



## Quantification of Uncertainty in Site-Specific Guideline Adjustment

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Regulators in different jurisdictions in Canada accept guideline adjustment based on the site-specific conditions. In Alberta, Tier 2 guideline adjustment becomes a common practice, particularly for the guidelines associated with DUA (domestic use aquifer), FAL (freshwater aquatic life) and inhalation pathways.

One of challenges in guideline adjustment is to select the parameter values to be used in the models. The parameter values at a site may be subject to spatial and temporal variations, but typically only one value is allowed in the simplified model for guideline calculation. Some of the parameters, such as infiltration rate, are inherently not measurable at a site and the literature values are or should be presented as a range rather than a single value. A common practice is to select a set of “representative” or “conservative” parameter values to be used in the model, which, however, may not guarantee “representative” or “conservative” outcomes due to complex non-linear interaction between different parameters in the model.

The presentation provides some case studies to quantify uncertainties in guideline calculation that are caused by variations of input parameter values. The methodology is based on Monte Carlo simulations and used to examine the sensitivity of each model parameter to the calculated guidelines. A set of calculated guidelines rather a single guideline value are used to make the site management decision, which allows quantification of the risks associated with decision made for the site. Historic data and multiple line of evidences may be used to narrow the input parameter value range as well as the calculated guideline ranges. More advanced uncertainty estimation methods will also be also discussed in the presentation for guideline adjustment.

### Amy Philip

Ms. Philip is a chemist and geologist with 19 years of experience as a contaminated sites specialist, providing guidance for site characterization, assessment, risk management and remediation on projects throughout Alberta and prairie provinces. Ms. Philip has worked on construction management projects on abandoned mine projects in Northern Canada. She also served as the program manager for the Faro Mine Complex Care and Maintenance project in the Yukon, as well as the Interim Construction Management contract at the Giant Mine in Yellowknife, Northwest Territories. She is currently the Technical Manager at Parsons.

### Sean Elliot

Mr. Sean Elliot is an associate geologist at Parsons. His work focuses primarily on conceptual site models and site characterization, assessing risk and data gaps at contaminated sites throughout the Canadian Prairies and Northern Canada. Mr. Elliot holds a Bachelor of Science in Geoscience and a Master of Science in Hydrogeology, with research surrounding low impact development functionality in Canada, specifically looking at vadose zone processes in frozen media.