ENVIRONMENTAL PROTECTION

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Consulting Engineers and Scientists

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LETTER OF TRANSMITTAL

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

DATE: 1/17/00
PROJ. NO. 980074.01
SUBJECT: 3925 Avenue
Oakland, California

#3586

WE ARE SENDING YOU THE FOLLOWING:

1 Copy - Table 1 from *Addendum 1 to the Report Regarding the 3925 Alameda Avenue Site, Oakland California*, dated 12 April 1999 (enclosed for your reference).

1 Copy - Table 2, which summarizes physical parameter assumptions used to calculate the volatilization factor from soil to outdoor air (VF_{samb}) in the attached Table 1.

1 Copy - Excerpts from three U.S. EPA documents that indicate that the Mann-Kendall test is appropriate for evaluating the statistical significance of potential trends in chemical concentrations.

REMARKS:

Barney: Attached is the information that you requested in your letter to Smooke & Son Investment, dated 19 November 1999. If you have any questions, please call.

COPY TO:

Paul Wren (Smooke & Sons Investment)
Vera Nelson (EKI)

If enclosures are not as noted, please advise us at once.

Very truly yours,

ERLER & KALINOWSKI, INC.

Michael T. Beck

Michael T. Beck, P.E.

Table 1
Application of RBCA Using Modified Depth to Subsurface Benzene Concentrations
3925 Alameda Avenue
Oakland, California

Chemical of Concern	Hypothetical Representative Concentration of COC in Soil, RC (mg/kg)	VF_{samb}; (a) (L/m^3)	Outdoor Air Exposure Point Concentration; (b) (mg/m^3)	Non-Carcinogen Chronic Daily Intake, (c) (mg/kg-day)	Carcinogen Chronic Daily Intake; (c) (mg/kg-day)	Non-Carcinogenic Inhalation Reference Dose; (d) (mg/kg-day)	Carcinogenic Inhalation Slope Factor, (d) $(mg/kg\text{-}day)^{-1}$	Non-Carcinogenic Hazard Index; (e)	Estimated Lifetime Incremental Cancer Risk, (f)
Benzene	12 50	4 0E-04	5.0E-03	9 8E-04	3.5E-04	0 0017	0 029	5 8E-01	1 0E-05
Total Estimated Risks due to Outdoor Inhalation of COCs Volatilized from Soil:								**5.8E-01**	**1.0E-05**

Notes.

(a) Chemical-specific volatilization factors from soil to outdoor air were calculated using the Risk-Based Corrective Action ("RBCA") model (ASTM, 1995)
With the exception of the parameter value for depth to subsurface soil sources, default parameters presented in ASTM (1995) were used in the volatilization model
A value of 9 feet rather than the default value of 3 feet was used to represent depth to subsurface soil sources

(b) The COC exposure point concentration in outdoor air ("EPC") is calculated using the following equation: $EPC = RC * VF_{samb}$.
RC is the hypothetical representative concentration in soil.

(c) Chronic daily intakes ("CDIs") were estimated using methodologies recommended by U.S EPA and Cal-EPA The equation used to calculate the CDI is the following.
$CDI_{inh} = EPC * InhR * EF * ED / (BW * AT)$ (Default values presented by ASTM (1995) were used to calculate CDIs)
where InhR = inhalation rate - 20 m3/d
EF = exposure frequency - 250 d/yr
ED = exposure duration - 25 years
BW = body weight - 70 kg
AT = averaging time - 70 yrs (carcinogen), 25 years (non-carcinogen)

(d) Chronic inhalation reference dose and slope factor were obtained from RBCA (1995).

(e) Non-carcinogenic hazard index ("HI") for compound i is defined as the CDI_i/RfD_i.

(f) Estimated lifetime incremental cancer risk for chemical i is defined as $CDI_i * SF_i$

Table 2
Physical Parameter Assumptions (a)

3925 Alameda Avenue

Oakland, California

Variable	Value	Units	Description
Site Specific Parameters:			
θ_{AS}	0.26	cm^3 air / cm^3 tot	Volumetric air content in vadose zone soil
θ_{WS}	0.12	cm^3 water / cm^3 tot	Volumetric water content in vadose zone soil
θ_T	0.38	cm^3 void / cm^3 tot	Total soil porosity (in vadose zone)
ρ_S	1.70	g soil / cm^3 tot	Soil dry bulk density (in vadose zone)
L_S	274	cm	Depth to subsurface soil sources (91')
U_{AIR}	225	cm / sec	Wind speed above ground surface in ambient mixing zone
δ_{AIR}	200	cm	Ambient air mixing zone height
W	1500	cm	Width of source area parallel to prevailing wind direction (49')
f_{OC}	0.01	g C / g soil	Fraction of organic carbon in soil
Chemical Specific Parameters:			
D^{air}	0.093	cm^2/sec	Diffusion coefficient in air
D^{water}	1.1E-05	cm^2/sec	Diffusion coefficient in water
H	0.22	L-H_2O/L-air	Henry's law constant
k_{OC}	38	cm^3 water/g soil	Organic carbon partion coefficient

✓ this
G 5-2-9
(1.3 ppm B)

Notes:

(a) With the exception of L_s, the physical parameters listed above are default parameters presented in ASTM, 1995, *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites.* American Society for Testing and Materials, Designation E 1739-95, 10 September 1995. Based on site-specific information, 9 feet rather than the default value of 3 feet was used to represent the depth to subsurface soil sources (L_s).

(b) The volatilization factor from soil to outdoor air (VFs_{amb}) was calculated using the parameters listed above and the following equation (ASTM, 1995):

$$VFs_{amb} = \frac{H \times \rho_S \times 10^3 \frac{cm^3 \cdot kg}{m^3 \cdot g}}{\left[\theta_{WS} + (k_{OC} \times f_{OC} \times \rho_S) + (H \times \theta_{AS})\right] \times \left(1 + \frac{U_{AIR} \times \delta_{AIR} \times L_S}{D_S^{eff} \times W}\right)}$$

where:

$$D_S^{eff} = \left[D^{air} \times \frac{(\theta_{AS})^{10/3}}{(\theta_T)^2}\right] + \left[D^{water} \times \frac{(\theta_{WS})^{10/3}}{H \times (\theta_T)^2}\right]$$

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12 April 1999

#3586

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

Subject: Addendum #2 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 letter providing additional information in support of our 1 March 1999 addendum to the report regarding the 3925 Alameda Avenue Site, Oakland, California ("Site Report"). The Site Report was submitted to the Alameda County Department of Environmental Health ("ACDEH") on 19 January 1999. This letter has been prepared at the specific request of ACDEH in response to questions and concerns identified by ACDEH during our telephone conversation on 16 March 1999. The letter has been prepared on behalf of Smooke & Sons Investment Co. and provides:

- the spreadsheet used to further evaluate potential human health risk from volatilization of benzene from soil into outdoor air, as discussed in the 1 March addendum; and

- recommendations regarding time of year to conduct future groundwater monitoring.

1.0 SPREADSHEET FOR FURTHER EVALUATION OF POTENTIAL HUMAN HEALTH RISKS

The 1 March 1999 addendum to the Site Report assessed potential human health risks due to benzene-impacted soils detected at MW-1 and G-5. The relationship between soil benzene concentration and calculated risk was examined using the ASTM (1995) model

for volatilization from subsurface soil sources into outdoor air. Default values were used for all parameters with the exception of the depth to subsurface soil sources (taken as 9 feet bgs based on depths at which elevated benzene concentrations were detected) (see Tables X2.5 and X2.6 in ASTM (1995)). The spreadsheet used for the calculations is shown in Table 1. As discussed in the 1 March addendum, the results of this assessment indicate that a hypothetical representative benzene concentration of 12.5 mg/kg would result in an estimated lifetime incremental cancer risk of 10^{-5}. Multiplying the hypothetical representative benzene concentration by the 29% reduction requested by ACDEH results in an RBSL of 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 RECOMMENDATION REGARDING TIME OF YEAR TO CONDUCT FUTURE GROUNDWATER MONITORING

Smith-Emery Geoservices (1996) suggested that seasonal variations of the groundwater table at the Site have resulted in a "smear zone" of chemicals of concern ("COCs"), i.e., total petroleum hydrocarbon ("TPH") products, at the groundwater table. ACDEH expressed concern that this potential smear zone may influence groundwater sampling results according to the time of the year chosen to perform annual groundwater monitoring. Concentrations of COCs are anticipated to be higher if sampling were to occur when the water table is higher (i.e., within the smear zone) rather than lower (i.e., below the smear zone).

As can be seen in Table 2, which summarizes the analytical groundwater data collected from monitoring wells at the Site, the elevation of the groundwater table at the Site is generally higher in December and March than in June and September. In addition, concentrations of TPH and BTEX detected in March appear to be generally higher than concentrations detected in December. Therefore, we recommend that future proposed groundwater sampling be conducted in March 2000 and March 2001.

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

cc: Richard Smooke, Smooke & Sons Investment Co.
Paul Wren, Smooke & Sons Investment Co
Robert Wyatt, Esq., Beveridge & Diamond LLP

REFERENCES

ASTM, 1995: *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites*, E 1739-95, November 1995, with editorial changes made in December 1996.

EKI, 1999a: Erler & Kalinowski, Inc., *Report Regarding the 3925 Alameda Avenue Site*, 19 January 1999.

EKI, 1999b: Erler & Kalinowski, Inc., *Addendum to the Report Regarding the 3925 Alameda Avenue Site, Oakland, California*, 1 March 1999.

Smith-Emery GeoServices, 1996: *Monitoring Well MW4 Installation and Geoprobe Sampling, 3925 Alameda Avenue, Oakland, California,* prepared for Smooke and Sons Investment Co., 16 December 1995.