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December 2, 1993

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Ms. Susan L. Hugo
Senior Hazardous Materials Specialist
Alameda County Department of Environmental Health
Hazardous Materials Division
80 Swan Way, Room 350
Oakland, CA 94621
(510) 271-4530
(510) 579-4757 FAX

**SUBJECT: STATISTICAL ANALYSIS OF SOIL SAMPLING DATA
QUIK STOP MARKET #47, 6001 MACARTHUR BOULEVARD,
OAKLAND, CA 94605**

Dear Susan:

Certified Environmental Consulting, Inc. (CEC) is pleased to submit a statistical analysis of the soil sampling data collected from the soil being treated at Quik Stop's Vasco Road site in Livermore. The spoils pile is presently located at 991 Vasco Road in Livermore, California (Figure 1).

The first sampling event occurred on May 20 & 21, 1992, when 31 samples were obtained at various locations and depths and analyzed for TPH(G) and BTEX compounds. On August 9, 1993, the five segments of the pile which contained the highest concentrations of TPH-G were resampled. Samples were collected at the same locations and depths of our May 1993 sampling event (Figure 2). Samples were collected in brass tubes using a slide hammer/tube sampler. Samples were collected, preserved, transported, and analyzed according to the protocol outlined in our work plan dated June 1992.

On September 22, 1993, the areas with the 5 highest levels of TPH(G) and BTEX compounds (according to the May 20 and 21, 1993 sampling event) were resampled and analyzed for TPH(G) and BTEX compounds by modified EPA method 8015 and TCLP. No leachable hydrocarbons were detected.

(916) 783-6034

536 Stone Road, Suite J
Benicia, California 94510-1170

Ofc (707) 745-0171
Fax (707) 745-0163
(800) 228-0171

Analytical results indicate TPH-G concentrations are below 4 mg/Kg (ppm) in the segments most recently sampled (Table 1). No benzene was detected in the most recent samples and concentrations of toluene, ethyl benzene, and xylenes are below 0.015 mg/Kg (ppm). Laboratory analytical sheets and chains of custody are presented in the Appendix.

Sampling was based on a grid established over the soil pile to represent approximately 200 yards, and each grid cell was sampled. The statistical analysis was prepared for the data using the equations in SW 846 published by EPA. All values are given in ppm, and for the calculations, an analysis result of ND (Non Detect) was given a value of 0. Attached are tables that contain the sample ID, grid location, and raw data.

We request permission to transport and permanently dispose of the soil at the El Charro Quarry located at 580 El Charro Road in Pleasanton, California (Figure 3). The soil will be used to backfill the upper five feet of one of the quarry excavations. This action will close the spoils issue.

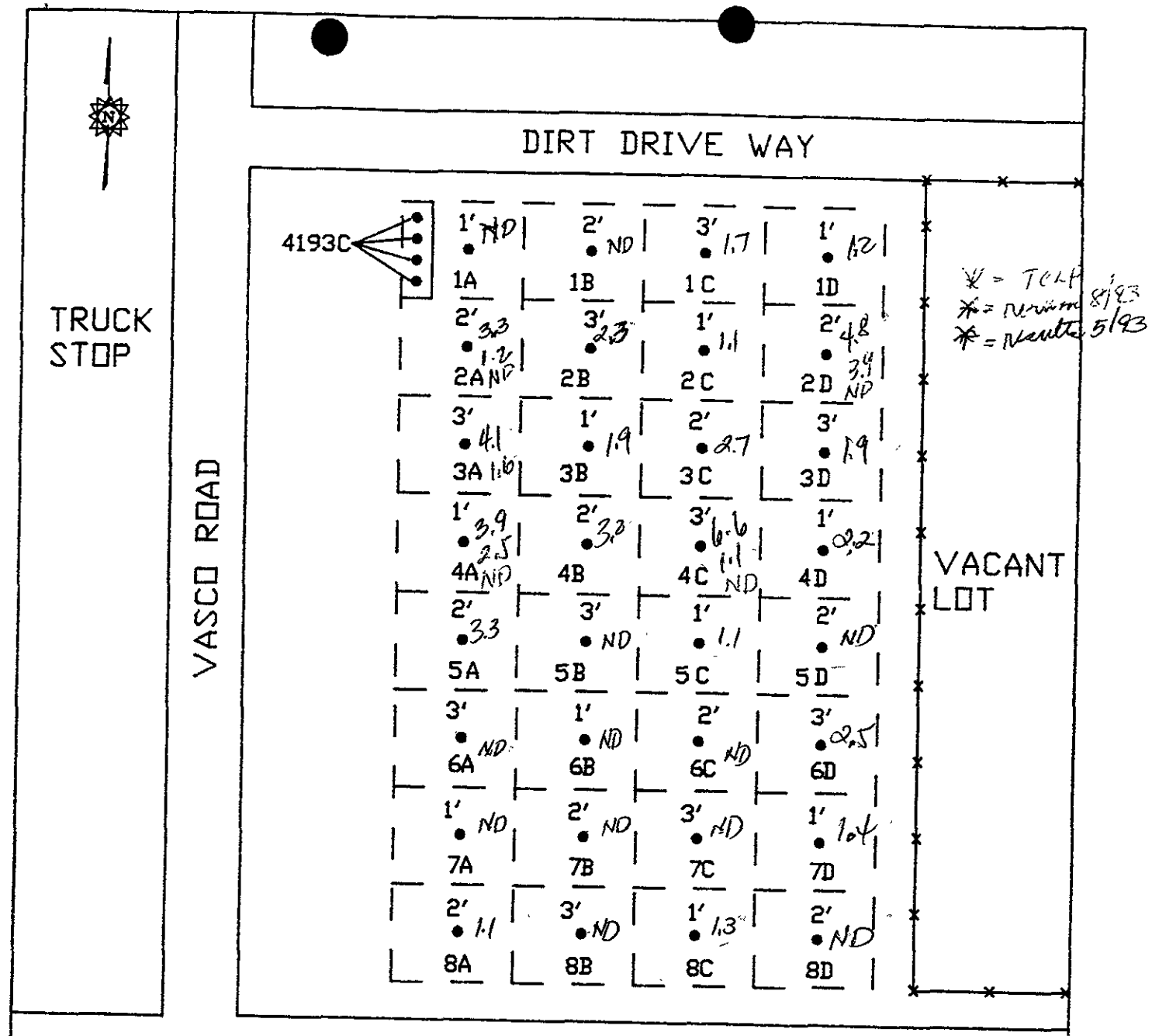
Sincerely,

David W. Janney
Project Geologist

Stanley L. Klemetson, Ph.D., P.E.
Exec. Vice President

REGISTERED PROFESSIONAL ENGINEER
STANLEY LOUIS KLEMETSON
No. 40087
Exp. 3/31/94
CIVIL
STATE OF CALIFORNIA

cc: Mr. Michael Karvelot, Quik Stop Markets, Inc.
Mr. Richard Hiett, San Francisco Bay Regional Water Quality Control Board
Ms. Christine Noma, Wendel, Rosen, Black, Dean & Levitan
Mr. Roger Higdon, City of Pleasanton Public Works



SPOILS PILE SAMPLE LOCATION MAP
991 VASCO ROAD
LIVERMORE, CA
FOR QUIK STOP # 47

CERTIFIED ENVIRONMENTAL CONSULTING
356 STONE ROAD, SUITE J, BENICIA, CA 94510
(707) 745-0171 / (800) 228-0171 / (707) 745-0163 FAX

FIGURE **2**

SITE LOCATION

The soil from the Quik Stop #47 site is presently located at 991 Vasco Road in Livermore, California (Figure 1).

SOIL SAMPLING HISTORY

Sampling was based on a grid established over the soil pile to represent approximately 200 yards per grid cell and each grid cell was sampled. See Figure 2.

The first sampling event occurred on May 20 & 21, 1992, when 31 samples were obtained at various locations and depths and analyzed for TPH(G) and BTEX compounds. On August 9, 1993, the five segments of the pile which contained the highest concentrations of TPH-G were resampled. Samples were collected at the same locations and depths of our May 1993 sampling event. Samples were collected in brass tubes using a slide hammer/tube sampler. Samples were collected, preserved, transported, and analyzed according to the protocol outlined in our revised work plan dated June 1992.

On August 9, 1993, the areas with the 5 highest levels of TPH(G) and BTEX compounds were resampled and analyzed for TPH(G) and BTEX compounds (Table 1). These same locations were resampled again on September 22, 1993. Samples collected on September 22 were analyzed for TPH-G and BTEX using modified EPA method 8015. In order to determine if the hydrocarbons detected by the modified 8015 method were leachable, a toxicity characteristic leaching profile (TCLP) using synthetic rainwater (pH 5.5) was also performed (Table 5). Both hydrochloric acid (HCL) and carbonic acid (HCO_2)were used to lower the pH of the deionized water used in the TCLP test. There was no difference in the leachability of the hydrocarbons between the two acids. Therefore, carbonic acid was used for the test as it more closely approximates the type of acid which might occur naturally in the soil.

ANALYTICAL RESULTS

Analytical results indicate TPH-G concentrations are below 4 mg/Kg (ppm) (modified method 8015) in the segments most recently sampled (Table 1). No benzene was detected in the ~~most recent samples~~ and concentrations of toluene, ethyl benzene, and xylenes are below 0.015 mg/Kg ~~(ppm)~~. TCLP results also indicated the hydrocarbons are not leachable. Laboratory analytical sheets and chains of custody are presented in the Appendix.

STATISTICAL ANALYSIS

The statistical analysis was prepared for the data using the equations in SW 846 published by EPA. All values are given in ppm, and for the calculations, an analysis result of ND (Non Detect) was given a value of 0. Attached are tables that contain the sample ID, grid location, and raw data.

Table 1

Analytical Results For Spoils Pile (991 Vasco Rd., Livermore)
Quick Stop Market #47
6001 MacArthur Boulevard, Oakland, CA

Sample Number-Depth Collected	Date Collected	TPH-G mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Xylenes mg/Kg
1A-1'	5/20/93	ND	ND	ND	ND	ND
1B-2'	5/20/93	ND	ND	ND	ND	0.009
1C-3'	5/20/93	1.7	ND	0.007	0.005	0.018
1D-1'	5/20/93	1.2	ND	0.006	0.006	0.017
2A-2' 2A-2'	5/20/93 8/9/93	3.3 1.2	0.010 ND	0.008 ND	0.012 ND	0.035 0.013
2B-3'	5/20/93	2.3	ND	0.009	0.007	0.021
2C-1'	5/20/93	1.1	ND	0.005	ND	0.009
2D-2' 2D-2'	5/20/93 8/9/93	4.8 3.9	ND ND	ND 0.015	ND 0.009	0.008 0.011
3A-3' 3A-3'	5/20/93 8/9/93	4.1 1.6	0.005 ND	0.010 0.014	0.007 ND	0.030 0.015
3B-1'	5/20/93	1.9	ND	0.006	0.005	0.018
3C-2'	5/20/93	2.7	ND	0.008	0.010	0.032
3D-3'	5/20/93	1.9	ND	ND	0.005	0.018
4A-1' 4A-1'	5/21/93 8/9/93	3.9 2.5	ND ND	0.016 0.010	0.010 0.008	0.033 0.010
4B-2'	5/21/93	3.2	0.006	0.009	0.011	0.043
4C-3' 4C-3'	5/21/93 8/9/93	6.6 1.1	ND ND	0.015 ND	0.016 ND	0.059 0.015
4D-1'	5/21/93	2.0	ND	0.006	ND	0.012
5A-2'	5/21/93	3.3	ND	0.008	0.008	0.029
5B-3'	5/21/93	ND	ND	ND	ND	ND
5C-1'	5/21/93	1.1	ND	ND	ND	0.008
5D-2'	5/21/93	ND	ND	ND	ND	ND
Detection Limits		1.0	0.005	0.005	0.005	0.005

ND = Not Detected

Table 1 (Continued)

Analytical Results For Spoils Pile (991 Vasco Rd., Livermore)
Quick Stop Market #47
6001 MacArthur Boulevard, Oakland, CA

Sample Number-Depth Collected	Date Collected	TPH-G mg/Kg	Benzene mg/Kg	Toluene mg/Kg	Ethyl Benzene mg/Kg	Xylenes mg/Kg
6A-3'	5/21/93	ND	ND	ND	ND	ND
6B-1'	5/21/93	ND	ND	ND	ND	ND
6C-2'	5/21/93	ND	ND	ND	ND	ND
6D-3'	5/21/93	2.5	ND	ND	ND	ND
7A-1'	5/21/93	ND	ND	ND	ND	ND
7B-2'	5/21/93	ND	ND	ND	ND	ND
7C-3'	5/21/93	ND	ND	ND	ND	0.007
7D-1'	5/21/93	1.4	ND	ND	ND	0.013
8A-2'	5/21/93	1.1	ND	0.006	ND	0.012
8B-3'	5/21/93	ND	ND	ND	ND	0.006
8C-1'	5/21/93	1.3	ND	0.006	ND	0.012
8D-2'	5/21/93	ND	ND	ND	ND	0.010
Detection Limits		1.0	0.005	0.005	0.005	0.005

ND = Not Detected

TABLE 2

5/20-21/93 SAMPLING EVENT

n=31	TPH(G)	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES
MEAN	1.6	0.00065	0.0039	0.0031	0.012
VARIANCE	2.9	4.7E-06	2.2E-05	2.1E-05	0.00024
STD. DEV.	1.7	0.0021	0.0047	0.0046	0.015
$t_{.20}$	1.31	1.31	1.31	1.31	1.31
s_x	0.31	0.00039	0.00085	0.00083	0.0028
UPPER CI	2.0	0.0011	0.0050	0.0042	0.016
LOWER CI	1.2	0.00014	0.0027	0.0020	0.0087

Sample size = n

Mean = $X = Ex_i/n$

Variance = $S^2 = [Ex_i^2 - (Ex_1^2 - (\Sigma x_1^2 - (\Sigma x_i)^2]/(n - 1)$

Standard Deviation = s = sqrt s^2

Standard Error = s_x = s/sqrt(n)

Confidence Interval = CI = X +/- $(t)(s_x)$

TABLE 3

8/9/93 SAMPLING EVENT

n = 5	TPH(G)	BENZENE	TOLUENE	ETHYL BENZENE	XYLENE
MEAN	2.48	0	0.0078	0.0034	0.0128
VARIANCE	1.34	0	5.4E-05	2.1E-05	5.2E-06
STD. DEV.	1.15	0	0.0073	0.0048	0.0022
t_{20}	1.533	1.533	1.533	1.533	1.533
s_x	0.60	0	2.4E-05	9.7E-06	1.3E-06
UPPER CI	3.4	0	0.0078	0.0034	0.012
LOWER CI	1.55	0	0.0077	0.0033	0.012

Sample size = n

Mean = $X = Ex_i/n$

Variance = $S^2 = [Ex_i^2 - (Ex_i^2 - (\Sigma x_i^2 - (\Sigma x_i)^2]/(n - 1)$

Standard Deviation = s = sqrt s^2

Standard Error = s_x = s/sqrt(n)

Confidence Interval = CI = X +/- $(t)(s_x)$

TABLE 4

9/22/93 SAMPLING EVENT

n = 5	TPH(G)	BENZENE	TOLUENE	ETHYL BENZENE	XYLENE
MEAN	.44	0	0.0078	0.0022	0.014
VARIANCE	0.96	0	2.8E-05	2.4E-05	2.1E-05
STD. DEV.	0.98	0	0.0053	0.0049	0.0046
t_{20}	1.533	1.533	1.533	1.533	1.533
s_x	0.43	0	1.2E-05	1.0E-05	9.4E-06
UPPER CI	1.1	0	0.0078	0.0022	0.014
LOWER CI	0	0	0.0078	0.0021	0.014

Sample size = n

Mean = X = Ex_i/n

Variance = $S^2 = [Ex_i^2 - (Ex_i^2 - (\Sigma x_1^2 - (\Sigma x_i)^2]/(n - 1)$

Standard Deviation = s = sqrt s^2

Standard Error = s_x = s/sqrt(n)

Confidence Interval = CI = X +/- $(t)(s_x)$

TABLE 5

TCLP RESULTS FOR THE 9/22/93 SAMPLING EVENT

All values in ug/L (ppb)

Sample Number	TPH(G)	BENZENE	TOLUENE	ETHYL BENZENE	XYLENES
2DR@2'	ND	ND	ND	ND	ND
2AR@2'	ND	ND	ND	ND	ND
3AR@3'	ND	ND	ND	ND	ND
4AR@1	ND	ND	ND	ND	ND
4CR@3'	ND	ND	ND	ND	ND
Detection Limit	50	1	1	1	1

DISCUSSION

The data appears to be close to a normal distribution, but may be skewed due to a high number of Non Detect values. The locations of the 8/9/93 and 9/22/93 sampling events were the same, and were the locations that indicated the highest levels of petroleum concentration in the initial sampling event.

Looking at the most recent sampling event, the mean of the values for TPH(G), Benzene, and Ethyl Benzene are less than the analytical detection limit for those compounds. The mean of the values for Toluene and Xylene are also quite low, less than 0.02 ppm. Based on the Upper Confidence Interval, the TPH(G) levels in the stockpile are less that 1.1 ppm.

TCLP analysis (using synthetic rainwater with a pH of 5.5) was also performed on the samples obtained 9/22/93, No hydrocarbons were detected by this analytical method.

CONCLUSIONS

On the basis of the data collected, the TPH(G) and BTEX compound concentrations are extremely low or below detection limits in all cases. No hydrocarbons are detectable using the TCLP method.

Hydrocarbons do not appear to be leachable and therefore do not present a threat to groundwater.

We request permission to transport and permanently dispose of the soil at the El Charro Quarry located at 580 El Charro Road in Pleasanton, California. The disposal site is not located within the limits of Pleasanton or Livermore. The soil will be used to backfill the upper five feet of one of the quarry excavations. This action will close the spoils issue.