



# **Implementation Plan**

**for the Yukon Guide for Developing Water Quality  
Objectives and Effluent Quality Standards  
for Quartz Mining Projects**

2021.10.15



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# Glossary

The following terms and abbreviations are used in this document:

## Abbreviations

BCP: Background Concentration Procedure

COPC: Contaminants of Potential Concern

EQS: Effluent Quality Standards

WER: Water Effect Ratio

WQG: Water Quality Guidelines

WQO: Water Quality Objectives

YESAA: *Yukon Environmental and Socio-economic Assessment Act*

## Terms used

The definition of the following terms are from the *Yukon Guide for Developing Water Quality Objectives and Effluent Quality Standards for Quartz Mining Projects*:

**Assimilative capacity:** The quantity of a substance that can be released into a water body during a specific period of time without exceeding Use-Protection maximum Water Quality Objectives (WQO), calculated as the difference between background water quality and the Use-Protection maximum water quality objective.

**Background Concentration Procedure:** A method for developing WQO that is based on the natural background concentrations of Contaminants of Potential Concern in water as determined through the implementation of a background monitoring program.

**Contaminant of Potential Concern:** a substance that a project may release into surface waters at concentrations that may adversely affect achievement of the narrative WQOs.

**Effluent Quality Standard:** The maximum allowable concentrations or other measures of contaminants of potential concern or other substances that can be released to the environment in effluent.

**Guide:** *Yukon Guide for Developing Water Quality Objectives and Effluent Quality Standards for Quartz Mining Projects* (Government of Yukon, Draft December 30, 2019)

**Recalculation Procedure:** A method for developing WQOs that accounts for any real differences between the sensitivity range of the species of aquatic organisms represented in the complete toxicological data set and that of the species that occur at the site under consideration.

**Resident Species Procedure:** A method for developing WQOs that involves the generation of a complete data set on the toxicity of the substance under consideration using site water and resident species thereby accounting for the major factors affecting the derivation of site-specific WQOs, including the sensitivity of the species that occur at the site, and the influence of site-water characteristics on toxicity

**Water Effect Ratio Procedure:** A method for deriving WQOs that relies on the results of acute and/or short-term chronic toxicity tests conducted with indicator and/or resident species in both site water and laboratory water.

**Water Quality Objectives:** Thresholds of acceptable water quality conditions in specific receiving waters that may be affected by a project, including both narrative descriptions of expectations for acceptable water quality conditions and numerical benchmarks that define specific chemical or physical characteristics of acceptable water quality.

# Table of Contents

Glossary.....	3
1. Introduction.....	7
2. Purpose and application.....	7
3. Background.....	8
4. Contents of the Guide.....	8
4.1. Brief summary of the Guide.....	8
4.2. Responsibility for the Guide.....	15
4.3. Flexibility for establishing WQO.....	15
5. Implementation of the guide.....	16
5.1. Implementation phase.....	16
5.2. Integration into assessment and regulatory processes.....	16
References.....	18
Contact information.....	19

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# 1. Introduction

This is a companion document to the *Yukon Guide for Developing Water Quality Objectives and Effluent Quality Standards for Quartz Mining Projects* (the “Guide”), issued by the Government of Yukon on October 15, 2021. This document will explain the context of the Guide, its expectations and implementation.

## 2. Purpose and application

The purpose of the Implementation Plan is to provide a brief summary of the Guide and its main concepts, and to explain how the Guide will be implemented by the parties involved.

The purpose of the Guide is to provide technical and scientific guidance regarding the acceptable approaches and procedures for developing Water Quality Objectives (WQO) for freshwater ecosystems in the Yukon. It also describes methods for using the WQO to derive Effluent Quality Standards (EQS) that will be protective of Yukon waters, and that can be applied in water licences. The Guide is also intended to provide clarity, certainty and predictability for proponents using this process.

The Guide applies to proposed quartz mining projects that are subject to assessment under the *Yukon Environmental and Socio-economic Assessment Act* (YESAA), and are seeking authorizations under the *Waters Act* and the *Quartz Mining Act*. The Guide also applies to existing mines that are seeking amendments to their operation, and which thereby are subject to the assessment and water licensing process.

While the Guide does not apply directly to the exploration stages of a mineral property, the proponent should begin to consider the expectations of this Guide during the advanced exploration stage to ensure that sufficient data have been collected by the time the project is submitted for the assessment and water licensing processes.

The approaches and procedures are equally relevant to other types of activities that may affect water quality.

The Government of Yukon expects quartz mining proponents to adhere to all components described in the Guide, and it will use this Guide for the review of WQO and EQS proposed in YESAA and Water Licence applications.

## 3. Background

The work on the Guide was initiated in 2015 as part of the Government of Yukon's Mine Licencing Improvement Initiative, with the intent of clarifying the methods and providing certainty for proponents when determining WQO and EQS for their quartz mining projects.

The Guide has been developed by a technical working group consisting of representatives from the Government of Yukon (Departments of Environment, Energy Mines and Resources and Executive Council Office), the Yukon Environmental and Socio-economic Assessment Board (YESAB), the Yukon Water Board Secretariat, and, at some stages, representatives of Yukon First Nations. Input from engagement activities and workshops with industry, consultants and First Nations have been incorporated into the final Guide together with peer reviews conducted in 2017 and 2019.

## 4. Contents of the Guide

### 4.1. Brief summary of the Guide

The Guide contains and communicates the Government of Yukon's expectations and methods for proponents when they are preparing their site-specific WQO and EQS for their quartz mining projects. The Guide identifies three water management approaches and associated narrative WQO:

1. **The Non-Degradation Approach** aims to maintain water quality in a condition that is unchanged from pre-project conditions. As a principle, waters of the Yukon are managed to maintain natural water quantity and quality, unless a compelling sustainable and wise use of water by people warrants application of an alternative

water management approach. The narrative objective for waters managed using the Non-Degradation approach is:

*Baseline water quality must be maintained at all times. Any permitted discharges shall be regulated in a manner that prevents degradation of the quality of receiving waters.*

2. **The Use-Protection Approach** aims to maintain water quality in a condition that will not adversely affect designated water uses (e.g., aquatic life, drinking water). The narrative objective for waters managed using the Use-Protection Approach is:

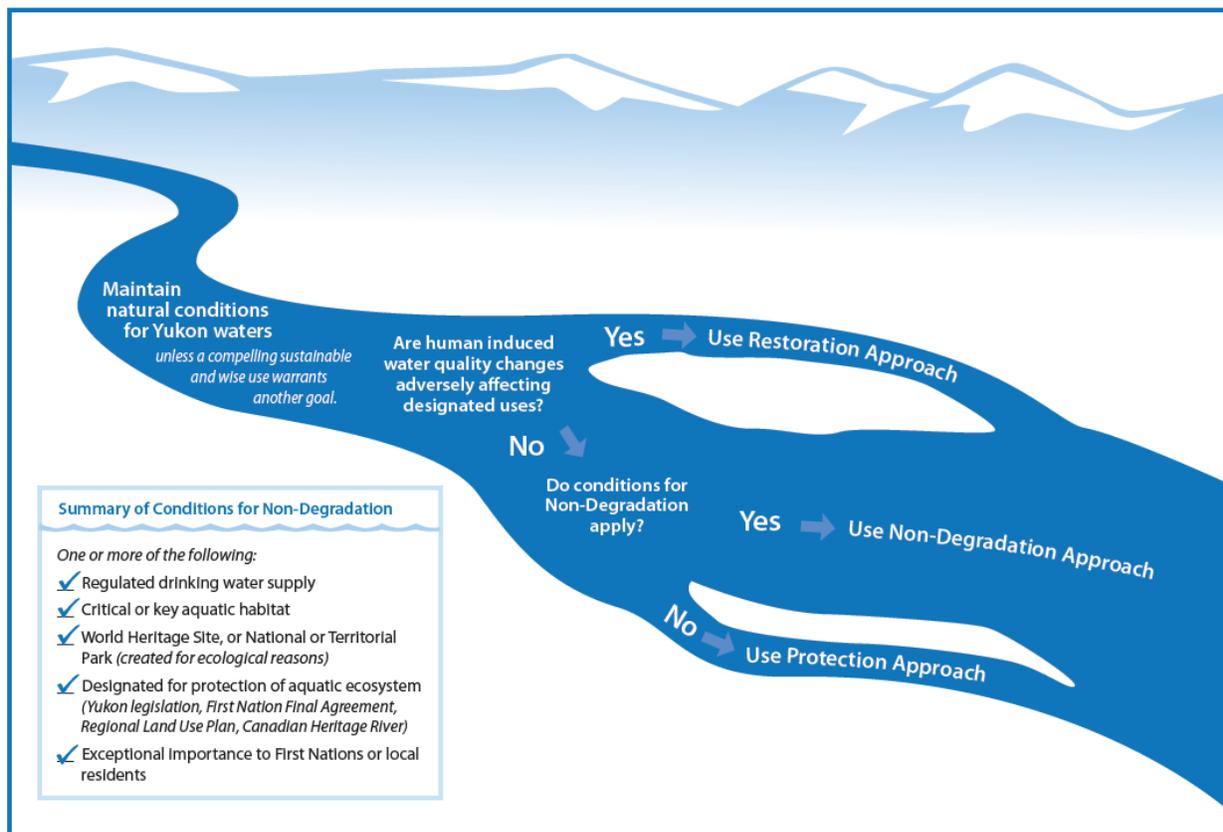
*Water quality must be maintained to protect the most sensitive designated water use at all times. Any permitted discharges shall be regulated in a manner that provides protection for the most sensitive designated water uses in the receiving waters.*

3. **The Use-Restoration Approach** aims to improve the quality of impaired waters to support the restoration of water uses (e.g., aquatic life, agricultural uses). It applies to waters where designated uses have been adversely affected by historical or ongoing human-induced changes in water quality. The narrative objective for waters managed using the Use-Restoration Approach is:

*Water quality conditions must be managed to avoid any further degradation of baseline water quality and to facilitate the restoration of designated uses to the extent practical over time.*

The proponents will select the water management approach based on the criteria and engagement as outlined in the Guide.

Figure 1, below, provides a depiction of the considerations for selecting the appropriate Water Management Approach.



“Human induced water quality changes” in Figure 1 refers to the baseline condition (i.e., before the initiation of any proposed activities that may affect water quality).

Following the selection of the water management approaches, the Guide describes five methods for developing numerical WQO for specific Contaminants of Potential Concern (COPC). They are the substances that a project may release into surface waters at concentrations that may adversely affect the achievement of the narrative WQO. Identification of COPC, as described in chapter 3 of the Guide, relies on a thorough understanding of background and baseline conditions, and existing and potential contaminant sources.

The five methods for defining numerical WQO are:

1. Adoption of Generic Water Quality Guidelines (WQGs) as WQO, for example, adoption of WQG specified by the Canadian Council of Ministers of the Environment (CCME). Appendix 1 of the Guide describes a framework for selecting WQGs for application in the Yukon.

2. Background Concentration Procedure (BCP), whereby acceptable water quality conditions are defined based on the background concentrations of a COPC. Appendix 2 of the Guide describes detailed procedures for the BCP.
3. Recalculation Procedure, in which a WQG is adjusted to account for the differences between the sensitivity of the species of aquatic organisms used to generate the WQG for a COPC, and that of the specific species that occur in the watercourse under consideration. Appendix 3 of the Guide describes detailed procedures for the Recalculation Procedure.
4. Accounting for Bioavailability and Toxicity Modifying Factors (BTMF) including the Water Effect Ratio (WER) Procedure, in which a WQG is adjusted to account for the unique water quality characteristics of the watercourse. Appendix 4 of the Guide describes detailed procedures for one method of accounting for BTMF, the WER Procedure.
5. Resident Species Procedure, involving the generation of a complete toxicity data set that meets the requirements for deriving a WQG in accordance with CCME protocols (CCME 1991; 2007). The data set can be used to develop WQO that are specifically relevant to the species at the site and the water conditions.

**Table 1, below, summarizes the relationship between the three water management approaches and the five methods for developing numerical WQO.**

<b>Water Management Approach</b>	<b>Decision Factors</b>	<b>WQO Methods</b>
Non-Degradation		BCP
Use-Protection	Background water quality exceeds WQG	BCP
	WQG protective of most sensitive species, and predicted COPC concentrations less than WQG	Adopt WQG
	Watercourse hosts species that are more or less sensitive than those considered for deriving WQG	Recalculation Procedure
	Watercourse has water quality conditions that may affect toxicity	Accounting for BTMF (e.g. WER)
	Watercourse hosts species that are more or less sensitive than those considered in the WQG, and has water quality conditions that may affect toxicity	Resident Species Procedures
Use Restoration	Initial WQO	BCPs
	Staged WQO	Any Use-Protection Method

The identification of COPC and implementation of some WQO development methods rely on comprehensive understandings of baseline and background water quality, and in some cases, toxicity testing programs. The Guide establishes the following minimum data requirements for background and baseline water quality, as described in Appendix 6:

1. Three consecutive years of recent water quality data collected on a monthly basis at locations where WQOs are to be applied, and at appropriate reference locations.
2. One or more intensive sampling programs during each of the three years, with at least five samples collected in 30 days during periods of high expected short-term water quality variability. In most cases, the period of highest variability will occur during freshet, but intensive sampling should be included to address any other periods of high natural variability.

To support the efficient collection of sufficient, high-quality data, Section 4.5 of the Guide recommends that proponents prepare a detailed Water Quality Objectives Development Work Plan (“Work Plan”) early in the WQO development process. The

development of numerical WQO can be a complicated process that requires collection, collation, evaluation, and interpretation of a substantial quantity of site data and information. For further information regarding the Work Plan, please refer to Section 4.5 of the Guide.

The development of WQO and EQS includes several steps and activities that require input from affected parties, communities and relevant government (federal, territorial, First Nation) agencies. Detailed information from a range of parties will be particularly relevant for the selection of water management approaches and allocation of assimilative capacity because these decisions must consider societal and ecological values. Input will also be beneficial during the planning stages for developing WQO and baseline monitoring programs.

Figure 2, below, shows the process for developing and implementing WQO and EQS.



## 4.2. Responsibility for the Guide

The Guide is a Government of Yukon document, and it will be used to communicate the government's expectations and methods for proponents when they are preparing site-specific WQO and EQS for their quartz mining projects. The Government of Yukon expects that proponents will follow the guidance, and intends to use the Guide in their review of project proposals. Any discrepancies between the Guide and the project proposal will be identified and communicated.

The Water Resources Branch of the Government of Yukon has the primary responsibility for the Guide and should be the first point of contact. For any questions regarding interpretation or application of the Guide, please contact the senior scientist for water quality or the director of the Water Resources Branch. Additional contact information is included in Section 8: Contact Information.

YESAB supports the Guide and sees it a technically defensible guidance document that embraces generally accepted and long-established principles and approaches to water quality management. The Guide will serve an important role during assessment to determine and build a shared understanding of water use goals, the appropriate water quality management approach, and the information required to support that approach. Evidence of this shared understanding should be provided in support of an adequate proposal or queried as early as possible during the assessment process. However, even though the Guide recommends using three years of baseline data to develop WQOs, YESAB recognizes that some proponents, for various reasons, may choose to deviate from the Guide. This, in and of itself, would not prevent the proponent from entering the assessment process.

## 4.3. Flexibility for establishing WQO

The Guide provides some flexibility to allow the WQO to vary for the same project at different locations, during different phases or seasons, or various parameters. Water management approaches (Section 2) and allocation of assimilative capacity (Section 6) may be different for different mine phases, which may allow for different WQO. The

WQO may also vary by location or watersheds. To address seasonal differences, proponents may choose to establish multiple, temporally-relevant WQO, or a single WQO for the most sensitive period.

## 5. Implementation of the Guide

### 5.1. Implementation phase

An implementation phase will begin once the Government of Yukon has approved and published the Guide. During this initial phase, some flexibility should be considered with respect to the consistent use and reference to the Guide by proponents and others involved.

The draft Guide has been available to proponents since prior to the Workshop in 2017, and there are already examples in which proponents are selecting water management approaches and deriving WQO in a manner consistent with the draft Guide.

The Yukon Water Board has endorsed the Guide and will use the Guidelines for water licence applications received after the document was published. The guide will not be used for applications that were submitted before the guide was published.

### 5.2. Integration into assessment and regulatory processes

The proponents will use the Guide to select the appropriate water management approach, the methods for deriving WQO, and the development of EQS. The proponent should discuss their chosen approaches and methods with the Government of Yukon and conduct engagement with affected parties early in the process, i.e., during the pre-submission stage to come to an understanding of the appropriate approaches and methods for a specific project. Such engagement will provide an opportunity for proponents to understand the value of aquatic ecosystems and any potential concerns and issues related to water quality. Engagement should begin early in any WQO or EQS development process and continue through all stages. Section 1.3 of the Guide provides additional information regarding this engagement.

The methods and procedures in the Guide will be used to evaluate project proposals in the assessment and water licensing process. The WQO and EQS information will be relevant for YESAA assessments and for water licensing. The proposed EQS cannot be less stringent than the federal Metal and Diamond Mining Effluent Regulations.

Proponents should prepare a stand-alone report that describes the development of WQO, including the approach and methods used to define the numerical values. The WQO included in project proposals submitted to YESAB should be developed based on the minimum data requirements for background and baseline water quality, as described in Appendix 6 of the Guide. The WQO included in water licence applications should be updated based on available water quality data at the time of submission to the Yukon Water Board. The proposed EQS should be included in water licence applications and calculated using updated WQOs, as specified in Chapter 4 of the Guide. The approach and timing for reporting may be influenced by the information that is relevant for assessment and regulatory processes.

# References

CCME (Canadian Council of Ministers of the Environment). 1991. A protocol for the derivation of water quality guidelines for the protection of aquatic life. In: Canadian Water Quality Guidelines: Appendix IX. Prepared by the Task Force on Water Quality Guidelines of the Canadian Council of Ministers of the Environment. Water Quality Branch. Environment Canada. Ottawa, Canada. 24 pp.

CCME. 2007. A protocol for the derivation of water quality guidelines for the protection of aquatic life 2007. In: Canadian environmental quality guidelines, 1999, Canadian Council of Ministers of the Environment, 1999, Winnipeg, Manitoba.

Government of Yukon. Yukon Guide for Developing Water Quality Objectives and Effluent Quality Standards (Draft December 30, 2019)

Metal and Diamond Mining Effluent Regulations, SOR/2002-222

Quartz Mining Act, SY 2003, c 14

Waters Act, SY 2003, c.19

Yukon Environmental and Socio-economic Assessment Act, S.C. 2003, c. 7

For further references, please see Chapter 8.0 of the Guide, and the “References Cited” for each of the Appendices (1-6) of the Guide.

# Contact information

Any questions regarding the use or interpretation of the Guide should be directed to:

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