

## FAQs

### Atlantic RBCA Guidance for Vapour Intrusion Assessments (Dec. 2016)

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#### 1) Are there short term targets for indoor air?

Although Atlantic PIRI has not developed short term targets for indoor air, Health Canada has published minimal guidance for some parameters, found here: <https://www.canada.ca/en/services/health/publications/healthy-living.html#a2.1>.

#### 2) Why does Atlantic PIRI use a 1-in-100,000 ILCR as a target for all land uses?

When assessing risks posed by exposure to carcinogenic chemicals, regulatory agencies assume that any level of exposure (other than zero) is associated with some hypothetical cancer risk. As a result, it is necessary to specify a level of carcinogenic risk that is considered acceptable or essentially negligible. The background incidence of cancer in Canada is high, relative to a  $1 \times 10^{-5}$  risk level. The lifetime probability of developing cancer in Canada is approximately 0.4, or 40%. Thus, an excess or incremental cancer risk of  $1 \times 10^{-5}$  increases a person's lifetime cancer risk from 0.40000 to 0.40001. Health Canada has stated that, given the conservative (safety) margin associated with the derivation of cancer slope factors and unit risks, and the negligible impact of a 1 in 100,000 incremental risk level for contaminated site exposures, a cancer risk level of 1 in 100,000 ( $1 \times 10^{-5}$ ) is recommended for the purposes of assessing and managing federal sites contaminated with carcinogenic substances. Atlantic PIRI considers this same rationale to be applicable to non-federal contaminated sites in Atlantic Canada.

#### 3) What does Atlantic PIRI mean by “wet basement”? At what point do the PSSSLs not apply?

In areas of shallow water tables (such as floodplains), there may be times when groundwater is in direct contact with the foundation floor (i.e., there is no unsaturated soil). This scenario is often referred to as a “wet-basement” condition. Wet basement conditions would allow off-gassing of vapours from the contaminated groundwater directly into the building, likely at higher rates than those predicted by vapour intrusion models. Indoor air sampling would be recommended in these cases.

Wet-basement conditions should be suspected when buildings may have a sump pump to prevent flooding, or the groundwater table is within 1 m of the foundation floor and seasonal variations have not been confirmed. In these circumstances, the PSSSLs should not be used until the potential for a wet-basement condition has been confirmed.

**4) The J&E equation is non-linear and very complicated. Where can I go to learn more about the sensitive parameters for indoor air assessments?**

The on-line RBCA training provides an overview of the J&E equation and the sensitive parameters. A more in-depth discussion of the critical parameters for the J&E model can be found in the following paper published by the American Petroleum Institute:

- Identification of Critical Parameters for the Johnson and Ettinger (1991) Vapor Intrusion Model, Paul. C. Johnson, Department of Civil and Environmental Engineering, Arizona State University, May 2002.

In this paper, a flow chart approach is used to identify critical and non-critical parameters when applying the model for various situations, based on three calculated variables (A, B and C). These variables are calculated using site specific data. The critical parameters are dependent on the calculated variable values, and will therefore vary from site to site.

**5) How should duplicate samples be collected for sub-slab and soil gas?**

The preferred method to collect duplicate sub-slab and soil gas samples is to use a T connector. This allows for the two samples to be collected simultaneously, thereby providing true duplicate samples.

**6) The Guidance document says to collect over two seasons (warmer and colder). Which is more conservative?**

Site specific conditions dictate which season is more conservative. For example, the “chimney” effect during the winter period would only influence sub-slab samples, and would have little to no effect on soil vapour probes outside the footprint of the building. If contamination is predominantly in the water, (away from the source area) then high water table periods would represent worst case conditions. Conversely, if soil contamination is present in the vadose zone, then periods of low water table (which would expose more of the impacted vadose zone) would represent the worst case condition. The site professional therefore needs to carefully consider all site specific data, along with the conceptual model for the site, to determine what time period would represent the worst case conditions, and should confirm by having more than one sampling event. The rationale for this determination should be provided in their report.

**7) How does barometric pressure affect soil gas readings?**

For soil vapour probes away from buildings, temperature and barometric pressure should have minimal influence on soil gas concentrations collected at depths of 0.3-0.6 m or greater below ground surface. Beyond this depth, the subsurface conditions are less susceptible to ambient fluctuations.

**8) How should Site Professionals address VI on sites with contamination in layered systems?**

The development of a proper Conceptual Site Model will provide confidence that the Site Professional adequately assesses whether or not such conditions exist and where such conditions exist the vapour probe program should be designed to assess the multiple soil layers in the vadose zone.

**9) The groundwater table at my site is less than 3m below ground. Can I still use the PSSLs?**

The PSSLs for soil are independent of the depth to groundwater, and groundwater PSSLs are not very sensitive to the depth of groundwater. Therefore, a water level within 3m of the building does not negate the use of the PSSLs for either soil or groundwater. However, if the water table is less than 1m from the foundation floor, there is a potential for a “wet-basement” condition, which should be addressed by the Site Professional.