



# BACE Environmental

A Division Of

Brunsing Associates, Inc.

September 9, 1994

Project No. 94SEP.12

Ms. Jennifer Eberle  
Alameda County Health Care Services  
Department of Environmental Health  
80 Swan Way, Room 200  
Oakland, CA 94612

STID 3826  
94SEP 1 11:45 AM  
ALCO  
TYNAT

**RE: Progress Report: Vapor Extraction System Operations, January - August 1994  
Pacific Supply Company  
Oakland, California**

Dear Ms. Eberle:

This correspondence is intended to report the progress of the first eight months of operation through August 26, 1994 using vapor extraction to remove gasoline from subsurface soils and groundwater at the Pacific Supply Company, Oakland, California. The vapor extraction system was installed in the fall of 1993, and was on-line ready for operation on December 26, 1993. The vapor extraction system [reference: Spray Aeration Vapor Extraction (SAVE) system] was manufactured by Remediation Service Int'l, and BACE Environmental oversees the operations and maintenance of the system components with regularly scheduled maintenance visits from Pacific Coast Building Products personnel. In accordance with the permit requirements regulated by the Bay Area Air Quality Management District (BAAQMD), vapor samples were collected the first three days of operation, December 27, 28 and 29, 1993. Thereafter, inflow and exhaust vapor samples have been collected and analyzed every two weeks for total petroleum hydrocarbons as gasoline (TPHg), and benzene, toluene, ethylbenzene and xylenes (BTEX). Quarterly influent and effluent water sampling, testing and reporting is required by the East Bay Municipal Utility District (EBMUD). Influent and effluent water samples are tested for organic and inorganic constituents.

### Vapor Extraction, Treatment and Discharge

Through August 26, 1994, 2,805 hours of non-continuous operation have been logged by the SAVE system. This reduces to an average of approximately 11.6 hours per day over the entire operations period without correcting for down time of 17 days used to upgrade the SAVE system within air/moisture separator and replacement blower. The quantity of petroleum hydrocarbons as gasoline removed from subsurface soils and groundwater during the hours of operation is estimated to be 1,785 pounds of product (equivalent to 324 gallons). This estimated quantity of product removed is based on the following data:

1. An average concentration of TPHg sampled on 16 occasions over an eight month period is calculated to be 4,673 parts per million volume (ppmv);  
 $\rightarrow \times \frac{86}{24.5} = 16400 \text{ mg/m}^3$
2. A molecular weight of total hydrocarbons equivalent to hexane (86.2);
3. 2,805 hours of operation;

$$m^3 = 1352 \text{ e}$$

$$1 \text{ cft} = 28.3 \text{ l}$$

$$10 \text{ cft} = 283 \text{ l/min}$$

$$2805 \text{ hr} \times \frac{60 \text{ min}}{\text{hr}} \times \frac{283 \text{ l}}{\text{min}} \times \frac{\text{m}^3}{1352 \text{ l}} \times \frac{16.4 \text{ g}}{\text{m}^3} \times \frac{1 \text{ lb}}{454 \text{ g}} =$$

$$1272 \text{ lb}$$

4. An average well flow rate of 10 standard cubic feet per minute (scfm). The August 26, 1994 well flow reading indicated 23 scfm.

A summary of the analytical test results for TPHg and BTEX constituents sampled at representative inflow and exhaust ports between December 27, 1993 and the August 15, 1994 is included with this progress report.

The SAVE system is connected to nine on-site extraction wells. For the past eight months, vapor has been extracted from ~~has~~ focused on the interior-most wells of the network. Nearly 95 percent of the 2,805 operating hours has been dedicated to wells VRW-4, VRW-5 and VRW-7. (These wells indicated the highest levels of TPHg in soil samples collected in the vadose zone at the time of installation.) The inflow hydrocarbon concentrations have generally decreased by a factor of ten over the operations period. An unusually high pocket of hydrocarbons was sampled on August 15, 1994 which equaled the highest concentrations to date. This would appear to be an anomalous result in light of the previous 7.5 months. The amount of propane fuel required to supplement the engine's fuel requirement has steadily increased from zero to 60 scfm as measured on August 25, 1994. The increased use of propane supports the data indicating that TPHg levels in the subsurface are steadily decreasing.

No-VRW-6 had the highest conc. in soil 3800 ppm TPH-g + 41 benzene

The recent system upgrades which included the installation of a air/moisture separator and a new blower has resulted in increasing the vacuum capacity of the SAVE system by approximately 10 to 15 percent. The air/moisture separator will reduce the moisture content of the air stream to the blower which will increase blower's efficiency and life.

Over the operating period there have been two occasions where exhaust emissions exceeded BAAQMD permit conditions. In each instance, the SAVE system was shut down, maintenance performed, and the system re-started. Exhaust emissions were tested to verify compliance with the permit, and the results of the test reported to the BAAQMD. (The permit does not require regular progress monitoring reports to be prepared and submitted to EBMUD.) The permit is structured for self monitoring, and mandatory reporting in the event of exceedance of the permit conditions.

### Groundwater Extraction, Treatment and Discharge

The quantity of groundwater extracted, treated and discharged to the EBMUD sanitary sewer is 6,200 gallons as reported through August 25, 1994. This amounts to approximately 26 gallons per day over the operations period.

An unusual amount of sediment has been generated as part with the extraction of groundwater. In June 1994 the 2,000 gallon batch tank was cleaned of approximately 25 cubic feet of sludge. This material was transferred to 55-gallon drums. An in-line particle filter were installed to reduce the accumulation of sediment in the batch tank and to prevent the spray nozzles from becoming fouled. The particle filter has been successful in reducing the accumulation of sediment; however, the filter has been clogging which is causing water to backup within the knockout tank, resulting in water

follow up



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flowing into the engine by way of the vapor line. This condition will be corrected by: 1) installing a second larger in-line filter on the influent line and 2) replacing the filters more frequently.

To date three quarterly monitoring reports have been prepared and submitted to the EBMUD, dated January 14, 1994, April 8, 1994 and July 13, 1994, as required by EBMUD permit Account No. 502-85601. The next quarterly sampling is scheduled for September 1994. The current waste water discharge permit is up for renewal. The application for renewal is due at EBMUD by September 24, 1994.

### **Recommendations**

#### Vapor Extraction Run Time

The SAVE system is operating at approximately 48 percent efficiency. Over the next 30 days BACE Environmental will attempt to increase the efficiency to over 80 percent. This will increase the volume of hydrocarbon vapor destroyed as well as increase the capacity for extracting and treating groundwater.

#### Groundwater Extraction and Treatment

Increasing the SAVE system run time will increase the volume of groundwater extracted from the subsurface for treatment and discharge. This water is being extracted under a vacuum, and as a consequence, the volume of extracted groundwater varies due to changes in down-well pressure, variable groundwater levels, etc. To produce a steady flow of water to the system, a groundwater pump is required. A single pneumatic groundwater pump is recommended at this time to increase flow to the treatment system. This pump would work off of the existing air compressor on the SAVE system. The pump would supply two to four gallons of water per minute (2,880 to 5,760 gallons per day based on continuous operation) to the system for treatment. The SAVE system is capable of treating five to ten gallons per minute.

To further discuss the information discussed above and/or the recommendations, please call me at 415-364-9031 or Normita Callison at (916) 971 2390.

Respectfully submitted,



Michael E. Velzy  
Project Manager

Enclosure: Vapor Analytical Results Summary

cc: Normita Callison



**VAPOR ANALYTICAL RESULTS SUMMARY  
PACIFIC SUPPLY COMPANY  
OAKLAND, CALIFORNIA**

Sample Date	Lab	Analyses Performed	Results (ppmv)		Comments
			Intake	Exhaust	
12/27/93	Sequoia	TPHg	6,800	ND	100% destruct rate/accept 98.5% • <b>Acceptable</b>
		Benzene	380	ND	
		Toluene	230	ND	
		Ethyl Benzene	19	ND	
		Xylene	58	ND	
12/28/93	Sequoia	TPHg	11,000	ND	100% destruct rate/accept 98.5% • <b>Acceptable</b>
		Benzene	340	ND	
		Toluene	430	ND	
		Ethyl Benzene	28	ND	
		Xylene	92	ND	
12/29/93	Sequoia	TPHg	9,400	ND	100% destruct rate/accept 98.5% • <b>Acceptable</b>
		Benzene	340	ND	
		Toluene	270	ND	
		Ethyl Benzene	16	ND	
		Xylene	48	ND	
1/13/94	Sequoia	TPHg	7,600	ND	100% destruct rate/accept 98.5% • <b>Acceptable</b>
		Benzene	200	ND	
		Toluene	260	ND	
		Ethyl Benzene	280	ND	
		Xylene	100	ND	
1/26/94	Sequoia	TPHg	7,900	150	98.10% destruct rate/accept 98.5% • <b>NOT ACCEPTABLE</b> Results reported on 1/31, VES turned off on 2/1
		Benzene	270	19	
		Toluene	270	6.6	
		Ethyl Benzene	15	0.37	
		Xylene	29	1.1	
2/4/94	Sequoia	TPHg	NT	2.3	Retest of 1/26 after new catalytic converter installed
		Benzene	NT	ND	
		Toluene	NT	ND	
		Ethyl Benzene	NT	ND	
		Xylene	NT	ND	



Sample Date	Lab	Analyses Performed	Results (ppmv)		Comments
			Intake	Exhaust	
2/11/94	Sequoia	TPHg	5,600	6.0	99.89% destruct rate/accept 98.5% • <b>Acceptable</b>
		Benzene	170	0.47	
		Toluene	190	0.029	
		Ethyl Benzene	7.6	ND	
		Xylene	21	0.0022	
2/23/94	Sequoia	TPHg	3,300	29.0	99.24% destruct rate/accept 98.5% • <b>Acceptable</b>
		Benzene	100	1.7	
		Toluene	140	0.74	
		Ethyl Benzene	15	ND	
		Xylene	46	0.015	
3/14/94	Sequoia	TPHg	3,200	75.0	97.66% destruct rate/accept 98.5% • <b>NOT ACCEPTABLE</b> BAAQMD called 3/15 (VES shut off 3/15 & tuned up on 3/17 & field tested with PID prior to restart)
		Benzene	56	4.1	
		Toluene	85	2.7	
		Ethyl Benzene	6.7	0.28	
		Xylene	30	1.5	
3/23/94	Sequoia	TPHg	1,400	4.5	99.68% destruct rate/accept 97% • <b>Acceptable</b>
		Benzene	19	19	
		Toluene	53	53	
		Ethyl Benzene	6.2	6.2	
		Xylene	22	22	
4/21/94	Sequoia	TPHg	1,100	11	99.00% destruct rate/accept 97% • <b>Acceptable</b>
		Benzene	15	0.075	
		Toluene	23	0.037	
		Ethyl Benzene	ND	ND	
		Xylene	3.7	0.032	
5/2/94	Sequoia	TPHg	1,200	7.9	99.34% destruct rate/accept 97% • <b>Acceptable</b>
		Benzene	9.4	0.38	
		Toluene	18	ND	
		Ethyl Benzene	1.4	ND	
		Xylene	6.9	ND	
5/16/94	Sequoia	TPHg	1,400	20	98.57% destruct rate/accept 97% • <b>Acceptable</b>
		Benzene	25	0.25	
		Toluene	43	ND	
		Ethyl Benzene	4.6	ND	
		Xylene	18	ND	



Sample Date	Lab	Analyses Performed	Results (ppmv)		Comments
			Intake	Exhaust	
6/1/94	Sequoia	TPHg	680	7.9	98.84% destruct rate/accept 97% • <b>Acceptable</b>
		Benzene	6.6	ND	
		Toluene	8.5	ND	
		Ethyl Benzene	1.5	ND	
		Xylene	8.3	ND	
6/13/94	Sequoia	TPHg	980	ND	100% destruct rate/accept 97% • <b>Acceptable</b>
		Benzene	9.4	ND	
		Toluene	17	ND	
		Ethyl Benzene	2.1	ND	
		Xylene	7.2	ND	
6/27/94	Sequoia	TPHg Benzene Toluene Ethyl Benzene Xylene			SAVE System down for retrofit up-grades: 6/27/94 - 7/14/94
7/11/94	TAL	TPHg Benzene Toluene Ethyl Benzene Xylene			Samples lost by Remediation Management-TAL claims that the samples never arrived to lab
8/1/94	TAL	TPHg	2,200	19	99.14% destruct rate/accept 97% • <b>Acceptable</b>
		Benzene	81	ND	
		Toluene	96	0.033	
		Ethyl Benzene	12	ND	
		Xylene	41	ND	
8/15/94	TAL	TPHg	11,000	12	99.89% destruct rate/accept 98.5% • <b>Acceptable</b>
		Benzene	280	0.24	
		Toluene	380	0.033	
		Ethyl Benzene	140	ND	
		Xylene	550	ND	
8/30/94	TAL	TPHg	3,300	66	98.00% destruct rate/accept 98.5%

