A Report Prepared For:

Mr. Harvey L. Grohs
2505 South 252nd.
Kent, Washington 98032

SUBSURFACE GAS SAMPLING
JACK-IN-THE-BOX RESTAURANT NUMBER 8459
SOUTHWEST CORNER OF PACIFIC HIGHWAY SOUTH AND SOUTH 252ND
KENT, WASHINGTON

Kleinfelder Job Number 60-1092-03

Prepared By:

Rory L. Galloway

Rory L. Galloway, RG
Senior Project Manager

Reviewed By:

Robert Zenobia for

Brad C. Kleinfelder, REA
Regional Manager

KLEINFELDER, INC.
1200 112th Avenue, N.E., Suite C226
Bellevue, Washington 98004
Phone: (206) 451-2877

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1.0 INTRODUCTION

Mr. Harvey Grohs authorized Kleinfelder to perform subsurface gas sampling exploration for the proposed Jack in the Box restaurant, store number 8459. The property is located at the southwest corner of Pacific Highway South and South 252nd Street in Kent, Washington (see Plate 1 for regional location). Our work was intended to identify the volatile organic gases detected during a previous exploration of the property, Kleinfelder Report number 60-1092-02, dated December 6, 1990. Our work was performed in accordance with our proposal number YP0166CE.WK3, dated December 7, 1990.

2.0 BACKGROUND

In the early part of 1990, Foodmaker, Inc. contracted the services of Associated Earth Sciences, Inc. (AESI) to perform a geotechnical engineering investigation of the site (report dated February 9, 1990). Kleinfelder was authorized, during this same time period, to perform a preacquisition environmental site assessment (PESA report dated February 16, 1990). During Kleinfelder's investigation, we reviewed the AESI report, which stated that gasoline odors were noted during geotechnical drilling activities in one of the soil borings. This information indicated the possible presence of gasoline or other hydrocarbon fuels in the site soils. Kleinfelder also identified that the Midway Landfill, a National Priority Listed (Superfund) site, is located approximately 1,000 feet to the northeast. This landfill has documented ground-water contamination and methane-gas migration problems.

Kleinfelder was authorized to perform a limited soil vapor survey of the property (Soil Vapor Survey Report, dated September 28, 1990). High flame-ionization-detector readings (greater than 1000 ppmv in six of the nine original soil vapor probes) indicated the on-site soils contain some form of flammable gas, possibly methane, gasoline, or other volatile hydrocarbons.

Subsequently, a subsurface soil-sampling program was completed to collect additional site information. The subsurface exploration of the property included drilling four borings (SB-01 through SB-04), collecting soil samples from each borehole, chemical analysis of the sample from each boring suspected to contain the highest concentration of volatile organics and/or petroleum hydrocarbons, and two additional soil vapor probes. No free ground water was observed during drilling.

Laboratory analyses of soil samples, collected during the drilling program on October 19, 1990, indicate that total petroleum hydrocarbons (TPH) are present in the soils. Three of the four TPH sample results were below the current Washington State Department of Ecology (WDOE) action level of 100 parts per million (ppm) for gasoline. All of the samples analyzed showed TPH concentrations less than the current 200 ppm standard for diesel. Volatile organics were not detected in the four analyzed soil samples. However, high flame-ionization-detector and explosimeter readings were observed in the two additional soil vapor probes. These findings again indicate the on-site soils contain some form of gas, possibly methane, gasoline or other volatile hydrocarbons. The results of this exploration were presented in our Subsurface Exploration Report, dated December 6, 1990.

Based on our knowledge of the site, we concluded that the detected concentrations of subsurface gas may be caused by any combination of the following: the result of decomposition of organic debris in the on-site fill soils; the presence of gasoline/diesel fuels in the on-site fill soils; or the migration of gases from the Midway Landfill.

Given the findings of the above described explorations, we proposed the collection and laboratory analysis of the subsurface gas samples to identify which gases were present. The results of this exploration are presented in this report.

3.0 SITE EXPLORATION ACTIVITIES

Kleinfelder collected three subsurface soil vapor samples on December 11, 1990. This work was performed to identify and quantify the elevated concentrations of soil gases noted during the previous subsurface explorations and the vapor-probe survey. Field methods are presented in Appendix A of this report.

Three soil vapor probes were installed at the locations shown on Plate 2. Soil vapors were drawn into Summa canisters (stainless steel, vacuum, sample bottles) and submitted to an analytical laboratory for volatile organic compounds (EPA Method 8240). The samples also were analyzed for methane and volatile total petroleum hydrocarbons. The results of the sample analyses are discussed in Section 4.1 of this report and summarized on Tables 1 and 2. The analytical laboratory report is presented as Appendix B of this report.

4.0 DISCUSSION AND CONCLUSIONS

Based on the findings of this exploration and previous explorations, we have come to the following conclusions concerning the presence of volatile organic and hydrocarbon contamination on the subject site.

4.1 Previous Site Explorations

1. Volatile organic compounds were not detected by laboratory analyses (EPA Method 8240) of the submitted soil samples.

2. Total petroleum hydrocarbons (EPA Method 418.1) were detected in samples from all four borings.

3. Three of the four TPH sample results were below WDOE action level of 100 ppm, the current cleanup standard for gasoline. All of the samples analyzed showed TPH concentrations less than the 200 ppm, the current cleanup standard for diesel.

4. High flame-ionization-detector readings (greater than 1000 ppmv in six of the nine original soil vapor probes) and elevated explosimeter readings (observed in the two additional soil vapor probes) indicate the on-site soils contain some form of flammable gas, possibly methane, gasoline, or other volatile hydrocarbons.

5. Based on our knowledge of the site, we concluded that the detected flammable gas concentrations may be the result of: decomposition of organic debris in the on-site fill soils; presence of gasoline/diesel fuels in the fill soils; or migration of gases from the Midway Landfill.

4.2 This Exploration

1. Methane was detected in elevated concentrations in each of the three soil vapor samples, collected on December 11, 1990. The highest concentration of methane, 42,937 ppm (parts per million) in sample A0312110, equates to a concentration of 4.29

percent. The LEL (lower explosive limit, or lowest concentration that could ignite) for methane in air is reported to be 5.3 percent. Therefore, the elevated concentrations of methane detected in the gas samples represent a risk to the property.

a. Based on our observations during site explorations, fill soils appear to contain only small quantities of organic material. Therefore, the fill soils do not appear to be the source of the discovered concentrations of methane.

b. Kleinfelder believes the methane gas could be coming from the Midway Landfill, which has a history of methane gas migration problems. However, this possibility cannot be confirmed at this time due to the lack of subsurface information for properties located between the Midway Landfill and the subject property.

c. If methane gas is migrating onto the subject property, current information cannot predict whether concentrations will increase, decrease, or remain constant over time.

2. Numerous petroleum-hydrocarbon compounds, which are generally ingredients of petroleum fuels such as gasoline and diesel, were detected in elevated concentrations in each of the three soil vapor samples. In addition, the organic solvents acetone and 2-hexanone (compounds not common to gasoline or diesel fuel) also were detected in the three samples in elevated concentrations (acetone was not detected in sample A0112110).

a. It is possible that the discovered petroleum-hydrocarbon compounds, and the organic solvents acetone and 2-hexanone, may be migrating onto the property from an off-site source. However, this possibility cannot be confirmed at this time due to the lack of subsurface information regarding off-site properties.

b. Based on the detected TPH concentration in soil samples submitted to the analytical laboratory, on-site fill soils cannot be ruled out as a possible source of these compounds.

5.0 RECOMMENDATIONS

Kleinfelder recommends that a copy of this report be forwarded to the WDOE project manager for the Midway Landfill. The submittal of this report may allow the WDOE to address the potential gas migration from the landfill and to provide any information regarding development restrictions the WDOE may place on the property.

6.0 LIMITATIONS

Kleinfelder has performed this work in accordance with the generally accepted standards of care that exist in the state of Washington at the time of this study. Judgements leading to conclusions and recommendations are generally made with an incomplete knowledge of the subsurface and historical conditions applicable to the study area. More extensive studies including additional site exploration, soil and ground-water sampling, and chemical analyses may be used to supplement the information presented by this study. Kleinfelder should be notified for additional consultation if Mr. Harvey L. Grohs or Foodmaker, Inc., wishes to reduce uncertainties beyond the level associated with this study. Our assessment of the property may also change as new data become available during additional site exploration, remediation, or development. No warranty, express or implied, is made.

Since site activities and regulations beyond our control could change at any time after the completion of this report, our observations, findings and opinions can be considered valid only as of the date of the report.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on site and off site) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Kleinfelder of such intended use by executing the "Application for Authorization to Use" which follows this document as an Appendix. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements be the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

TABLE 1
SOIL VAPOR SAMPLES
METHANE AND TOTAL PETROLEUM HYDROCARBONS (1)

SOIL VAPOR PROBE #	A01	A02	A03
SAMPLE #	A0112110	A0212110	A0312110
DEPTH (FT)	7.5	5.0	10.0
UNITS: PPM			
METHANE	21,432	42,117	42,937
UNITS: MG/M3			
TOTAL PETROLEUM HYDROCARBONS	251	464	466

(1) Volatile TPH Purge/Trap. Units: MG/M3, Milligrams per Cubic Meter

ATI# 90-7750A

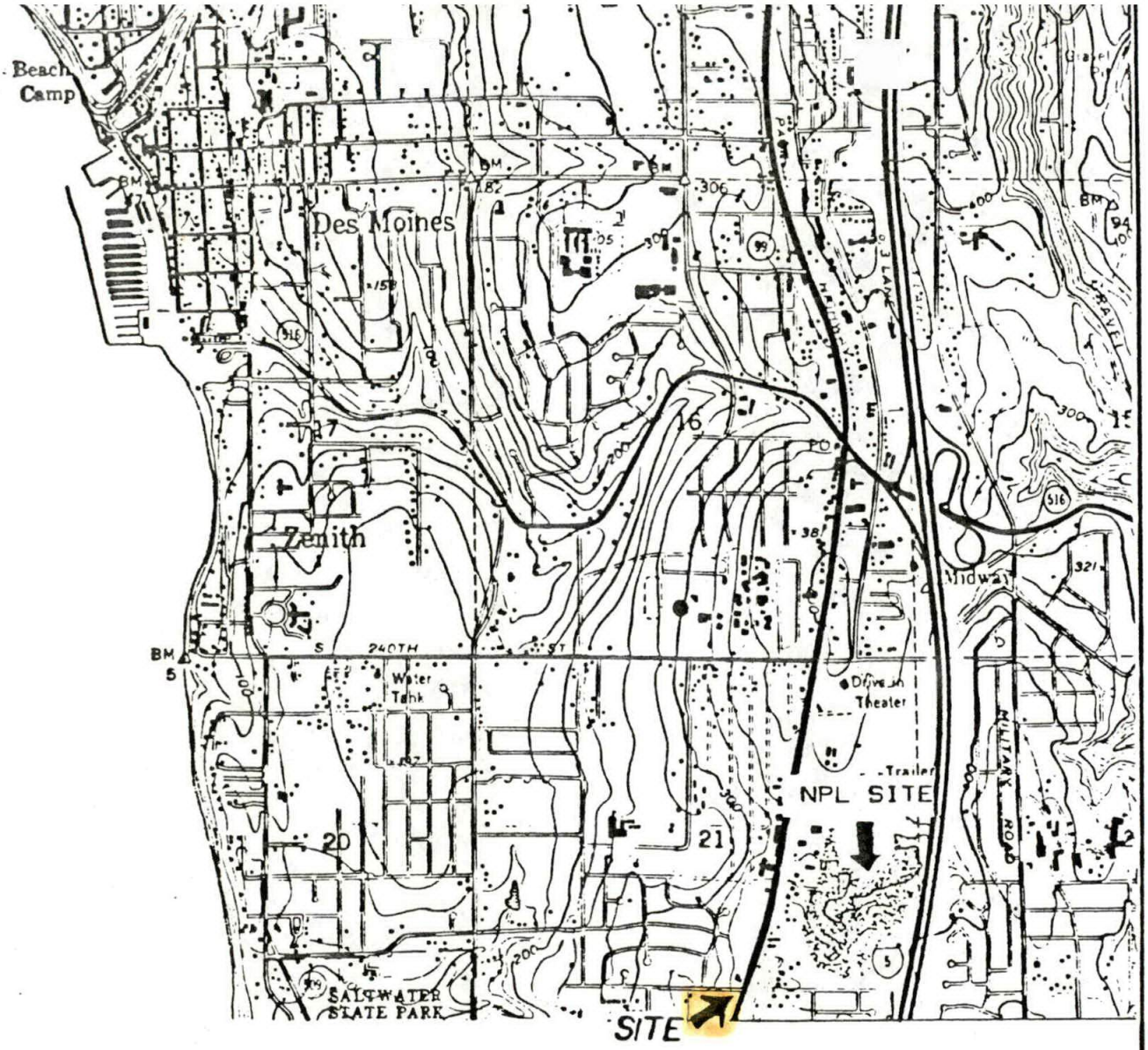
109203T1.WK3

TABLE 2
SOIL VAPOR SAMPLES
VOLATILE ORGANIC ANALYSIS (1)

SOIL VAPOR PROBE # / SAMPLE # / DEPTH (FT)	A01 A0112110 7.5	A02 A0212110 5.0	A03 A0312110 10.0	DETECTION LIMIT
COMPOUNDS (Units: MG/M3)				
ACETONE	*	85	2159	2.0
ACROLEIN	*	*	*	20.0
ACRYLONITRILE	*	*	*	20.0
BENZENE	*	*	54	0.2
BROMODICHLOROMETHANE	*	*	*	0.2
BROMOFORM	*	*	*	0.4
BROMOMETHANE	*	*	*	0.2
2-BUTANONE (MEK)	*	*	*	0.8
CARBON DISULFIDE	*	*	*	0.2
CARBON TETRACHLORIDE	*	*	*	0.4
CHLOROBENZENE	*	*	*	0.2
CHLOROETHANE	*	*	*	0.2
2-CHLOROETHYL VINYL ETHER	*	*	*	1.0
CHLOROFORM	*	*	*	0.4
CHLOROMETHANE	*	*	*	0.4
DIBROMOCHLOROMETHANE	*	*	*	1.0
DIBROMOMETHANE	*	*	*	1.0
DICHLORODIFLUOROMETHANE	*	*	*	1.0
1,1-DICHLOROETHANE	*	*	*	0.2
1,2-DICHLOROETHANE	*	*	*	0.4
1,1-DICHLOROETHENE	*	*	*	0.2
1,2-DICHLOROETHENE (TOTAL)	*	*	*	1.0
1,2-DICHLOROPROPANE	*	*	*	0.4
CIS-1,3-DICHLOROPROPENE	*	*	*	0.2
TRANS-1,3-DICHLOROPROPENE	*	*	*	0.2
1,4-DICHLORO-2-BUTENE	*	*	*	1.0
ETHANOL	*	*	*	10.0
ETHYLBENZENE	8	*	38	0.2
ETHYL METHACRYLATE	*	*	*	1.0
2-HEXANONE (MBK)	587	382	1680	0.8
IODOMETHANE	*	*	*	1.0
METHYLENE CHLORIDE	*	*	*	0.8
4-METHYL-2-PENTANONE (MIBK)	*	*	*	0.8
STYRENE	*	*	*	0.4
1,1,2,2-TETRACHLOROETHANE	*	*	*	0.4
TETRACHLOROETHENE	*	*	*	0.2
TOLUENE	*	*	211	1.0
1,1,1-TRICHLOROETHANE	*	*	*	1.0
1,1,2-TRICHLOROETHANE	*	*	*	0.4
TRICHLOROETHENE	*	*	*	0.2
TRICHLOROFLUOROMETHANE	*	*	*	0.2
1,2,3-TRICHLOROPROPANE	*	*	*	1.0
VINYL ACETATE	*	*	*	0.4
VINYL CHLORIDE	*	*	*	0.2
TOTAL XYLENES	24	*	155	0.8
TENTATIVELY IDENTIFIED COMPOUNDS				
2-METHYL PROPANE	*	*	105	NR
(DOT) CYCLOHEXANE	*	*	54	NR
METHYL CYCLOPENTANE	*	*	117	NR
2,3-DIMETHYL BUTANE	*	*	45	NR
2,2,3-TRIMETHYL HEXANE	*	70	*	NR
3-METHYL PENTANE	*	*	111	NR
1,3-DIMETHYL-TRANS-CYCLOPENTANE	144	99	*	NR
1,3-DIMETHYL-TRANS-CYCLOPENTANE	*	*	92	NR
METHYL CYCLOHEXANE	137	46	91	NR
2,4-DIMETHYL PENTANE	143	116	58	NR
3-METHYL HEXANE	278	191	109	NR
1,1,3-TRIMETHYL CYCLOPENTANE	230	*	*	NR
2,4-DIMETHYL HEXANE	135	76		NR
2,2,3,4-TETRAMETHYL PENTANE	*	374	151	NR
2,2,3,4-TETRAMETHYL PENTANE	587	*	*	NR
3-METHYL HEXANE	373	144	*	NR
2,3,4-TRIMETHYL HEXANE	182	72	*	NR
2,4-DIMETHYL HEXANE	*	*	32	NR
2,5-DIMETHYL HEXANE	200	76	*	NR
2,5-DIMETHYL HEXANE	*	*	35	NR
3-ETHYL-2-METHYL HEXANE	164	*	*	NR
3,5-DIMETHYL OCTANE	156	*	*	NR
4-ETHYL-2-METHYL HEXANE	*	*	38	NR
2,2,5-TRIMETHYL HEXANE	128	35	*	NR

(1) EPA Method 8240. Units: MG/M3, Milligrams per Cubic Meter
* Not Detected
NR Not Reported

ATI # 90-7750
109203T2.WK3



REFERENCE: USGS TOPOGRAPHIC MAP
DES MOINES, WASHINGTON QUADRANGLE
PHOTOREVISED 1981

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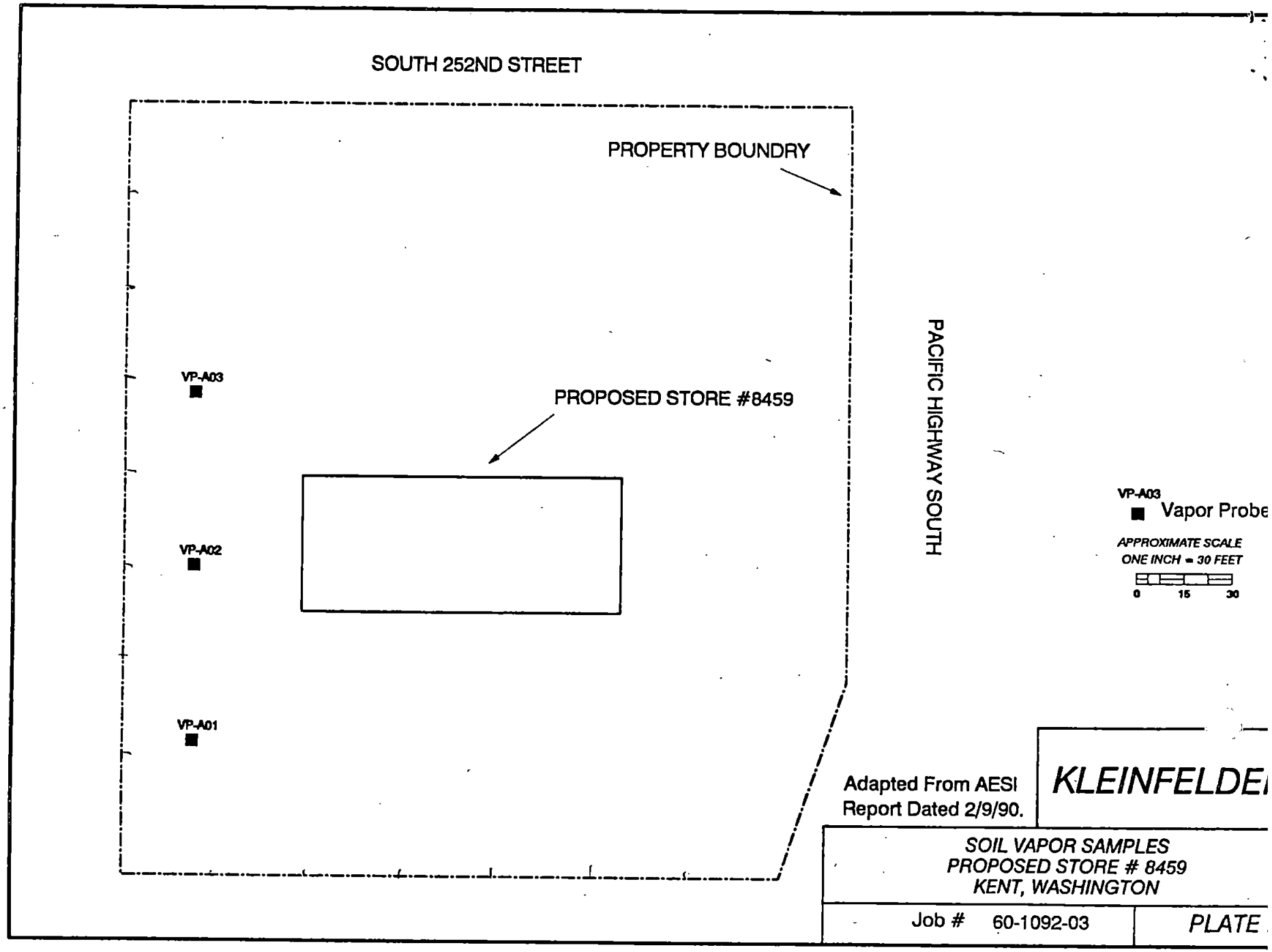
SCALE 1 INCH = 2000 FEET

KLEINFELDER	NPL SITES NEAR PACIFIC HIGHWAY S. and S. 252nd KENT, WASHINGTON	
	Job # 60-1092-02	PLATE 1



Adapted From AESI
Report Dated 2/9/90.

KLEINFELDE

SOIL VAPOR SAMPLES
PROPOSED STORE # 8459
KENT, WASHINGTON

Job # 60-1092-03

PLATE