

ENVIRONMENTAL  
PROTECTION

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1 March 1999

Mr. Barney Chan  
Alameda County Department of Environmental Health  
1131 Harbor Bay Parkway, #250  
Alameda, California 94502-6577

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Subject: Addendum to the Report Regarding the 3925 Alameda Avenue Site,  
Oakland, California  
(EKI 980074.00)

Dear Mr. Chan,

Erler and Kalinowski, Inc. ("EKI") is pleased to present this addendum to our report regarding the 3925 Alameda Avenue Site, Oakland, California ("Site"), submitted to the Alameda County Department of Environmental Health ("ACDEH") on 19 January 1999 ("Site Report"). This addendum has been prepared at the specific request of ACDEH in response to questions and concerns identified by ACDEH during our telephone conversation on 21 January 1999. The addendum has been prepared on behalf of Smooke & Sons Investment Co. and provides:

- further evaluation of potential human health risk from volatilization of benzene in soil into outdoor air based on maximum benzene concentrations recently detected on Site; and
- statistical analysis of groundwater monitoring data to further evaluate the stability of chemical concentrations detected in groundwater at the Site.

### 1.0 FURTHER EVALUATION OF POTENTIAL HUMAN HEALTH RISKS

The Site Report did not address the maximum benzene concentration of 1.3 mg/kg recently detected in soil samples collected at MW-1 and G-5, respectively ("maximum Site benzene concentration"). These soil samples were collected in 1995 at 13.5 and 9 feet below ground surface ("fl bgs"), respectively.

Letter to Mr. Chan  
Alameda County Department of Environmental Health  
1 March 1999  
Page 2

The maximum Site benzene concentration (i.e., 1.3 mg/kg) is equal to the Risk-Based Screening Level ("RBSL") for volatilization of benzene into outdoor air corresponding to a cancer risk of  $10^{-5}$  ("the  $10^{-5}$  RBSL") using the 29% factor requested by ACDEH (see Site Report). This RBSL was developed assuming that the depth to subsurface soil sources is 3 feet bgs (see ASTM, 1995 and Smith-Emery, 1997); however, elevated concentrations of benzene detected at MW-1 and G-5 were significantly deeper than 3 feet (i.e., 13.5 feet and 9 feet, respectively). Impacted soil at greater depth will result in lower chemical concentrations in air at the ground surface than impacted shallow soil because the concentration of the chemical attenuates as it travels through the soil column to the surface. Therefore, in order to assess potential human health risks due to benzene-impacted soils detected at MW-1 and G-5, the  $10^{-5}$  RBSL for volatilization of benzene to outdoor air was calculated assuming the depth to the maximum benzene concentration was 9 feet bgs. Utilizing default values for all other parameters and the 29% reduction requested by ACDEH, the resulting RBSL is 3.6 mg/kg. This value is three times greater than the maximum Site benzene concentration of 1.3 mg/kg. This result confirms conclusions in the Site Report that volatilization of benzene from soil into outdoor air at the Site does not pose an unacceptable risk to human health.

## **2.0 STATISTICAL ANALYSIS OF GROUNDWATER TRENDS**

The Mann-Kendall test recommended by U.S. EPA (1998, 1994b) was used to evaluate the statistical significance of potential trends in chemical concentrations detected in groundwater at the Site. The test determines if a trend in concentrations exists by calculating an indicator statistic,  $S$ . If  $S$  is a large negative number, measurements taken later in time tend to be smaller than those taken earlier. Similarly, if  $S$  is a large positive number, measurements taken later in time tend to be larger (Gilbert, 1987). A statistically relevant upward trend is established if the computed value of  $S$  is positive at a significance level less than a given value,  $\alpha$  (i.e., the probability, or confidence level, of an upward trend is  $(100 - \alpha \cdot 100)\%$  or greater). A significance level of 0.05, which corresponds to a 95% confidence level, is frequently used as a standard or default value for  $\alpha$  and was used to evaluate trends in groundwater concentrations at the Site. In addition, statistical guidance from the U.S. EPA (1994a) recommends that a significance level of 0.05 be used to ensure adequate statistical power, while limiting the number of false positive results.

A minimum of four data points is generally used for statistical analysis using the Mann-Kendall test, as indicated by U.S. EPA (1998), Gilbert (1987), and Hollander and Wolfe (1973). In addition, U.S. EPA (1986) indicates that a minimum of 4 samples are required for statistical analysis of sample variability.

Letter to Mr. Chan  
Alameda County Department of Environmental Health  
1 March 1999  
Page 3

Groundwater data for gasoline, diesel, and benzene were averaged to obtain a representative concentration for each compound for each year in which data was collected (1995 through 1998). This averaging method allowed for a consistent time interval between data points with which meaningful statistics could be calculated. Consistent with Gilbert's recommendations, concentrations below the laboratory method reporting limit are assigned a common value, generally 0.05 mg/L, equal to the smallest reporting limit for the compound in the data set (Gilbert, 1987).

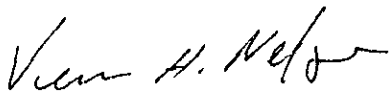
The resulting averaged data, the calculated Mann-Kendall statistic  $S$ , and the significance level  $\alpha$  are provided in Table 1. As can be seen in Table 1, the significance level  $\alpha$  greater than 0.05 in all cases, indicating that no statistically significant upward trend exists in any groundwater monitoring well at the Site. In addition, it is noted that the statistic  $S$  is negative or zero in all cases, indicating that data collected at later times tend to be smaller than or similar to data collected at earlier times. This result confirms prior analyses presented in the Site Report indicating that groundwater concentrations at the Site are stable or potentially decreasing.

However, due to the applied averaging technique, only three data points were available for statistical analysis in several cases, whereas a minimum of four data points is generally used for statistical analysis, as discussed above. The Mann-Kendall test was performed for those cases with fewer than three averaged data values available, but the reliability of the resulting statistic is questionable. Therefore, we recommend that this test be applied again in December 2000 to obtain more reliable results after two additional rounds of groundwater monitoring are performed.

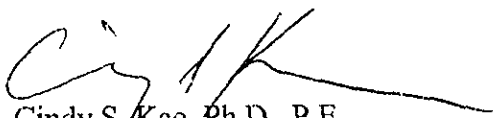
Please contact us if you have any questions.

Very Truly Yours,

ERLER & KALINOWSKI, INC.



Vera H. Nelson, P.E.  
Project Manager



Cindy S. Kao, Ph.D., P.E.  
Environmental Engineer

Letter to Mr. Chan  
Alameda County Department of Environmental Health  
1 March 1999  
Page 4

**Erler &  
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cc: Richard Smooke, Smooke & Sons Investment Co.  
Paul Wren, Smooke & Sons Investment Co  
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## **REFERENCES**

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**Table 1  
Results of the Mann-Kendall Test for Evaluating Upwards Trends  
Utilizing Groundwater Monitoring Data Averaged Yearly  
3925 Alameda Avenue, Oakland, California**

Data Type	Date	Units	TPHG	Diesel	Benzene
Averaged Groundwater Data for MW-1	1995	mg/L	33	7.4	4.5
	1996	mg/L	10	4.0	1.7
	1997	mg/L	11	NA	2.8
	1998	mg/L	6.0	2.5	2.2
<b>S</b>			<b>-4</b>	<b>-3*</b>	<b>-2</b>
<b>α</b>			<b>0.167</b>	<b>-</b>	<b>0.375</b>
<b>Result</b>			<b>no upward trend</b>	<b>-</b>	<b>no upward trend</b>
Averaged Groundwater Data for MW-2	1995	mg/L	7.6	4.7	0.98
	1996	mg/L	5.6	3.0	1.4
	1997	mg/L	10	NA	3.3
	1998	mg/L	3.7	1.3	0.90
<b>S</b>			<b>-2</b>	<b>-3*</b>	<b>0</b>
<b>α</b>			<b>0.375</b>	<b>-</b>	<b>0.625</b>
<b>Result</b>			<b>no upward trend</b>	<b>-</b>	<b>no upward trend</b>
Averaged Groundwater Data for MW-3	1995	mg/L	0.14	1.9	0.00077
	1996	mg/L	0.35	0.10	0.0025
	1997	mg/L	0.26	NA	0.0020
	1998	mg/L	0.15	1.1	0.00071
<b>S</b>			<b>0</b>	<b>-1*</b>	<b>-1</b>
<b>α</b>			<b>0.625</b>	<b>-</b>	<b>0.5</b>
<b>Result</b>			<b>no upward trend</b>	<b>-</b>	<b>no upward trend</b>
Averaged Groundwater Data for MW-4	1996	mg/L	8.5	166	0.53
	1997	mg/L	15	NA	1.0
	1998	mg/L	2.5	0.88	0.074
<b>S</b>			<b>-1*</b>	<b>-1*</b>	<b>-1*</b>
<b>α</b>			<b>-</b>	<b>-</b>	<b>-</b>
<b>Result</b>			<b>-</b>	<b>-</b>	<b>-</b>

Notes:

“NA” indicates value was not analyzed.

\* Corresponds to fewer than four averaged data points.

Hyphen (“-“) indicates information is not available.