



**Yukon  
Water Board**

*Office des eaux  
du Yukon*

**TYPE A AND B  
QUARTZ MINING UNDERTAKINGS  
INFORMATION PACKAGE FOR APPLICANTS**

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Appendix A: Recommended Table of Contents for Water Use Application Reports for Quartz Mining Undertakings

## 1 INTRODUCTION

The purpose of this information package is to assist applicants in developing and submitting Water Use Licence applications for Type A and B Quartz Mining Undertakings and in understanding the deliberation process that will be completed by the Yukon Water Board (“the Board”) in rendering a decision on the application.

The specific information requirements and licensing principles presented in this package are not intended to serve as fixed standards for licensing. Rather, they are intended to set out a framework of information expectations for applications and of principles and position statements that the Board will apply in its licensing deliberations. The Board may deviate from or supplement the criteria or general information requirements identified in this package.

The Board acknowledges that each quartz mining undertaking is a unique project and that they vary significantly in their magnitude and in the potential environmental effects associated with them. The information contained in this document assumes the development of a metal mine with significant potential for environmental impacts that may arise from a wide variety of performance issues, such as the potential failure of waste impoundment structures or the discharge of contaminated water from mine wastes following the cessation of active mining.

Nevertheless, the information in this document and its appendices is also suggested as guidance for potentially lower impact project applications, such as for quartz mining exploration projects, amendments or renewals of existing Type A or B Water Licences for existing quartz mining undertakings. It is understood that for these types of projects not all information requirements will apply.

The information package contains the following sections:

- Section 1: Introduction** – an outline of this information package.
- Section 2: Statutory Requirements** – An overview of relevant statutory requirements related to applications for water use licences for quartz mining undertakings.
- Section 3: Yukon Water Board and the Licensing Process** – A description of the Yukon Water Board and its licensing process.
- Section 4: Licensing Principles and Position Statements** – presentation of the principles and position statements considered by the Board in deliberating and rendering decisions on quartz mining applications;
- Section 5: Information Requirements for Applications** – an outline of the expected information required to support a water use licence application for a quartz mining undertaking.
- Section 6: Guidance Documents** – information on the use of third party guidance documents in applications and identification of guidance documents considered relevant for quartz mining in Yukon.
- Section 7: Application Contents and Format** - The required contents and format of applications.

**Section 8: Licensing Conditions** - Typical conditions that may be associated with issued licences.

## 2 STATUTORY REQUIREMENTS

Under the terms of the *Waters Act* (the *Act* or “*WA*”), the Yukon Government has delegated to the Board the authority to adjudicate applications for the use of, and deposit of waste in, water in the Yukon. As the adjudicating body, the Board can deny an application or approve an application with conditions. For Type A Water Use Licence applications or Type B applications that were adjudicated on the basis of a public hearing, the water use licence also requires the approval of the Yukon Government Minister responsible for the administration of the *WA* (the Minister) before it can be issued by the Chair of the Board.

In exercising its powers, the Board recognizes and respects its objects that are described in Section 12 of the *WA*, as follows:

*“The objects of the Board are to provide for the conservation, development and utilization of waters in a manner that will provide the optimum benefit therefrom for all Canadians and for the residents of the Yukon Territory in particular.”*

The Board also has statutory obligations under Chapter 14 of the Umbrella Final Agreement (“*UFA*”) between the Governments of Canada, Yukon and Yukon First Nations. Section 14.8.0 of the *UFA* provides that the Board shall not authorize any substantial alteration of the quantity, quality or rate of flow of water on or adjacent to settlement land, unless it is satisfied that:

- a) there is no alternative which could reasonably satisfy the requirements of the applicant; and
- b) there are no reasonable measures by which the applicant could avoid causing the alteration.

Section 14.9.0 imposes similar obligations upon the Board where a traditional use of water by a First Nation person in their traditional territory may be adversely affected by a licensed use.

In addition, under the *Yukon Environmental and Socio-economic Assessment Act* (“*YESAA*”) the Board’s actions in enabling a project, i.e. issuance of a licence, cannot occur until all Decision Bodies for the project have issued decision documents allowing for the project to proceed to the regulatory stage, i.e. in this case the possible granting of a Water Use Licence. Where such decision documents include conditions, the Board may not issue a Water Use Licence with conditions that conflict with those of the Decision Document. It is important to note, though, that interaction with the Secretariat of the Yukon Water Board in preparing a water use licence application for public comments can occur concurrently with the *YESAA* process.

Finally, mining projects must, at a minimum, also meet the requirements of the federal *Metal Mining Effluent Regulations* (“*MMER*”) of the *Fisheries Act* for the discharge of waste. Therefore, the Board cannot issue a licence with terms or conditions that do not at least meet the requirements of *MMER* with respect to waste discharges. For clarity, the Board can and often does require more stringent requirements related to the discharge of waste than those required by *MMER*.

### **3 YUKON WATER BOARD AND THE LICENSING PROCESS**

The Yukon Water Board is an independent quasi-judicial board with members nominated by the Government of Canada, the Government of Yukon, and the Council of Yukon First Nations and then appointed by the Yukon Government Minister responsible for administration of the *WA*.

Board members are independent of their nominating government. As a quasi-judicial body, the Board's adjudication of applications must be conducted according to the principles of natural justice and the decisions of the Board are final and conclusive. The decisions of the Board are only subject to appeal to the Supreme Court of the Yukon Territory on questions of jurisdiction or law.

It is a fundamental principle of natural justice that, other than during a public hearing, the Board members not interact with the Applicant or other parties with an interest in the application. Such interactions include those required to determine the adequacy of an application. Therefore, all communications with the Board, except for questioning and representations during a public hearing, must be directed to the Board's staff: the Yukon Water Board Secretariat ("Secretariat").

To ensure adherence to natural justice, the Board has delegated to the Secretariat the role of reviewing applications for licences or for amendment or renewal of existing licences to ensure that they satisfy all mandatory requirements, are of acceptable scope and clarity to allow for the effective participation of other parties who may wish to intervene ("Interveners") and will facilitate the efficient adjudication of the application by the Board. This process termed "adequacy review" must be completed to the Secretariat's satisfaction prior to the application being made public by the Secretariat and accepted for adjudication by the Board.

There is currently no timeline to complete the adequacy process, but the Secretariat is planning to draft guidelines intended to provide more process and timelines certainty. Staff of the Secretariat make best efforts to work with the Applicant to ensure that the application is adequate and provide direction as necessary to address deficiencies as may be found in the application.

Once deemed adequate, the Secretariat will post the application on the Board's website registry and will publicly advertise that the application has been accepted for adjudication by the Board. The advertisement will identify an intent date for interested parties to provide comments on the application and to identify whether they wish to have and/or wish to participate in a public hearing. In addition to public advertisement, the Secretariat will also directly notify key departments of the Government of Canada, Government of Yukon, and Yukon First Nation Governments potentially affected by the undertaking.

Except for rare circumstances, the adjudication of a Type A Quartz Mining Water Use Licence application, amendment or renewal of an Type A Quartz Mining Water Use Licence may include a public hearing that follows Board's Rules of Procedure. For Type B applications or for applications to amend or renew Type B Licences, a public hearing is not required unless the Board determines it to be in the public interest for a hearing to be conducted. In the absence of a public hearing the Board will deliberate upon an application during a scheduled Board meeting. Such Board meetings are typically held on a monthly schedule.

In its deliberations, the Board will consider the arguments of the Applicant and of any Interveners, will assess and evaluate the evidence submitted to the Board by the Applicant and any Interveners, and will apply the licensing principles and position statements of the Board.

The current licensing principles and position statements of the Board are presented in section 4 of this information package.

If the Board agrees to issue a licence or renew a licence, it will develop a licence document complete with conditions acceptable to the Board and consistent with any statutory requirements associated with *YESAA*, *MMER*, or any other applicable legislation. If the Board agrees to amend an existing licence, it will modify the existing licence document to that effect and include or modify any relevant conditions related to the amendment. As with new licences, an amended licence must still be consistent with any statutory requirements associated with *YESAA*, *MMER*, or other applicable legislation. Irrespective of whether the Board agrees to issue (or amend or renew) a licence or not, the written reasons for its decision will be issued and made available publicly.

The written reasons for decision issued by the Board presents the rationale applied by the Board in reaching its decision and in developing the conditions of an issued licence, it provides context to licences if a licence is issued, and identifies how the Board has adjudicated any disputed evidence or disputed interpretations of evidence arising during the licensing processes.

If an application is approved by the Board, a water use licence issued for a quartz mining undertaking will be based on the proposals and commitments made in the application by the Applicant and the submissions of Interveners to the process. The Board cannot change the nature of the work proposed by the Applicant other than to establish conditions for that work in a licence under the *WA*.

Prior to finalizing a new licence or an amendment or renewal of a licence, particularly for a very complex project, the Board may elect to distribute a draft of the licence to the Applicant and Interveners to seek technical comments on the contents. The distribution of a draft licence by the Board is not to re-hear or reconsider its decision but only to seek feedback on the clarity and/or correctness of specific parameters, names, and terminology presented in the licence. For example, an error in the units of a given parameter may be identified and subsequently corrected as a result of technical comments received based on distribution of a draft licence.

Type A water use licences, including amendments and renewals, approved by the Board are submitted to the Minister for approval and do not become effective until the Minister's and the Chairperson's signatures are applied. Type B water use licences approved by the Board become effective upon the signature of the Chairperson.

The above described licensing process is summarized graphically in Figure 1, below.

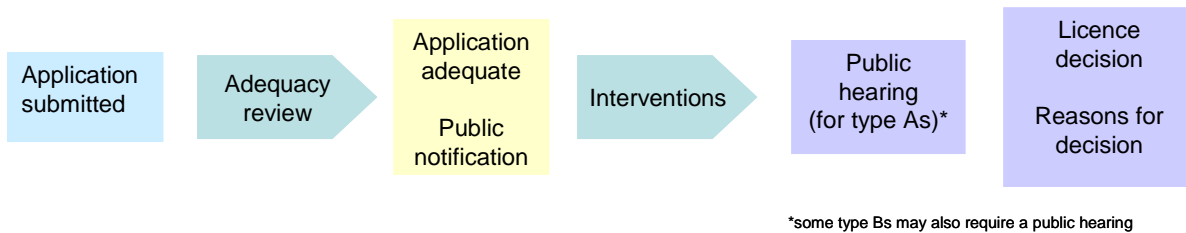


Fig. 1: Yukon Water Board Licensing Process

## 4 LICENSING PRINCIPLES AND POSITION STATEMENTS

### 4.1 Licensing Principles

In deliberations and rendering decisions on quartz mining undertakings, the Board will apply the following principles:

- 4.1.1 avoid, minimize and/or mitigate significant adverse environmental effects from the potential uses of waters authorized by it under the *WA*.
- 4.1.2 only issue water use licences where doing so is consistent with the objects of the Board and supported, on the balance of probabilities, by the evidence presented;
- 4.1.3 only issue licences that, on the balance of probabilities are expected to at least achieve the objectives set out in the mitigation included in the *YESAA* decision document, subject to the Board's authority and responsibility under the *WA* and the *UFA*;
- 4.1.4 issue licences that do not grant or renew rights in respect to water contrary to a *YESAA* decision document;
- 4.1.5 issue licences with conditions that address the specific aspects of the project being authorized and the site under development;
- 4.1.6 consider impacts on other applicants and authorized water users, consistent with its other obligations to the public;
- 4.1.7 act openly, pursuant to the principles of procedural fairness and natural justice;
- 4.1.8 protect public health and safety and, in particular, minimize risk to human life; and

The Board will also endeavour to apply the following additional principles; to the extent it is feasible, in the public interest while recognizing that some may be more or less applicable to a given undertaking than others:



- 4.1.9 issue licences that are clear and enforceable and administratively consistent;
- 4.1.10 issue licences only when there is a reasonable certainty that an acceptable level of reclamation of the site can be achieved during mining and/or following the cessation of mining; and
- 4.1.11 encourage the use of robust, proven technologies, but allow for the use of innovative technologies where significant advantages can be shown. In the case of innovative yet unproven technologies, the Board will take a cautious approach, expecting Applicants to provide detailed rationales and contingency plans to manage the performance risk the innovative approach may entail.

## **4.2 Board Position Statements**

The Board gives notice to potential Applicants that its deliberations will apply the following Board position statements:

- 4.2.1 source controls must be implemented to the extent practical to minimize the potential mobilization of contaminants resulting from the proposed undertaking. This includes, but is not limited to, avoiding exposure of potential sources of contaminants and managing non-process waters to avoid contamination.
- 4.2.2 that the reuse and recycling of water used in the operations should be maximized to the extent practicable to limit the need for raw water withdrawals from the environment.
- 4.2.3 that the management of various sources of potentially contaminated water on a project site be designed to the extent practical to minimize the potential load of contaminants that may be release to the environment.
- 4.2.4 that effluent, tested in accordance with the single concentration procedure of Environment Canada reference method EPS1/RM/13, must have a 96 hour rainbow trout mortality of 50% or less (LT<sub>50</sub>) to be considered non-toxic. Irrespective of the rainbow trout mortality criterion, on a case by case basis, the Board may also require other toxicity criteria be met to conclude that an effluent is non-toxic.
- 4.2.5 given the uncertainty of the response of natural systems to disruption by mining activities, development of an adaptive management plan is an essential element for mine management. An adaptive management plan shall not be the basis for the management of the project. The plan should describe the process(es) of decision making that will be undertaken to achieve the operational objectives set out in the additional plans required to form part of the application, as detailed in section 5.

## 5 INFORMATION REQUIREMENTS FOR APPLICATIONS

The Board expects that Applicants for water use licences for quartz mining undertakings will at a minimum:

- 5.1 submit an overall **project description** that details: the project location(s); the project setting and history; the proposed development, its major components and schedule for development and operation; the proposed ore(s) to be extracted, the resulting processed metal product(s) or concentrate(s) and the resulting mine wastes; the proposed mining and mineral processing schemes; mine waste management plans; and other relevant details to provide a full understanding of the proposed project. The project description must be of sufficient detail to facilitate an understanding of the project, its purpose, life cycle, and to support more detailed sections of the application as described in subsequent sections of this list.
  
- 5.2 submit comprehensive information regarding the **project environment**. It is assumed that the majority of these data will have been generated for the YESAA process. Such information will normally be required to be based on measurements and/or observations from a period of at least two consecutive years, inclusive of all available monitoring programs conducted at the site by the Applicant and/or past parties managing the site and will include:
  - a) surface water and groundwater quality and quantity, including seasonal variations in quality and quantity;
  - b) surface water and groundwater flow patterns;
  - c) stream sediment data;
  - d) climatic data (particularly precipitation);
  - e) characterization of the presence and nature of permafrost at the site;
  - f) characterization of the acid rock drainage and metal leaching potential of all geological materials that will be disturbed by the project or that have been previously disturbed at the project site. The characterization shall consider both the current states and forms of such geological materials and any states or forms they will be altered into over the life cycle of the project;
  - g) descriptions of aquatic ecosystems;
  - h) descriptions of terrestrial ecosystems; and
  - i) descriptions of existing human activities and uses of resources.

Investigations should be sufficiently specific and detailed that they provide an appropriate understanding of the variability of the site, including seasonal variability. Historical information, if any, shall be summarized and limitations on its accuracy and precision identified.

- 5.3 submit a **prediction of drainage chemistry from waste streams** that will be created by the development. This will primarily entail an assessment of the potential for Acid Rock Drainage and Metal Leaching (“ARD/ML”) of disturbed geological materials. The prediction must also include consideration of the contribution of mining and mineral processing chemicals and reagents on drainage chemistry.
- 5.4 submit a **comprehensive water balance model** and modelling results incorporating all components, water uses, and waste deposits of the project, with all assumptions and calculations clearly explained, that is sufficiently detailed to assess normal and extreme operations for all phases of the mine life and all critical components of the undertaking’s water management infrastructure. The water balance model shall also address the potential implications of climate change at an appropriate time and spatial scale for the undertaking.
- 5.5 submit a **water quality model** and modelling results, with all assumptions and calculations clearly explained, that is sufficiently detailed to assess normal, seasonal, and extreme performance of the project on both a short-term and long-term basis, and that is clearly linked to outputs of the water balance model. The rationale for the applicability of the submitted water quality model, its limitations, and its sensitivity to assumptions and input parameters must also be provided.
- 5.6 submit **water and waste management plans** based on the mine plan, site water balance, the site water quality model, the determined potential for acid drainage and metal leaching of exposed geological materials, infrastructure designs, and potential environmental effects of project operations. The management plans should outline the objectives, strategies, activities to manage water and waste either produced or affected by the development. Typically waste management plans will include tailings and waste rock management plans. The water management plan must be integrated with all of the waste management plans to show how water will be managed from source to discharge.
- 5.7 submit **hazardous materials management plans** for hazardous materials that will be manufactured, transferred, stored, or utilized at the site. Such materials include but are not limited to petroleum products, reagents for mineral processing and/or water treatment, and explosives. The management plans will detail safe handling, storage, and disposal of such materials. The plans will also detail response plans to contain and clean up any spills of hazardous materials. It is assumed that the majority of this information will have been generated for the YESAA or the quartz mine licensing process.
- 5.8 submit **preliminary designs** of site specific project components of relevance to water use and waste deposition, including mining and mineral processing infrastructure, water management infrastructure, and mine waste emplacements. For clarity the Board considers that the preliminary design stage builds upon feasibility and/or conceptual studies required to determine the desirability of proceeding with a particular project. The objectives of preliminary designs submitted to the Board are:

- (i) to provide evidence that the proposed project component can satisfy its desired function in the normal and extreme operational and environmental conditions it will be exposed to throughout the life cycle of the component; and
- (ii) to show compliance with relevant standards or guidelines, including hazard or risk classifications that may apply to that class of infrastructure, whether that is for human health and safety or environmental protection.

To accomplish the above objectives, preliminary designs for project components are to be based on engineering analysis and environmental impact assessments that establish the location, function, construction, and operation of the components. In addition, preliminary designs should identify how decommissioning has been accounted for and any necessary post-closure modifications to allow for decommissioning of the components.

Preliminary designs are normally expected to be based on the results of specific site investigations, although additional investigations may be required later in the detailed design process. All engineering drawings and specifications submitted to the Board must be sealed by a Professional Engineer licensed to practice in Yukon.

Finally, the Board advocates that preliminary designs be based on the application of robust and proven technologies both in terms of the design methodology utilized and of the materials or components incorporated into the designed object. The use of more innovative approaches may also be acceptable; however, the proposed use of innovative approaches will require the Applicant to submit clear, technically defensible and comprehensive explanations and justifications to the Board to utilize an innovative or less proven technology. Regardless of whether a technology is considered to be proven or innovative, evidence of its applicability for the project environment will be required.

Preliminary design briefs or reports submitted as part of the application should include:

- a) a complete description of the designed project component and its intended function, the data and analysis supporting the design, and design standards or criteria utilized in the design;
- b) performance specifications of critical materials and equipment utilized in the component;
- c) scaled preliminary plans showing layouts and general dimensions of structures and components; and
- d) a project schedule covering further engineering, and construction activities.

- 5.9 submit a **preliminary decommissioning and reclamation plan** for closure of the project that is based on a progressive reclamation approach. It is assumed

that this plan will have been generated as part of the quartz mine licensing process.

The plan needs to show detailed **security** calculations with a complete estimate of the cost of implementing the reclamation plan, covering each stage of the development.

The Board advocates that decommissioning and reclamation plans be based on the application of robust and proven science, technologies, and methodologies. The use of innovative approaches may also be acceptable; however, the Applicant will be expected to submit clear, technically defensible and comprehensive explanations and justifications to the Board to utilize innovative or less proven science, technology, or methods. Regardless of whether a decommissioning and reclamation approach is considered to be proven or innovative, evidence of its applicability for the project environment will be required.

- 5.10 submit a detailed **monitoring plan and program** for all phases of the undertaking that allows for the collection of data to validate assumptions and predictions of:
- a) climatic, geochemical, hydrologic, and hydrogeologic inputs to the project;
  - b) the nature, geochemistry, and quantity of mine waste materials produced;
  - c) the quality, quantity, and time history of water use and waste deposition;
  - d) the performance of water and waste management infrastructure or of components of such infrastructure including, but not limited to, tailings dams, water treatment plants, heap leach liners, treatment pond liners, and waste cover systems;
  - e) the effectiveness of measures taken to mitigate any adverse environmental effects of the project; and
  - f) the effects of water use and waste deposition on the environment.
- 5.11 submit an **adaptive management plan** specifically designed to guide management decisions arising from unexpected performance of the project. In particular, the plan must identify trigger levels for management actions and potential management actions that would be enacted based on the results of monitoring activities. The adaptive management plan should focus on aspects of the project performance that can directly or indirectly lead to unexpected or unacceptable impacts to the aquatic environment.

Applicants should be aware that licences, if issued, are tied to the information submitted in the application. This includes any additional submissions and/or revisions submitted to the Board by the Applicant, up to the date of the Board's decision. Any significant change to the project post

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licensing will likely trigger a requirement for an amendment of the licence and may also trigger a need for a project assessment under YESAA. Therefore, it is imperative to ensure that the application accounts for all currently planned or foreseen activities of the proposed quartz mining undertaking.

## **6 GUIDANCE DOCUMENTS**

Within the Canadian and international mining sectors there are numerous guidance documents that have been developed to assist mine owners in the responsible planning, design, operation, and closure of mining projects. The Board recognizes the following guidance documents, or their most recent revisions, as being generally applicable for quartz mining undertakings in Yukon

- 6.1 The Environmental Code of Practice for Metal Mines. Environment Canada. 2009.
- 6.2 Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials, MEND Report 1.20.1. Natural Resources Canada. 2009.
- 6.3 Draft Guidelines For Metal Leaching and Acid Rock Drainage at Mine sites in British Columbia. British Columbia Ministry of Energy, Mines and Petroleum Resources. 1998.
- 6.4 Yukon Mine Site Reclamation and Closure Policy. Yukon Government. 2006.
- 6.5 Yukon Mine Site Reclamation and Closure Policy. Financial and Technical Guidelines. Yukon Government. 2008.
- 6.6 Dam Safety Guidelines. Canadian Dam Association. 2007.
- 6.7 Canadian Environmental Quality Guidelines and Summary Table. Canadian Council of Ministers of the Environment. 2011.
- 6.8 Interim guidelines for Investigation and design of mine dumps, British Columbia Mine Waste Rock Pile Research Committee. 1991.
- 6.9 Guidance Document for Flow Measurement of Metal Mining Effluents. Environment Canada. 2002.
- 6.10 Guidance Document for the Sampling and Analysis of Metal Mining Effluents. Environment Canada. 2002.

It is the Board's view that these documents present guidelines and not standards and will therefore consider more or less stringent requirements that are duly supported by rationale derived from evidence in the application or in interventions.

In addition to the above list of guidance documents, the Board acknowledges that numerous other guidance documents exist that may be relevant to any specific quartz mining undertaking. Where the Applicant or Interveners believe it is appropriate they may identify and submit such documents as evidence to support either the application or interventions and the Board will give due consideration to the value of the guidance document in deliberating upon the application.

## 7 APPLICATION CONTENT AND FORMAT

The Board expects that water use licence applications for quartz mining undertakings will be accompanied by the following (*\* indicates mandatory form*):

- 7.1 Completed Schedule 4 application form\* (available on the Board's website);
- 7.2 Copies of any approved regulatory authorizations including but not limited to:
  - (a) Quartz Mining Licence, Letters of Approval for plans and the associated approved plans,
  - (b) *Fisheries Act* Authorizations and associated compensation plans, and
  - (c) Yukon *Environment Act* approvals;
- 7.3 Proof of business entity;
- 7.4 Environmental Health form (available on the Board's website);
- 7.5 Applicable fees;
- 7.6 Agent Authorization Form\* (if applicable); and
- 7.7 Completed Project Confirmation Form\* (available on the Board's website), as well as a copy of the YESAA evaluation/screening report and the signed decision document(s).

The above information would be included in an application report that presents at least the information identified in section 5 and that follows the general Table of Contents outlined in Appendix A of this information package. In addition to the application report, the Board expects that technical appendices would be provided to present detailed supporting studies and preliminary design briefs.

The Board expects that the completed application report and technical appendices would be submitted in draft form for adequacy review by the Secretariat and that it would be resubmitted in final form complete with any revisions, modifications, updates, or additions, resulting from the adequacy review by the Secretariat.

Both the draft and final application documents shall be provided in hard copy and unsecured, searchable electronic form such as PDF document(s). Numerical data associated with the application shall also be provided in useable electronic spreadsheet format.

## 8 POTENTIAL LICENCE CONDITIONS

If the Board decides to issue a water use licence for a quartz mining undertaking, the licence may contain conditions related to the following:

- 8.1 a requirement to submit to the Board, prior to the commencement of construction, the final detailed design drawings, construction plans and specifications for all proposed structures and facilities including, but not limited to:
- a) waste rock dumps;
  - b) dams;
  - c) coffer dams;
  - d) impoundments;
  - e) drainage works;
  - f) diversions;
  - g) spillways;
  - h) waste storage facilities;
  - i) water supply systems;
  - j) wastewater transportation systems and treatment facilities; and
  - k) any other structure or facility relevant to the conditions of the licence.

For clarity, detailed design is the last level of project design. It should include the results of any additional investigations identified during the preliminary design process and all of the final detailed drawings and specifications required to construct the project. All engineering drawings and specifications submitted to the Board must be sealed by a Professional Engineer licensed to practice in Yukon.

- 8.2 a requirement for additional water quality and flow monitoring points in addition to the points proposed in the application and/or more frequent sampling of proposed monitoring points. Such modifications to the monitoring plan may be established for the purposes of monitoring the overall performance of the project and for identifying emerging problems in their early stages, as well as, for example, measuring and monitoring environmental effects including receiving water quality and biological and physical impacts.
- 8.3 a requirement to submit to the Board details of any modifications to or variations from the preliminary designs previously submitted, in advance of any related construction. Such submissions must include an explanation of the reasons for the change, and present evidence that the change results in water use and/or waste deposition that is already permitted under the terms of the issued licence. Moreover, it is required that the licensee confirm that the modifications or variations do not require an assessment under YESAA. All such design modifications must be sealed by a Professional Engineer licensed to practice in Yukon.
- 8.4 a requirement to submit to the Board a comprehensive decommissioning and reclamation plan, based on the preliminary plan submitted with the application, and a requirement to update the plan, including the cost estimates, from time to time as circumstances warrant.



- 8.5 a requirement to submit to the Board final record (as-built) drawings of all structures and facilities following the completion of construction. All drawings must be sealed by a Professional Engineer licensed to practice in Yukon.
- 8.6 a requirement to submit to the Board a detailed construction quality assurance/quality control manual before beginning the construction of structures or facilities authorized by the licence and to submit the results of the monitoring following the completion of construction. Such a manual should be designed to ensure that construction materials and methods conform to the designs and specifications for the project, as well as generally accepted practices, and that proper documentation of construction is maintained. All construction monitoring should be carried out under the supervision of Professional Engineers licensed to practice in Yukon.
- 8.7 a requirement to submit to the Board specific plans or studies in a time frame specified.



## **APPENDIX A:**

# **RECOMMENDED TABLE OF CONTENTS FOR WATER USE LICENCE APPLICATION REPORTS FOR QUARTZ MINING UNDERTAKINGS**

**Yukon Water Board**  
*Office des eaux du Yukon*



**APPENDIX A:**

**RECOMMENDED TABLE OF CONTENTS FOR  
WATER USE LICENCE APPLICATION REPORTS  
FOR QUARTZ MINING UNDERTAKINGS**

February 2012

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## **Preamble**

The Yukon Water Board (“the Board”) has developed this document to guide Applicants in the development of application reports required to support Type A and Type B water use licence applications for quartz mining undertakings. The document presents an annotated outline of the recommended table of contents and provides guidance in regards to the nature of information expected within identified sections of the application report.

The Board recognizes that each quartz mining undertaking is a unique project; however, the requirement for a consistent table of contents will aid the Board and third parties in efficiently reviewing applications. Moreover, the guidance provided within this document should allow Applicants to prepare applications that more readily meet the Board’s information requirements and therefore shorten the adequacy review period.

The Board expects the application report to be a summary document for the detailed plans, studies, assessments, and preliminary designs that have been completed to advance and support the project. It is expected that the supporting documents that present the evidentiary basis of the project will be included as appendices to the application report.

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## Water Use Licence Application Report TABLE OF CONTENTS

### Front Matter

**Section i:** Transmittal & Cover Letter

**Section ii:** Mandatory Forms

The mandatory forms section must include the following Yukon Water Board forms:

- Schedule 4
- Agent Authorization Form (if applicable)
- Project Confirmation Sheet

**Section iii:** Executive Summary

**Section iv:** Abbreviations and Acronyms

### Report Body

## 1. INTRODUCTION

### a. PROJECT OVERVIEW

Provide a high level, concise overview of the project including a description of the planned mining and mineral processing activities and technologies, projected mine life, location, summary details in regards to the magnitude and scope of associated activities, and summaries of uses of water and deposits of waste associated with the undertaking. A more detailed project description is required under section 4.1 of the Table of Contents.

### b. PROPONENT INFORMATION

Provide a description of the mine proponent including corporate structure, experience, and relevant policies on environmental management, stakeholder engagement, or sustainable development.

### c. REGULATORY AUTHORIZATIONS AND APPROVALS

#### i. SUMMARY OF YESAA PROJECT ASSESSMENT

Provide a concise summary of the completed YESAA project assessment process that has been completed for the project. The resulting Decision Document as well as the Project Evaluation or Project Screening Report should be provided as an appendix of the application report.

#### ii. SUMMARY OF POST ASSESSMENT STAKEHOLDER ENGAGEMENT

Provide a summary of engagement with stakeholders that has occurred since and/or concurrent to the YESAA project assessment. Stakeholders should include but not be limited to: First Nations governments; federal and territorial regulators; non-government organizations; and any other interested parties identified in the YESAA assessment process.

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### iii. EXISTING REGULATORY APPROVALS

List the Applicant's currently held regulatory approvals and submitted regulatory applications. Define the scope (term, spatial limits, and enabled activities) of all held approvals.

### iv. EXISTING WATER USERS

List existing water use licences or pre-existing water use licence applications held by other parties within the watershed area(s) that could potentially be affected by the proposed project and/or contribute to potential cumulative effects to the water source(s) or receiving environment(s) that will be utilized for this project. Also list un-licensed water users including traditional First Nation water users that may be affected by the project.

A conservative approach should be utilized in this section to define the spatial limits, both upstream and downstream, of potential water licences or water users.

In the event that significant numbers of water users need to be identified, summary information can be presented and detailed information attached as an appendix to the application report.

### v. REQUESTED WATER USES AND WASTE DEPOSITS

Identify all proposed water uses and waste deposits that require a Type A or Type B water use licence to authorize as defined by the licensing criteria presented in Schedule 7 of the *Waters Regulation*. For direct water use identify the volume, frequency, source, and timing of the proposed use(s). For other water uses (watercourse crossings, watercourse training, flood control or diversions) provide general information on the nature of the use.

For proposed waste deposits identify the location, rate, timing, frequency, and duration of the deposit. Also identify the anticipated constituents of the deposit and the concentration (or anticipated range of concentrations) of the constituents.

For both water uses and waste deposits that may vary significantly in nature or magnitude over the course of the project identify the anticipated nature and/or magnitudes at key stages over the course of the life cycle of the project including the post-closure phase.

## 2. PROJECT LOCATION & BACKGROUND

### a. LOCATION

Provide a description of the project location(s) including but not limited to information such as:

- Geographic Location;
  - Legal Land Description;
  - Study Area Boundaries for YESAA effects assessments;
  - Land Tenure within the study area(s), including First Nation Traditional Territory and First Nation Settlement Lands and known First Nation uses;
  - Access roads and public highways serving the location;
  - Mineral Rights (quartz and placer);
  - Registered Trapline Concessions; and
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- Outfitting Concessions.

Provide scaled, geo-referenced figures conveying the above information.

## **b. PROJECT BACKGROUND**

### **i. PAST DEVELOPMENT OR EXPLORATION**

Describe past development at the project site including previous exploration or extraction of minerals, or developments of other nature that may have occurred.

### **ii. EXISTING MINE WORKINGS AND WASTE EMPLACEMENTS**

Identify the nature and extent, if any, of existing mine workings, mine infrastructure and waste emplacements at the project site.

## **3. PROJECT ENVIRONMENT**

Provide detailed descriptions of the project environment in the context of pre-development or of the current development status if development already exists. The amount of information presented should be sufficient to establish baseline conditions for all relevant parameters of the project environment.

Depending on the level of information available for each aspect of the environment and the complexity of the environment and/or the project, it is also likely that additional subsections will be necessary for each of the primary topics identified below; the subsections should be grouped or split so that the information is logically presented.

For each section also provide a summary of the sources of data that has been relied upon to develop the description of the project environment. This should include listing public data sources (regional climatic records, etc.) and project specific data collection programs undertaken by applicant.

For data highly relevant to water licensing, such as water quality, water quantity, aquatic biota, and geochemistry provide details on data collection methodologies and limitations.

Also summarize site specific data and data collection programs (if any) undertaken by others at the site as part of previous resource studies or site developments. Where such historical data is known to exist and is not being utilized in the development of baseline conditions or for the prediction of project effects identify why it is not being considered (for example insufficiently sensitive detection limits, etc.).

Contemporary and historical data collection reports should be included as appendices to the application report. For historical reports that contain significant amounts of information that is not relevant to the application, or is excessively repetitive, a summary of the completed program(s) and excerpts of relevant data can be provided.

### **a. CLIMATE**

Provide an overview of the regional and local climate setting, temperature and precipitation statistics and trends based on regional and project-specific climate station data. Use tables and figures to help summarize and depict data.

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For precipitation provide statistics on the proportion of precipitation occurring as snow; snow depth and water content; magnitude and timing of the snow melt and other major runoff events; snow-free period; and evapo-transpiration estimates.

For projects that will be utilizing or proposing to utilize engineered covers as a mitigative measure to reduce or prevent effects related to contaminants released from waste emplacements, the Board expects that climatic parameters related to actual and potential evapo-transpiration will be provided and the methodologies used to develop estimates of actual evapo-transpiration will be described and their use justified.

The Board expects that the site specific climate dataset will build upon data presented during the preceding project assessment phase conducted under YESAA. Data acquired after or not considered during the Project Assessment by YESAB is expected to be incorporated into any description or analysis of the climatic environment.

The Board also expects that a discussion of the possible implications of climate change to key climatic parameters will be addressed in the context of the project life cycle including the post-closure phase.

## **b. GEOLOGY AND SOILS**

Present descriptions of the regional and project specific surficial and bedrock geology. Use maps, photomosaics, tables, and figures to help summarize and depict data and information.

The Applicant should note that a detailed description of the geochemistry of geologic materials will be required in section 5.2; thus only high level information on geochemistry is necessary in this section of the application report.

### **i. PHYSIOGRAPHY**

Provide an overview of the regional and local physiography (i.e. topography and relative relief, and drainage patterns).

### **ii. SURFICIAL GEOLOGY AND SOILS**

Provide an overview of the characterization mapping of the surficial geology (unconsolidated materials) present at the project site. Provide terrain maps at scales of up to 1:2000. Also specifically identify and discuss:

- The suitability of surficial materials for later site reclamation activities;
- The presence, extent, and nature of permafrost soils;
- Soils units that will be utilized in the construction or the support of mine infrastructure; and
- Any potential terrain hazards associated with surficial soils.

### **iii. BEDROCK GEOLOGY**

Provide detail on the regional and project specific bedrock geology. Describe the regional geological setting and provide an overview of the geology of the area. This should include a description of the tectonic belt(s), physiography, regional metamorphism and structure, and regional seismicity. Any known geologic hazard associated with geologic materials should also be described.

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For the project specific geology provide a detailed description of the ore bodies and adjacent country rock at the project site. For the ore bodies describe the physical nature including location, known dimensions and approximate shape. Include separate descriptions of any recognized ore types and waste rocks within the ore bodies. Also include information on:

- the ore mineralogy including alteration type, deposit character, deposit classification and age of mineralization;
- general ore controls; and
- average assay values and reserve information (proven, probable).

Describe the country rock in the vicinity of the ore body, paying particular attention to any rocks that will be excavated during mining or will remain in pit walls or workings. For each country rock unit, waste rock unit or ore type; describe the mineralogy of the unit, listing the constituent minerals and their average percentage weights. Provide a summary chemical analysis of the rock types, including trace elements.

For both ore and country rock, the mineralogy should emphasize the presence of sulphidic minerals and other potential contaminants (metals, metalloids, and non-metals) that could result in degradation of the environment if allowed to mobilize from their existing form.

## **C. WATER AND WATER QUALITY**

### **i. SURFACE WATER**

Describe the surface water environment including surface water bodies, water courses, and drainage systems. Water bodies that will be either water sources or receiving environments for the project should be specifically identified. Key subsections are to include hydrology and water quality.

For surface water, the Board expects that near continuous flow monitoring data will be provided for key watercourses at the site unless it can be shown that the stream flows are such that near continuous monitoring was/is not feasible. Such flow information will normally be required to be based on measurements and/or observations from a period of at least two consecutive years, inclusive of all available monitoring programs conducted at the site by the Applicant and/or past parties managing the site.

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Based on the collected dataset provide representative measurements of annual stream flow/volume distribution including annual peak and low flows. The measurements should be sufficient to develop proper stage-discharge curves.

For surface water quality, the Board expects that sampling will encompass conditions representative of the range of seasonal flow conditions that have occurred at the site over at least two consecutive years of monitoring. Moreover, it is expected that more intense sampling will have been conducted during the higher discharge periods of the project's water courses. Best efforts should also be made to sample during storm events or during the flow recession from storm events.

Finally, the Board also expects that surface water data collection (both for flow and quality) will be continued during and subsequent to the YESAA project assessment and that data collected after the submission of the Project Proposal will be incorporated into the water use licence application.

## ii. GROUNDWATER

Establish and map flow rate and gradient of groundwater within project watersheds including measurement of spatial and temporal variability. Groundwater aquifers that will either be used for water supply or for disposal of project wastes should be specifically identified.

The frequency of the baseline/monitoring will be relative to the flow rate and should be sufficient to adequately define the baseline physical hydrogeological conditions at the site. Identify linkages between hydrogeological and surface flows particularly for base flow conditions and where groundwater reports to surface. Identify if, and where, permafrost may affect groundwater flows.

Baseline groundwater quality sampling should characterize spatial and temporal (seasonal) variation in groundwater quality over the project area. Sampling stations should be established at sites suitable as future monitoring and compliance points. Sampling stations should be situated to provide adequate spatial coverage relative to the project including both reference/control locations and potentially affected stations. Provide measurements of baseline water quality where project-affected groundwater reports to surface (i.e., seeps).

Where existing mine development or historic mine workings are present at the site, provide specific details of groundwater flows and quality associated with those workings.

At a minimum the Board expects that characterization of groundwater will require monitoring over at least two consecutive years. Irrespective of the period of monitoring prior to assessment of the project under YESAA, the Board also expects that groundwater data collection (both for flow and quality) will be continued during and subsequent to the YESAA project assessment and that data collected after the submission of the Project Proposal will be incorporated into the water use licence application.

## d. FISH AND FISH HABITAT

Describe the aquatic organisms and aquatic habitat in the environmental assessment study area, including in waterbodies on the mine site, as well as upstream and downstream watercourse and water bodies that may be affected by the development. Describe the following for key aquatic species:

- seasonal and life cycle movements;
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- local and regional abundance and distribution;
- known or suspected sensitive habitat areas for different development stages and times of year;
- the food chain that supports the species
- the effects of the water use on fish and their habitats, as per section 14.8.4.1 of the First Nation Final Agreements; and
- any known issues currently affecting fish and other aquatic life forms in the area.

#### **e. WILDLIFE AND WILDLIFE HABITAT**

The Board anticipates that wildlife and wildlife habitat descriptions provided during the project assessment by YESAB are sufficient to utilize for this section. Having said this, the Board recommends that added emphasis be placed on describing wildlife interactions with water resources, as well as the effects of the water use on wildlife and its habitat, as per section 14.8.4.1 of the First Nation Final Agreements.

#### **f. VEGETATION**

The Board anticipates that vegetation descriptions provided during the project assessment by YESAB are sufficient to utilize for this section. Having said this, the Board recommends that added emphasis be placed on describing riparian vegetation and wetland vegetation that may be affected by the project.

#### **g. SOCIAL ENVIRONMENT**

The Board anticipates that the socio-economic descriptions developed for the YESAA project assessment supplemented with reference to any compensation or benefits agreements developed subsequent to the project assessment can be summarized in this section. Having said this the section should specifically focus on the relationship between the project and existing water users including First Nations traditional use of water resources. In particular, it is required that the nearest and/or most potentially affected First Nation Settlement Lands for each watershed of the project are identified and any compensation plans with First Nations or other users be identified.

### **4. PROJECT DESCRIPTION**

#### **a. MINE PLAN**

Provide a narrative overview of the mine plan for the mine development, operation, and closure phases of the project. The narrative overview should include descriptions of development activities, schedules, production schedules, mining and processing methods, and required infrastructure for the project. The narrative may present lesser detail in respect to the closure phase of the proposed development as a detailed description of closure planning is required in section 8 of the application report.

The narrative should include abundant figures and tables to present the information. In regards to figures, an overall development site plan or plans at a scale not less than 1:5000 should be included in the application report. This site plan or site plans should show the locations of all of the main components of the project, including but not limited to the mining claims, mine, mill, rock dump(s), ore stockpile(s), dam(s), tailings area(s), access road(s), camp(s), water supply source(s), waste discharge(s) and any other facilities proposed to be licensed through this application.

#### **b. DESCRIPTION OF PROJECT COMPONENTS**

Following from the narrative description, this section should include more detailed descriptions of the project components. Where appropriate, the descriptions should draw from completed preliminary designs that will be included as appendices to the report. No significant changes to project components should be made after the completion of the preliminary design, although it is anticipated

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that additional details of the design will be developed. Significant changes to project components are likely to require licence amendments, as well as a requirement for further assessment under YESAA.

Note that preliminary designs submitted to the Board will be required to be sealed by Professional Engineers registered to practice in Yukon.

Where a given project component has a hazard classification of high, very high, or extreme based on the hazard classification system of the Canadian Dam Association or similar relevant hazard classification system, the Board will expect that a Failure Modes Effects Assessment (“FMEA”), or similar hazard/risk study will be completed as part of the preliminary design process for that infrastructure. Such studies normally involve the participation of a wide range of stakeholders and the Board would expect that the Applicant has made and or can show that best efforts have been made to include stakeholders in any FMEA studies completed to support the submitted application.

**i. DESIGN AND PERFORMANCE CRITERIA**

Include an overview of the design and performance criteria (codes, standards, guidelines, and specific performance criteria including selected hazard or risk classifications) that have been adopted for the project. Key points can be summarized and additional details provided in an appendix.

For criteria related to risk, such as the selection of the inflow design flood and design earthquake ground motion parameters, provide the rationale for the selection of the criteria. The rationale should be linked to the risk level of the project component and should reference criteria for similar infrastructure in Canada.

The Board believes that the Applicant should be forward looking in terms of risk criteria and should utilize more stringent risk tolerances where international trends indicate a movement towards increasingly protective tolerances.

**ii. MINE WORKINGS**

Include detailed descriptions of proposed underground and surface (open pit) workings that are proposed for the project. Volumes of removed materials and sequencing of development should be emphasized.

The presented plans should also emphasize source control measures that have been incorporated into the proposed design of mine workings. Source control measures reduce or eliminate the quantity or hazardous nature of contaminants and waste at the point of generation. Source control includes strategies to predict the occurrence of acid-forming materials, contaminants and toxic metals likely to be mobilized by mining activities and design operations to avoid or minimize contact with these materials and/or assure their isolation.

Examples of source controls include locating mine development workings outside of reactive waste rock and/or mineralized zones, backfilling of mine voids, and flooding of mine workings.

**iii. WASTE EMPLACEMENTS**

For all proposed waste emplacements, including but not limited to tailings facilities, waste rock dumps, treatment sludge holding cells, overburden, and soil stockpiles provide a description based on developed preliminary engineering plans that should be attached as appendices to this application.

The Board looks favourably upon waste emplacement designs that eliminate the long term geological risk posed by water/fluid retaining structures and that creates landforms with similar or better potential for long term performance with respect to erosion and other mass wasting phenomenon as exhibited by stable natural landforms in the development area. The Board also views the underground and sub-aqueous disposal of reactive waste materials as prudent where it is possible

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to do so. Finally, waste emplacement designs that optimize the potential for progressive reclamation are encouraged.

Where the Applicant presents designs contrary to the above preferences of the Board it is expected that strong rationale will be supplied by the Applicant to justify the use of the submitted designs.

**iv. PROCESSING FACILITIES**

A description of the process is required. Flow sheets that indicate process streams, quantities and significant equipment can be used to describe the process(es). The chemicals or reagents that will be used in the process must be identified and the use of any particularly hazardous products must be noted.

Where heap leaching is to be utilized, a preliminary design of the heap leach facility is required.

**v. WATER MANAGEMENT STRUCTURES**

Include descriptions of all water management structures including, but not limited to, water supply dams, water intake structures, groundwater supply wells, water conveyance systems, water diversion systems, water storage and treatment ponds, underground sumps, water treatment plants and treated wastewater discharge facilities.

All such structures and infrastructure must be described on the basis of completed preliminary designs that must be attached to the Application report.

**vi. ADDITIONAL MINESITE INFRASTRUCTURE**

Any additional mine site structures, including on-site accommodations and offices, workshops, storage facilities, fuel storage facilities, explosive storage and/or manufacturing facilities must be described in terms of location and construction. Items of particular relevance to the reclamation plan are locations, foundations, and nature of construction (e.g. movable modular units or 'permanent' structures).

Access and transportation modes and routes for mine personnel and mine supplies and products (including ore or concentrate) must be described. Specific mention must be made of the requirements that restrict road access.

**5. PREDICTED PROJECT PERFORMANCE**

In this section the predicted performance of the project, as well as the tools and analytic models used to predict the performance will be presented.

**a. PRODUCTION OF PRODUCTS AND WASTES**

On the basis of the mine plan detail the products (metals, concentrates, etc.) and the waste streams that will be produced by the project over its life cycle. All identified products and waste streams must be characterized such that there is sufficient information to incorporate the waste streams into predictions of drainage chemistry from mine residuals (tailings, leached ore, waste rock, un-processed ore stockpiles, treatment sludge, etc.). Furthermore, the characterization is necessary to support monitoring activities that are proposed during the project life and to provide bench marks for potential adaptive response plans.

Characterization of products and wastes should include water content, geochemistry, presence of reagents and blast residuals, physical properties and depositional form, volumes and tonnages, and production schedules over the life cycle of the project.

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## **b. PREDICTION OF DRAINAGE CHEMISTRY FROM WASTE STREAMS**

In the context of a water use licence application, drainage chemistry includes the water quality of surface or groundwater originating from waste emplacements and mine workings at the project site. These flows are considered to be the inputs into project effluent treatment systems or if suitable direct effluent releases into the environment.

For the application report predict the drainage chemistry for each waste stream. This will primarily entail a metal leaching/acid rock drainage (“ML/ARD”) assessment to predict resulting drainage chemistry from disturbed geological materials. The assessment of potential drainage chemistry problems is primarily concerned with ARD because of its frequency and the magnitude of its impacts. However, Applicants are also required to predict the potential for leaching of metal and non-metal contaminants (metalloids, salts, etc.) under neutral or alkaline drainage conditions that may be present or predicted for a given development.

It is recommended that the assessment be completed in accordance with the ‘*Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials*’ (MEND Report 1.20.1) and the ‘*Guidelines For Metal Leaching and Acid Rock Drainage at Mine sites in British Columbia*’.

In addition, predictions of the drainage chemistry resulting from the mining and mineral processing technologies are also required. This will include consideration of potential nitrogen residuals from blasting, and residuals or by-products of processing reagents such as cyanide.

## **c. WATER BALANCE MODELLING**

In this section Applicants must present a summary of a developed site-wide water balance model for the project and the results of modelling. A comprehensive report on the development and application of the model must be included as an appendix to the application report.

The developed model will need to incorporate, where appropriate:

- surface water inputs into the site and outputs from the site;
- precipitation inputs and evaporation/evapo-transpiration outputs;
- seasonal snow-pack development and melt;
- glacial and permafrost melting (i.e., negative storage);
- groundwater contributions from dewatering mine workings, groundwater supply wells, natural springs, and groundwater inputs to surface water systems;
- existing and project-affected runoff conditions;
- influence of project components that could affect the water balance, such as storage of water in concentrates, tailings and mine waste;
- hydrological variability between wet years and dry years especially flood volumes and frequency; and
- results of sensitivity analyses on the developed water balance model.

The water balance model must be used to develop results and projections for a variety of operating and climatic scenarios including specific consideration of all key stages of the mine life cycle and variations on climatic cycles (dry, normal, and wet years or periods). The rationale for the selected scenarios that have been modelled must be provided. In particular the return period of selected wet and dry years/scenarios must be presented and defended.

The water balance must also include a discussion of climate change implications on the water balance and how climate change implications have been incorporated into the water balance scenarios.

Output from the model must specifically identify transfers of water from one watershed to another (if any) and must explicitly identify and quantify the reuse and recycling of water that will occur. In this

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context reuse is where water from one process is used in a subsequent process without treatment and recycling is where water from one or more uses is collected and treated so that it can be used again for some purpose at the site. The Board expects that reuse and recycling of water will be maximized wherever possible in proposed activities for quartz mining undertakings.

Proponents should consider providing a functional electronic version of their water balance model that is broadly accessible. This allows reviewers to fully understand the assumptions, inputs, mass balances, etc. which were used.

#### **d. WASTEWATER DISCHARGE**

##### **i. WASTEWATER TREATMENT**

Describe the wastewater treatment processes that will be applied to wastewater discharges that will be released to the environment. The description should build upon the drainage chemistry and water balance predictions to show the resulting water quality of all discharges from all discharge locations to the receiving environment(s) throughout the life of the project.

The predicted water quality of contaminants and potential contaminants of concern must be provided both in terms of mean expectations as well as potential variance. The predictions should identify achievable outcomes for the applied processes and not just back calculated maximum concentrations that may allow for maintenance of receiving water quality objectives.

The sensitivity of predicted outcomes to changes to input water quality or quantity should be discussed.

It is expected that wastewater treatment technologies that are proposed will be supported by at least bench scale trials and preferably by field-scale trials or applications of similar scale to that being proposed. Evidence from such trials must be provided in appendices to the application report.

##### **ii. RECEIVING ENVIRONMENT(S)**

Provide a summary of the characterization of the receiving environments for the project. The characterization should include identification of critical species and water quality objectives suitable for those species. If site specific water quality objectives are proposed the development of those objectives should be summarized. If standard water quality objectives such as CCME objectives are proposed these should be identified and their applicability discussed.

Any proposed degradation of the background water quality in the receiving environments must be identified and the rationale for the level of degradation provided.

Relevant studies and analysis supporting the selection of proposed water quality objectives must be included as appendices

The Board advises Applicants that water quality objectives are normally considered by the Board in the context of evaluating and establishing effluent discharge criteria that will be included as conditions in the water use licence.

##### **iii. WATER QUALITY MODELING**

This section should summarize and describe a water quality model or models developed for the project and present the results of water quality modelling for a robust set of development, operational, and closure scenarios considered for the project.

The water quality model or models must be developed utilizing the predicted drainage chemistry, water balance, mine plan, and predictions of water treatment processes, to predict the resultant water quality of receiving environment(s) proposed for this project. The water quality model(s) must be clearly coupled to the water balance model and must be suitable to make accurate predictions for all phases of the project life cycle. The model(s) should account for variability in both the discharge effluent streams and the receiving environment water quality and quantity parameters. The sensitivity of the model to its input parameters and assumptions should be examined and reported.

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Full details on the development of the model and the applicability of the modelling methodology should be included with the full results of completed modelling in an appendix to the Application report.

#### **iv. PROPOSED EFFLUENT DISCHARGE STANDARDS**

Proposed discharge standards for effluent discharges from the project need to be presented and substantiated. The proposed standards shall identify all contaminants of concern and potential contaminants of concern. The standards shall also include release timing and quantity elements as may be required as part of the effluent discharge strategy. If applicable, proposed standards for various phases of the project must be presented.

The proposed effluent discharge standards must be compared to the identified water quality objectives for the receiving environment and shown through completed water quality modelling to be protective of the receiving environment(s).

As previously noted the proposed effluent discharge standards should be based on achievable outcomes of proposed treatment processes as determined by suitable scale testing and not just back calculated maximum concentrations that may allow for maintenance of receiving water quality objectives. The rationale for selecting the scale of testing completed for proposed treatment processes must be provided.

With respect to *Metal Mining Effluent Regulation* (“*MMER*”) discharge standards, the Board accepts them as statutory maximum discharge concentrations for contaminants regulated by *MMER*, but does not view them as necessarily appropriate maximum discharge standards for any given application.

In many cases the Board expects that more stringent standards (i.e. lower maximum concentrations) will be required than those maximum standards represented in *MMER*.

#### **e. PREDICTED EFFECTS ON SETTLEMENT LAND AND TRADITIONAL WATER USES**

Chapter 14 of the Umbrella Final Agreement (“*UFA*”) and specific Yukon First Nation Final Agreements between the Government of Canada, the Government of Yukon and the Council of Yukon First Nations creates specific duties that the Board must fulfill in terms of considering the possible effects that proposed water uses (including deposit of a waste in water) may have on First Nation Settlement Lands and on the traditional use of water by a Yukon First Nation people on non-Settlement Land.

Specifically a Yukon First Nation has the right to have water which is on or flowing through or adjacent to its Settlement Land remain substantially unaltered as to quantity, quality, and rate of flow, including seasonal rate of flow.

Also where an applicant is proposing to substantially alter the quantity, quality, or rate of flow, including seasonal rate of flow, in a drainage basin such that the traditional use of water by a Yukon First Nation person in that person’s Traditional Territory will be adversely affected, a First Nation can request that the Water Board consider alternatives and reasonable measures to avoid the adverse impact.

Therefore, in this section the applicant must provide the results of analyses that show whether:

- (a) The quantity, quality, and rate of flow, including seasonal rate of flow of water through or adjacent to Settlement Lands will be substantially altered; and
- (b) Traditional uses of water by a Yukon First Nation person (or people) will be adversely affected by a proposed substantial alteration of the quantity, quality, or rate of flow, including seasonal rate of flow in that person’s Traditional Territory.

The analyses must be accompanied by sufficient drawings or figures to clearly define the Settlement Lands and Traditional Territories that will be potentially affected by the project. The analyses must also be explicit, based on evidence, and continue downstream to the extent that any reasonably predicted substantial alteration of quantity, quality, and rate of flow, including seasonal rate of flow is expected to occur. The analyses must consider all drainage basins or watersheds that may be affected by the proposed Quartz mining activity. Finally the analysis must describe the definition(s) of

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“substantial alteration” used in evaluating the results of completed analyses and the rationale supporting that definition(s).

In the event that the completed analyses find that:

- (1) the quantity, quality, or rate of flow, including seasonal rate of flow will be substantially altered where water flows through or adjacent to Settlement Land, or
- (2) that the traditional use of water by a Yukon First Nation person in that person’s Traditional Territory will be adversely affected by a substantial alteration of quantity, quality or rate of flow, including seasonal rate of flow, in that person’s Traditional Territory,

Then this section should include or reference evidence and arguments showing that:

- (a) there is no alternative which could reasonably satisfy the requirements of the applicant, and
- (b) there are no reasonable measures whereby the applicant could avoid the interference.

In addition, this section must also provide or reference evidence regarding the effect of the proposed water uses on fish, wildlife and their habitats and the effect of the water use on the Yukon First Nation or on a Yukon Indian Person enrolled pursuant to that Yukon First Nation Final Agreement.

Finally, if the applicant is proposing water use resulting in an adverse effect to the water rights of a First Nation or First Nation person, then the Board would expect that a compensation agreement would be provided as part of the application and summarized in this section of the Application report.

## **6. WATER AND WASTE MANAGEMENT PLANS**

Water and waste management plans are documents that outline the objectives, strategies, activities and methods to manage water and waste either produced or affected by the project. The plans should highlight the use of strategies for source reduction of potential contaminants, potential reuse or recycling of waste products, the treatment of waste products (before or after placement) and the application of diversions and barriers to prevent contaminants from entering the receiving environment. Achievable management objectives based on the results of modelling and testing should be proposed.

For most quartz mining applications, the Board anticipates that waste management plans would be required for, but not limited to, waste rock, tailings, heap leach residuals, treatment sludge, domestic waste, and sewage. The water management plan must be integrated with the various waste management plans to show how water will be managed from sources to discharge from the site.

It is expected that the various plans will be included as standalone appendices and that summaries of the various waste management plans and of the integrated water management plan will be presented in this section and its subsections. Typical subsections may include:

- Waste Rock Management Plan;
- Underground Development Plan;
- Open Pit Development Plan;
- Tailings Management Plan
- Heap Leach Management Plan;
- Sludge Management Plan;
- Management of sewage and domestic waste; and
- Integrated Water Management Plan.

In describing the water and waste management plans, the emphasis can be placed on the development and operations phases of the project as a standalone preliminary closure plan will also be required and can include the summary of the closure phase water and waste management plans.

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## **7. HAZARDOUS MATERIAL MANAGEMENT PLAN(S)**

In the context of quartz mining water use licence applications hazardous materials exclude mine wastes for which separate management plans are required. Hazardous materials more generally refer to hazardous materials used in the direct or indirect support of the mining operation including but not limited to fuels, lubricants, antifreeze, process reagents (including cyanide), pesticides, and explosives.

The applicant is required to develop management plans for the transportation, storage, use and disposal of such hazardous materials. In addition, contingency plans to respond to, contain, and treat spills of these materials must also be developed.

It is anticipated that a single overarching plan may be suitable for smaller or less complex projects. For larger or more complex projects or projects utilizing very hazardous materials, such as cyanide, standalone plans for various categories of materials are likely required.

In either case, the plan or plans should be summarized in this section of the application report and the full plans included as appendices. The applicant is cautioned that hazardous material management plans must be consistent with any applicable Federal or Territorial legislation governing the management of hazardous materials. It is the duty of the applicant to ensure this consistency irrespective of the decision of the Board to accept (or not) the management plans submitted as part of this application.

## **8. DECOMMISSIONING AND RECLAMATION**

During the project assessment process undertaken by YESAB, the applicant will have developed and submitted a preliminary decommissioning and reclamation plan that accounts for both potential temporary closures and the ultimate permanent closure of the proposed development. It is generally expected that such a plan would have been based upon conceptual planning of the project.

The Board expects that this original “conceptual” plan will have been expanded or revised to include any changes or additions of detail necessary or beneficial as a result of:

- the findings of the project assessment (i.e. Conditions within a Decision Document);
- the results of any further studies, such as on, but not limited to, mineral processing, water and waste treatment, and the logistical development and operation of the mine;
- the implications of expanded environmental data sets;
- the input of further stakeholder engagement; and
- the knowledge of more advanced engineering designs that has been completed or in progress since the original plan was prepared for the project assessment.

The updated preliminary decommissioning and reclamation plan must be included as a supporting document to the application report and in this section of the application report, key aspects of the preliminary decommissioning and reclamation plan must be summarized. In particular the following must be presented:

- Statements of the overarching reclamation goal(s) and of the global and mine component specific objectives needed to achieve that goal(s);
  - For specific mine components, measurable closure criteria that are proposed to identify when the component specific objectives have been achieved and the rationale for those criteria;
  - Realistic descriptions and expected results of proposed reclamation activities;
  - Conceptual descriptions of proposed contingency measures to augment proposed activities if required;
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- A description of the evidentiary basis that shows the stated reclamation objectives can be achieved through the described activities and proposed contingency measures;
- The need and plans for reclamation research necessary to further refine the proposed closure activities and contingency plans, thereby reducing the level of uncertainty regarding the likelihood of these activities achieving the closure criteria selected for the project;
- The proposed post-closure monitoring requirements and the rationale for the selection of those monitoring activities;
- The schedule of proposed reclamation activities, including studies associated with refinement of the plan, with specific identification of progressive reclamation activities proposed for the operational phase of the mining undertaking;
- Projections of the likely post-reclamation risks to the aquatic environment resulting from completion of the proposed decommissioning and reclamation plan. The projections to include consideration of uncertainty in at least a qualitative level; and
- Reclamation liability costs and financial security estimates to a level of detail consist with the preliminary engineering designs completed and scientific understanding available. The Board requires that the security estimates be based on third parties undertaking the closure activities and include incidental costs, such as project familiarization, mobilization/demobilization, and project management, for third parties to complete the tasks.

In addition to these requirements, the Board also requires the applicant to include a specific summary of the temporary or interim closure planning that is also detailed in the preliminary decommissioning and reclamation plan. Specifically the following must be provided:

- Definition of temporary and permanent closure;
- Statements of the temporary closure goal(s) and objectives;
- For specific mine components, measurable temporary closure criteria that are proposed to confirm that the component specific objectives are being achieved and the rationale for those criteria;
- Realistic descriptions of activities necessary during temporary closure, including identification of systems and processes (water treatment, heating, dewatering, water collection, snow removal, etc.) that must be maintained during the temporary closure period;
- Expected staffing requirements and identification of required consumables necessary to maintain the site;
- Conceptual descriptions of proposed contingency measures to augment proposed activities if required;
- The proposed monitoring and reporting requirements during temporary closure and the rationale for the selection of those monitoring activities; and
- An estimate of the cost of maintaining the site during temporary closure with the cost estimate to include staffing, consumables, and external resources. The cost estimate shall be based on annual time units and shall incorporate costs that may be associated with specific seasonal activities, for example management of the annual freshet or winter operations. A range of potential costs that might be expected based on the point in time that the temporary closure occurs can also be provided. Lacking this level of detail, the costing should be specific to the most critical time that a temporary shutdown could occur.

In evaluating the plan, the Board will be conscious of whether the applicant has clearly designed and planned the undertaking for closure without imposing undue levels of risk as to the potential success of closure. The Board will expect that to the extent possible closure will achieve a “walk away” solution that requires only minimal future management and monitoring. Where passive treatment options of long term

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site discharges are proposed the Board will seek strong evidence that such options can be expected to perform as required.

Moreover, the Board will expect that field trials of proposed closure measures and technologies, for example cover systems and passive water treatment technologies, will be proposed and scheduled for as early as possible in the project life cycle.

## 9. MONITORING AND REPORTING PLAN

Monitoring and reporting is an essential part of managing quartz mining projects; therefore, the Board requires that applicants develop and submit a detailed monitoring and reporting plan as part of the Application report. Monitoring and reporting plans are expected to include various monitoring programs designed to monitor different aspects of the project performance. These programs may be relatively straight forward or extremely complex depending upon:

- the nature and scale of the proposed mining activities;
- the nature, complexity, and sensitivity of the project and receiving environments; and
- the potential challenges associated or anticipated with the project.

Depending on the complexity of the developed monitoring and reporting plan, the plan can either be presented in its entirety in this section of the application report, or summarized in this section with the full plan presented in an appendix to this report. Regardless of how it is presented it is essential that the developed plan state the objectives of its component programs and include the justification for its proposed program activities. Moreover, the developed plan should utilize descriptive figures, tables, and plain language descriptions to convey the plan to the Board and third parties.

In respect to the Board's expectations for a monitoring and reporting plan, the Board expects that the monitoring programs comprising the plan will encompass all phases of the undertaking and that they will be sufficient to ensure the collection, analysis, and reporting of data necessary to validate assumptions and predictions of:

- a) Climatic, geochemical, hydrologic, and hydro-geologic inputs to the project;
- b) The nature and quantity of mine waste materials produced;
- c) The quality, quantity, and time history of water use and waste deposition;
- d) The performance of water and waste management infrastructure or of components of such infrastructure including, but not limited to, tailings dams, heap leach pads, water treatment plants, treatment pond liners, and waste cover systems;
- e) The effectiveness of measures taken to mitigate any adverse environmental effects of the project; and
- f) The effects of water use and waste deposition on the receiving environment.

With respect to monitoring of infrastructure, the monitoring effort should be designed to reflect the hazard associated with potentially poor performance of the infrastructure. Therefore, visual inspection of a diversion ditch, for example, may be acceptable whereas detailed instrumentation would likely be expected for a large tailings dam.

The monitoring program must also be designed to guide management decisions related to the environmental performance of the project.

Accordingly, the monitoring plan shall include programs designed to capture data related to, but not necessarily be limited to:

- Site climatic parameters;
  - Surface water quality and quantity;
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- Groundwater quality and quantity;
- Process water quality and quantity;
- Stream sediment quality;
- Physical performance of water retaining and waste containing structures, including any embankments, liners, covers, and water management systems associated with those structures;
- Physical performance of flow conveyance infrastructure;
- The production, nature, deposition, and release (if any) of waste materials; and
- Project effects on the receiving environment.

The individual programs developed to monitor these aspects of the project shall detail sampling or measurement locations, sampling media, procedures, frequency, analytical techniques – including expected precision and accuracy, and monitored parameters for both field and, if relevant, subsequent laboratory measurement. Programs shall identify quality control and quality assurance processes, means of recording and managing collected data, and internal and external reporting protocols that will be followed to utilize and present the collected data.

For each program it is expected that an annual or more frequent reports will be prepared and that the report(s) will include analysis of the collected data that interprets any implications that the data may imply with respect to the current and future performance of the project. Irrespective of proposed reporting frequencies, the Board encourages Applicants to include provisions in its monitoring plan to release monitoring data, in its raw form, in a publicly accessible media, such as websites, on a timely and routine basis.

## **10. ADAPTIVE MANAGEMENT PLAN**

The Board accepts that planning for a mining development will contain uncertainties that may result in the unexpected performance of the project leading to impacts of some magnitude in the aquatic environment. The monitoring plan developed for the project must be designed to monitor the performance of the project and thereby directly or indirectly allow for the potential impacts of the project on the aquatic environment to be determined. However, the monitoring plan does not necessarily describe the actions that will be taken and the trigger levels to initiate those actions if or when unexpected and/or more significant impacts are or may be indicated based on the results of monitoring.

In order to ensure that the applicant can reasonably foresee and prepare for potential variations in the performance of the project and the potential resulting changes to aquatic impacts that may occur, the Board requires that an adaptive management plan be prepared and submitted with the application. In this section of the application report, the adaptive management plan must be summarized and the basis for its development presented.

To assist in completing this section and the required adaptive plan document, the Board notes that the purpose of the adaptive management plan will be to identify the response of the applicant to monitoring results that could be suggestive of a future adverse impact on the receiving environment. In particular, the plan must identify trigger levels for management actions and potential management actions that would be enacted based on the results of monitoring activities.

Therefore, the contents of an adaptive management plan will include the following:

- a summary of environmental interactions and predictions of project-related effects on the aquatic environment;
  - a summary of monitoring programs and how monitoring results are linked to potential effects on the aquatic environment;
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- a description of how environmental change in the aquatic environment will be measured and considered;
- a description of significance thresholds for valued aquatic ecosystem components and/or contaminants of potential concern, where the significant thresholds represent the on-set of adverse impacts on valued aquatic ecosystem components;
- a description of appropriate action levels, specific to monitoring results, that would be set well below significance thresholds so that action is necessarily taken prior to an adverse impact arising; and
- a description of the management response plans that would be enacted if a given action level is reached.

With respect to action levels and management response plans, the Board expects that action levels may be tiered for any given monitoring result or group of results. For example, a lower action level may lead to a management response such as repeating the monitoring activity and re-assessing results. A higher action level may lead to a management response that includes changes in the monitoring program or in the operations of the project. In either case all action levels must be set below the significance threshold(s).

## **Supporting Documents**

The following is a list of generally expected categories of supporting documents that will provide much of the evidentiary support for the proposed project. These supporting documents should be grouped into appendices as indicated below. It is expected that many of the appendices will include multiple reports in sub-appendices. As an aid to the Board and third parties, appendices with multiple documents should include an overall summary document that describes in general the contents and purpose of the various sub-appendices included.

- Appendix 1: Decision Document and YESAB Screening or Evaluation Report
  - Appendix 2: Project Environment Baseline Data Reports
  - Appendix 3: Preliminary Design Reports
  - Appendix 4: Geochemical Characterization and Drainage Chemistry Prediction Reports
  - Appendix 5: Water Balance Modelling Reports
  - Appendix 6: Wastewater Treatment Reports
  - Appendix 7: Receiving Environment Reports
  - Appendix 8: Water Quality Modelling Reports
  - Appendix 9: Water and Waste Management Plans
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- Appendix 10: Hazardous Material Management Plans
- Appendix 11: Preliminary Decommissioning and Reclamation Plan
- Appendix 12: Monitoring and Reporting Plan
- Appendix 13: Adaptive Management Plan