



PROTOCOL 3
FOR CONTAMINATED SITES

**Blending, Mixing, or Dilution as a
Remediation Approach**

Prepared pursuant to Section 64 of the
Environmental Management Act

Approved: _____ Ron Driedger _____ July 20, 1999
Director of Waste Management Date

1.0 Introduction

The purpose of this protocol is to establish the acceptability of using blending, mixing or dilution of contaminated soils as a remediation strategy, whether at a contaminated site or at a site to which contaminated soil is being relocated.

2.0 Definitions

“agricultural quality” means soil or other material that is suitable for agricultural or any other land use as specified in the Contaminated Sites Regulation.

“blend” means to mix or dilute so as to obtain a uniform material of a desired quality, obscuring or harmonizing the individual components.

“industrial/commercial quality” means soil or other material that is not suitable for residential, urban park, or agricultural land use, but is suitable for industrial or commercial land use as specified in the Contaminated Sites Regulation.

“non-hazardous waste” means soil or other materials that, as defined in the Contaminated Sites Regulation, are not classified as hazardous wastes, but are classified as:

- waste quality;
- industrial/commercial quality;
- residential/urban park quality; or
- agricultural quality.

“residential/urban park quality” means soil or other material that is not suitable for agricultural land use, but is suitable for residential, urban park, commercial, or industrial land use as specified in the Contaminated Sites Regulation.

“hazardous waste” means materials as defined in the Hazardous Waste Regulation (reference 1).

“waste quality” means soil or other material that is not suitable for industrial, commercial, urban park, residential, agricultural, or any other land use as specified in the Contaminated Site Regulation.

3.0 General

Blending soils containing different contaminant concentrations can reduce the concentrations of individual contaminants within the resultant mixture. However, mixing does not reduce the contaminant mass. If the entire resultant mixture is re-introduced into the environment, no treatment or reduction of the contaminants in the environment is achieved.

Where numerical remediation standards are used, blending is not considered an acceptable remediation approach. The numerical remediation approach was not structured to properly assess whether blending is appropriate. Dilution can reduce the rate of contaminant release into the environment, but may not reduce short- and long-term toxicological effects from the blended contaminants.

Blending can result in changes to the toxicological character of a contaminant, and raises the potential of multiple loading effects, bioaccumulation, chemical accumulation, and chemical species interactivity. Blending under the numerical standards approach creates the potential to circumvent the intent of the Contaminated Sites Regulation. The technique is often proposed so that contaminated materials can be reclassified to a less rigorous standard. If allowed, this could result in a loss of regulatory control over the movement and discharge of contaminants into the environment.

Where risk based standards are used, blending can be considered as a possible remediation technique. The risk assessment and risk management approach can properly assess potential changes to the toxicological character of the contaminant and effects related to potential multiple loading, bioaccumulation, chemical accumulation, or chemical species interactivity.

4.0 Legal requirements

Under section 36 of the Hazardous Waste Regulation, blending, or the mixing and dilution of hazardous waste *is prohibited*.

Under the Contaminated Sites Regulation, blending of non-hazardous waste is not specifically prohibited. However, under section 56 of the *Environmental Management Act*, restrictions on blending are provided in that the selection of remediation options for a contaminated site *must* satisfy the following:

56 (1) A person conducting or otherwise providing for remediation of a site must give preference to remediation alternatives that provide permanent solutions to the maximum extent practicable, taking into account the following factors:

- (a) any potential for adverse effects on human health or for pollution of the environment;
- (b) the technical feasibility and risks associated with alternative remediation options;
- (c) remediation costs associated with alternative remediation options and the potential economic benefits, costs and effects of the remediation options;
- (d) other prescribed factors.

(2) When issuing an approval in principle or a certificate of compliance, a director must consider whether permanent solutions have been given preference to the maximum extent practicable as determined in accordance with any guidelines set out in the regulations.

The *Environmental Management Act* requires a responsible person conducting or otherwise providing for remediation at a contaminated site to give preference to remedial alternatives that provide permanent solutions.

The ministry does not consider blending to be a permanent remedial solution.

The ministry's *Technical Guidance 1 on Contaminated Sites: Site Characterization and Confirmation Testing* (2005) reiterates this principle and cautions strongly against diluting contaminant concentrations to achieve regulatory compliance.

5.0 Protocol for soil blending

A Director under section 56 of the *Environmental Management Act* has the legislated authority to approve remediation strategies. Under section 64 (2) (j) of the Act, the director has the authority to approve and adopt a protocol that endorses "certain remediation approaches as the preferred alternatives for a certain type of site."

Blending of hazardous waste *is prohibited*. Blending of non-hazardous waste for the sole purpose of circumventing regulatory restrictions on the use of contaminated materials *is not an acceptable remediation methodology* where numerical standards for remediation are applied.

The ministry recommends that the blending of non-hazardous waste should not be approved as a remediation strategy by a Director, except where risk assessment and risk management is used on a site-specific basis to demonstrate that:

- a) the proposal to blend contaminated material will result in a net benefit to the environment; and
- b) no unacceptable risk to human health or the environment will result.

In addition to the submission of a risk assessment and risk management plan acceptable to a Director, the following documents must also be presented:

- a) a detailed soil classification and management plan;
- b) a long-term monitoring program or, if one is not considered necessary, reasons why; and
- c) financial security requirements or, if these are not considered necessary, reasons why.

6.0 References

1. Hazardous Waste Regulation. B.C. Reg. 63/88 including amendments up to B.C. Reg. 464/2004. Consolidated October 22, 2004.
2. Ministry of Environment. (2005). Technical Guidance 1 on Contaminated Sites: Site Characterization and Confirmation Testing. Victoria, BC. August 2005.

For more information, contact the Environmental Management Branch at site@gov.bc.ca