

# **ECOVAC SERVICES**

The World Leader in Mobile Dual-Phase/Multi-Phase Extraction

June 13, 2005

Ms. Cathy Böhlke  
EA Engineering, Science, and Technology, Inc.  
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Bellevue, Washington 98005  
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**Subject: Enhanced Fluid Recovery (EFR®) Results  
Event No. 1  
Former Circle K (Jay's Cleaners)  
2350 24<sup>th</sup> Avenue E  
Seattle, Washington**

Dear Ms. Böhlke:

Please find attached the data summary for the initial EFR® event conducted at the subject site on June 9, 2005. The following summarizes the results of this EFR® event.

### **SUMMARY OF RESULTS**

Separate phase hydrocarbons (SPH) were detected in four monitor wells prior to conducting this EFR® event (MW-4 – 0.42 feet, MW-8 – sheen, MW-9 and MW-13 – 0.01 feet). This EFR® event was performed for a duration of eight hours at four extraction points, consisting of monitor wells MW-4, MW-8, MW-9, and MW-13. Extraction was performed at MW-4, MW-8, and MW-9 during the initial 15 minutes of the event and MW-4, MW-8, MW-9, and MW-13 during the ensuing 2.75 hours. An individual well removal rate test was conducted at 15 minute intervals for each extraction well during the fourth hour of the event. The final three hours of the event were conducted at MW-4, MW-8, and MW-9. A calculated total of 112 pounds of petroleum hydrocarbons (approximately 18 equivalent gallons of gasoline) was removed during this EFR® event.

Vapor-phase hydrocarbon removal rates ranged from 1.9 to 38 pounds per hour. Removal rates changed throughout the event depending on the extraction array utilized, as shown below in order from highest to lowest removal rates:

<u>Extraction Well Array</u>	<u>Removal Rates</u>
MW-4,8,9	8.8 to 38 pounds per hour
MW-4,8,9,13	15 to 35 pounds per hour
MW-9	5.7 pounds per hour
<u>Extraction Well Array</u>	<u>Removal Rates</u>

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MW-4	5.0 pounds per hour
MW-8	4.5 pounds per hour
MW-13	1.9 pounds per hour

Offgas concentrations during this event ranged from 5,400 to 50,000 parts per million (ppm). Air flow rates to the atmosphere ranged from 29 to 118 cubic feet per minute (CFM). The range of vacuum readings recorded at the extraction wells during this EFR® event are detailed in the EFR® Field Data Sheet and summarized below:

<u>Extraction Well Location</u>	<u>Vacuum Readings</u>
MW-4	15 to 19 inches of mercury
MW-8	13 to 16 inches of mercury
MW-9	13 to 16 inches of mercury
MW-13	14 to 17 inches of mercury

Differential pressures were recorded at adjacent monitor wells to assess the vacuum influence induced by EFR® in the vadose zone. The differential pressure data are detailed in the attached table and summarized below:

<u>Monitor Well</u>	<u>Maximum Vacuum</u>	<u>Nearest Extraction Well (Approx. Distance)</u>
MW-16	-0.07 inches of water	MW-9 (19 feet)
MW-6	-0.03 inches of water	MW-4 (22 feet)
MW-15	0.00 inches of water	MW-9 (25 feet)
MW-14	0.00 inches of water	MW-8 (27 feet)
MW-10	0.00 inches of water	MW-4 (43 feet)
MW-7	-0.06 inches of water	MW-4 (48 feet)

Groundwater levels were also recorded during the event to determine drawdown of the aquifer. The groundwater drawdown data are detailed in the attached data table and summarized below:

<u>Monitor Well</u>	<u>Maximum Vacuum</u> <sup>change</sup>	<u>Nearest Extraction Well (Approx. Distance)</u>
MW-16	-2.75 feet	MW-9 (19 feet)
MW-6	-0.08 feet	MW-4 (22 feet)
MW-15	-1.66 feet	MW-9 (25 feet)
MW-14	-0.43 feet	MW-8 (27 feet)
MW-10	-0.09 feet	MW-4 (43 feet)
MW-7	-0.09 feet	MW-4 (48 feet)

Approximately 1,597 gallons of liquid were recovered during this EFR® event and transported to Emerald Services' treatment facility (Seattle, WA) for disposal. SPH was not detected in the vacuum truck tank prior to offloading of the liquids.

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Thank you for this opportunity to team with EA Engineering in serving the environmental needs of your clients. We look forward to working with you again in the future to provide innovative and cost effective environmental solutions at this and other sites.


Sincerely,

EcoVac Services

A handwritten signature in black ink, appearing to read "Mark Patterson", written in a cursive style.

Mark Patterson

# EFR<sup>®</sup> FIELD DATA SHEET

Client: EA Engineering		Facility Name: Former Circle K (Jay's Cleaners)				Event #: 1						
Facility Address: 2350 24th Avenue E - Seattle, WA				Technician: M. Patterson		Date: 6/9/05						
Extraction Well(s)	Time hh:mm	Extraction Well-head Vacuum (in. Hg)						Vacuum Truck Exhaust				
		Inlet	MW-4	MW-8	MW-9	MW-13		Concentration PPM	Offgas Velocity FT/MIN	Flow Rate CFM	Removal Rate LBS/HR	Interval Removal LBS
Start Time:	7:15											
MW-4,8,9	7:30	22	17	15	15	-		50,000	1,300	64	38	9.5
MW-4,8,9,13	7:45	21	16	15	15	16		38,000	1,600	78	35	8.8
"	8:15	21	16	15	15	16		26,000	1,650	81	25	12
"	8:45	21	16	14	14	15		20,000	1,750	86	20	10
"	9:15	20	15	13	13	14		16,000	2,000	98	19	9.3
"	9:45	20	15	13	13	14		13,000	2,200	108	17	8.3
"	10:15	20	15	13	13	14		11,000	2,400	118	15	7.7
MW-4	10:30	24	19	-	-	-		8,600	1,000	49	5.0	1.3
MW-8	10:45	22	-	16	-	-		11,000	700	34	4.5	1.1
MW-13	11:00	24	-	-	-	17		5,400	600	29	1.9	0.5
MW-9	11:15	22	-	-	16	-		14,000	700	34	5.7	1.4
MW-4,8,9	11:45	21	16	15	15	-		10,000	2,100	103	12	6.1
"	12:15	21	16	15	15	-		9,400	2,200	108	12	6.0
"	13:15	21	16	15	15	-		8,600	2,100	103	11	11
"	14:15	21	16	15	15	-		8,000	2,100	103	10	10
"	15:15	21	16	15	15	-		7,200	2,100	103	8.8	8.8
Well Gauging Data:			Before EFR <sup>®</sup> Event			After EFR <sup>®</sup> Event			Corr. DTW Change (ft)			
Well No.	Diam.	TD (ft)	DTS (ft)	DTW (ft)	SPH (ft)	DTS (ft)	DTW (ft)	SPH (ft)				
MW-4	2"	17.90	9.87	10.29	0.42	-	17.42	0.00	-7.45			
MW-6	2"		-	11.54	0.00	-	11.62	0.00	-0.08			
MW-7	2"		-	8.76	0.00	-	8.85	0.00	-0.09			
MW-8	2"	19.60	-	10.18	sheen	-	16.80	0.00	-6.62			
MW-9	2"	20.35	10.30	10.31	0.01	-	15.89	0.00	-5.59			
MW-10	2"		-	9.90	0.00	-	9.99	0.00	-0.09			
MW-13	2"	18.90	11.07	11.08	0.01	-	17.05	0.00	-5.98			
MW-14	2"	*note	-	9.08	0.00	-	9.51	0.00	-0.43			
MW-15	2"		-	9.77	0.00	-	11.43	0.00	-1.66			
MW-16	2"		-	9.76	0.00	-	12.51	0.00	-2.75			
Vacuum Truck Information		Well ID	Breather Port	Stinger Depth	Recovery/Disposal Information							
Subcontractor:	Emerald	MW-4	0(closed)	15 to 17.5 ft**	Hydrocarbons Removed (vapor):	112	pounds					
Truck Operator:	D. Knechtel	MW-8	0(closed)	15 to 17.5 ft**	Hydrocarbons Removed (liquid):	0	gallons					
Truck No.:	737	MW-9	0(closed)	15 to 17 ft**	Total Hydrocarbons Removed:	18	equiv. gal.					
Vacuum Pumps:	Fruitland	MW-13	0(closed)	14.5 to 17.5 ft**	Molecular Weight Utilized:	75	g/mole					
Pump Type:	RCF500				Disposal Facility:	Emerald Services						
Tank Capacity (gal.):	3,000				Bill of Lading #:	28797						
Stack I.D. (inches)	3.0				Total Liquids Removed:	1,597	gallons					
 www.ecovacservices.com 888-4ECOVAC		Time:	7:15 to 15:15		* Silt and mud was evacuated from MW-14 upon completion of the event,							
		# Pumps:	1		extending the total depth from approx. 15.5 to 19 feet below TOC							
		RPMs:	900		** Stinger depths were increased at 10:30 due to decreasing liquid production							
		Time:			and corresponding increase in air flow and decrease in wellhead vacuums							
# Pumps:												
RPMs:												

Differential Pressure and Groundwater Drawdown Data Recorded During EFR®

Event #: 1 Date: 6/9/05

Facility Name: Former Circle K (Jay's Cleaners)

Facility Address: 2350 24th Avenue E - Seattle, WA

**DIFFERENTIAL PRESSURE DATA**

		Well Designation:					
		MW-16	MW-6	MW-15	MW-14	MW-10	MW-7
Nearest Extraction Well:		MW-9	MW-4	MW-9	MW-8	MW-4	MW-4
Approximate Distance:		19 feet	22 feet	25 feet	27 feet	43 feet	48 feet
Time	Elapsed Time	Differential Pressure Readings (inches of water):					
7:45	0.5 hr.	-0.07	0.00	0.00	0.00	0.00	0.00
8:15	1 hr.	-0.05	-0.02	0.00	0.00	0.00	-0.06
9:15	2 hrs.	-0.02	-0.03	0.00	0.00	0.00	-0.02
10:15	3 hrs.	-0.02	-0.02	0.00	0.00	0.00	-0.02
13:15	6 hrs.	-0.03	-0.02	0.00	0.00	0.00	-0.03
Maximum Change:		-0.07	-0.03	0.00	0.00	0.00	-0.06

**GROUNDWATER DRAWDOWN DATA**

		Well Designation:					
		MW-16	MW-6	MW-15	MW-14	MW-10	MW-7
Nearest Extraction Well:		MW-9	MW-4	MW-9	MW-8	MW-4	MW-4
Approximate Distance:		19 feet	22 feet	25 feet	27 feet	43 feet	48 feet
Time	Elapsed Time	Depth to Liquid (feet below top of casing):					
Prior to EFR®		9.76	11.54	9.77	9.08	9.90	8.76
10:15	3 hrs.	12.10	11.59	10.89	9.32	9.93	8.78
13:15	6 hrs.	12.41	11.60	11.17	9.43	9.96	8.82
15:15	8 hrs.	12.51	11.62	11.43	9.51	9.99	8.85
Maximum Change:		-2.75	-0.08	-1.66	-0.43	-0.09	-0.09



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28797

**BILL OF LADING AND GALLONAGE TICKET**

SHIP GENERATOR	CONTRACT	JOB #
ADDRESS	PHONE	EQSD
CITY/STATE/ZIP	PHONE	DATE
CARRIER	PHONE	DOCUMENT #
CONSIGNEE	PHONE	TRUCK #
MOVERS	PHONE	PRODUCT/TARE
CITY/STATE/ZIP	PHONE	EST. GALLONS

YR	ITEM	U.S. DOT DESCRIPTION	TYPE	QTY
		Hot Resin/Epoxy Matching		600
				15.87

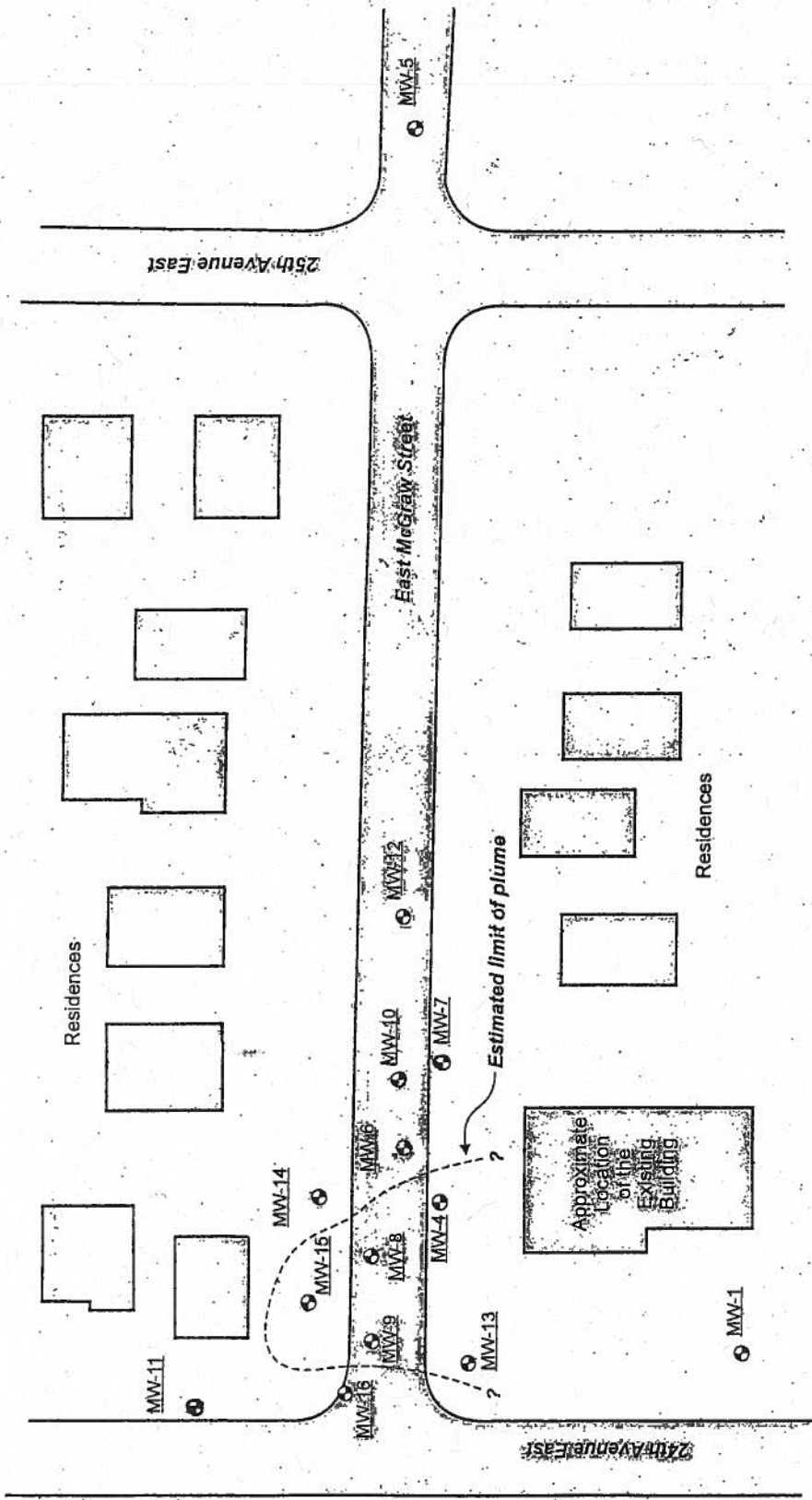
A. WPDV	DISP CODE	C. WPDV	DISP CODE
B. WPDV	DISP CODE	D. WPDV	DISP CODE

**DISPOSAL**

WASH CONTAINER NUMBER	DATE	TIME IN	TIME OUT
TEST	LOCATION	TEST	DISP CODE
TEST	LOCATION	TEST	DISP CODE
PUSHED TO SOLDS BY CENTRIFUGE	TEST	DISP CODE	
OLD DIESEL GAS	GALLONS	LOCATION	TEST
TEST	TEST	TEST	DISP CODE

Shipper's Certification: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked and labeled and are in all respects in proper condition for transport by highway, vessel and air according to applicable international and national government regulations and this material is not regulated as a hazardous waste in accordance with 49 CFR Part 173.201 or 49 CFR Part 173.203.

X	SHIPPER (PRINT NAME)	SIGNATURE	DATE
X	CARRIER - DRIVER 1 (PRINT NAME)	SIGNATURE	DATE
X	CARRIER - DRIVER 2 (PRINT NAME)	SIGNATURE	DATE
X		SIGNATURE	DATE



Former Circle K  
 Montlake Area  
 Seattle, Washington

Pinnacle GeoSciences

Locations of All Features Shown Are Approximate



NO TOW-AWAY  
AFTER  
KING AREA





Circle K station #14661

