RECLAIM V 8.0 (working draft) Changes and Clarification Points

Changes and updates made to the RECLAIM v 8.0 (working draft) are presented in the CIRNAC letter released to the NWT Online Review System and Nunavut Water Board's Public Registry. The working draft was presented to members of the mining community and regulators in a workshop setting in Vancouver on January 23, 2025. Clarification was requested for a couple of new items as well as additional information on the basis of estimate and derivation of the updated and new unit rates.

This letter provides a review of major costs in mine closure and reclamation, a brief review of the security review process and RECLAIM, as well as technical review of RECLAIM v 7.0 and key changes proposed for RECLAIM v 8.0.

RECLAIM

The RECLAIM Model is a financial tool used in the NWT and Nunavut to estimate the cost of mine closure and reclamation. It ensures that mining companies post adequate financial security to cover environmental cleanup costs if they default.

The intent of RECLAIM is to:

- Ensures adequate financial security so the public are not left with cleanup costs.
- Standardized approach allows for fair and consistent cost estimates.
- Accounts for long-term liabilities, such as water treatment and tailings stabilization.

Review of RECLAIM v 7.0

The GNWT and CIRNAC commissioned Brodie Consulting Ltd. (BCL) and AtkinsRéalis to conduct a review of RECLAIM v 7.0 to identify missed securities or cost items that needed to be updated in RECLAIM v 8.0. The details are provided in the Brody discussion paper titled *Review of Mine Financial Security Estimates and RECLAIM*, dated March 2020.

A Technical Working Group, consisting of members of GNWT, CIRNAC, BCL and AtkinsRéalis was formed and comments and suggested changes to RECLAIM were documented and addressed as described in the table below.

Table A Discussion Paper Recommendations and Comment from Technical Working Group

#	Discussion Paper Recommendations	Comment from Technical Working Group
1	Align Costing Model with the MVLWB/INAC/GNWT Guidelines	Costs for engagement, regulatory compliance and finalizing the Closure and Reclamation plan were included on the Interim Care and Maintenance worksheet.
2	Task a Working Group with Reviewing Unit Costs and Comprehensiveness of RECLAIM	CIRNAC and GNWT reviewed and implemented recommendations and comments and are engaging private industry.
3	Create Mechanism to Update Unit Costs	Included in RECLAIM v 8

#	Discussion Paper Recommendations	Comment from Technical Working Group
4	Improve Detail in RECLAIM User Manual and Unit Cost Table	Included in RECLAIM v 8
5	Direct Costs Versus Indirect Costs	Reorganized the indirects and directs based on discussions by the Working Group. Moved mobilization and post-closure activities to Capital Costs.
6	Other Models	Review other costing models, such as, the BC Mine Reclamation Bond Calculator, recent security estimates completed for mine closure projects in the Yukon, BC and Saskatchewan and BCL reviewed the Land Calculator. Project management costs for construction oversight is at 10% of Capital costs. This was adopted for RECLAIM.
Review Comments within Discussion Paper		
7	Review of if mob and demob costs should be direct	Based on conversations with the Working Group the mob and demob costs were moved to direct costs
8	Indirect cost of engagement/regulatory requirements should be added	This was added at 3% of Capital Costs
9	For Interim Care and Maintenance a 2-3 years minimum and default in RECLAIM.	Default in RECLAIM set to 2 years.
10	Review winter road/ice road costs to update RECLAIM	Rates were updated and distinction added for ice road, winter road and winter trail
11	Discussion needed on timelines for mob and demob. RECLAIM has one season but most projects require two seasons	Additional lines added for mobilization costs during each phase of closure added to the mobilization worksheet.
12	Additional clarity in the manual regarding contingency percentages.	Completed
13	Discount rate in RECLAIM for post-closure	The discount rate was removed, and future value calculations were added in.
14	Recommendation that RECLAIM be updated with guidance from a qualified demolition contractor	RECLAIM is intended for costing only and not to act as guidance on how decontamination and demolition be completed.
15	Recommendation that RECLAIM be updated to include a more comprehensive list of land reclamation activities and the unit cost table be updated to reflect a range for each activity.	Site specific reclamation activities should be proposed based on the end land use and Closure and Reclamation Plan, outside of RECLAIM.

#	Discussion Paper Recommendations	Comment from Technical Working Group
16	Recommendation that RECLAIM more explicitly include line items for what CIRNAC expects will be a minimum sequence of assessments. Includes addition of HHERA	Line items added for ESA (I through III), Human and Ecological Risk Assessment and finalization of the Closure and Reclamation Plan.
17	Recommendation that the option to have separate individual worksheets for monitoring and post-closure maintenance be further evaluated.	Kept the same for simplicity purposed.
18	Recommendation that the contractor review update NWT closure guidelines on holdbacks	Holdbacks are an external policy item and not part of developing the cost for closure. Those are something that would be set on a jurisdiction and mine site basis.
19	Recommendation that a template be developed for monitoring and inspections that includes types of monitoring, frequency and duration	RECLAIM should not be a template on how to conduct closure only a tool for developing the costs in a comparable manner.
20	Recommended that guidance be included for NPV and discount rates	Discount rates were removed, and future value calculations were added as per other recommendations.
21	Recommendation that the default percentages for Project Management should be increased but Engineering costs should be maintained. More explicit description in the manual as to what is included	The default percentages for project management and engineering were both increased as per later recommendations
22	Addition of regulatory compliance costs	Included as a percent of Capital Costs

Changes to RECLAIM v 8.0

Changes and updates made to the RECLAIM v 8.0 (working draft) are presented in the CIRNAC letter released to theNWT Online Review Systen and Nunavut Water Board's Public Registry. RECLAIM V. 8.0, the Basis of Unit Rate Development (Table 1) and RECLAIM v 8.0 Price Sources, Basis and References (Table 2) are available on the Public Registry.

During the January workshop in Vancouver, clarification was requested for a couple of new items including details of what is included in a Human Health and Ecological Risk Assessment (HHERA) and Owners Representatives as well as additional information on the basis of estimate and derivation of the updated and new unit rates. These are discussed in the sections that follow.

Indirect Percentage Increases

The table below presents the increase in percentages for Indirects based on Capital Costs with supporting rationale.

Table B: Summary of Changes to Percentage Increases for Indirect Costs based on Capital Costs

In-Direct	Old %	New %	Rationale
ENGINEERING DESIGN	5%	8%	Increased based on feedback from the Technical Work Group and review of actual cost for Mine Closure and Reclamation at various locations across Canada
PROJECT MANAGEMENT	5%	10%	
HEALTH AND SAFETY PLANS/MONITORING & QC	1%	1%	No Change
BONDING/INSURANCE	1%	3%	Increased based on feedback from the Technical Work Group and review of actual cost for Mine Closure and Reclamation at various location across Canada
ENGAGEMENT AND REGULATORY COMPLIANCE	N/A	3%	Previously not included. Described in detail in the User Manual
CONTINGENCY	20%	25%	Increased based on feedback from the Technical Work Group and review of actual cost for Mine Closure and Reclamation at various location across Canada
OWNERS REPRESENTATIVE	N/A	8%	Previously not included. Described in detail in the User Manual and in the Section below.

Human Health and Ecological Risk Assessment

Human health and ecological risk assessment is the process of evaluating the potential for adverse effects to humans and biota to result from exposure to chemicals in the environment. This cost is captured on the Interim Care and Maintenance (ICM) worksheet as 3% of Capital Cost (less the ICM and Post Closure Activities).

HHERAs for federal sites are completed in accordance with federal risk assessment guidance provided by Health Canada, Environment and Climate Change Canada (ECCC) and the Canadian Council of Ministers of the Environment (CCME). A HHERA helps to identify the site liabilities such that the Owner can select the approach risk mitigation technique (i.e., administrative control (specified land-uses), institutional control (signage warning humans of risk), or physical management (remediation) which can then be pulled into the Final Closure and Reclamation Plan.

HHERA follows guidance included the following key documents:

- Health Canada. 2024. Guidance on Human Health Preliminary Quantitative Risk Assessment (PQRA), Version 4.0.

- Health Canada. 2010. Part V: Guidance on Human Health Detailed Quantitative Risk Assessment for Chemicals ($HHRA_{Chem}$).
- Health Canada. 2021. Toxicological Reference Values (TRVs), Version 3.0.
- Health Canada. 2010. Supplemental Guidance on Human Health Risk Assessment for Country Foods ($HHRA_{Foods}$).
- ECCC. 2023 (draft). Ecological Risk Assessment Guidance. Federal Contaminated Sites Action Plan.
- CCME. 2020. Ecological Risk Assessment Guidance Document.

The HHERA will be completed according to the above listed federal guidance and is consistent with risk assessment methods commonly used by regulatory agencies across Canada and the United States (US), including the BC Ministry of Environment and Parks (BC MEP) and the US Environmental Protection Agency (US EPA). The HHRA consists of five main components, including the following:

- *Problem Formulation*. The Problem Formulation presents the location and description of the Project, the identification of chemicals of potential concern (COPCs) for the Project, the populations (also referred to as receptors of concern) that have the potential to be exposed to COPCs, and the relevant exposure pathways for the receptors of concern.
- *Exposure Assessment*. The Exposure Assessment involves the estimation of the dose of each COPC that the receptors of concern have the potential to be exposed to.
- *Toxicity Assessment*. The Toxicity Assessment is the compilation of toxicity data on the potential adverse health effects for each of the COPCs, as well as TRVs for each of the COPCs. For noncarcinogenic chemicals, TRVs represent an exposure dose or air concentration below which no adverse effects are expected to occur. For carcinogenic chemicals (considered in human health risk assessment), the TRV is presented as an upper bound of the increased cancer risk from a lifetime exposure to the chemical.
- *Risk Characterization*. In the Risk Characterization, the doses estimated in the Exposure Assessment are compared to/combined with the TRVs identified in the Toxicity Assessment to estimate potential health risks associated with receptor exposure to the COPCs under the assumptions of the HHERA.
- *Uncertainty Analysis*. The Uncertainty Analysis is conducted to evaluate the sources of uncertainty inherent in the HHRA, as well as how the uncertainty affects the results of the HHERA.

This assessment will be conducted using a series of worst-case assumptions to ensure that human health and ecological risks associated with the Project are not under-predicted. This type of approach limits the likelihood of under-predicting health risks and is likely to result in a considerable over-prediction of risks. The application of conservative assumptions will be documented and discussed in the Uncertainty Analysis.

Owners Representative

The Owners Representative plays a critical role in ensuring the project objectives are met while adhering to all technical, regulatory and contractual requirements. The Owners Representative is a third-party engineering firm that supports CIRNAC and assumes responsibilities such as:

- Acting as a liaison between stakeholders.
- Regulatory compliance oversight.
- Scope definition and project planning.

- Contract administration.
- Risk Management.
- Monitoring and Quality Assurance.
- Budget and schedule oversight.
- Supporting environmental and community engagement.
- Reporting and Documentation.
- Health and safety oversight.

The Owners Representative cost is captured at 8% of the Capital Costs in RECLAIM v 8.0. A review of recent projects where Owners Representative costs were incurred at mining closure and reclamation projects ranged from 12% to greater than 20%. Complex sites with contaminant migration concerns or offsite impacts to human or ecological receptors can result in additonal efforts by the Owner Representative and can be very time consuming and costly. Especially in cases where the mine becomes abandoned and defaults ownership to the Canadian government, who may be held to a high degree of scrutiny under the Federal Contaminated Site Program.

Unit Rate Updates

Unit rates were updated based on published data sources, civil unit rate tools, recent awarded contracts, historical data, web searches and budgetary quotes. The Basis of Unit Rate Development (Table 1) and RECLAIM v 8.0 Price Sources, Basis and References (Table 2) are available on the Public Registry.

Published databases include information rates sources such as Construction Labour Relations Alberta, 2024 Nunavut, Qulliq Energy Corporation, Alberta union collective agreement, 2024 Rental Rates for heavy machinery (Quebec), etc. Historical databases include recent quotes from detailed design projects. Estimated unit rates can include typical costs for a task based on actual costs incurred at projects across Canada. Such as Phase 2/3 Environmental Site Assessments, which are backed up with assumptions of hours per worker and expenses which include drilling costs, laboratory expenses, equipment cost, etc. In some cases, unit rates were escalated in 2024 or were obtained from web searches. Online resources used to update RECLAIM are linked in the table below.

First principles were used to develop unit rates for load, haul, place and spread, and compact. To do this a civil estimating tool was used which factors in site specific information such as fuel costs, remoteness, unionized workforces, shift duration and schedule, number of workers, types of and capacity of machinery such as rock trucks and excavators, material properties and bulk density, etc.

A detailed breakdown of the site-specific factors used to develop the short haul load, haul place unit rate and with spread and compact of rock is provided as Attachment A. The same approach was used for soil movement however a bulk density of 2.0 tonnes per m3 was assumed. The unit rate in RECALAIM for Excavate Rock - Low Spec (e.g. Stockpile Source, Bulk Fill, short haul) is $17 per m3 (rounded down). The unit rate in Attachment A is $17.23. CIRNAC invites the reviewers of the RECLAIM v 8.0 (working draft) to fact check the new unit rates provided in Tables 1 and 2 of RECLAIM available on the Public Registry and to use first principles and site-specific information (similar to what is shown in Attachment A) to propose alternate unit rates for RECLAIM.

Table C: Published databases used to Update Rates in RECLAIM

Data source – Data Type	Website Link
Construction Labour Relations Alberta – Labour Costs & Subsistance Rates	https://clra.org/2019/08/industrial-subsistence-rates/

Data source – Data Type	Website Link
RSMeans data – Construction Costs	https://www.rsmeans.com/resources/unit-cost-databases-construction-guide
Statistics Canada Data – Fuel Costs	https://www150.statcan.gc.ca/n1/en/type/data
Qulliq Energy Corporation – Energy Costs	https://www.qec.nu.ca/
NEAS Sealift Rates	https://neas.ca/rates/
BC Bluebook – Equipment Rentals	https://www.roadbuilders.bc.ca/product/2024-2025-blue-book/
Alberta Equipment Rental Rates	https://www.arhca.ab.ca/product-page/2024equipment-rental-rates-guide-and-member-rosters
Richardson Costonline – Construction Costs	https://www.costdataonline.com/
Chemanalyst – treatment chemical costs	https://www.chemanalyst.com/Pricing/Pricingoverview
Quebec Bluebook – Equipment Rentals	https://boutique.publicationsduquebec.gouv.qc.ca/produit/taux-de-location-de-machinerie-lourde-avec-op%C3%A9rateur-et-%C3%A9quipements-divers-2024/01tJQ000005a6onYAA

Future Value

Future value was added to the Summary Worksheet which is to be used for the security amount. These amounts were added in the columns to the right of the baseline values. The calculation uses input values to be entered by the use above the table for inflation, and years for when closure activities and post-closure activities are anticipated to occur. The inflation value was set to a default value of 3% as this is has been the upper limit of the Bank of Canada's target inflation rate since 1992. The future value calculation was included to ensure that Sites are not under secured for activities anticipated to occur in the future.

Conclusion

It is noted that the percent indirects and unit rates provided in RECLAIM v 8.0 (working draft) should be considered as a starting point for reviewing securities. CIRNAC and the GNWT strongly encourage mining companies to obtain detail site-specific quotes for closure activities and develop detailed ICRP and advance the engineering as much as possible using a stage gating process to show all liabilities at the site are fully understood and cost can be accounted for. Progressive reclamation activities should also be considered to minimize held securities and reduce overall contingencies.

When mining companies go bankrupt or fail to provide sufficient financial assurance, Canadian public often bear billions of dollars in cleanup costs. Perpetual water treatment is one of the most expensive liabilities, especially for mines with acid rock drainage. Updated unit rates and cost item as presented in RECLAIM v 8.0 (working draft) provide a better starting point for assessing and booking securities and is needed to prevent the public from covering these costs.

Attachment

Attachment A: Example of factors considered in the development unit rates for movement of waste rock.