



P.O. Box 10640 Bozeman, Montana 59719

(406) 460-0903

TO: Jim Griswold, NMOCD

FROM: Curtis Shuck, Chairman

DATE: April 15, 2023

RE: O'Brien Fee 18 #005 (30-005-61020) Orphan Well Post-Plugging Methane Monitoring

### TECHNICAL MEMORANDUM

Well Done New Mexico LLC and the Well Done Foundation, Inc. (WDF) performing contract professional services methane monitoring for the State of New Mexico Energy, Minerals and Natural Resources Department – Oil Conservation Division (OCD) under Purchase Order #52100-00000073985 for Orphan Oil & Gas Wells in Chaves County, NM.

The site conditions found at the O'Brien Fee 18 #005 by the WDF Measure 1 Field Team on March 18, 2023, revealed a cement filled casing, cutoff to -2'-0" below the surface with a welded monument. The WDF Measure 1 Team took site photographs, performed field gas measurements and collected a gas sample for immediate laboratory analysis.

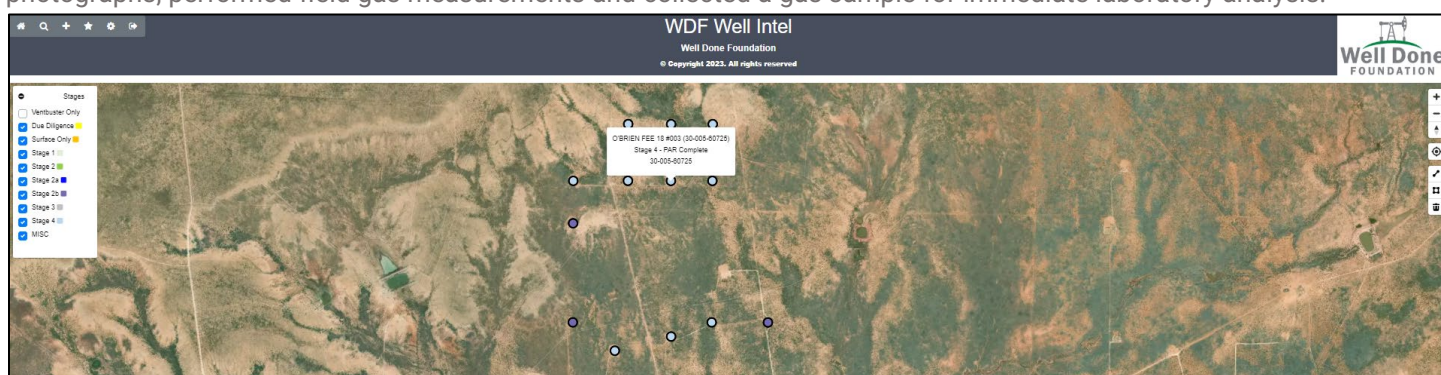


Image 1.1 – O'Brien Fee 18 #005 (30-005-61020) Orphan Well in Chaves County, NM

The Pre-Plugging Methane Flow Calculations were based on the O'Brien Field Averaging Analysis conducted by the Well Done Foundation and Well Done New Mexico LLC and dated March 30, 2023, that included a total of 26 orphan wells. 16 of the O'Brien Field Wells, or 61.54%, were randomly selected and monitored using Ventbuster™ Instruments VB100 Series Ultra-Low Flow Meter with GPS. The Methane Concentration and Methane Flow results of the 16 monitored wells were then averaged and applied to the 10 wells, or 38.46% that were not measured. This resulted in 91,741.25 ppm in methane gas concentration and 0.61 cubic meters per day of wellhead emissions. Therefore, the adjusted average methane gas emission measured at this wellhead is calculated at **1.67 grams per hour (g/hour)**.<sup>1</sup>

The State of New Mexico used the methane flow data collected by WDF to prioritize the O'Brien Fee 18 #005 orphan well plugging under the IJJA Program and began mobilizing a contractor to location. J A Drake Well Service, Inc. of Farmington, NM was awarded the plugging contract.

WDF arrived at the O'Brien Fee 18 #005 location on March 18, 2023, to perform post-plugging orphan well methane testing and sampling on behalf of the State of New Mexico. **WDF post plugging field gas tests revealed 0.00% of methane or H<sub>2</sub>s gasses. The post plugging collected gas samples, analyzed by Laboratory Services, Inc. confirmed 0.00 ppm or methane gas and 0.00 ppm of H<sub>2</sub>s gas. THEREFORE, the total Methane Gas Emissions Reduction is: 1.67 g/hour.**

<sup>1</sup> Methane Calculation: 717 grams CH<sub>4</sub> per cubic meter (717 x 0.61 m<sup>3</sup>/day = 437.37 g/day total /24 = 18.22 g/hour x 0.091741 (methane concentration) = **1.67 g/hour CH<sub>4</sub>**). **Methane, gas** weighs 0.000717 gram per cubic centimeter or 0.717 kilogram per cubic meter, i.e. density of methane, gas is equal to 0.717 kg/m<sup>3</sup>; at 0°C (32°F or 273.15K) at standard atmospheric pressure. In Imperial or US customary measurement system, the density is equal to 0.044 pound per cubic foot [lb/ft<sup>3</sup>].

This orphan well did exceed the >1 g/hour federal program reporting requirements for methane emissions reductions as described in Section 40601 (Orphaned well site plugging, remediation, and restoration) of Title V (Methane Reduction Infrastructure) of the 2021 Bipartisan Infrastructure Law (BIL; Public Law 117-58)<sup>2</sup>.



333 Main Street Shelby, Montana 59474 / P.O. Box 10640 Bozeman, MT 59179

(406) 460-0903

TO: Jim Griswold, OCD  
FROM: Curtis Shuck, WDNM  
DATE: March 30, 2023  
RE: O'Brien Orphan Well Field Averaging

### MEMORANDUM

Well Done New Mexico LLC performed an Orphan Well Methane Emission Averaging Analysis on the O'Brien Field in Chaves County, NM that included 26 Orphan Wells in total. Of the total 26 Orphan Wells in the study group, 16 of them (61.54%) were randomly selected for the full Methane Emissions Testing, and the average of the Methane Concentration, in PPM, and the Average of the Methane Flow, in m3/day, was calculated and applied to the 10 Orphan Wells (38.46%) that did not receive the full Methane Emissions Testing.

The results of the O'Brien Field Averaging Analysis are shown below and attached herewith:

| O'Brien Orphan Well CH4 Averaging - Applied to the 10 Wells Outside Sample Set - CES |        |              |        |                |            |                                                                      |                                                                                        |                                                                            |                                                                                          |                                              |
|--------------------------------------------------------------------------------------|--------|--------------|--------|----------------|------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------|
| Prepared: 3.30.2023                                                                  |        |              |        |                |            |                                                                      |                                                                                        |                                                                            |                                                                                          |                                              |
| Well Name                                                                            | Well # | API #        | County | Purchase Order | Gas Sample | CH4/PPM                                                              | Total LELs/PPM                                                                         | CH4 Flow @ m3/day                                                          | Methane Emission @ g/hour                                                                | Post Plug CH4                                |
| O'Brien Deming 13                                                                    | 1      | 30-005-60922 | Chaves | 52100-72995    | 19-Feb     | 1,380                                                                | 8,390                                                                                  | 0.02                                                                       | 0.001                                                                                    | 0                                            |
| O'Brien Deming 6                                                                     | 1      | 30-005-60634 | Chaves | 52100-72995    | 18-Dec     | 0                                                                    | 5,800                                                                                  | 0.000                                                                      | 0.000                                                                                    | 0                                            |
| O'Brien Deming 6                                                                     | 2      | 30-005-60730 | Chaves | 52100-72995    | 18-Dec     | 0                                                                    | 3,110                                                                                  | 0.000                                                                      | 0.000                                                                                    | 0                                            |
| O'Brien Fee 18                                                                       | 1      | 30-005-60619 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 18                                                                       | 2      | 30-005-60640 | Chaves | 52100-72995    | 21-Feb     | 493,430                                                              | 764,050                                                                                | 2.400                                                                      | 35.378                                                                                   | 0                                            |
| O'Brien Fee 18                                                                       | 3      | 30-005-60725 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 18                                                                       | 4      | 30-005-60902 | Chaves | 52100-72995    | 19-Feb     | 0                                                                    | 4,100                                                                                  | 0.000                                                                      | 0.000                                                                                    | 0                                            |
| O'Brien Fee 18                                                                       | 6      | 30-005-61246 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 19                                                                       | 1      | 30-005-60528 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 19                                                                       | 2      | 30-005-60565 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 19                                                                       | 3      | 30-005-60566 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 19                                                                       | 4      | 30-005-60654 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 19                                                                       | 5      | 30-005-60716 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 19                                                                       | 6      | 30-005-60804 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 19                                                                       | 7      | 30-005-60905 | Chaves | 52100-72995    | 21-Feb     | 8,610                                                                | 11,520                                                                                 | 0.04                                                                       | 0.01                                                                                     | 0                                            |
| O'Brien Fee 19                                                                       | 8      | 30-005-61021 | Chaves | 52100-72995    |            | 91,741.25                                                            | 132,849                                                                                | 0.6088                                                                     | 1.668                                                                                    | 0                                            |
| O'Brien Fee 24                                                                       | 1      | 30-005-60803 | Chaves | 52100-72995    | 19-Feb     | 160,400                                                              | 252,660                                                                                | 0                                                                          | 0                                                                                        | 0                                            |
| O'Brien Fee 24                                                                       | 2      | 30-005-60923 | Chaves | 52100-72995    | 21-Feb     | 8,360                                                                | 8,891                                                                                  | 0.14                                                                       | 0.035                                                                                    | 0                                            |
| O'Brien Fee 25                                                                       | 5      | 30-005-60655 | Chaves | 52100-72995    | 23-Feb     | 44,050                                                               | 133,860                                                                                | 0.01                                                                       | 0.013                                                                                    | 0                                            |
| O'Brien Lightcap 7                                                                   | 1      | 30-005-60815 | Chaves | 52100-72998    | 18-Dec     | 0                                                                    | 3,680                                                                                  | 0                                                                          | 0 Not Plugged                                                                            | 0                                            |
| O'Brien Lightcap 7                                                                   | 2      | 30-005-60816 | Chaves | 52100-72998    | 19-Dec     | 0                                                                    | 3,230                                                                                  | 0                                                                          | 0                                                                                        | 0                                            |
| O'Brien LLL                                                                          | 1      | 30-005-62194 | Chaves | 52100-72998    | 20-Dec     | 510                                                                  | 2,128                                                                                  | 0                                                                          | 0                                                                                        | 0                                            |
| O'Brien P                                                                            | 1      | 30-005-62192 | Chaves | 52100-72998    | 21-Dec     | 0                                                                    | 9,070                                                                                  | 0                                                                          | 0 Not Plugged                                                                            | 0                                            |
| O'Brien P                                                                            | 2      | 30-005-62247 | Chaves | 52100-72998    | 21-Dec     | 141,550                                                              | 202,980                                                                                | 0                                                                          | 0                                                                                        | 0                                            |
| O'Brien P                                                                            | 3      | 30-005-62267 | Chaves | 52100-72998    | 21-Dec     | 609,570                                                              | 709,530                                                                                | 7.13                                                                       | 129.843                                                                                  | 0                                            |
| O'Brien R                                                                            | 1      | 30-005-62190 | Chaves | 52100-72998    | 20-Dec     | 0                                                                    | 2,580                                                                                  | 0                                                                          | 0                                                                                        | 0                                            |
| Total O'Brien Wells                                                                  | 26     |              |        |                |            | Sample Total CH4 PPM<br>1,467,860<br>Sample Avg CH4 PPM<br>91,741.25 | Sample Total Explosive Gas PPM<br>2,125,579<br>Sample Avg Explosive Gas PPM<br>132,849 | Sample Total Flow m3/day<br>9.7400<br>Sample Average Flow m3/day<br>0.6088 | Sample Total CH4 Emission g/hour<br>165.2800<br>Sample Avg CH4 Emission g/hour<br>1.6680 | Total O'Brien CH4 Emission g/hour<br>181.960 |

<sup>2</sup> Methane Calculation:  $717 \text{ grams CH}_4 \text{ per cubic meter} (717 \times 0.6088 \text{ m}^3/\text{day} = 436.51 \text{ g/day total} / 24 = 18.19 \text{ g/hour} \times 0.091741 \text{ (methane concentration) } = 1.67 \text{ g/hour CH}_4)$  Methane, gas weighs 0.000717 gram per cubic centimeter or 0.717 kilogram per cubic meter, i.e. density of methane, gas is equal to 0.717 kg/m<sup>3</sup>; at 0°C (32°F or 273.15K) at standard atmospheric pressure. In Imperial or US customary measurement system, the density is equal to 0.044 pound per cubic foot [lb/ft<sup>3</sup>].

Image 2.1 – Well Done New Mexico LLC O'Brien Field Averaging Memorandum

<sup>2</sup> These April 11, 2022 Guidelines were developed to meet the federal program reporting requirements for methane emissions reductions as described in Section 40601 (Orphaned well site plugging, remediation, and restoration) of Title V (Methane Reduction Infrastructure) of the 2021 Bipartisan Infrastructure Law (BIL; Public Law 117-58).

## METHANE GAS EMISSIONS REDUCTION O'BRIEN FEE 18 #005 (30-005-61020)

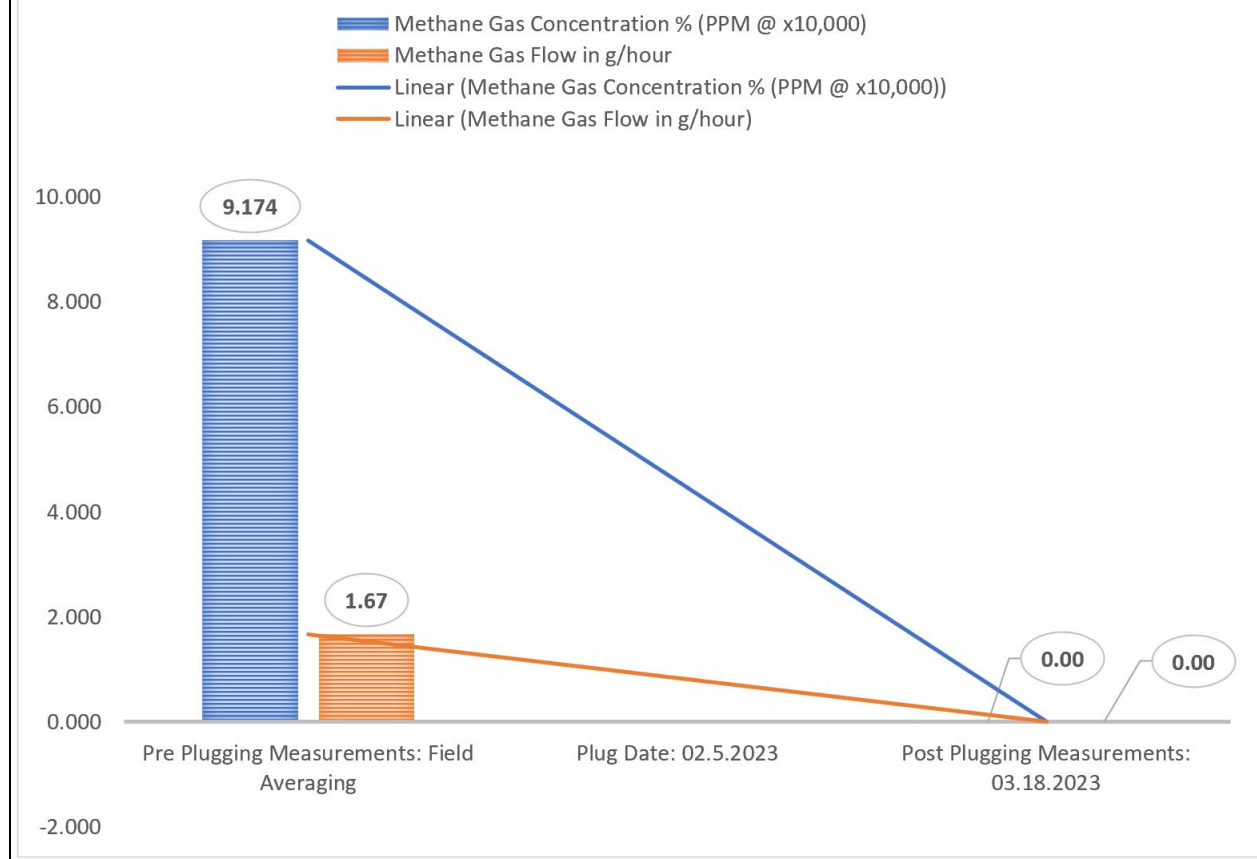


Image 3.1 – O'Brien Fee 18 #005 (30-005-61020) Methane Gas Emissions Reduction Pre Plugging to Post Plugging

### TECHNICAL FINDINGS

O'Brien Fee 18 #005 (30-005-61020):

- Total C1 through C6 Gas Concentration: 132,849 ppm
- Total Measured Wellhead Gas Emissions: 0.61 m<sup>3</sup>/day
- Methane Gas Concentration: 91,741 ppm
- Calculated Average Wellhead Methane Gas Emissions: 1.67 g/hour
- Post Plugging Methane Gas Concentration: 0.00 ppm
- Post Plugging Methane Flow: 0.00 g/hour

## CONCLUSIONS

- The O'Brien Fee 18 #005 (30-005-61020) was emitting Methane gas pre-plugging at the average rate of 1.67 g/hour, which was above the Federal minimum threshold for reporting described in Section 40601 (Orphaned well site plugging, remediation, and restoration) of Title V (Methane Reduction Infrastructure) of the 2021 Bipartisan Infrastructure Law (BIL; Public Law 117-58) which is >1g/hour.
- Post Plugging, the O'Brien Fee 18 #005 (30-005-61020) presented 0.00 ppm of Methane gas emissions from field gas tests and laboratory analysis of WDF collected gas samples.

## FIELD NOTES



Well Site

[Info](#) [Well File](#) [Images](#) [Well Data](#) [Regulatory](#) [Field Notes](#) [Live Data View](#) [Access](#) [Remove Well](#)

Date03/18/2023

New Noteces: WDF Measure1 on location to perform Field Gas Analysis, collect Gas Sample for Lab Analysis and photo document the site conditions. WILDCAT OUT|

Add

Image 4.1 – O'Brien Fee 18 #005 (30-005-61020) Field Notes from WDF Well Intel™ Orphan Well Project Management IoT

Appendix A – Site Photos for O'Brien Fee 18 #005 (30-005-61020)



1) O'Brien Fee 18 #005 – Field Gas Analysis



2) O'Brien Fee 18 #005 – Gas Sample



2) O'Brien Fee 18 #005 – Green Ribbon



www.permianls.com  
575.397.3713 2609 W Marland Hobbs NM 88240

## C6+ Gas Analysis Report

|                      |                    |                        |                                          |
|----------------------|--------------------|------------------------|------------------------------------------|
| 16395G               | OBrien Fee 18 #5   | OBrien Fee 18 #5       |                                          |
| Sample Point Code    | Sample Point Name  | Sample Point Location  |                                          |
| Laboratory Services  | 2023066027         | Tedlar Bag             | CES - Spot                               |
| Source Laboratory    | Lab File No        | Container Identity     | Sampler                                  |
| USA                  | USA                | USA                    | New Mexico                               |
| District             | Area Name          | Field Name             | Facility Name                            |
| Mar 18, 2023 12:35   | Mar 18, 2023 12:35 | Mar 24, 2023 08:27     | Mar 24, 2023                             |
| Date Sampled         | Date Effective     | Date Received          | Date Reported                            |
| Torrance             |                    |                        |                                          |
| Ambient Temp (°F)    | Flow Rate (Mcf)    | Analyst                | Press PSI @ Temp °F<br>Source Conditions |
| Well Done Foundation |                    | NG                     |                                          |
| Operator             |                    | Lab Source Description |                                          |

| Component          | Normalized Mol % | Un-Normalized Mol % | GPM    |
|--------------------|------------------|---------------------|--------|
| H2S (H2S)          | 0.0000           | 0                   |        |
| Nitrogen (N2)      | 99.9460          | 99.94652            |        |
| CO2 (CO2)          | 0.0390           | 0.03898             |        |
| Methane (C1)       | 0.0000           | 0                   |        |
| Ethane (C2)        | 0.0000           | 0                   | 0.0000 |
| Propane (C3)       | 0.0000           | 0                   | 0.0000 |
| I-Butane (IC4)     | 0.0000           | 0                   | 0.0000 |
| N-Butane (NC4)     | 0.0000           | 0                   | 0.0000 |
| I-Pentane (IC5)    | 0.0000           | 0                   | 0.0000 |
| N-Pentane (NC5)    | 0.0000           | 0                   | 0.0000 |
| Hexanes Plus (C6+) | 0.0150           | 0.0145              | 0.0070 |
| TOTAL              | 100.0000         | 100.0000            | 0.0070 |

Method(s): Gas C6+ - GPA 2261, Extended Gas - GPA 2286, Calculations - GPA 2172

| Analyzer Information |                   |                |              |
|----------------------|-------------------|----------------|--------------|
| Device Type:         | Gas Chromatograph | Device Make:   | Shimadzu     |
| Device Model:        | GC-2014           | Last Cal Date: | Feb 13, 2023 |

| Gross Heating Values (Real, BTU/ft³) |                       |     |           |
|--------------------------------------|-----------------------|-----|-----------|
| 14.696 PSI @ 60.00 Å°F               | 14.73 PSI @ 60.00 Å°F |     |           |
| Dry                                  | Saturated             | Dry | Saturated |
| 0.8                                  | 1.6                   | 0.8 | 1.6       |

| Calculated Total Sample Properties            |                        |
|-----------------------------------------------|------------------------|
| GPA2145-16 *Calculated at Contract Conditions |                        |
| Relative Density Real                         | Relative Density Ideal |
| 0.9677                                        | 0.9678                 |
| Molecular Weight                              |                        |
| 28.0294                                       |                        |

| C6+ Group Properties |              |              |
|----------------------|--------------|--------------|
| Assumed Composition  |              |              |
| C6 - 60.000%         | C7 - 30.000% | C8 - 10.000% |

|           |
|-----------|
| Field H2S |
| 0 PPM     |

## PROTREND STATUS:

Passed By Validator on Mar 27, 2023

## DATA SOURCE:

Imported

## PASSED BY VALIDATOR REASON:

First sample taken @ this point, composition looks reasonable

## VALIDATOR:

Brooke Rush

## VALIDATOR COMMENTS:

OK

| Source      | Date                 | Notes           |
|-------------|----------------------|-----------------|
| Brooke Rush | Mar 27, 2023 2:38 pm | Methane = 0 PPM |
| Brooke Rush | Mar 27, 2023 2:38 pm | Methane = 0 PPM |

**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 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**

DEFINITIONS  
  
Action 211937

DEFINITIONS

|                                                                                   |                                                                    |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Operator:<br>CANYON E & P COMPANY<br>251 O'Connor Ridge Blvd.<br>Irving, TX 75038 | OGRID:<br>269864                                                   |
|                                                                                   | Action Number:<br>211937                                           |
|                                                                                   | Action Type:<br>[UF-OMA] Post-Plug Methane Monitoring (UF-OMA-MMB) |

DEFINITIONS

The Orphan Well Mitigation Activity (OMA) forms are a subset of the OCD's forms exclusively designed for activities related to State of New Mexico's contracted plugging and reclamation activities. Specifically, these forms are used for orphan wells or associated facilities which are in a "Reclamation Fund Approved" status. This status represents wells or facilities where the OCD has acquired a hearing order allowing the OCD to perform plugging or reclamation on wells and associated facilities that no longer have a viable operator to perform the necessary work. These forms are not to be utilized for any other purpose.

**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 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**

QUESTIONS

Action 211937

**QUESTIONS**

|                                                                                   |                                                                    |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------|
| Operator:<br>CANYON E & P COMPANY<br>251 O'Connor Ridge Blvd.<br>Irving, TX 75038 | OGRID:<br>269864                                                   |
|                                                                                   | Action Number:<br>211937                                           |
|                                                                                   | Action Type:<br>[UF-OMA] Post-Plug Methane Monitoring (UF-OMA-MMB) |

**QUESTIONS**

|                            |                                    |
|----------------------------|------------------------------------|
| <b>Prerequisites</b>       |                                    |
| [OGRID] Well Operator      | [269864] CANYON E & P COMPANY      |
| [API] Well Name and Number | [30-005-61020] O'BRIEN FEE 18 #005 |
| Well Status                | Plugged (not released)             |

**Monitoring Event Information***Please answer all the questions in this group.*

|                    |                              |
|--------------------|------------------------------|
| Reason For Filing  | Post-Plug Methane Monitoring |
| Date of monitoring | 03/18/2023                   |
| Latitude           | 33.61726                     |
| Longitude          | -104.02675                   |

**Monitoring Event Details***Please answer all the questions in this group.*

|                                                   |              |
|---------------------------------------------------|--------------|
| Flow rate in cubic meters per day (m³/day)        | 0.00         |
| Test duration in hours (hr)                       | 1.0          |
| Average flow temperature in degrees Celsius (°C)  | 10.0         |
| Average gauge flow pressure in kilopascals (kPag) | 0.0          |
| Methane concentration in part per million (ppm)   | 0            |
| Methane emission rate in grams per hour (g/hr)    | 0.00         |
| Testing Method                                    | Steady State |

**Monitoring Contractor***Please answer all the questions in this group.*

|                               |                          |
|-------------------------------|--------------------------|
| Name of monitoring contractor | Well Done New Mexico LLC |
|-------------------------------|--------------------------|