

**FloSurvey - Real Time Survey Tool**

1200 Cypress Creek Road  
 Cedar Park, TX 78613  
 Phone: (512)340-5000  
 Fax: (512)340-5441

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March 28, 2017

Oil Conservation Division  
 1220 South St. Francis Dr.  
 Santa Fe, NM 87505

CLIENT: Murchison Oil & Gas  
 WELL: Jawbone State Com 4-H  
 FIELD: Cottonwood Draw Bone Springs  
 RIG: Nabors M55  
 COUNTY: Eddy  
 API NO: 30-015-43986

We hereby certify that the enclosed field survey data performed on the referenced well by National Oilwell Varco, contained in this report represents to the best of our knowledge, a true and accurate survey of the surveyed section of the well at the time the survey was run.

Other information required by your office is as follows.

<u>Name &amp; Title of Surveyor</u>	<u>Drainhole Number</u>	<u>Surveyed Depths</u>	<u>Dates Performed</u>	<u>Type of Survey</u>
Ali Quiroz FloSurvey Technician	Jawbone State Com 4-H Original Hole	94.00 Ft to 274.00 Ft	March 6, 2017 to March 6, 2017	FloSurvey

If any other information is required, please contact the undersigned at the above letterhead and phone number.  
 Sincerely,

Bradley Aden  
 Field Service Manager

CC: Murchison Oil & Gas  
 Enclosures: [2]  
 County of Eddy  
 State of New Mexico

Attn: Cindy Cottrell  
 7250 Dallas Parkway  
 Suite 1400, Plano, TX 75024

Attn:

**NM OIL CONSERVATION**  
 ARTESIA DISTRICT

APR 28 2017

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I, Ali Quiroz certify that; I am employed by National Oilwell Varco, L.P.; that the surveys taken on the day(s) of March 06, 2017 through March 06, 2017, from a depth of 94 feet to a depth of 274 feet; are to the best of my knowledge, the data is true, correct, complete and within the limitations of the tool as set forth by National Oilwell Varco, L.P.; that I am authorized and qualified to make this report; that this survey was conducted at the request of Murchison Oil & Gas for the Jawbone State Com 4-H Well (Original Hole) API No. 30-015-43986 in Eddy County, New Mexico; and that I have reviewed this report and find that it conforms to the principals and procedures as set forth by National Oilwell Varco, L.P.

Signature

A handwritten signature in black ink, appearing to read 'Ali Quiroz', written over a horizontal line.

Ali Quiroz

FloSurvey Technician

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**Murchison Oil & Gas**  
**Eddy County**  
**Jawbone State Com 4-H**  
**Surveys: 94`MD - 274`MD**  
**Survey Date: Monday, March 06, 2017**

## **National Oilwell Varco**

### **Survey Report**

**Tuesday, March 28, 2017**

UWI No. 30-015-43986

Surface Coordinates: 424093.10 N, 562112.80 E (32° 09' 57.2120" N, 104° 15' 58.2930" W)  
Grid Coordinate System: NAD83 New Mexico State Planes, Eastern Zone

Kelly Bushing Elevation: 3352.00ft above Mean Sea Level  
Kelly Bushing Elevation: 22.00ft above Ground Level  
Ground Level: 3330.00ft above Mean Sea Level

Survey Ref: svy1216

**NM OIL CONSERVATION**  
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Survey Report for Eddy County, Jawbone State Com 4-H, Surveys: 94`MD - 274`MD

Survey Depth (ft)	Incl. (°)	(Grid) Azim. (°)	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00	
94.00	1.29	101.02	93.99	0.20 S	1.04 E	1.06	1.37
165.00	1.48	108.22	164.97	0.64 S	2.69 E	2.77	0.36
231.00	1.32	102.64	230.95	1.07 S	4.25 E	4.38	0.32
274.00	1.34	104.67	273.94	1.31 S	5.22 E	5.38	0.12

All data is in Feet (US Survey) unless otherwise stated. Directions and coordinates are relative to Grid North. Vertical depths are relative to Jawbone State Com 4-H. Northings and Eastings are relative to Jawbone State Com 4-H.

The dogleg severity is in Degrees per 100 feet (US Survey). Vertical Section is from Jawbone State Com 4-H calculated along an azimuth of 104.10° (Grid).

Based upon minimum curvature calculations, at a measured depth of 274.00ft, the bottom hole displacement is 5.38ft, in the direction of 104.10° (Grid).

The along-hole displacement is 5.38ft. The total accumulated dogleg is 1.51°. The measured tortuosity is 0.57°/100ft. The directional difficulty index is 0.4.

Survey Tool Program for Jawbone State Com 4-H, Surveys: 94`MD - 274`MD

From Measured Depth (ft)	Vertical Depth (ft)	To Measured Depth (ft)	Vertical Depth (ft)	Survey Tool Description
0.00	0.00	274.00	273.94	NOV_FLOSURVEY_TILT_MEM

## Survey Report for Eddy County, Jawbone State Com 4-H, Surveys: 94`MD - 274`MD

REFERENCE DATA			
Ellipsoid	Geodetic Reference System of 1980	Unit System	Feet (Us Survey)
Coord. System	NAD83 New Mexico State Planes, Eastern Zone	North Ref.	Grid North
Mag. Model	International Geomagnetic Reference Field 2015	Vertical Ref.	Mean Sea Level
Calc. Date	06 Mar, 2017		

LOCATION DATA			
RKB Elevation	3352.00ft above MSL	Total Field	47858.6 nT
Map North	424093.10 N	Magnetic Dip	59.90°
Map East	562112.80 E	Declination	7.30°
Latitude	32° 09' 57.2120" N	Convergence	0.04°
Longitude	104° 15' 58.2930" W		

NORTH REFERENCE DATA	
Magnetic Model	International Geomagnetic Reference Field 2015
Calculation Date	Monday, March 06, 2017
Declination	7.30°
Inclination/Dip	59.90°
Horizontal Component	24002.1 nT
Northerly Component	23807.6 nT
Easterly Component	3049.2 nT
Vertical Component	41404.6 nT
Total Field Strength	47858.6 nT
Grid North is 0.04 degrees East of True North (Grid Convergence) Magnetic North is 7.30 degrees East of True North (Magnetic Declination) Magnetic North is 7.26 degrees East of Grid North (Magnetic Convergence)	
To convert a True Direction to a Grid Direction, Subtract 0.04 degrees. To convert a Magnetic Direction to a True Direction, Add 7.30 degrees. To convert a Magnetic Direction to a Grid Direction, Add 7.26 degrees.	

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