Chevron

Chevron

Chevron U.S.A. Products Company
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San Ramon, CA 94583
P.O. Box 5004
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Marketing – Northwest Region
Phone 510 842 9500

February 29, 1996

Ms. Eva Chu
Alameda Co. Dept. of Environmental Health
1131 Harbor Bay Pkwy, 2nd Floor
Alameda, CA 94502-6577

Re : Former Chevron Service Station 9-7127
Interstate 580 & Grantline Rd.

Dear Ms. Chu :

The enclosed work plan from Pacific Environmental Group dated February 26, 1996 outlines the tasks associated with the proposed risk assessment. Please review the enclosed work plan. If the work plan meets your approval, please send a written letter to my office approving the work plan. If you have any questions or comments, please call me at (510) 842-8752 or Mark Sullivan at Pacific Environmental Group at (408) 4441-7500.

Sincerely,
Chevron Products Co.

Kenneth Kan
Engineer

LKAN/97127R06

Enclosure

cc : Mr. John Moody, RWQCB-Central Valley Region
3443 Routier Rd., Sacramento, CA 95827-3098

Mr. Ardavan Onsori
2021 Las Positas Ct., Ste. 153, Livermore, CA 94550

Mr. & Mrs. Joe Jess, Jess Ranch
Route 5, Box 704-A, Tracy, CA 95376

Ms. Bette Owen, Chevron Products Co.

PACIFIC
ENVIRONMENTAL
GROUP, INC.

Std 4100

Rejected

① Se soil only for ambient air - should use tables in RBCA-Tier 2

② Do Tier 2 RBCA analysis for indoor and outdoor air. If outdoor risk not exceeded by 10^{-5} then no need to do air monitoring.

February 26, 1996
Project 325-004.1D

Mr. Kenneth Kan
Chevron U.S.A. Products Company
P.O. Box 5004
San Ramon, California 94583

Re: Risk Assessment Work Plan
Former Chevron U.S.A. Service Station 9-7127
Grant Line Road at Interstate 580
Tracy, California

Dear Mr. Kan:

Pacific Environmental Group, Inc. (PACIFIC), on behalf of Chevron U.S.A. Products Company (Chevron), has prepared the following risk assessment work plan (Plan) for the site referenced above. This Plan includes a site background, scope of work, and schedule of activities. PACIFIC proposes to conduct a risk assessment in order to delineate the potential risk from benzene to humans associated with the future development of the site. The risk assessment will provide an analysis of the dissolved groundwater plume as it relates to volatilization and atmospheric dispersion, volatilization and enclosed space accumulation, and groundwater transport.

SITE BACKGROUND

The site is located at the southeast corner of the junction between Grant Line Road and Interstate 580 in Tracy, California (Figures 1 and 2). The site operated as a gasoline service station between 1971 and 1986. The underground storage tanks (USTs) and associated piping were removed in 1991. With the exception of a water-supply well, all site improvements have been removed. The site is currently used for cattle grazing, however it is anticipated that the site will be developed into a gasoline service station in the future.

Based on previous investigations, petroleum hydrocarbon-impacted soil at the site was limited to the vicinity of the former USTs. Overexcavation of impacted soils in the

vicinity of the USTs was performed to remove soils with elevated concentrations of petroleum hydrocarbons. This overexcavation was limited to approximately 14 feet below ground surface (bgs) due to encountered bedrock.

SCOPE OF WORK

The scope of work for the Plan includes two exposure pathways, the ingestion of groundwater from the water-supply well on site and the inhalation of vapors resulting from transport through soils on site. The inhalation scenario will include the analysis of volatilization and atmospheric deposition, and volatilization and enclosed space accumulation. All risk scenarios will be conducted using a commercial exposure to humans from benzene. Benzene was chosen due to its carcinogenic nature and because it provides the most conservative values. The cancer risk for these scenarios will be set at one in one million.

The Plan will be carried out using the American Society for Testing and Materials' (ASTMs) *Standard Guide for Risk Based Corrective Action Applied at Petroleum Release Sites* (RBCA) framework when possible. The actual on-site benzene concentrations will be compared to RBCA's Tier 1: Risk Based Screening Levels (RBSL) found within RBCA Table X2.1, which presents the Example Tier 1 RBSL Look-Up Table. No other portions of the RBCA Worksheets will be completed for this risk assessment.

Regarding the enclosed space pathway scenario, actual on-site concentrations can not be collected. In this case, a model will be used in order to calculate the potential benzene concentrations in the enclosed space. This concentration will then be used to calculate the possible risk associated with the inhalation of benzene in a commercial exposure.

Ingestion

The groundwater ingestion scenario will be based on groundwater quality from the water-supply well. The proposed exposure scenario is a human ingesting water from the water-supply well at a rate of 1 liter of water per day for 70 years. Currently, the water supply well is not being used as a source of drinking water and it is not anticipated to be used as such. However, the ingestion pathway will be examined for this well in order to provide a greater understanding of the risks associated with the ingestion of groundwater form the on-site water supply well.

The water-supply well was sampled weekly for a period of 45 weeks during 1993 (Table 1). During this time, benzene was detected only once at a concentration of 0.8 parts per billion (ppb). While it is possible that this 0.8 ppb benzene detection was

anomalous, this concentration will be used to conduct the risk assessment in order to provide for the most conservative case scenario. This benzene concentration will be compared to RBCA's RBSL exposure scenario for a commercial groundwater ingestion of benzene as provided for in Section X2.1 of the ASTM Standard Guide for RBCA.

Inhalation

Outdoor Air. In order to obtain the outdoor benzene vapor concentrations, dedicated samplers will be used to calculate the ambient benzene concentrations above Monitoring Wells MW-1 and MW-3. The dedicated sampler is a pump which draws air through a carbon filter. Hydrocarbons drawn through the sampler adsorb to the carbon; these hydrocarbons are then extracted from the carbon in the laboratory and the benzene concentration can then be calculated.

Three dedicated samplers will be left at the site, one at each monitoring well, and one upgradient from the plume in a control location selected for topographical and surface feature similarities to the test well locations. All three samplers will be activated for a period of 8 hours. After this time period, the carbon within the dedicated sampler will be sent to a state-certified analytical laboratory for analysis. The highest benzene concentration, less any concentrations detected in the control sample, will be used in the outdoor inhalation risk assessment scenario. Table X2.1 of RBCA presents the pertinent RBSL Look-up Table equations for Tier 1 RBSLs. As defined by the equations presented in Table X2.2 of RBCA, this proposed exposure scenario is a human inhaling in ambient (outdoor) air near Monitoring Wells MW-1 and MW-3 at a rate of 20 cubic meters per day for a period of 70 years.

Enclosed Space Air. Since there are no enclosed spaces currently present on site, the predicted benzene concentration in the air of an enclosed space must be calculated (Attachment A). The model which will be used involves applying the highest groundwater concentration of benzene from Monitoring Wells MW-1 and MW-3 and applying Henry's Law, as referenced in ASTM's RBCA, in order to determine the benzene concentration in the air at the groundwater-air interface. This concentration will then be placed in Farmer's equation from *A Seasonal Soil Compartment Model* (SEASOIL) by the Environmental Protection Agency. This will establish the benzene concentration flux across the surface, which will then be used to determine the benzene concentration in an enclosed space with a crack factor of 0.01. The crack factor, obtained in ASTM's RBCA, is used as a estimation of the possible conduits for vapor transport through soils into buildings. This resulting concentration will be placed in a risk equation to determine the carcinogenic risk from benzene concentration in an enclosed space. The model is as follows:

1. The highest concentration of benzene in Monitoring Well MW-1 and MW-3 will be used to determine the concentration of benzene in soil vapor. This assumption overestimates the potential health risks to employees or customers at a commercial site.
2. Volatilization of dissolved benzene will be determined using Henry's Law, as referenced in ASTM's RBCA. The value obtained will provide a maximum benzene concentration in air at the groundwater-air interface.
3. Farmer's equation will be used to determine the benzene flux from the groundwater-air interface through the soil cover.
4. The soil diffusion coefficient for benzene will be related to the air diffusion coefficient for benzene using a Farmer's equation from SEASOIL.
5. The background concentration of benzene in air will be calculated using the personal sampler as described above.
6. All risk equation exposure parameters will be taken from ASTM's RBCA Table X2.4.

References for the model are provided at the end of this letter.

Evaluation of Data

The RBCA ingestion of groundwater framework will be applied to the water supply well to determine whether groundwater concentrations of benzene exceed the concentrations presented in the RBSLs for dissolved benzene. Analytical data from the ambient air survey will be utilized to determine whether ambient benzene concentrations exceed the concentrations presented in the RBSLs for benzene concentrations in air. Likewise, the enclosed space air model will be applied to site conditions to determine whether enclosed space benzene concentrations exceed the concentrations presented in the RBSLs for benzene concentrations in air. This information will be utilized to determine whether a vapor barrier is required at the site. These results will be tabulated and included in the final risk assessment report.

SCHEDULE OF ACTIVITIES

Upon approval of this Plan by Chevron and the Alameda County Health Care Services Agency, PACIFIC will perform the field work within 2 weeks. The completed risk

assessment will be submitted to Chevron within 4 weeks after the field work has been completed.

If you have any questions or comments regarding this Plan, please call.

Sincerely,

Pacific Environmental Group, Inc.

Michelle Shipp
Senior Staff Scientist

Mark Sullivan
Project Manager

REFERENCES

American Society for Testing and Materials. *Risk Based Corrective Action Applied at Petroleum Release Sites: E 1739 - 95.* November 1995.

United States Environmental Protection Agency, A *Seasonal Soil Compartment Model*, Bonazountas, M. and Wagner, J. May 1984.

United States Environmental Protection Agency, *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part A.:* December 1989.

Attachments: Table 1 - Water-Supply Well Analytical Data
Figure 1 - Site Location Map
Figure 2 - Site Map
Attachment A - Inhalation of Groundwater Vapors in Enclosed Spaces

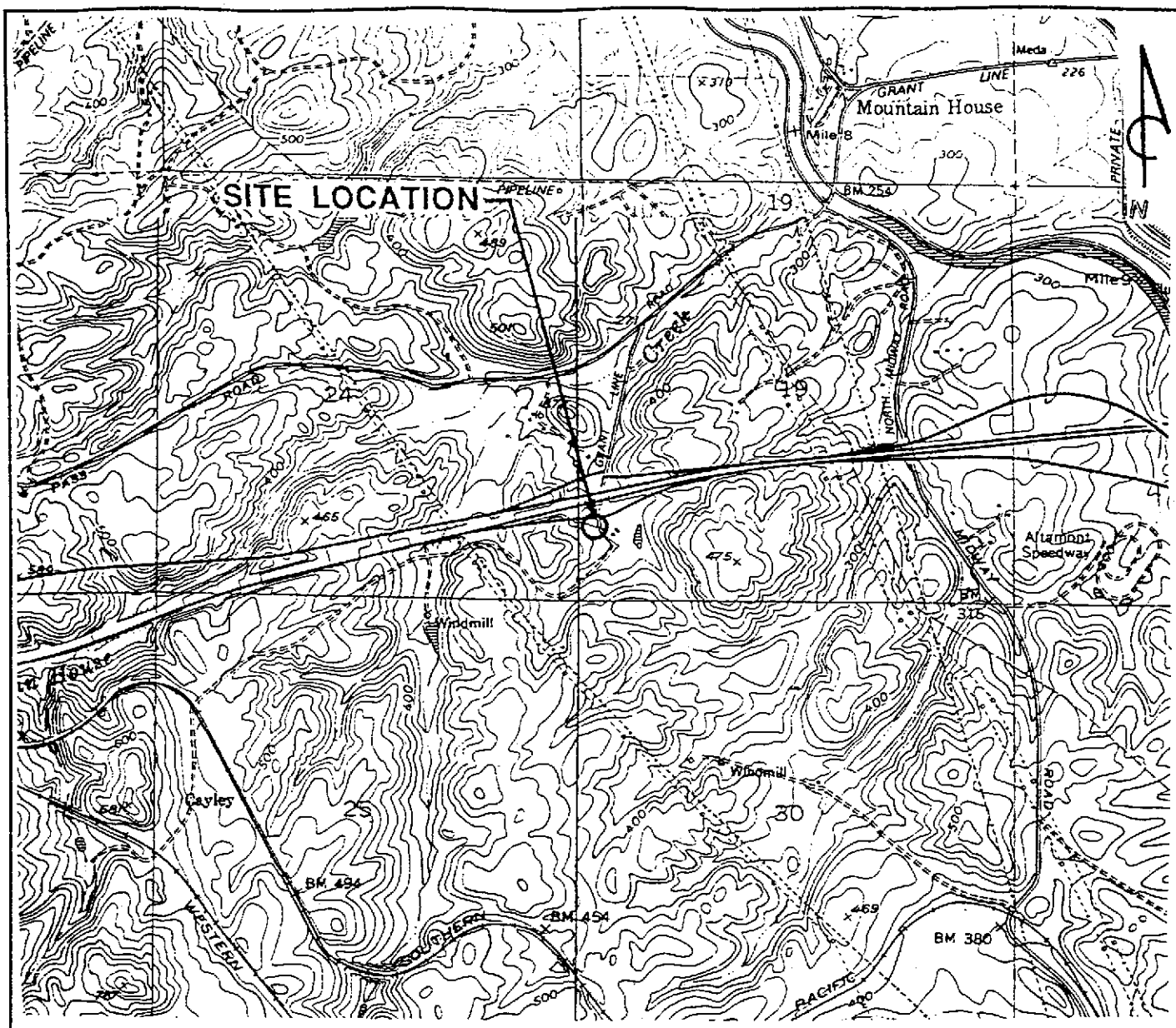
cc: Ms. Eva Chu, Alameda County Health Care Services Agency

Table 1
Water-Supply Well Analytical Data
Total Petroleum Hydrocarbons
(TPPH as Gasoline and BTEX Compounds)

Former Chevron U.S.A. Service Station 9-7127
Grant Line Road at Interstate 580
Tracy, California

Date Sampled	TPPH as Gasoline (ppb)	Benzene (ppb)	Toluene (ppb)	Ethyl-benzene (ppb)	Xylenes (ppb)
01/07/93	<50	<0.5	<0.5	<0.5	<0.5
01/22/93	<50	<0.5	<0.5	<0.5	<0.5
01/29/93	<50	<0.5	**3**	<0.5	**2**
02/04/93	<50	<0.5	<0.5	<0.5	<0.5
02/12/93	<50	<0.5	<0.5	<0.5	<0.5
02/19/93	<50	<0.5	<0.5	<0.5	<0.5
02/26/93	<50	<0.5	<0.5	<0.5	<0.5
03/04/93	<50	<0.5	<0.5	<0.5	<0.5
03/11/93	<50	<0.5	<0.5	<0.5	<0.5
03/19/93	<50	**0.8**	<0.5	<0.5	<0.5
03/25/93	<50	<0.5	<0.5	<0.5	<0.5
04/01/93	<50	<0.5	<0.5	<0.5	<0.5
04/08/93	<50	<0.5	<0.5	<0.5	<0.5
04/15/93	<50	<0.5	<0.5	<0.5	<0.5
04/23/93	<50	<0.5	<0.5	<0.5	<0.5
04/29/93	<50	<0.5	<0.5	<0.5	<0.5
05/07/93	<50	<0.5	<0.5	<0.5	<0.5
05/13/93	<50	<0.5	<0.5	<0.5	<0.5
05/20/93	<50	<0.5	<0.5	<0.5	<0.5
05/21/93	<50	<0.5	<0.5	<0.5	<0.5
06/04/93	<50	<0.5	<0.5	<0.5	<0.5
06/11/93	<50	<0.5	<0.5	<0.5	<0.5
06/18/93	<50	<0.5	<0.5	<0.5	<0.5
06/24/93	<50	<0.5	<0.5	<0.5	<0.5
07/01/93	<50	<0.5	<0.5	<0.5	<0.5
07/08/93	<50	<0.5	<0.5	<0.5	<0.5
07/16/93	<50	<0.5	<0.5	<0.5	<0.5
07/23/93	<50	<0.5	<0.5	<0.5	<0.5
07/29/93	<50	<0.5	<0.5	<0.5	<0.5
08/05/93	<50	<0.5	<0.5	<0.5	<0.5
08/12/93	<50	<0.5	<0.5	<0.5	<0.5
08/19/93	<50	<0.5	<0.5	<0.5	<0.5
08/26/93	<50	<0.5	<0.5	<0.5	<0.5
09/02/93	<50	<0.5	<0.5	<0.5	<0.5
09/09/93	<50	<0.5	<0.5	<0.5	<0.5
09/17/93	<50	<0.5	<0.5	<0.5	<0.5
09/23/93	<50	<0.5	<0.5	<0.5	<0.5
10/01/93	<50	<0.5	<0.5	<0.5	<0.5
10/07/93	<50	<0.5	<0.5	<0.5	<0.5
10/15/93	<50	<0.5	<0.5	<0.5	<0.5
10/21/93	<50	<0.5	<0.5	<0.5	<0.5
10/28/93	<50	<0.5	<0.5	<0.5	<0.5
11/05/93	<50	<0.5	<0.5	<0.5	<0.5
11/11/93	<50	<0.5	<0.5	<0.5	<0.5

TPPH = Total purgeable petroleum hydrocarbons
ppb = Parts per billion



QUADRANGLE LOCATION

REFERENCES:

USGS 7.5 MIN. TOPOGRAPHIC MAP
TITLED: MIDWAY, CALIFORNIA
DATED: 1953 REVISED: 1980
TITLED: CLIFTON COURT FOREBAY, CALIFORNIA
DATED: 1978

SCALE IN FEET

2000 0 2000

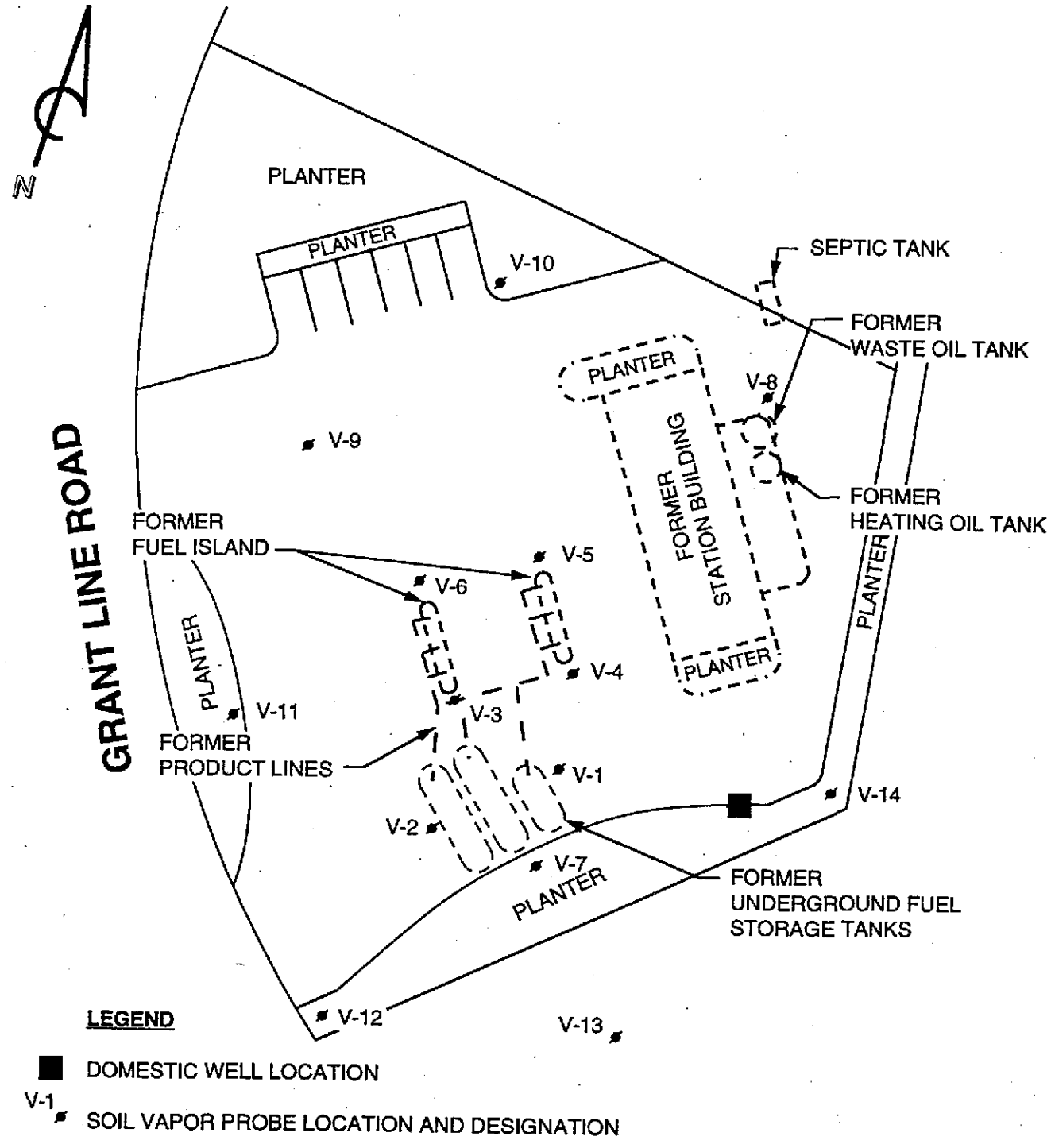
PACIFIC ENVIRONMENTAL GROUP, INC.

FORMER CHEVRON U.S.A. SERVICE STATION 9-7127
Grant Line Road at Interstate 580
Tracy, California

SITE LOCATION MAP

FIGURE: 1

PROJECT: 325-004.1D



PACIFIC ENVIRONMENTAL GROUP, INC.	**FORMER CHEVRON U.S.A. SERVICE STATION 9-7127** Grant Line Road at Interstate 580 Tracy, California **SITE MAP**	FIGURE: **2** PROJECT: 325-004.1D

ATTACHMENT A

INHALATION OF GROUNDWATER VAPORS IN ENCLOSED SPACES

Table 1
Inhalation of Groundwater Vapor in Enclosed Spaces

Determine Benzene Concentration in Air at Groundwater-Air Interface Based on Groundwater Concentration of X mg/L

what is Hb? Pt?

Using Henry's Law: **Yb = (Hb*Xb)/Pt**

Xb = (µg B / L)*(g B / 1E-6 µg)*(mol B / 78.11 g B)*(L W / 1000g W)*(18g W / mol W)

Where: B = Benzene Concentration in groundwater µg/L
Molecular Weight of Benzene = 78.10 g Benzene

Xb = 0.00E+00 moles B / moles W

Yb = [(309.2 atm / mol)*(4.61E-8 mol B / moles W)] / atm

Where: B = Benzen 4.61E-08 mole B / mole W
309.02 atm/mole fraction
A = Air W = Water

Yb = moles B / moles A

Converting moles to µg/L

Yb = (1.43E-5 mol B/mol A)*(78.11 g B/mol B)*(mol A/29 g A)*(1.29 g A/L A)*(1E6 µg B/g B)

Where: B = Benzene
A = Air

Yb = µg/L
Yb = µg/L

Yb = µg/mL

Table 2
Inhalation of Groundwater Vapors in Enclosed Spaces

Determine Benzene Flux Across the Surface
Using SEASOIL and Farmer's Equations:

$$P = \frac{[DA*(((n-ms)^{3.33} / (n^2))]*[((CATM - Yb) / L) * T] * CF}{H}$$

Where:
CA = Benzene Concentration in Air at Groundsurface [mg/cu. m]
DA = Steady State Diffusion Coefficient in Air (Benzene) [sq. cm/s]
n = Soil Porosity [fraction]
ms = Soil Moisture [fraction]
CATM = Benzene Concentration in Background Surface Air [mg/ml]
Yb = Benzene Concentration in Air at Groundwater -Air Interface [mg/ml]
L = Depth of Soil Cover [cm]
CF = Conversion Factor [ml/cu. cm]

Values:		
DA =	0.077	sq. cm/s
n =	0.25	
ms =	0.2	
CATM =		µg/ml
Yb =		µg/ml
L =		cm
CF =	1.00	ml/cu. cm

Solution: **P = µg/sq. cm s**

Table 3
Inhalation of Groundwater Vapors in Enclosed Spaces

Benzene Concentration in Enclosed Space with a Crack Factor of 0.01

$$CES = \frac{P * A * CF * RR}{V}$$

Where:	CES =	Concentration of Benzene in Enclosed Space [µg/cu. m]
	P =	Pollutant flux across surface [µg/sq. cm s]
	A =	Area of house [sq. cm]
	CF =	Crack Factor
	RR =	Recirculation Rate [times/day - transformed to seconds]
	V =	Volume of house [cu. m]

Values:	P =		µg/sq. cm s
	A =	1.86E+07	sq. cm
	CF =	0.01	sq.cm cracks/sq.cm total area
	RR =	7200	s
	V =	448	cu. m

Solution:

CES =	0.000	µg/cu. m
CES =	**0.00E+00**	**mg/cu. m**

Table 4
Inhalation of Groundwater Vapors in Enclosed Spaces

EQUATION:

$$\textbf{RISK} = \frac{CA * IR * ET * ED * EF * SF}{BW * AT}$$

Where:	CES =	Benzene Concentration in Enclosed Space [mg/cu. m]
	IR =	Inhalation Rate [cu. m/hr]
	ET =	Exposure Time [hr/day]
	ED =	Exposure Duration [years]
	EF =	Exposure Frequency [days/year]
	SF =	Slope Factor [kg day/mg]
	BW =	Body Weight [kg]
	AT =	Averaging Time [days]

Values:	CES =		mg/cu. m
	IR =	0.83	cu. m/hr
	ET =	15.36	hr/day
	ED =	70	yr
	EF =	365	days/yr
	SF =	0.029	kg day/mg
	BW =	70	kg
	AT =	25550	days

Solution:

RISK = 0.00E+00