



Missouri Department of
Natural Resources

Vapor Intrusion and Evaluation of the Indoor Inhalation Pathways

By:

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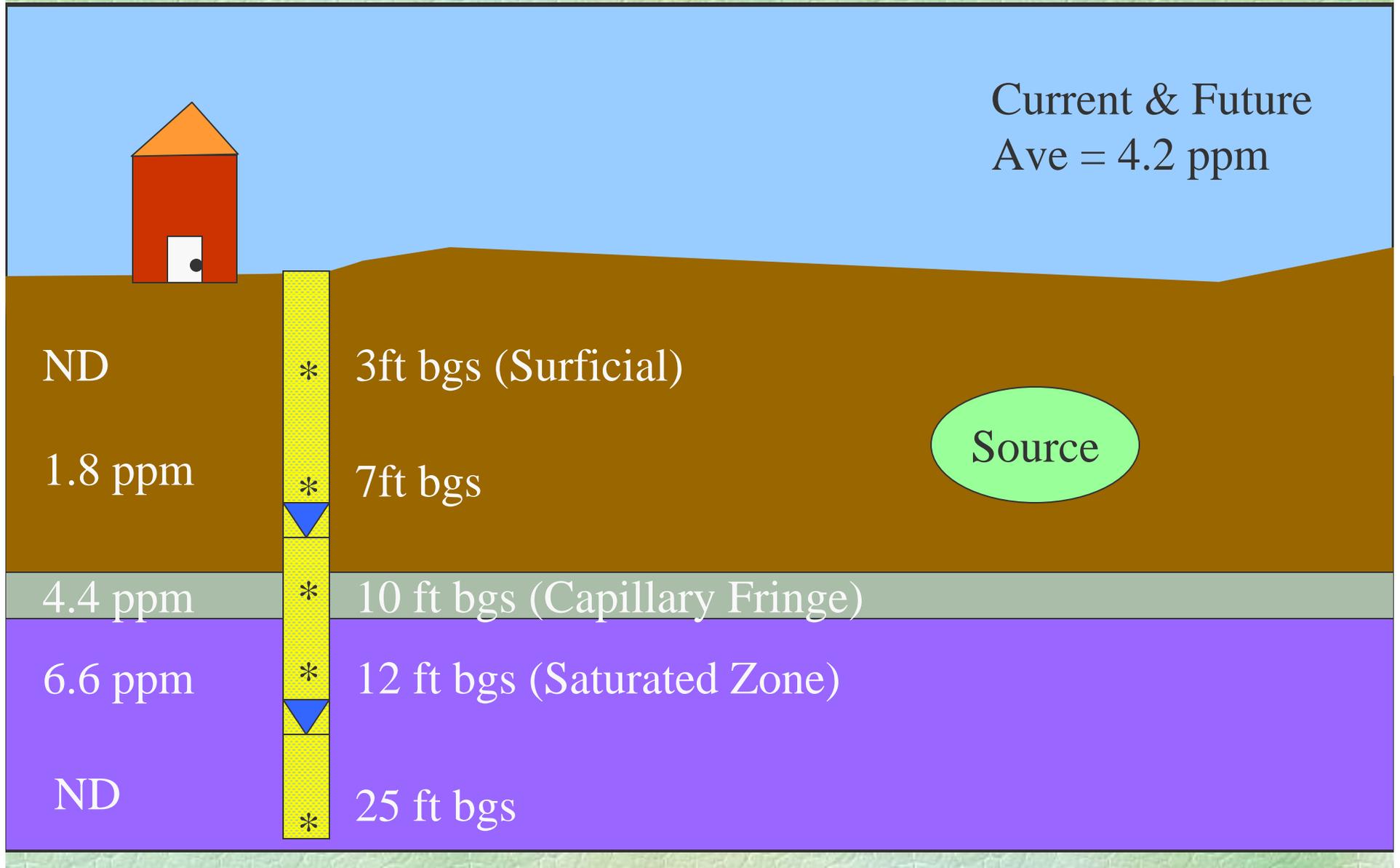
Evaluation Of Indoor Inhalation Pathways

- **Johnson-Ettinger Model assumes only vertical migration**
- **MRBCA Guidance requires samples within 10 feet of building footprint**
- **Exception for when access is denied or obstructed, samples must be collected between the source of contamination and building**

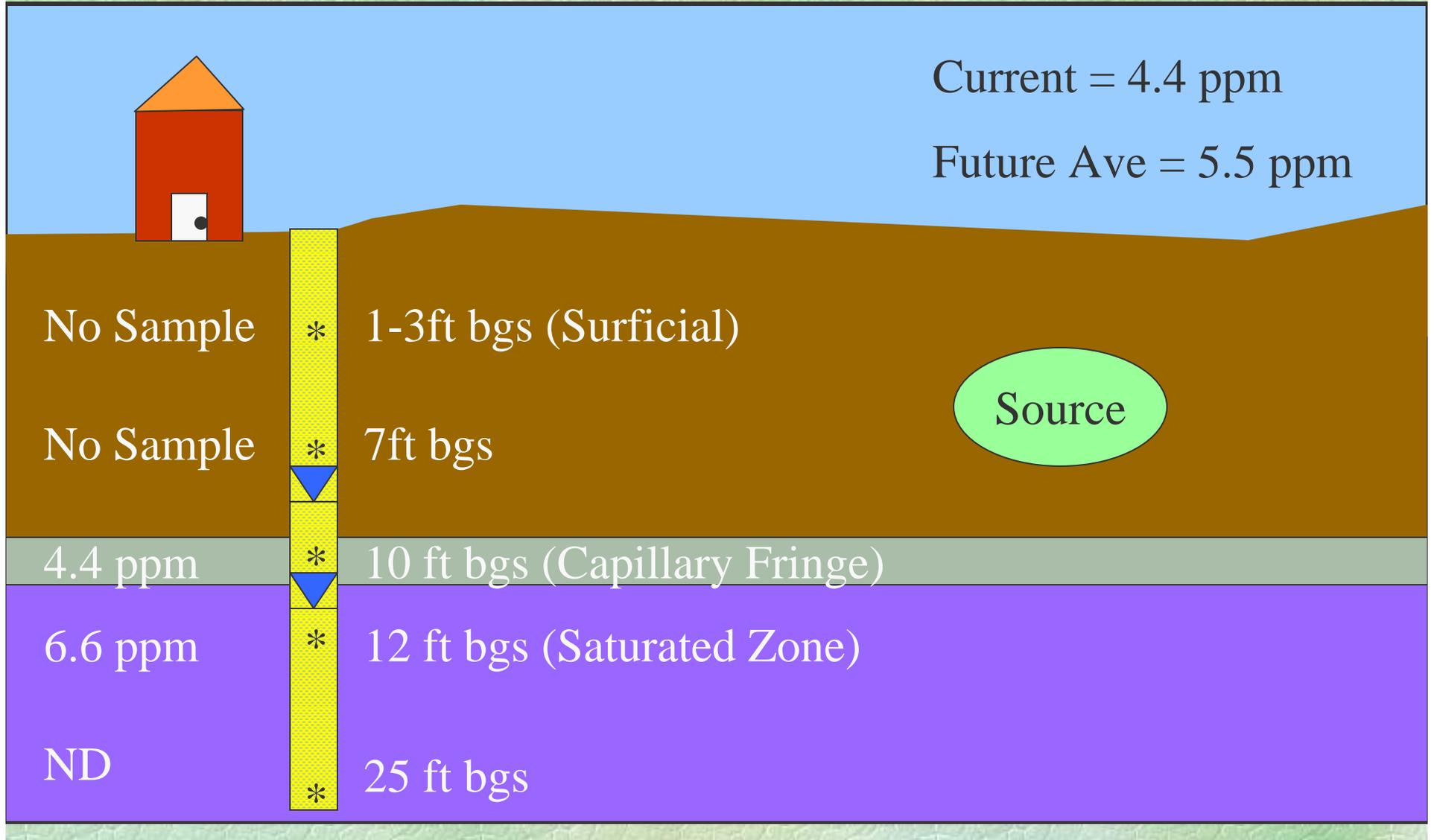
Vapors from Contaminated Subsurface Soil

- **Averaging – Which data points you should use, which you should not use**
- **Contamination in the Smear Zone**
- **Non-Detects – When to use $\frac{1}{2}$ DTL, when to use full DTL**

Within Boring Averaging – Example 1



Example 2



Vapors from Contaminated Groundwater

- **What do you do when you have LNAPL within 10 feet of a existing building, or in the area of your future hypothetical building? (within last 2 years)**

Vapors from LNAPL

STEP ONE

- Use effective solubility calculation based on Raoult's Law to determine dissolved phase concentrations in groundwater assuming a default % weight of chemicals or using results of actual product sample
- Calculate RC by averaging groundwater concentrations from all wells within 10 feet of building footprint
- Compare with applicable Indoor Inhalation from groundwater RBTLs and SSTLs

Vapors from LNAPL

STEP TWO (If RC > RBTLs and/or SSTLs)

- **Collect actual soil vapor samples – at least 2 events at least 3 months apart, usually no more than 4 soil vapor sampling events required, compare results with soil vapor SSTLs in Tier 2 software, or**
- **Submit Risk Management Plan**

Preliminary Risk Evaluation -- Letter/Report & Work Plan

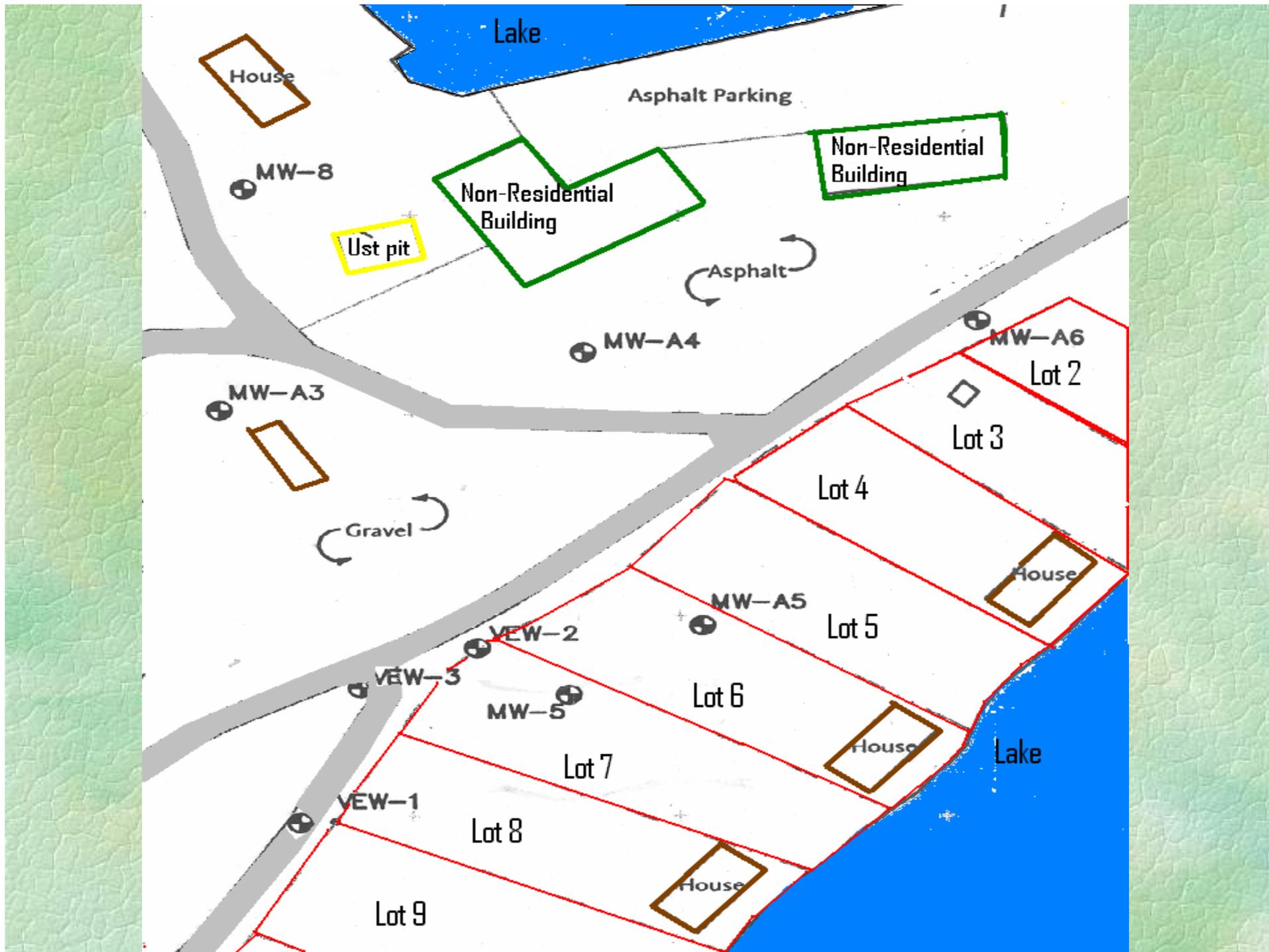
When LNAPL or very high levels of soil or groundwater contamination within the exposure domain of an existing occupied structure

If the RCs > RBTLs, and/or SSTLs, submit letter report & work plan with RMP or proposal for soil vapor sampling

Notify the project manager by phone or email so the site's priority can be upgraded

Common Mistakes

- **Improper locations of borings/wells**
- **Improper evaluations of off-site receptors**
- **Incorrect calculation of RCs**



On-site, Non-Resident: Future Conditions (Subsurface Soil) Representative Concentration Calculation

	B-1	B-2	B-3	B-4	B-4	B-4	B-4	B-7	B-7	B-16	B-16
	5/1/01	5/1/01	5/1/01	3/6/04	3/6/04	3/6/04	3/6/04	3/6/04	3/6/04	9/8/07	9/8/07
	8.0	9.5	7.5	7	10	12	25	8	11	8	9.5
Benzene	5.81	29	ND	1.8	4.4	6.6	ND	<1.0	0.805	2.11	<.025
Toluene	1.57	33	ND	3.5	27	1.5	ND	1.05	0.1	0.076	0.0214
Ethylbenzene	10.5	35	ND	7.5	15	2.5	ND	ND	2.41	3.68	0.0038
Xylene	37.9	150	ND	12.3	55	5.6	ND	ND	3.71	14.2	0.0037
MTBE	0.031	0.32	ND	0.032	0.015	0.047	ND	ND	0.5	0.363	0.029
TPH-GRO	846	1,689	ND	620	581	710	ND	227	311	446	0.016
TPH-DRO	83	241.3	ND	53	17	625	ND	41.3	7.6	10	6.7

Results in mg/kg (ppm)



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Questions?

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