

TECHNICAL BULLETIN 1, AND NON-CHLORINATED PHENOLS WATER QUALITY STANDARDS

GLYN R. FOX
HEAD, SCIENCE & STANDARDS
January 11, 2014

GeoEnvirologic Seminar - Update on BC Contaminated Site Regime
May 7, 2014




Ministry of
Environment

Bulletins – General Points

- Purpose of a CSR Bulletin is to convey direction/instruction
- Typically a Bulletin acts to fill a gap in some other CSR:
 - protocol,
 - Guidance, or
 - Procedureuntil the other CSR document can be revised
- Two types of bulletins:
 - technical, and
 - administrative
- Usually Bulletins are short (2 pages) and issued directly, often without external review or comment

TECHNICAL BULLETIN 1 - PURPOSE

TB1 - RA Evaluation of Occupational Dermal Exposure to Contaminated Water



BRITISH COLUMBIA
Ministry of
Environment

1

**TECHNICAL BULLETIN
FOR CONTAMINATED SITES**

Effective date: September 1, 2013

Risk Assessment Evaluation. Occupational Dermal Exposure from Contaminated Surface Water or Groundwater

Purpose
This bulletin provides supplemental technical direction regarding the evaluation of the dermal exposure pathway for human health risk assessment conducted under the Contaminated Sites Regulation (the Regulation).

Bulletin
To evaluate in human health risk assessment, the dermal exposure pathway for occupational receptors (i.e., trench workers, utilities maintenance personnel, etc.) arising from contact with surface or groundwater at a contaminated site:

1. In accordance with procedures provided by the United States Environmental Protection Agency [1], determine the log octanol-water coefficient (log K_{ow}) value for all potential contaminants of concern (PCOCs) and contaminants of concern (COCs) present in the surface or groundwater which exceed the applicable water quality numerical standards in the Regulation.²
2. a) If the log K_{ow} for a PCOC or COC is less than 4.5, the dermal exposure pathway for occupational receptors arising from contact with surface or groundwater with respect to that substance need not be evaluated in the human health risk assessment.

b) If the log K_{ow} for a PCOC or COC is greater than or equal to 4.5, the dermal exposure pathway for occupational receptors arising from contact with surface or groundwater with respect to that substance must be evaluated in the human health risk assessment.
3. a) If the hazard and risks for the substance(s) quantified for the dermal exposure pathway for occupational receptors arising from contact with surface or groundwater do not exceed the corresponding risk-based standards of the Regulation (i.e., hazard index less than or equal to one or lifetime cancer risk less than or equal to one in 100,000) the parcel is considered to have been satisfactorily

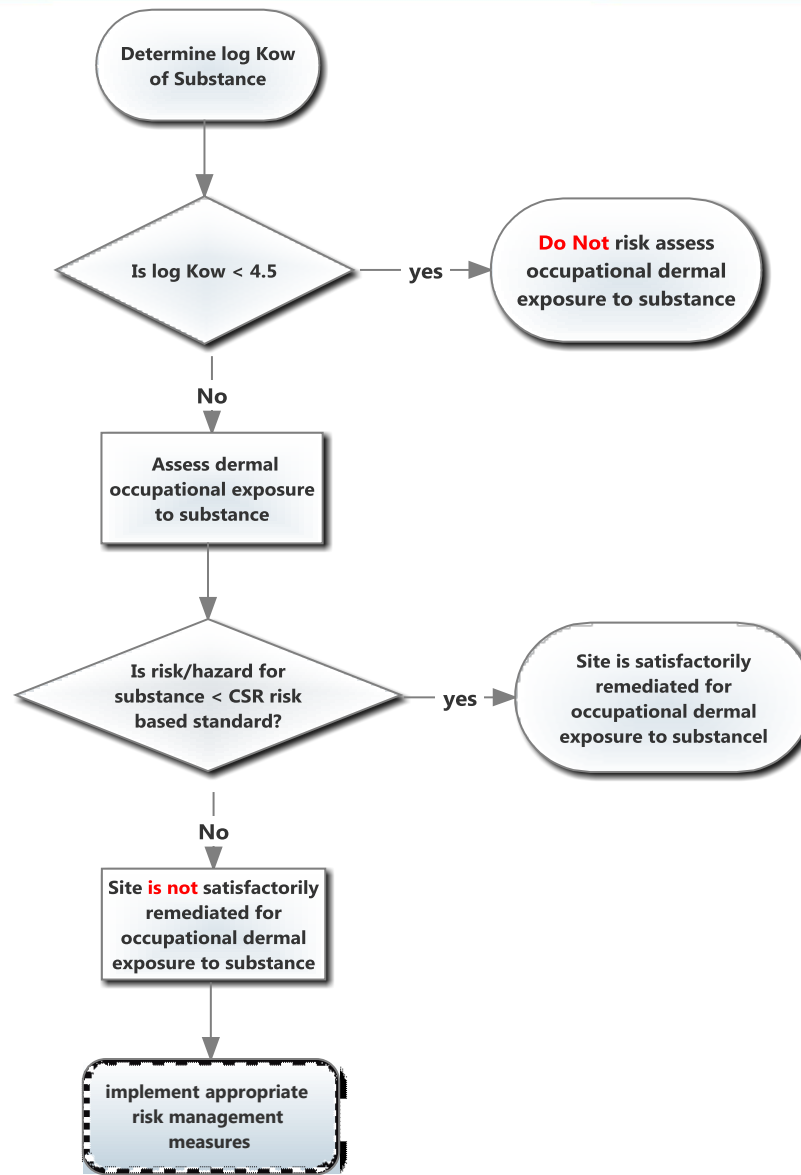
² Where mixtures of substances (e.g., a mixture of pesticide and petroleum "carrier") or different forms of a substance (e.g., pentachlorophenol and pentachlorophenolate) may be present, assume that the most conservative (i.e., the largest) log K_{ow} value applies.

Purpose of TB1

- Give instruction on how to determine if a contaminant in water needs to be evaluated for dermal exposure of workers in risk assessment

TB1 - PROCESS

[Log Kow](#)



CURRENT CSR SCHEDULE 6 AQUATIC LIFE STANDARDS FOR NON-CHLORINATED PHENOLS (TOTAL)

CSR Schedule 6 Aquatic Life Standard – “nonchlorinated phenols (total)”: 10 ug/L

- Current CSR standard is based on CCME 1987 WQC of 1 ug/L
- Current CSR standard is not strictly toxicologically based
- Standard uses an analytical method (colourimetric) which is only semi-specific for NCPs:
 - method captures: carboxyl, halogen, methoxyl and sulphonic substituted NCPs, but
 - method does not capture: aldehyde, alkyl, aryl, benzoyl, hydroxyl, nitro or nitroso substituted NCPs
- So current method:
 - over-captures some NCPs which are not toxic, and
 - fails to capture other NCPs which are toxic.

NCP – MoE WATER QUALITY GUIDELINES

MoE Ambient Water Quality Guidelines for nonchlorinated phenols to protect Aquatic Life

- In 2002 the ministry's NCP Aquatic Life [Water Quality Guidelines](#) were amended:
 - added new tox-based Water Quality Guidelines for
 - 3-hydroxyphenol and 4-hydroxyphenol, but also
 - retained (and increased from 10 ug/L to 50 ug/L) the guideline for total phenols

| Non-halogenated phenol species | Guideline (Micrograms/L) |
|--|--------------------------|
| 4-hydroxyphenol (hydroquinone, quinol) | 4.5 |
| 3-hydroxyphenol (resorcinol) | 12.5 |
| Total of all other phenols | 50.0 |

PROPOSED NEW CSR NCP STANDARDS

CSR Standards

- CSR standards are tox-based
- So need to:
 - repeal current Schedule 6 Aquatic Life nonchlorinated phenols (total) standard and
 - replace it with tox-based NCP standards for discrete phenols
- In 2012:
 - we reviewed the available aquatic toxicity data for 32 NCPs,
 - derived tox-based proposed CSR Sch 6 standards for the nine most toxic of the 32 NCPs, and
 - requested BCELTAAC to develop an analytical method which could distinguish and quantitate all of the nine discrete NCPs

NCP NEW ANALYTICAL METHOD

New Chlorinated and Non-Chlorinated Phenols in Water by GC/MS

- To assay for all nine of the discrete NCPs for which CSR standards had been proposed, BCELTAC developed a very sophisticated new isotope dilution method, incorporating:
 - Derivatization (acetylation and methylation),
 - “Exotic” solvents (MTBE, DCM, iso-octane), and
 - Deuterated phenolic surrogates
- BCELTAC performed an all-lab proficiency study of the new method in the summer of 2013
- The ministry approved the [new method](#) in October, 2013

NCP “BACKGROUND” SAMPLES

New Chlorinated and Non-Chlorinated Phenols in Water by GC/MS

- In 2014:
 - we obtained water samples from sites expected to have high levels of NCPs from natural causes, e.g.:
 - wood waste site,
 - composting facility,
 - natural peat bog, and
 - muskeg site
- The samples have recently been analyzed and we are in the process of considering how the results of the background NCP sampling might influence finalization of the proposed standards.
- New NCP standards will likely be implemented as part of the omnibus updating of the CSR standards

QUESTIONS ?

GLYN FOX

GLYN.FOX@GOV.BC.CA OR (250) 356-8374