Non-Petroleum Vapor Intrusion (VI) Evaluation for UST Low-Risk Closure

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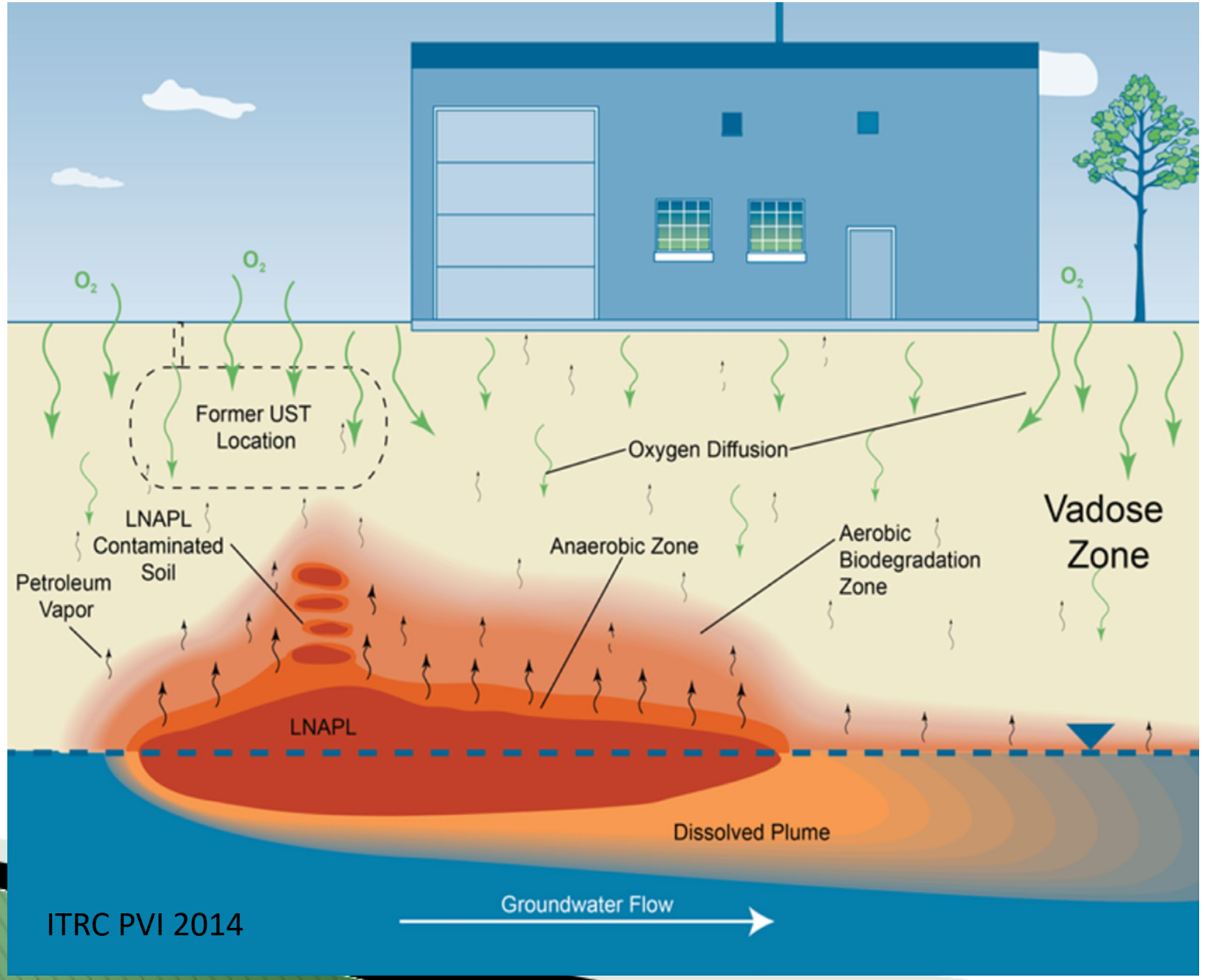
VI Definition:
VI is the migration of chemical vapors from subsurface into buildings which could pose a risk to human health



ITRC PVI 2014

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LTCP Petroleum Vapor Intrusion (PVI) Criterion

- Focus is only on the petroleum vapor intrusion to indoor air and does not apply to CVOCs or other constituents.

- Criterion evaluates the exposure to petroleum vapors migrating from contaminated soil and groundwater in subsurface.

LTCP Petroleum Vapor Intrusion (PVI) Criterion (continued)

The LTCP PVI applies to sites where the release originated and impacted or potentially impacted adjacent parcels when:

1) There is an occupied building

2) There is a plan for construction of building being occupied in the future

LTCP Petroleum Vapor Intrusion (PVI) Criterion

Petroleum release sites shall satisfy the media-specific criteria for PVI to indoor air and be considered low-threat for the VI to indoor air pathway if:

1. The site-specific conditions satisfy the criteria of scenarios 1 through 4 as applicable, or;
2. Conduct a site-specific risk assessment for the VI pathways and demonstrate that the human health is protected, or;
3. If satisfies the regulatory agencies requirements, mitigate the VI into indoor air by using institutional or engineering controls.

LTCP Petroleum Vapor Intrusion (PVI) Criterion

Exception: Active commercial petroleum fueling facilities

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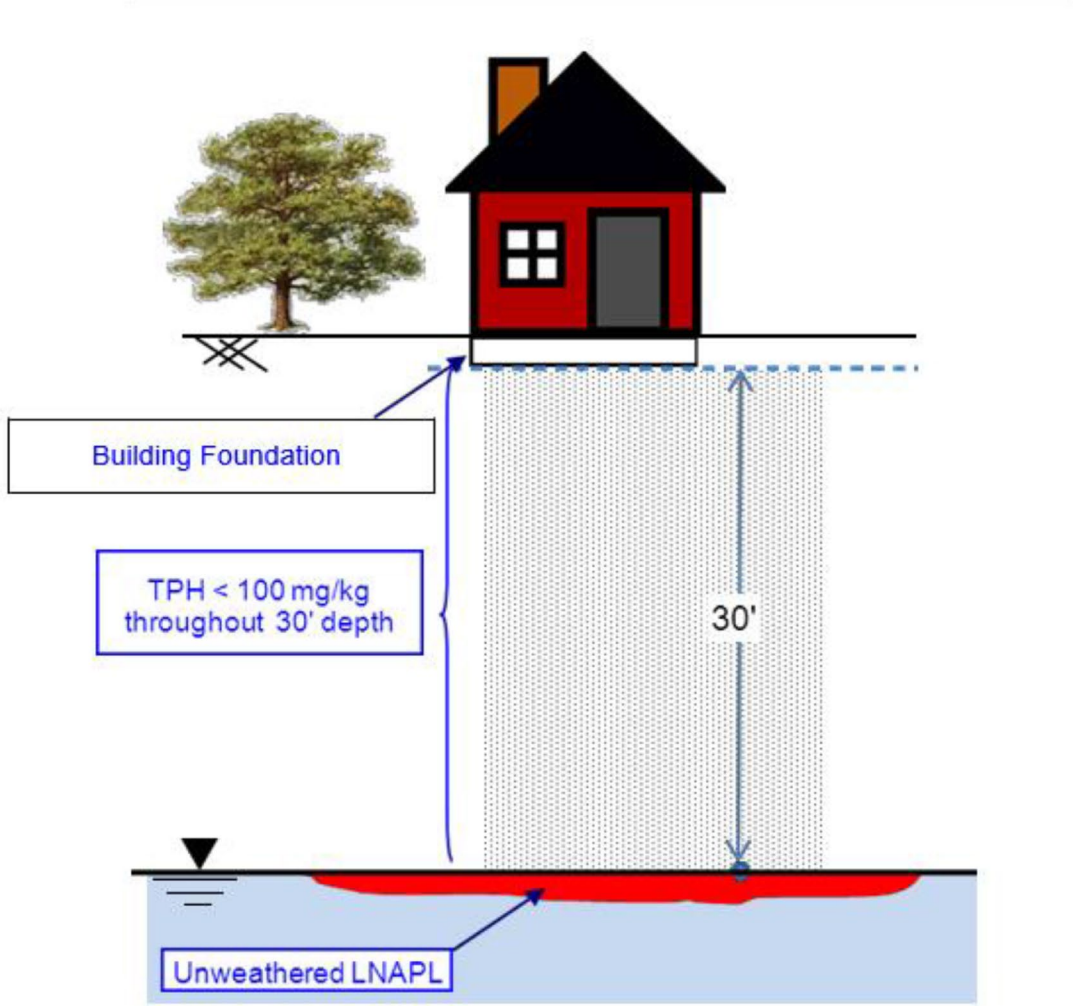
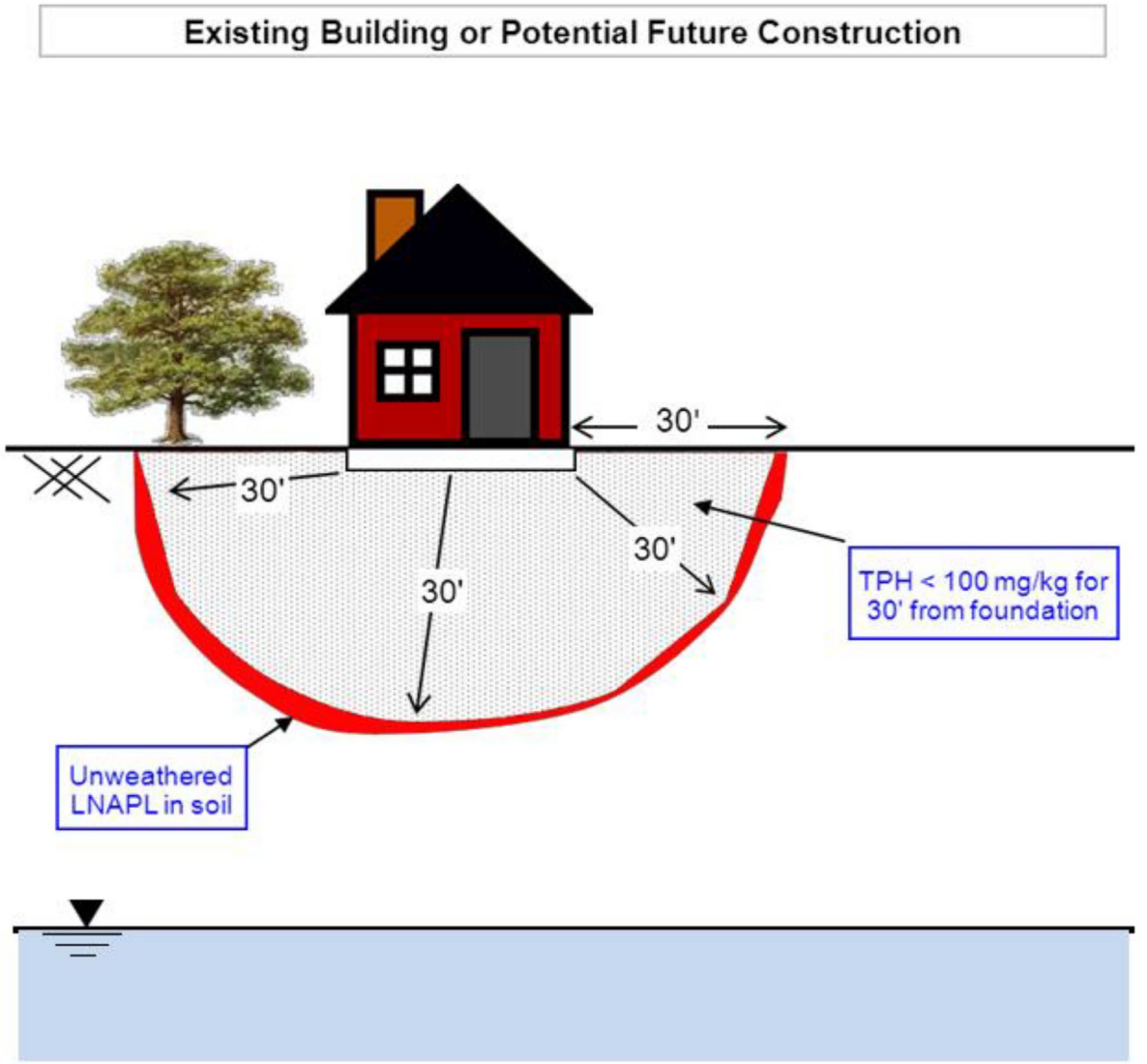
PVI Scenario 1: Unweathered LNAPL in Groundwater with Bioattenuation Zone



UST LTCP 2012

PVI Scenario 2: Unweathered LNAPL in Soil with Bioattenuation Zone



UST LTCP 2012

PVI Scenario 3: Dissolved Phase Benzene Concentrations in Groundwater (Low concentration groundwater scenarios with or without oxygen data)

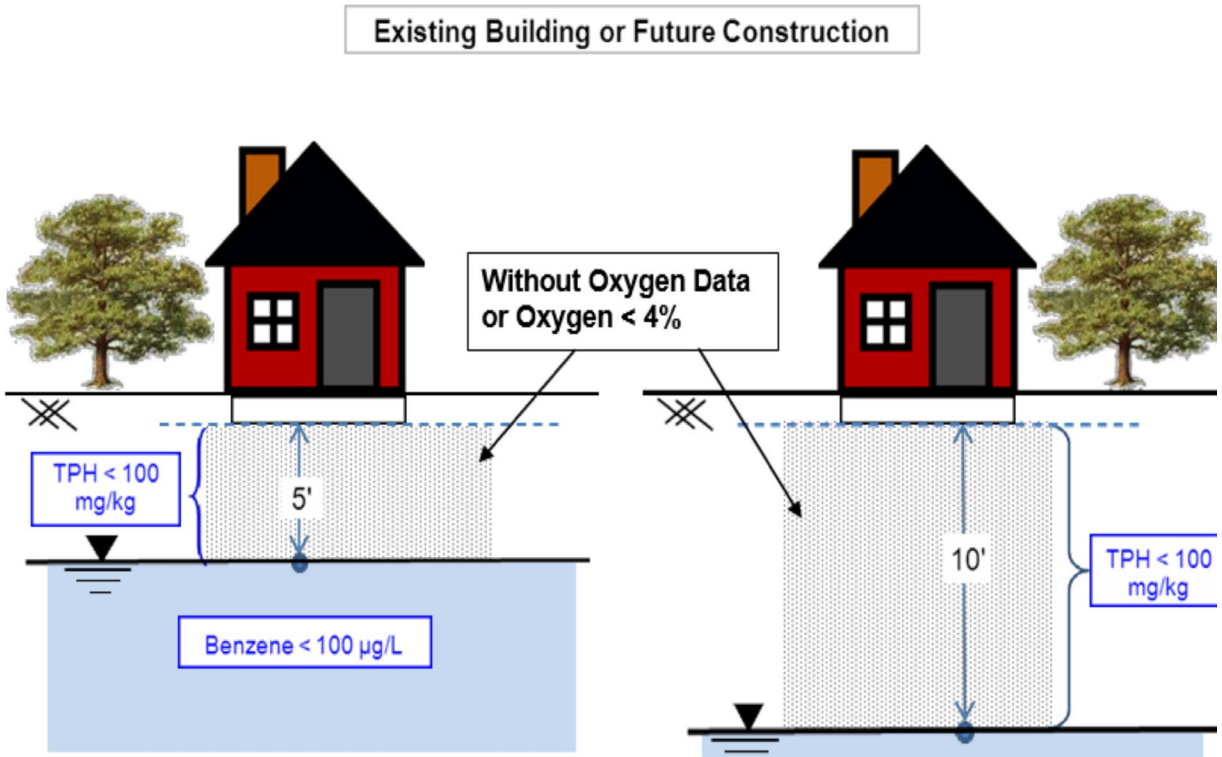


Figure A

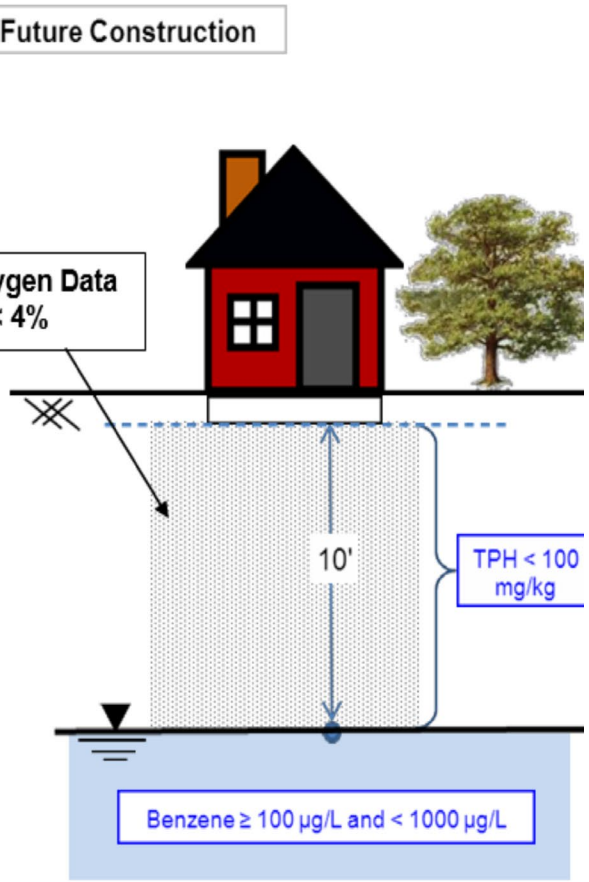


Figure B

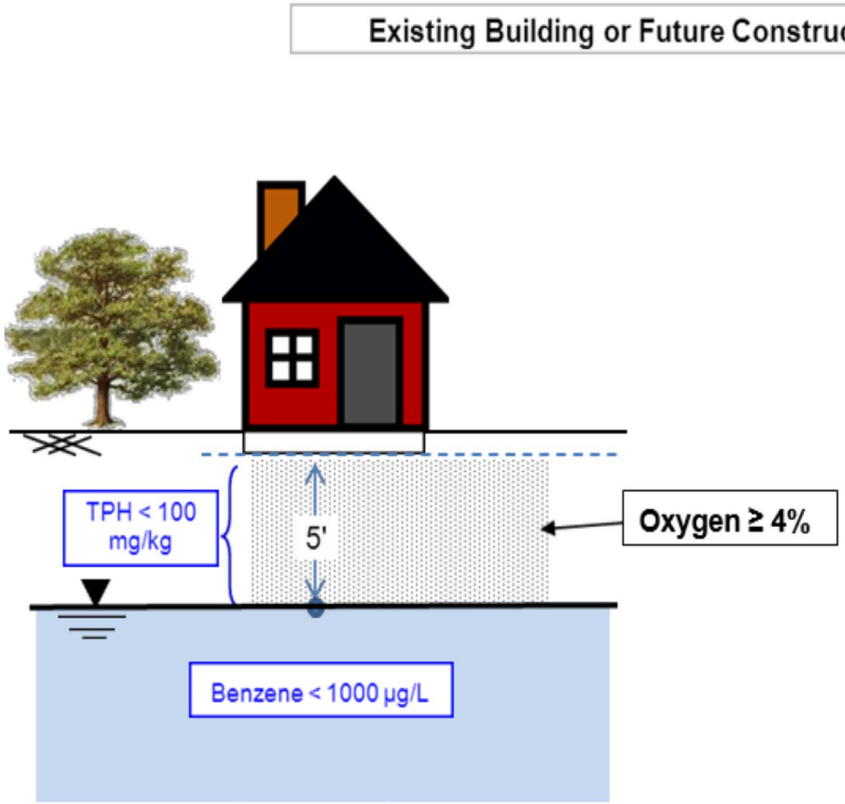
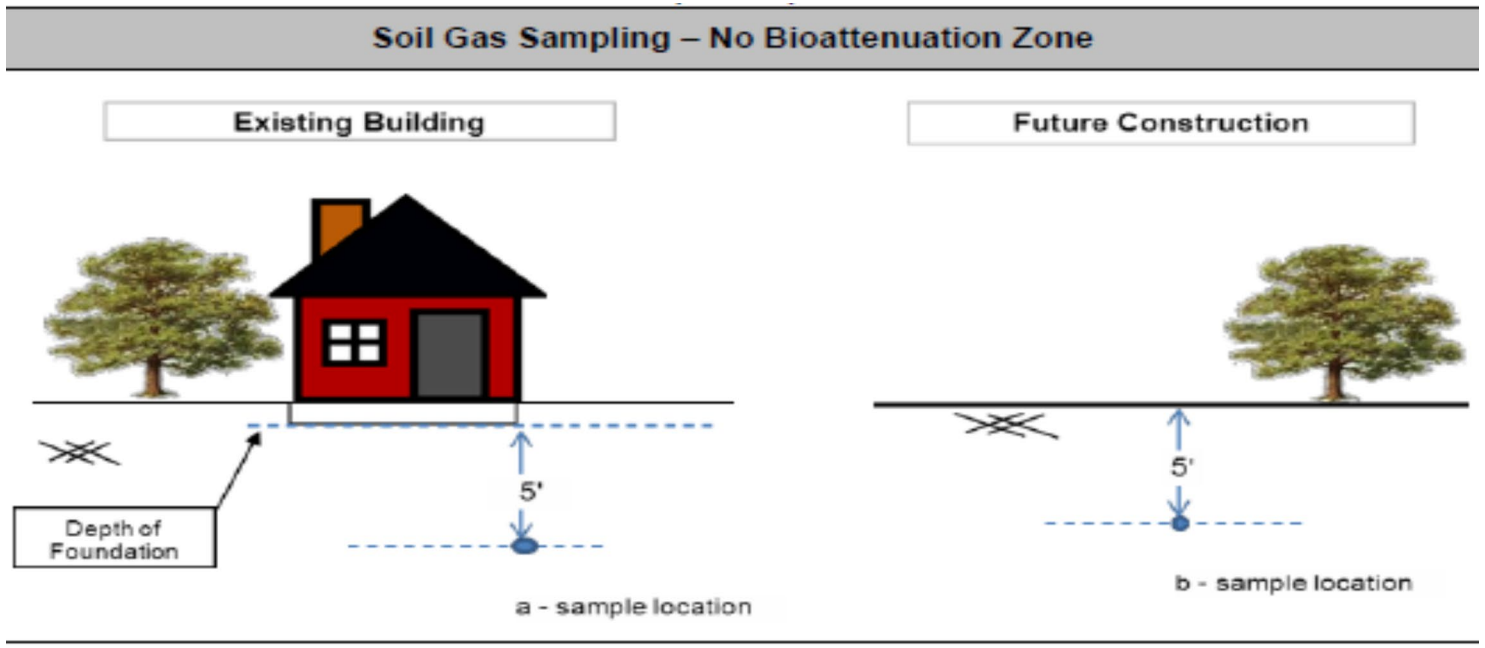


Figure C

UST LTCP 2012

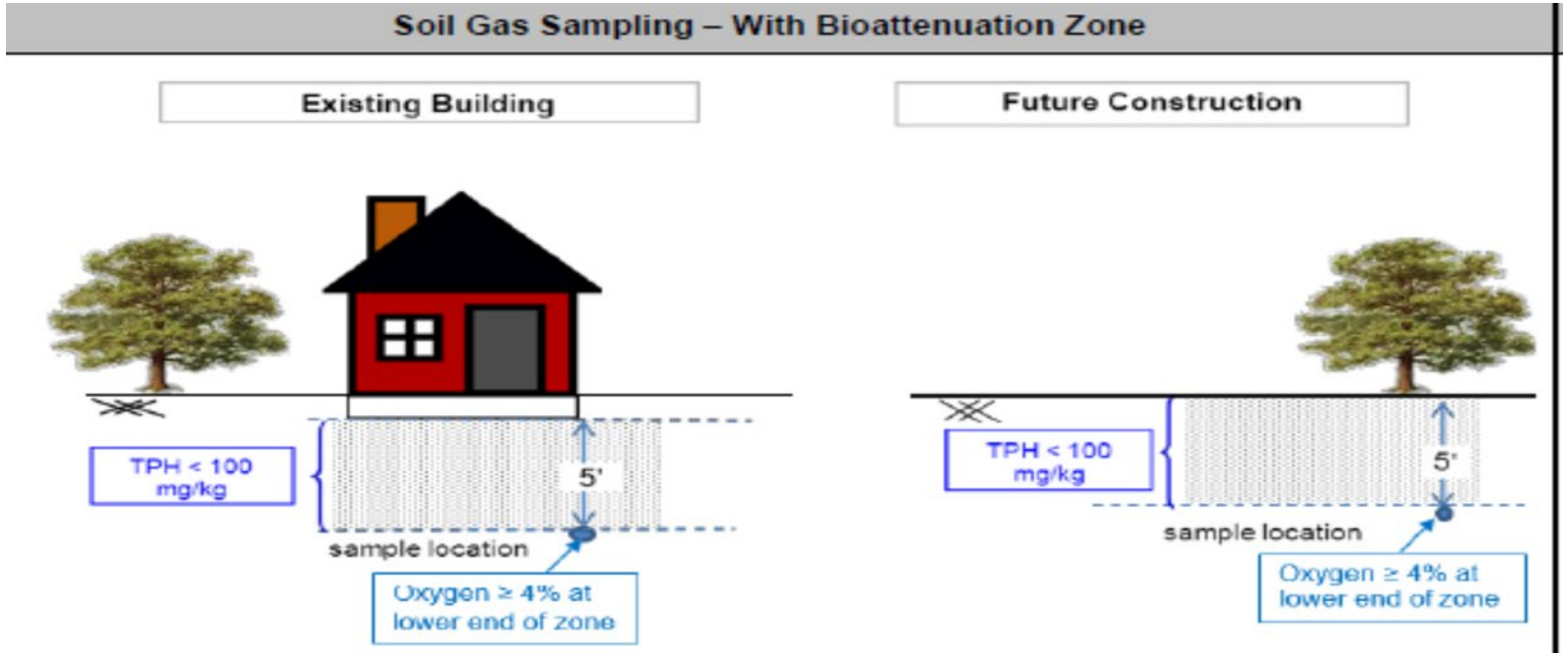
PVI Scenario 4: Direct Measurement of Soil Gas Concentrations



UST LTCP 2012

Soil Gas Criteria (µg/m³)		
No Bioattenuation Zone		
	Residential	**Commercial**
Constituents	***Soil Gas Criteria (µg/m³)***	
Benzene	<85	<200
Ethylbenzene	<1,100	<3600
Naphthalene	<93	<310

PVI Scenario 4: Direct Measurement of Soil Gas Concentrations



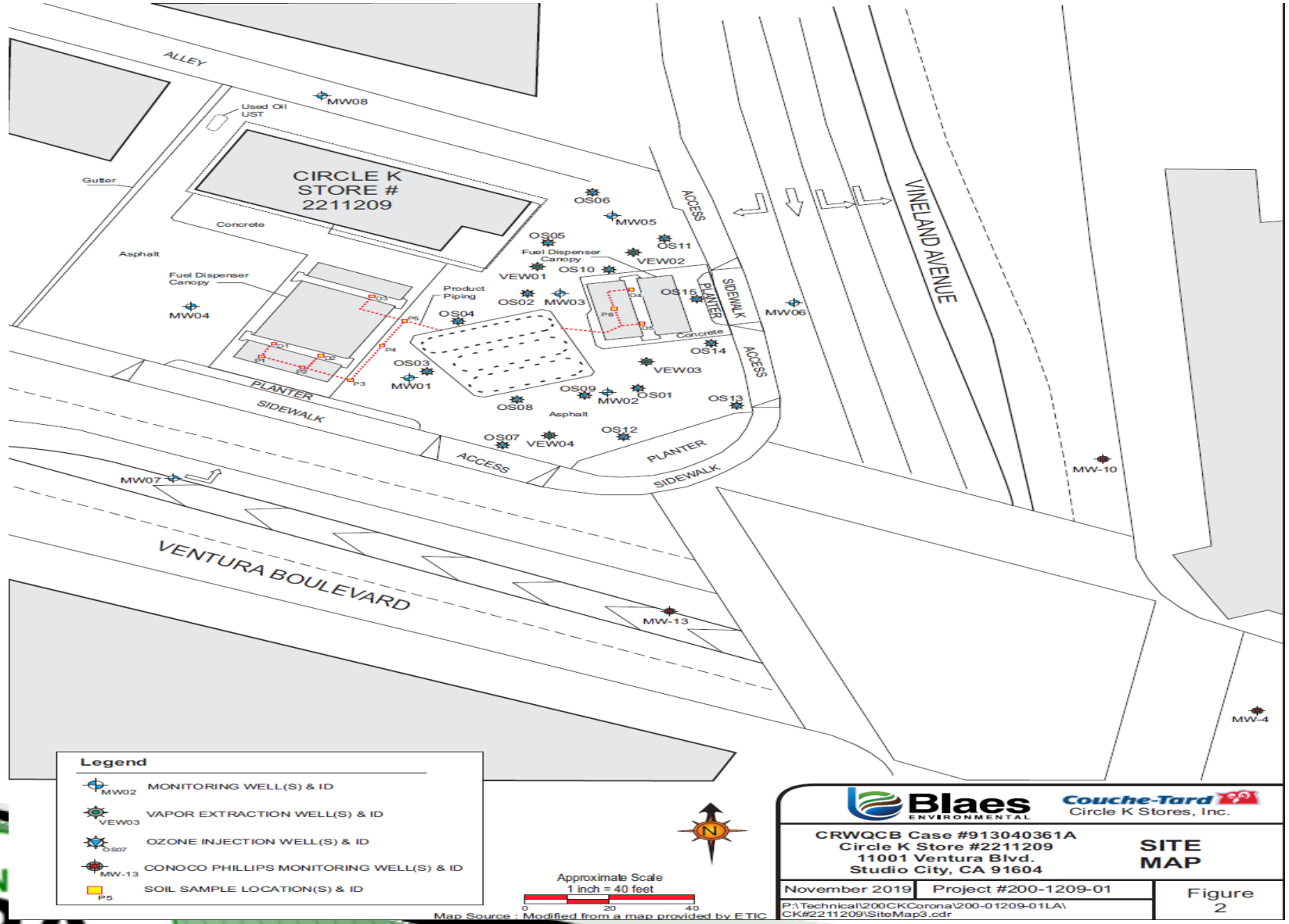
UST LTCP 2012

Soil Gas Criteria (µg/m³)		
With Bioattenuation Zone		
	Residential	**Commercial**
Constituents	***Soil Gas Criteria (µg/m³)***	
Benzene	<85,000	<200,000
Ethylbenzene	<1,100,000	<3600,000
Naphthalene	<93,000	<310,000

Case Study

Background:

- Currently the site is an active service station with one 12,000-gallon, two 10,000-gallon gasoline underground storage tanks (USTs) and one 1,000-gallon used oil UST at the site.
- The site is surrounded by commercial and residential properties.
- Several rounds of site investigation and remediation have been conducted from August 2002 through March 2021.



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Evaluation for Low-Risk Closure

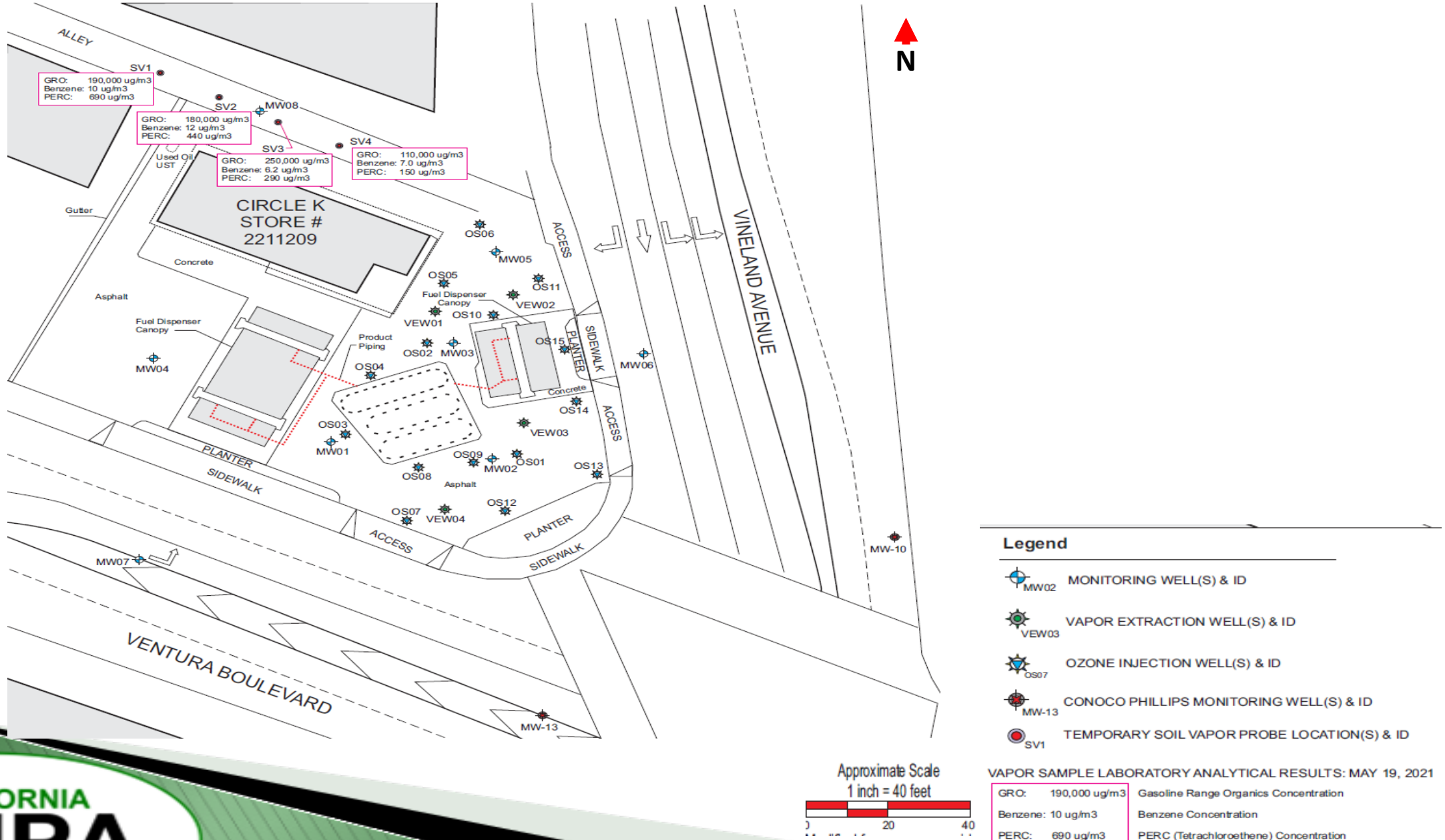
- The site was evaluated for low-risk closure using LTCP.
- The site met the following LTCP Criteria:
  - ✓General Criteria
  - ✓Media-Specific Criteria for Groundwater
  - ✓Direct Contact and Outdoor Air Exposure

Why is this Site not Exempted?

Although this site is an active fueling station and exempted from this criterion, **due to the close proximity of the site to a residential property** north of the site a soil vapor survey was conducted.

Soil Vapor Survey – May 2021

- Four soil vapor probes SV1 through SV4 were installed
- Soil vapor probes were located near the residential properties
- Soil vapor samples were collected at 5 feet bgs



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Soil Vapor Survey Results

Vapor Sample Identification	Sampling Date	Sample Depth (feet bgs)	GRO (µg/m³)	Benzene (µg/m³)	Toluene (µg/m³)	Ethylbenzene (µg/m³)	meta- & para-Xylenes (µg/m³)	ortho-Xylenes (µg/m³)	MTBE (µg/m³)	TBA (µg/m³)	1,2,4-Trimethyl-benzene (µg/m³)	1,3,5-Trimethyl-benzene (µg/m³)	p-Isopropyl-toluene (µg/m³)	Isopropyl-benzene (µg/m³)	PERC (µg/m³)
SV1-5	05/19/21	5	190,000	10	42	8.2	22	6.8	<5.0	<50	12	6.8	300	550	690
SV1-5 DUP	05/19/21	5	190,000	9.8	45	8.6	25	8.2	<5.0	<50	7.8	6.8	670	410	660
SV2-5	05/19/21	5	180,000	12	59	10	25	7.4	<5.0	<50	10	6.4	230	520	440
SV3-5	05/19/21	5	250,000	6.2	27	6.2	18	5.0	<5.0	<50	7.0	5.8	590	570	290
SV4-5	05/19/21	5	110,000	7.0	27	4.6 J	11	3.2	<5.0	<50	7.6	5.8	180	340	150

LTCP PVI Evaluation for a Low-Risk Closure

- The site meets Scenario 4: Direct Measurement of Soil Gas with No Bioattenuation Zone.

Soil Gas Criteria (µg/m³)			
No Bioattenuation Zone			
Constituents	**Site Soil Gas Concentrations**	**Residential**	**Commercial**
	Soil Gas Concentration (µg/m³)		
Benzene	12	<85	<200
Ethylbenzene	10	<1,100	<3600
Naphthalene	ND	<93	<310

Non-Petroleum VI (Chlorinated) to Indoor Air Evaluation

Elevated concentrations of PCE were detected in the soil vapor samples. These concentrations are exceeding the PCE soil gas **ESLs of *15* µg/m³**.

Soil Vapor Probes	PCE (µg/m³)
SV1	**690**
SV2	**440**
SV3	**290**
SV4	**150**

Next Steps

Due to elevated concentrations of PCE in soil vapor samples near the residential property…

The LA Water Board requested OEHHA to review and conduct a risk assessment for this site.

Next Steps (continued)

OEHHA recommended additional sampling for an indoor air investigation, including sub-slab and ambient samples.

The additional data can provide more information on risks to the current building occupants.

Conclusion

Based on the above assessments, LA Water Board staff concluded that the site meets the LTCP criteria for PVI to indoor air both for the site and for the residential property north of the site.

A low-risk closure was granted in February 2022.

Conclusion (continued)

The site does not pass the risk assessment conducted for PCE soil vapor intrusion.

additional investigation was recommended by OEHHA

this case was transferred to the remediation program to address the PCE vapor intrusion issues and additional indoor air vapor intrusion investigation.

Thank You!

Questions?