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(406) 460-0903

TO: Randy Pancheco, APWS; Jim Griswold, NMOCD

FROM: Curtis Shuck, Chairman

DATE: November 28, 2022

RE: Harrison #002 (30-025-24749) Orphan Well Post-Plugging Methane Monitoring

### TECHNICAL MEMORANDUM

The Well Done Foundation, Inc. (WDF) performing contract professional services methane monitoring for A-Plus Well Services, Inc. (APWS) for the State of New Mexico Energy, Minerals and Natural Resources Department – Oil Conservation Division (OCD) under Purchase Order #1000002000038AA for Orphan Oil & Gas Wells in Lea County, NM.

The site conditions found at Harrison #002 by the WDF Measure 1 Field Team on November 20, 2022, at 11:20 A.M. revealed a cement plugged orphan well with an open wellbore. The WDF Measure 1 Team took site photographs, performed field gas measurements and collected a gas sample for immediate laboratory analysis.



Image 1.1 – Harrison #002 (30-025-24749) Orphan Well near Jal, NM

The Pre-Plugging Methane Flow Monitoring Test on September 19, 2022, using Ventbuster™ Instruments VB100-034 Ultra-Low Flow Meter with GPS, resulted in 0.18 cubic meters per day of total measured wellhead emissions. A composite gas sample collected at the wellhead by WDF during the flow test established a methane gas concentration level measured at 13,290 ppm, pursuant to Test ID 2022058189 performed by Laboratory Services of Hobbs, NM. Therefore, the adjusted average methane gas emission measured at this wellhead is calculated at **0.03 grams per hour (g/hour)**.<sup>1</sup>

The State of New Mexico used the methane flow data collected by WDF to prioritize the Harrison #002 orphan well plugging under the IJJA Program and began mobilizing a contractor to location on November 14, 2022. A-Plus Well Service, Inc. of Farmington, NM was awarded the plugging contract. A-Plus completed the orphan well plugging on Thursday November 18, 2022 and recorded cement to the surface.

WDF arrived at the Harrison #002 location on November 20, 2022 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 H2s**

<sup>1</sup> Methane Calculation: 554 grams CH<sub>4</sub> per cubic meter (554 x 0.18 = 99.72 g/day total /24 = 4.16 g/hour x 0.013290 (methane concentration) = **0.06 g/hour CH<sub>4</sub>**). **Methane, gas** weighs 0.000554 gram per cubic centimeter or 0.554 kilogram per cubic meter, i.e. density of methane, gas is equal to 0.554 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 0.0346 pound per cubic foot [lb/ft<sup>3</sup>], or 0.0003202 ounce per cubic inch [oz/inch<sup>3</sup>].

gases. The post plugging collected gas samples, analyzed by Laboratory Services, Inc. confirmed 0.00 ppm or methane gas and 0.00 ppm of H2s gas.

This orphan well did not 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>.



# Interval Report

<b>Interval Start Date:</b> Tuesday, September 20th, 2022, 9:46 AM MDT	<b>Test Operator:</b> DJF
<b>Interval End Date:</b> Tuesday, September 20th, 2022, 11:55 AM MDT	<b>Authorized By:</b> NMOCD
<b>Device:</b> VB100-0034	<b>Test Reason:</b> PRE PLUG
<b>Well Licensee:</b> NMOCD	<b>Scope Of Work:</b> 12-Hour
<b>Well Name:</b> HARRISON 002	<b>AFE Number:</b> NMOCD038AA/APWS22.001
<b>UWI:</b> 30-025-24749	<b>GPS:</b> 32.14678,-103.19575
<b>Well License Number:</b> 30-025-24749	<b>Notes:</b> GTG
<b>Surface Location:</b> PRIVATE	
<b>Bottom Hole Location:</b> UNKNOWN	

## Flow Test

Average Flowrate <b>0.18</b> m3/d <b>0.06</b> g/ hour	Average Flow Temperature <b>32.2</b> °C	Average Flow Pressure <b>3.5</b> kPag	Flow Duration <b>2.2</b> hours
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Image 2.1 – Harrison #002 (30-025-24749) Pre-Plugging Methane Monitoring Dashboard

### BACKGROUND

The Harrison #002 (30-025-24749) Orphan Well is located near the City of Jal in Lea County, NM at Latitude 32.1467321086975, Longitude -103.19570568399801 was measured and monitored by the WDF Measure 1 Field Team on 9/19/2022 following a Safety Briefing. Per the WDF protocol, the well was photographed from four (4) compass point aspects and closeups capturing the wellhead, field gas analysis results and gas sampling and uploaded to the WDF Well Intel™ IoT site. A Field Gas Analysis was conducted to detect Methane and H2s gas presence and concentration levels using a Honeywell BW Quattro Multi Gas Meter, serial number: QA121-012211.

The WDF Measure 1 Field Team collected Gas Sample #1 using a 1 Liter Tedlar/TO-Plus Gas Sampling Bag from the 2-3/8" production tubing which was flowing gas past the valve and at the 4" casing port at the beginning of the Flow Test at

<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).

approximately 11:59 A.M. MDT on 9.19.2022 as the well was being prepared for the Flow Measurement. Gas Sample #2 was collected in the same 1 Liter Tedlar Bag on 9.20.2022 before the Flow Test was concluded 12:03 P.M. MDT.

WDF rigged up the Ventbuster™ Instruments VB100-034 Continuous Ultra-Low Flow Meter with GPS for testing site confirmation for a minimum 2-Hour Methane Emission Test and began Test ID: 60d187df, verifying a cellular signal, cloud link and GPS coordinates. WDF collected Gas Sample #2 in the same Tedlar/TO Plus Gas Sample Bag prior to the VB Test being concluded later in the evening on 9.20.2022 to ensure the Methane Emission Flow was normalized. The collected Gas Sample was secured and placed in a storage cooler for transport to Laboratory Services, Inc. in Hobbs, NM.

WDF performed a 24.0-hour continuous flow methane monitoring test using VB100-034 to closely monitor the Pre-Plugging Methane Emission Flow Test. At the completion of the test, the WDF Team rigged the VB100-034 unit down and secured the wellhead as best as possible. A "Green Ribbon" was placed at the Wellhead indicating that WDF had concluded the Pre-Plugging Methane Flow testing.

The State of New Mexico reviewed the WDF provided Methane gas flow and concentration data and prioritized the Harrison #002 plugging as part of their IJJA Orphan Well Program of Projects. A-Plus Well Services, Inc. of Farmington, NM was dispatched to plug the prioritized orphan well on November 10, 2022 and the orphan well plugging was completed, with cement to the surface on November 18, 2022.

The WDF Measure 1 Team arrived back on location on November 20, 2022 to measure Methane gas concentration and emissions. WDF found the cement to be -18.6" below the surface collar of the production casing. WDF performed field gas tests that established 0.00% Methane and collected a gas sample for laboratory analysis. Laboratory Services, Inc. of Hobbs, NM rushed the analysis of the collected gas sample, using Test ID: #2022060523 and the findings concluded on November 23, 2022 were **0.00 ppm Methane Gas** and **0.00 ppm H2s Gas**.

## TECHNICAL FINDINGS

Harrison #002 (30-025-24749):

- **Total C1 through C6 Gas Concentration: 44,640 ppm**
- **Total Measured Wellhead Gas Emissions: 0.18 m3/day**
- **Methane Gas Concentration: 13,290 ppm**
- **Calculated Average Wellhead Methane Gas Emissions: 0.06 g/hour**
- **Peak Methane Flow Measured at: 0.29 g/hour**
- **Post Plugging Methane Gas Concentration: 0.00 ppm**
- **Post Plugging Methane Flow: 0.00 g/hour**

## CONCLUSIONS

- The Harrison #002 (30-025-24749) was emitting Methane gas pre-plugging at the average rate of 0.06 g/hour, which was below 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 Harrison #002 (30-025-24749) presented 0.00 ppm of Methane gas emissions from field gas tests and laboratory analysis of WDF collected gas samples.

**FIELD NOTES**

#	Date	Note
1	2022-09-19	ces: Arrive on Harrison #002 location. Take site photos. Update GPS coordinates. Conduct field gas detection. Collect gas sample 1 for laboratory analysis. Rig up VB100-034 for 12-Hour Methane flow test.
2	2022-09-20	ces: back on location to collect gas sample 2 and rig down VB100-034. Secure location. Place green flagging on well for pluggers. WILDCAT OUT!
3	2022-11-20	Measure team 1 post plug completion rigged up 4 gas monitor no indication of any gasses took a sample, measured well depth and photos both of well depth and photos of plugged well completion
4	2022-11-20	WILDCAT OUT!

Image 4.2 – Harrison #002 (30-025-24749) Field Notes from WDF Well Intel™ Orphan Well Project Management IoT



1) Harrison #002 (30-025-24749) - North Facing Post Plug



2) Harrison #002 (30-025-24749) - Cement Depth from Surface



3) Harrison #002 (30-025-24749) - Field Gas Testing



4) Foster #001 (30-025-07698) - Post Plugging Gas Sample



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

C6+ Gas Analysis Report

<b>15365G</b>	<b>Harrison #002 Post Plug</b>	<b>Harrison #002 Post Plug</b>	
Sample Point Code	Sample Point Name	Sample Point Location	
<b>Laboratory Services</b>	<b>2022060523</b>	<b>Tedlar Bag</b>	<b>FV - Spot</b>
Source Laboratory	Lab File No	Container Identity	Sampler
<b>USA</b>	<b>USA</b>	<b>USA</b>	<b>New Mexico</b>
District	Area Name	Field Name	Facility Name
<b>Nov 20, 2022 11:20</b>	<b>Nov 20, 2022 11:20</b>	<b>Nov 22, 2022 14:28</b>	<b>Nov 23, 2022</b>
Date Sampled	Date Effective	Date Received	Date Reported
<b>Torrance</b>			
<b>Ambient Temp (°F)</b>	<b>Flow Rate (Mcf)</b>	<b>Analyst</b>	<b>Press PSI @ Temp °F</b>
			Source Conditions
<b>Well Done Foundation</b>		<b>NG</b>	
Operator		Lab Source Description	

Component	Normalized Mol %	Un-Normalized Mol %	GPM
H2S (H2S)	0.0000	0	
Nitrogen (N2)	99.8840	99.88355	
CO2 (CO2)	0.0120	0.01231	
<b>Methane (C1)</b>	<b>0.0000</b>	<b>0</b>	
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+)	0.1040	0.10414	0.0450
<b>TOTAL</b>	<b>100.0000</b>	<b>100.0000</b>	<b>0.0450</b>

Gross Heating Values (Real, BTU/ft³)			
14.696 PSI @ 60.00 Å°F		14.73 PSI @ 60.00 Å°F	
Dry	Saturated	Dry	Saturated
5.3	6.1	5.3	6.1

Calculated Total Sample Properties	
GPA2145-16 *Calculated at Contract Conditions	
Relative Density Real	Relative Density Ideal
0.9695	0.9696
Molecular Weight	
28.0831	

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

Field H2S 0 PPM
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**PROTREND STATUS:** Passed By Validator on Nov 23, 2022  
**DATA SOURCE:** Imported

**PASSED BY VALIDATOR REASON:** Close enough to be considered reasonable.

**VALIDATOR:** Luis Cano

**VALIDATOR COMMENTS:** ok

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:	Sep 26, 2022

**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  
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**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 161540

**QUESTIONS**

Operator: PRIMAL ENERGY CORPORATION 211 Highland Cross Houston, TX 77073	OGRID: 154303
	Action Number: 161540
	Action Type: [UF-OMA] Post-Plug Methane Monitoring (UF-OMA-MMB)

**QUESTIONS**

<b>Prerequisites</b>	
[OGRID] Well Operator	[154303] PRIMAL ENERGY CORPORATION
[API] Well Name and Number	[30-025-24749] HARRISON #002
Well Status	Reclamation Fund Approved

<b>Monitoring Event Information</b>	
Reason For Filing	Post-Plug Methane Monitoring
Date of monitoring	11/20/2022

<b>Monitoring Event Details</b>	
Flow rate in cubic meters per day (m <sup>3</sup> /day)	0.00
Test duration in hours (hr)	1.0
Average flow temperature in degrees Celsius (°C)	20.0
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

<b>Monitoring Contractor</b>	
Name of monitoring contractor	Well Done Foundation