BRITISH COLUMBIA

Ministry of Water, Land and Air Protection

PROTOCOL 9 FOR CONTAMINATED SITES

Determining Background Groundwater Quality

Prepared pursuant to Section 53 of the
Contaminated Sites Regulation under the
Waste Management Act

Approved: _____ _____

Director of Waste Management — Date

1.0 INTRODUCTION

This protocol provides a procedure for determining local background concentrations in groundwater. It is intended to assist persons conducting remediation pursuant to the *Waste Management Act* at sites with local background concentrations of a substance or substances above numerical water quality standards. Concentrations of a substance that occur naturally in a geographic area are considered to be representative of background concentrations.

2.0 DEFINITIONS

"background concentration" means the concentration of a substance in an environmental medium in a geographic area, but does not include any contribution from local human-made point sources.

"contaminated site" means an area of land in which the soil or any groundwater lying beneath it, or the water or the underlying sediment, contains

(a) a special waste, or

(b) another prescribed substance in quantities or concentrations exceeding prescribed criteria, standards or conditions.

"local human - made point source" means a location or area at a site where, as a result of human activity, a substance was introduced into the environment causing the substance concentration to exceed the local background concentration.

"prescribed criteria, standards or conditions" mean the numerical water quality standards listed in Schedule 6 of the Contaminated Sites Regulation.

3.0 REGULATORY PROVISIONS

Subsection 11(3) of the Contaminated Sites Regulation states that:

> *A site is not a contaminated site with respect to a substance in the soil, surface water or groundwater if the site does not contain any substance with a concentration greater than the local background concentration of that substance in the soil, surface water or groundwater respectively.*

and subsection 17(2) of the Contaminated Sites Regulation in part states that:

> *A contaminated site is considered to have been satisfactorily remediated if:*

(b) the soil, surface water or groundwater at the site does not contain any substance with a concentration greater than or equal to the local background concentration of that substance in the soil, surface water or groundwater respectively.

4.0 PROCEDURES FOR DETERMINING LOCAL BACKGROUND GROUNDWATER QUALITY

4.1 Rationale

The objective of this protocol is to establish a procedure for determining the local background concentration of a substance in groundwater in a defined geographic area and for a defined groundwater flow system.

This protocol is not intended to allow unrestricted water uses at sites where concentrations of a substance are representative of the local background groundwater concentration. It provides a release from the requirement to undertake remediation at such sites.

It is the responsibility of the applicant to ensure that best professional practice is used in the siting, construction, development and sampling of groundwater monitoring wells and in the preparation of technical reports submitted in support of applications for the determination of local background groundwater concentrations.

4.2 Siting and Monitoring of Background Monitoring Wells

For the purposes of this protocol, a minimum of three background groundwater 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 site of interest. Preferred locations for background wells are off-site natural areas, parks and residential neighbourhoods.

Background wells should not be located within the area of influence of any on-site or off-site human-made point sources of contamination. They should be located cross-gradient or up-gradient of any identified human-made point sources of contamination. On-site background wells may be used provided they can be shown to be outside the influence of human-made point sources.

Areas that have received imported fill should be avoided unless the source and quality of the fill material is documented and the fill quality is equal to or better than residential land use quality. 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.

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.

4.3 Statistical Determination of Local Background Concentration

Where collective background data fall within a single statistical population, the representative local background concentration is the 95th percentile concentration 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 Technical Guidance 12, Statistics for Contaminated Sites.

4.4 Reporting and Application Requirements

An application seeking approval to establish a local background groundwater concentration of a substance in a geographic area must be supported by a background groundwater investigation report prepared in accordance with best professional practice in groundwater investigations. The information contained in the report should be similar to that of a detailed site investigation report as outlined in Technical Guidance 11, Checklist for Reviewing a Detailed Site Investigation. Ministry review of background groundwater applications is subject to fees provided in Schedule 3, Table 2 of the Contaminated Sites Regulation.

An application must include a signed statement confirming that:

a) the person carrying out the background groundwater investigations and preparing the report has demonstrable experience in the assessment of groundwater flow systems and groundwater quality of the type encountered at the site;
b) the investigation has been carried out in accordance with best professional practice in groundwater investigations;
c) analytical methods acceptable to the Director of Waste Management have been used; and
d) the estimated background concentration for the substance or substances of interest is representative of local background conditions.