

October 5, 2024

Client's Name Company Address 1 Address 2 City, State, Zip 500 Northpoint Pkwy SE Acworth, GA 30102 www.fruits-us.com (866) 974-6999 (770) 974-6999

Subject: 24.0 Hour High-Vacuum Remediation Event A Typical Service Station 12345 Main Street Somewhere in, GA Fruits Project: GA24-XXXXX

Dear Client's Name:

Fruits & Associates, Inc. is pleased to provide this summary of the High-Vacuum Remediation event that was conducted on July 9th, 2024 at the above referenced facility. Below is a summary of both the technology as well as the results of the actual event.

Technology:

High-Vacuum Remediation (HVR) involves the extraction of subsurface vapors and liquids via a monitoring well or recovery well. This is accomplished by applying high levels of vacuum pressure to the extraction point. To eliminate mounding of the water table, a drop tube (commonly known as a stinger) is inserted in the well to the static water level depth. The applied vacuum and airflow extracted from the well is pulled through this drop tube. As the water table attempts to mound due to the application of vacuum, the liquids are "slurped" through this drop tube. This slurping effectively maintains the static conditions of the water table while the elevated vacuum is applied to the well during the event. In order to minimize any change to the current smear zone associated with the site, seasonal water level data is analyzed. Once the extraction process is underway, the inlet of the stinger assembly is slowly lowered to the maximum historical water level observed for each extraction well. This draw down (one to ten feet below the static water level) depresses the water table and creates a cone of influence, which maximizes the efficiency of the high vacuum process.

Occasionally, fresh air (5 to 25 CFM) is introduced at the well surface to increase the airflow and enhance the liquid removal rate. In order to accurately record the actual removal rate from the well, an airflow gauge is mounted on the well head to measure the amount of fresh air that is introduced. This extra fresh air is subtracted from the total flow calculated for each extraction well. Additionally, two vacuum gauges are installed; one on the stinger assembly (well head vacuum), and one on the well casing (influence vacuum). If fresh air is introduced at the well head, the influence vacuum reading will be artificially lower than the actual applied vacuum because the inlet for fresh air is adjacent to this vacuum gauge port. The setup and piping configurations are shown in Figure #1.

During the extraction process, the combined air and liquids are transferred to the mobile treatment system where the liquids are separated with a liquid scrubber / knockout system and discharged into a storage tank for future disposal. The hydrocarbon vapors are transferred to the off-gas treatment system and are incinerated in a forced air Thermal Oxidation (ThOx) unit at 1500 degrees Fahrenheit. After thorough destruction of the contaminants in the air stream, the clean air is discharged into the atmosphere. A complete flow diagram of this process is shown in Figure #2.

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Calculations:

During the HVR event, two measurements are taken, of both the influent and effluent flow rates, the concentrations of the vapors removed (before off-gas treatment), and the off-gas treatment system concentrations. These measurements are used to calculate the removal rates and the off-gas emission rates. The flow rates were measured using a Dwyer DS-300 Pitot tube attached to a differential pressure gauge. These flow rate measurements are reported in Actual Cubic Feet per Minute (ACFM). Before each event, these flow assemblies are calibrated to insure an accurate flow measurement. A separate flow rate is calculated for each influent well (if more than one well is connected), as well as for any additional fresh air that is introduced into the influent stream. The individual flow rates are combined to achieve the total flow and velocity derived from the extraction points. Because of the extremely high concentrations involved with a High Vacuum event, additional quench air (0 to 2,000 SCFM) is added to the vapor stream, just before entering the ThOx unit. An additional Pitot tube assembly is installed at the inlet of the ThOx unit and is used to measure the total flow. Combined with the off-gas concentration readings, this total flow rate is used to calculate the destruction efficiency of the system.

The concentration measurements are taken using a TVA-1000A FID instrument calibrated to methane. For comparison purposes, the removal rates are calculated in total carbon, as well as total hydrocarbons. This FID instrument has a dynamic range of 0-50,000 PPM as methane, 0-100,000 PPM as hydrocarbon. Our concentration samples are collected before any additional bleed or quench air is added to the extracted flow rate. These undiluted concentration measurements exceed the dynamic range of any FID instrument. In order to accurately record the high concentrations observed during a HVR event, a calibrated 10:1 dilution valve is used to cut the sample. This dilution valve, along with the FID instrument, is calibrated before the start of each event.

In order to eliminate the naturally occurring methane that is present during a typical HVR event, each concentration sample is measured twice. The first sample is collected directly from the system, and recorded as the total VOC concentration. The second sample is collected using an in-line activated carbon filter, which adsorbs the hydrocarbon compounds leaving only methane present in the sample to be measured. This methane only result is then subtracted from the total VOC concentration measurement (first sample), resulting in a Non-Methane Organic Compound (NMOC) concentration. This NMOC concentration is used in the mass removal calculations. However, as with any FID instrument, the NMOC results are recorded as parts per million by volume (PPM_v) as if the concentrations were methane. A conversion from methane to a hydrocarbon and from a volume to a weight is necessary to calculate an accurate mass removal rate. Using the NMOC concentration results and the TVA-1000's factory certified response ratio for hydrocarbons, the NMOC results are converted to equivalent hydrocarbon mg/Ls. A TVA-1000 FID has an average response ratio of 600 PPM_v per mg/L of unleaded gasoline and 200 PPM_v per mg/L of diesel. Summaries of these calculations are shown in Figure #3.

Results:

Phase Separated Hydrocarbon (PSH) was detected in monitoring wells MW-2 (0.50 feet), MW-3 (0.02 feet) and MW-7 (0.31 feet) prior to performing the event (well locations are shown in Figure #4). Once static water levels were established, the system was connected to MW-7, MW-3 and MW-2. At each of the extraction points a stinger was located at the static fluid levels, and once the ThOx unit's normal operating temperature was reached, the inlet flow valve was opened for these wells. Once the PSH was removed from the extraction wells, the stinger assemblies were lowered into the static fluid level approximately 3 feet, creating a cone of influence.

During the 24.0 Hour HVR event, the average ACFM was calculated at 39.91 for MW-7, with an additional 5.00 ACFM recorded at the fresh air breather port. The fresh air breather port is used during an event to enhance the volatilization and fluid recovery rates from the monitoring wells. Additionally, 46.77 ACFM was calculated for MW-3 with 5.00 ACFM recorded at the fresh air breather port and 34.35 ACFM was calculated for MW-2 with 5.00 ACFM recorded at the fresh air breather port. A summary of the recovered flow rates are shown in Figure # 5. The combined total airflow from the extraction wells and breather ports averaged 136.03 ACFM.

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Throughout the event, air concentration measurements were recorded periodically from both the influent and effluent sample ports. The concentration results were entered into the HVR field monitoring log (Attachment A) and during the event, 182.34 pounds of carbon was removed (916.58 pounds of hydrocarbon, 148.79 equivalent gallons of gasoline). Additionally, 12.62 pounds of methane was removed and incinerated during the event. A summary of the total equivalent hydrocarbon recovery rate is shown in Figure #6. The total off-gas discharge (to the atmosphere) was 0.02953 pounds of carbon (0.09854 pounds of hydrocarbon), thus yielding a 99.99% destruction rate for the ThOx unit. Induced vacuum readings (in inches of water column) were recorded in this event (See Attachment A for results).

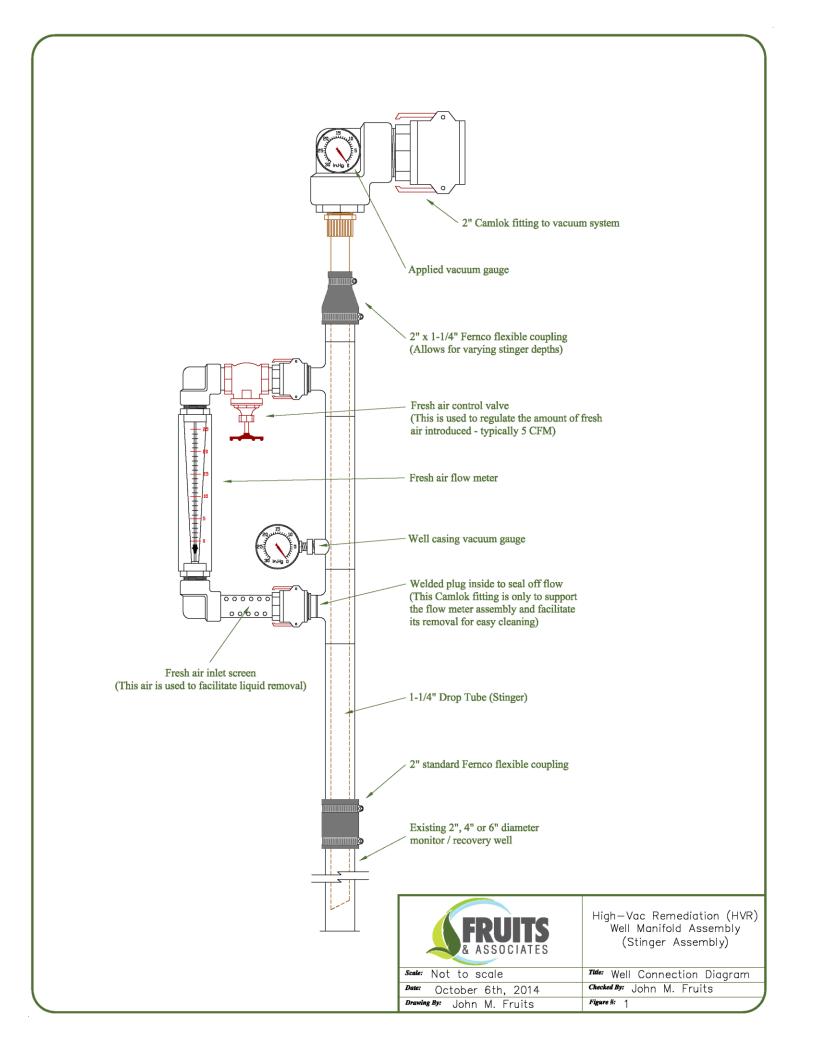
Once the HVR event was complete, a second round of water level measurements was recorded in which the results are shown in Attachment A. After the event, there were no levels of PSH recorded in any of the associated monitoring wells. During the event, 3,300 gallons of petroleum contacted water (PCW) was removed and collected in a holding tank on the system and later disposed of at Shamrock Environmental (Formerly: Aqua Terra Recycling) located in Oxford, Georgia. Fruits and Associates, Inc. provided transportation of the PCW. Copies of the manifested waste transportation and disposal tickets are included in Attachment B.

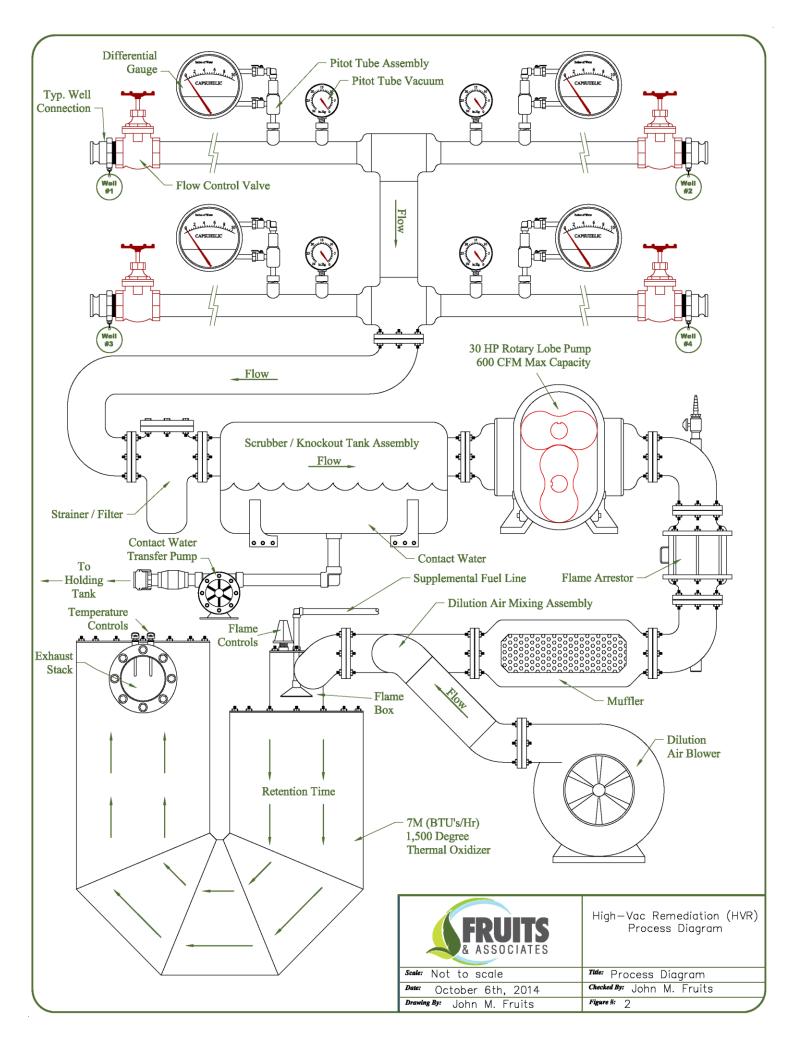
Sincerely,

Fruits & Associates, Inc.

John M. Fruits







Calculation of Hydrocarbon Loading Rate

Formula:

$$\dot{m} = Q \times C \times CF$$

Where:

m = Contaminant Loading Rate (lbs/hr)

Q = Air Flow Rate (CFM)

C = Contaminant Concentration (mg/m³)

CF = Conversion Factor =
$$0.000003743 = \frac{1 m^3}{35.31 ft^3} \times \frac{1 lb}{454 \times 10^3 mg} \times \frac{60 min}{1 hr}$$

Since all field measurements are in PPM_V, the following formula is used to convert to mg/m³.

$$\mathbf{C} = \frac{PPM_{V}}{R} \mathbf{X} \frac{1,000 L}{1m^3}$$

Where:

R = TVA Response Ratio*

*According to the manufacture's documentation, *The Foxboro Monitor, Volume 3, Issue 1A, Page 5, Response Ratio of Fuel Samples,* the Foxboro TVA-1000 has a response ratio of approximately 600 PPM_V for Gasoline, 200 PPM_V for Diesel Fuel.

Example:

Q = Air Flow Rate = 200 CFM

 $C = TVA-1000 Reading = 20,400 PPM_v$

 \mathbf{R} = Response Ratio for Gasoline = 600

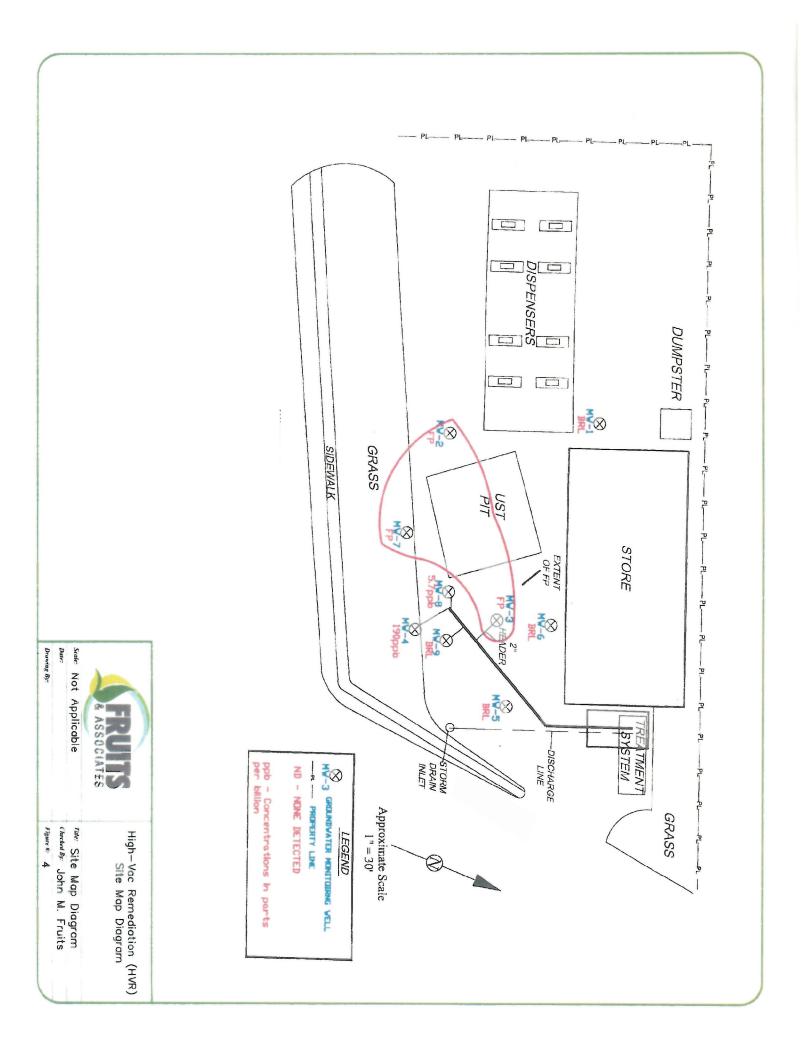
Results:

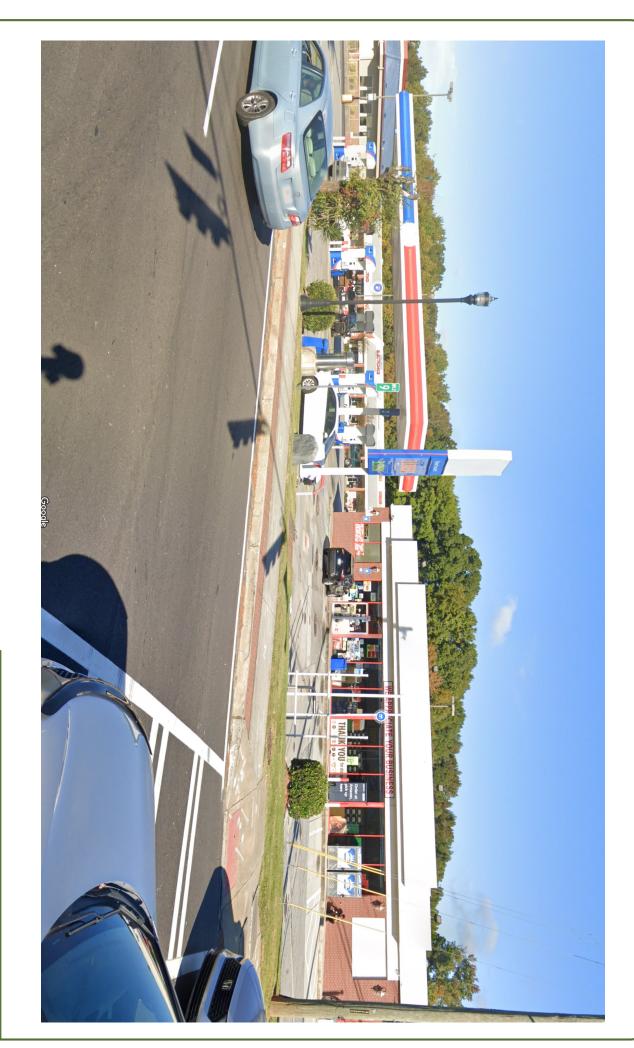
ts:
25.45 lbs/hr = 200 x (
$$\frac{20,400}{600}$$
 x 1,000) x 0.000003743
 \dot{m} CF

Note:

To convert *lbs* to equivalent gallons, the following formula is used: Specific Gravity (Gasoline = 0.74, Diesel = 0.84) x Conversion Factor (8.333) = *lbs/gal*. (Gasoline = 6.16 *lbs/gal*. Diesel = 6.99 *lbs/gal*.)

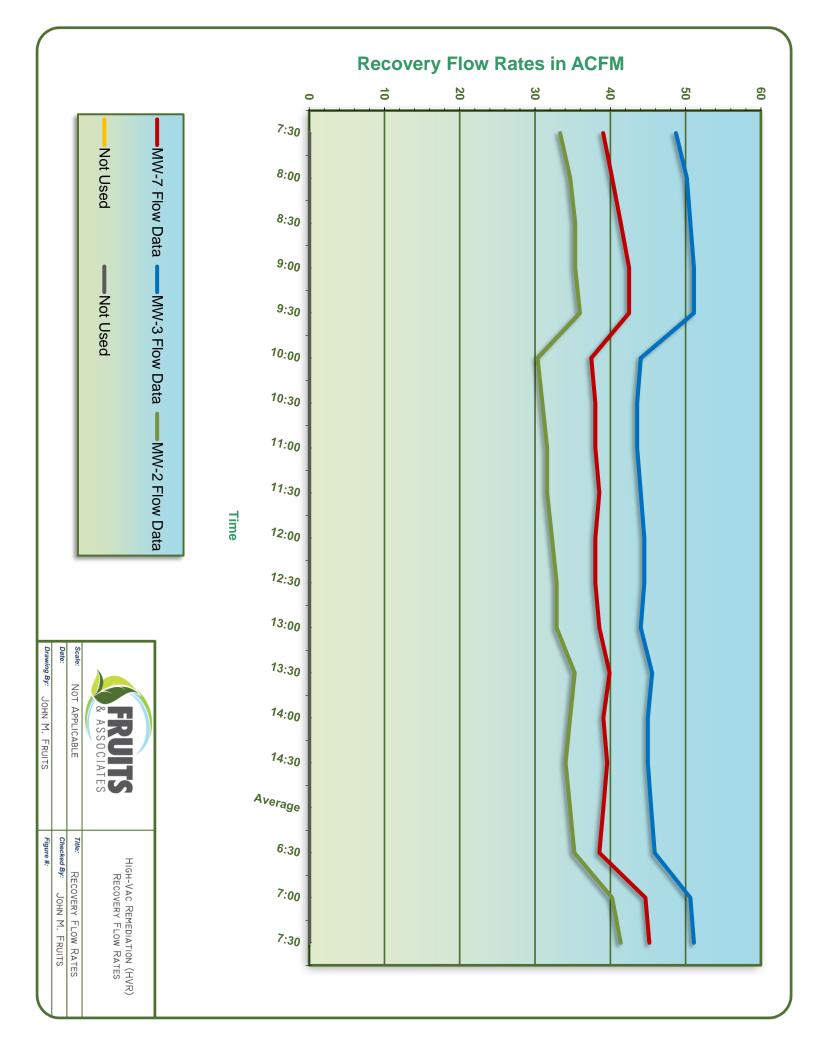
FRUITS & ASSOCIATES	High—Vac Remediation (HVR) Process Diagram
Scale: Not to scale	Title: Concentration Calculations
Date: October 6th, 2014	Checked By: John M. Fruits
Drawing By: John M. Fruits	Figure #: 3

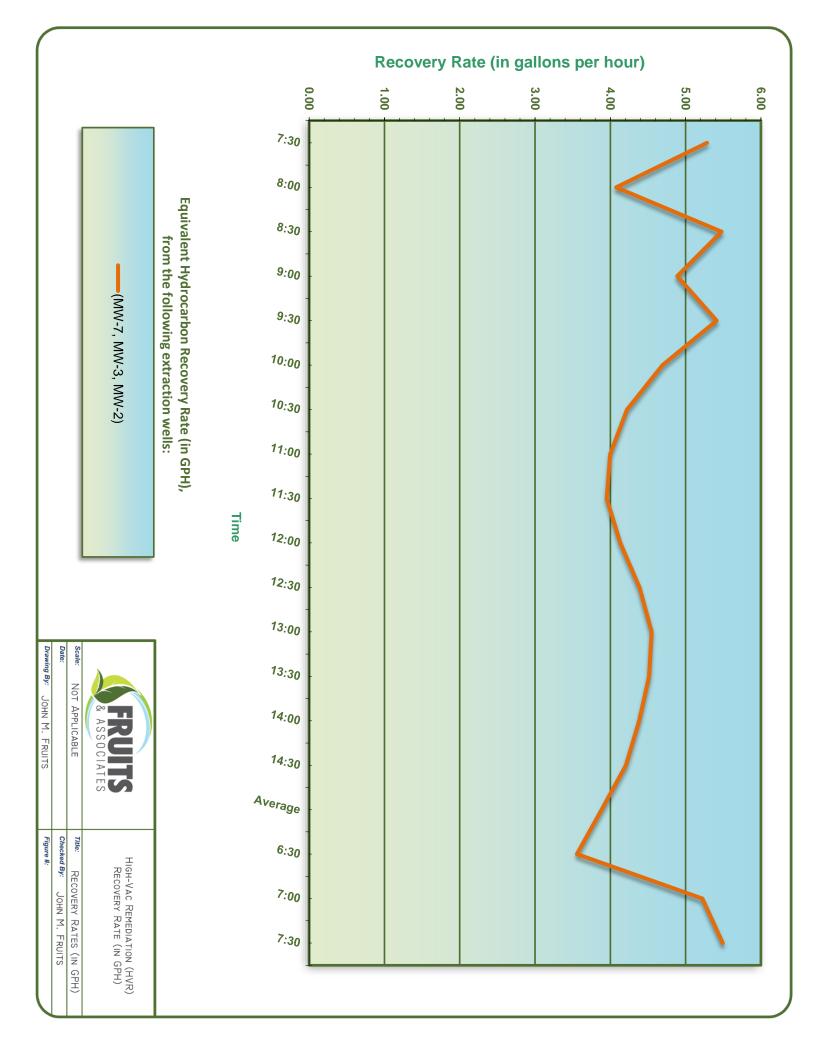






High-Vac Remediation (HVR) Site Map Diagram







HVR FIELD MONITORING LOG

r winy ion.		
Facility ID#: Personnel on Site: Rilly (Facility Name: Facility	e: July 9, 2024

500 Northpoint Parkway, SE Acworth, GA 30102

										_																	_		_	_	_	_	-
Average:												116.7	115.1	102.9	102.5	102.1	102.2	103.7	99.7	99.7	99.2	8.86	97.5	97.0	110.5	110.0	108.8	107.1	104.0		Ft/sec.	Velocity	Iotal
136.0												152.7	150.5	134.7	134.2	133.6	133.7	135.7	130.4	130.4	129.8	129.2	127.6	126.8	144.6	143.9	142.3	140.1	136.1		(ACFM)	Flow	Iotal
131.0												147.5	145.5	130.1	1292	128.2	128.2	130.2	125.4	125.3	124.7	1242	122.8	122.3	139.4	139.3	137.8	135.6	130.8		(DSCFM)	Flow	LOIGI
79.7												78.0	78.0	78.0	80.0	82.0	82.0	82.0	81.0	81.0	81.0	81.0	80.0	79.0	79.0	77.0	77.0	77.0	81.0		(F ⁰)	Flow	
36300.0												37,900	36,700	28,100	31,000	33,900	35,400	36,100	37,800	36,700	34,900	33 700	36,700	40,900	41,700	37,900	42,400	33,500	39,900		(PPMv)	Influent FID Result	
2231.1												1,130	1,250	1,110	1,300	1,490	1,650	1,860	1,970	2,110	2.180	2 2 70	2,750	3,010	3,370	3,250	3,140	3,810			(PPMv)	(CH ₄)	
Total I												36,770	35,450	26,990	29,700	32,410	33,750	34,240	35,830	34,590	32.720	31 430	33,950	37,890	38,330	34,650	39,260	29,690	39,900		(PP		
Total Removed:		İ									H	61,283	59,083	44,983	49,500	54,017	56,250	57,067	59,717	57,650	54.533	52 383	56,583	63,150	63,883	57,750	65,433	49,483	66,500		Mv) (mg/m3)	Compounds (Hydrocarbon)	
12.622												0.204	0.223	0.177	6.381	0.234	0.259	0.297	0.303	0.324	0.333	0.346	0.414	0.451	0.576	0.555	0.530	0.633			(lbs.)	Methane	
2 182.34		t					rails out	collected	Gallons of			5.07	4.82	3.28	111.13	3.88	4.04			-	-	+	3.90	+	4.99	4.51		H	0.00		(lbs.)		
916.58							rank dum Bum aken	collected in the holding	Gallons of Free Product	308.00		16.92	16.08	10.95	370.90	12.96	13.50	13.90	14.01	13.52	12.73	12 17	13.00	14.46	16.67	15.06	16.87	12.56	0.00		П		
148.795							Ļ	⊋ ₂	TCT TCT	50.000		2.747	2.611	1.778	60.211	2.103	2.191	2.257	2.274	2.194	2,066	1 976	2.111	2.347	2.706	2.445	2.739	2.039	0.000		Gal	Hydrocarbon Removed	
Average												1375.0	1379.0	1298.0	1335.0	1372.0	1370.0	1371.0	1369.0	1365.0	1372.0	1389.0	1429.0	1474.0	1521.0	1518.0	1577.0	1397.0	1239.0		(F°)	of Stack Gas	
Average / Totals:												2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	200	2.00	2.00	2.00	2.00	2.00	2.00	2.00		(PPMv)	Effluent FID Results	
329.11												329.11	329.11	329.11	329.11	329.11	329.11	329.11	329.11	329.11	329.11	329 11	329.11	329.11	329.11	329.11	329.11	329.11	329.11		(SCFM)	-	
3.300												3,300		3,100		1,150		1,000		850		700	550		400		175				(Gallons)		
0.02953												0.0006	0.0006	0.0006	0.0191	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0006	0.0000		(bs.)		
0.09854												0.0021	0.0021	0.0021	0.0636	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0000		(lbs.)	Hydrocarbon Rate	
99.99%												99.99%	99.99%	99.98%	99.98%	99.98%	99.98%	99.99%	99.99%	99.98%	99.98%	99 98%	99.98%	99.99%	99.99%	99.99%	99.99%	99.98%	99.99%		%	Efficiency Rating	

01:00 PM 01:30 PM

14.0" 30.00 30.00

30.00

39.9

38.5

30.0 12.0" 44.5 30.0 12.0" 44.5 30.0 12.0" 44.0 30.0 12.0" 45.6

31.0

32.9

32.2

15.0 15.0 15.0 15.0

15.0 15.0 15.0 15.0

31.0 12.0" 12.0" 12.0" 12.0" 12.0"

12.0"

34.1 34.7 35.2 40.2 34.7

15.0 15.0 15.0 15.0

15.0

30.00

30.0

12:00 PM 11:30 AM 11:00 AM

30 min. 14.0" 29.00

12.0" 38.5

30.00 28.00

07:30 AM 06:30 AM 02:30 PM 02:00 PM

30.00

14.0"

30 min. 30 min. 30 min.

30 min.

30 min. 30 min. 30 min. 30 min. 30 min. 30 min. 30 min. 30 min. 30 min. 30 min.

09:30 AM 10:00 AM 10:30 AM

09:00 AM

Time Lobe Vacuum (in/Hg)

Stinger Depth (ft)

Well Vacuum (in/Hg)

Flow Rate (ACFM)

Stinger Depth (ft)

Well Vacuum (in/Hg)

Rate (ACFM)

Stinger Well
Depth Vacuum
(ft) (in/Hg)

Rate (ACFM)

Stinger Depth (ft)

Flow Rate (ACFM) Stinger Depth (ff)

Flow Rate (ACFM

Addl. Bleed Air (ACFM

Extraction Point(s) Data:

30 min. 16.0* 27.00 14.0" 42.5

27.0 14.0" 51.1

28.0 14.0" 35.3

28.0 14.0" 33.3 28.0 14.0" 34.7 28.0 14.0" 35.3

27.00 27.00

14.0" 12.0" 12.0"

42.5 37.5 38.0 38.0

 25
 27.0
 14.0°
 51.1
 28.0
 14.0°
 36.0

 36
 27.0
 12.0°
 40.2
 28.0
 12.0°
 30.3

 30
 27.0
 12.0°
 43.6
 28.0
 12.0°
 30.3

 30
 28.0
 12.0°
 43.6
 28.0
 12.0°
 31.6

 30
 28.0
 12.0°
 43.6
 29.0
 12.0°
 31.6

 35
 29.0
 12.0°
 44.0
 30.0
 12.0°
 31.6

Well Before	B	Before Event	nt		Vacuum Readings at:		During Event		After Event	nt	Drawdown	
Number	DTP	DTW	DTW Prod.(ft)	1:30 PM		DTP	DTW Prod.(ft)	(tt) DTP	DTW	DTW Prod.(ft)	Results (ft)	Comments.
MW-2	28.18	28.68	0.50	6.75" Hg				30.01	30.01		-1.33	approximately 50 gallons of Free Product was collected in the Holding Tank during this event.
MW-3	26.65	26.67	0.02	6.25" Hg				30.35	30.35		-3.68	
MW-7	27.01	27.32	0.31	6.75" Hg				29.91	29.91		-2.59	
MW-1	29.27	29.27		-0.05 " H2O				29.52	29.52		-0.25	
MW-4	27.56	27.56		0.00 H2O				28.67	28.67		-1.11	
MW-5	27.13	27.13		-0.48 " H2O				27.56	27.56		-0.43	
MW-6	28.39	28.39		-0.41 " H2O				28.84	28.84		-0.45	
MW-8	26.93	26.93		-9.54 " H2O				29.03	29.03		-2.10	
MW-9	26.76	26.76		-0.23 " H2O				28.36	28.36		-1.60	
								-				

Calibration Gas	Methane
Calibration Gas Concentration (PPMv)	10,000
Response Factor (TVA-1000)	600
Number of Carbons	_
Influent Pipe Dia.	2
Effluent Stack Dia	80

This Event's Totals

	Camarate (10 Date) Totals
	Cumulative (To Date) Totals
24.0	Total Operating Time (Hours)
3300.00	Total Gallons of Liquid (Groundwater)
148.795	Equiv. Gal. of Hydrocarbons
916.58	Total Lbs of Hydrocarbon
12.62	Total Lbs of Methane
182.34	Total Lbs of Carbon

Total Lbs of Methane

Total Lbs of Hydrocarbon Equiv. Gal. of Hydrocarbons

40822.67 6627.140 12139.06 183.66





Fruits & Associates, Inc. 500 North Point Parkway, Suite A Acworth, GA 30102 Invoice Number 389142
Invoice Date July 29, 2024

Contract

Project 24-WDO-24-0011
Terms: Net 30 Days
Customer ID: 17100258
Page 1 of 1

Manager

Salesperson In-House

	Current	Unit of		Current
	Qty	Measure	Rate	Amount
Waste Disposal				
Date of Service 07/12/2024				
Petroleum Contact Water, Manifest Id: 13145	3,300.00	GALLON	0.220	726.00
Environmental Recovery Fee	726.00		0.080	58.08
Invoice Total			- - -	784.08

Biller:

Please remit payment to our new remittance address :

Dept #330 PO Box 1431 Charlotte, NC 28201

Terms: Payment not received within 30 days is subject to a finance charge of 11/2% per month or fraction thereof.

Approved By:

If you would like to sign up to pay via ACH please contact:
Shamrock AR Department and/or your CSR
receivables@shamrockenviro.com
336-375-1989

6106 Corporate Park Dr. Browns Summitt, NC 27214 336-375-1989 800-881-1098 Fax 336-375-1801 JP 24-WD0-24-0011 D# 294803 A# 2023-1857 R# 234617

Acworth, Georgia 30102

500 North Point Parkway, Suite A

F&A Project #: GA94-10311

Manifest Number:

NON-HAZARDOUS WASTE MANIFEST

13145

(770) 974-6999	Fax: (770) 974-4888
Section 1:	GENERATOR
Generator Name.	Generating Locations Sq m &
Address	. Address:
City	Zig:
Phone No.	Phone No.: Fax:
Description of Waste	Petroleum contacted graundwater
	Quantity
	that the above named material is not a hazardous weste as defined by 40 CFR part 261 or any applicable state law,
has been proper	ty described, classified and packaged, and is in proper condition for transportation according to applicable regulations. in U.S. Gallons
Generator Authorized	Agent Name / Signature / Signa
	TRANSPORTER
Section 2:	TRANSPORTER
	Transport Company Additional Transport Company
	E. Fruits & Associates, Inc. Company Name: SAME
Address	s 500 North Point Parkway Address:
	Suite A Acworth State: Zp:
	Acworth State: Zp:
	Billy Graham Diver Name / Title: Carl N Zeller
	# 353946 Vehicle Tag: 2890573 C Rock # 219155 Vehicle Tag: 2439932
73	Shaham July 10, 3024 Driver Signature Date
Driver Signature	Date Driver Signature Date
Section 3:	DESTINATION / DISPOSAL FACILITY
	I hereby certify that the above material has been accepted and to the best of my knowledge the foregoing is true and accurate.
Addre	10 Moore Street Travis Turnel
	on Oxford sine 64 Dr. 30054 Name of Authorized Agent / Tito
	6786254025 Fax / NOWN / MMel 7-12-2029
PTIGHER	Synthere Dane:
Discrepand	cy.