EPA Vapor Intrusion Workshop

Measurement-Based Methods for Protective & Defensible Chlorinated VI Exposure Determinations

Review of the Redfield Site, Denver, CO IECC Zone 5(B)

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References

- Folkes, D., W. Wertz, J. Kurtz, and T. Kuehster. 2009. Observed Spatial and Temporal Distributions of CVOCs at Colorado and New York Vapor Intrusion Sites. *Groundwater Monitoring & Remediation*, *29*(1), 70-80.
- Redfield Site Website; http://www.redfieldsite.org/
- Indoor Air Vapor Intrusion Database; https://iavi.rti.org/workshops.html


Monitoring&Remediation

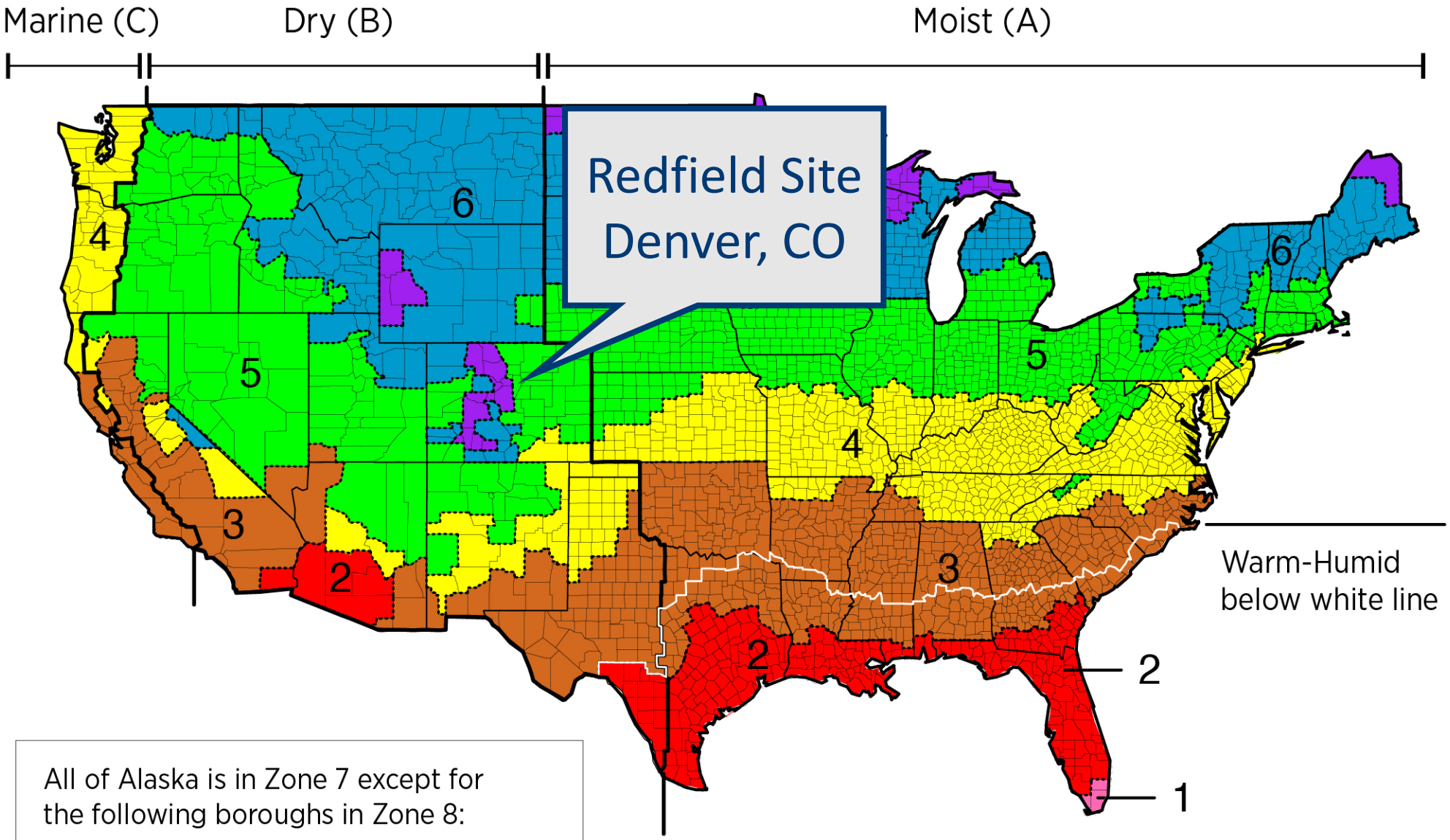
Observed Spatial and Temporal Distributions of CVOCs at Colorado and New York Vapor Intrusion Sites

by David Folkes, William Wertz, Jeffrey Kurtz, and Theodore Kuehster

Abstract

The vapor intrusion impacts associated with the presence of chlorinated volatile organic contaminant plumes in the ground water beneath residential areas in Colorado and New York have been the subject of extensive site investigations and

Introduction



All of Alaska is in Zone 7 except for the following boroughs in Zone 8:

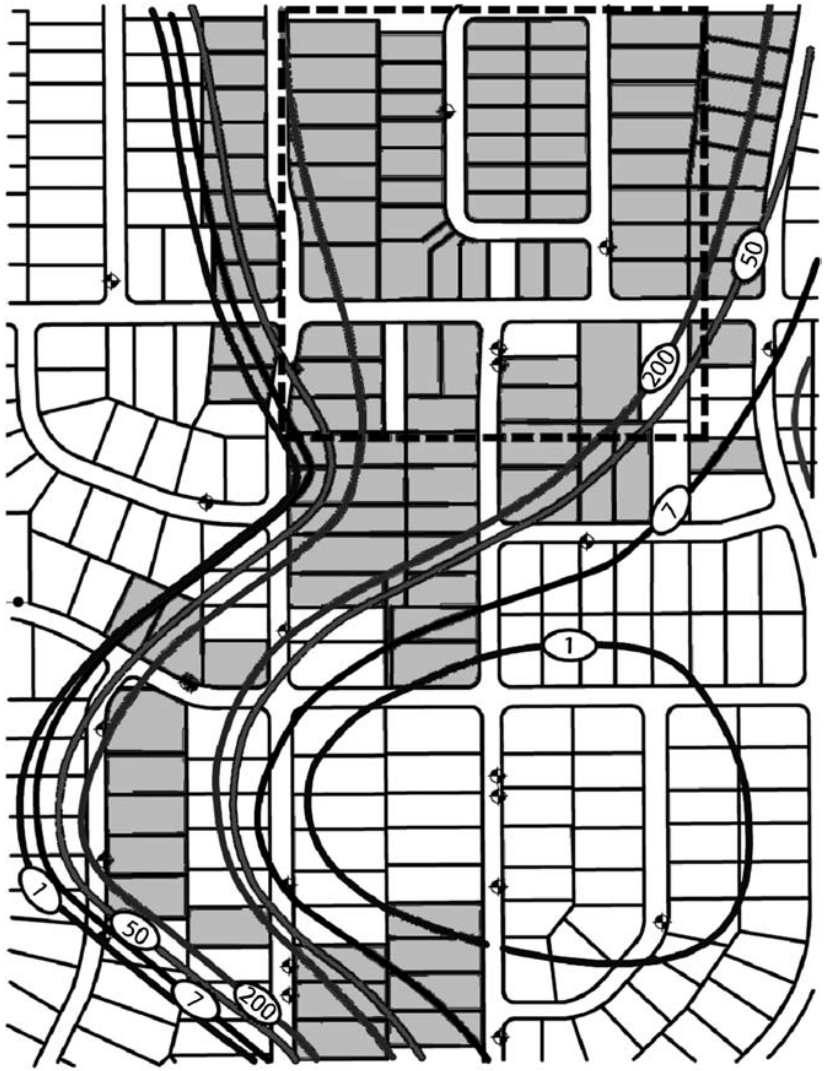
Bethel, Northwest Arctic, Dellingham, Southeast Fairbanks, Fairbanks N. Star, Wade Hampton, Nome, Yukon-Koyukuk, North Slope

Zone 1 includes Hawaii, Guam, Puerto Rico, and the Virgin Islands

Image: ***https://basc.pnnl.gov/images/iecc-climate-zone-map***

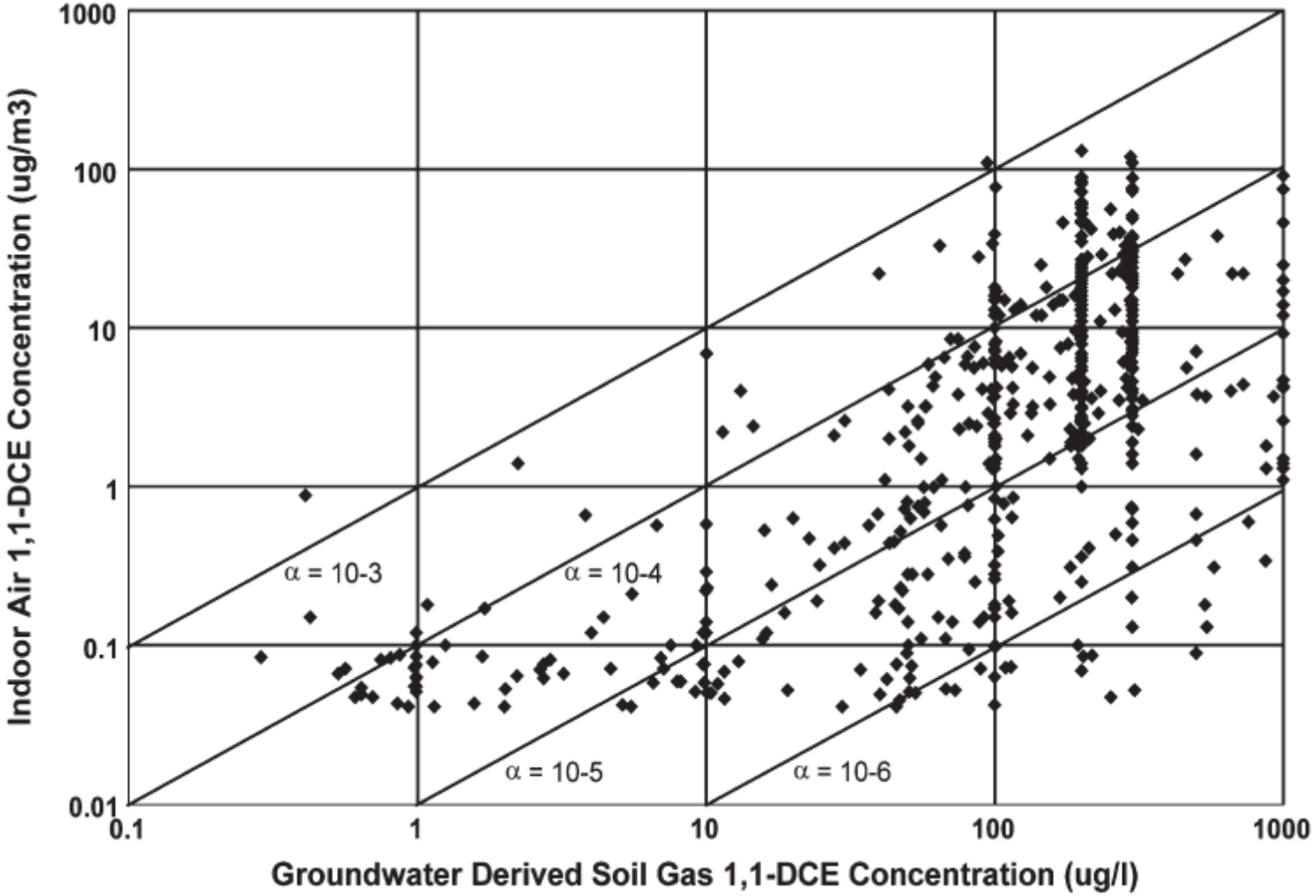
Site Background

- VOC impacted groundwater plume (**1,1-DCE**, 1,1,1-TCA, TCE)
- Variable geology; sand, silt, clay, weathered sedimentary rock
- Variable depth to groundwater (10’ to 50’)
- Variable building construction and characteristics
- On- and off-site groundwater treatment



Folkes et al., 2009

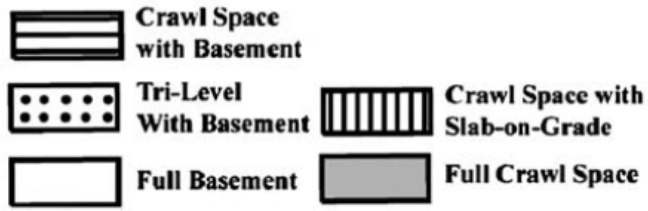
Case Study: *Folkes et al., 2009*

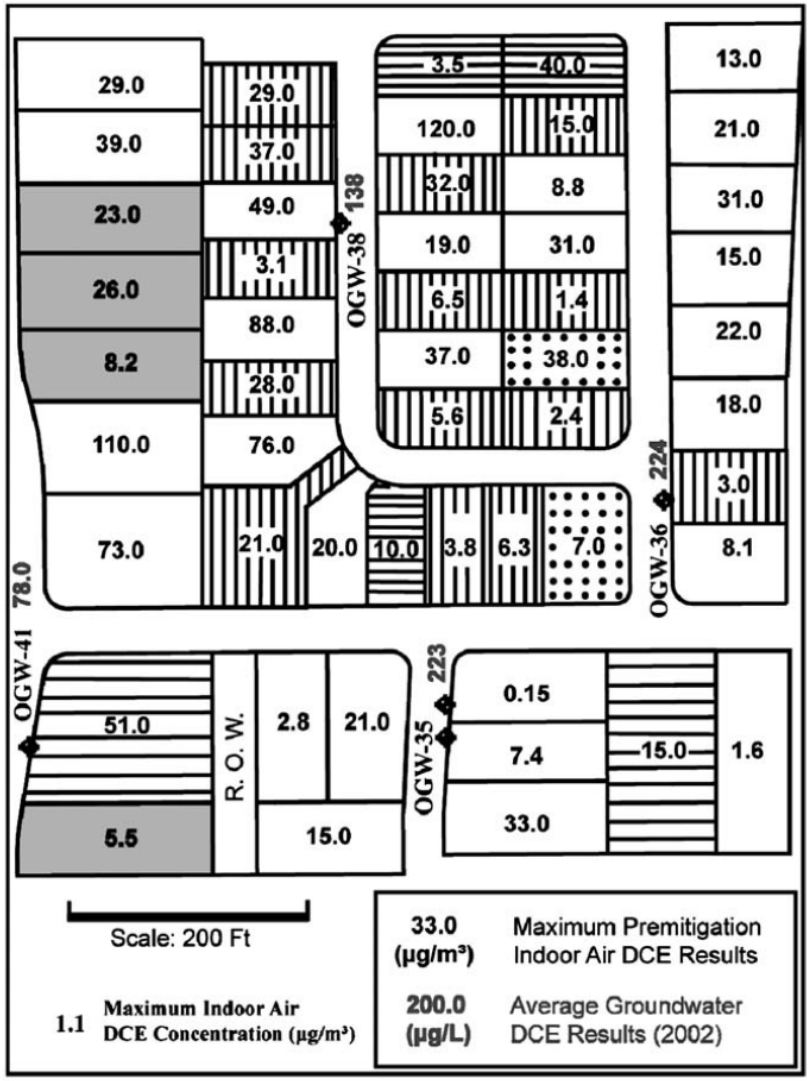


Groundwater derived soil gas concentration versus pre-mitigation indoor air concentration of 1,1-DCE (*1998-2003*)

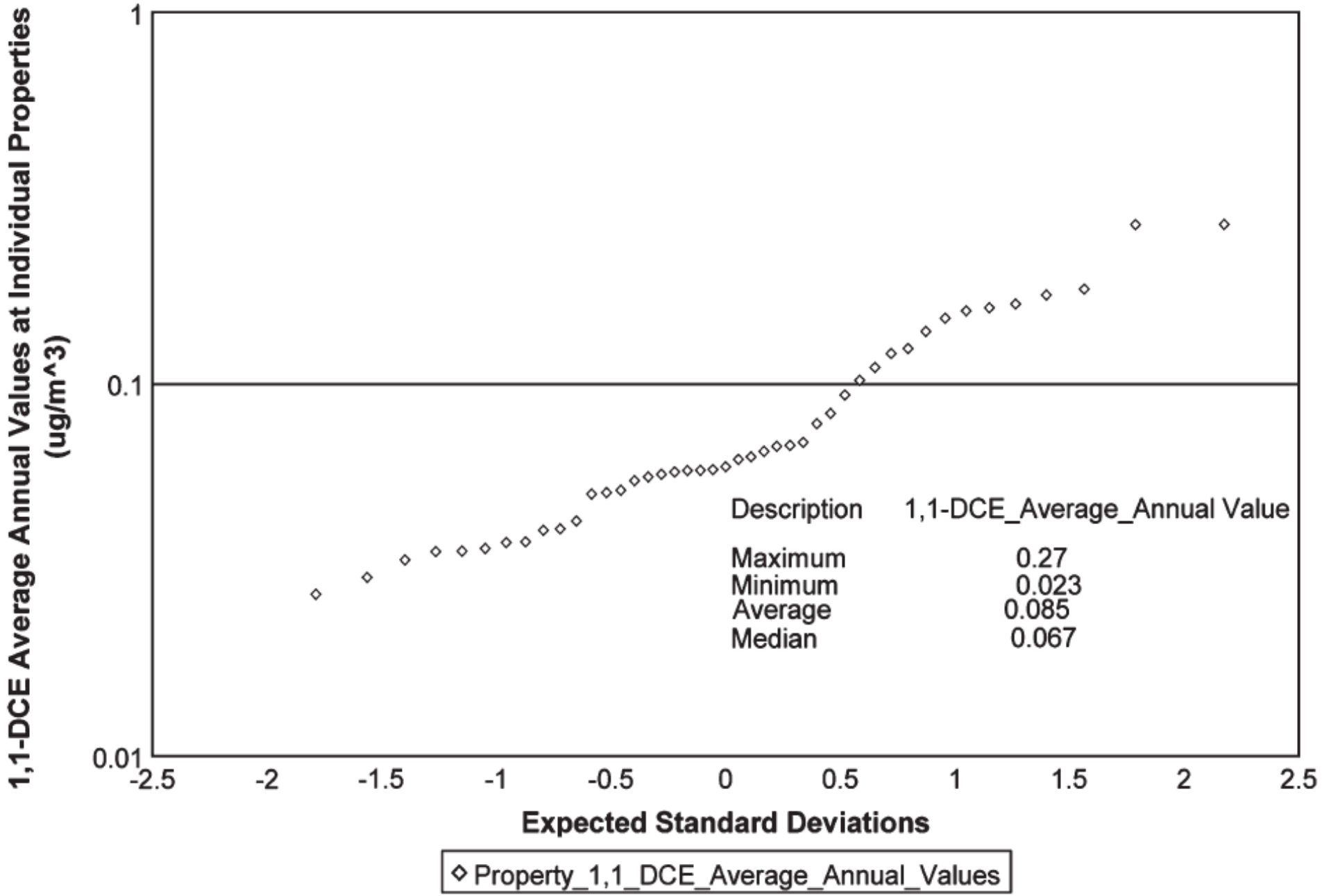
Case Study: *Folkes et al., 2009*

- Evaluation of 45 unmitigated homes
  - 2 to 10 years indoor air data (7.8 year average)
  - 715 indoor air measurements
  - Average annual 1,1-DCE indoor air concentration, 0.023 to 0.27 µg/m³

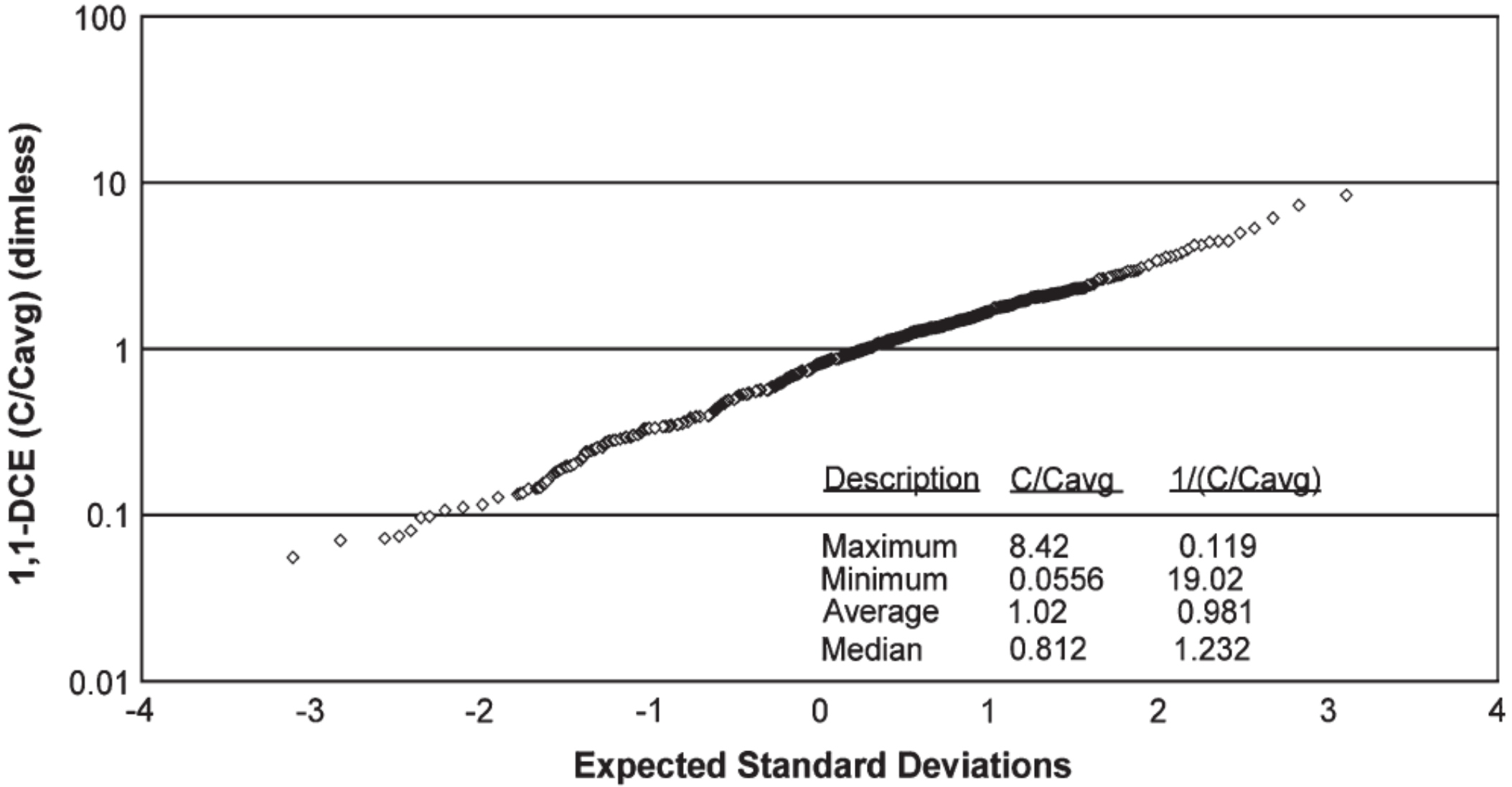




Folkes et al., 2009



Case Study: *Folkes et al., 2009*



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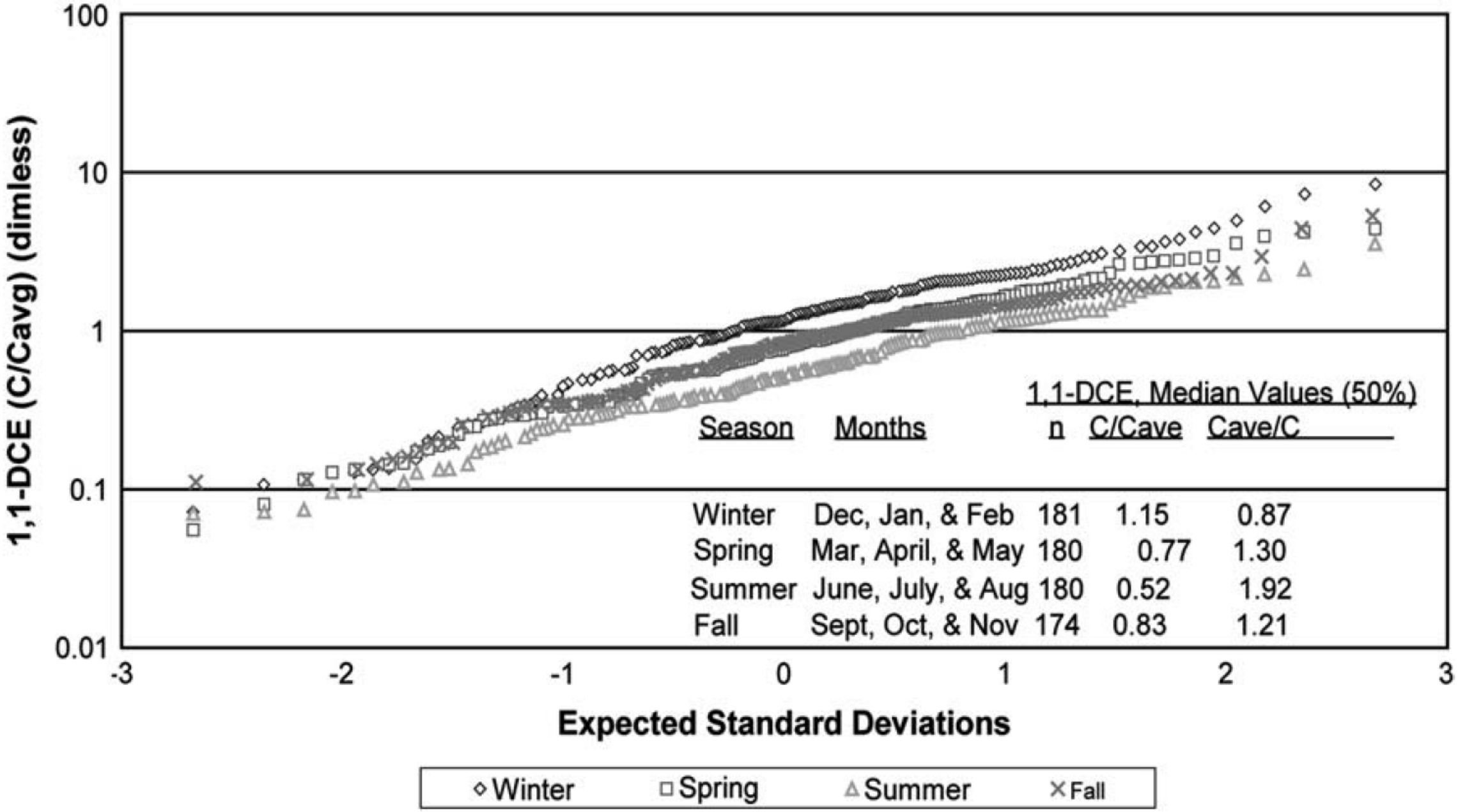

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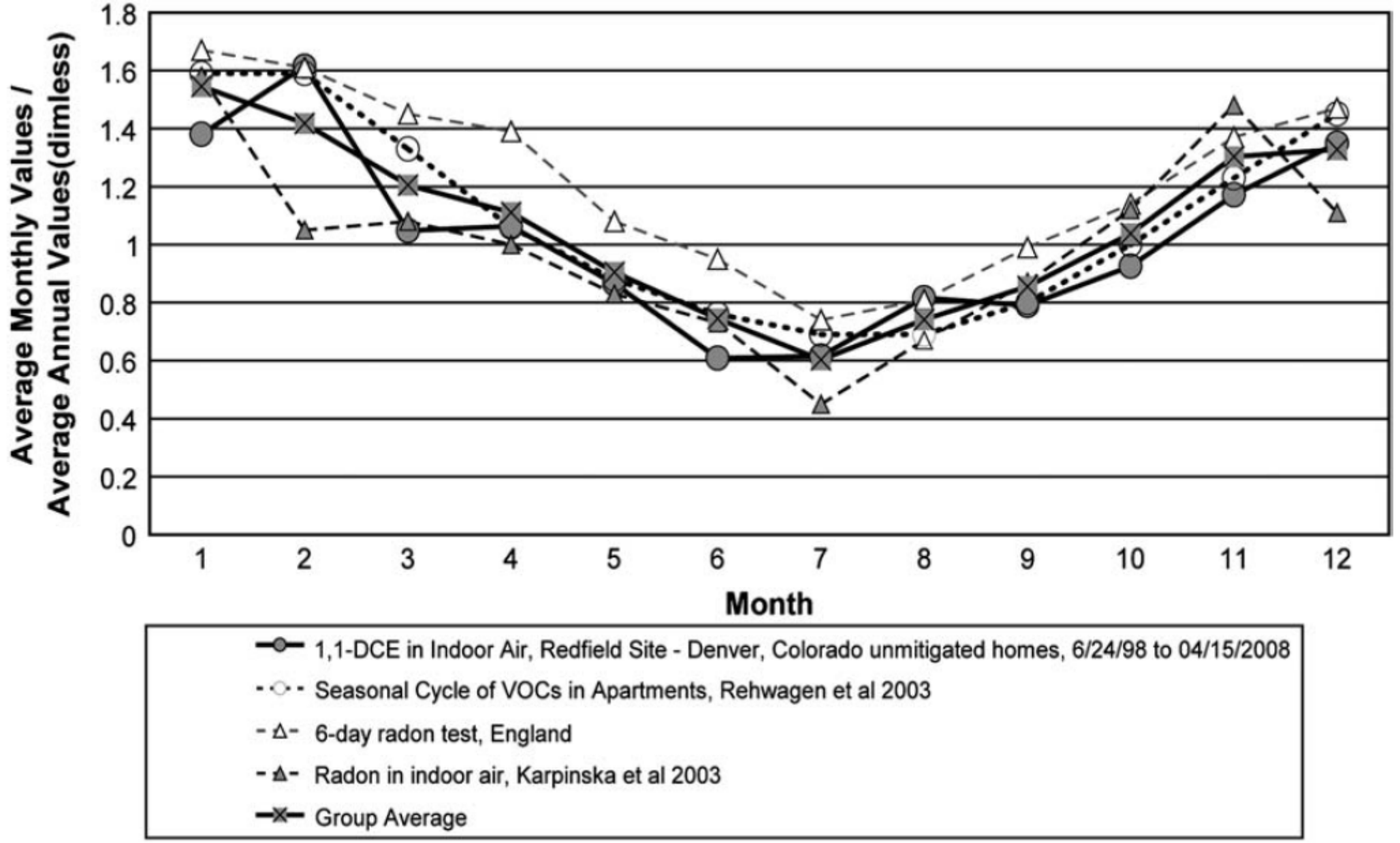
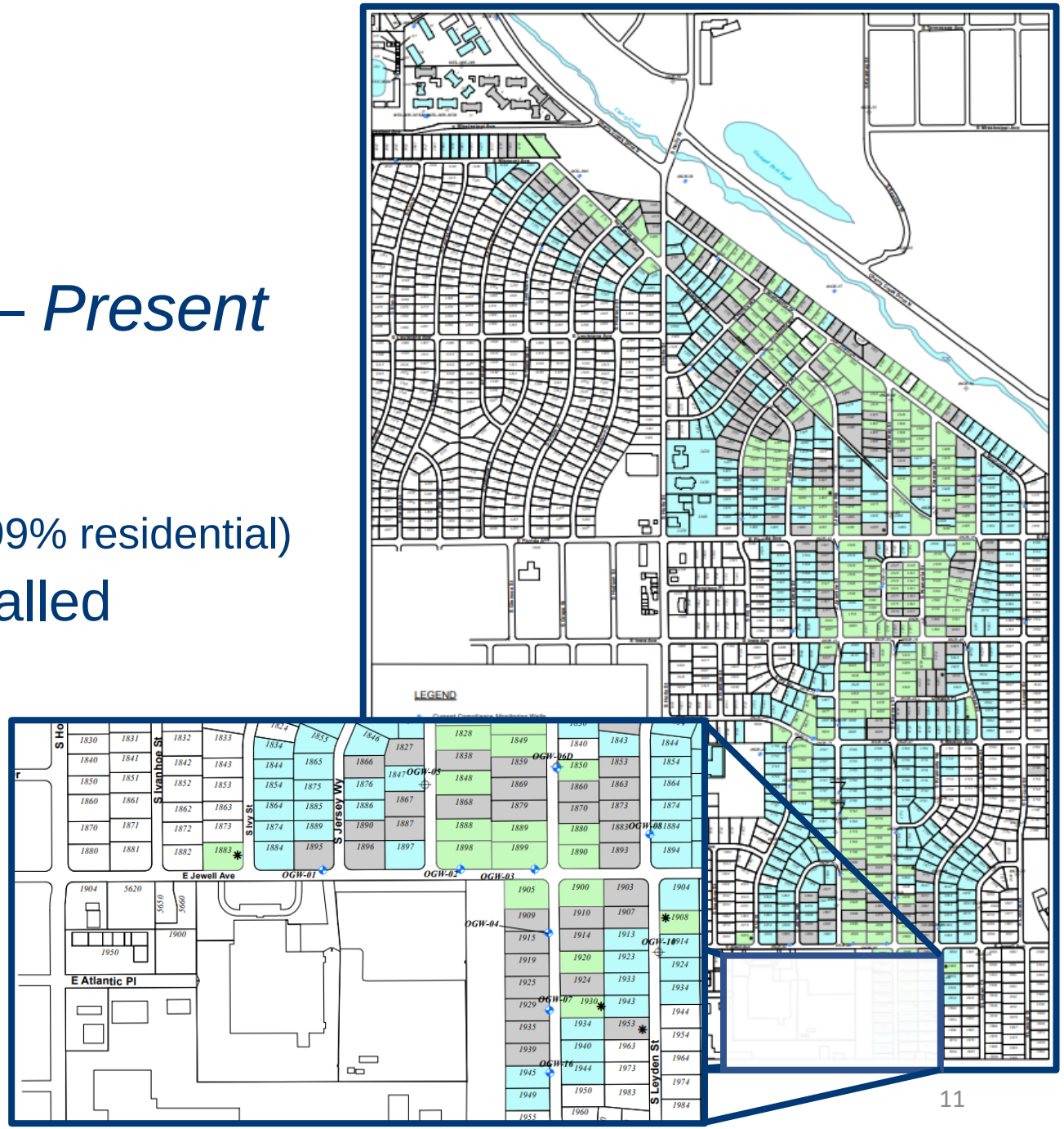


Case Study: *Folkes et al., 2009*

Folkes et al., 2009

Site Background

- Indoor air sampling, 1998 – *Present*
  - > 11,500 samples collected
  - > 9,600 indoor air samples
  - > 750 buildings sampled (~99% residential)
  - 387 mitigation systems installed



Air Monitoring Program Status Map, 10/2015

Looking Forward

- Evaluation of seasonality and weather patterns – historical records and on-site meteorological station

Summary and Conclusions

- Large residential VI dataset (>20 years), including pre- and post mitigation monitoring
  - Opportunity to evaluate historical weather data, including temperature, wind, and barometric pressure
- Previous study (Folkes et al., 2009) shows seasonal differences in indoor air concentrations; 2-3X annual average

Questions?

Thank you,

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