



BRITISH
COLUMBIA

Ministry of
Water, Land and Air Protection

PROCEDURE MANUAL

SUBJECT
**Protocol for Regulation of Petroleum
Hydrocarbons in Water under the Special Waste
and Contaminated Sites Regulations**

This procedure replaces:

Contaminated Sites Protocol 7: "Regulation of Petroleum Hydrocarbons in Water under the Contaminated Sites and Special Waste Regulations", July 19, 1999.

Staff, Organizations directly affected:

Environmental Management
Environmental Protection Regional Operations

Policy cross-references:

Special Waste Regulation
Contaminated Sites Regulation

Other cross-references:

None.

Purpose:

This procedure provides a protocol for the regulation of petroleum hydrocarbons in water under the Special Waste and Contaminated Sites Regulations pursuant to section 53 of the Special Waste Regulation.

Procedure:

Introduction

1. This protocol describes the application of numerical standards for petroleum hydrocarbons in water under Schedule 6 of the Contaminated Sites Regulation (CSR).

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AUTHORIZATION

SIGNATURE

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It also describes the conditions for management of petroleum hydrocarbons in water at contaminated sites, whereby, under the authority of Section 53 of the Special Waste Regulation (SWR), groundwater containing benzene, toluene, ethylbenzene or xylenes in excess of the leachate standards of the SWR is exempted from the regulatory regime of the SWR.

Pertinent standards are presented in Table 1.

Protocol

1. Definitions

"EHw₁₀₋₁₉" means light extractable petroleum hydrocarbons in water, including acenaphthene, acridine, anthracene, fluorene, naphthalene and phenanthrene.

"groundwater travel time" means the time required for groundwater to travel a given distance by advection. By convention, travel time is calculated using average linear flow velocity.

"leachable toxic waste" means waste which when subjected to the Leachate Extraction Procedure described in Part 1 of Schedule 4 of the Special Waste Regulation produces an extract with a contaminant concentration greater than those prescribed in Table 1 of Schedule 4 of the Special Waste Regulation.

"leachate quality standards" means the leachate quality standards listed in Table 1 of Schedule 4 of the Special Waste Regulation.

"LEPHw" means light extractable petroleum hydrocarbons in water, and includes light extractable petroleum hydrocarbons with the exception of acenaphthene, acridine, anthracene, fluorene, naphthalene and phenanthrene.

"numerical water standards" means the generic numerical water standards listed in Schedule 6 of the Contaminated Sites Regulation.

"plume front" means the downgradient extent of a contaminant plume that is defined outside its boundary by:

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- i) the absence of detectable petroleum hydrocarbon concentrations; or
- ii) petroleum hydrocarbon concentrations below the numerical water standard for the nearest downgradient water use (e.g. drinking water or aquatic life).

“preferential flow pathway” means a pathway capable of conveying groundwater at a velocity greater than the average linear flow velocity of groundwater in a petroleum hydrocarbon contaminated aquifer. Preferential flow pathways can occur along underground utilities, for example sewers, water and gas lines, or along surface depressions or ditches that intersect and drain shallow aquifers.

“VPHw” means volatile petroleum hydrocarbons in water, and includes volatile petroleum hydrocarbons with the exception of benzene, toluene, ethylbenzene and xylenes.

“VHw₆₋₁₀” means volatile petroleum hydrocarbons in water, including benzene, toluene, ethylbenzene and xylenes.

2. Overview

As provided in Table 1, this protocol changes the regulatory system with respect to the management of petroleum hydrocarbons in water at contaminated sites such that:

- (1) the leachate quality standards for benzene, toluene, ethylbenzene and xylenes in the SWR no longer apply to the regulation of petroleum hydrocarbons in water;
- (2) where a water use described in the CSR *is applicable* at a site, groundwater contaminated with petroleum hydrocarbons need not be managed on the basis of the leachate quality standards for benzene, toluene, ethylbenzene and xylenes in the SWR but rather must be managed in accordance with the numerical water standards of the CSR for benzene, toluene, ethylbenzene, xylene, volatile petroleum hydrocarbons (VPHw) and light extractable petroleum hydrocarbons (LEPHw) as specified in the CSR for that water use;
- (3) where the water uses described in the CSR *are not applicable* at a site, petroleum contaminated groundwater need not be managed on the basis of the leachate quality standards for benzene, toluene, ethylbenzene and xylenes of the SWR but rather must be managed in accordance with the numerical water standards of the CSR for VHw₆₋₁₀ and EHW₁₀₋₁₉; and

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(4) at all sites, regardless of water use, the numerical water standards of the CSR for VHW₆₋₁₀ and EHW₁₀₋₁₉ apply.

This protocol does not authorize any change in the application of the leachate quality standards in the SWR to the regulation of petroleum hydrocarbon contaminated soil.

3. **Special Waste Regulation - Authorization and Mandatory Conditions**

3.1 **Authorization**

Pursuant to Section 53 of the SWR, leachable toxic waste containing benzene, toluene, ethylbenzene and xylenes in groundwater at a contaminated site is exempt from the regulatory provisions of the SWR, provided the groundwater is managed in accordance with the regulatory requirements of the CSR and the conditions of this protocol outlined below.

3.2 **Mandatory Conditions**

- 3.2.1 For conditions 3.2.2 and 3.2.3 below, the water use assigned at the plume front applies to all properties that contribute to, or are impacted by, the petroleum hydrocarbon plume.
- 3.2.2 Where the petroleum hydrocarbon contaminant plume front is located the lesser of 1 km or 50 years groundwater travel time from the nearest aquatic receiving environment, the applicable water use is aquatic life and the applicable standards are the CSR aquatic life numerical water standards.
- 3.2.3 Where the petroleum hydrocarbon contaminant plume front is located the lesser of 1.5 km or 100 years groundwater travel time from the nearest existing or probable future drinking water supply, the applicable water use is drinking water and the applicable standards are the CSR drinking water numerical water standards.
- 3.2.4 At all sites, regardless of water use, the water quality standards for VHW₆₋₁₀ and EHW₁₀₋₁₉ apply.



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- 3.2.5 In accordance with the requirements of the CSR, the owner of the petroleum hydrocarbon source site has notified the owners of neighbouring properties onto which the petroleum hydrocarbons have migrated or have likely migrated. This notification is required when any of the following CSR standards are exceeded or are likely exceeded:
- i) the numerical water standards for VHW₆₋₁₀ or EHW₁₀₋₁₉;
 - ii) the applicable numerical water standards for benzene, toluene, xylenes, ethylbenzene, VPHw or LEPHw.
4. **Additional requirements that may apply**
- 4.1 Where a petroleum hydrocarbon plume occurs within a “protected aquifer” as designated by the director, the water use shall be that for which the aquifer is protected.
- 4.2 Where a preferential flow pathway intersects a petroleum hydrocarbon plume, groundwater travel times calculated using standard groundwater flow equations are invalid. Pending completion of ministry guidance on the assessment and treatment of preferential flow pathways on contaminated sites, the manager should be consulted regarding appropriate calculation of groundwater travel times and assignment of water use.
- 4.3 The CSR soil standard “Odorous Substances – not present” applies on all sites, including those subject to this protocol.
- 4.4 Nothing in this protocol alters the authority of a manager to specify under Section 17(5) of the CSR, a numerical standard for surface water or groundwater as necessary to protect current and future surface water or groundwater uses on adjacent sites or to prevent pollution.
- 4.5 Nothing in this protocol alters the authority of a manager to specify under Section 12 of the CSR, the surface water uses or groundwater uses which currently, or may reasonably be expected in the future, to apply at a site.

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Table 1: Special Waste Regulation and Contaminated Sites Regulation Standards for Petroleum Hydrocarbons in Water

Substance	Special Waste Regulation	Contaminated Sites Regulation	
	Leachate Quality Standards (ug/L)	Aquatic Life Water Standards (ug/L)	Drinking Water Water Standards (ug/L)
Benzene	500	4 000 ^{1,2} , 1 000 ^{2,3}	5
Ethylbenzene	240	2 000 ^{1,2} , 2 500 ^{2,3}	2.4
Toluene	2 400	390 ^{1,2} , 3 300 ^{2,3}	24
Xylenes	30 000	NS ⁴	300
VPHw	NS ⁴	1 500 ²	NS ⁴
LEPHw	NS ⁴	500 ²	NS ⁴
VHW ₆₋₁₀	NS ⁴	15 000 ⁵	15 000 ⁵
EHW ₁₀₋₁₉	NS ⁴	5 000 ⁵	5 000 ⁵
Nonaqueous Phase liquids	NS ⁴	not present ⁶	not present ⁶

Footnotes

- ¹ Standard to protect freshwater aquatic life.
- ² This generic standard may be modified by developing a site-specific standard. Consult director for further advice.
- ³ Standard to protect marine and/or estuarine aquatic life.



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⁴ NS - no standard.

⁵ Standard is applicable at all sites, irrespective of water use.

⁶ Water must be remediated so that nonaqueous phase liquids are not present in quantities in excess of that acceptable to a manager. For the purposes of this protocol, not present means VHW₆₋₁₀ and/or EHW₁₀₋₁₉ concentrations less than 15 000 ug/L and 5 000 ug/L, respectively. Concentrations greater than these levels could be considered proof of nonaqueous phase liquids presence.

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