

1R - 455

REPORTS
(Event 4)

DATE:

6-5-13



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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

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PLAINS MARKETING, L.P.
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JUNE 5, 2013

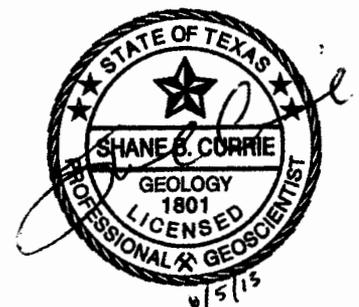


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I. MDPE SUMMARY REPORT AND WASTE DISPOSITION

A. MDPE Results

The following report summarizes data collected during the 12-hour High Vacuum Multi-Phase Extraction (MDPE) event conducted from April 23 - 24, 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. 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 **121.38 equivalent gallons of hydrocarbons (Total)** were removed during the event. The combined volume of hydrocarbons were comprised of approximately **96 gallons of PSH (liquid phase)** and approximately **25.38 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 271.45 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 17,120 ppmv for Hydrocarbon Composition. Laboratory analytical results can be found in Attachment 2.

C. Waste Management and Disposition

A cumulative total of 1,621 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)
20:30	0.5	58	13.5	183.72	106.1	269.94	50000	-	17120.00	1.22	20931	25.80	26.03	13.02	13.02
21:00	0.5	56	13.5	183.72	105.4	269.57	40697	17120.00	17120.00	1.00	17120	21.18	21.35	10.67	23.69
22:00	1	56	13	176.92	104.3	272.20	36721	-	17120.00	0.90	15372	19.02	19.35	19.35	43.04
23:00	1	54	13	176.92	101	268.38	29312	-	17120.00	0.72	12270	15.24	15.29	15.29	58.33
0:00	1	50	12.5	170.11	89.4	257.19	23555	-	17120.00	0.62	10698	13.39	12.88	12.88	71.21
1:00	1	50	12.5	170.11	81.5	245.57	19911	-	17120.00	0.49	8335	10.43	9.58	9.58	80.79
2:00	1	48	12.5	170.11	77.3	238.63	1178	-	17120.00	0.03	493	0.62	0.58	0.56	81.34
3:00	1	46	12	163.31	85.6	256.25	12511	-	7020.00	2.76	19358	23.90	22.90	22.90	104.24
4:00	1	48	11.5	156.50	91.7	268.36	10963	-	7020.00	2.42	16963	20.86	20.93	20.93	125.16
5:00	1	48	11	149.70	99.6	283.45	8174	-	7020.00	1.80	12647	15.55	16.48	16.48	141.64
6:00	1	50	11	149.70	110.1	297.43	6218	-	7020.00	1.37	9621	11.79	13.10	13.10	154.75
7:00	1	50	11	149.70	113.4	301.85	4537	7020.00	7020.00	1.00	7020	8.60	9.70	9.70	164.45
8:00	1	50	11	149.70	111.3	299.04	4319	-	7020.00	0.95	6683	8.19	9.15	9.15	173.60
Averages:		51.08	12.15	165.40	98.21	271.45	19253.54						Total	173.60	

PSH Mass Recovered in Vapor Phase = 25.38 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.liter/K.mole)	(F)	(K)	(C_mg/l)
20931	29.0857	1	0.0821	58	287.4444444	25.79899347

Inputs are the green values.

Calculated values are yellow.

Constants are purple values.

Output are the blue values.

Liquid-phase Hydrocarbon Recovery

□ * r2 * h = volume

Total Hydrocarbon Recovery

PSH Mass Recovered in Vapor Phase = 173.60 lbs

PSH Mass Recovered in Liquid Phase = 25.38 gallons

656.64 lbs

96.00 gallons

TOTAL = 830.24 lbs

121.38 gallons

Gallons removed determined at time of pick up

PSH Volume in Gallons= 96

PSH Mass in Pounds= 656.64

% Vol. Hydrocarbon to ppmv - Influent 1				
Compound	Molecular Weight (g/mol)	% Vol	=	ppmv
Methane (CH4)	16.04	0		0.00
Ethane (C2H6)	30.07	0		0.00
Propane (C3H8)	44.10	0.023		230.00
Iso-Butane (C4H10)	58.12	0.036		360.00
N-Butane (C4H10)	58.12	0.13		1300.00
Iso-Pentane (C4H12)	72.15	0.201		2010.00
N-Pentane (C5H12)	72.15	0.181		1810.00
Hexane+ (C6H14)	97.40	1.141		11410.00
Total				17120.00

*Hexane+ is treated as 60% hexanes, 30 % heptanes, and 10 % octanes, as such its (0.6*93.1887)+(0.3*100.2019)+(0.1*114.2285) = 97.3966

Molecular Weight Calculations		
component	Molecular Weight (g/mol)	mol%
Nitrogen (N2)	28.016	94.8450
Methane (CH4)	16.0425	0.0000
Carbon Dioxide (CO2)	44.011	4.5470
Ethane (C2H6)	30.069	0.0000
Propane (C3H8)	44.0956	0.0150
Iso-Butane (C4H10)	58.1222	0.0180
N-Butane (C4H10)	58.1222	0.0650
Iso-Pentane (C4H12)	72.1488	0.0810
N-Pentane (C5H12)	72.1488	0.0730
Hexane+	97.3966	0.3560
Total		100
Calculated MW		29.0857

% Vol. Hydrocarbon to ppmv - Influent 2				
Compound	Molecular Weight (g/mol)	% Vol	=	ppmv
Methane (CH4)	16.04	0		0.00
Ethane (C2H6)	30.07	0		0.00
Propane (C3H8)	44.10	0.008		60.00
Iso-Butane (C4H10)	58.12	0.01		100.00
N-Butane (C4H10)	58.12	0.035		350.00
Iso-Pentane (C4H12)	72.15	0.058		580.00
N-Pentane (C5H12)	72.15	0.058		580.00
Hexane+ (C6H14)	97.40	0.537		5370.00
Total				7020.00

*Hexane+ is treated as 60% hexanes, 30 % heptanes, and 10 % octanes, as such its (0.6*93.1887)+(0.3*100.2019)+(0.1*114.2285) = 97.3966

Molecular Weight Calculations		
component	Molecular Weight (g/mol)	mol%
Nitrogen (N2)	28.016	97.8610
Methane (CH4)	16.0425	0.0000
Carbon Dioxide (CO2)	44.011	1.9040
Ethane (C2H6)	30.069	0.0000
Propane (C3H8)	44.0956	0.0040
Iso-Butane (C4H10)	58.1222	0.0050
N-Butane (C4H10)	58.1222	0.0170
Iso-Pentane (C4H12)	72.1488	0.0220
N-Pentane (C5H12)	72.1488	0.0230
Hexane+	97.3966	0.1640
Total		100
Calculated MW		28.4615

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

ppmv= % Vol x 10,000

Vacuum to Jal 14 Inch Mainline 3 – 700376.128.04 - SRS# 2003-00117 – Event 4 – 12 Hour

ATTACHMENT 1
MDPE Field Logs

Start Date: 4/23/2013

MDPE FIELD DATA

TIME	SAMPLE TAKEN	Well Flow			FID Composite (PPM)	Propane Tank (%-size) 500 Gal.	EXHAUST TEMP F	Well Data				
		Inflent temp. (°f)	Diff. Pressure (INH2O) 2" Preso	Vac (In.Hg)				COMMENTS:				
								RW-1 VAC (INH2O)	RW-3 VAC (INH2O)	RW-4 VAC (INH2O)	RW-5 VAC (INH2O)	VAC (INH2O)
20:30		58	106.1	13.5	>50000	85	1412	10.3	24.1	23.6	26.7	
21:00	*	56	105.4	13.5	40897	82	1409	12	26.6	24.2	29.5	
22:00		56	104.3	13	36721	79	1415	8.6	25.3	22.3	27.3	
23:00		54	101	13	29312	76	1412	9.7	24.6	20.4	24.1	
0:00		50	89.4	12.5	25555	74	1411	10.5	23.5	18.8	21.8	
1:00		50	81.5	12.5	19911	72	1413	9.6	21.7	16	22.3	
2:00		48	77.3	12.5	1178	70	1409	9	19.8	13.9	22.7	
3:00		46	85.6	12	12511	68	1413	11.5	18.5	15.9	20.6	
4:00		48	91.7	11.5	10963	66	1411	13.6	17.1	18.7	19.3	
5:00		48	99.6	11	8174	64	1408	18.7	16.9	20	16.5	
6:00		50	110.1	11	6218	62	1410	20.4	15.7	21.6	14.9	
7:00	*	50	113.4	11	4537	60	1413	21.6	14.3	23.7	13.4	
8:00		50	111.3	11	4319	58	1411	21.9	13.8	24.1	12.9	

Soil Vacuum Influence

Observation Well	MW-1
Extraction Well (EW)	RW-1
Time:	In. H2O
21:00	0
7:00	0

Vacuum to Jal 14 Inch Mainline 3 – 700376.128.04 - SRS# 2003-00117 – Event 4 – 12 Hour

ATTACHMENT 2
Laboratory Analytical Results



HOUSTON LABORATORIES
 5720 INTERCHANGE DRIVE
 HOUSTON, TEXAS 77054
 PHONE (713) 960-0201

Certificate of Analysis

Number: 1030-2013040736-001A

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

May 03, 2013

Sample ID:		Sampled By:	LB
Station Name :	Influent #1	Sample Of:	Gas Spot
Station Number :	700376.128.04	Sample Date:	04/23/2013 21:00
Station Location :	Eunice, NM.	Sample Conditions:	N.G. Pres. , N.G. Temp.
Sample Point:	Vac to Jal 14" #3	PO / Ref. No:	

ANALYTICAL DATA

Components	Mol %	Wt %	GPM at 14.650 psia	Method	Lab Tech.	Date Analyzed
				GPA-2261 M	JD	5/2/2013 10:04:15 AM
Nitrogen	94.845	91.404				
Carbon Dioxide	4.547	6.884				
Propane	0.015	0.023	0.004			
Iso Butane	0.018	0.036	0.006			
n-Butane	0.065	0.130	0.020			
Iso Pentane	0.081	0.201	0.029			
n-Pentane	0.073	0.181	0.026			
Hexanes Plus	0.356	1.141	0.154			
	100.000	100.000	0.239			
	C2 +	C3 +	iC5 +			
GPM TOTAL :	0.239	0.239	0.209			
Relative Density	Real Gas			1.0036		
Calculated Molecular Weight				29.07		
Compressibility Factor				0.9996		
GPA 2172-09 Calculation :						
Calculated Gross BTU per ft³ @14.650 psia & 60°F						
Real Gas:	Dry BTU:		27			
	Water Sat. Gas_Base BTU:		27			
Comments :	H2O Mol% - 1.75_Wt% - 1.092					

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 LABORATORY
 4000 INTERCOMMERCE BLVD
 HOUSTON, TEXAS 77061
 PHONE 281-280-4242

Certificate of Analysis

Number: 1030-2013040736-002A

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

May 03, 2013

Sample ID:		Sampled By:	LB
Station Name :	Influent #2	Sample Of:	Gas Spot
Station Number :	700376.128.04	Sample Date:	04/24/2013 07:00
Station Location :	Eunice, NM.	Sample Conditions:	N.G. Pres. , N.G. Temp.
Sample Point:	Vac to Jal 14" #3	PO / Ref. No:	

ANALYTICAL DATA

Components	Mol %	Wt %	GPM at 14.650 psia	Method	Lab Tech.	Date Analyzed
				GPA-2261 M	JD	5/2/2013 10:23:54 AM
Nitrogen	97.861	96.353				
Carbon Dioxide	1.904	2.945				
Propane	0.004	0.006	0.001			
Iso Butane	0.005	0.010	0.002			
n-Butane	0.017	0.035	0.005			
Iso Pentane	0.022	0.056	0.008			
n-Pentane	0.023	0.058	0.008			
Hexanes Plus	0.164	0.537	0.071			
	<u>100.000</u>	<u>100.000</u>	<u>0.095</u>			
GPM TOTAL :	C2 + 0.095	C3 + 0.095	iC5 + 0.087			
Relative Density	Real Gas			0.9822		
Calculated Molecular Weight				28.45		
Compressibility Factor				0.9997		
GPA 2172-09 Calculation :						
Calculated Gross BTU per ft³ @14.650 psia & 60°F						
Real Gas:	Dry BTU:					11
	Water Sat. Gas_Base BTU:					11
Comments :	H2O Mol% - 1.75_Wt% - 1.115					

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

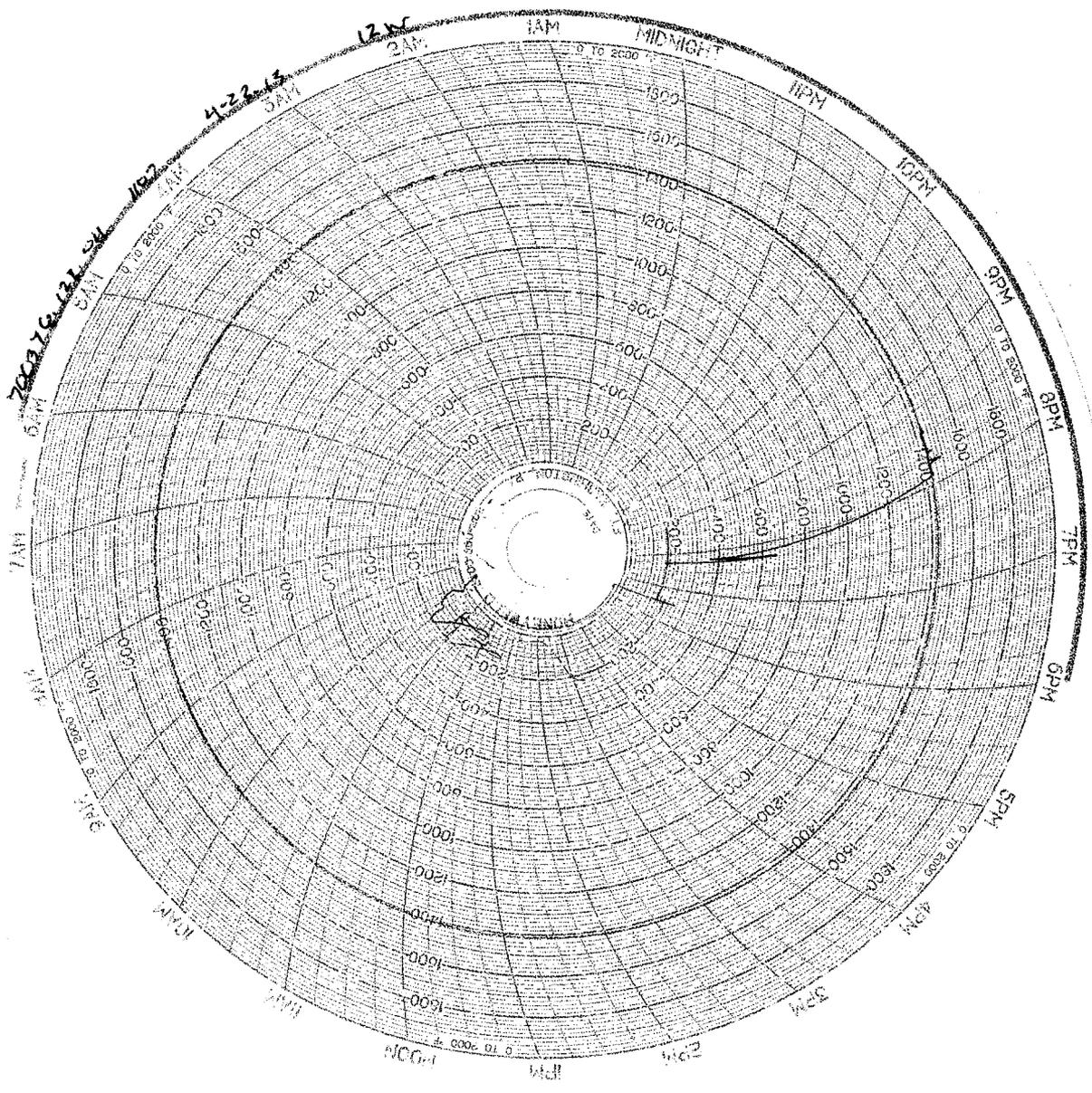
SPL, Inc.
Analysis Request Chain of Custody Record

<i>SPL</i>			SPL Work Order No.:			Acct. Mate Code:			Dept. Code			SPL														
						NEEDS CLIENT CODE						Page <u>1</u> of <u>1</u>														
Report To: (Company Name): Talon/LPE, Ltd.			Project/Station Name:			Project/Station Number:			Project/Station Location:			Requested TAT 10 business days														
Address: 921 N. Bivins St.			Influent Soil Vapor			700376.128.04			Vaco to Jul 14" #3 Eunice, NM																	
City/State/Zip: Amarillo TX 79107			Indicate Billing Type: (Place "X", where appropriate)			Net 30 day Acct.			Check #			* Surcharges May Apply (See quote for details)														
Contact: Simon I. Walshe, CAPM swalshe@talonlpe.com Phone: 806-350-8672 Fax: 806-467-0622						Credit Card			<<<Contact SPL, Inc for CC payment arrangements.																	
Invoice To: (Company Name): Talon/LPE, Ltd.			† Terms: Cylinders will be rented for \$10/cyl. All cylinders checked out are to be returned within 21 days, whether they contain sample or not. Cylinders not returned after 30 days will be considered lost and will be billed at current replacement cost.			Requested Analysis (Place an "X" next to Sample ID below)																				
Address: 921 N. Bivins St.																										
City/State/Zip: Amarillo TX 79107																										
Contact: Talon - Accounts Payable acctpayables@talonlpe.com Phone: 806-467-0607 Fax: 806-372-6603																										
Client PO# or Ref. No.: N/A																										
Contract/Proposal #: (i.e. SPLQ###) SPLQ5270																										
Sample ID (used to log/track sample)			Sample Date			Sample Time			Sample Type (Gas/Liq./Solid)			Duplicate			Composite			Spot			Cylinder Tracking Info*			Comments		
Influent #1			4-27-13			2100			GAS																	
Influent #2			4-24-13			0760			"																	
Sampled By-Print Name: <u>L. Bridger</u>			Signature: <u>[Signature]</u>			Received By-Company:																				
Relinquished By-Print Name: <u>L. Bridger</u>			Signature: <u>[Signature]</u>			Date: <u>4-28-13</u>			Time:			Received By-Print Name: <u>[Signature]</u>			Signature: <u>[Signature]</u>			Date: <u>4/26/13</u>			Time:					
Relinquished By-Print Name:			Signature:			Date:			Time:			Received By-Print Name:			Signature:			Date:			Time:					
Relinquished By-Print Name:			Signature:			Date:			Time:			Received By-Print Name:			Signature:			Date:			Time:					

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Vacuum to Jal 14 Inch Mainline 3 – 700376.128.04 - SRS# 2003-00117 – Event 4 – 12 Hour

ATTACHMENT 3
Oxidizer Charts



Vacuum to Jal 14 Inch Mainline 3 – 700376.128.04 - SRS# 2003-00117 – Event 4 – 12 Hour

ATTACHMENT 4

Waste Ticket

