03	0.30	671,461.77	845,323.90	32° 50' 31.052 N	103° 20' 36.828 W
11,900.00	28.00	179.38	11,888.99	-67.04	0.73	671,422.75	845,324.32	32° 50' 30.666 N	103° 20' 36.827 W
12,000.00	38.00	179.38	11,972.76	-121.43	1.31	671,368.37	845,324.91	32° 50' 30.128 N	103° 20' 36.826 W
12,100.00	48.00	179.38	12,045.80	-189.53	2.05	671,300.26	845,325.65	32° 50' 29.454 N	103° 20' 36.825 W
12,200.00	58.00	179.38	12,105.91	-269.29	2.91	671,220.51	845,326.51	32° 50' 28.665 N	103° 20' 36.824 W
12,300.00	68.00	179.38	12,151.26	-358.27	3.88	671,131.53	845,327.48	32° 50' 27.784 N	103° 20' 36.822 W
12,317.43	69.74	179.38	12,157.55	-374.52	4.05	671,115.27	845,327.65	32° 50' 27.624 N	103° 20' 36.822 W
Top of Target Window									
12,400.00	78.00	179.38	12,180.47	-453.77	4.91	671,036.04	845,328.51	32° 50' 26.839 N	103° 20' 36.820 W
12,500.00	88.00	179.38	12,192.65	-552.89	5.98	670,936.92	845,329.58	32° 50' 25.859 N	103° 20' 36.819 W

Planning Report - Geographic

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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
12,520.04	90.00	179.38	12,193.00	-572.92	6.20	670,916.88	845,329.80	32° 50' 25.660 N	103° 20' 36.818 W
Start 90° hold at 12520.04 MD									
12,600.00	90.00	179.38	12,193.00	-652.88	7.07	670,836.93	845,330.66	32° 50' 24.869 N	103° 20' 36.817 W
12,647.13	90.00	179.38	12,193.00	-700.00	7.58	670,789.80	845,331.17	32° 50' 24.403 N	103° 20' 36.816 W
Vindicator 15 1H FTP									
12,700.00	90.00	179.38	12,193.00	-752.87	8.15	670,736.93	845,331.75	32° 50' 23.880 N	103° 20' 36.815 W
12,747.08	90.00	179.38	12,193.00	-799.95	8.66	670,689.86	845,332.26	32° 50' 23.414 N	103° 20' 36.815 W
Start DLS 2.00 at 12747.08 MD									
12,800.00	91.06	179.38	12,192.51	-852.86	9.23	670,636.94	845,332.83	32° 50' 22.891 N	103° 20' 36.814 W
12,804.03	91.14	179.38	12,192.43	-856.90	9.27	670,632.91	845,332.87	32° 50' 22.851 N	103° 20' 36.814 W
Start 91.14° hold at 12804.03 MD									
12,900.00	91.14	179.38	12,190.52	-952.84	10.31	670,536.97	845,333.91	32° 50' 21.901 N	103° 20' 36.812 W
13,000.00	91.14	179.38	12,188.54	-1,052.81	11.40	670,436.99	845,335.00	32° 50' 20.912 N	103° 20' 36.810 W
13,100.00	91.14	179.38	12,186.55	-1,152.79	12.48	670,337.02	845,336.08	32° 50' 19.923 N	103° 20' 36.808 W
13,200.00	91.14	179.38	12,184.56	-1,252.76	13.56	670,237.05	845,337.16	32° 50' 18.934 N	103° 20' 36.807 W
13,300.00	91.14	179.38	12,182.57	-1,352.74	14.65	670,137.07	845,338.25	32° 50' 17.945 N	103° 20' 36.805 W
13,400.00	91.14	179.38	12,180.58	-1,452.71	15.73	670,037.10	845,339.33	32° 50' 16.955 N	103° 20' 36.803 W
13,500.00	91.14	179.38	12,178.60	-1,552.69	16.82	669,937.12	845,340.41	32° 50' 15.966 N	103° 20' 36.802 W
13,600.00	91.14	179.38	12,176.61	-1,652.66	17.90	669,837.15	845,341.50	32° 50' 14.977 N	103° 20' 36.800 W
13,700.00	91.14	179.38	12,174.62	-1,752.63	18.98	669,737.17	845,342.58	32° 50' 13.988 N	103° 20' 36.798 W
13,800.00	91.14	179.38	12,172.63	-1,852.61	20.07	669,637.20	845,343.67	32° 50' 12.999 N	103° 20' 36.796 W
13,900.00	91.14	179.38	12,170.64	-1,952.58	21.15	669,537.23	845,344.75	32° 50' 12.009 N	103° 20' 36.795 W
14,000.00	91.14	179.38	12,168.66	-2,052.56	22.23	669,437.25	845,345.83	32° 50' 11.020 N	103° 20' 36.793 W
14,100.00	91.14	179.38	12,166.67	-2,152.53	23.32	669,337.28	845,346.92	32° 50' 10.031 N	103° 20' 36.791 W
14,200.00	91.14	179.38	12,164.68	-2,252.51	24.40	669,237.30	845,348.00	32° 50' 9.042 N	103° 20' 36.789 W
14,300.00	91.14	179.38	12,162.69	-2,352.48	25.49	669,137.33	845,349.08	32° 50' 8.052 N	103° 20' 36.788 W
14,400.00	91.14	179.38	12,160.71	-2,452.45	26.57	669,037.36	845,350.17	32° 50' 7.063 N	103° 20' 36.786 W
14,500.00	91.14	179.38	12,158.72	-2,552.43	27.65	668,937.38	845,351.25	32° 50' 6.074 N	103° 20' 36.784 W
14,600.00	91.14	179.38	12,156.73	-2,652.40	28.74	668,837.41	845,352.34	32° 50' 5.085 N	103° 20' 36.783 W
14,700.00	91.14	179.38	12,154.74	-2,752.38	29.82	668,737.43	845,353.42	32° 50' 4.096 N	103° 20' 36.781 W
14,800.00	91.14	179.38	12,152.75	-2,852.35	30.90	668,637.46	845,354.50	32° 50' 3.106 N	103° 20' 36.779 W
14,900.00	91.14	179.38	12,150.77	-2,952.33	31.99	668,537.48	845,355.59	32° 50' 2.117 N	103° 20' 36.777 W
15,000.00	91.14	179.38	12,148.78	-3,052.30	33.07	668,437.51	845,356.67	32° 50' 1.128 N	103° 20' 36.776 W
15,100.00	91.14	179.38	12,146.79	-3,152.28	34.15	668,337.54	845,357.75	32° 50' 0.139 N	103° 20' 36.774 W
15,200.00	91.14	179.38	12,144.80	-3,252.25	35.24	668,237.56	845,358.84	32° 49' 59.150 N	103° 20' 36.772 W
15,300.00	91.14	179.38	12,142.81	-3,352.22	36.32	668,137.59	845,359.92	32° 49' 58.160 N	103° 20' 36.771 W
15,400.00	91.14	179.38	12,140.83	-3,452.20	37.41	668,037.61	845,361.00	32° 49' 57.171 N	103° 20' 36.769 W
15,500.00	91.14	179.38	12,138.84	-3,552.17	38.49	667,937.64	845,362.09	32° 49' 56.182 N	103° 20' 36.767 W
15,600.00	91.14	179.38	12,136.85	-3,652.15	39.57	667,837.67	845,363.17	32° 49' 55.193 N	103° 20' 36.765 W
15,700.00	91.14	179.38	12,134.86	-3,752.12	40.66	667,737.69	845,364.26	32° 49' 54.204 N	103° 20' 36.764 W
15,800.00	91.14	179.38	12,132.87	-3,852.10	41.74	667,637.72	845,365.34	32° 49' 53.214 N	103° 20' 36.762 W
15,900.00	91.14	179.38	12,130.89	-3,952.07	42.82	667,537.74	845,366.42	32° 49' 52.225 N	103° 20' 36.760 W
16,000.00	91.14	179.38	12,128.90	-4,052.04	43.91	667,437.77	845,367.51	32° 49' 51.236 N	103° 20' 36.758 W
16,100.00	91.14	179.38	12,126.91	-4,152.02	44.99	667,337.79	845,368.59	32° 49' 50.247 N	103° 20' 36.757 W
16,200.00	91.14	179.38	12,124.92	-4,251.99	46.08	667,237.82	845,369.67	32° 49' 49.258 N	103° 20' 36.755 W
16,300.00	91.14	179.38	12,122.93	-4,351.97	47.16	667,137.85	845,370.76	32° 49' 48.268 N	103° 20' 36.753 W
16,400.00	91.14	179.38	12,120.95	-4,451.94	48.24	667,037.87	845,371.84	32° 49' 47.279 N	103° 20' 36.752 W
16,500.00	91.14	179.38	12,118.96	-4,551.92	49.33	666,937.90	845,372.93	32° 49' 46.290 N	103° 20' 36.750 W
16,600.00	91.14	179.38	12,116.97	-4,651.89	50.41	666,837.92	845,374.01	32° 49' 45.301 N	103° 20' 36.748 W
16,700.00	91.14	179.38	12,114.98	-4,751.87	51.49	666,737.95	845,375.09	32° 49' 44.312 N	103° 20' 36.746 W
16,800.00	91.14	179.38	12,112.99	-4,851.84	52.58	666,637.98	845,376.18	32° 49' 43.322 N	103° 20' 36.745 W
16,900.00	91.14	179.38	12,111.01	-4,951.81	53.66	666,538.00	845,377.26	32° 49' 42.333 N	103° 20' 36.743 W
17,000.00	91.14	179.38	12,109.02	-5,051.79	54.74	666,438.03	845,378.34	32° 49' 41.344 N	103° 20' 36.741 W

Planning Report - Geographic

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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
17,051.24	91.14	179.38	12,108.00	-5,103.01	55.30	666,386.80	845,378.90	32° 49' 40.837 N	103° 20' 36.740 W
Start hold at 17051.24 MD - Vindicator 15 1H LTP									
17,100.00	91.14	179.38	12,107.03	-5,151.76	55.83	666,338.05	845,379.43	32° 49' 40.355 N	103° 20' 36.739 W
17,101.15	91.14	179.38	12,107.01	-5,152.91	55.84	666,336.90	845,379.44	32° 49' 40.343 N	103° 20' 36.739 W
TD at 17101.15 MD - Vindicator 15 1H PBHL									

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
Vindicator 15 1H PBH - plan misses target center by 0.06ft at 17101.15ft MD (12107.01 TVD, -5152.91 N, 55.84 E) - Point	0.00	0.00	12,107.01	-5,152.91	55.90	666,336.90	845,379.50	32° 49' 40.343 N	103° 20' 36.739 W
Vindicator 15 1H LTP - plan hits target center - Point	0.00	0.00	12,108.00	-5,103.01	55.30	666,386.80	845,378.90	32° 49' 40.837 N	103° 20' 36.740 W
Vindicator 15 1H FTP - plan misses target center by 0.03ft at 12647.12ft MD (12193.00 TVD, -700.00 N, 7.58 E) - Point	0.00	0.00	12,193.00	-700.00	7.60	670,789.80	845,331.20	32° 50' 24.403 N	103° 20' 36.816 W

Casing Points

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (in)	Hole Diameter (in)
	12,180.00	7 5/8"	7.625	7.625
	17,101.15	5 1/2"	5.500	6.000
80.00	80.00	20"	20.000	26.000
2,100.00	2,100.00	13 3/8"	13.375	17.500
5,100.00	5,100.00	9 5/8"	9.625	12.250

Planning Report - Geographic

Database:	EDM	Local Co-ordinate Reference:	Well Vindicator 15 ST 1H
Company:	Manzano, LLC	TVD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Project:	Lea County, NM (NAD 83)	MD Reference:	GL 3853' + 20' RKB @ 3873.00ft
Site:	Vindicator 15 State 1H	North Reference:	Grid
Well:	Vindicator 15 ST 1H	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Plan #1		

Formations

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,010.00	2,010.00	Rustler Anhydrite		0.00	179.38
2,120.00	2,120.00	Base Anhydrite		0.00	179.38
2,165.00	2,165.00	Top Salt		0.00	179.38
3,600.00	3,600.00	7 Rivers		0.00	179.38
4,280.00	4,280.00	Queen		0.00	179.38
5,025.00	5,025.00	San Andres		0.00	179.38
6,670.00	6,670.00	Glorieta		0.00	179.38
6,780.00	6,780.00	Yeso		0.00	179.38
7,520.00	7,520.00	2nd Bone Spring		0.00	179.38
7,570.00	7,570.00	Abo Dolomite		0.00	179.38
9,000.00	9,000.00	3rd Bone Spring		0.00	179.38
9,540.00	9,540.00	Wolfcamp		0.00	179.38
11,530.00	11,530.00	Cisco		0.00	179.38
11,732.73	11,732.00	Canyon Shale		0.00	179.38
12,317.43	12,157.55	Top of Target Window		-1.14	179.38

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
11,620.04	11,620.04	0.00	0.00	Start Build 10.00 at 11620.04 MD
12,520.04	12,193.00	-572.92	6.20	Start 90° hold at 12520.04 MD
12,747.08	12,193.00	-799.95	8.66	Start DLS 2.00 at 12747.08 MD
12,804.03	12,192.43	-856.90	9.27	Start 91.14° hold at 12804.03 MD
17,051.24	12,108.00	-5,103.01	55.30	Start hold at 17051.24 MD
17,101.15	12,107.01	-5,152.91	55.84	TD at 17101.15 MD