Major Mine Reclamation Liability Cost Estimate (RLCE) Guidance

May 2024
Version 1.0

BRITISH COLUMBIA
Ministry of Energy, Mines and Low Carbon Innovation

PROVINCE OF BRITISH COLUMBIA
B.C. Ministry of Energy, Mines and Low Carbon Innovation

Major Mine Reclamation Liability Cost Estimate (RLCE) Guidance

Version 1.0
May 2024

This document provides information regarding the authorizations for major mines in British Columbia to the Major Mines Office for major mines in British Columbia. Although references are made to legal requirements, the content of this document should not be interpreted as legal instructions or legal advice. Users of this document should refer directly to official copies of the legislation to determine legal requirements and seek qualified legal counsel when case-specific interpretations are needed.

Table of Contents

1 Introduction

The British Columbia (BC) Ministry of Energy, Mines and Low Carbon Innovation's (EMLI) seeks to ensure that permittees for major mines cover the full cost of environmental cleanup and reclamation for their mine. The *Mines Act* outlines that security can be required by the Chief Permitting Officer for mine reclamation and to provide for the protection of, and mitigation of damage to, watercourses and cultural heritage resources affected by the mine.

EMLI also collects security on behalf of Ministry of Environment and Climate Change Strategy (ENV) for liabilities associated with EMA permits. EMLI and ENV have a Memorandum of Understanding (MOU) whereby EMLI calculates and collects security on behalf of ENV under the Environmental Management Act (EMA). ENV staff collaborate, review, and provide input to EMLI on the liability costing review process for applicable projects. The MOU ensures that mining companies are not required to post securities for the same activity under two different statutes.

The Major Mines Reclamation Security Policy (Interim) sets out requirements for major mines to provide a clear accounting of estimated reclamation costs and establishes a framework for determining the amount and form of reclamation security. This Reclamation Liability Cost Estimate (RLCE) guidance document is a companion document to the Major Mines Reclamation Security Policy.

A RLCE must describe the methods used to determine the estimated cost to implement the reclamation and closure plan, addressing all liabilities resulting from mining operations, including any required source controls or mitigation measures. These estimated costs are then used by the Chief Permitting Officer to determine the amount and timing of reclamation security for the mine.

RLCEs are required for *Mines Act* permit application/amendments for major mine projects, 5 Year Mine Plan and Reclamation Program Updates, and Annual Reclamation Report (ARR) submissions. This document outlines EMLI's expectations and guidance to proponents on the format and detailed information required in a RLCE. The costing information requirements outlined in this document are consistent with the costing information requirements in the Joint Application Information Requirements (JAIR) Guidance Document. This guidance document is expected to improve transparency by identifying key EMLI process steps and to improve the consistency and quality of RLCEs.

2 RLCE Parameters

The RLCE submitted as part of a 5 Year Mine Plan and Reclamation Program Updates or Annual Reclamation Report (ARR) must be developed to be consistent with the parameters outlined below.

2.1 Time Period

- The RLCE must include all costs required to implement the Reclamation and Closure Plan and maintain compliance with provincial and federal regulatory requirements over a 100-year period.
- Year 1 of the 100-year period must be set to the year the RLCE is submitted, regardless of whether the site is in construction, operation, care and maintenance, or closure.

2.2 Costing Scenarios

- The RLCE must include the following two scenarios for the 100-year period:
  - the calculated liability and reclamation and closure costs associated with the existing site disturbance and implementation of the next five years of the mine plan; and
  - the calculated liability and reclamation and closure costs associated with the life of mine, where the permitted mine plan is fully implemented.

- For both scenarios, the RLCE must show the following total cost estimates:
  - total RLCE without any discounts or credits applied to any cost category;
  - total RLCE with applicable discounts applied to the eligible cost categories; and
  - total RLCE with applicable discounts and any eligible Exploration Incentive Security credits applied.

2.3 Progressive Reclamation

- The planned implementation of the Reclamation and Closure Plan during the operations phase (i.e. progressive reclamation) cannot be discounted from the RLCE until the work has been completed and demonstrated to the Chief Inspector that the implemented progressive reclamation supports the achievement of land use and capability objectives.

2.4 Third-Party Costs

- All costs associated with implementing the Reclamation and Closure Plan, required mitigations, and maintaining compliance with all regulatory requirements must be based on recent third-party information sources, which can include quotes, estimates, or invoices received from suppliers, contractors, and/or consultants. Costs

associated with conventional reclamation activities, labour and equipment rates, engineering, project management, mobilization/demobilization, equipment and structure removal/disposal, site monitoring, capital and operating costs for source controls and mitigation measures, and site maintenance must be based on recent third-party information sources, which can include quotes, estimates, or invoices received from suppliers, contractors, and/or consultants:

- Equipment rates can also be informed by the BC Road Builders and Heavy Construction Association Equipment Rental Rate Guide – The Blue Book; and
- Equipment productivity rates can also be determined from manufacturer sources, such as the Caterpillar Performance Handbook or similar published reference information.

2.5 Revenue Streams

- All revenue sources related to implementation of the Reclamation and Closure Plan and operation of the site must be excluded from the RLCE.
- This includes any revenue that may be generated from non-mining activities on the mine site (e.g. landfilling, power generation, etc.) as well as any revenue that could potentially be generated from salvage of equipment or materials.

2.6 Mobilization/Demobilization

- The mobilization/demobilization of equipment and staff from the mine site may be estimated as 5% of the value of the costs associated with the physical work to be conducted (equipment, labour, and materials/supplies) or based on recent prior work of a similar nature.

2.7 Project Management

- The project management costs associated with implementation of the Reclamation and Closure Plan may be estimated as 10% of the value of the physical work to be conducted or estimates based on recent prior work of a similar nature.

2.8 Engineering/Consulting Costs

- These are costs required to complete future design and/or construction and/or reporting work outlined in the Reclamation and Closure Plan.
- Engineering/consulting costs must be based on a cost estimate provided by an engineering/consulting firm or a conservative estimate based on recent prior work of a similar nature.

2.9 Contingency Fees

- A minimum 15% contingency must be applied to the final, undiscounted, RLCE.

- Higher contingencies may be applied at the discretion of the Chief Permitting Officer based on the level of uncertainty.
- If lower contingencies are being proposed, justification must be included in the RLCE and be acceptable to the Chief Permitting Officer.
- Applied contingencies from vendor quotes/specific estimates do not need to have the 15% contingency re-applied, provided the minimum 15% contingency is included in the quote.

2.10 Discount Rates

- Discount rates must not be applied to short-term site activities (i.e. Cost Categories 1 to 3)
- Discount rates must only be applied to long-term mine site activities (e.g. Cost Categories 4 to 7)
- The following discount rates must be applied to mine sites with an undiscounted RLCE < $50M:
  Years 1 to 5 - 1.5%; Years 6 to 30 - 2.0%; Years 31 to 100 - 3.0%
- The following discount rate must be applied to mine sites with an undiscounted RLCE > $50M:
  Years 1 to 100 - 4.0%
- The 4% discount rate cannot be applied to reduce the RLCE below $50M after the inclusion of contingencies.

3 Required Components

The RLCE accompanying an application must be comprised two main components:

1. RLCE Summary Report; and
2. RLCE Spreadsheets.

3.1 RLCE Summary Report

The RLCE Summary Report, also referred to as a Basis of Estimate, links the Reclamation and Closure Plan to the RLCE Spreadsheets and must include the following information:

- all relevant cost requirements (i.e. information requirements) outlined in this document;
- the assumptions, supporting information, and calculation methods for each included cost requirement;
- the Cost Estimate Classification System and Cost Estimate Class(es), and expected accuracy range(s); and
- the total undiscounted costs and discounted costs.

3.2 RLCE Spreadsheets

The RLCE Spreadsheets must:

- be provided in, or compatible with, Microsoft® Excel®;

- be unlocked and editable, with all inputs and calculations made visible;
- report undiscounted costs for all cost requirements, in all Cost Categories, before and after any applied contingencies; and
- report costs for all cost requirements, in all Cost Categories, on an annual basis, and be consistent with the Reclamation and Closure Plan and the RLCE Summary Report.

The RLCE Spreadsheets must include:

- a separate section/tab for each Cost Category outlined in Section 3.3 below;
  - the relevant cost requirements for each Cost Category must be individually listed;
  - any values and/or assumptions used in calculations of cost requirements must be included;
  - all cost requirements must be shown over a 100-year period; and
- A summary section/tab that includes the annual totals for each Cost Category over a 100-year period.

The costs presented in the post-closure phase would include line-items from all Cost Categories. It is recommended that, for a tabular presentation of all post-closure costs over the entire RLCE term, line items and Cost Categories are grouped together based on their eligibility for discounting for ease of review.

3.3 Cost Categories

This section presents each of the Cost Categories that comprise the RLCE and the specific cost requirements (i.e. information requirements) for each. The Cost Categories include:

- Cost Category 1 – Infrastructural Removal;
- Cost Category 2 – Site Remediation;
- Cost Category 3 – Conventional Reclamation;
- Cost Category 4 – Source Controls and Treatment;
- Cost Category 5 – Site Staffing;
- Cost Category 6 – Site Maintenance;
- Cost Category 7 – Site Monitoring and Reporting.

3.3.1 Cost Category 1 - Infrastructure Removal

Infrastructure removal includes the costs associated with the removal of all infrastructure from within the Permitted Mine Area (PMA).

3.3.1.1 General Requirements

- The RLCE Spreadsheet must include the total cost and the removal year for each separate piece of infrastructure that will be removed within the 100-year period.
- The RLCE Summary Report must include:
  - a breakdown of the labour, equipment, and disposal cost for each separate piece of infrastructure; and

- a summary of infrastructure that is required for site operations beyond the 100-year period and will not be removed.

3.3.1.2 Infrastructure Types

Infrastructure types include, but are not limited to:

- buildings and foundations;
- machinery and mechanical equipment (e.g. haul trucks, mobile crushers, drills, pumps, etc.);
- water management structures (e.g. ponds, sumps, ditches, diversions channels, embankments, berms, etc.);
- roads;
- groundwater wells;
- other structures not housed within a building (e.g. conveyors, storage tanks, fuel stations, pipelines, etc.);
- utilities (e.g. powerlines, substations, booster stations, etc.); and
- chemicals/reagents (collection, containment, and removal from site).

3.3.2 Cost Category 2 – Site Remediation

Site remediation includes all activities associated with the investigation, characterization, and on-site treatment of contaminated sites within the PMA to ensure the mine site remains in compliance with the HSRC, the *MA* permit, the *EMA* permit, and other relevant authorizations over the 100-year period.

3.3.2.1 Contaminated Sites Investigations

- The RLCE Spreadsheet must include the cost for each individual site requiring investigation within the PMA.
- The RLCE Summary Report must include:
  - a summary of each site area requiring investigation;
  - a summary of the required investigation for each site area; and
  - a summary of the assessment, remediation, monitoring, and reporting requirements and costs.

3.3.2.2 Soil Treatment

- The RLCE Spreadsheet must include the cost for each soil treatment site within the PMA.
- The RLCE Summary Report must include:
  - a summary of each site area requiring investigation;
  - a summary of the required investigation for each site area; and
  - a summary of the assessment, remediation, monitoring, and reporting requirements and costs.

3.3.3 Cost Category 3 - Conventional Reclamation

Conventional reclamation includes all activities associated with the physical implementation of the Reclamation and Closure Plan to achieve site-specific end land uses and must include the physical reclamation of all disturbances associated with the *MA* permit, unless otherwise exempted by the Chief Inspector. This must include all decommissioning, earthworks, and revegetation, as well as the design and construction of closure infrastructure.

3.3.3.1 General Requirements

- When there is more than one occurrence of a mine component on a site (such as two separate waste rock dumps), the conventional reclamation cost must be provided separately for each.
- The RLCE must include the cost to conduct studies, complete detailed closure designs, and implement all work required for the closure of individual facilities, if not already conducted. These costs must be based on cost estimates provided by an engineering/consulting firm with applicable Qualified Professionals (QPs) or a conservative estimate based on recent prior work of a similar nature.
- The RLCE Spreadsheet must include each reclamation activity and the associated cost, including the assumed unit costs, for each mine component, including any calculations.
- The RLCE Summary Report must provide:
  - a detailed summary of each mine component, including surface area, prescribed reclamation activities, and assumed equipment, labour, and material costs; and
  - a summary of the individual cost for each reclamation activity of each mine component, including any assumptions, calculations, and equations applied.

3.3.3.2 Mine Components

Conventional reclamation costs must be provided for the following mine components, if present, within the PMA:

- open pits;
- underground workings (including adits, portals, shafts, etc.);
- Tailings Storage Facilities (TSFs);
- sediment ponds and other dams;
- waste rock dumps;
- ore stockpiles;
- coarse coal rejects stockpiles;
- soil/overburden stockpiles;
- quarries;
- borrows;
- linear features (e.g. roads, powerline, pipeline, and conveyor coordinators);
- plant site (e.g., mill, shops, administration buildings, etc.);
- laydown areas;
- other disturbed areas; and
- any other site-specific components.

3.3.3.3 Reclamation and Closure Activities

For each mine component, the following reclamation activities, if applicable, must be included:

- recontouring;
- growth media placement (e.g. overburden, soil, amendments);
- site preparation (e.g. ripping/scarifying, mounding, etc.);
- seeding, planting, and specialized revegetation work;
- specific habitat restoration elements (e.g. stream channel reconstruction);
- design and construction of closure features (e.g. spillways, portal plugs, etc.); and
- erosion protection.

3.3.3.4 Cost

The following costs must be included for each conventional reclamation activity:

- engineering studies, designs and implementation costs, if applicable;
- surface area;
- material volume;
- labour cost;
- equipment cost (e.g. hourly, daily);
- fuel cost; and
- procurement and delivery of materials (e.g. rock, rip rap, soil, overburden, amendments, seed, planting species etc.).

3.3.4 Cost Category 4 – Water Quality Mitigations

Water quality mitigations (mitigations) includes all capital costs and operating costs associated with the source control and/or water and effluent treatment processes or systems (mitigations), as follows:

- capital costs:
  - must be provided for any proposed mitigation. Capital costs are not required for already constructed and/or operating mitigations.
  - must be based on costs provided by a third-party supplier or the actual cost of a similar system used elsewhere.
  - may be excluded if the mitigation will be constructed when > 10 years remain in the mine's operating life, at the discretion of the CPO; and
- operating costs
  - must be based on costs provided by a third-party supplier or on a conservative estimate based on costs to operate a similar mitigation elsewhere.
  - for existing mitigations, current operating costs may be used to determine future operating costs. However, it must be demonstrated that the actual operating costs incurred during previous years are representative of future costs.

3.3.4.1 General Requirements

- The RLCE Spreadsheet must include the following:
  - construction and decommissioning capital costs for each mitigation;

    - operational costs of each mitigation, with the delivered cost for each operational component shown separately for each year of operation over the 100-year period; and
    - capital and operating costs at the point during the 100-year period when the mitigation would be required.
- The RLCE Summary Report must include:
    - a timeline of the assumed constructed, commissioning, maintenance, and if applicable, replacement or decommissioning;
    - the maintenance requirements, including parts and labour;
    - the assumed lifespan and replacement frequency;
    - the assumed consumption rate for all required reagents; and
    - the assumed production rates of any treatment by-products requiring handling and disposal.

3.3.4.2 Capital Costs

Capital costs are one-time cost requirements associated with the initial construction and/or replacement of each mitigation and associated infrastructure, as well as the final decommissioning of the infrastructure, if planned during the 100-year period.

The capital costs must include the following:

- design/engineering costs required to provide Issued For Construction (IFC) design details;
- materials procurement (delivered costs for imported material; excavation and transport costs for site sourced material);
- construction;
    - equipment (operation and mobilization/demobilization);
    - personnel;
    - monitoring and reporting;
- commissioning;
- decommissioning;
- project management; and
- other site-specific costs.

3.3.4.3 Operating Costs

Operating costs include the cost requirements associated with the operation, maintenance, monitoring, and reporting of each mitigation. For proposed mitigations that will be operated over multiple years, the operating costs must be included for each year of operation.
The operating costs must include the following:

- site personnel requirements (for operation, maintenance, and monitoring programs);
- materials, instrumentation, and/or reagents;
- power requirements;
- maintenance and, if applicable, replacement costs;
- handling and disposal of wastes and by-products;

- monitoring, including water quality and quantity, sampling, and analyses;
- reporting requirements (if separate from site personnel); and
- other site-specific costs.

3.3.5 Cost Category 5 - Site Staffing

Site staffing includes all staff and/or contractor positions required to carry out reclamation and closure activities and to ensure the mine site remains in compliance with the HSRC, the *MA* permit, the *EMA* permit, and other relevant authorizations over the 100-year period.

3.3.5.1 General Requirements

- The RLCE Spreadsheet must include the total cost for all staff positions required for each year of the 100-year period.
- The RLCE Summary Report must include:
  - a breakdown of the number of site staff positions, a summary of each position's responsibilities, and a rationale for each position if it is not required to be in place full-time over the 100-year period; these staff positions must not include those staff positions required for the operation, monitoring, and maintenance in Cost Category 3; and
  - the assumed weekly hours worked and the annual average salary for each staff position based on third-party contractor rates, which must be commensurate with the skill requirements and reflective of current market rates.

3.3.6 Cost Category 6 –Site Maintenance

Site maintenance includes all costs required to ensure the remaining site infrastructure is monitored, maintained, and reported on as required to ensure the mine site remains in compliance with the HSRC, the *MA* permit, the *EMA* permit, and other relevant authorizations over the 100-year period.

3.3.6.1 General Requirements

- The RLCE Spreadsheet must include the total cost for each site maintenance requirement for each year of the 100-year period.
- The RLCE Summary Report must include:
  - A summary of each piece of site infrastructure that is required over the full 100-year period, not including those included in Cost Category 4; and
  - A summary of the operating and maintenance requirements and estimated costs for each piece of site infrastructure based on third-party rates.

3.3.6.2 Site Maintenance Items

Site maintenance items include;

- site access infrastructure;
- invasive species management;
- vegetation management (e.g. maintenance required for dam or cover integrity);
- utilities and powerlines;

- roadway;
- buildings;
- site water management systems;
  - including all collection ditches, diversion ditches, collection ponds, sediment ponds (including dredging), spillways, culverts, piping, pumps, etc.; and
  - excludes the water management items included in Cost Category 4;
- vehicles and site equipment;
- storage and disposal of fuels and oils; and
- adaptive reclamation activities (e.g. fill planting, reseeding, additional fertilizer applications, etc.).

3.3.7 Cost Category 7 – Site Monitoring and Reporting

Site Monitoring and Reporting includes all monitoring programs and reporting required to maintain regulatory compliance with the HSRC, the *MA permit,* the *EMA permit,* and federal regulations, including the Metal and Diamond Effluent Regulations, over the 100-year period.

3.3.7.1 General Requirements

- The RLCE Spreadsheet must include the total cost for each required monitoring program and report for each year of the 100-year period.
- The RLCE Summary Report must include:
  - a summary of the required monitoring programs, including the number of monitoring locations, number of samples per event, event frequency per year and over the 100-year period;
  - a summary of the costs associated with each monitoring program;
  - a summary of each required report, including provincial and federal requirements, including the name of each required report and the submission frequency over the 100-year period; and
  - a summary of the costs associated with each required report, including number of personnel, data interpretation and report generation time required, and required personnel and hourly rates.

3.3.7.2 Monitoring Programs

The required monitoring programs include the following:

- reclamation monitoring program;
- surface water and groundwater quantity/quality monitoring programs:
  - must include all monitoring locations, sampling frequencies, and sampling parameters identified in the current MA and EMA permits and currently required under federal regulations;
  - must be assumed to occur over the full 100-year period;
  - may not assume any reductions in frequencies, monitoring sites, or parameters assumed during the different stages of mine life, unless already included in the MA and EMA permits or federal regulations; and
  - does not include monitoring requirements included in Cost Category 4;

- geotechnical monitoring programs, including:
  - all HSRC and permit required activities and reports (e.g. Dam Safety Investigations (DSI), Dam Safety Reviews (DSRs), Independent Tailings Review Board (ITRB), etc.);
  - TSF and dam monitoring;
  - subsidence monitoring;
  - open pit slope monitoring;
  - waste rock dump monitoring;
  - instrumentation maintenance and replacement; and
  - Operation, Maintenance, and Surveillance (OMS) manual updates and revisions;
- Site-specific monitoring programs required by the *MA* and *EMA* permits:
  - Metal Leaching and Acid Rock Drainage (ML/ARD) monitoring, air quality, meteorology, aquatic effects, etc.

3.3.7.3 Monitoring Cost Items

The following cost items must be included in the total monitoring program cost:

- number of monitoring locations;
- monitoring frequency per year;
- monitoring frequency over the 100-year period;
- analytical parameters being monitored;
- personnel;
  - time required;
  - hourly rate;
  - overhead (travel, accommodation, meals; transportation);
  - site staff may be utilized and the component of their salary associated with monitoring programs must be summarized in Cost Category 5; and
- laboratory analysis (including shipping).

3.3.7.4 Reporting Costs

The required reports include all the reports currently included in the HSRC, the *MA* and *EMA* permits and federal regulations. The following cost items must be included in the total cost for each required report:

- report frequency;
- total number of reports over the 100-year period;
- data interpretation and report writing time; and
- personnel:
  - hourly rate; and
  - site staff may be utilized, and the component of their salary associated with monitoring programs must be summarized in Cost Category 5.

4 Exploration Incentive Security

As per the Major Mines Reclamation Security Policy (Interim), an Exploration Incentive Security is available to companies that are in full compliance with respect to their reclamation security payment schedule. The Exploration Incentive Security is based on two eligibility criteria:

- Criteria 1: Stage of Mine Life
  - The mine is not in the first five or last five years of a mine's life.

- Criteria 2: Net Present Value (NPV) of the Mineral Reserve
  - No more than 10% of the NPV of the mineral reserve may be used to secure the allowable amount of the reclamation liability as an Exploration Incentive Security. For this purpose, the value of the mineral reserve is the NPV of the pre-tax cash flow at a discount rate of 8% as reported in a NI 43-101.

4.1 Application Submission

The Permittee must apply and receive approval from the Chief Permitting Officer before the Exploration Incentive Security can be used as a form of security against the reclamation security amount for the mine.

The Mine Manager must submit the Exploration Incentive Security application and all required supporting information identified in Section 4.2.

The application must be submitted via email to EMLI's inbox at PermRecl@gov.bc.ca and clearly identified in the subject line as a "Exploration Incentive Security Application".

4.2 Information Requirements

The Permittee must include the following information in the Exploration Incentive Security Application:

- A copy of the most recent Reclamation Liability Cost Estimate (RLCE) for the mine, including all information requirements outlined in in Section 2 and 3 of this document;
- A copy of the most recent NI43-101 for the mine;
- A summary of how the mine's 'pre-tax free cash flow' was calculated, including a definition of each included revenue and expense;
- A summary of how the number of years of economically viable mineral reserves, at the currently permitted production rate, was calculated;
- A table and/or spreadsheet demonstrating how the net present value, using an 8% discount rate, was calculated;
- A summary of the Method #1 and Method #2 calculations; and
- A summary of the Exploration Incentive Security being requested for the mine.

Major Mines Reclamation Liability Cost Estimate Guidance