

**FloSurvey - Real Time Survey Tool**

1200 Cypress Creek Road

Cedar Park, TX 78613

Phone: (512)340-5000

Fax: (512)340-5441

March 28, 2017

Oil Conservation Division

1220 South St. Francis Dr.

Santa Fe, NM 87505

CLIENT: Murchison Oil & Gas
WELL: Jawbone State Com 3-H
FIELD: Cottonwood Draw Bone Springs
RIG: Nabors M55
COUNTY: Eddy
API NO: 3001543985

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 & 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 3-H Original Hole	118.00 Ft to 293.00 Ft	March 23, 2017 to March 23, 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

RECEIVED



FloSurvey - Real Time Survey Tool

1200 Cypress Creek Road

Cedar Park, TX 78613

Phone: (512) 340-5000

Fax: (512) 340-5441

I, Ali Quiroz certify that; I am employed by National Oilwell Varco, L.P.; that the surveys taken on the day(s) of March 23, 2017 through March 23, 2017, from a depth of 118 feet to a depth of 293 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 3-H Well (Original Hole) API No. 3001543985 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

Murchion Oil & Gas
Eddy County
Jawbone State Com 3-H
Surveys: 118`MD - 293`MD
Survey Date: Thursday, March 23, 2017

National Oilwell Varco

Survey Report

Friday, March 24, 2017

UWI No. 3001543985

Surface Coordinates: 424093.11 N, 562132.83 E (32° 09' 57.2120" N, 104° 15' 58.0600" W)
Grid Coordinate System: NAD83 New Mexico State Planes, Eastern Zone

Kelly Bushing Elevation: 3353.10ft above Mean Sea Level
Kelly Bushing Elevation: 22.00ft above Ground Level
Ground Level: 3331.10ft above Mean Sea Level

Survey Ref: svy1214

NM OIL CONSERVATION

ARTESIA DISTRICT

APR 28 2017

RECEIVED

Survey Report for Eddy County, Jawbone State Com 3-H, Surveys: 118`MD - 293`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	
118.00	0.51	11.37	118.00	0.51 N	0.10 E	0.52	0.43
147.00	0.72	17.71	147.00	0.81 N	0.18 E	0.83	0.76
172.00	0.46	359.66	172.00	1.06 N	0.23 E	1.08	1.27
211.00	0.47	353.02	210.99	1.38 N	0.21 E	1.39	0.14
293.00	0.62	6.91	292.99	2.15 N	0.22 E	2.17	0.24

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 3-H. Northings and Eastings are relative to Jawbone State Com 3-H.

The dogleg severity is in Degrees per 100 feet (US Survey).
Vertical Section is from Jawbone State Com 3-H calculated along an azimuth of 5.93° (Grid).

Based upon minimum curvature calculations, at a measured depth of 293.00ft, the bottom hole displacement is 2.17ft, in the direction of 5.93° (Grid).

The along-hole displacement is 2.17ft. The total accumulated dogleg is 0.74°.
The measured tortuosity is 0.26°/100ft. The directional difficulty index is -0.3.

Survey Tool Program for Jawbone State Com 3-H, Surveys: 118`MD - 293`MD

From Measured Depth (ft)	Vertical Depth (ft)	To Measured Depth (ft)	Vertical Depth (ft)	Survey Tool Description
0.00	0.00	293.00	292.99	NOV_FLOSURVEY_TILT_MEM

Survey Report for Eddy County, Jawbone State Com 3-H, Surveys: 118`MD - 293`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	23 Mar, 2017		

LOCATION DATA			
RKB Elevation	3353.10ft above MSL	Total Field	47853.8 nT
Map North	424093.11 N	Magnetic Dip	59.90°
Map East	562132.83 E	Declination	7.29°
Latitude	32° 09' 57.2120" N	Convergence	0.04°
Longitude	104° 15' 58.0600" W		

NORTH REFERENCE DATA		
Magnetic Model	ational Geomagnetic Reference Field 2015	
Calculation Date	Thursday, March 23, 2017	
Declination	7.29°	
Inclination/Dip	59.90°	
Horizontal Component	24000.1 nT	
Northerly Component	23805.9 nT	
Easterly Component	3046.9 nT	
Vertical Component	41400.3 nT	
Total Field Strength	47853.8 nT	
Grid North is 0.04 degrees East of True North (Grid Convergence) Magnetic North is 7.29 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 7.29 degrees. To convert a Magnetic Direction to a Grid Direction, Add 7.26 degrees.		

The diagram illustrates the angular relationships between different north references. A horizontal arrow at the bottom points to the right, labeled 'Hole Direction'. Three other arrows originate from a common point: 'True North' points up and to the left, 'Grid North' points straight up, and 'Magnetic North' points up and to the right. The angle between True North and Grid North is labeled as 0.04°. The angle between Grid North and Magnetic North is labeled as 7.26°.

Disclaimer Notice
National Oilwell Varco makes no warranty of any kind with respect to the subject matter included herein or the completeness or accuracy of this document.
National Oilwell Varco are not responsible for any actions (or lack thereof) taken as a result of relying on or in any way using information contained in this document and in no event shall be liable for any damages resulting from reliance on or use of this information.