



Ministry of  
Environment and  
Climate Change Strategy

# *PROTOCOL 30* **FOR CONTAMINATED SITES**

## Determination of Carcinogenic Substances

Version 1.0

Prepared pursuant to Section 64 of the  
*Environmental Management Act*

Approved:

\_\_\_\_\_  
Director of Waste Management

\_\_\_\_\_  
Date

Effective Date: November 1, 2017

## 1.0 Definitions

The following words, acronyms, and expressions used in this document are defined in [Procedure 8, "Definitions and Acronyms for Contaminated Sites"](#):

cancer risk	protocol
contaminant	Regulation
contaminated site	risk assessment
contaminated sites legal instrument	weight-of-evidence
ministry	

## 2.0 Introduction

This protocol provides the criteria for determining if a substance is a carcinogenic substance for the purposes of performing human health risk assessments at contaminated sites in BC .

The definition of "carcinogenic substance" in section 1 of the Contaminated Sites Regulation (the Regulation) was redefined under the Stage 10 amendment.

**"carcinogenic substance"** means any chemical classified as carcinogenic in accordance with a director's protocol.

## 3.0 Carcinogens

For the purposes of the Regulation, a human health risk assessment of a carcinogenic substance at a contaminated site requires that both the non-carcinogenic and carcinogenic effect endpoints of the substance be assessed.

A substance is considered to be a carcinogenic substance if any of the criteria in section 3.1, 3.2 or 3.3 below are met.

### 3.1 United States Environmental Protection Agency (US EPA) Evaluations and Classifications

#### 3.1.1 US EPA Weight-of-Evidence Evaluation

The substance has been evaluated under the US EPA Guidelines for Carcinogen Risk Assessment [1, 2] and has been classified based on the weight-of-evidence evaluation as:

- a) Carcinogenic to humans, or
- b) Likely to be carcinogenic to humans.

### 3.1.2 US EPA Descriptor or Classification

In the case that a US EPA weight-of-evidence evaluation is not available, the substance has been evaluated under the US EPA Guidelines for Carcinogenic Risk Assessment [3, 4] and has been assigned a descriptor of, or has been classified as:

- a) Known or likely human carcinogen,
- b) Group A: Human carcinogen, or
- c) Group B1: Probable human carcinogen, with limited evidence of carcinogenicity from epidemiological studies.

### 3.2 United Nations World Health Organization, International Agency for Research on Cancer (IARC) Classification

The substance has been evaluated by IARC [5] and has been classified as:

- a) Group 1: Carcinogenic to humans, or
- b) Group 2A: Probably carcinogenic to humans.

### 3.3 Canadian Council of Ministers of the Environment (CCME), Carcinogenic Classification for Polycyclic Aromatic Hydrocarbons (PAHs)

The substance is a PAH listed in Table 1 below, and has been determined to be carcinogenic or possibly carcinogenic, by the CCME [6]<sup>1</sup>.

**Table 1. CCME list of carcinogenic or possibly carcinogenic PAHs**

Polycyclic Aromatic Hydrocarbon	CAS Number
benz(a)anthracene	56-55-3
benzo(b)fluoranthene	205-99-2
benzo(j)fluoranthene	207-82-3
benzo(k)fluoranthene	207-08-9
benzo(a)pyrene	50-32-8
chrysene	218-01-9
dibenz(a,h)anthracene	53-70-3
indeno(1,2,3-cd)pyrene	193-39-5

<sup>1</sup> CCME also considers benzo(g,h,i)perylene (CAS number 191-24-2) to be a carcinogenic PAH. This classification is inconsistent with that of other regulatory agencies. At this time, the Director does not consider benzo(g,h,i)perylene to be a carcinogenic substance. Note also that benzo(g,h,i)perylene is not currently a prescribed substance under the Regulation.

## 4.0 Non-carcinogens

Substances not classified as carcinogenic substances under Section 3 of this protocol are considered to be non-carcinogenic substances under the Regulation.

## 5.0 References

1. US EPA, 2005. [Guidelines for Carcinogen Risk Assessment](#). Risk Assessment Forum. Washington, DC. March 2005.
2. US EPA, 1999. Guidelines for Carcinogen Risk Assessment (Review Draft). Risk Assessment Forum. Washington, DC. July 1999. Available from: <https://www.epa.gov/aboutepa/about-national-center-environmental-assessment-ncea>
3. US EPA, 1996. Proposed Guidelines for Carcinogen Risk Assessment. Risk Assessment Forum. Washington, DC. April 1996. Available from: <https://www.epa.gov/aboutepa/about-national-center-environmental-assessment-ncea>
4. US EPA, 1986. Guidelines for Carcinogen Risk Assessment. Risk Assessment Forum. Washington, DC. September 1986. Available from: <https://www.epa.gov/aboutepa/about-national-center-environmental-assessment-ncea>
5. UN World Health Organization, 2017. IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Vol. 1 - 118. International Agency for Research on Cancer. Lyon, France. Last update: 13 April 2017. Available from: <http://monographs.iarc.fr/ENG/Classification/index.php>
6. CCME, 2010. [Canadian Soil Quality Guidelines: Carcinogenic and Other Polycyclic Aromatic Hydrocarbons \(PAHs\) \(Environmental and Human Health Effects\) Scientific Criteria Document \(Revised\)](#)

For more information, please direct inquiries to [site@gov.bc.ca](mailto:site@gov.bc.ca).

### Revision history

Approved Date	Effective Date	Document Version	Notes
	November 1, 2017	1.0	for stakeholder comment