



**PROTOCOL FOR THE CONTAMINATED SITES REGULATION
UNDER THE ENVIRONMENT ACT**

**PROTOCOL NO. 10:
Determining Background Groundwater Quality**

Prepared pursuant to Part 6 – Administration, Section 21,
Contaminated Sites Regulation, OIC 2002/171

DETERMINING BACKGROUND GROUNDWATER QUALITY

1.0 Introduction

Section 2(2) of the *Contaminated Sites Regulation*, OIC 2002/171 states that a site is not a contaminated site if it does not contain any contaminant with a concentration greater than or equal to the local background concentration of that contaminant in the soil, surface water or groundwater. In accordance with section 21(1)(i) of the *Contaminated Sites Regulation*, this protocol describes the methods to be used to determine the local background concentration in groundwater at a given site for the purpose of such a comparison.

2.0 Definitions

- 2.1 “Background concentration” means the concentration of a substance in an environmental medium in a geographic area, not including any contribution from local human-made point sources of contamination.
- 2.2 “Local background concentration in groundwater” means the background concentration in groundwater relevant to a nominal contaminated site, determined by the use of background monitoring wells as described in this protocol.
- 2.3 “Nominal contaminated site” means a site at which exceedances of the numerical standards of the *Contaminated Sites Regulation* have been detected, but the status of the site under section 2(2) of the Regulation has yet to be determined.

3.0 Siting of Background Monitoring Wells

To determine background groundwater quality, a minimum of three background groundwater monitoring wells are required. Background wells should be located in the same geographic area and in the same groundwater flow system as close as possible to the nominal contaminated site. Preferred locations for background wells are off-site natural areas, parks and residential neighbourhoods.

Background wells should be located cross-gradient or upgradient from and outside of the area of influence of any on-site or off-site human-made point sources of contamination. On-site background wells may be used provided they can be shown to meet these criteria.

Areas that have received imported fill should be avoided unless the source and quality of the fill material is documented and the fill does not contain any contaminants in concentrations exceeding any of the standards in the *Contaminated Sites Regulation* for that contaminant.

In developed areas, or at large sites that have been widely impacted by human activity, a greater number of background wells and increased sampling intensities may be necessary to adequately demonstrate the absence of human-made point source contributions.

4.0 Sampling of Background Monitoring Wells

Sampling should be conducted at the background wells in accordance with a detailed plan. This plan should select sampling methods at the background wells in order to maximize comparability between the background wells and the nominal contaminated site, such as by taking samples from similar depths and using the same sample collection mechanisms. Samples must be analysed using analytical methods identical to those used with the samples from the nominal contaminated site, and preferably by the same laboratory.

Background groundwater wells should be sampled a minimum of two times to address temporal variability and provide a robust data set. Where groundwater flow conditions and/or quality are expected to vary seasonally, the sampling strategy should address seasonal effects. Appropriate quality assurance and quality control methods should be used.

All monitoring wells must be installed and sampled in accordance with Protocol 7.

5.0 Statistical Determination of Local Background Concentration

Where the data collected from the background monitoring wells fall within a single statistical population, the representative local background concentration is the 95th percentile of the data set. Where data variability is large and the data do not fall within a single population, conservative estimates should be used to determine local background concentrations, or additional background wells should be installed and sampled to increase the size of the data set. For additional information, please consult the Environmental Programs Branch.

6.0 Comparison and Reporting

Persons wishing to have a site released from consideration as a contaminated site based on a comparison of contaminant concentrations at the site and at background monitoring wells must submit to the Environmental Programs Branch a written request for such a release accompanied by a report prepared by a qualified environmental practitioner. The report shall contain, at a minimum, the following details:

- 6.1** The rationale for selecting the locations of the background monitoring wells, accompanied by the following details about the site(s) on which they are located:
 - a) name and address of the property owner;
 - b) civic and legal addresses, where available, as well as geographic coordinates;
 - c) current land and water uses;
 - d) surrounding land and water uses;
 - e) previous land and water uses;
 - f) potential contaminant sources, both natural and anthropogenic, including non-point sources;
 - g) physical characteristics;
 - h) a diagram or map of the site(s) showing property boundaries and all sampling locations.
- 6.2** Sampling and analysis procedures used, as well as explanations of and justifications for any differences between methods used at the background monitoring wells and the nominal contaminated site.
- 6.3** A comparison of the calculated local background concentration with the analytical results from the nominal contaminated site, and an analysis of the statistical significance of the result.
- 6.4** Conclusions drawn from the above comparison, indicating whether the site should be released from consideration as a contaminated site as per section 2(2) of the *Contaminated Sites Regulation*.

If the report shows that the site is suitable for release under section 2(2) of the *Contaminated Sites Regulation*, the Environmental Programs Branch will provide written authorization for such a release.

