

April 18, 1996

Ms. Juliet Shin
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway
Alameda, CA 94502-6577

RE: Potential Human Health Threat
Alameda City Hall, 2263 Santa Clara Avenue, Alameda, California
ACC Job No. 96-6209-3.1

Dear Ms. Shin:

ACC Environmental Consultants, Inc., (ACC) is pleased to provide this letter in response to your letter dated March 5, 1996, regarding the above referenced site.

BACKGROUND

Three underground storage tanks were removed from the site in June 1994 by RGA Environmental, Inc. Overexcavation was performed around tank T-1 to remove impacted soil detected in verification sampling. Because of utilities, a groundwater monitoring well, and the garage building in the vicinity of the tank, overexcavation was limited. However, analytical results indicated nondetectable to minor concentrations of petroleum hydrocarbons in the soil samples collected from the tank T-1 excavation pit. A concentration of 0.63 parts per million (ppm) benzene was detected in one sample (T1-S3) collected from the tank pit excavation at a depth of 9.5 to 10.3 feet below ground surface (bgs). Smith Environmental recommended site closure based on groundwater monitoring at the site since 1987 and nondetectable results since 1989.

REGULATORY RESPONSE

According to your letter, "it appears that the residual concentrations of benzene identified in former tank pit T-1, adjacent to the actively used garage building, may potentially pose a threat to human health through the intrusion of vapors into the building." According to Tier 1 of the American Society for Testing and Materials (ASTM) Risk-Based Corrective Action (RBCA) guidelines, the potential for vapor intrusion into buildings in a commercial/residential area is 0.005 ppm benzene for a 10^{-6} cancer risk and 0.49 ppm for a 10^{-4} cancer risk.

DISCUSSION

ACC feels that, because the concentrations detected on site were minimal, the Tier 1 guidelines are too stringent. The Tier 1 guidelines assume that there is homogeneous soil type, impact within a depth of 3.3 feet bgs, concrete foundation with limited integrity, homogeneous topsoil, and air exchange of 1 exchange per 20 days.

Corrig. ~ 9' bgs.

ENVIRONMENTAL
PROTECTION

Based on ACC's site reconnaissance, the following specific site conditions were noted:

- A 4-inch-thick concrete foundation with good integrity;
- Soil impact was reported at a depth of 9.5 feet bgs, which is 6.2 feet deeper than Tier 1 assumptions;
- The garage is occupied from 8 a.m. to 5 p.m., Monday through Thursday and work is conducted in an open office located within the garage. The office floor is covered with floor tile, which would further restrict vapor intrusion; and
- During regular work hours, the garage is open, allowing for continual air exchange.

ACC evaluated site specific facts by determining the overall risk of leaving TPHg residues in soil at a depth of 6 to 9 feet bgs at the subject site. This was determined by calculating the Area-Weighted Average concentration for benzene of 0.071 to 0.073 mg/kg at the site, which is much less than the single high value of 0.63 mg/kg reported in sidewall sample T1-S3. This average was determined using the Thiessen Polygon Method (Table 1 and Figure 1 attached) (Fetter, C.W. *Applied Hydrogeology*, 3rd edition, 1994, pp 40-44, Macmillan College Publishing Co., New York, New York).

how was this calculated?

Without further discussion, this average concentration of 0.071 to 0.073 mg/kg is less than the 10^{-4} cancer risk value of 0.49 mg/kg and just above the 10^{-5} cancer risk value of 0.049 mg/kg for benzene (the conservative but most widely used risk goal).

Due to the volatile nature of benzene, some portion of the benzene reported in soil sample T1-S3 may volatilize into soil vapor and migrate upward. Unfortunately, it is extremely hard to quantify this number. Common sense tells us soil vapor seeks preferential pathways and the subsurface preferential direction would be toward the 90 cubic yard excavation backfilled with pea gravel and away from the clayey sand under the structure. Multiple retardation factors, including the 4-inch-thick concrete floor and relatively impermeable tile flooring, indicate the actual concentration of benzene that theoretically could volatilize into air space within the building are on the orders of magnitude less than the Area-Weighted Average benzene concentration in soil.

RBCA Tier 2 levels represent a minimal increase in site-specificity and less conservative screening levels. Tier 2 assumes that no mobile free-phase product is present, the dissolved plume is stable, concentrations of constituents in groundwater are decreasing with time, and the movement of the groundwater is slow. The degradation rate for benzene is 0.6% per day (Baker, et al); however, rates may be slower for concentrations below 2.0 ppm.

The shallow aquifer is impacted; however, based on quarterly monitoring conducted at the site, the dissolved plume appears to be stable and groundwater movement is very slow.


Excavation of soils to meet Tier 1 criteria would be expensive due to the relatively low residual concentration in the soil. Active remediation is not cost effective at this site considering the overall cost versus resulting goal. It would be too costly to achieve the maximum contaminant level goal.

The allowances in the Tier 1 guidelines are too conservative to be used as preliminary remediation goals (PRGs) at this site. According to EPA Region IX Preliminary Remediation Goals Second Half dated September 1, 1995, the PRG for benzene concentrations in surface residential soil is 1.4 mg/kg and in surface industrial soil is 3.2 mg/kg. Based on site usage, these are more realistic goals.

Based on the calculated Area-Weighted Averages and the PRGs noted in the EPA document, there is minimal risk to the subject site or its occupants from the residual amount of impact reported within the soils. Therefore, ACC requests that this case be evaluated for "no further action."

If you require additional information, please feel free to call me at (510) 638-8400.

Sincerely,



Misty C. Kaltreider
Project Geologist



David R. DeMent
Senior Geologist

MCK/mcr

Attachments

cc: Mr. Wesley Adams, City of Alameda

TABLE 1 - AREA-WEIGHTED AVERAGE CONCENTRATION
(calculated using the Thiessen Polygon Method)*

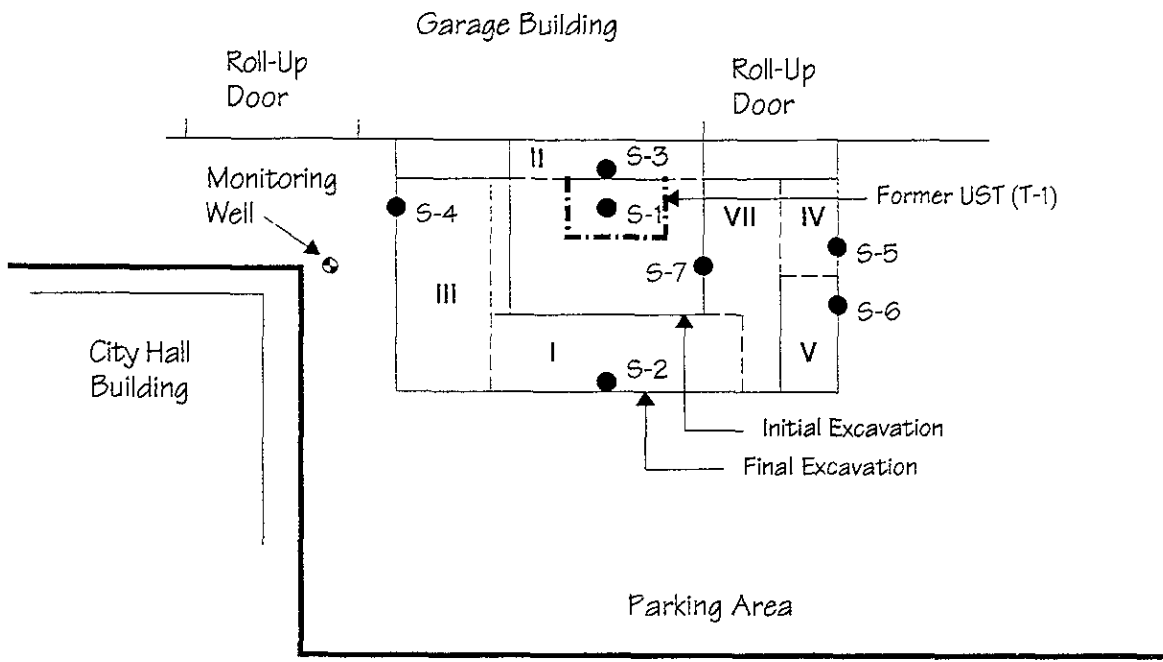
Polygon Element**	Mean Soil Concentration (C _{avg}) mg/kg	Area of Element (A) m ²	A x C _{avg}
I	0.0025	4.83	0.0120
II	0.63	1.86	1.1710
III	0.0025	5.11	0.0127
IV	0.051	1.39	0.0708
V	0.0025	1.67	0.0041
VI	0.0025	2.50	0.0062
TOTALS		17.36 m²	1.276

*Fetter, C.W., *Applied Hydrogeology*, 3rd edition, 1994, pp 40-44, Macmillan College Publishing Co., New York, New York

**Attached Site Plan illustrates polygon areas.

$$\begin{aligned}
 \text{Area-Weighted Average Concentration} &= \frac{(\Sigma A \times C_{avg})}{A_{total}} \\
 \text{using 0.0025 mg/kg for ND results} & \\
 &= \frac{1.276}{17.36} = 0.073 \text{ mg/kg}
 \end{aligned}$$

$$\begin{aligned}
 \text{Area-Weighted Average Concentration} &= \frac{(\Sigma A \times C_{avg})}{A_{total}} \\
 \text{using 0.0 mg/kg for ND results} & \\
 &= \frac{1.242}{17.36} = 0.071 \text{ mg/kg}
 \end{aligned}$$



LEGEND

- S-1 - Sample Locations
- III - Polygon Area

Title: Site Map 2263 Santa Clara Street Alameda, California	
Figure Number: 1.0	Scale: 1" = 10'
Project Number: 96-6209-3.1	Drawn By: SP6
A · C · C ENVIRONMENTAL CONSULTANTS	Date: 4/17/96
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