

1R - 455

REPORTS
(Event 3)

DATE:

6-14-13



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**MOBILE DUAL PHASE EXTRACTION REPORT
VACUUM TO JAL 14 INCH MAINLINE 3 PIPELINE RELEASE
LEA COUNTY, NEW MEXICO**

SRS # 2003-00117

NMOCD# 1R-0455

RECEIVED OGD

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PREPARED FOR:

PLAINS MARKETING, L.P.

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PREPARED BY:

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JUNE 14, 2013

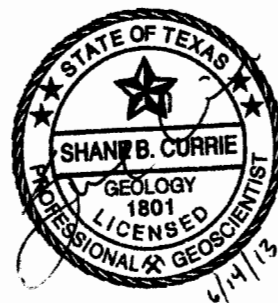


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I. MDPE SUMMARY REPORT AND WASTE DISPOSITION

A. MDPE Results

The following report summarizes data collected during the 12-hour High Vacuum Multi-Phase Extraction (MDPE) event conducted from February 14 - 15, 2013 at the Vacuum to Jal 14 Inch Mainline 3 Pipeline release site, located in Lea County, New Mexico. The objective of the MDPE treatment was to remove both vapor and liquid phase separated hydrocarbons (PSH) from onsite groundwater wells. Talon/LPE utilized an MDPE unit which consisted of an SVE extraction pump capable of generating vacuum up to 25" hg. Off gas vapors extracted from the extraction wells were destroyed using a propane-fired 1000-SCFM thermal oxidizer capable of processing 172.96 lbs/hr of gasoline.

A total of 12 hours (0.5 days) of PSH recovery was performed on RW-1, RW-3, RW-4, & RW-5 for 12 hours.

Prior to and immediately following the event, the groundwater wells were gauged for groundwater elevation and PSH. Depth to groundwater ranges were measured in feet below the top of casing. Refer to Attachment 1 for a summary of data collected during the MDPE event.

The volume of PSH removed during the MDPE event is shown to reflect the portions of PSH in the liquid phase and as off-gas vapor. Air removal rates were calculated from velocity measurements recorded at the influent manifold prior to entry into the MDPE unit. PSH recovery and air flow data has been detailed and is contained in Table 1. Two influent air samples were collected over the course of the event. These samples were submitted for laboratory testing in order to compare the predicted vapor concentrations (based on field-screening or calculated based on fuel consumption) to the actual vapor concentrations. Both influent samples were tested for Total-Gas Analysis (Hydrocarbon Composition) by GPA 2261-C6+. Laboratory analytical results can be found in Attachment 2.

Based on a combination of field vapor screening and collected laboratory samples, a combined estimated total of **61.09 equivalent gallons of hydrocarbons (Total)** were removed during the event. The combined volume of hydrocarbons were comprised of approximately **13 gallons of PSH (liquid phase)** and approximately **48.09 gallons as off-gas vapor**. The calculations used to estimate the off-gas vapor mass recovered reflect the mass of total hydrocarbons recovered and does not necessarily equate to an equal mass of the product released. The mass recovery calculations may be affected by variations in the specific gravity of hydrocarbon released, age of release, activity of aerobic and/or anaerobic processes, and site specific geochemical factors.

The cumulative air flow measurements for the MDPE event were calculated using a combination of field data measurements and Preso® B+ manufacturer provided formulas. **Air flow rates extracted from the recovery wells averaged 207.16 SCFM during the event.**

A portion of the extracted air flow rates measured is attributable to compressed air, which was “injected” into the extraction wells. This “injected” air is introduced into the extraction wells for the purpose of enhancing liquid recovery rates.

B. Air Quality

Two influent air samples were collected during the event. These samples were submitted for laboratory testing in order to compare the predicted vapor concentrations (based on field-screening or calculated based on fuel consumption) to the actual vapor concentrations. The maximum influent concentration was recorded as 60,100 ppmv for Hydrocarbon Composition. Laboratory analytical results can be found in Attachment 2.

C. Waste Management and Disposition

A cumulative total of 1,500 gallons of fluid were generated during this event. The fluids were transferred to an on-site storage tank prior to being hauled to an authorized disposal facility. A copy of the disposal ticket can be found in Attachment 4.

II. SYSTEM OPERATION DATA AND MASS RECOVERY CALCULATIONS

Formulae:

$$\text{Concentration (C_mg/l)} = \frac{\text{C_ppmv} \times \text{Mol. wt. in mg(estimated)} \times 1000 \times 0.000001}{0.0821 \times \text{Temp (K)}}$$

$$\text{Recovery Rate (lbs/hr)} = \frac{(\text{C_mg/l}) \times 2.2 \times (\text{Flowrate}) \times 60 \times 28.32}{1,000,000}$$

$$\text{Recovery (lbs)} = (\text{lbs/hr}) \times (\text{hrs})$$

$$\text{Correction Factor (CF)} = \frac{\text{FID Reading(ppmv)}}{\text{FID Reading at Time of Laboratory Analysis}}$$

$$\frac{8.34 \text{ lbs}}{\text{gallon water}} \times 0.82 \text{ average specific gravity of light crude (estimated)} = \frac{6.84 \text{ lbs light crude}}{\text{gallon}}$$

Table 1
System Operation Data and Mass Recovery Calculations

Time	Period (hours)	Influent Temp. (°F)	Vacuum (in. hg)	Vacuum (in. h2O)	Differential pressure (in. h2O)	Flow (SCFM)	FID Readings (ppm)	Lab Result (ppmv)	Assigned Lab Result (ppmv)	Correction Factor (CF)	Adjusted Lab Result (ppmv)	Adjusted Lab Result (mg/L)	Recovery (lbs/hr)	Recovery in Period (lbs)	Total Recovery (lbs)
13:00	0.5	70	19	258.57	78.6	187.43	50000	-	60100.00	1.08	64728	74.58	52.26	26.13	26.13
13:30	0.5	70	19	258.57	78.1	186.83	46425	60100.00	60100.00	1.00	60100	69.25	46.37	24.18	50.31
14:30	1	71	20.5	278.98	78.2	173.52	26732	-	60100.00	0.58	34606	39.80	25.82	25.82	76.13
15:30	1	73	20.5	278.98	79.6	174.74	10637	-	60100.00	0.23	13770	15.78	10.31	10.31	86.44
16:30	1	73	21	285.79	94.8	185.59	18961	-	60100.00	0.41	24417	27.98	19.41	19.41	105.85
17:30	1	72	19.5	265.38	94.2	200.07	14635	-	60100.00	0.32	18948	21.75	16.27	16.27	122.11
18:30	1	66	17.5	238.16	92.5	217.62	8814	-	60100.00	0.19	11410	13.25	10.78	10.78	132.89
19:30	1	62	17.5	238.16	87	211.85	20566	-	29720.00	1.26	37313	44.40	35.16	35.16	168.05
20:30	1	59	17	231.35	89.2	219.41	18762	-	29720.00	1.15	34040	40.74	33.41	33.41	201.46
21:30	1	56	16	217.74	89	228.12	15365	-	29720.00	0.94	27877	33.56	28.62	28.62	230.08
22:30	1	56	15.5	210.94	92.5	236.69	18892	-	29720.00	1.15	34276	41.26	36.51	36.51	266.59
23:30	1	54	15.5	210.94	90.8	234.96	18381	29720.00	29720.00	1.00	29720	35.92	31.55	31.55	298.13
0:30	1	53	15.5	210.94	91.6	236.23	15882	-	29720.00	0.97	28815	34.89	30.81	30.81	328.94
Averages:		64.23	18.00	244.96	87.39	207.16	21688.62						Total	328.94	

PSH Mass Recovered in Vapor Phase = **46.09** gallons

FID maximum Concentration = 50,000 PPM

Ex: Conversion from ppmv to mg/L (Influent 1)

Measured Conc.	Molecular Wt.	Pressure	Gas Constant	Temp.	Temp.	Conc.
(ppmv)	(Grams)	(atm)	(atm.liters/K.mole)	(F)	(K)	(C_mg/l)
64728	27.6234	1	0.0821	70	294.111111	74.584262

Inputs are the green values.

Calculated values are yellow.

Constants are purple values.

Outputs are the blue values.

Liquid-phase Hydrocarbon Recovery

$V \cdot \rho \cdot t = \text{volume}$

Total Hydrocarbon Recovery

PSH Mass Recovered in Vapor Phase = **328.94** lbs

46.09 gallons

PSH Mass Recovered in Liquid Phase = **86.92** lbs

13.00 gallons

TOTAL = 417.86 lbs
51.09 gallons

Gallons removed determined at time of pick up

PSH Volume in Gallons=

13

PSH Mass in Pounds=

86.92

SG = 0.82

% Vol. (Wt. %) Hydrocarbon to ppmv - Influent 1

Compound	Molecular Weight (g/mol)	Wt. %	=	ppmv
Methane (CH4)	16.04	4.213		42130.00
Ethane (C2H6)	30.07	0.275		2750.00
Propane (C3H8)	44.10	0.166		1660.00
Iso-Butane (C4H10)	58.12	0.1		1000.00
N-Butane (C4H10)	58.12	0.096		960.00
Iso-Pentane (C5H12)	72.15	0.109		1090.00
N-Pentane (C5H12)	72.15	0.099		990.00
Hexane+ (C6H14)	97.40	0.952		9520.00
Total				60100.00

*Hexane+ is treated as 60% hexanes, 30 % heptanes, and 10 % octanes, as such its
(0.6*93.1867)+(0.3*100.2019)+(0.1*114.2285) = 97.3966

Molecular Weight Calculations

component	Molecular Weight (g/mol)	mol%
Nitrogen (N2)	28.016	89.3830
Methane (CH4)	16.0425	7.3040
Carbon Dioxide (CO2)	44.011	2.4960
Ethane (C2H6)	30.069	0.2540
Propane (C3H8)	44.0956	0.1050
Iso-Butane (C4H10)	58.1222	0.0480
N-Butane (C4H10)	58.1222	0.0460
Iso-Pentane (C5H12)	72.1488	0.0420
N-Pentane (C5H12)	72.1488	0.0380
Hexane+	97.3966	0.2840
Total		100
Calculated MW		27.8234

% Vol. (Wt. %) Hydrocarbon to ppmv - Influent 2

Compound	Molecular Weight (g/mol)	Wt. %	=	ppmv
Methane (CH4)	16.04	1.645		16450.00
Ethane (C2H6)	30.07	0.103		1030.00
Propane (C3H8)	44.10	0.064		640.00
Iso-Butane (C4H10)	58.12	0.041		410.00
N-Butane (C4H10)	58.12	0.06		600.00
Iso-Pentane (C5H12)	72.15	0.062		620.00
N-Pentane (C5H12)	72.15	0.067		670.00
Hexane+ (C6H14)	97.40	0.86		8600.00
Total				29720.00

*Hexane+ is treated as 60% hexanes, 30 % heptanes, and 10 % octanes, as such its
(0.6*93.1867)+(0.3*100.2019)+(0.1*114.2285) = 97.3966

Molecular Weight Calculations

component	Molecular Weight (g/mol)	mol%
Nitrogen (N2)	28.016	94.1270
Methane (CH4)	16.0425	2.9010
Carbon Dioxide (CO2)	44.011	2.4440
Ethane (C2H6)	30.069	0.0970
Propane (C3H8)	44.0956	0.0410
Iso-Butane (C4H10)	58.1222	0.0200
N-Butane (C4H10)	58.1222	0.0390
Iso-Pentane (C5H12)	72.1488	0.0360
N-Pentane (C5H12)	72.1488	0.0340
Hexane+	97.3966	0.2610
Total		100
Calculated MW		28.2979

Calculated MW= $\frac{\text{sum (individual component MW x their reported mol\%)}}{100}$

ppmv= % Vol x 10,000

ATTACHMENT 1
MDPE Field Logs

Start Date: 2/14/2013

MDPE FIELD DATA

		Well Flow						Well Data				
TIME	SAMPLE TAKEN *	Inflent temp. (°f)	Diff. Pressure (INH2O) 2" Preso	Vac (In.Hg)	FID Composite (PPM)	Propane Tank (%-size) 500 Gal.	EXHAUST TEMP F	COMMENTS:				
								RW-1	RW-3	RW-4	RW-5	
								VAC (INH2O)	VAC (INH2O)	VAC (INH2O)	VAC (INH2O)	
13:00		70	78.6	19	>50000	50	1416	19.5	5.3	34.1	47.9	
13:30	*	70	78.1	19	46425	49	1415	19.6	5	33.4	48.4	
14:30		71	78.2	20.5	26732	48	1413	19.2	4.9	32.7	9.6	
15:30		73	79.6	20.5	10637	48	1412	13.3	3.2	29.7	12.5	
16:30		73	94.8	21	18861	47	1410	15.1	3.1	28	12.1	
17:30		72	94.2	19.5	14635	45	1409	14.7	3.4	30.8	12.6	
18:30		66	92.5	17.5	8814	44	1405	15.2	2.6	30.9	12.3	
19:30		62	87	17.5	20566	43	1408	15.6	2.4	32	12.4	
20:30		59	89.2	17	18762	42	1414	18.4	2.1	33.8	13	
21:30		56	89	16	15368	40	1407	18.1	2.3	34	12.8	
22:30		56	92.5	15.5	18892	38	1410	16.2	1.8	32.7	12.5	
23:30	*	54	90.8	15.5	16372	35	1408	18.4	2.1	34.2	13	
0:30		53	91.6	15.5	15882	31	1407	17.9	2	33.4	13.2	

Soil Vacuum Influence

Observation Well	RW2
Extraction Well (EW)	RW5
Time:	In. H2O
13:30	0.19
23:30	0.27

ATTACHMENT 2
Laboratory Analytical Results



HOUSTON LABORATORIES
8820 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis

Number: 1030-2013020419-001A

Simon I. Walshe, CAPM
Talon/LPE
921 N. Bivins St.
Amarillo Texas 79107

February 19, 2013

Sample ID:		Sampled By:	LB
Station Name :	Influent #1	Sample Of:	Gas Spot
Station Number :		Sample Date:	02/14/2013 13:30
Station Location :	Amarillo, TX	Sample Conditions:	N.G. Pres. , N.G. Temp.
Sample Point:		PO / Ref. No:	

ANALYTICAL DATA

Components	Mol %	Wt %	GPM at 14.650 psia	Method	Lab Tech.	Date Analyzed
GPA-2261 M DK 2/19/2013 7:10:53 AM						
Nitrogen	89.383	90.040				
Carbon Dioxide	2.496	3.950				
Methane	7.304	4.213				
Ethane	0.254	0.275	0.068			
Propane	0.105	0.166	0.029			
Iso Butane	0.048	0.100	0.016			
n-Butane	0.046	0.096	0.014			
Iso Pentane	0.042	0.109	0.015			
n-Pentane	0.038	0.099	0.014			
Hexanes Plus	0.284	0.952	0.123			
	100.000	100.000	0.279			
	C2 +	C3 +	IC5 +			
GPM TOTAL :	0.279	0.211	0.152			
Relative Density	Real Gas			0.9602		
Calculated Molecular Weight				27.81		
Compressibility Factor				0.9995		
GPA 2172-09 Calculation :						
Calculated Gross BTU per ft ³ @14.650 psia & 60°F						
Real Gas:	Dry BTU:		101			
	Water Sat. Gas_Base BTU:		100			
Comments :	H2O Mol% - 1.75_Wt% - 1.141					

Chris Staley

Hydrocarbon Laboratory Manager

Quality Assurance:

The above analyses are performed in accordance with ASTM, UOP or GPA guidelines for quality assurance, unless otherwise stated



HOUSTON LABORATORIES
8820 INTERCHANGE DRIVE
HOUSTON, TEXAS 77054
PHONE (713) 660-0901

Certificate of Analysis

Number: 1030-2013020419-002A

Simon I. Walshe, CAPM
Talon/LPE
921 N. Bivins St.
Amarillo Texas 79107

February 19, 2013

Sample ID:
Station Name : Influent #2
Station Number :
Station Location : Amarillo, TX
Sample Point:

Sampled By: LB
Sample Of: Gas Spot
Sample Date: 02/14/2013 23:30
Sample Conditions: N.G. Pres. , N.G. Temp.
PO / Ref. No:

ANALYTICAL DATA

Components	Mol %	Wt %	GPM at 14.650 psia	Method	Lab Tech.	Date Analyzed
GPA-2261 M DK 2/19/2013 7:27:57 AM						
Nitrogen	94.127	93.225				
Carbon Dioxide	2.444	3.803				
Methane	2.901	1.645				
Ethane	0.097	0.103	0.026			
Propane	0.041	0.064	0.011			
Iso Butane	0.020	0.041	0.007			
n-Butane	0.039	0.080	0.012			
Iso Pentane	0.036	0.092	0.013			
n-Pentane	0.034	0.087	0.012			
Hexanes Plus	0.261	0.860	0.113			
	100.000	100.000	0.194			
	C2 +	C3 +	ic5 +			
	0.194	0.168	0.138			
GPM TOTAL :						
Relative Density	Real Gas			0.9766		
Calculated Molecular Weight				28.28		
Compressibility Factor				0.9996		
GPA 2172-09 Calculation :						
Calculated Gross BTU per ft ³ @14.650 psia & 60°F						
Real Gas:	Dry BTU:		50			
	Water Sat. Gas_Base BTU:		49			
Comments : H2O Mol% - 1.75_Wt% - 1.122						

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP or GPA guidelines for quality assurance, unless otherwise stated

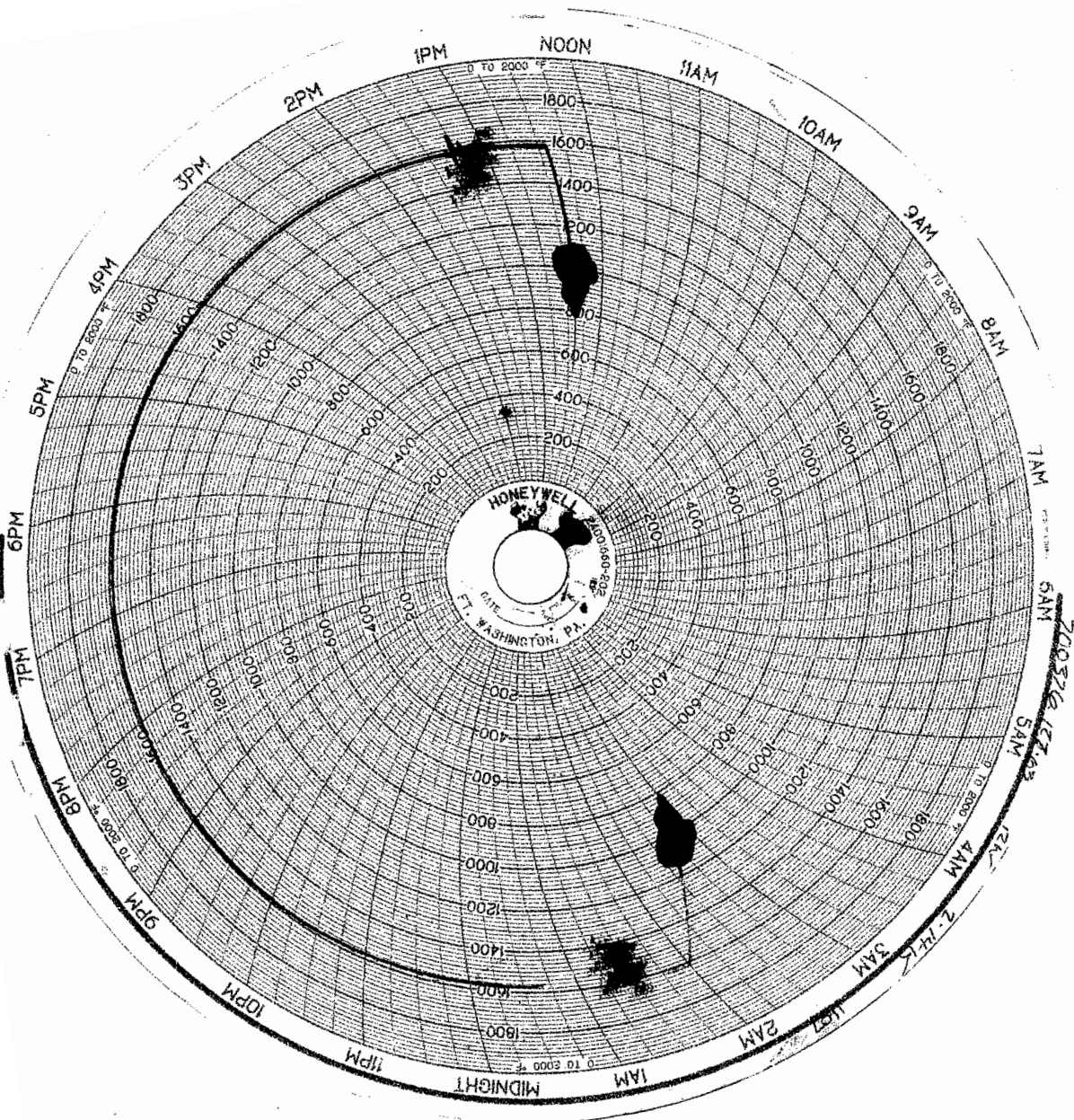
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Note - As a convenience to our clients, this form is available in an electronic format. Please contact one of our offices above for the form to be e-mailed to you.

ATTACHMENT 3

Oxidizer Charts



ATTACHMENT 4
Waste Ticket

**GANDY CORPORATION
SPRINKLE FEDERAL**

No 68488

398-4960 ~ Tatum
396-4948 ~ Lovington

P. O. BOX 2140 • LOVINGTON, NEW MEXICO 88260

Trucking Company: GANDY Date: 2-15-13
Oil Company: PLAINS PIPE LINE Time: AM
Lease: JAL TO VAC # 3 BBLS: 35.71
Driver: RANDY

DRIVER COPY - White

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