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Comparison of Observed Vapour Attenuation versus Model Predicted for Sites Contaminated with Chlorinated Solvents

RPIC: Federal Contaminated Sites Workshop

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Summary

- Goal of study was to compare modeled vapour intrusion attenuation factors to those calculated from site data
- Data was gather from multiple sources, and needed to be filtered to control quality, and the influence of background
- Compared to Health Canada's vapour intrusion model which is based on the Johnson and Ettinger model
- Model was not found to be consistently conservative, but data issues may be partially responsible



Indoor Air Concentration = Source Concentration X Attenuation



Study Description

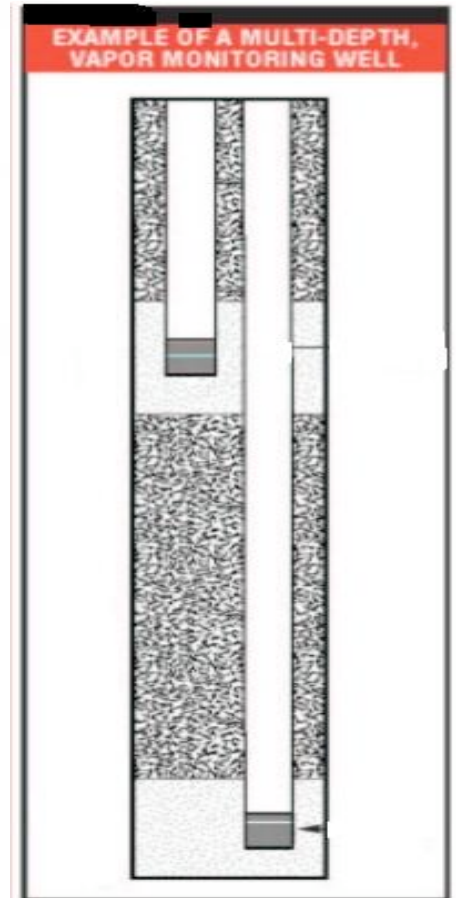


- Compare model predictions to measured values
- Chlorinated Solvents
- Northern Regions
- Gathered data through informal networks, combined with US EPA database



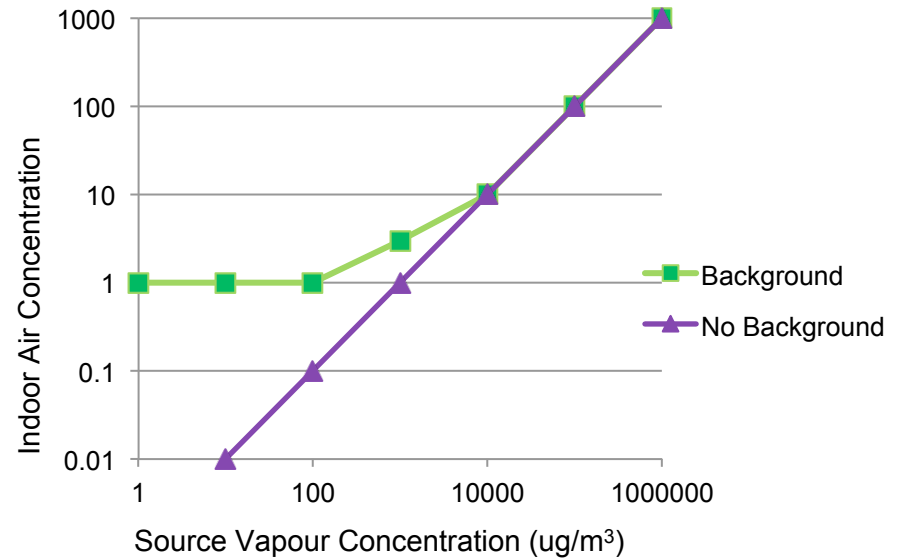
Data Characteristics

- Different countries, years, techniques
- Sites with subsurface and indoor air samples (3 months)
- Important details missing or inferred
 - Sample depth, soil type, screen intervals etc.

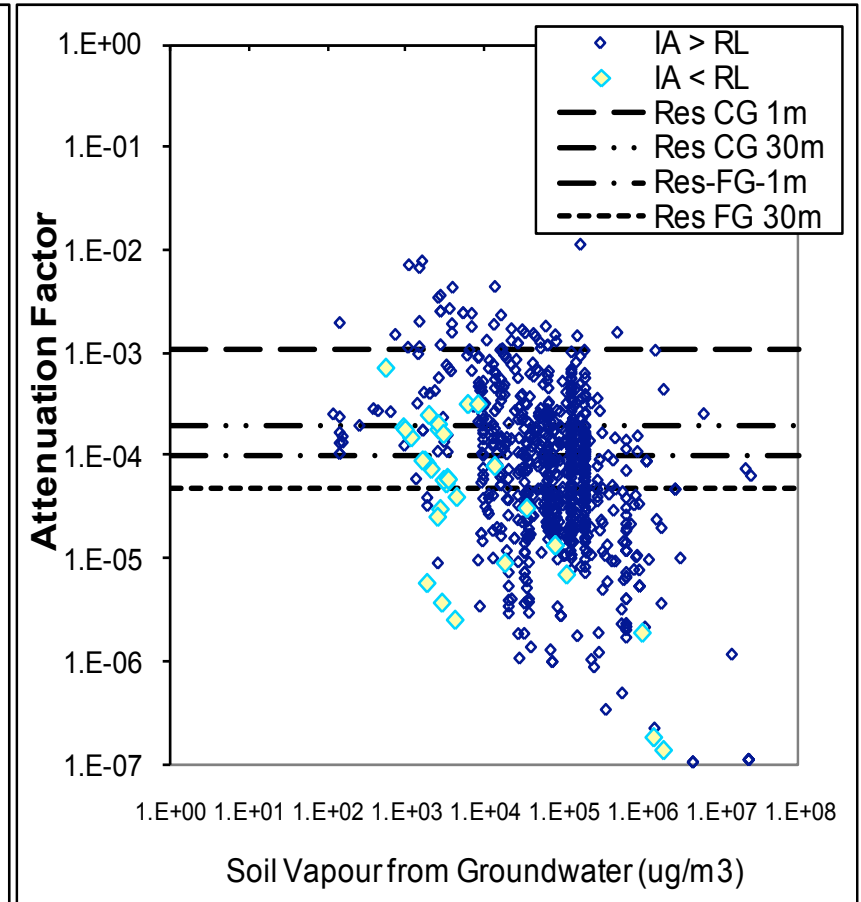
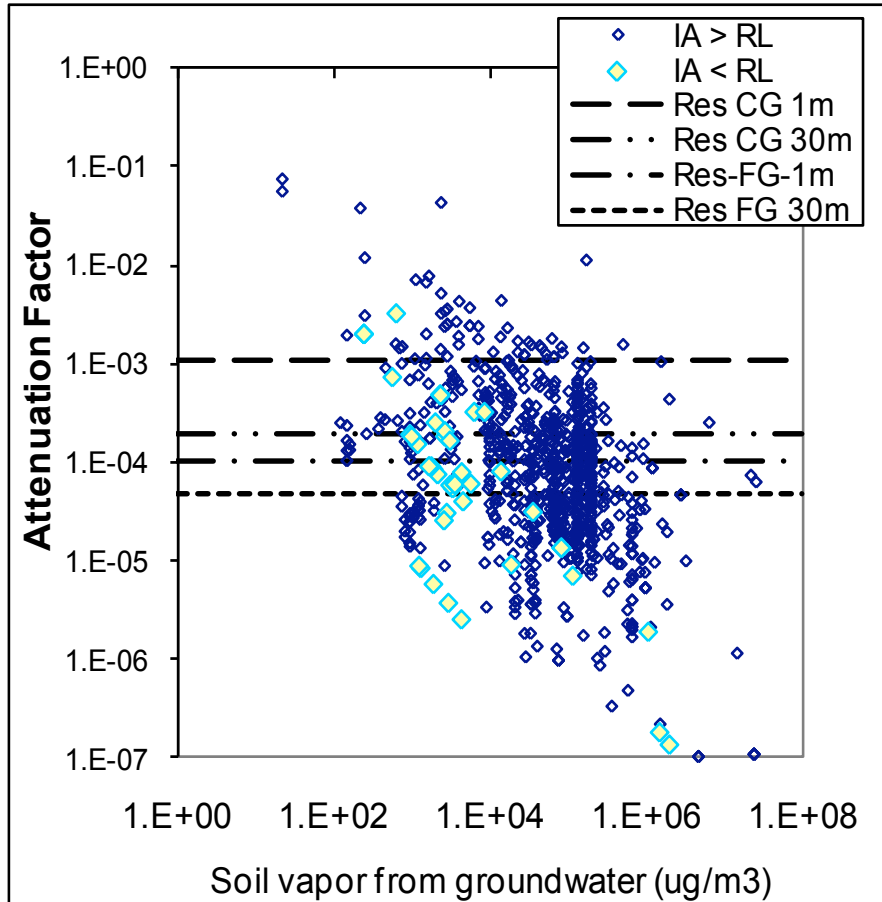


Filtering

- Remove Influence of Background
 - Source Strength
 - Consistency between multiple chemicals
 - Detection Limit

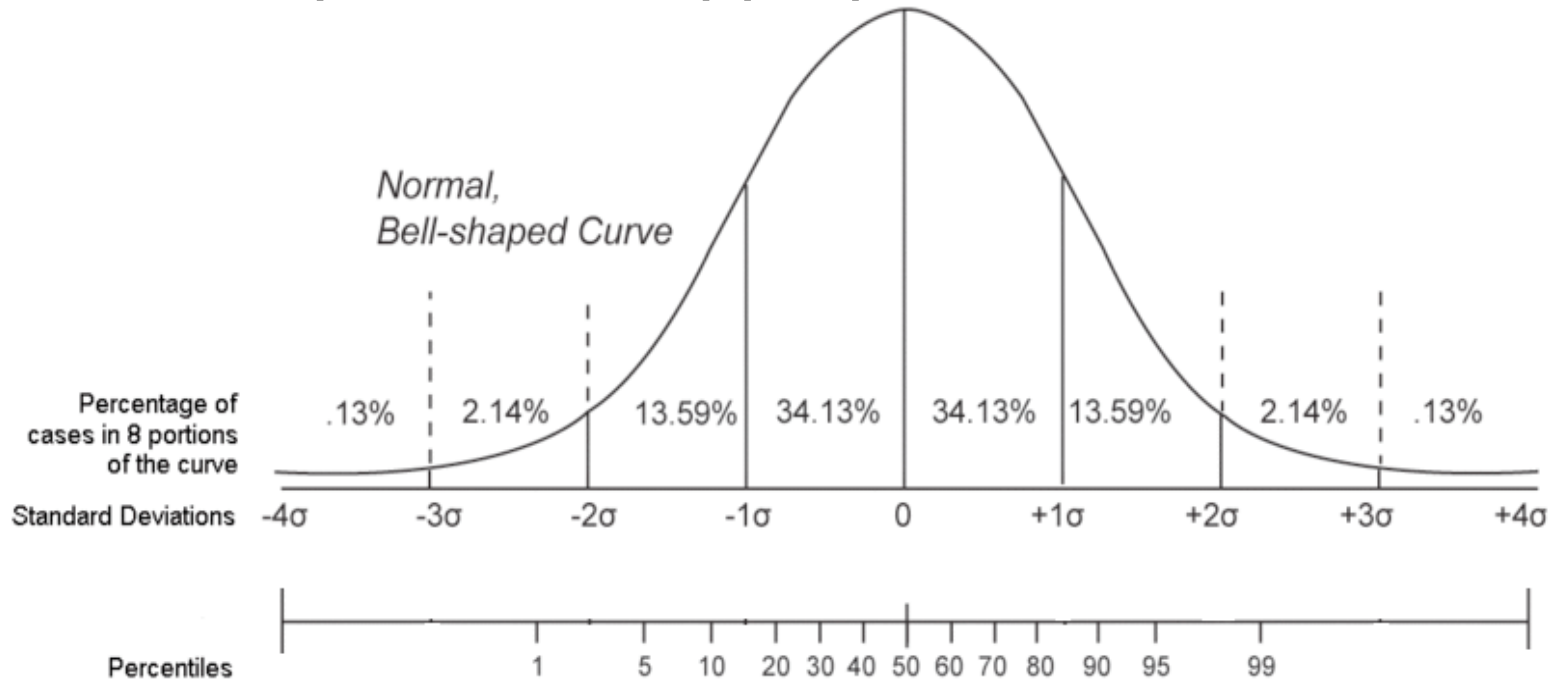


Filtering For Source Strength



Model Comparisons

- Is the 75th percentile appropriate?

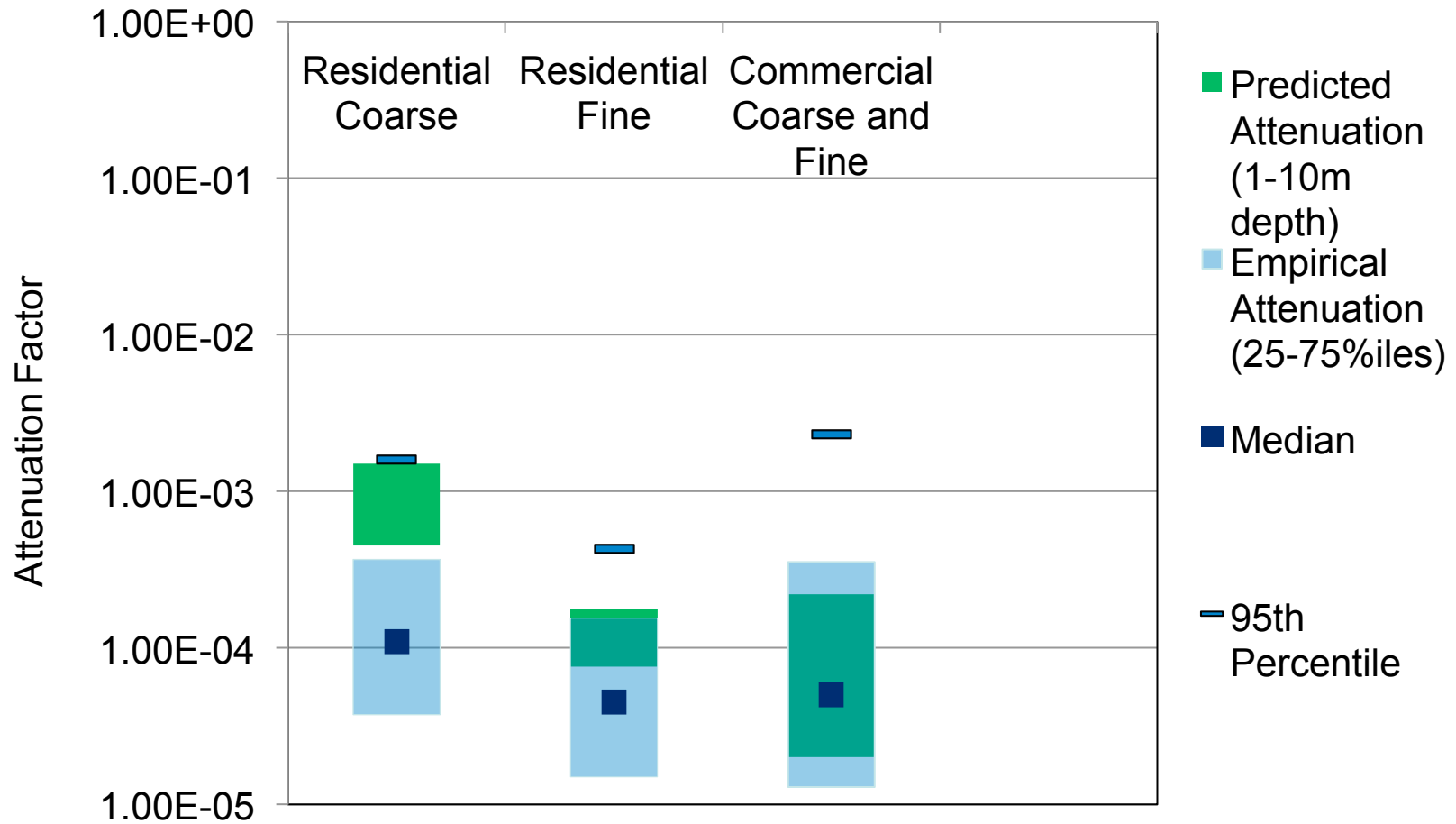


Health Canada's Vapour Intrusion Model

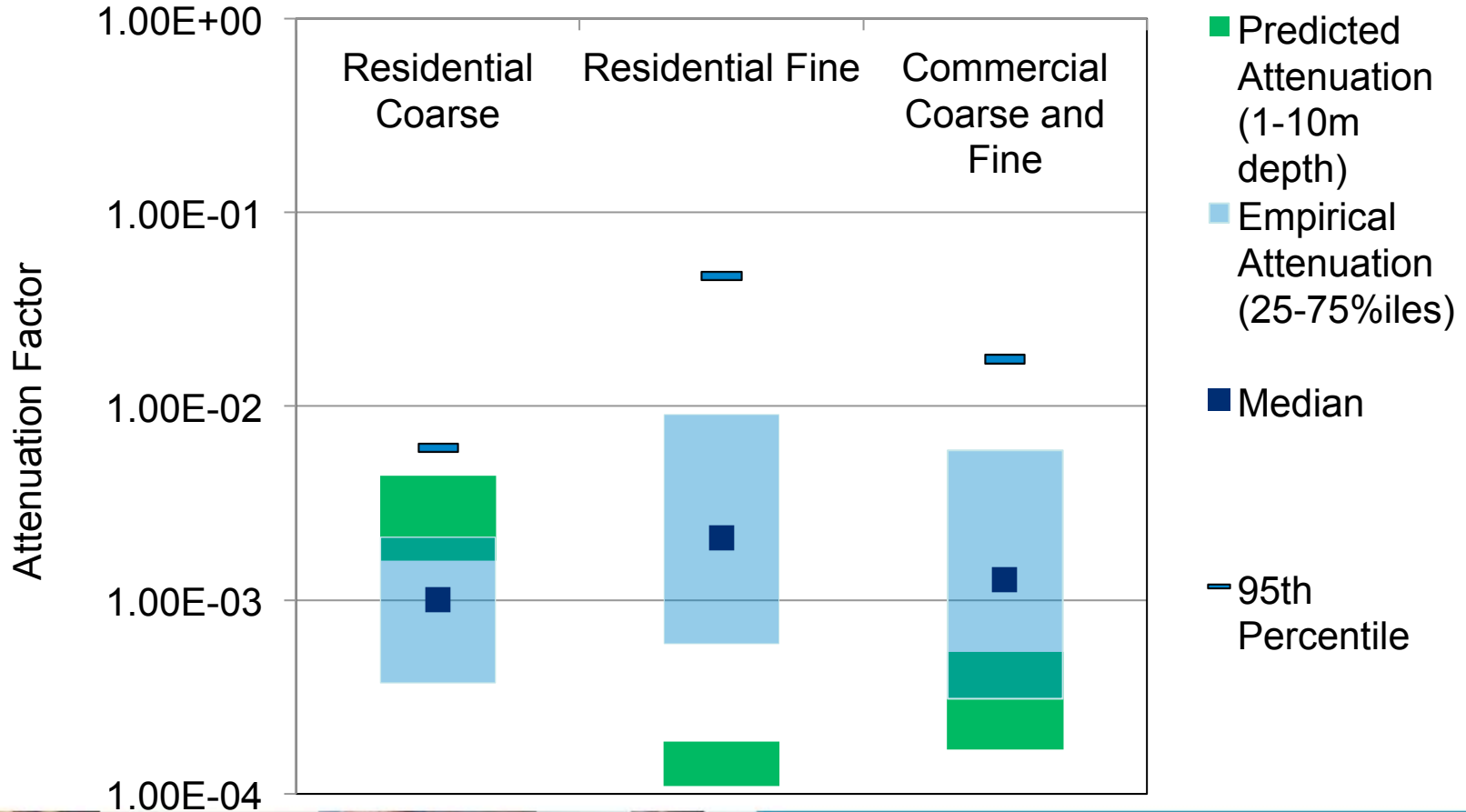
- Partitioning into soil pore space vapour, diffusive and advective transport into buildings, mixing in building
- Model uses an empirical flow rate into building
- No adjustments to model predictions for partitioning or biodegradation
- More conservative than CCME for BTEX, wanted model to be more widely applicable, and to be applicable at sites where there is not sufficient data to determine if biodegradation is occurring.



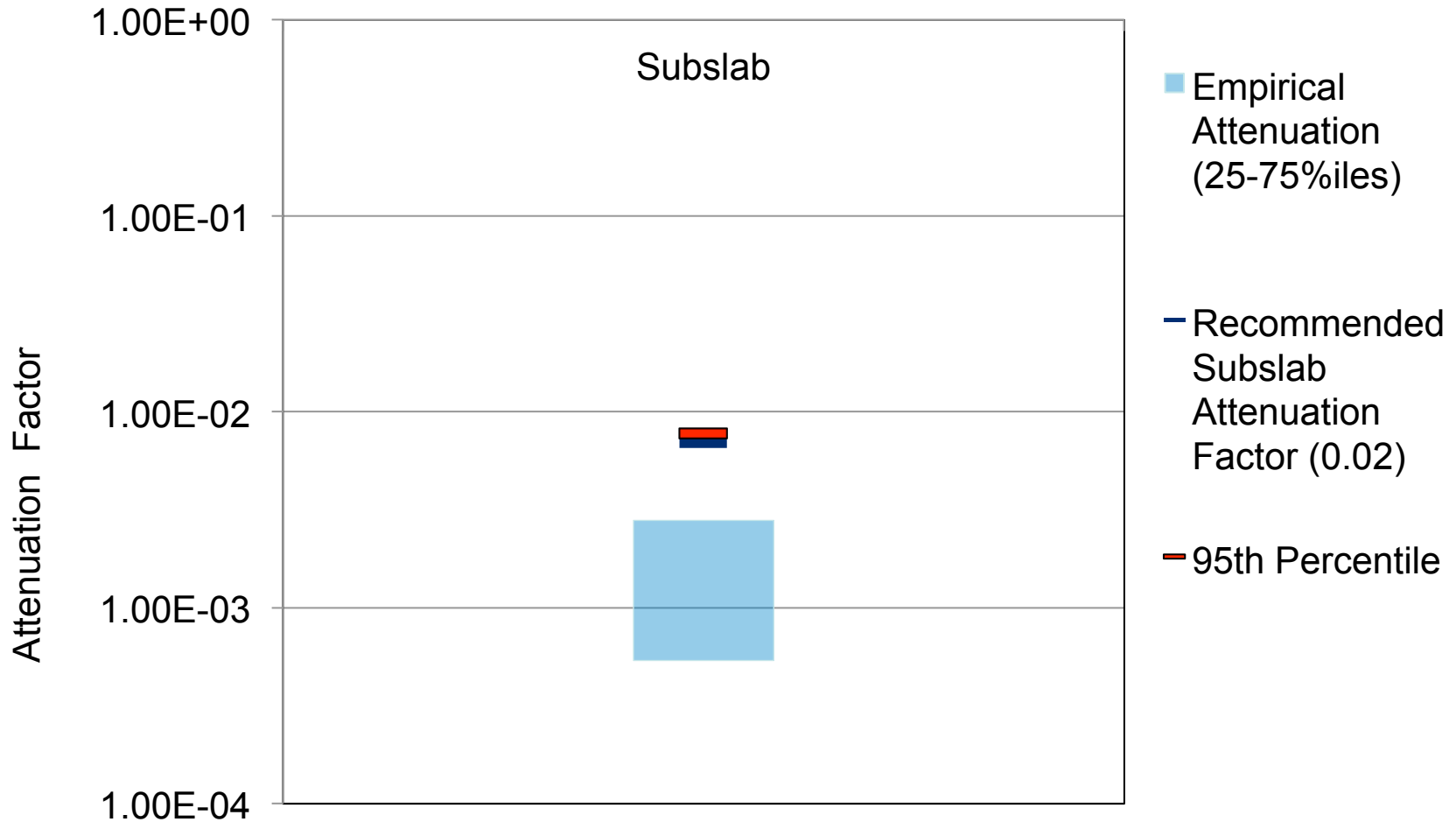
Results -- Groundwater



Results - Soil Vapour



Results – Subslab Samples



Recommendations

- The importance of adequate, good quality data can not be underestimated
- Predict within 10x acceptable risk
 - Review data (2 samples, 2 sides of building, 2 seasons)
 - Fill data gaps, consider multiple lines of evidence, subslab sampling
 - For commercial buildings, check building parameters for correspondance with model assumptions (may need DQRA spreadsheet)



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