

## **A Comparison of Dissolved Analyte Concentrations in Water Samples Collected Prior to and Following Purging of Groundwater Monitoring Wells in Alberta**

Alexander Oiffer <sup>a</sup>, James Armstrong <sup>b</sup>, Brent Moore <sup>c</sup>, Trevor Butterfield <sup>a</sup>

<sup>a</sup> WorleyParsons Komex, Suite 705, 10240-124 Street, Edmonton Alberta,

<sup>b</sup> WorleyParsons Komex, Suite 100, 4500 16 Avenue NW, Calgary Alberta

<sup>c</sup> Devon Canada Corporation, 32 Shores Drive, Leduc Alberta

Historically, purging of groundwater prior to sample collection was advocated in order to remove stagnant groundwater from a monitoring well that may not be representative of porewater within the surrounding geologic material. Purging typically consists of removing a given number of well volumes of groundwater (often set arbitrarily at three), whereby a well volume has been operationally defined as the volume of water contained within the well casing under hydrostatic conditions. Proposed departures from this approach have been based on studies that minimized purge volumes and agitation within the monitoring well (e.g., low flow sampling) or eliminated purge volumes altogether (e.g. no-purge sampling, diffusion bag sampling, collection devices). No-purge sampling is attractive because it reduces the sampling time and avoids handling of purged groundwater. However, few studies have been published on no-purge sampling research in Alberta.

A comparison was done to investigate variations in groundwater chemistry between no-purge, diffusion-based and conventional sampling on groundwater chemistry. Numerical modelling was used to examine potential sources of error from a conceptual basis. Field testing was also conducted, with results assessed using visual and statistical comparisons of dissolved analyte concentrations derived from multiple samples from shallow groundwater monitoring wells.

The three main results of the study were as follows. First, Pre-Purge and Post-Purge samples showed good reproducibility for most inorganic compounds. Second, dissolved hydrocarbons showed greater scatter, but within ranges noted for field duplicate variability. Third, in contrast, poorer reproducibility was noted with respect to polycyclic aromatic hydrocarbons, with distinctly higher concentrations noted in groundwater samples collected prior to purging. Depending on the goals of the groundwater study, no-purge sampling has the potential to significantly reduce the time and costs associated with traditional sampling while providing data of comparable quality.

### **Brent Moore, M.Sc., P.Geol.**

Brent is an Environmental Advisor for Devon Canada Corporation. He has over 15 years experience in contaminant hydrogeology. His M.Sc. is in hydrogeology from the University of Waterloo. His main interests are water resources, monitored natural attenuation, in situ remediation, and risk management. He has been involved with the evaluation of purging versus no-purging during groundwater sampling for a number of years.