Over the past decade there have been significant advances in our understanding of petroleum vapour intrusion at contaminated sites and new methods have been developed for the assessment of this pathway. The available empirical data compiled from sites in Canada, US and Australia demonstrates a consistent pattern of vapour attenuation that support application of vertical and lateral screening distances. The screening distance approach is applicable within a defined framework consistent with the conceptual site model for soil vapour source strength from light non-aqueous phase liquid and dissolved petroleum sources and in consideration of factors that preclude the application of this approach (precluding site conditions). The screening approaches and distances published in key guidance documents are summarized. While the fundamental aspects of aerobic biodegradation of petroleum hydrocarbon vapours are well understood, there are questions on how certain site conditions and factors affect aerobic biodegradation and application of screening distances including cold climate sites, the behavior of petroleum hydrocarbon classes (e.g., aliphatic and aromatic fractions), the effect of ethanol on petroleum vapour biodegradation, the biodegradation of lead scavengers, 1,2-dichloroethane and ethylene dibromide, and the effect of building slabs and surface cover on aerobic biodegradation rates. The state of knowledge and key research on these conditions and factors is summarized, including modeling studies and empirical data on oxygen shadow science and oxygen recharge to below buildings, a key consideration for application of screening approaches for petroleum vapour intrusion. From these studies, guidelines are recommended for building and contaminant conditions when aerobic biodegradation rates could be affected. Within the current state of knowledge and guidance, the potential application of screening approaches for assessment of petroleum vapour intrusion within a Canadian context is described.

Ian Hers, PhD

Ian Hers is a senior consultant and Principal of Golder Associates located in Vancouver, B.C., Canada with 30 years professional experience. He serves as Golder’s global practice lead for vapour intrusion and natural source zone depletion. He has developed guidance for numerous regulatory agencies in US, Canada and UK and has published over 25 technical papers on vapor intrusion, LNAPL remediation and natural source zone depletion. He is the principal investigator for applied research or guidance projects recently completed or currently in progress for the American Petroleum Institute, Shell Global, Contaminated Sites Approved Professional Society and Health Canada. His recent interests lies in sustainable site assessment remediation approaches for petroleum hydrocarbon impacted sites. Dr. Hers holds a Ph.D. in Civil Engineering (University of British Columbia), is on the Board of Directors of the Science Advisory Board for Contaminated Sites in British Columbia.