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BC EAO EAC Application – Tenas Project

Section 13.0 Management Plans
Chapter 12 Metal Leaching/Acid Rock Drainage Management Plan

May 2022

VERSION 1.0

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Submitted by:	Telkwa Coal Limited Suite 1410 – 409 Granville Street Vancouver, BC V6C 1T2

Tenas Project

Section 13.0 Management Plans
Chapter 12 Metal Leaching/Acid Rock Drainage Management Plan

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Abbreviations and Acronyms

Abbreviation or Acronym	Long Form of Abbreviation or Acronym
ABA	Acid Base Accounting
AP	Acid Potential
ARD	Acid Rock drainage
TIC	Total Inorganic Carbon
BC MEMLI	British Columbia Ministry of Energy, Mines and Lower Carbon Innovation
BC MECCS	British Columbia Ministry of Environment and Climate Change Strategy
ML/ARD	metal leaching and acid rock drainage
non-PAG	non-potentially acid generating
NP	Neutralization Potential
NPR	Neutralization Potential Ratio
PAG	Potentially Acid Generating
POPC	parameters of potential concern
SRK	SRK Consulting (Canada) Inc.
TC	Total Carbon
TIC	Total Inorganic Carbonate
TCL	Telkwa Coal Limited

Units of Measure

Abbreviation or Acronym	Long Form of Abbreviation or Acronym
km	kilometre
m	metre

EXECUTIVE SUMMARY

The focus of this Metal Leaching (ML)/Acid Rock Drainage (ARD) Management Plan (ML/ARDMP) is the identification and management of potentially acid generating (PAG) rock and management of metal leaching from non-PAG rock for parameters such as selenium. Geochemical test results (SRK 2021a) were used to develop source terms for material handled by the Project which were carried forward into a site wide water quality model (SRK 2021b) to evaluate ML under neutral conditions as the current designed method of submerging PAG material underwater is expected to prevent ARD. Management of ML is addressed through the **Minesite Water Management Plan (S13.0-C11) (MWMP**), this ML/ARDMP and the **Selenium Management Plan** that is an **Appendix 13.5-I** of the **Discharge Management Plan (S13.0-C5) (DMP)** and **1.9.4.2.5 Mining**. The primary purpose of the ML/ARDMP is to outline an ML/ARD monitoring and identification program of mined material for geochemical inventory and identification of trending geochemical parameters which may require changes to handling and/or management strategies. Roles and responsibilities are outlined to undertake this monitoring and identification programs, enable correct timing and depth of water cover in management ponds and alleviate any improper placement of PAG rock within the Project footprint.

Management of PAG materials at Telkwa Coal Limited (TCL) will be critical order to meet Environmental Assessment Certificate (EAC) and *Mines Act*, RSBC 1996, c 293 and *Environmental Management Act,* SBC 2003, c 53 (*MA/EMA)* permit conditions and ensure environmental protection from both ML/ARD. Through implementation of this ML/ARDMP and relevant Standard Policies and Procedures (SPPs), TCL will ensure the efficient sampling to identify and manage PAG rock, correct placement of PAG and non-PAG rock, and timing on provision and depth of water cover over PAG materials in management ponds

1. Introduction

The Tenas Project (Project) is a proposed open pit mine that will excavate overburden, coal and waste rock associated with the extraction of coal. Based on the work conducted over the past twenty years (i.e., Norecol Dames & Moore [1999], SRK [2021a]), some of these materials are considered potentially acid generating (PAG). Telkwa Coal Limited (TCL) has developed the following Metal Leaching/Acid Rock Drainage Management Plan (ML/ARDMP) to address the management of acid rock drainage (ARD). The focus of this ML/ARDMP is on the identification and management of PAG rock. Geochemical test results (SRK 2021a) were used to develop source terms which were carried forward into a site wide water quality model (SRK 2021b) to evaluate metal leaching (ML). Management of ML is addressed through **the Minesite Water Management Plan (S13.0-C11) (MWMP)**. The ML/ARDMP will form a key component of TCL's **Environmental Management System (S13.0-C1) (EMS)** for operation of the Project, located approximately 25 kilometres (km) southwest of the Town of Smithers, British Columbia (BC).

2. Purpose and Objectives

The objectives of the ML/ARDMP are to:

- provide a summary of geochemical characteristics of mined materials and identification of Parameters of Potential Concern (POPC) for water quality;
- outline an ML/ARD monitoring program of mined material for geochemical inventory and identification of trending geochemical parameters which may require changes to handling and/or management strategies; and
- provide operational handling and management strategies which will minimize the potential of ML/ARD during operations.

3. Scope and Scale

The scope of the ML/ARDMP is defined within Project Area. This ML/ARDMP will be implemented during the Construction, Operation, Decommissioning and Reclamation, and Post-closure phases of the Project and ceases to be in force at the final closure of the Minesite as approved by the regulatory authorities.

4. Compliance Obligations

4.1 Regulatory Requirements

Several legislative requirements are applicable to management of materials that are metal leaching and/or produce ARD. A list of these requirements and their major applicable components are provided in **Table 4.1-1** below.

Table 4.1-1: Legislation and Guidelines Relevant to the Metal Leaching/Acid Rock Drainage Management Plan (ML/ARDMP)

Legislation, Regulations, and Guidelines	Applicable Information
Environmental Management Act, SBC 2003, c. 53 (Government of British Columbia [GovBC] 2003) (*EMA*)	The *EMA* sets out requirements for disposal of oil and hazardous materials, spill prevention and reporting, and pollution abatement. Authority for provincial spill cost recovery is additionally provided by the *EMA*. Regulations may be applied to a reportable hydraulic or chemical spill, any spill in water, industrial accident, or environmental emergency.
Fisheries Act, 1985, c F-14 (Government of Canada [GovCan] 1985)	Prohibits the release of a deleterious substance to fish habitat.
Health, Safety and Reclamation Code for Mines in British Columbia (British Columbia Ministry of Energy, Mines and Low Carbon Innovation [BC MEMLI] 2021) (Code)	Part 3, 3.7.1 Mine Emergency Response Plan details components and testing requirements
Mines Act, RSBC 1996, c 293 (GovBC1996)	Regulates mines through the Code and permitting of roads on mineral claims registered to a proponent
Waste Discharge Regulation, BC Reg 320/2004 (GovBC 2004)	“Prescribes” which industries and trades are regulated under the *EMA* and prescribes annual fees.
Water Sustainability Act, B.C. Reg. 36/2016 (GovBC 2016)	Provides guidance on protecting aquatic ecosystems and handling wells and groundwater protection.

Joint Application Information Requirements for *Mines Act* and *Environmental Management Act* Permits (British Columbia Ministry of Energy, Mines and Petroleum Resources [BC MEMPR] and British Columbia Ministry of Environment and Climate Change Strategy [BC MECCS] 2019) (JAIR) provides requirements for obtaining *Mines Act,* RSBC 1996, c 293, and *Environmental Management Act,* SBC 2003, c 53 (*MA/EMA)* permits. This ML/ARDMP is designed to fulfill the JAIR objectives as well as EAC Application requirements

4.2 Standard Practices and Procedures (SPP)

TCL Standard Practices and Procedures (SPPs) will conform to the British Columbia Health, Safety and Reclamation Code for Mines in British Columbia (British Columbia Ministry of Energy, Mines and Low Carbon Innovation [BC MEMLI] 2021) (Code).

In addition to regulatory requirements, the Project will implement SPPs that meet or exceed the required laws and regulations.

5. Relationship to Other Management Plans

The Project is governed by an **EMS**, an overarching management plan strategy comprising a set of processes and practices which enable TCL to manage its environmental and safety performance in a holistic way, within an integrated framework. While the management plans are part of the **EMS**, the **EMS** is not just a collection of management plans.

In addition to the overall guidance of the **EMS**, this ML/ARDMP has a relationship with other management plans that also present mitigation measures. Those management plans and their relationship to this ML/ARDMP are listed in **Table 5-1**.

Table 5-1: Management Plans with Relationship to the Metal Leaching/Acid Rock Drainage Management Plan (ML/ARDMP)

Management Plans	Nature of Relationship
Environmental Management System (S13.0-C1) (EMS)	All management plans are part of the EMS.
Construction Environmental Management Plan (S13.0-C4) (CEMP)	Any materials excavated as part of construction will need to follow this ML/ARD
Discharge Management Plan (S13.0-C5) (DMP)	ML/ARD is an input into the overall Discharge Management Plan.
Mine Emergency Response Plan (S13.0-C9) (MERP)	Response to emergencies from storage, and disposal of materials are addressed in the MERP.
Minesite Water Management Plan (S13.0-C11) (MWMP)	The adequate management of ML/ARD is key component in the development of the MSWMP especially the management ponds.

6. Details of Metal Leaching and Acid Rock Drainage Management Plan (ML/ARDMP)

6.1 Tenas Deposit Geochemistry and Potentially Acid Generating (PAG) Classification Criteria

Two (2) geochemical studies have been completed to characterise the acid generating and metal leaching potential of the Tenas Deposit including:

- Norecol Dames and Moore (1999). Draft Report. Assessment of ARD Potential and Water Quality Predictions. Telkwa Coal Project; and
- SRK (2021a). Telkwa Coal – Tenas Project Supplemental Geochemical Characterization.

The Norecol Dames and Moore (1999) study included the collection and analysis of over 700 samples. An additional 173 samples were collected as part of a supplemental geochemical characterization study (SRK 2021a). The supplemental samples were used to confirm the results of the 1999 study and correlate the test results to more up-to-date testing methods. For example, analysis on samples collected as part of the Norecol Dames and Moore (1999) study was limited to total sulfur and neutralization potential using the Sobek-NP (1978) method. Results from both studies were combined to form a robust geochemical characterisation that is reported in SRK (2021a) and provided in **Appendix 13.15-A Tenas Project Supplemental Geochemical Characterisation Report** of this report. The reader is referred to **Appendix 13.15-A** for additional detail on the geochemical characterisation program including sample selection, collection, testing and results.

The outcomes of these studies indicated that a large volume of the material that will be excavated from the Tenas Deposit is PAG. Furthermore, ARD potential is stratigraphically constrained in zones that are generally separated by the coal seams. The geochemical properties of the deposit were therefore described based on these mineable stratigraphical zones. The geochemical testing results indicate that all zones contain some PAG material; however, there are units that are predominantly PAG versus non-PAG (**Figure 6.1-1**). Based on the site-specific neutralization potential ratio (NPR) (SRK 2021a) and the average bulk geochemical properties, the ARD potential of the stratigraphical zones was classified as follows:

- Non-PAG: Zone 1, Zone 4, Zone 5, and Zone 55, Zone 6, Zone 7, Zone 8; and
- PAG: Zone 1a, and Zone 2/3.

The geochemical characterisation results also indicate that coarse and fine processed rock are PAG, and overburden samples are non-PAG.

PAG material is identified as material that has an NPR greater than a cut-off value. The NPR is the ratio of the neutralization potential (NP) to the acid potential (AP). NP is measured in the lab through digestion of a small volume of sample in acid and titration of the sample to determine how much carbonate mineral was consumed during the digestion. AP was estimated based on measured sulfide concentrations using a combination of Leco furnace and ICP-MS methods (SRK 2021a). Testing using these methods requires samples to be sent to offsite laboratories, which can have lengthy turn around times that are not amenable to making operational mine waste management decisions (i.e., the storage location of blasted mine rock). To facilitate the shorter turn around times that are required to make operational decisions for placement of blasted rock, rejects and other materials, the results of the geochemical characterisation (**Appendix 13.12-A**) were used to develop operational proxies for determining NP and AP in an onsite laboratory that will be equipped with a Leco furnace. The following subsections provide the derivation details of the NP and AP proxies.

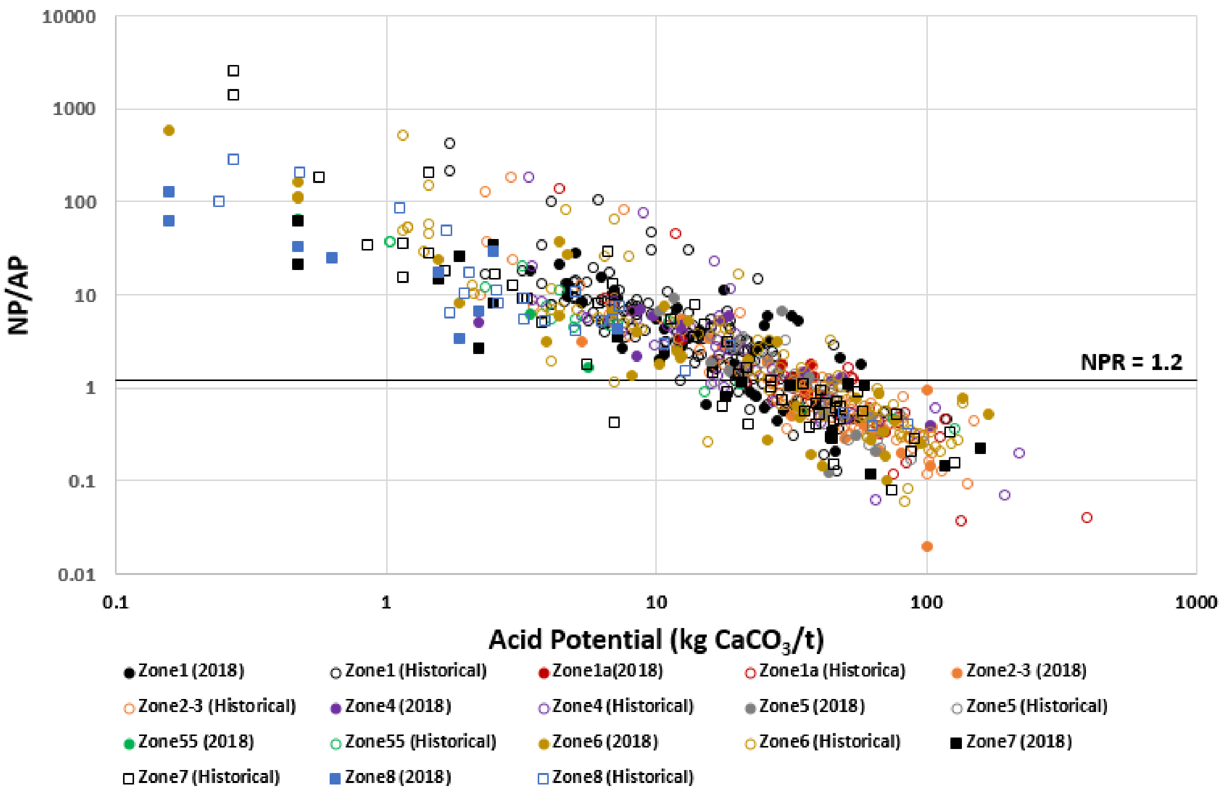

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Figure 6.1-1: Neutralization Potential Ratio (NPR) versus Acid Potential

6.1.1 Neutralization Potential (NP)

Mineralogical testing of waste rock samples indicates that iron carbonates (e.g., siderite) are present in varying percentages in stratigraphic zones (SRK 2021a). As iron carbonates do not provide effective NP, a correction was developed to account for the effective NP available from Ca-Mg carbonates (e.g., calcite, dolomite) ($TIC_{XRD\text{-}corrected}$).

A strong correlation (r=0.97) exists between the modified-NP and total inorganic carbon (TIC), when corrected for iron carbonates ($TIC_{Fe\text{-}corrected}$) (**Figure 6.1-2).** The modified-NP results exceed the $TIC_{Fe\text{-}corrected}$ results indicating some silicate influence.

The relationship between TIC_{XRD}-Fe corrected and modified-NP can be used to correct total TIC concentrations measured by Leco. A strong correlation also exists between the TIC concentrations, estimated from XRD (TIC_{XRD}-total), to TIC_{XRD}-Fe corrected (**Figure 6.1-3**). This relationship indicates the carbonate-NP, or the effective-NP ($NP_{effective}$) can be estimated using the following equation (EQ1):

$$NP_{effective}(kg\ CaCO_3/t) = 0.56 \times TIC_{Leco}(\%) \times 83.3 \text{ (EQ1)}$$

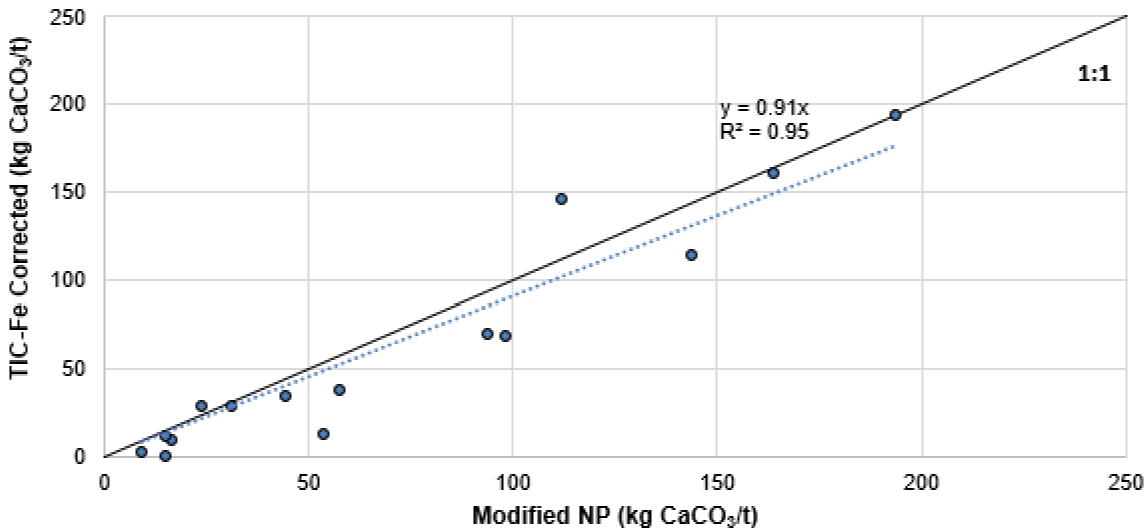

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Figure 6.1-2: Modified-NP versus TICXRD-Fe corrected

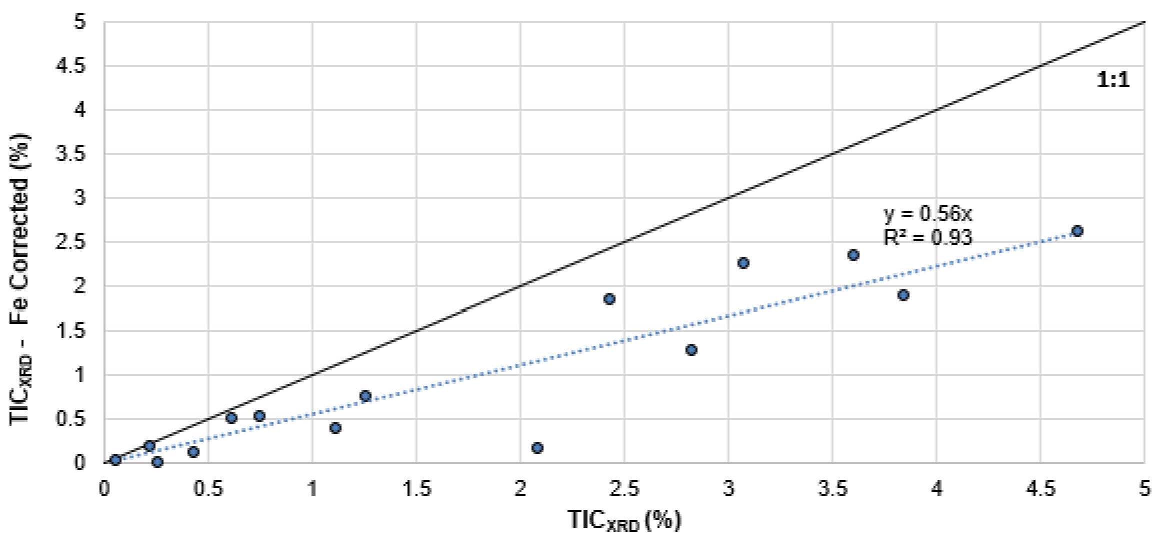

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Figure 6.1-3: TICXRD versus TICXRD-Fe corrected

6.1.2 Acid Potential (AP)

Sulfur in waste rock at the Project occurs as mineralogical sulfur (sulfides and sulfates) as well as organic sulfur which commonly occur in coal deposits. The definition of sulfur species and sulfur analysis at the Project are as follows:

- S_{ICP} – sulfur from ICP-MS analysis representing all mineralogical sulfur as sulfide and sulfate (also referred to as total inorganic sulfur);
- S_{HCl} – sulfur which occurs as sulfate as measured following HCl leach;
- S^{2-} – sulfur which occurs as sulfide;
- Organic sulfur – sulfur occurring as organic species;
- S_{XRD} – sulfur as determine by mineralogy using XRD; and
- S_{Leco} – total sulfur (i.e., inorganic + organic) analyzed by Leco furnace.

Mineralogical sulfur was estimated using ICP-MS following an aqua regia digestion (S_{ICP}). The aqua regia digestion is used to estimate total inorganic sulfur in lieu of total sulphur by Leco due to the presence of organic sulfur species (SRK 2021a). To account for the presence of non-sulfide inorganic sulfur, sulfur as sulfate is measured by analysis of sulfur following HCl digestion (S_{HCl}). Sulfide (S^{2-}) was calculated as the difference of total inorganic sulfur and sulfate according to the following equation (EQ2):

$$S^{2-}\ (\%) = S_{ICP}\ (\%) - S_{HCl}\ (\%) \qquad \text{(EQ2)}$$

Much of the total inorganic sulfur is present as sulfide in all zones (**Figure 6.1-4**). Highest total sulfur concentrations typically occur in Zone 2/3 and in the footwall Zones 6 and 7 (**Figure 6.1-4**). Sulfate is generally low (average of 0.03%) in the samples as indicated by the difference of S_{ICP} (open symbols on **Figure 6.1-4**) and the calculated sulfide concentrations (solid symbols on **Figure 6.1-4**) using Equation 2. Sulfate concentrations increase at higher total sulfur concentrations; however, sulfide is still the dominant sulfur species. At higher total sulfur concentrations, larger deviations from the 1:1 line occur indicating the presence of organic sulfur.

A regression analysis of all samples indicates there is a strong correlation (i.e., r=0.99) between total sulfur and sulfide sulfur (**Figure 6.1-4**). Total sulfur can therefore be used as a proxy for estimating sulfide using the following mathematical relationship:

$$S^{2-}\ (\%) = 0.93 \times \text{Total-}S_{\text{Leco}}\ (\%) \qquad \text{(EQ3)}$$

Mineralogical analyses (SRK 2021a) indicate pyrite is the predominant sulfide mineral in the samples. Based on estimated pyrite content, total sulfur calculated using the XRD results generally corresponds to the total sulfur by Leco (Figure 6-5). Therefore, use of Equation 3 to estimate sulfide sulfur is reasonable.

S_{XRD} generally exceeds S_{Leco} (**Figure 6.1-5**). This can occur because the XRD results are normalized to 100%. XRD does not detect amorphous phases and minerals at lower percentages and the normalization of detectable mineral species to 100% can result in an overestimation of the detectable species.

The calculated sulfide sulfur can subsequently be used to estimate AP by the following equation (EQ4):

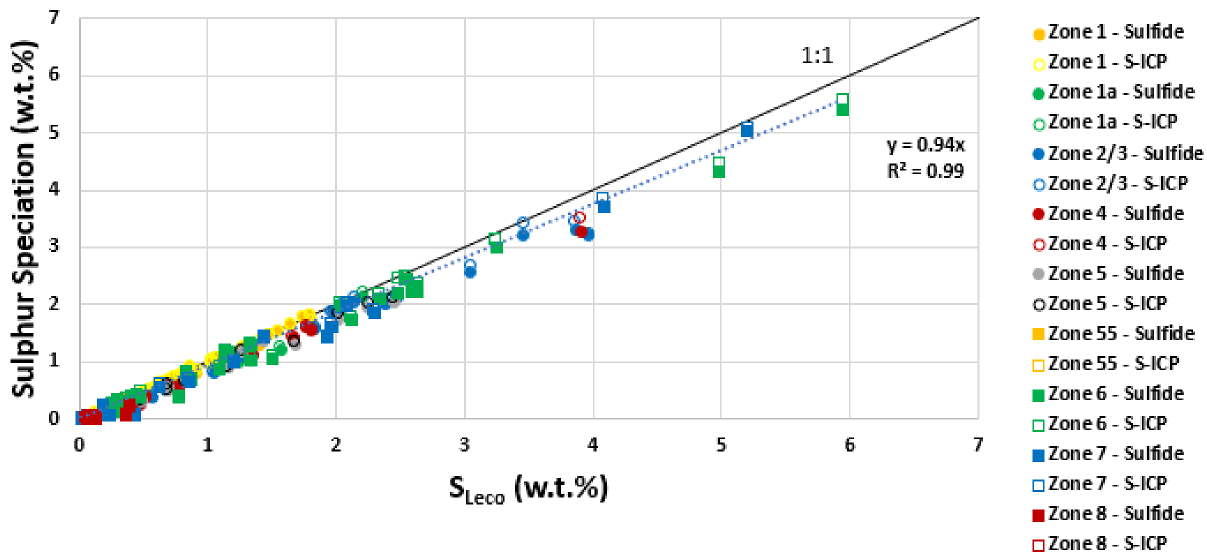

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Figure 6.1-4: SLeco versus Total Inorganic Sulfur and S2-

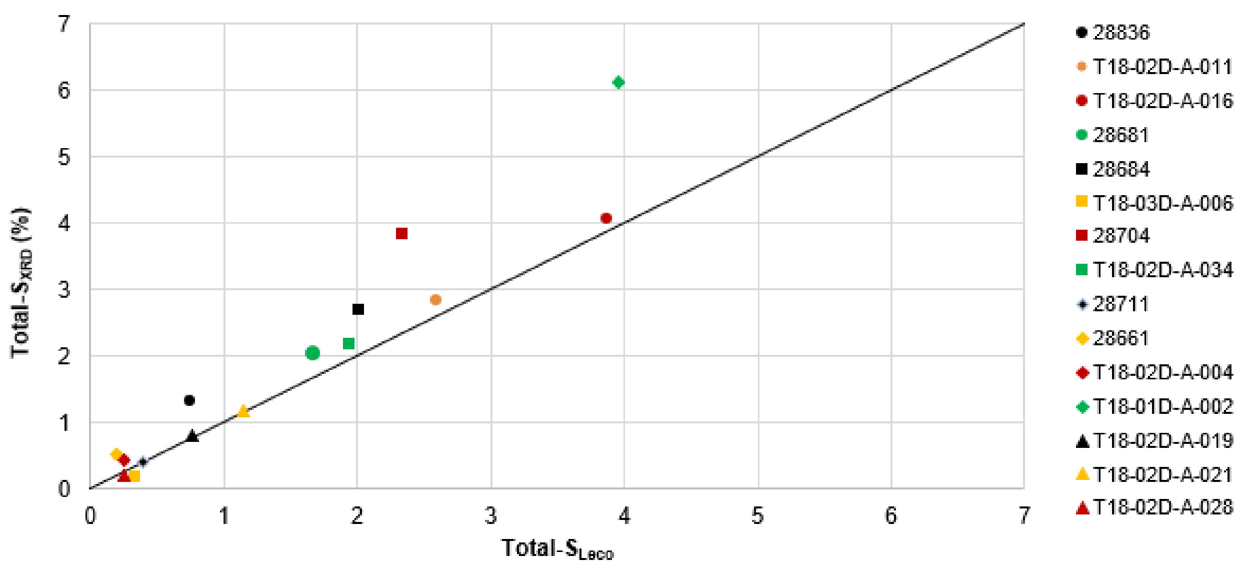

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Figure 6.1-5: Leco Sulfur versus XRD Sulfur

6.1.3 Potentially Acid Generating (PAG) Classification Criterion

Humidity cell tests (HCTs) were initiated on representative waste rock material from the Project (SRK 2021a). The HCT results were used to calculate the carbonate molar ratio (CMR), which is the ratio of calcium and magnesium from carbonates to the sulphate production rate, expressed as follows:

$$\frac{(Ca + Mg)}{SO_4}\ mol/mol$$

The CMR is used to develop site-specific criteria for the classification of ARD potential. If it is determined that the calcium and magnesium loads in the humidity cell test are released from carbonate dissolution, the CMR represents the site-specific NPR when the pH in the test is neutral. SRK (2021a) demonstrated that a strong positive correlation exists between NP_{XRD}, following correction for iron carbonates, and modified-NP and a strong positive correlation exists between modified-NP and calcium plus magnesium. These lines of evidence provide confidence that the modified-NP is a measure of calcium and magnesium carbonate dissolution (i.e., the effective-NP). CMRs were calculated based on the stable average non-acidic loading rates from the HCTs. **Figure 6.1-6** provides a comparison of the CMR to the average sulfate release rate. This figure indicates the CMR values are low (<1) at low sulfate production rates (<20 mg/kg/week) (e.g., Zone 1). This is indicative of cation exchange which is expected based on the presence of clay minerals illite-muscovite and kaolinite (SRK 2021a). **Figure 6.1-7** provides a plot of the CMR, accounting for cation exchange, versus the sulfate production rate. The CMRs in this figure indicate a site-specific NPR of 1.2 can be used to classify mine rock at the Project as PAG versus non-PAG. An NPR of 1.2 is therefore used as the site-specific ARD classification criterion for mine rock.

As there is insufficient kinetic test data on overburden, process rock, other material types (i.e., overburden, fine and processed rock and coal) a site-specific criterion for ARD classification cannot be derived. Therefore, an NPR of 2 is proposed to classify ARD potential for these materials.

PAG materials are classified as follows:

- $NP_{effective}$ / AP ≤ 1.2 for mine rock; and
- $NP_{effective}$ / AP ≤ 2 for overburden, fine and coarse processed rock and coal

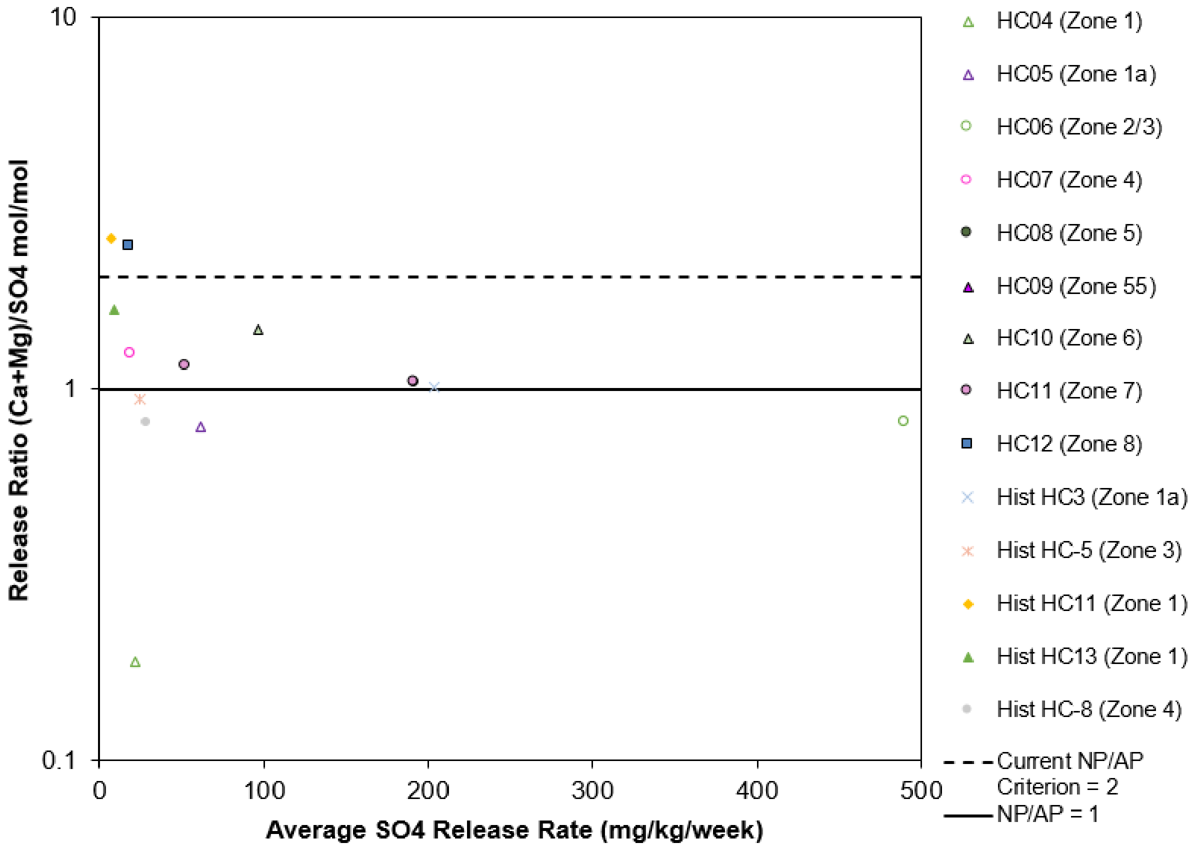

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Figure 6.1-6: Carbonate Molar Ratios versus Sulfide Release Rates

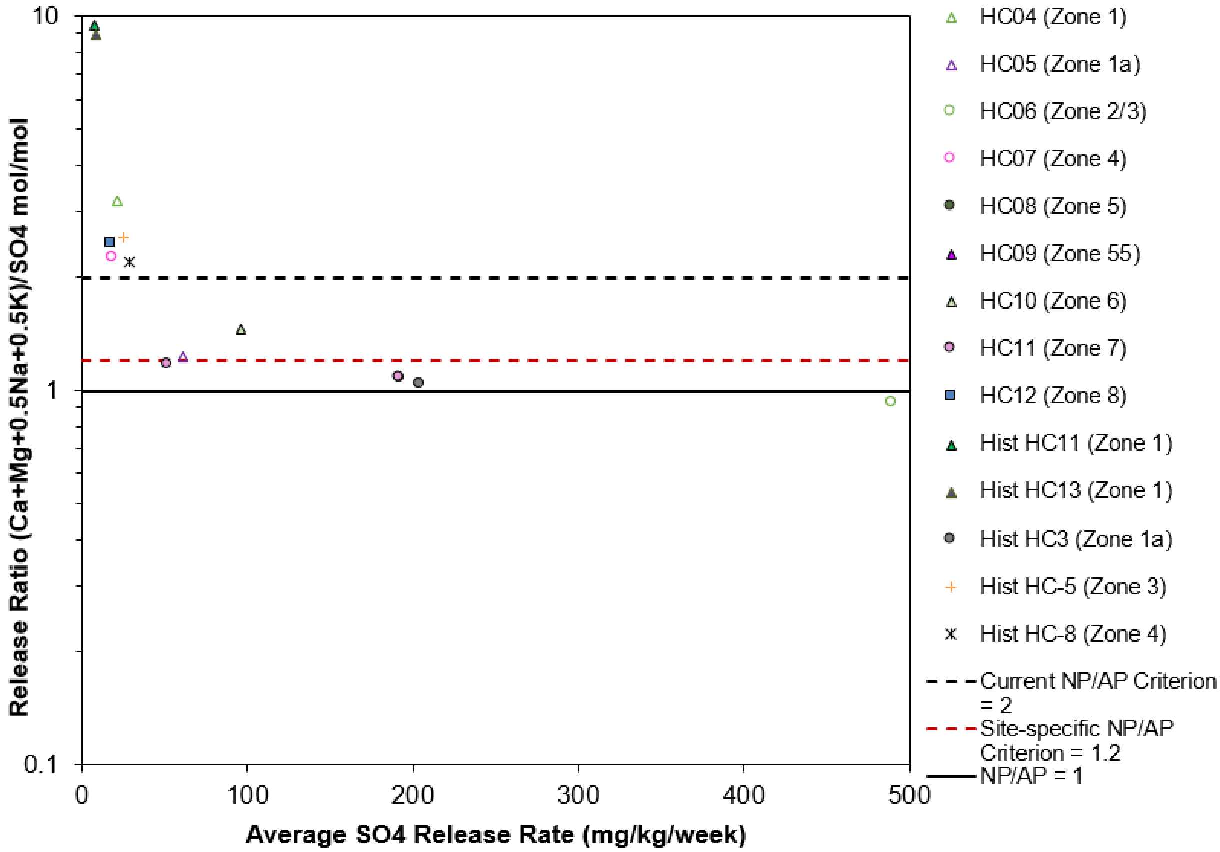

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Figure 6.1-7: Carbonate Molar Ratios Accounting for Cation Exchange versus Sulfide Release Rates

6.1.4 Metal Leaching (ML)

Solid-phase analysis was completed on the waste material samples to identify elements that were elevated in the solid-phase. An element was screened as elevated if it was greater than 10 times the average crustal abundance (Smith and Huyck 1999). The following is a summary of constituents that were screened to be elevated in each material type (SRK 2021a):

- Mine rock – arsenic (20% of the samples), phosphorus (1% of the samples), selenium (1% of the samples) and sulfur (54% of the samples);
- Overburden:
  - +2 mm-25 mm fraction – arsenic (67% of the samples) and cadmium (17% of the samples);
  - -2 mm fraction – arsenic (17% of the samples), gold (17% of the samples) and tellurium (83% of the samples);
  - +25 mm fraction – no elevated element concentrations;
- Coal Rejects – arsenic (86% of the samples), selenium (86% of the samples), sulfur (100% of the samples) and tellurium (100% of the samples); and
- Construction material samples – no elevated element concentrations.

An elevated element concentration in the solid phase does not necessarily imply an elevated concentration will occur in the liquid phase since element leachability is dependent on several factors (e.g., mineralogy, pH, redox, etc.). Leachability of constituents was evaluated by scaling humidity cell test results to field conditions and coupling them with modelled site facility volumes to develop source terms for each material type that will be mined. The source terms were carried forward into the site water and load balance (SRK 2021b) to identify if element concentrations would be present at concentrations that would require additional mitigation (e.g., water treatment). The outcomes of this modelling indicate that water treatment will not be required if site drainage is neutral (SRK 2021b).

A key assumption in water quality modelling is the proposed PAG management strategy will prevent acid generating conditions and source terms were developed assuming neutral drainage conditions. If the PAG management strategy is not effective and pH is depressed, concentrations of several parameters (e.g., sulfate, aluminum, arsenic, cadmium, copper, iron, etc.) will increase (SRK 2021a). The efficacy of the PAG management strategy will be evaluated through ongoing operational water quality modelling. Water treatment is included in the project mitigation strategy and will be implement should acidic drainage occur.

6.2 Mine Plan

The locations of all major Project components for this configuration are shown on **Figure 6.2-1**. The Project will consist of a conventional shovel and truck coal extraction operation, like other rock quarry and surface mine operations in the region. To develop the mine open pit, TCL will salvage topsoil, excavate overburden, and drill and blast the rock in horizontal layers (or benches). The estimated total footprint overlapped by the Project is summarized by **Table 6.2-1** below

Table 6.2-1: Project Component Footprints

Project Component	Project Subcomponent	Major Component Area (ha)	Subcomponent Area (ha)
Open pit related		293.3	
	Open pit including backfill areas	207.5	207.5
	Haul roads and service roads	31.0	31.0
	Cleared areas for access	54.7	54.7
Coal Processing Plant and ancillary buildings including processed coal, rock and run-of -mine coal stockpiles		15.2	
Material storage facilities		139.1	
	Rock and overburden (dams and buttresses)	106.2	106.2
	Reclamation materials stockpiles	32.9	32.9
Site water management infrastructure and discharges		300.4	
	Collection, diversion, and discharge channels	38.7	38.7
	Management, Sedimentation, and Control ponds	261.7	261.7
Explosive infrastructure	Includes access roads and sedimentation ponds	3.1	
Tenas Access Corridor including gravel quarries		60.3	
Power supply	Under all new powerlines excluding overlap	5.0	
Rail Infrastructure	Centre of Rail Loop excluded	13.8	
Mine Footprint Total		830.1	
Buffers and Contingency areas		1,025.0	
Project Area Total		**1,855.1**	

Note: *ha=hectare*

ROM coal will be extracted using heavy machines and trucked to an onsite coal processing plant (CPP) constructed north of the pit on the west side of Goathorn Creek. All process water fed into the CPP will be reused or recycled or entrained in the processed rock and processed coal material. The fine processed rock will be dewatered and combined with coarse processed rock material. The CPP will require makeup water to replace any water that is entrained in the processed coal and/or in the coarse and fine processed rock.

Mining of the Tenas deposit will produce overburden and mine rock from the open pit and processed rock from the CPP. The projected generation of overburden, mine rock and processed rock is provided in Figure 6 8. The following is the proposed management strategies for these materials:

- Soil: This is the top 30 cm of material that contains the bulk of organic material and allows the growth of vegetation. All soil salvaged will be temporarily stored in stockpiles for use in reclamation or will be “direct placed” on reclaimed external or backfilled mine rock piles as per the **Construction Environmental Management Plan in S13.0-C4 (CEMP)** and **Reclamation**

and Closure Plan S13.0-C15 (RCP). All surface soil has been classified as non-PAG (SRK 2021a);

- Overburden: This is the non-rock material between topsoil and rock that consists of gravel and till material with almost no organic material. All overburden material has been classified as non-PAG (SRK 2021a). Some will either be stockpiled or used as cover for non-PAG backfill to limit oxygen ingress and as cover material for the management ponds. The rest will be used to construct the embankments for the management ponds and/or backfilled into the open pit;
- Construction Materials: The Tenas Project will be using onsite (Goathorn Gravel Quarry) and offsite gravel deposits owned by independent third parties like Viahr, and overburden found within the Project footprint. These materials have been classified as non-PAG (SRK 2021a). Most of these materials are produced from excavated and fill activities within the Tenas Access Corridor, the Rail Infrastructure and mine haul roads;
- PAG rock: These are mine materials with an NPR of less than 1.2 or 2.0 depending on the material type or planning type (geochemical or mine planning) (see **6.1.3**). All of the PAG rock will be placed in management ponds and submerged with a minimum of 1.0 m of water within an average of six (6) months after excavation but no longer than 12 months. This management option minimizes the potential to form ARD by placement in a subaqueous setting to limit interaction with oxygen. The PAG rock will be placed subaqueously prior to the onset of acidic drainage. PAG rock will be managed as follows:
  - In advance of, and during mining, TCL proposes to progressively construct three Management Ponds. The purpose of the ponds is to store PAG material in subaqueous conditions to minimize sulfide oxidation and formation of acidic drainage;
  - The North Management Pond which is constructed first will be external to the open pit, located north of the open pit. The East Management Pond is constructed next and will be external to the open pit and will be south of the North Management Pond, and northeast of the open pit. The West Management Pond is constructed last and will encompass the northern portion of the open pit plus an embankment to provide sufficient storage for PAG material (**Figure 6.2-1**);
  - PAG material will first be placed in the North Management Pond. PAG material will be progressively placed in lifts and then flooded so that exposure of PAG material to atmospheric oxygen is minimized. TCL is proposing to place all PAG rock underwater before it becomes acid generating. The timing to the onset of acid generation is discussed in **6.1-3**;
  - Once the storage capacity of the North Management Pond has been reached, storage will begin in the East Management Pond and subsequently in the West Management Pond. The Management Ponds will be maintained with a one (1)-m water cover during active use and under at least two (2) m of water once the management pond PAG rock storage capacity has been reached;
  - Once the ponds have reached the maximum PAG rock storage capacity, TCL will place a one to two (2) m layer of non-PAG rock on top of the submerged PAG material below the active water level of the management pond, followed by a one (1) to three (3) m overburden layer to create a dry landform above water, followed by approximately a 30 cm layer of reclamation materials (surface soils) to reduce evaporative losses from the water cover above the saturated PAG rock;
- Non-PAG rock: This is mine rock with low sulphur levels with an NPR that is greater than 1.2 or 2.0 depending on the material type (see **6.1.3**). The non-PAG rock will be used as open pit backfill, in management pond embankments, buttresses or used as interim cover material over the management ponds at closure;

- Processed Rock (tailings): This is coarse and fine rock material separated from the processed coal during coal processing. These materials are classified as PAG and will be placed subaqueously in the management ponds (**Figure 6.2 1**);
- ROM Coal: This is coal that is excavated from the open pit and placed into several stockpiles for feeding into the Coal Processing Plant (CPP). This material is classified as PAG. Historical testing (Norecol, Dames & Moore 1999) indicates that coal can become acid generating in a shorter timeframe than processed rock; however, this was not confirmed as part of the SRK (2021a) study. Drainage from the coal stockpiles will be monitored and if for some reason ROM Coal is not processed , it will be placed in the management ponds;
- Processed Coal: This is coal that is produced by the CPP for the marketplace and is classified as PAG. Drainage from the processed coal stockpiles will be monitored and if for some reason processed coal is not processed, it will be placed in the management ponds; and
- Open Pit Walls: Pit walls will be covered with non-PAG material to limit oxygen and water ingress from contacting open pit wall rock surfaces. Much of the open pit will be backfilled during the Operation and the Decommissioning and Reclamation Phases. However, a very small portion of hanging wall will exist at closure. Meteoric water contacting the non-PAG covered open pit walls will report to an End Pit Lake, which will subsequently drain northwards by gravity and mix with Management Pond water prior to discharging.

Surface water management features (i.e., channels, sedimentation ponds and storage ponds) are illustrated in **Figure 6.2-1**. Upslope diversion channels will divert non-contact water away from the material stockpiles and surface mine areas, into existing natural watercourses. Downslope collection channels will collect runoff from the material storage areas and divert it into the sedimentation ponds for treatment with approved flocculants/coagulants to reduce total suspended solid levels to regulatory levels. No water treatment is anticipated beyond normal sediment control (SRK 2021b); discharge water from the site will achieve the water quality criteria required to protect drinking water and fish and aquatic life downstream of the project.

The estimated material production schedule is provided in **Table 6.2-2** below.

Table 6.2-2: Material Production Schedule

Year	Construction Materials (kBCM/Material)	Reclamation Materials (surface soils) (kBCM)	Overburden (kBCM)	PAG Rock (kBCM)	Non-PAG Rock (kBCM)	Run-of-Mine Coal (ktonnes)	Processed Coal (ktonnes)	Processed Rock (ktonnes)
-0.5	125.0/OVB 16.4 Well Graded Base (WGB) 10.0 Open Graded Base (OGB) 4.0 ballast 6.0 sub ballast 7.0 high fines	797	1423	0	0	0	0	0
0	175.0/OVB 21.6 high fines 45.0 OGB	83	1032	327	0	263	196	38
1	67.0/OVB 5.0 high fines 15.0 OGB	140	1,082	1214	337	1050	768	161
2	67.0/OVB 5.0 high fines 15.0 OGB	366	3729	1549	641	1050	764	163
3	67.0/OVB 5.0 high fines 15.0 OGB	140	1,668	1,712	1,738	1,050	803	141
4	50.0/OVB 5.0 high fines	28	904	1,769	741	1,050	773	158

Year	Construction Materials (kBCM/Material)	Reclamation Materials (surface soils) (kBCM)	Overburden (kBCM)	PAG Rock (kBCM)	Non-PAG Rock (kBCM)	Run-of-Mine Coal (ktonnes)	Processed Coal (ktonnes)	Processed Rock (ktonnes)
	15.0 OGB							
5	5.0 high fines	24	815	1,980	1,238	1,050	775	157
	15.0 OGB							
6 to10	25.0 high fines	194	4,242	7,819	9,760	7,819	3,809	823
	75.0 OGB							
11 to 15	25.0 high fines	292	4,709	7,753	7,434	7,753	3,968	733
	75 OGB							
16 to 21	30.0 high fines	199	1,805	6,783	6,817	6,783	3,836	808
	90.0 OGB							
Total	551.0/OVB	2,264	21,409	30,906	28,706	27,868	15,692	3,183
	133.6 high fines							
	16.4 WGB							
	370.0 OGB							
	4.0 ballast							
	6.0 sub ballast							

***Note:** kBCM=thousand bank cubic metres; ktonnes=thousand tonnes*

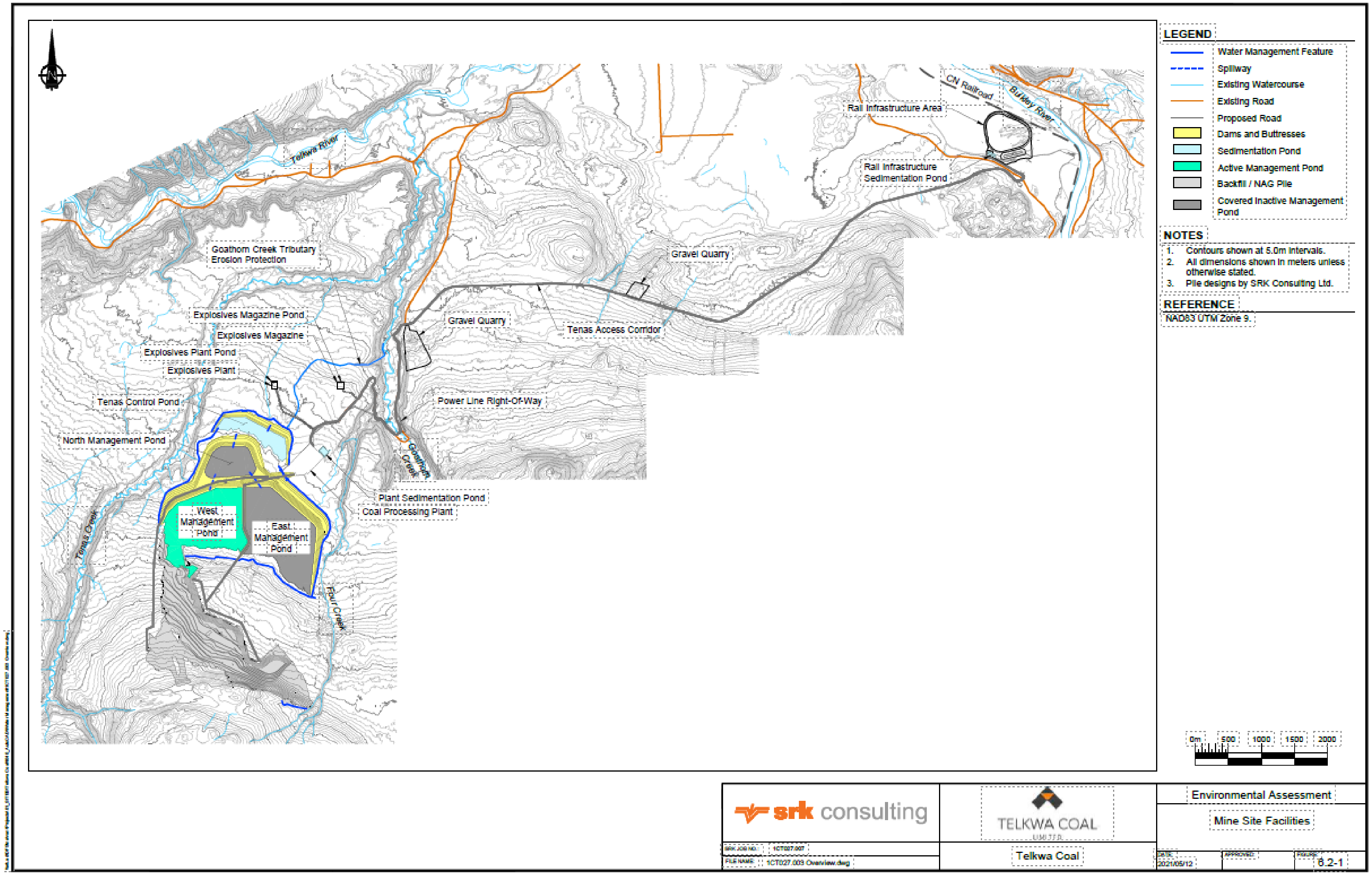

Figure 6.2-1: Tenas Project Proposed Project Footprint and Facilities

6.3 Material Handling and Processing

Figure 6.3-1 below provides a flow chart for the material handling methodology for the Project. As presented, any surplus overburden and non-PAG material will be placed within the critical backfill portions and/or buttress area of the embankments for the management ponds or backfilled into the open pit.

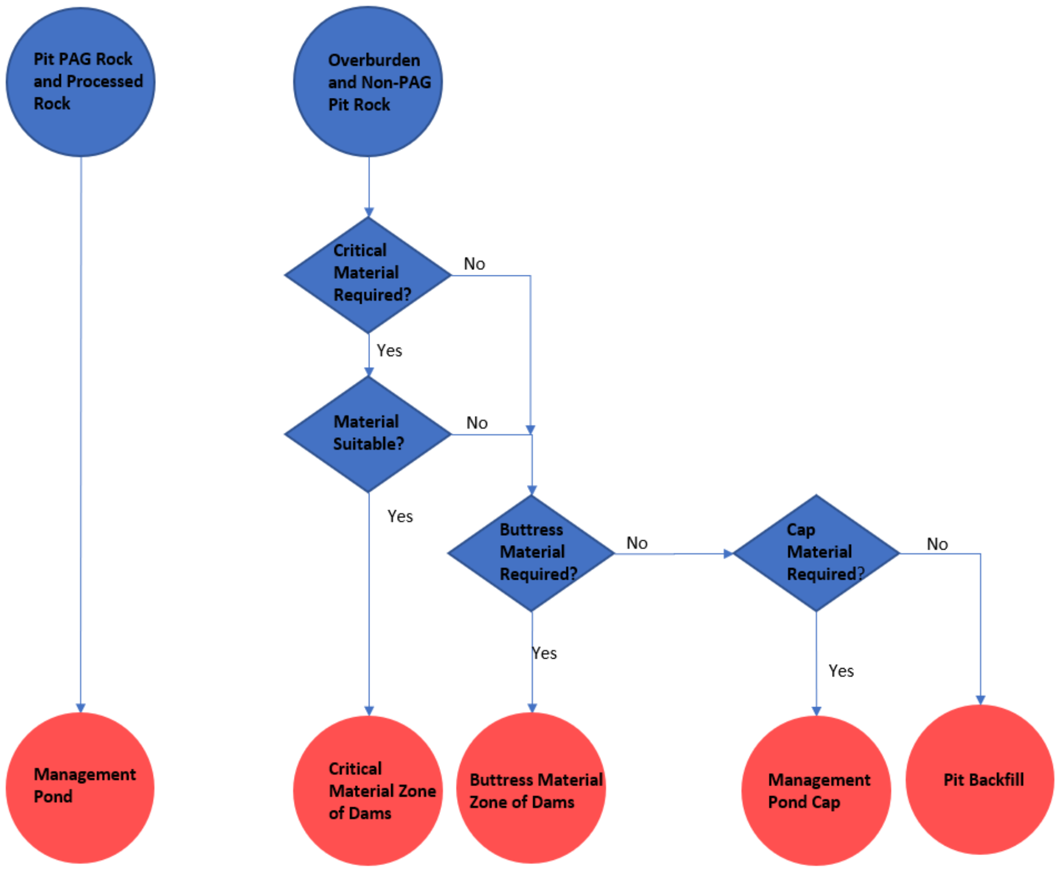

Figure 6.3-1: Material Management Decision Matrix

The Coal Processing Plant (CPP) flowsheet is provided below in **Figure 6.3-2.** The proposed flowsheet is typical of other western Canadian metallurgical coal operations; however, TCL will use centrifuges for processed coal dewatering versus coal and/or natural gas fueled coal dryers to minimize GHG and dust emissions. As shown, all material entering the plant leaves in one of two streams, processed coal or processed rock, with the former being sold on the marketplace and the latter being disposed of in the management ponds.

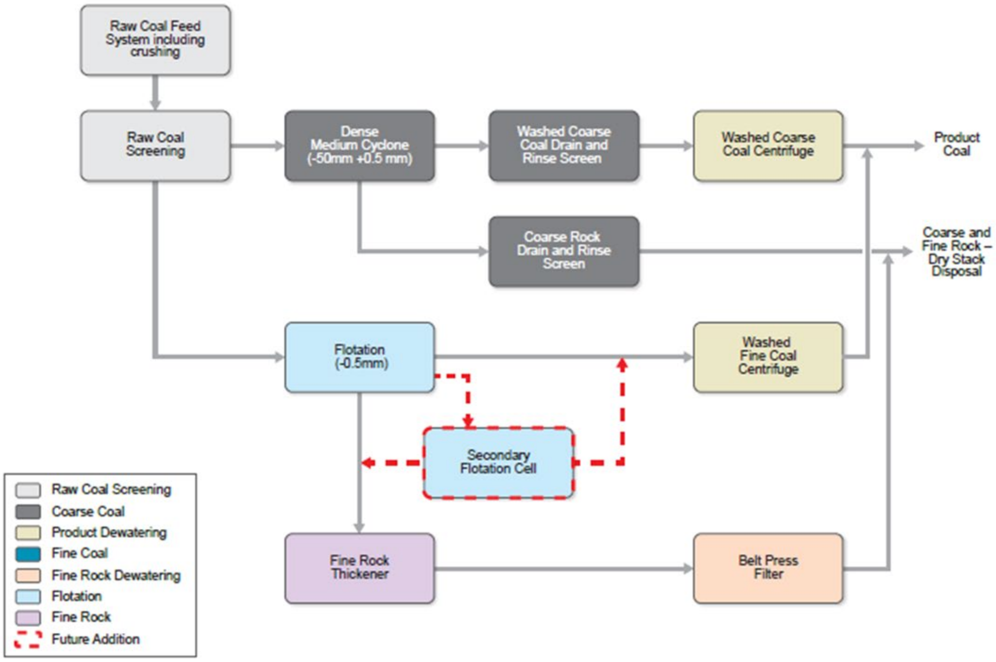

Figure 6.3-2: Coal Processing Flowsheet

6.4 Operational Monitoring & Geochemical Criteria

6.4.1 Scope of Criteria

These criteria apply to chip samples collected during drilling of blast holes and to free dig materials (e.g., overburden) and from processed rock. Classification of ARD is based on zone, material type, and the NPR for the chip sample collected and their distribution within the blast pattern.

6.4.2 Classification Based on Zone and Material Type

All materials excavated from the following zones will be considered PAG and placed in the management ponds:

- 1a; and
- 2/3.

Though zones 5, 55 and 6 were classified as non-PAG, these zones occur adjacent to the main economic coal seams recovered by the Project and unintended mixing of coal materials into these zones will occur during the mining process. Therefore, these three (3) zones will initially be classified and managed as PAG material during the Operation phase unless testing can demonstrate otherwise.

Zone 4 has both non-PAG and PAG portions depending on the NPR used and data collected. Currently the majority of Zone 4 has been classified and non-PAG.

All processed rock is classified as PAG and will be placed in the management ponds. Zones 7 and 8 will not be mined in the current open pit, however if they are mined, they will be handled as non-PAG.

6.4.3 Classification Based on Neutralization Potential Ratio (NPR)

6.4.3.1 Mine Rock

Zones 1 and portions of zone 4 are classified as non-PAG based on their bulk properties (SRK 2021a). It is unlikely these zones will be associated with adjacent coal mining but as noted in **6.1** all units potentially contain a component of PAG material. PAG rock in Zones 1, 4, and 5 will be isolated using the site-specific NPR through sample monitoring in advance of excavation of material via blasthole sampling. All rock with an NPR less than 1.2 will be classified as PAG and placed in the management ponds. Mine rock with an NPR greater than or equal to 1.2 will be classified as non-PAG and will either be used as open pit backfill, used in management pond embankments and buttresses, placed inside the management ponds, or used as the final cover material for the management ponds. The following sections provide the procedures for sample collection, testing and analysis.

6.4.3.1.1 Sample Collection

Each blast will consist of the following approximate attributes:

- Blast hole depth of 13 m;
- Blast hole spacing of 9.3 m; and
- Blast hole burden of 8.0 m.

A blast pattern will be approximately 140 m by 60 m, producing approximately 100,000 bank cubic meters (BCM) of rock per blast.

Geochemical samples will be collected from blast hole drill cuttings at intervals of approximately 18.6 m or two times blast hole spacing distance and 16 m or two times the burden distance along burden (**Figure 6-11**). Composite samples throughout the entire drillhole length of designated blast holes should be created through collection of chips from the blast hole and coning and quartering the sample to create a homogenized sample representative of the entire blast hole. If multiple zones are intersected in one drillhole, composite samples along the length of each zone will be collected. Samples are to be bagged and labelled with a unique sample ID and the location, time, date, and stratigraphic unit the sample was collected from. Approximately 3 to 5 kilograms (kg) of sample should be collected and stored in case future analysis is required.

6.4.3.1.2 Determine the Drillhole Neutralization Potential Ratio (NPR)

The following are the steps to calculate the NPR of each sample:

- Measure total carbon and total inorganic carbon using standard procedures (MEND 2009):
  - Measure total carbon using standard Leco furnace procedures;
  - Measure total inorganic carbon (TIC) through evolving CO_2 with a HCl leach;
- Calculate the NP of the sample using Equation 1;
- Measure total sulfur using standard Leco furnace procedures;
- Calculate the AP of the sample using Equations 3 and 4; and

- Calculate the NPR of the sample by dividing the NP by the AP.

All holes within a primarily non-PAG zone with an NPR<1.2 are classified as PAG and all holes with an NPR≥1.2 are classified as non-PAG.

6.4.3.1.3 Delineate Potentially Acid Generating (PAG) and non-PAG Mine Rock

Blasts may consist of a mix of PAG and non-PAG, as defined by drill hole sample results. Rock is only considered non-PAG in the blast hole grid where the package of rock is contained within four non-PAG drill holes. All rock adjacent to PAG holes is considered PAG. An example of PAG and non-PAG mine rock delineation is provided in **Figure 6.4-1.** If verification testing shows increasing variability the sampling program can be increased to take a sample from every drillhole versus every second drillhole as illustrated by **Figure 6.4-1** below.

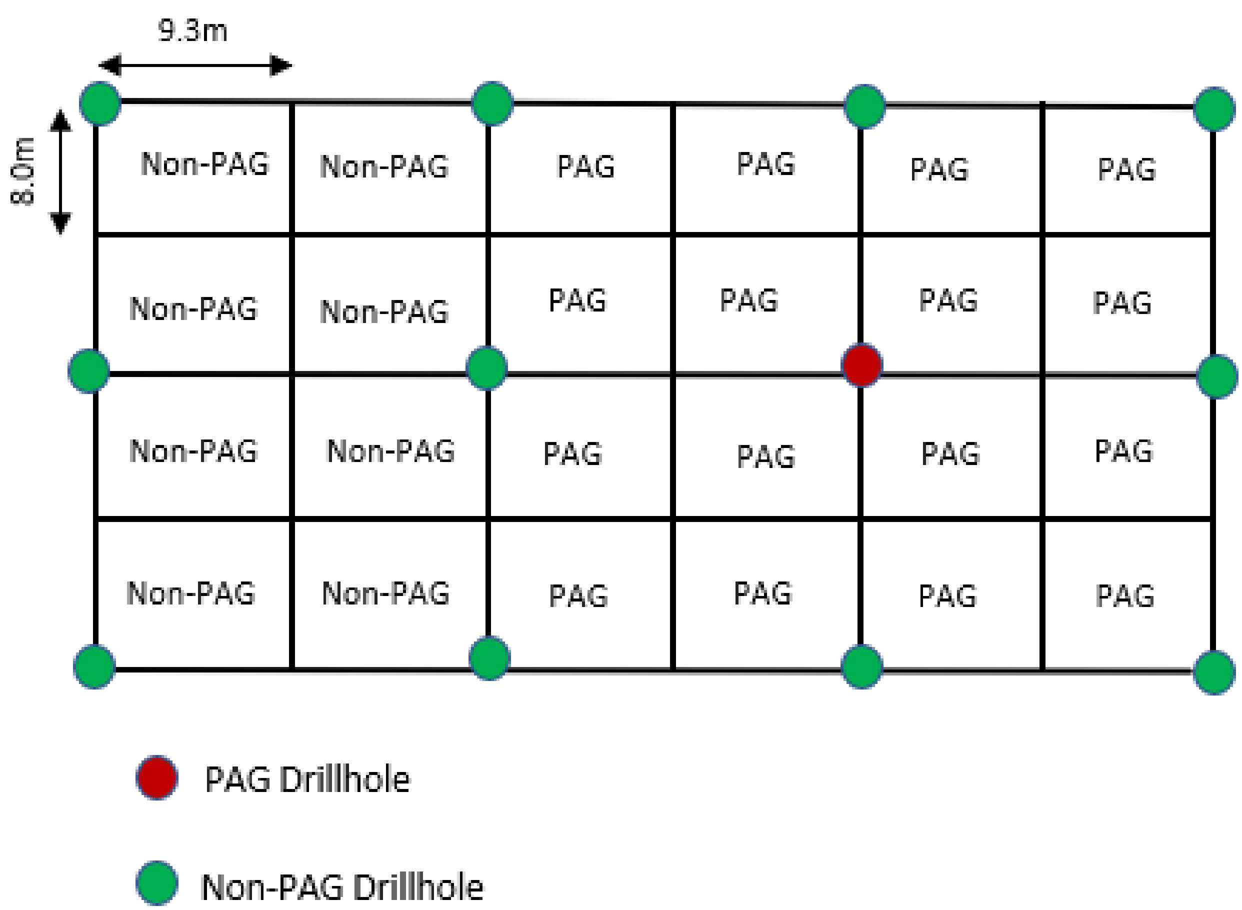

Figure 6.4-1: Example of Blast Grid non-PAG and PAG Waste Rock

6.4.3.1.4 Confirmatory Testing

Application of the above criteria will require collection of samples to confirm and/or update, as necessary, the operational NP and AP calculation methods. A minimum of one (1) confirmation sample per blast should be collected for testing as follows:

- If all blast holes are classified as either non-PAG or PAG, one (1) confirmation sample should be collected for confirmatory analysis; or
- If it is classified as having both non-PAG and PAG holes, one (1) non-PAG and one (1) PAG sample should be collected for confirmatory analysis.

These samples should be submitted to an accredited lab for the following analyses:

- Paste pH;
- Total sulphur by Leco furnace;
- Sulfur as sulfate following HCl leach;
- TIC measured from evolved CO_2; and
- Elemental analysis using ICP-MS following an aqua regia digestion using ultra low detection limits.

6.4.3.2 Overburden

Geochemical testing (SRK 2021a) indicates that overburden is depleted in sulfide and is non-PAG. All samples collected as part of the supplemental geochemical characterisation (SRK 2021a) were non-PAG. Overburden is expected to be non-PAG with confirmatory testing planned at a frequency of one sample per 10,000 m^3 of excavated overburden. Composite samples from the excavation are to be bagged and labelled with a unique sample ID and the location, time, date, and stratigraphic unit the sample was collected from. Approximately 3 to 5 kg of sample should be collected and stored in case future analysis is required.

6.4.3.3 Surface Soils

All surface soils for the Project area are expected to be non-PAG due to the lack of sulfur present in this unit. Confirmatory testing planned at a frequency of one sample per 100,000 m^3 of salvaged surface soils will be completed.

6.4.3.4 Run-of-Mine (ROM) Coal, Processed Rock and Processed Coal.

Geochemical testing (SRK 2021a) indicates that coal materials for the Project have an excess of sulfur above neutralizing minerals and has been classified as PAG. All samples collected as part of the supplemental geochemical characterisation (SRK 2021a) were PAG. No confirmatory testing is required as all material will be classified as PAG, and processed rock will be placed into the management ponds while ROM Coal is processed into processed rock and processed coal with processed coal being shipped off site to market prior to material producing acid rock drainage.

6.4.3.5 Construction Materials

Geochemical testing (SRK 2021a) indicates that construction materials selected for this Project are depleted in sulfide and is non-PAG. Construction materials can be considered non-PAG with confirmatory testing of one sample per 10,000 m^3 of provided construction materials. Composite samples from the excavation are to be bagged and labelled with a unique sample ID and the location, time, date, and stratigraphic unit the sample was collected from. Approximately 3 to 5 kg of sample should be collected and stored in case future analysis is required.

In the event of blasting being required the same confirmatory sampling for rock will be used.

6.5 Potentially Acid Generating (PAG) Material Submersion Timing

A key aspect of the **ML/ARDMP** is flooding of PAG materials in the management ponds prior to acidic drainage occurring. The estimated lag times to acidic conditions is provided in **Table 6.5-1**. Details of the derivation of the lag times is provided in **Appendix 13.12-A.**

Based on the average bulk properties of PAG materials, the lag time is approximately seven (7) years under laboratory conditions. Lag times would be longer under ambient conditions due to differences in field and laboratory conditions (e.g., temperature, etc.). A minimum lag time of 0.6 years is estimated for PAG material which has a minimum of NPR of 0.1. Based on depletion times, all PAG material will be placed and flooded in the management ponds in an average of six (6) months after excavation.

Processed rock (e.g., tailings) will also be placed in the management ponds. Depletion calculations using the empirical open system at near neutral pH method (MEND 2009) on these materials (SRK 2021a) indicate the lag time to acidic drainage is six years under laboratory conditions.

Coal samples were not included in the SRK (2021a) study. Historical testing of Tenas coal samples was conducted on three (3) samples (Norecol Dames and Moore 1999) and indicated that coal can produce acidity immediately with one (1) sample producing acidic drainage from the test initiation. The two (2) other coal samples did not produce acidic conditions during the 14-week testing period. Until it can be confirmed through additional testing, it is conservatively assumed that coal can become acid generating immediately. However, there is uncertainty in the timing to the onset of acidic conditions in coal and drainage from coal stockpiles will be monitored and if acidic drainage occurs, the stockpile material will be placed in management ponds.

Table 6.5-1: Estimated Acid Generation Lag Times in Years under Laboratory Conditions

Zone	Minimum	P5	Average	P95	Max
1	---	---	---	---	---
1a	4	4	8	12	12
2/3	2	2	8	---	---
4 (PAG)	0.6	2	7	9	9
4 (non-PAG)	---	---	---	---	---
5	3	4	---	---	---
55	3	4	---	---	---
6	4	5	---	---	---
7	3	3	---	---	---
8	4	---	---	---	---

7. MONITORING

TCL will conduct regular inspections of the laboratory equipment, sampling equipment, results collected and personnel carrying out the tasks to ensure proper procedures are being followed and there is no potential for PAG material being placed in the incorrect location. Inspections will be recorded and provided to the Environmental Coordinator and Mine Manager.

7.1 Performance Objectives

Table 7.1-1 below highlights the performance objectives and targets required to ensure the proper implementation of this ML/ARDMP.

Table 7.1-1: Performance Objectives

Objectives	Target
Inductions completed	Metal leaching/acid rock drainage (ML/ARD) induction complete and additional training complete for those that require it
Samples taken of blasted rock and results recorded in the geochemical database	target zero with no samples missed.
Potentially acid generating (PAG) volumes placed in correct location	Incorrect placement; target zero
Actual PAG volumes reconciled, and results assessed versus models	Targets met
Inspection of management ponds completed	Improvement: for more frequent inspections made, if needed; continual improvement
PAG rock submerged within 6 months	Verify timely water cover
Tracking documents and volumetrics	up to date and are being completed; target met
Management pond PAG requirements met	Management ponds were covered with non-PAG material on top of the submerged PAG material followed by a one (1) to three (3) m overburden layer to create a dry landform above water, followed by approximately a 30 cm layer of reclamation materials(soil) to evaporative losses from the water cover above the saturated PAG rock

8. Reporting

8.1 General Reporting

Reporting completed by TCL will confirm consistent implementation of the MWMP. Summary reports of evaluation activities and results will be compiled and reviewed annually.

8.2 Compliance Reporting

Compliance reporting will be subject to the Environmental Assessment Certificate (EAC), and *MA/EMA* permit conditions. The information gathered during monitoring practices will be summarized with information from other management plans into an Annual Environmental Management Summary Report and upon permitting completion, the Annual Environmental Reports as required by *MA/EMA* permits. Community engagement activities will be an aspect of the **Socio-economic Management Plan (S13.0-C16) (SEMP)**. The SEMP will have requirements related to reporting on community engagement programs.

Furthermore, events requiring emergency response have other regulatory reporting responsibilities and they will be fulfilled as required.

8.3 Internal Reporting

Details of all monitoring will be reported internally on an annual basis according to the adaptive management framework of the **EMS**. The **EMS** annual report will provide results of monitoring, assessment of performance objectives where applicable, and any other pertinent information.

TCL staff or contractors will be strongly encouraged to report any inefficiencies to management for evaluation consideration.

8.4 Geochemical Database

A geochemical database will be developed to maintain all operational monitoring results. The database will include the following information:

Sample attributes:

- collection date and time;
- sample location;
- sample depth intervals;
- drillhole ID for waste rock;
- sample mass;
- sample zone;
- a description of the lithological composition of the sample;
- any other visible attributes of the sample;
- Blast volume, ARD classification and storage location;
- Testing results: total sulfur, TIC and calculated NP, AP, and NPR values;

- Sample ARD classification as PAG or non-PAG;
- Blast rock storage location; and
- Confirmatory ABA and elemental analysis results including: paste pH, total sulfur, sulfate sulfur, TIC, NP, NPR, ICP-MS elemental analysis results.

8.5 Monthly Reporting

ML/ARD results will be reviewed monthly by environmental/engineering staff and discussed with the Environmental Coordinator and Mine Superintendent. The results including raw data and QA/QC will be provided in the Annual Reclamation Report.

8.6 Annual Reporting Requirements

Results from implementation of this plan, as approved by EMLI's Chief Inspector of Mines, will be provided in annual reporting for the *Mines Act* permit and submitted by March 31 each year. For mined rock, the annual reporting will ensure requirements for inventorying of mine rock as specified in Section 10.5.7 of the Health, Safety and Reclamation Code for Mines in British Columbia (BC MEMLI 2021) are met. This will include:

- The quantities (mass and volume) of each type of mine rock (specified as each stratigraphical zone);
- The location and cumulative areas of storage facilities based on the past and the current reporting year; and
- Results of the monitoring specified in this plan.

Annual seep surveys will be conducted along the toe of all mine rock storage areas during the freshet to identify any new seeps. Freshet provides the best opportunity to observe seepage. If new seeps are identified, water is collected and analyzed for major ions and dissolved trace elements. A specific seep survey sampling procedure with sample locations will be developed as seep locations are identified following placement of materials.

9. Roles and Responsibilities

Primary responsibilities have been assigned to the following roles or groups:

9.1 Mine Manager

The Mine Manager bears overall responsibility for all phases of the Project, and responsibility for onsite environmental monitoring and compliance relating to Construction, Operation, Decommissioning and Reclamation, and Post-Closure phase activities. The Mine Manager reports to the executive steering committee for TCL and will coordinate with this group to ensure that Project objectives are being met.

Specifically, the Mine Manager will:

- complete an annual review of the ML/ARDMP;
- Provide personnel, equipment, or other assistance to ensure compliance with all applicable regulations, acts, guidelines, permits and policies for the protection of the environment;
- Investigate improvements in any trend and assess whether the practices responsible for the improvements can be applied to other areas of the Project; and
- Deteriorating trends will be studied to determine the root cause. When the cause is identified, the Mine Manager or their delegate will implement a suitable corrective action.

9.2 Mine Superintendent

The Mine Superintendent reports to the Mine Manager:

- complete quarterly inspections of all management pond infrastructure;
- provide equipment and personnel to carry out sampling and monitoring of PAG materials and water management infrastructure when requested; and
- Review ML/ARD results monthly by environmental/engineering staff and discuss with the Environmental Coordinator.

9.3 Environmental Coordinator

The Environmental Coordinator reports to the Mine Superintendent:

- Oversee compliance with all regulations, acts, guidelines, permits and policies;
- Provide expertise for all decisions regarding protection of the environment and ML/ARD management;
- Oversee appropriate monitoring and inspections are performed as required or needed;
- Complete an annual review of the ML/ARDMP;
- Ensure compliance of ML/ARD monitoring programs with the approved *MA/EMA* permits and SPPs; and
- Complete reporting for regulatory agencies and for the Annual Environmental Management Summary Report to Indigenous groups as related to this MLARDMP.

9.4 Quality Assurance /Quality Control (QA/QC) Technician and Environmental Technician

The QA/QC Technician and Environmental Technician report to the Environmental Coordinator and will:

- participate in required training;
- understand and perform assigned tasks and duties;
- report to the Environmental Coordinator any discrepancies, concerns, or questions regarding tasks, duties, or procedures in a prompt manner; and
- sample mine rock, processed rock, ROM coal and open pit surfaces.

9.5 Employees

TCL staff as outlined above have primary responsibility for ensuring *MA/EMA* permits, **EMS** and related management plans, operation maintenance and surveillance programs for open pits, material storage piles, management and control ponds, and SPP requirements are met with respect to sampling, analysis of mine material classification, mine material placement, and confirmatory monitoring.

10. COMMUNICATION

Communication of the ML/ARDMP at TCL will be based on internal requirements and will primarily take place through this ML/ARDMP and relevant SPPs. Any significant change to the ML/ARDMP will be communicated to the Project's employees and contractors through a site-wide email, announcements over all radio channels by Minesite supervision and bulletins posted around the Project's Minesite. When effective to do so, maps will be marked with changes.

10.1 Training and Awareness

ML/ARD management requires special handling, monitoring, and tracking. All employees, contractors, and subcontractors who are involved in implementation of the ML/ARDMP at the Project will be provided with appropriate training or be required under contract to have that training.

10.2 Employee and Contractor Training

The training of all personnel involved in Construction, Operation, Decommissioning and Reclamation phase activities on the Project who are dealing with PAG and non-PAG material to understand it is a critical factor in achieving the objectives outlined in this ML/ARDMP. All those responsible for the management, implementation, and operation of any aspect of this ML/ARDMP will be competent for their role. Prior to the commencement of work onsite, all employees and contractors, including those responsible for dealing with material movement onsite, will:

- attend an induction session that will provide a brief overview of the types of materials mined on site and how they are managed; and
- review and understand the requirements of the ML/ARDMP and the Code.

In addition, workers will receive additional training specific to concepts and sampling requirements for ML/ARD, if required for the work they are undertaking.

10.3 Visitor Training

Visitors will not be required to be knowledgeable of this ML/ARDMP as they will be under the direction of TCL employees and will not be allowed to be in a situation involving PAG material management.

11. Evaluation and Adaptive Management

11.1 Evaluation

A review of the ML/ARDMP will be completed by the Mine Manager and Environmental Coordinator on an annual basis to compare data, trends, and implementation of the management plans and their objectives. This process will include a review of the management plan deliverables and input received from stakeholders

11.2 Adaptive Management

A philosophy of adaptive management will be adopted to make sure that management plans and mitigation measures are consistently meeting or exceeding performance targets. This will be achieved through periodic reviews of the ML/ARDMP and the results of monitoring programs.

11.3 Continual Improvement

TCL will work towards continual improvement at the Minesite to reduce waste and ensure appropriate handling of all materials. The Mine Manager or delegate will investigate improvements in any trend and assess whether the practices responsible for the improvements can be applied to other areas of the Project. Deteriorating trends will be studied to determine the root cause. When the cause is identified, the Mine Manager or their delegate will implement a suitable corrective action.

Examples of corrective actions could include:

- additional supervision and control of material management;
- additional training of employees and contractors on procedures;
- enhancement of maintenance or monitoring measures; and
- additional supervisory oversight.

TCL will amend the ML/ARDMP as required based on annual evaluations and feedback from relevant stakeholders. Any proposed changes will be sent out for review by relevant stakeholders before being finalized and implemented into the ML/ARDMP.

12. Change Management

Changing any part of the ML/ARDMP requires the use of a formalized process. If significant changes are being planned to objectives, management plan structure, operational milestones, communication and/or information management, it is required that the Management of Change (MOC) procedure in the **EMS** be followed. Minor edits and/or updates to this ML/ARDMP will be controlled through version control and content approval functions.

13. Conclusion

Management of PAG materials at TCL is important in order to meet EAC and *MA/EMA* permit conditions and ensure environmental protection from ML/ARD. Through implementation of this ML/ARDMP and relevant SPPs, TCL will ensure the efficient sampling of PAG rock, correct placement, and timing on provision of water cover over PAG rock in management ponds.

14. REFERENCES

British Columbia Ministry of Energy, Mines and Low Carbon Innovation (BC MEMLI). 2021. Health, Safety and Reclamation Code for Mines in British Columbia. Victoria, BC. Available at: https://www2.gov.bc.ca/gov/content/industry/mineral-exploration-mining/health-safety/health-safety-and-reclamation-code-for-mines-in-british-columbia. Accessed July 2021.

British Columbia Ministry of Energy, Mines and Petroleum Resources (BC MEMPR) and British Columbia Ministry of Environment and Climate Change Strategy (BC MECCS). 2019. Joint Application Information Requirements for *Mines Act* and *Environmental Management Act* Permits. Available at: https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/mineral-exploration-mining/documents/mineral-titles/permitting/2019_09_24_joint_application_information_requirements.pdf. Accessed July 2021. Accessed July 2021.

Clague John J. 1984. Quaternary Geology and geomorphology, Smithers-Terrace-Prince Rupert Area, British Columbia. Memoir 413. Geological Survey of Canada.

Government of British Columbia (GovBC). 1996. *Mines Act*, RSBC 1996, c 293. Available at: https://canlii.ca/t/54qxj. Accessed July 2021.

Government of British Columbia (GovBC). 2003. *Environmental Management Act*, SBC 2003, c 53. Available at: https://canlii.ca/t/54wmd. Accessed July 2021.

Government of British Columbia (GovBC). 2004. Waste Discharge Regulation, BC Reg 320/2004. Available at: https://www.bclaws.gov.bc.ca/civix/document/id/complete/statreg/320_2004. Accessed July 2021.

Government of British Columbia (GovBC). 2016. *Water Sustainability Act*, B.C. Reg. 36/2016 Available at: https://canlii.ca/t/54qx7. Accessed July 2021.

Government of Canada (GovCan). 1985. *Fisheries Act,* 1985, c F-14. Available at: https://laws-lois.justice.gc.ca/eng/acts/f-14/. Accessed March 2019.

MEND. 2009. Prediction Manual for Drainage Chemistry from Sulphidic Geologic Materials. MEND Report 1.20.1. December 2009. Available at: http://mend-nedem.org/wp-content/uploads/1.20.1_PredictionManual.pdf. Accessed July 2021.

Norecol Dames & Moore 1999. Draft Report. Assessment of ARD Potential and Water Quality Predictions Telkwa Coal Project. Prepared for Luscar Coal Ltd. Project No. 25373-004-310. March 19, 1999.

Smith and Huyck. 1999. An Overview of the Abundance, Relative Mobility, Bioavailability, and Human Toxicity of Metals. Chapter 2 in: Reviews in Economic Geology, Volumes 6A and 6B. The Environmental Geochemistry of Mineral Deposits. Pp 29-70.

Sobek, A.A., Schuller, W.A., Freeman, J.R., Smith, R.M. 1978. Field and Laboratory Methods Applicable to Overburdens and Minesoils. Report EPA-600/2-78-054, U.S. National Technical Information Report PB-280 495.

SRK (SRK Consulting (Canada) Inc.). 2021a. Telkwa Coal – Tenas Project Supplemental Geochemical Characterization. Prepared for Telkwa Coal Ltd. December 2021.

SRK. 2021b. Tenas Project – Water and Load Balance Modeling Report. Prepared for Telkwa Coal Ltd. November 2021.