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Geochemical Assessment of Potential Waste Rock and Tailings

FEDERATION PROJECT

Prepared for:

Hera Resources Pty Ltd

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EXECUTIVE SUMMARY

Terrenus Earth Sciences (Terrenus) has completed a geochemical assessment of potential mineral waste (potential waste rock and potential tailings) from the Federation Project (the Project) located approximately 10 kilometres (km) south of Hera Mine, New South Wales. Hera Mine is located about 5 km south of the township of Nymagee. The Project is being developed by Hera Resources Pty Ltd, the 'operator' of Hera Mine. The geochemical assessment was completed to assist with mine planning and to address the requirements of the Planning Secretary's Environmental Assessment Requirements (SEARs) for the Project.

The Project is a proposed satellite underground mining operation associated with the existing Hera Mine, targeting gold (Au), copper (Cu), lead (Pb), silver (Ag) and zinc (Zn) ore hosted within mineralogically altered sandstone and siltstone units. The mine will be accessed via a single decline from a portal at the base of a box-cut (small pit). Waste rock – primarily from the box-cut and decline development – will be brought to the surface for storage, before eventually being managed in a number of ways depending on mine scheduling and the characteristics of the waste rock.

Terrenus has geochemically assessed drill-core samples (representing potential waste rock) collected from a range of drill-holes and depths at the Project. Terrenus has also assessed tailings samples produced from a bench-scale trial process.

The samples were assessed by Terrenus with respect to their ability to generate acid and metalliferous drainage (AMD) and salinity. AMD includes acid/acidic drainage (AD), neutral mine drainage (NMD) and saline drainage from sulfide oxidation (SD). The geochemical characteristics associated with potential waste rock and tailings materials are discussed.

Geochemical Characteristics of Waste Rock

AMD Potential of Waste Rock

- Weathered waste rock (from the box-cut) is expected to generate pH-neutral to slightly alkaline contact water (run-off and seepage) when initially exposed. Fresh waste rock is expected to generate alkaline contact water when initially exposed.
- The total sulfur (S) concentration of this material is generally low, with a modest 90th percentile total S concentration of 0.24 percent (%), of which most of this is present as sulfide. The weathered samples had much lower total S (and sulfide) compared to the fresh samples. As such, the maximum potential acidity (MPA) that could be generated by potential waste rock samples is also relatively modest, with a 90th percentile MPA of 25.7 kilograms of sulfuric acid per tonne of rock (kg H_2SO_4/t). As expected by the total S values, the fresh samples have greater MPA values compared to the weathered samples.
- The acid neutralising capacity (ANC) values for potential waste rock are generally very low, with a very low median ANC value of 2.5 kg H_2SO_4/t. Mineralogical analysis has revealed the carbonate mineralogy is dominated by dolomite and calcite, however further geochemical analysis has found that only about one quarter to one third of the ANC is likely to be 'readily available' (to neutralise acidity).
- As such, the geochemical assessment has found that essentially all weathered waste rock is classified as non-acid forming (NAF). Most fresh waste rock (indicatively 85 %) is classified as

potentially acid forming (PAF), predominantly with a low capacity to generate significant acidity. Overall, fresh waste rock can be classified as PAF – Low Capacity (PAF-LC).

- As expected from a mineralised area, most samples had some total metal and metalloid concentrations that were 'enriched' to varying degrees in several elements compared to average element abundance in soil in the earth's crust. However, for the most part, the solubility of these elements is low.

- Under pH-neutral to slightly alkaline conditions, potential waste rock is expected to produce leachate with generally low concentrations of soluble metals and metalloids. Under acid generating conditions (*ie*. PAF rock, when allowed to oxidise), leachate is likely to contain moderate to high concentrations of soluble metals and metalloids – and soluble SO_4 (due to sulfide oxidation).

Box-cut material (weathered waste rock)

Moderately to highly weathered waste rock has a very low potential to generate AMD as either AD and/or NMD. Additionally, due to the very low total S (and negligible sulfide [Scr]) concentrations, the potential for saline (sulfate) drainage from sulfide oxidation is also negligible. Some slightly weathered materials from the base of the box-cut (at the oxidation zone) may have a low to moderate potential to generate AMD.

Decline and underground mine material (fresh waste rock)

Fresh waste rock has a high potential to generate AD, albeit at a modest capacity, and has a moderate to high potential for saline (sulfate) drainage from sulfide oxidation. The indicative lag time until the potential onset of AMD is in the order of 2 to 6 months – under unmitigated oxidising conditions.

Salinity Potential of Waste Rock

Potential waste rock has electrical conductivity (EC) values ranging from 30 to 511 microSiemens per centimetre (µS/cm), with median and 90th percentile values of 108 and 309 µS/cm, respectively.

Waste rock is expected to generate low-salinity contact water (run-off and seepage).

The potential for sulfate-derived salinity (from sulfide oxidation) from weathered waste rock is very low. The potential for sulfate-derived salinity from fresh waste rock is moderate to high.

Sodicity and Dispersion Potential of Waste Rock from the Box-cut

Weathered samples (n=12) had very low cation exchange capacity (CEC) values and high exchangeable sodium percentage (ESP) values, resulting in most samples being classified as 'strongly sodic' or 'sodic'. Three samples were classified as 'non-sodic'. As such, weathered waste rock is expected to be sodic (to varying degrees). The CEC and ESP values suggest that this material type would likely be subject to some degree of dispersion.

Weathered waste rock is expected to be sodic to strongly sodic, with a potential for dispersion.

Geochemical Characteristics of Tailings

AMD Potential of Tailings

- Tailings – represented by the Master Composite sample – is expected to generate pH-alkaline contact water (run-off and seepage) when initially produced/disposed.
- The total S concentration of potential tailings material is moderate to high (S = 1.4 %), with a similarly moderate to high sulfide concentration, which produced moderate MPA values. As such, and combined with ANC values that are generally lower than the MPA, the Master Composite tailing sample was classified as PAF.
- Mineralogical analysis has revealed the carbonate mineralogy is dominated by calcite, however further geochemical analysis has found that only about one quarter of the ANC is likely to be 'readily available' (to neutralise acidity).
- As expected from processing mineralised ore, the tailings sample had some total metal and metalloid concentrations that were 'enriched' to varying degrees is several elements compared to average element abundance in soil in the earth's crust – suggesting that metalliferous drainage from tailings is plausible.
- Under pH-neutral conditions, potential tailings are expected to produce leachate with generally low concentrations of soluble metals and metalloids. Under acid generating conditions (*ie*. once oxidised) leachate is likely to contain moderate to high concentrations of soluble metals and metalloids – and soluble SO_4 (due to sulfide oxidation).

Tailings has a high potential to generate AD, and has a moderate to high potential for saline (sulfate) drainage from sulfide oxidation. The indicative lag time until the potential onset of AMD is in the order of 2 to 6 months – under unmitigated oxidising conditions.

Salinity Potential of Tailings

The Master Composite tailings sample has an EC of 308 µS/cm.

Consistent with fresh waste rock, tailings are expected to generate low-salinity contact water (run-off and seepage). Due to the moderate to high total S (and sulfide) concentration, the potential for sulfate-derived salinity (from sulfide oxidation) is moderate to high.

Management and Mitigation of Waste Rock

Of a potential 1.5 million tonnes of waste rock to be mined, about 60 % will report to the surface during the first seven years (approximately) of operations, with the remainder disposed underground as backfill. Waste rock brought to the surface will be placed in one or more waste rock stockpile areas, depending upon the environmental geochemical classification (to segregate NAF from PAF waste rock as much as practical). Run-off and seepage (leachate) from the waste rock stockpile areas will be captured in lined leach ponds before use in the mine water management system.

Weathered waste rock is expected to be NAF, and poses a very low potential to generate AMD and low potential to generate salinity and NMD. As such, weathered rock from the box-cut will be stockpiled separately to fresh rock, as much as practical, and potentially used to backfill the box-cut; for other rehabilitation and construction activities; or transported to Hera Mine and disposed underground. Run-off and seepage of weathered waste rock stockpiles will be monitored for 'standard' water quality parameters (refer below).

Fresh waste rock is expected to be PAF, and poses a high potential to generate low to moderate-level AMD (as a bulk material). Fresh rock from the underground will report to the waste rock stockpiles, where run-off and seepage (leachate) will be captured in lined leach ponds before use in the mine water management system. PAF waste rock that is brought to the surface will either be transported back underground (during or post operations) for use as backfill or transported to Hera Mine and disposed underground. No PAF waste rock is proposed to remain at the surface at closure.

PAF waste rock used as underground backfill would be placed well below the final groundwater level (approximately 60 to 80m below natural surface) where oxidation within the saturated zone would be very low (negligible). PAF waste rock initially placed above the water table (*ie*. whilst groundwater recovers) does pose a short-term risk of generating AMD, however the potential impact to groundwater during the groundwater recovery period would be limited (if at all) and very localised to the placement area. As such, backfilled waste rock would pose a low environmental risk with respect to AD and/or NMD.

Weathered waste rock is expected to be sodic to varying degrees with potential for dispersion and erosion. During operations, waste rock will be stockpiled on pads with run-off and sediment captured, therefore erosion and dispersion of waste rock will not pose an environmental risk. Any waste rock remaining at the surface at the end of operations would be land formed, topsoiled and revegetated to manage potential erosion and dispersion.

Where rock is used for construction activities, this should be limited to competent NAF waste rock. Regardless of the rock type, especially where engineering or geotechnical stability is required, laboratory testing and/or field trials should be undertaken to determine the suitability of the rock for the proposed use.

Surface water run-off and seepage (leachate) from waste rock stockpiles will be captured in lined leach ponds before use in the mine water management system. This water will be monitored for 'standard' water quality parameters including, but not limited to, pH, EC, major anions (sulfate, chloride, alkalinity), acidity, major cations (sodium, calcium, magnesium, potassium), total dissolved solids (TDS) and a broad suite of soluble metals/metalloids by ICP-MS (or equivalent high-resolution analysis).

With the implementation of the proposed management and mitigation measures, the waste rock is regarded as posing a low risk of environmental harm.

Management and Mitigation of Tailings

Based on the current assessment, tailings (Master Composite) are regarded as posing a moderate to high AMD hazard with respect to generation of acidity and sulfate.

A small quantity of ore (approximately 10 %) may be transported to Peak Gold Mine (near Cobar) for processing in the initial years, with tailings from that ore remaining at Peak Gold Mine. The majority of ore from the Federation deposit (approximately 90 %) will be processed at Hera Mine.

Approximately 60 % of the tailings produced from Federation ore will be thickened and returned underground (at Federation mine) for backfilling underground stopes. The remaining tailings will be disposed/managed under the current approved tailings management measures at Hera Mine, which comprises the disposal of tailings slurry into a dedicated tailings storage facility.

Under the proposed management strategies, tailings will either be disposed into the approved TSF (where oxidation will be limited by rapid and subsequent burial by fresh tailings), or tailings will be paste thickened and returned underground at Federation Mine as backfill, eventually residing below the post-closure groundwater level. Tailings paste is similar to cement (a mix of general purpose cement and 'slag' will be used as the binder), which hardens within weeks resulting in a concrete-like material, which therefore binds the material into a permanently cemented matrix where oxidation of sulfide minerals is significantly limited. Furthermore, the tailings paste will be alkaline due to the cement binder. Tailings paste initially placed above the water table (*ie*. during operations and whilst groundwater recovers) may pose a very short-term and limited risk of generating AMD (potentially as NMD or SD) whilst the paste hardens, however the potential impact to groundwater during this time (and then during the groundwater recovery period) would be limited and very localised to the placement area.

As such the risk of environmental harm and health-risk that emplaced tailings poses is low.

Management of ROM Stockpiles

ROM ore is not mining waste, and surface water run-off and seepage from ROM pads and stockpiles would not report off-site and would be managed as part of the mine water management system.

ROM ore would be stored on-site for a relatively short period of time (days to weeks) compared to mineral waste materials, which would be stored at the site in perpetuity (at various surface and underground locations). Management practices are therefore different for ROM ore (compared to waste rock and tailings) and would largely be based around the operational (day-to-day) management of surface water run-off from ROM stockpiles, as is currently accepted practice at mines in Australia.

Surface water run-off from ROM stockpiles would report to a lined leach pond and be monitored for 'standard' water quality parameters including, but not limited to, pH, EC, major anions (sulfate, chloride, alkalinity), acidity, major cations (sodium, calcium, magnesium, potassium), TDS, and a broad suite of soluble metals/metalloids ICP-MS (or equivalent high-resolution analysis).

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GLOSSARY of TERMS

Acid	A measure of hydrogen ion (H^+) concentration; generally expressed as pH.
Acid-Base Account	Evaluation of the balance between acid generation and acid neutralisation processes. Generally determined by the maximum potential acidity (MPA) and the inherent acid neutralising capacity (ANC), as defined below. See also "MPA" and "ANC".
AMD	Acid and metalliferous drainage from mining waste material. A process of sulfide oxidation generating a drainage of variable chemistry depending on the balance between acid generating and acid neutralising capacity of a material. It includes acid(ic) drainage (AD), pH-neutral and metalliferous drainage (NMD), or saline drainage (SD). The term AMD is used more recently to replace the term Acid Rock Drainage (ARD) as metalliferous and saline drainage can occur under pH-neutral conditions.
ANC	Acid Neutralising Capacity, expressed as kg H_2SO_4 per tonne of rock/material. A measure of a sample's maximum potential ability to neutralise acid.
ANC/MPA ratio	Ratio of the acid neutralising capacity (ANC) to the maximum potential acidity (MPA) of a sample. Used to assess the risk of a sample generating acid conditions. See also "ANC" and "MPA".
EC	Electrical Conductivity, expressed as μS/cm.
Ore	Mineralised rock containing elements or minerals in economic quantities (concentration).
Kinetic test	Procedure used to measure the geochemical/weathering behaviour of a sample of mine material over time.
MPA	Maximum Potential Acidity. Calculated by multiplying the total sulfur (S) or sulfide-sulfur (Scr) content of a sample by 30.6 (stoichiometric factor) and expressed as kg H_2SO_4 per tonne of rock/material.
Mineral waste	An all-encompassing term for any geologic waste material produced during mining and processing of ore. In this report, the definition of Mineral Waste comprises Waste Rock, Tailings and Rejects.
NAF	Non-acid forming. Geochemical classification criterion for a sample that would not generate acid conditions. A sample classified as NAF may, or may not, have a significant sulfur content but the availability of neutralising material within the sample is more than adequate to neutralise all the acid that theoretically could be produced by any contained sulfide minerals. As such, material classified as NAF is considered unlikely to be a source of acidic drainage, however NAF material may still develop NMD and/or SD.
NAPP	Net Acid Producing Potential, expressed as kg H_2SO_4 per tonne of rock/material. Calculated by subtracting the ANC from the MPA.

NATA accreditation	Accreditation by the National Association of Testing Authorities (Australia). NATA accreditation for a specific analytical test indicates that the test method and means of undertaking the test (following the method and achieving valid results) by the laboratory has been independently recognised by NATA. Accreditation provides a means of determining and formally recognising the competence of facilities to perform specific types of testing, inspection, calibration, and other related activities, on a routine basis.
NMD	Neutral and metalliferous drainage. A component of AMD, NMD occurs where drainage is pH-neutral or higher yet contains elevated element concentrations.
PAF	Potentially Acid Forming. Geochemical classification criterion for a sample that has the potential to generate acid conditions. A sample classified as PAF almost always has a significant sulfur content, the acid generating potential (MPA) of which exceeds the inherent acid neutralising capacity (ANC) of the material. This means there is a high risk that such a material, even if pH circum-neutral when freshly mined or processed, could oxidise and generate acidic drainage if exposed to atmospheric conditions. See also PAF-LC.
PAF-LC	Potentially Acid Forming (low capacity). Geochemical classification criterion for a sample that has the potential to generate relatively low-level AMD.
Rejects	Coarse or oversize rock material – typically gold-ball sized – produced during milling and screening of ore. Sometimes called 'scats'.
ROM	Run-of-Mine. Ore as it comes from the mine, including any impurities.
S	Sulfur.
Scr	Chromium reducible sulfur. Analytical procedure to determine the sulfide-sulfur concentration in a sample.
SD	Saline drainage. A component of AMD, SD occurs where drainage is saline due to elevated sulfate as a result of sulfide oxidation.
SO_4	Sulfate.
Static test	Procedure for characterising the geochemical nature of a sample at one point in time. Static tests may include measurements of mineral and chemical composition of a sample and the Acid-Base Account.
Tailings	Fine-grained mineral waste produced from the plant as part of the processing of ore. Tailings typically comprises mud/clay, silt and sand-sized particles.
Uncertain	In the context of classifying a material (sample) as NAF or PAF. An 'Uncertain' classification (UC) applies when there is an apparent conflict in results such that neither NAF nor PAF classification can be given, or there is insufficient information to unequivocally classify as NAF or PAF. Uncertain

	samples are sometimes given a tentative sub-classification, such as UC(NAF) or UC(PAF) where preliminary data suggests the sample may be NAF or PAF, respectively.
Waste rock	Rock material overlying, underlying and surrounding ore, that is mined during extraction of ore and will report as waste. Waste rock typically has a much lower degree of mineralisation compared to ore.
Water extract	A method to determine the water-soluble parameters in soil. Solid samples undergo a bottle leach method where 10 g of pulped solid (85 % passing 75 μm) is combined with 50 grams of de-ionised water into a glass bottle. The 1:5 solution (1 part solid to 5 parts water) is tumbled end-over-end for one hour. Solutes are leached from the soil by the continuous suspension and agitation. The water extract solution is measured for pH and electrical conductivity (EC) prior to filtering for solute analysis (*eg.* soluble metals/metalloids and major ions).

1 Introduction and Context

Terrenus Earth Sciences (Terrenus) has completed a geochemical assessment of potential mineral waste (potential waste rock and potential tailings) from the Federation Project (the Project) located approximately 10 kilometres (km) south of Hera Mine, New South Wales. Hera Mine is located about 5 km south of the township of Nymagee. The Project is being developed by Hera Resources Pty Ltd, the 'operator' of Hera Mine. The geochemical assessment was completed to assist with mine planning and to address the requirements of the Planning Secretary's Environmental Assessment Requirements (SEARs) for the Project.

The Project is a proposed satellite underground mining operation associated with the existing Hera Mine, targeting gold (Au), copper (Cu), lead (Pb), silver (Ag) and zinc (Zn) ore hosted within mineralogically altered sandstone and siltstone units. The mine will be accessed via a single decline from a portal at the base of a box-cut (small pit). Waste rock – primarily from the box-cut and decline development – will be brought to the surface for storage, before eventually being managed in a number of ways depending on mine scheduling and the characteristics of the waste rock. Waste rock management options include transporting to Hera Mine for use as underground backfill, returned underground at Federation for use as backfill, used to backfill the box-cut at Federation, used in mine rehabilitation and/or comprise a rehabilitated final landform. A small amount of ore (approximately 10 per cent (%)) may be transported to Peak Gold Mine (near Cobar) for processing in the initial years. The majority of ore (approximately 90 %) from the Federation deposit will be processed at Hera Mine. Approximately 60 % of the tailings produced from Federation ore will be paste-thickened and returned underground (at Federation mine) for backfill. The remaining tailings will be disposed/managed under the current approved tailings management measures at Hera Mine.

Terrenus has geochemically assessed drill-core samples (representing potential waste rock) collected from a range of drill-holes and depths at the Project. Terrenus has also assessed tailings samples produced from a bench-scale trial process.

The samples were assessed by Terrenus with respect to their ability to generate acid and metalliferous drainage (AMD) and salinity. AMD includes acid/acidic drainage (AD), neutral mine drainage (NMD) and saline drainage from sulfide oxidation (SD). The geochemical characteristics associated with potential waste rock and tailings materials are discussed.

1.1 Objective

The overall objective of this geochemical assessment was to:

Evaluate the geochemical nature of mining and processing wastes likely to be produced from the Project and identify any environmental issues that may be associated with mining, handling and storing these materials.

1.2 Geological Background

Mineralisation at the Project is epigenetic (*ie*. formed later than the host rocks) and structurally controlled within fine-grained sedimentary rocks. Mineralisation consists of several steeply dipping vein breccia and massive sulfide lenses developed in the centre of a broad northeast-southwest striking corridor of quartz–sulfide vein stockwork mineralisation.

Massive sulfide and sulfide breccia base metal mineralisation is typically zinc-rich and associated with intense cross-cutting black chlorite alteration in the lower parts of the known deposit, with silica-sulfide dominant infill in the upper parts. Moderate- to high-grade gold mineralisation is best developed in a steeply plunging shoot in the northeast of the deposit, with recent drilling also highlighting high grades in other parts of the deposit.

Host rock surrounding the deposit (ie. potential waste rock) exhibits very low-grade mineralisation with relatively low sulfide and carbonate mineralisation.

2 Geochemical Assessment Methodology

This section provides the methodology used for the geochemical assessment of potential waste rock and tailings expected to be generated by the Project.

2.1 The Assessment Approach – What are we trying to understand?

The data was assessed with regard to the samples potential to generate acid and metalliferous drainage (AMD). Only after making such an assessment to understand the potential AMD risks can we formulate appropriate management measures to adequately mitigate the risks.

The term ‘AMD’ is used to describe low-quality seepage or drainage that has been affected by the oxidation of sulfide minerals (primarily pyrite and marcasite) and/or by the dissolution of acid generating sulfate minerals (such as jarosite and alunite), regardless of final drainage chemistry.

AMD may be produced when sulfide minerals (such as pyrite) are exposed to oxygen and water. Oxidation of sulfide minerals may result in the production of acid(ity), sulfate (SO_4) and, depending on mineralogy, the release of metals and salinity. AMD can be acidic, pH circum-neutral, alkaline and/or saline (INAP, 2009[1], DIIS, 2016[2]). Whether contact water is acidic and metalliferous (Acid Rock Drainage [ARD]), pH-neutral/alkaline and metalliferous (Neutral and Metalliferous Drainage [NMD]) or saline due to elevated sulfate (Saline Drainage [SD]) largely depends on the relative proportion of sulfide minerals (acid generating) and carbonate minerals (acid neutralising) in the source materials. In this assessment unless specified otherwise, the term AMD is broadly used to describe ARD, NMD and/or SD.

2.2 Desktop Review of Existing Information

A desktop review of available data and information was completed to provide a better understanding of the Project. The review included geological data, mineralogical and assay data associated with ore, exploration drilling programs, mining methods and mine plan, ore handling and processing methods, and mineral waste disposal and management strategies. Discussions were held throughout 2021 with Project personnel (predominantly Project geologists and metallurgists) to identify and discuss relevant technical information. Geological information was obtained from exploration drill-hole logs from the Project area, coupled with discussions with the Project geologists.

Existing assay data was available for selected drill-holes (primarily targeting ore zones) and from trial tailings processes. This existing data was used to guide the sampling and geochemical characterisation program. All geochemical information used for (and reported in) the assessment has come from new samples collected specifically for the assessment from targeted drill-holes and from the most recent (and representative) tailings trial process.

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[1] INAP, 2009. Global Acid Rock Drainage Guide.

[2] DIIS, 2016, Preventing Acid and Metalliferous Drainage. Handbook from Australian Federal Government’s Leading Practice Sustainable Development Program for the Mining Industry. https://www.industry.gov.au/data-and-publications/leading-practice-handbook-preventing-acid-and-metalliferous-drainage.

2.3 Sampling Strategy

The geochemical sampling and testing program developed for this assessment integrated with the exploration (resource definition) drilling program. This assessment is based on data that is relevant to assessing the environmental geochemical characteristics of mineral wastes to be produced by the Project.

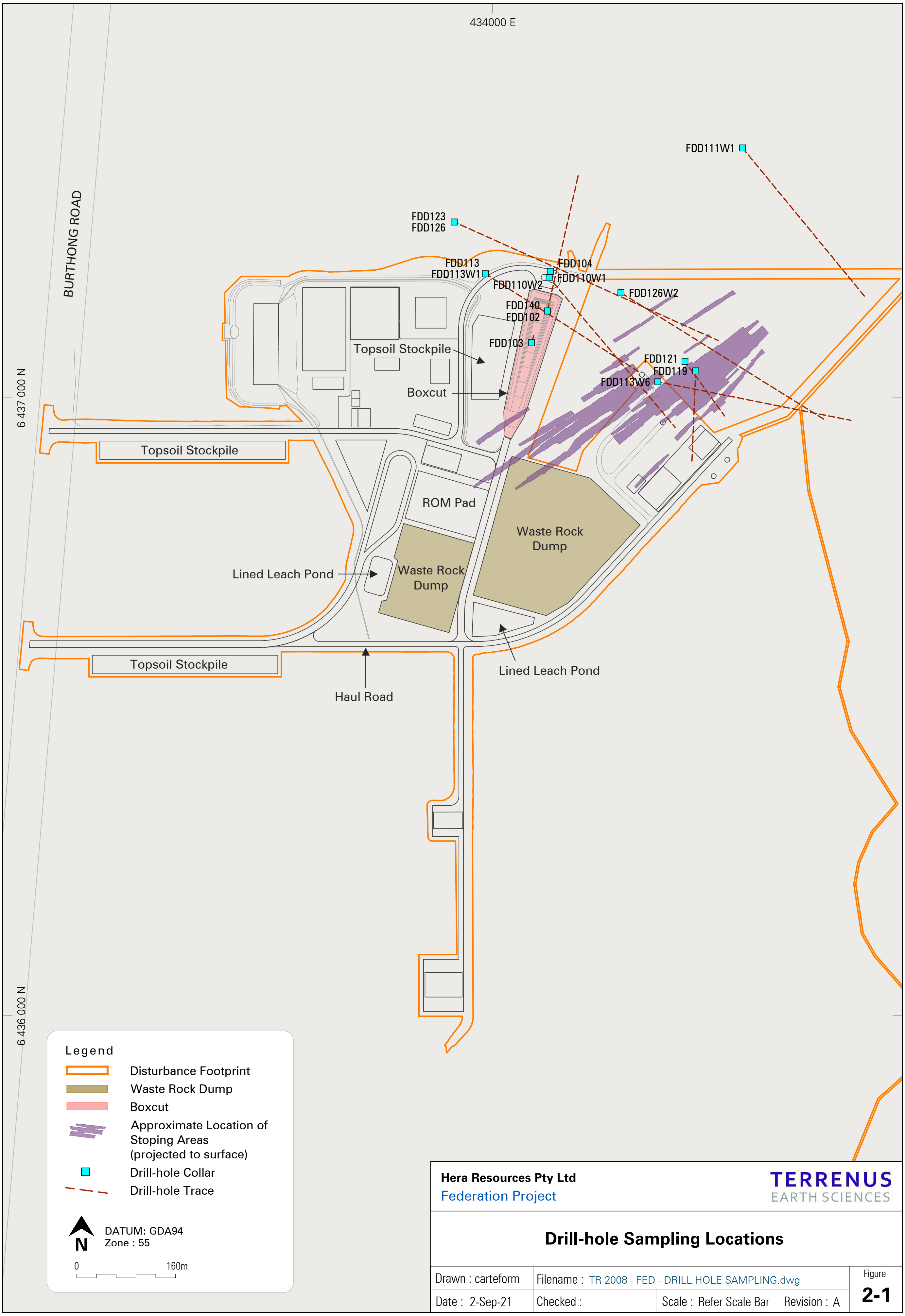
There are currently no specific regulatory requirements regarding the number of samples required to be tested for waste rock material for mines in New South Wales. Australian and international guidelines (Department of Industry, Innovation and Science [DIIS] 2016; International Network on Acid Prevention [INAP] 2009) advocate a risk-based approach to sampling, taking into account the geological and mineralogical complexity, mining methods, quantities of mineral wastes to be stored/disposed on the surface – and duration of waste rock storage/management, and the climate of the site.

Drill-core samples were selected from existing (recent) drill-holes by Project geologists and Terrenus (collaborative discussion). The drill-hole collar and trace locations are shown on **Figure 2-1** – projected over the approximate location of the stoping areas (underground mine). Drill-hole FDD111W1 is north of the stoping area, however is along strike from the deposit and is representative of potential waste rock. Drill-hole FDD140 extends north from the boxcut (*ie*. not in the direction of the stoping area) and is targeting upper and mid-level decline waste rock from two depth zones. All other drill-holes are sampled from various depths targeting potential waste rock amongst the deposit.

Geochemical data is available for 201 drill-core samples from 15 drill-holes, comprising 52 weathered samples from the proposed box-cut and portal area and 149 fresh (unweathered) samples from a range of depths throughout the deposit. Drill-hole samples were selected to target the dominant waste rock sources, comprising the box-cut (weathered waste) and the decline at various depths/locations.

Tailings geochemical data was obtained from three (3) trial samples from a bench process, and comprised 1). a master composite; 2). A high talc and clay 'end member'; and 3). A high sulfide 'end member'. The 'master composite' is the most relevant of these three samples – as being broadly representative of tailings to be generated by the project. The two 'end members' are considered to be the 'possible extremes' of the proposed tailings process – and have been included in the assessment for context. Unlike waste rock, where a potentially wide range of geological and geochemical variability may be expected, tailings are relatively homogeneous, as they are produced from a 'recipe' at the plant. As such, there is generally much less geochemical variability in tailings over time provided the 'recipe' doesn't change significantly and the ore feed is relatively mineralogically consistent.

Drill-hole information is provided in **Appendix A** and the drill-hole (sampling) locations are shown on **Figure 2-1**. Sample descriptions are provided in the tables in **Appendix B**.



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Drill-hole Sampling Locations

Drawn : carteform	Filename : TR 2008 - FED - DRILL HOLE SAMPLING.dwg			Figure 2-1
Date : 2-Sep-21	Checked :	Scale : Refer Scale Bar	Revision : A	

2.4 Geochemical Tests

The samples were characterised using a wide variety of detailed static geochemical test methods, which provide the fundamental geochemical characteristics of a sample. Static tests involve discrete analytical tests undertaken on samples, where the results represent the geochemical characteristics of the sample at a single point in time (or over a short period of time) and under simple experimental conditions as a 'snapshot' of the sample's likely environmental geochemical characteristics.

Drill-core samples were prepared for static testing by crushing to less than (passing) 6 millimetres (mm) then pulverising a sub-sample (for analysis) to a particle size of less than 75 micrometres (μm) in diameter. This is a standard preparation method that provides a homogenous sample for testing and creates a large surface contact area. This, in turn, provides a large potential for sample dissolution and reaction and therefore represents an initial 'assumed worst case' scenario for the potential waste rock material. Tailings samples underwent soluble analysis on the 'as received' size fraction, which was already very fine-grained.

The static testing results alone have been adequate and defining in the context of the assessment objectives for the purposes of the assessment. As such, kinetic leaching tests were not undertaken on these materials as part of this assessment.

Static Test Methodology

The test methods employed on each sample varied slightly between the different sample types (drill-hole samples versus tailings samples). Generally, most samples have undergone 'screening' tests for:

- pH and electrical conductivity (EC) (1:5 weight:volume [w:v]) on sample pulps;
- Net Acid Producing Potential (NAPP), which comprises total sulfur (S) and acid neutralising capacity (ANC). The NAPP test provides the fundamental information about the theoretical maximum amount of acid-producing and acid-neutralising material that a sample could produce; and
- Total carbon.

Based on the results of the screening tests, the type of sample (drill-hole versus tailings), lithology and weathering of each sample, selected samples were subjected to some or all of the following tests:

- Sulfur as sulfide [chromium reducible sulfur (Scr)];
- Acid buffering characterisation curve (ABCC) – a test to determine the proportion of ANC that's in a readily-available form and to provide an indication of the mineralogy of the neutralising material;
- Net Acid Generation (NAG) [single addition] – a test that encourages the oxidation of a sample to determine if acid can be produced, and how much acid could be produced;
- Kinetic net acid generation test (K-NAG) – undertaking a single addition NAG test whilst logging the change in temperature and pH of the sample during the oxidation reaction;

- Sequential net acid generation test (S-NAG) – a refinement of the single addition NAG test to resolve potential issues associated with incomplete oxidation of samples with high sulfide concentrations;
- NAG leachate analysis – after the NAG or S-NAG test the leachate is analysed for a range of parameters, such as pH, EC, major ions and soluble metals/metalloids.
- Total metals and metalloids by 4-acid (mixed) digest with analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and/or Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES);
- Quantitative x-ray diffraction (QRD) – to determine the mineralogical composition;
- Deionised water extract leach procedure – a 1 hour end-over-end bottle leach on pulp[3] samples at 1:5 solid:water ratio using de-ionised water, with filtered leachate analysed for:
  - EC and pH;
  - Major and minor ions [calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), sulfate (SO_4), chloride (Cl) and fluoride (F)];
  - Alkalinity [total alkalinity, bicarbonate (HCO_3) and carbonate (CO_3)];
  - Acidity (pH dependent);
  - Soluble metals and metalloids [approximately 28 elements by ICP-MS, ICP-AES and Flow Injection Mercury System (FIMS)].
- Exchangeable cations (Calcium [Ca], Magnesium [Mg], Sodium [Na], Potassium [K]) (with pre-treatment for salinity, if required). Results were used to calculate the cation exchange capacity (CEC).

The geochemical test work program is summarised in **Table 2-1** by sample type. Laboratory test work was undertaken by ALS Limited (ALS) Brisbane, using National Association of Testing Authorities (NATA) accredited methods (where such accreditation exists).

The Acid-Base Account (ABA) method was used to assess the acid-neutralising and acid-generating characteristics of the samples. The total and water-soluble element data was used to indicate the potential for the samples to leach metals and metalloids (under existing pH and oxygen [redox] conditions) at concentrations that could warrant further investigation (in an assumed 'worst-case' leaching scenario).

Table 2-1. Summary of the Geochemical Test Program
(Number of samples subjected to each test regime)

Analytical tests	Drill-hole samples	Tailing samples
pH and EC on 1:5 water extracts	149 samples	All 3 samples
Total sulfur (S)	All 201 samples	All 3 samples
ANC	All 201 samples	All 3 samples
Sulfide (Scr)	142 samples	All 3 samples

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[3] Drill-hole samples for soluble analysis (eg. pH, EC, soluble ions and soluble elements) were 'pulped to 85 % passing (minus) 75 μm. Tailings underwent soluble analysis on 'as received' samples, which are already very fine-grained.

Analytical tests	Drill-hole samples	Tailing samples
Total carbon (C)	All 201 samples	All 3 samples
NAG	142 samples	2 samples
NAG Sequential (S-NAG)	-	1 sample
NAG Kinetic (K-NAG)	12 samples	2 samples
ABCC	12 samples	All 3 samples
QXRD	10 samples	1 sample
Total elements in solids	20 samples	All 3 samples
Soluble elements and major ions in 1:5 deionised water extract	20 samples	All 3 samples
Exchangeable cations	12 samples	-

Assessment of Element Enrichment

From an environmental perspective, multi-element scans are typically undertaken to identify any elements (particularly metals and metalloids) present in a material at concentrations that *may* be of environmental concern with respect to surface and seepage water quality.

To assess the potential environmental enrichment, the total concentration result for each element were compared to median element abundance in soil in the earth's crust (Bowen, 1979) to measure how the total elemental concentrations in the samples compare against median elemental concentrations in unmineralised soil (worldwide). Such a comparison is undertaken to identify samples that contain what may be regarded as 'elevated' concentrations of metals and metalloids to assess any potential concerns related to disposal and rehabilitation. Naturally mineralised areas – as at the Project – may be expected to have higher levels of element enrichment in waste rock compared to waste rock from unmineralised areas. However, enrichment in any metals/metalloids in the solids does not translate to enhanced leachability or mobilisation of that specific element.

From the comparison with average crustal abundance in rocks a geochemical abundance index (GAI) was calculated. The GAI quantifies an assay result for a particular element in terms of the average abundance for that element (in sedimentary rocks). The index, based on a log 2 scale, is expressed in seven integer increments (0 to 6), which correspond to enrichment factors from 0 to over 96 times average crustal abundance, as shown in **Table 2-2**.

Table 2-2. Geochemical Abundance Index (GAI)

GAI	Enrichment factor	GAI	Enrichment factor
0	Less than 3-fold enrichment	4	24 to 48-fold enrichment
1	3 to 6-fold enrichment	5	48 to 96-fold enrichment
2	6 to 12-fold enrichment	6	Greater than 96-fold enrichment
3	12 to 24-fold enrichment		

As a general rule, a GAI greater than or equal to three indicates enrichment to a level that potentially warrants further investigation or provides an indication of which elements may potentially be problematic with respect to environmental impacts.

Elements identified as enriched may not necessarily be a concern for revegetation and rehabilitation, human and animal health or drainage water quality, but their significance should be evaluated. Similarly, if an element is not enriched it does not mean it would never be a concern, because under some conditions (*eg.* low pH) the geochemical behaviour of common environmentally important elements such as Al, As, Cu, Cd and Zn can change significantly.

Assessment of Element Solubility

Solubility data is available for 20 drill-hole samples and all three tailings samples. All samples have undergone a one hour 1:5 w:v (solid:water) deionised water bottle leach procedure to determine the immediate solubility and potential mobility of elements under highly agitated and solubility-inducing conditions. The NAG test leachate from 12 drill-hole samples and all three tailings samples was also assessed – primarily to determine the solubility of metals and metalloids following sample oxidation and onset of acidification.

The leaching tests for drill-hole samples were performed on pulped samples (85 % passing 75 μm in diameter). The leaching test for tailings samples were performed on very fine grained 'as received' samples. With pulp (or very fine grained) samples the available surface area for dissolution/ solubility and/or geochemical reaction is relatively high compared to dissolution/solubility of soil and rock at much greater grain sizes.

No comparison is made between bottle leachate (or NAG leachate) results and water quality guideline values, such as ANZG (2018), as such a comparison is inappropriate. The guideline values provided in ANZG (2018) are for receiving water environments (eg. creeks and rivers), whereas the soluble element data in this assessment is 'point source' obtained from a finely-pulped sample subjected to rigorous and artificial extraction to obtain a concentration approaching 'near maximum'. Furthermore, as contact water reports to the receiving environments a number of geochemical reactions will take place, including: retardation, adsorption and precipitation – and also likely dilution, which will attenuate the concentration as seepage/contact water migrates from the source. These processes are not accounted for in a laboratory setting.

2.5 Acid Classification Criteria

Sample classification of mineral waste material follows some general rules. Samples were classified, with respect to acid generation, using NAG and NAPP data (and ANC/MPA ratio where NAG data was not available) into three broad categories:

NAF	Non-acid Forming;
Uncertain	Those samples with inconclusive results, leading to a degree of uncertainty about their ability to generate acid; and
PAF	Potentially Acid Forming.

Within these three broad categories the sample classification was further refined with the aid of Total S data, as follows:

NAF (NAF):

NAPP <0 kg sulfuric acid per tonne of sample (kg H_2SO_4/t) and NAGpH ≥4.5 and S ≤1 %

or (where no NAG data is available)

NAPP <0 kg H_2SO_4/t and ANC/MPA ratio ≥3 and S ≤1 %

NAF-Sulfur (NAF-S):

NAPP <0 kg H_2SO_4/t and NAGpH ≥ 4.5 and S >1 %

or (where no NAG data is available)

NAPP <0 kg H_2SO_4/t and ANC/MPA ratio ≥ 3 and S >1 %

PAF – Low Capacity (PAF-LC):

NAPP ≥ 0 and <10 kg H_2SO_4/t and NAGpH <4.5

or (where no NAG data is available)

NAPP ≥ 0 and <10 kg H_2SO_4/t and ANC/MPA ratio <3 and S ≤ 1 %

PAF:

NAPP ≥ 10 kg H_2SO_4/t and NAGpH <4.5

or (where no NAG data is available)

NAPP ≥ 10 kg H_2SO_4/t and ANC/MPA ratio <3

Uncertain (UC)

Applied to results outside of the above criteria, or results that appear to significantly conflict with the expected result based on lithology or mineralogy. In most cases samples initially classified as 'Uncertain' were able to be refined into one of the NAF/PAF sub-classes above based on more detailed geochemical test results, such as S-NAG, ABCC and mineralogical (QXRD) data. Where there was still some uncertainty surrounding a classification a provisional classification of UC(NAF) or UC(PAF) was assigned where the available information suggested a likely classification. Taking all available information into account, four (4) samples were still assigned as 'Uncertain'.

Heterogeneity is a characteristic of natural geological (soil and rock) material. Sometimes an analytical result for a rock sample can vary to that which may be expected based on the known rock type (from information contained in the lithological logs). In this case, a degree of conservatism is applied to the result (*ie*. the precautionary principle prevails) and the sample is classified as 'Uncertain' until further information becomes available. Depending on the level of risk, from a mineral waste management perspective 'Uncertain' samples are usually managed conservatively.

Generally, those samples with an ANC/MPA mass ratio greater than two are considered to have a negligible/low risk of acid generation (DIIS, 2016; INAP, 2009[4]), especially where sulfide concentrations are very low and reactive ANC is very high. As such, an ANC/MPA ratio value of two (2) is typically used as part of the classification of samples. At the Project, ABCC and mineralogical data has showed that ANC is generally not in a readily available form for most samples and, as such, an ANC/MPA ratio value of three (3) was used for sample classification.

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[4] INAP (2009) considers that mine materials with an ANC/MPA ratio greater than 2 are likely to be NAF unless significant preferential exposure of sulfide minerals occurs along fracture planes, in combination with insufficiently reactive ANC.

3 Geochemical Test Results – Potential Waste Rock

The static geochemical results for drill-hole samples (potential waste rock) are tabulated in Appendix B. The laboratory reports can be provided on request.

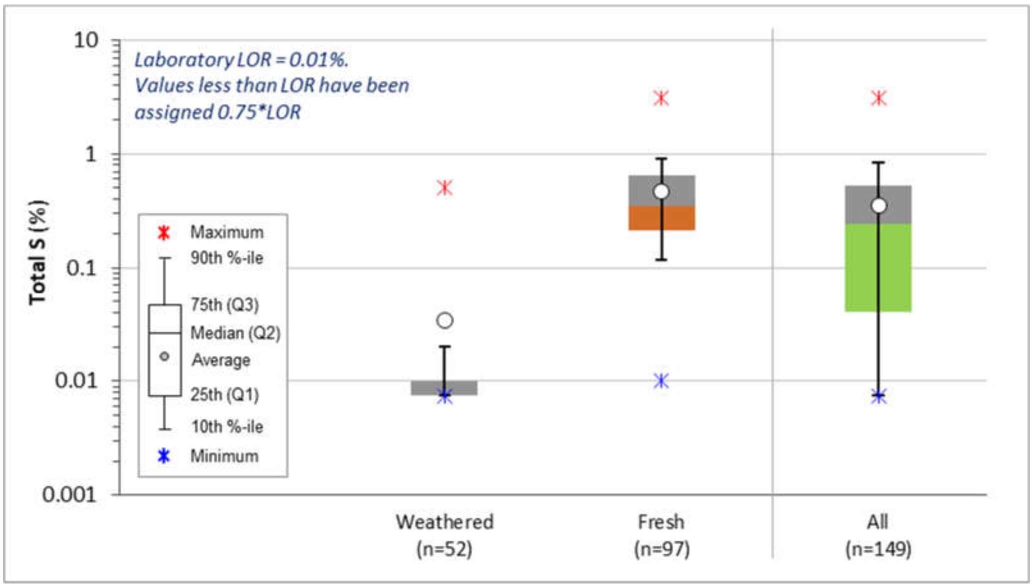
3.1 Acid-Base Accounting (Potential for Acid Generation)

The ABA is the theoretical balance between the potential for a sample to generate acid and neutralise acid and is expressed in units of kg H_2SO_4/t.

Sulfur and Sulfide

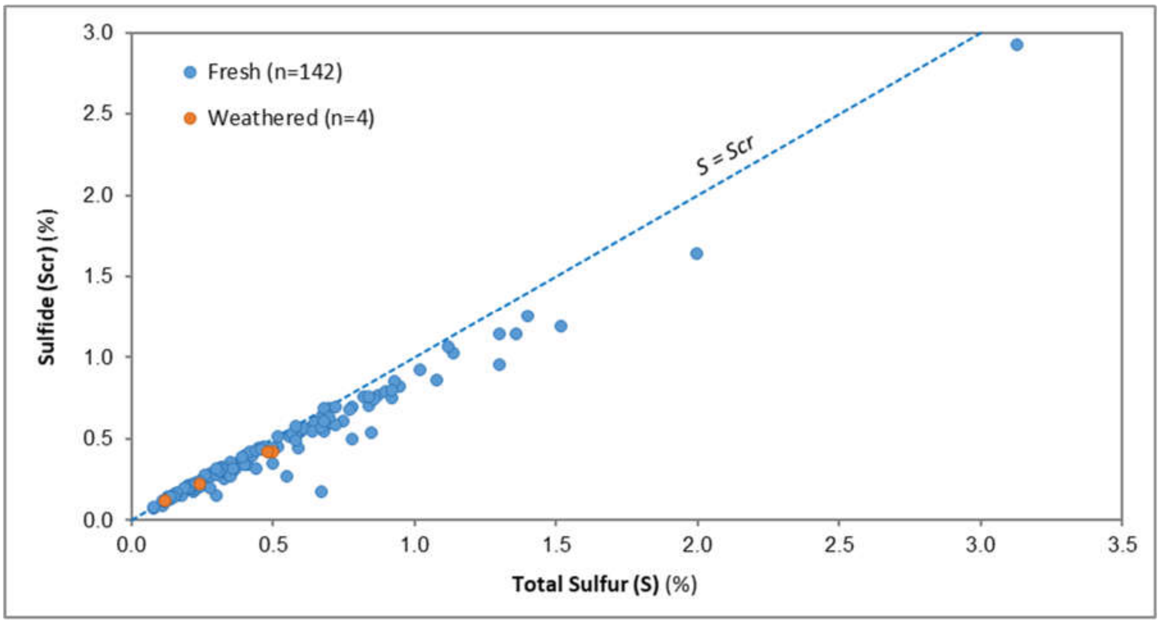
The total sulfur (total S) concentration values of potential waste rock samples ranged from less than 0.01 % to 3.13 %, with relatively modest median and 90th percentile values of 0.24 % and 0.84 %, respectively. As evident in Figure 3-1 the total S concentrations were higher in the fresh samples compared to the weathered samples.

Figure 3-1. Distribution of Total Sulfur of Potential Waste Rock



Chromium reducible sulfur (Scr) was measured on 142 samples (all 'fresh' [unweathered] samples, except for 4 weathered samples) – those samples with total S values greater than 0.1 %. The Scr values ranged from 0.07 % to 2.92 %. As a proportion of total S, Scr (sulfide) accounts for about 90 % (on average) of total S, indicating that most S is present as sulfide in the fresh (unweathered) samples (Figure 3-2).

Figure 3-2. Sulfide versus Total Sulfur of Potential Waste Rock



Maximum Potential Acidity and Acid Neutralising Capacity

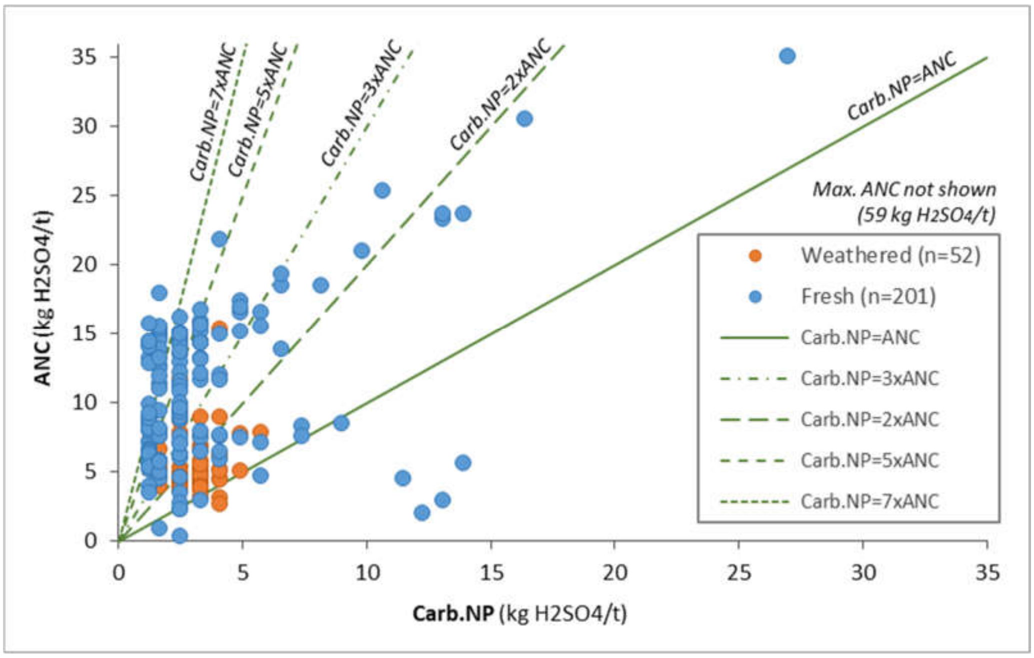
The maximum potential acidity (MPA) and acid neutralising capacity (ANC) represent each side of the acid-base account. MPA is calculated from total S and is the theoretical maximum potential acidity that can be generated if all of the S (assumed as sulfide) is able to oxidise and generate acid (H_2SO_4). ANC represents the theoretical maximum amount of acid-neutralising capacity of a sample assuming all neutralising material is in a readily available form. The net acid producing potential (NAPP) – discussed below – is the difference between the MPA and the ANC. In simple terms, a negative NAPP indicates an excess of ANC and the sample is likely to be non-acid forming (NAF) – assuming all ANC is 'readily available'; and a positive NAPP indicates an excess of MPA and the sample is likely to be potentially acid forming (PAF) – assuming all S is present as acid-generating sulfide. There can be exceptions to this simplified interpretation.

Due to the relatively modest total S values the MPA for most samples is also relatively modest, with a 90th percentile MPA value of 25.7 kg H_2SO_4/t (*ie*. 90 % of samples have an MPA less than 26 kg H_2SO_4/t). As expected by the total S values, the 'fresh' samples have greater MPA values compared to the weathered samples.

The ANC values are generally very low, ranging from less than 0.5 to 59 kg H_2SO_4/t, with a low median ANC value for all samples of 2.5 kg H_2SO_4/t and a very low 10th percentile value of 1.2 kg H_2SO_4/t (*ie*. 90 % of samples have an ANC greater than 1.2 kg H_2SO_4/t).

The total carbon (C) concentrations were used to calculate the Carb.NP, to assess the relationship (correlation) between ANC and Carb.NP. Carb.NP values ranged from 1.2 to 52 kg H_2SO_4/t, with a very low median Carb.NP value for all samples of 3.3 kg H_2SO_4/t and a negligibly low 10th percentile value of 1.2 kg H_2SO_4/t – with little difference between the weathered and fresh samples, as evident in Figure 3-3, where ANC is plotted against Carb.NP.

Figure 3-3. Acid Neutralising Capacity (ANC) versus Carbonate Neutralising Potential (Carb.NP) of Potential Waste Rock



If all C is present as inorganic C and if we assume all C is present as carbonate, such as dolomite, there should be reasonable alignment between ANC and Carb.NP. ANC values significantly higher than Carb.NP are likely to be indicative of samples where non-carbonate minerals are contributing to the ANC. Carb.NP values significantly higher than ANC implies that a significant proportion of C may be present as organic C, or the carbonate mineral(s) are not in a readily available form (ie, they're likely present as iron- or manganese-carbonate, rather than calcium- or magnesium-carbonate). At the Project the organic C is assumed to be very low. Therefore, differences between Carb.NP and ANC in waste rock at the Project are expected to be primarily due to carbonate mineral availability.

A significant proportion of the samples had Carb.NP values that were significantly higher than the ANC values, and with a broad range of difference between the Carb.NP value versus the ANC value for any given sample, as evident in **Figure 3-3**. This suggests that a significant proportion of carbonate present in potential waste rock material is not in a readily available form.

Available Neutralising Capacity

The availability of neutralising material is generally determined by the mineralogy of the sample – with pure calcite and dolomite (carbonate minerals) being more readily-available to neutralise acidity compared with, for example, silicates. Siderite and magnesite, although common carbonate minerals, have no net acid neutralising capacity. Other more common carbonate minerals, such as ferroan dolomite (Fe. Dolomite), are much less efficient acid neutralisers than their 'pure' counterparts. Twelve (12) samples underwent an acid buffering characterisation curve (ABCC) test to assess the proportion of ANC that may be 'readily available' (*ie*. short-acting) in these materials and provide some indication of what carbonate minerals are providing the ANC. 'Ready availability' is regarded as the proportion of ANC that is available for buffering reaction at pH 4.5.

For the 12 samples the ABCC results showed that the proportion of ANC likely available under field conditions ranged from 7 % to 51 % of the Total ANC, with median and 75th percentile values of 12 % and 43 %, respectively (**Table 3-1**).

Table 3-1. Available acid neutralising capacity

Drill-hole & Depth	Description	ANC	ANC @ pH4.5	Proportion of ANC 'readily available'	Carbonate (inferred)
		kg H_2SO_4/t			
FDD123_135-136m	Sandstone Marl; Carb. alteration	23.4	9.9	42%	Fe. Dolomite
FDD121_150-151m	Sandst.; weakly sheared; Chl., Si & Carb. alt.; trace Sph., Gal. & CuPy	16.2	1.2	7%	Magnesite/ Siderite
FDD119_240-241m	Sandstone Siltstone; Si. & Chl. alt.; trace Sph., Gal. & CuPy	23.7	10.2	43%	Fe. Dolomite
FDD113W6_330-331m	Siltstone Sandstone; Silica, Sericitic & Pyrr. alteration	21.9	1.9	9%	Magnesite/ Siderite
FDD113W6_360-361m	Siltstone; Laminated; Silica, Chl. & Pyrr. alt.; trace CuPy. & Sph.	15.7	1.5	10%	Magnesite/ Siderite
FDD113W6_410-411m	Siltstone; Black Chl. & Silica alteration	15.7	1.6	10%	Magnesite/ Siderite
FDD113_550-551m	Sandstone Siltstone; Silica & Pyrr. alteration; trace Pyrr. & Sph.	15.2	1.3	9%	Magnesite/ Siderite
FDD113W1_590-591m	Siltst. Sandst.; laminated; Si., Chl. & Pyrr. alt.; trace Sph. & Gal.	16.8	2.4	14%	Magnesite/ Siderite
FDD113W1_630-631m	Siltstone; Bioturbated; Si. & Chl. alt.; trace Sph. & Gal.	14.6	1.9	13%	Magnesite/ Siderite
FDD126W2_660-661.1m	Siltstone; Brecciated; Si. & Chl. alt.; trace Sph., Gal. & CuPy	21.1	10.4	49%	Fe. Dolomite
FDD126_680-681m	Sandst. Siltst.; Qtz veins; Si., Chl. & Albite alt.; trace Gal. & CuPy	30.6	15.7	51%	Fe. Dolomite
FDD126W2_680-681m	Siltstone Sandstone; Chl., Si. & Albite alt.; trace Sph., Gal. & CuPy	15.4	1.1	7%	Magnesite/ Siderite

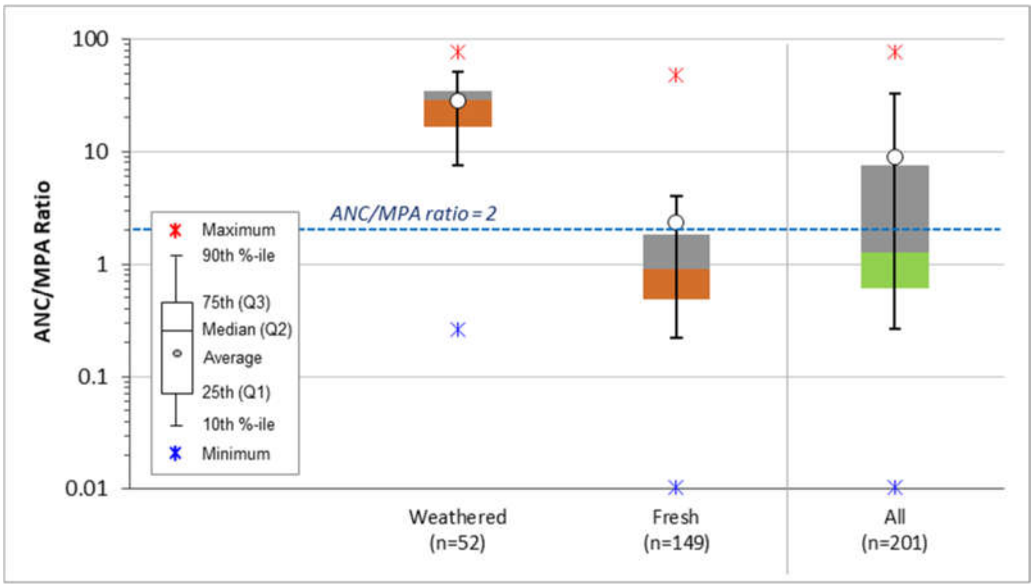
The shape of the ABCC curves (the reaction rate) can also be used to infer potential carbonate mineralogy based on standard curves/data for different carbonate minerals at varying ANC values. ABCC reaction rate curves are provided in **Appendix C**. Where some reasonable proportion of ANC was available, iron dolomite (Fe-dolomite) appeared to be the dominant carbonate mineral (based on the ABCC curves). However, where little ANC was readily available, the ABCC data suggested that carbonate was likely present as siderite or magnesite.

Based on the above, the carbonate minerals in bulk waste rock (fresh materials) are likely to be an iron dolomitic variety and siderite/magnesite. Mineralogy is discussed in further detail in **Section 3.2**.

ANC/MPA Ratios

Generally, those samples with an ANC/MPA mass ratio greater than two are considered to have a negligible/low risk of acid generation (DIIS, 2016; INAP, 2009[5]), especially where sulfide concentrations are very low and reactive ANC is very high. At the Project, sulfide concentrations are relatively modest, however reactive ANC is very low (generally). The results, illustrated in Figure 3-4, show that almost all weathered samples have an ANC/MPA ratio much greater than two, however most of the fresh samples have ANC/MPA ratios much lower than two.

Figure 3-4. Distribution of the Ratio of Acid Neutralising Capacity (ANC) to Maximum Potential Acidity (MPA) [ANC/MPA ratio] of Potential Waste Rock



Net Acid Producing Potential and Net Acid Generation Capacity

Based on the relatively modest MPA and low to modest ANC values (relative to the MPA), the calculated NAPP values span a wide range from -36 to + 81 kg H_2SO_4/t (Figure 3-5), with the weathered samples producing mostly low negative values. The fresh samples had a wide range of negative and positive NAPP values.

NAG test results are used in conjunction with NAPP values in determining the acid classification of samples. The calculated NAPP value assumes that all sulfur (or sulfide) will oxidise to generate acid (MPA) and that all neutralising material in a sample is in a readily available form to neutralise any acid that could be generated (ANC). Unlike the theoretical basis of the NAPP test, in a NAG test a sample is encouraged to oxidise by reaction with hydrogen peroxide and any acid generated through oxidation may be consumed by neutralising components in the sample. Any remaining acidity is measured and expressed as kg H_2SO_4/t. Samples with NAGpH values greater than pH 4.5 are considered to be NAF. Samples with NAGpH values less than or equal to pH 4.5 (*ie*. acid-generating) would also be expected to have measurable NAG capacity (*ie*. NAG capacity >0.1

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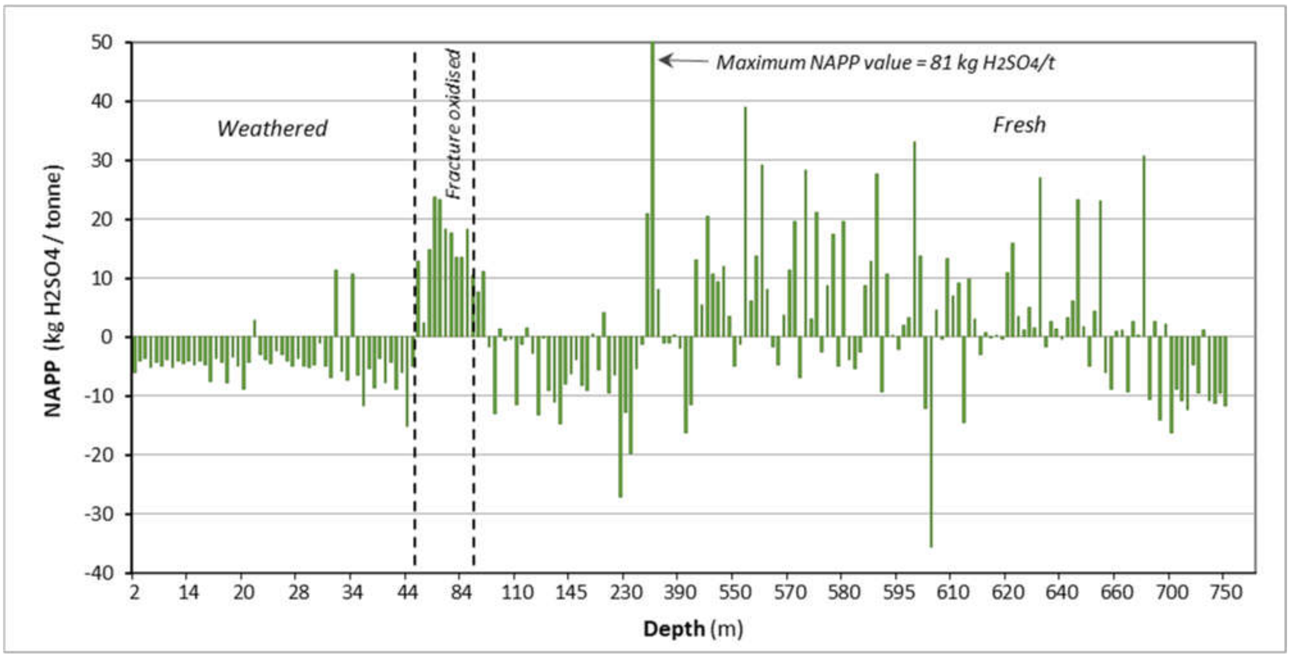
[5] INAP (2009) considers that mine materials with an ANC/MPA ratio greater than 2 are likely to be NAF unless significant preferential exposure of sulfide minerals occurs along fracture planes, and/or in combination with insufficiently reactive ANC.

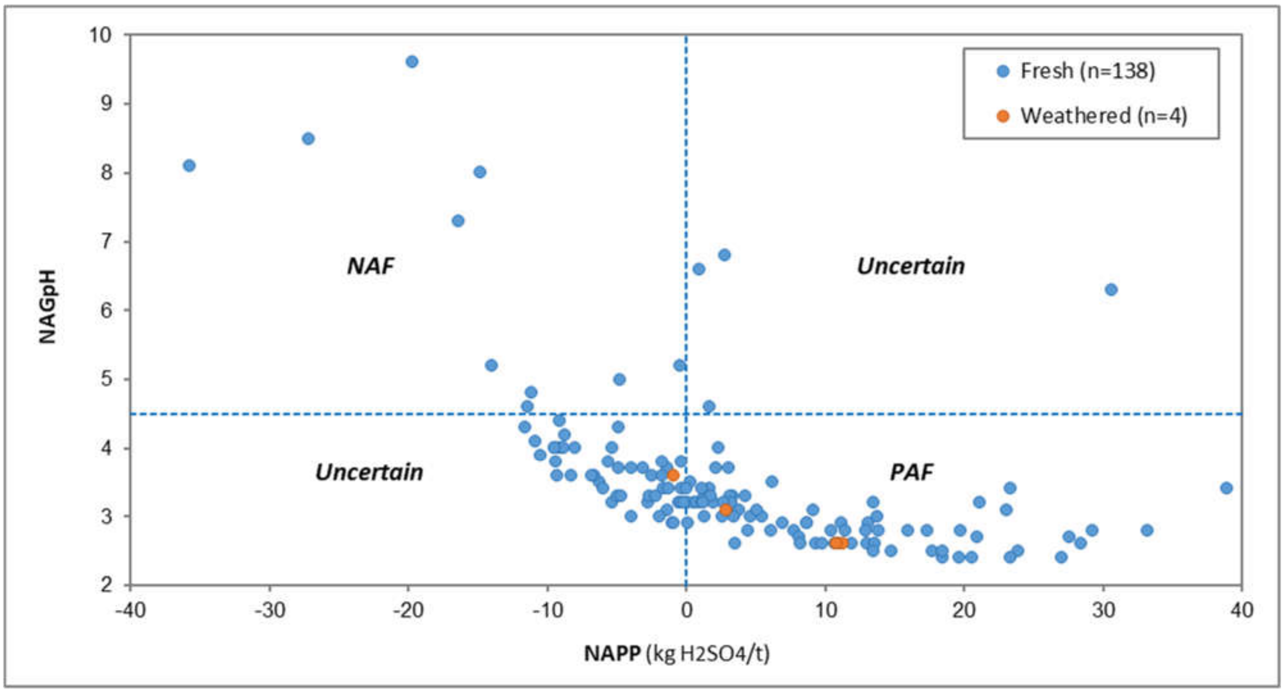
kg H_2SO_4/t). As a guide, NAG capacity values between 0.1 and 5 kg H_2SO_4/t are considered 'low capacity' (AMIRA, 2002).

Figure 3-5. Net Acid Producing Potential (NAPP) of Potential Waste Rock



NAG tests were undertaken on most 'fresh' samples and 4 weathered samples, which showed that most samples tested had NAGpH values less than pH 4.5 (and had 25th percentile NAG capacities of 5.2 kg H_2SO_4/t). The plot of NAGpH versus NAPP results (**Figure 3-6**) shows that most samples have low negative or positive NAPP values, and so plot in the 'Uncertain' or PAF domains.

Figure 3-6. Net Acid Producing Potential (NAPP) and Net Acid Generation pH (NAGpH) of Potential Waste Rock



Kinetic Net Acid Generation (K-NAG)

Twelve (12) potential waste rock samples also underwent Kinetic NAG (K-NAG) testing to estimate the rate of potential acid generation (if at all) and to assess how reactive the sample may be should it generate acid.

Kinetic net acid generation (K-NAG) tests provide an indication of the kinetics of sulfide oxidation and potential acid generation for a sample. The K-NAG test is the same as the standard NAG test except that the temperature and pH of the liquor are recorded over the duration of the test (up to six hours). The time until the pH of the liquor reaches pH 4 can be used to broadly estimate the potential lag period before acid conditions may develop in a sample under atmospheric oxidation conditions. The temperature profile can also provide an indication of how vigorous the reaction is (and relative sulfide concentration). A sharp 'spike' in temperature typically correlates to the rapid reaction of a 'high' (notable) sulfide concentration compared with a slow subtle change in temperature that correlates to a much slower reaction.

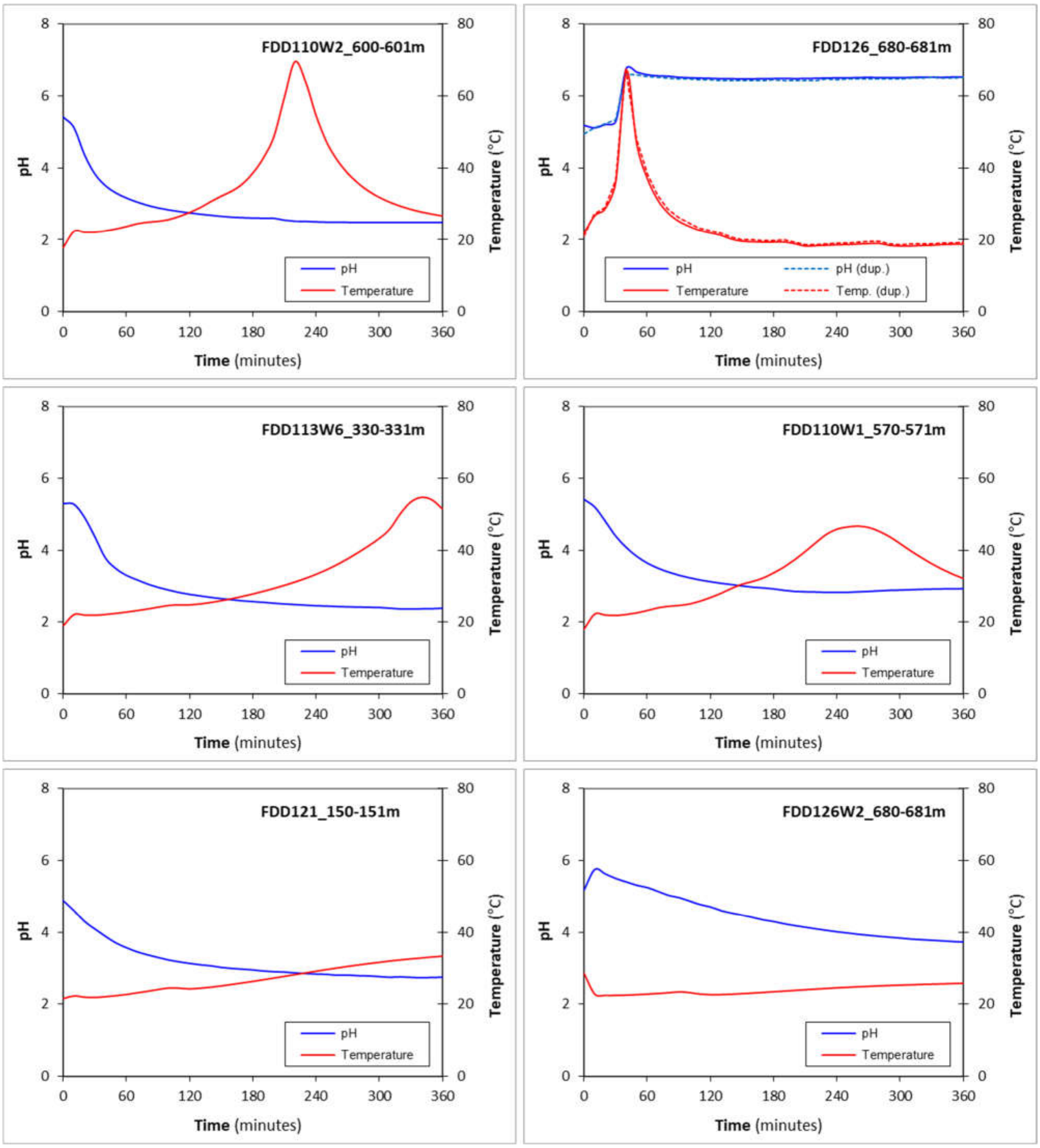
K-NAG testing was undertaken on 12 samples comprising one (1) slightly weathered and 11 fresh potential waste rock samples. Ten (10) of the samples were classified as PAF-LC or PAF, one (1) sample classified as 'Uncertain' and one (1) sample classified as UC(PAF). The K-NAG test was undertaken to help resolve uncertainty around the AMD classification (for some samples), however was primarily undertaken to understand – at a preliminary level – the reaction kinetics of a broad selection of 'PAF' potential waste rock samples.

The results (presented in **Appendix D**) found that most of the samples had relatively weak (slow) reaction kinetics, with relatively slow and minor changes in temperature even for samples identified as being PAF. Two samples [FDD110W2_600-601m and FDD126_680-681m] had sharp temperature 'spikes' typical of fast oxidation reactions. Two other samples [FDD113_330-331m and FDD110W1_570-571m] had more subdued temperature peaks, evident of slower reactions. The pH and temperature profiles for these four selected samples are provided in **Figure 3-7**, along with two samples displaying 'slow' pH decrease accompanied by 'slow' temperature increase – typical of a very slow reaction kinetics associated with PAF-LC samples. The plots for all 12 samples provided in **Appendix D**.

The K-NAG test-work showed that 11 of the 12 samples were confirmed as PAF – including the sample initially considered to be UC(PAF). The 'Uncertain' sample [FDD126_680-681m] (as shown in **Figure 3-7**) was still pH-neutral after six hours of oxidation, suggesting that the sample is likely to be NAF. A duplicate test was run on this same sample and achieved the same K-NAG result.

The K-NAG data can also be used to infer indicative lag times until acid generation. For most samples the time until acidification (pH 4) is in the order of 2 to 6 months. Some samples – notably FDD111W1_620-621, FDD11W1_660-661m and FDD126W2_680-681m – the time to pH 4 was very long (≥360 minutes), suggesting potential lag times in the order of a couple of years. It is important to note that these indicative lag times are not a substitute for a true kinetic analysis to determine lag times, however they provide a coarse indicator of potential lag timeframes.

Figure 3-7. Kinetic Net Acid Generation (K-NAG) pH and Temperature Profiles for Selected Potential Waste Rock Samples



Geochemical Classification of Potential Waste Rock

The ABA results presented in this section have been used to classify the acid forming nature of the drill-hole samples as shown in Appendix B, following the classification criteria outlined in Section 2.5 and taking into account all additional relevant data, such as ABCC test results. The acid forming nature of these samples is summarised in Table 3-2.

Table 3-2. Geochemical Classification of Potential Waste Rock

Waste Type	NAF	NAF-S	UC(NAF)	Uncertain	UC(PAF)	PAF-LC	PAF
	No. and % of samples						
Weathered (n=52)	48 (92 %)	-	-	-	-	2 (4 %)	2 (4 %)
Fresh (n=149)	21 (14 %)	-	1 (<1 %)	4 (3 %)	23 (15 %)	63 (42 %)	37 (25 %)
All samples (n=201)	*69 (34 %)*	-	*28 (14 %)*			*65 (32 %)*	*39 (19 %)*

The results in **Table 3-2** show that most of the weathered samples were classified as NAF, with four (4) samples (8% of weathered samples) classified as PAF-LC or PAF – meaning the weathered samples (and bulk weathered waste rock material represented by these samples) have low sulfur concentration, significant excess ANC (relative to the MPA) and have a very low capacity to generate acidity or sulfate (*ie*. very low capacity to generate AMD or SD from sulfide oxidation).

Comparatively, only 14 % of the fresh samples were classified as NAF and 67 % were classified as PAF-LC or PAF. The remaining 19 % of fresh samples were classified as Uncertain – of which almost all UC(PAF) samples are expected to be PAF-LC. At best, about 15 % of fresh waste rock (as represented by these samples) can be expected to be NAF, with the large majority to be PAF to varying degrees.

From an acid generating perspective weathered waste rock, as a bulk material, would be NAF. This has implications for soluble metals/metalloids transport, as pH-neutral to alkaline waste rock would inhibit the release of soluble metals/metalloids, compared to the relatively high soluble metals/metalloids concentrations possible in acidic drainage. Furthermore, the very low (negligibly low) sulfur concentrations in potential weathered waste rock indicate that the sulfate concentration that could be generated in weathered waste rock from sulfide oxidation (in addition to any salinity unrelated to sulfide oxidation) would also be very low.

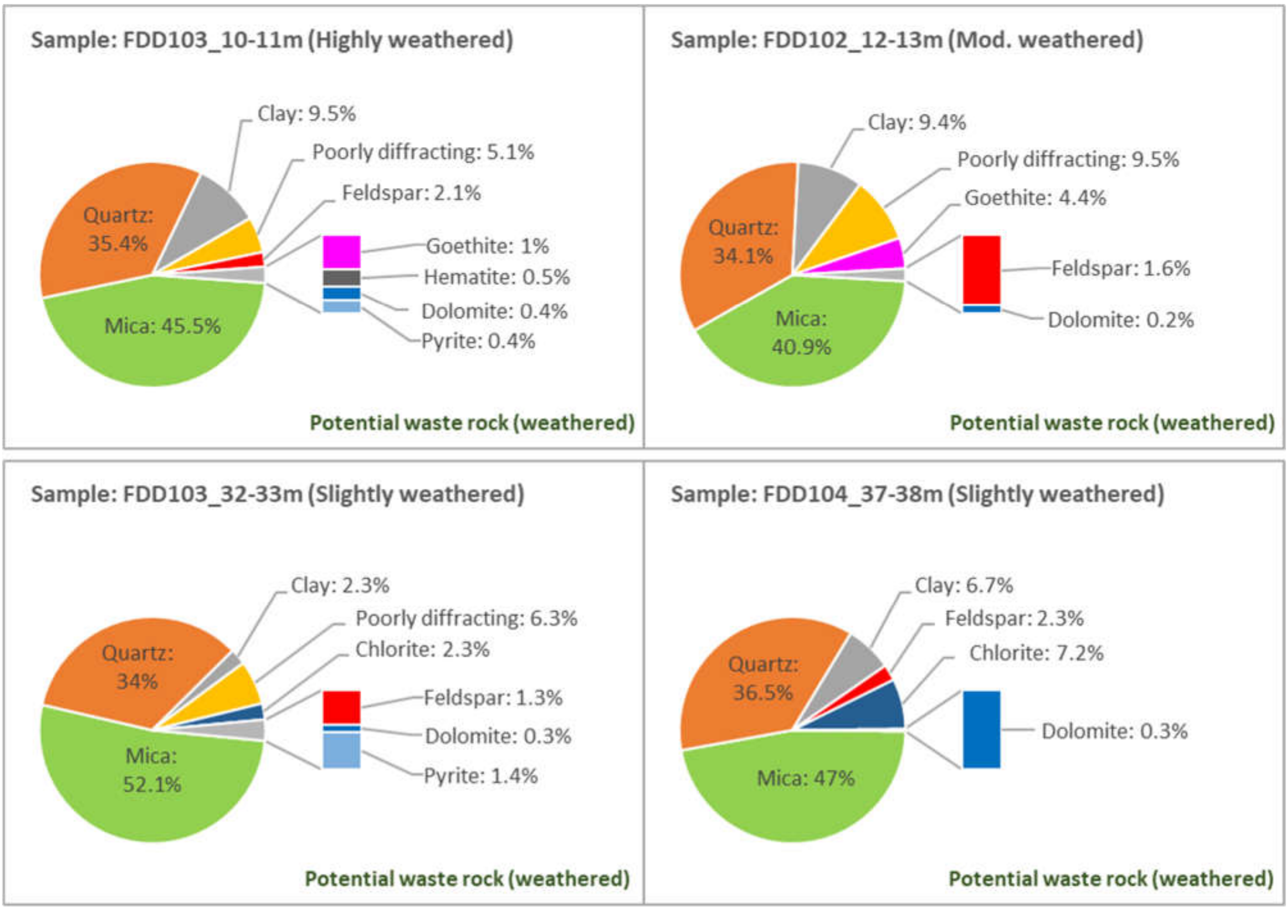
Comparatively, fresh waste rock – as a bulk material – is expected to be PAF with a high potential to generate AMD. Assuming that NAF fresh waste rock is mined and mixed with PAF rock (of which about 60 % of fresh rock is expected to be PAF-LC), fresh waste rock, overall is likely to have a relatively modest capacity to generate significant acidity (*ie*. bulk fresh waste rock can be broadly classified as PAF-LC).

3.2 Mineralogy

Data is available for 10 potential waste rock samples that underwent mineralogical analysis by Quantitative X-Ray Diffraction (QXRD). The samples tested comprised four (4) weathered samples and six (6) fresh samples.

The QXRD results show that most weathered samples are dominated by mica (predominantly muscovite), quartz and clay minerals (**Figure 3-8**). Poorly-diffracting material comprises a significant proportion of the overall composition of the weathered samples (ranging from less than 0.1% to 9.5%), however is expected to comprise mixed clay minerals (silicates) and iron oxides that were unable to be quantitatively determined. All weathered samples have low sulfide mineral proportions (confirming the analytical chemistry results for sulfide). Sulfide (where present) is present as pyrite. Carbonate group minerals are present only as dolomite, and in very low mineral proportions.

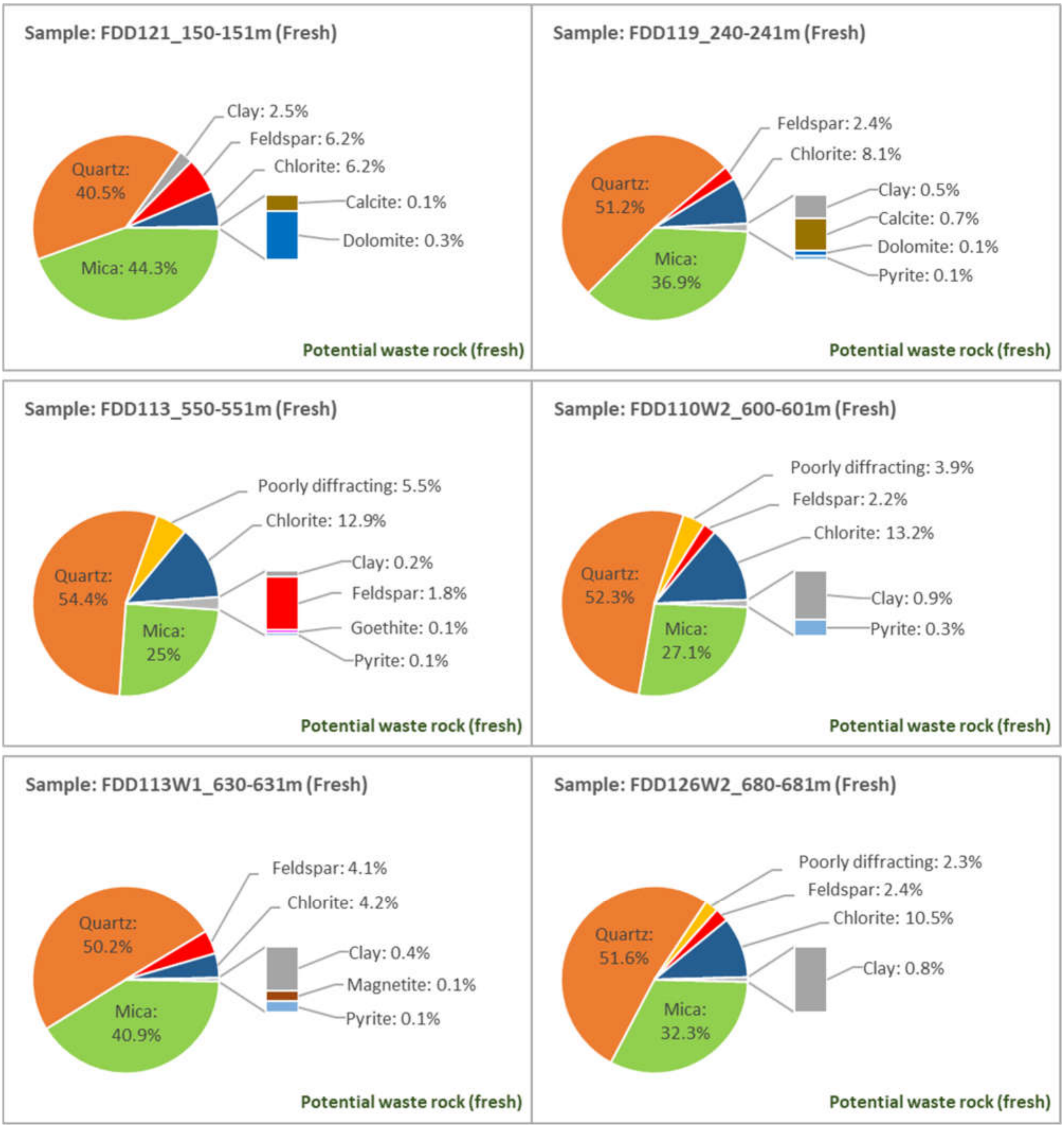
Figure 3-8. Mineralogy of Potential Weathered Waste Rock



The QXRD results show that most fresh samples are dominated by mica (predominantly muscovite) and quartz minerals (Figure 3-9) with variable proportions of feldspars (albite and microcline) and chlorite. Poorly-diffracting material comprises a minor proportion of some samples, and is expected to comprise iron oxides that were unable to be quantitatively determined. All fresh samples have low sulfide mineral proportions (confirming the analytical chemistry results for sulfide). Sulfide (where present) is present as pyrite. Carbonate group minerals are present as dolomite and calcite, and in low mineral proportions.

ABCC data is available for five of the six fresh samples, and for four of these samples the ABCC results were broadly consistent with the mineralogy data. One sample (FDD121_150-151m) has calcite and dolomite present in low concentrations (Figure 3-9), yet the ABCC result for this sample (Table 3-2) suggested little available neutralising capacity and the inferred carbonate mineral was siderite or magnesite.

Figure 3-9. Mineralogy of Potential Fresh Waste Rock



3.3 Metals and Metalloids (Assay)

Multi-element (metal and metalloid) data is available for selected potential waste rock samples: eight (8) weathered and 12 fresh samples. The test results are presented in Appendix B.

The results are compared to background concentrations for each element, based on average elemental abundance in soil in the earth's crust. The comparison is determined by the GAI, as outlined in Section 2.4. GAI values of one or two are regarded as 'slightly to moderately' enriched (with respect to average elemental abundance), GAI values of three or more are regarded as 'significantly' enriched. In mineralised areas – such as at the Project – enrichment in metals and metalloids is expected in ore (clearly) and waste rock (to a lesser extent). The GAI values are presented in Appendix B.

The GAI values show that all samples were enriched to varying degrees with regard to beryllium (Be) and titanium (Ti), and most samples were enriched, to varying degrees in silver (Ag), bismuth (Bi) caesium (Cs), antimony (Sb) and tungsten (W). The weathered samples were enriched in arsenic (As). The fresh samples were enriched in cadmium (Cd), lead (Pb) and zinc (Zn). The degree of enrichment with respect to elements that are generally regarded as more environmentally important is summarised in Table 3-3.

Some degree of enrichment is expected from a mineralised area, and the results are as expected – indicating that metalliferous drainage is plausible. The solubility of metals and metalloids from potential mineral waste is discussed in Section 3.5 (for NAF materials) and Section 3.6 (for PAF materials).

Table 3-3. Summary of Geochemical Abundance Indices (Metal and Metalloid Enrichment) of Potential Waste Rock

Drill-hole & Depth	Weath.	Description	Ag	As	Be	Bi	Cd	Co	Cr	Cu	Hg	Mn	Mo	Ni	Pb	Sb	Se	Sn	Tl	Zn
FDD103_10-11m	Highly	Sandstone Marl; Fractured; Limonite, Hematite & Clay alteration	≥ 3	≥ 3	≥ 3	1 or 2	0	0	0	0	0	0	0	0	0	1 or 2	0	0	≥ 3	0
FDD102_12-13m	Moderately	Sandstone; Limonite & Mn. Oxide alteration	0	1 or 2	≥ 3	1 or 2	0	0	0	0	0	0	0	0	0	1 or 2	0	0	≥ 3	0
FDD103_18-19m	Slightly	Sandstone Marl; Fractured; Limonite & Hematite alteration	1 or 2	≥ 3	≥ 3	1 or 2	0	1 or 2	0	0	0	0	0	0	0	1 or 2	0	0	≥ 3	0
FDD102_32-33m	Moderately	Sandstone Marl; Limonite, Mn. Oxide & Carb. alteration	0	1 or 2	≥ 3	1 or 2	0	0	0	0	0	0	0	0	0	1 or 2	0	0	1 or 2	0
FDD103_32-33m	Slightly	Sandstone; Hematite & Carbonate alteration	1 or 2	1 or 2	≥ 3	1 or 2	0	0	0	0	0	0	0	0	0	1 or 2	0	0	≥ 3	0
FDD104_37-38m	Slightly	Sandstone Marl; Limonite, Hematite & Carb. alteration	0	1 or 2	≥ 3	1 or 2	0	0	0	0	0	0	0	0	0	1 or 2	0	0	1 or 2	0
FDD102_42-43m	Slightly	Sandstone Marl; Limonite, Hematite & Carb. alteration	0	1 or 2	≥ 3	1 or 2	0	1 or 2	0	0	0	1 or 2	0	0	0	1 or 2	0	0	1 or 2	0
FDD104_45-45.9m	Moderately	Sandstone Marl; Hematite, Limonite & Carb. alteration	0	1 or 2	≥ 3	1 or 2	0	0	0	0	0	0	0	0	0	1 or 2	0	0	1 or 2	0
FDD121_150-151m	Fresh	Sandstone; weakly sheared; Chlorite, Silica & Carbonate. alteration.; trace Sphalerite., Galena & Chalcopyrite	1 or 2	1 or 2	≥ 3	0	1 or 2	0	0	1 or 2	0	0	0	0	≥ 3	1 or 2	0	0	≥ 3	1 or 2
FDD119_240-241m	Fresh	Sandstone Siltstone; thinly bedded; Silicate & Chlorite alteration; trace Sphalerite, Galena and Chalcopyrite	-	0	≥ 3	0	0	0	0	0	0	0	0	0	1 or 2	0	0	0	1 or 2	0
FDD113W6_360-361m	Fresh	Siltstone; Laminated; Silica, Chlorite & Pyrrhotite alteration; trace Chalcopyrite & Sphalerite	1 or 2	1 or 2	≥ 3	1 or 2	1 or 2	0	0	0	0	0	0	0	1 or 2	1 or 2	0	0	1 or 2	1 or 2
FDD113W6_410-411m	Fresh	Siltstone; Black Chlorite & Silica alteration	1 or 2	1 or 2	≥ 3	1 or 2	1 or 2	0	0	1 or 2	0	0	0	0	≥ 3	1 or 2	0	0	1 or 2	≥ 3
FDD113_550-551m	Fresh	Sandstone Siltstone; Silica & Pyrrhotite alteration; trace Pyrrhotite & Sphalerite	0	0	≥ 3	0	0	0	0	0	0	0	0	0	0	1 or 2	0	0	1 or 2	0
FDD110W1_570-571m	Fresh	Siltstone Sandstone; partially brecciated; Silicate, Chlorite & Pyrrhotite alteration; trace Sphalerite, Galena & Pyrrhotite	1 or 2	0	1 or 2	0	≥ 3	0	0	≥ 3	0	0	0	0	≥ 3	1 or 2	0	0	1 or 2	≥ 3
FDD110W2_600-601m	Fresh	Sandstone; Silica, Chlorite & Pyrrhotite alteration; trace Pyrrhotite & Sphalerite	1 or 2	0	1 or 2	1 or 2	≥ 3	1 or 2	0	1 or 2	0	0	≥ 3	0	≥ 3	1 or 2	0	0	1 or 2	≥ 3
FDD113_600-601m	Fresh	Fault Zone or Shear Zone Siltstone; Brecciated; Silica & Chlorite alteration; trace Sphalerite & Galena	1 or 2	0	1 or 2	0	≥ 3	0	0	0	0	0	0	0	≥ 3	0	0	0	1 or 2	≥ 3
FDD111W1_620-621m	Fresh	Siltstone Sandstone; Interbedded; Silica & Chlorite alteration; trace Pyrrhotite	1 or 2	0	1 or 2	0	1 or 2	0	0	0	0	0	0	0	≥ 3	1 or 2	0	0	1 or 2	≥ 3
FDD113W1_630-631m	Fresh	Siltstone; Bioturbated; Silica & Chlorite alteration; trace Sphalerite & Galena	≥ 3	0	≥ 3	1 or 2	≥ 3	0	0	0	0	0	0	0	≥ 3	1 or 2	0	0	1 or 2	≥ 3
FDD126_680-681m	Fresh	Sandstone Siltstone; Quartz veining; Silica, Chlorite & Albite alteration; trace Galena, Chalcopyrite & Pyrrhotite	≥ 3	0	1 or 2	≥ 3	≥ 3	0	0	1 or 2	0	0	0	0	≥ 3	≥ 3	≥ 3	0	1 or 2	0
FDD126W2_680-681m	Fresh	Siltstone Sandstone; Chlorite, Silica & Albite alteration; trace Sphalerite, Galena & Chalcopyrite	1 or 2	0	1 or 2	1 or 2	1 or 2	0	0	0	0	0	0	0	≥ 3	1 or 2	0	0	1 or 2	1 or 2

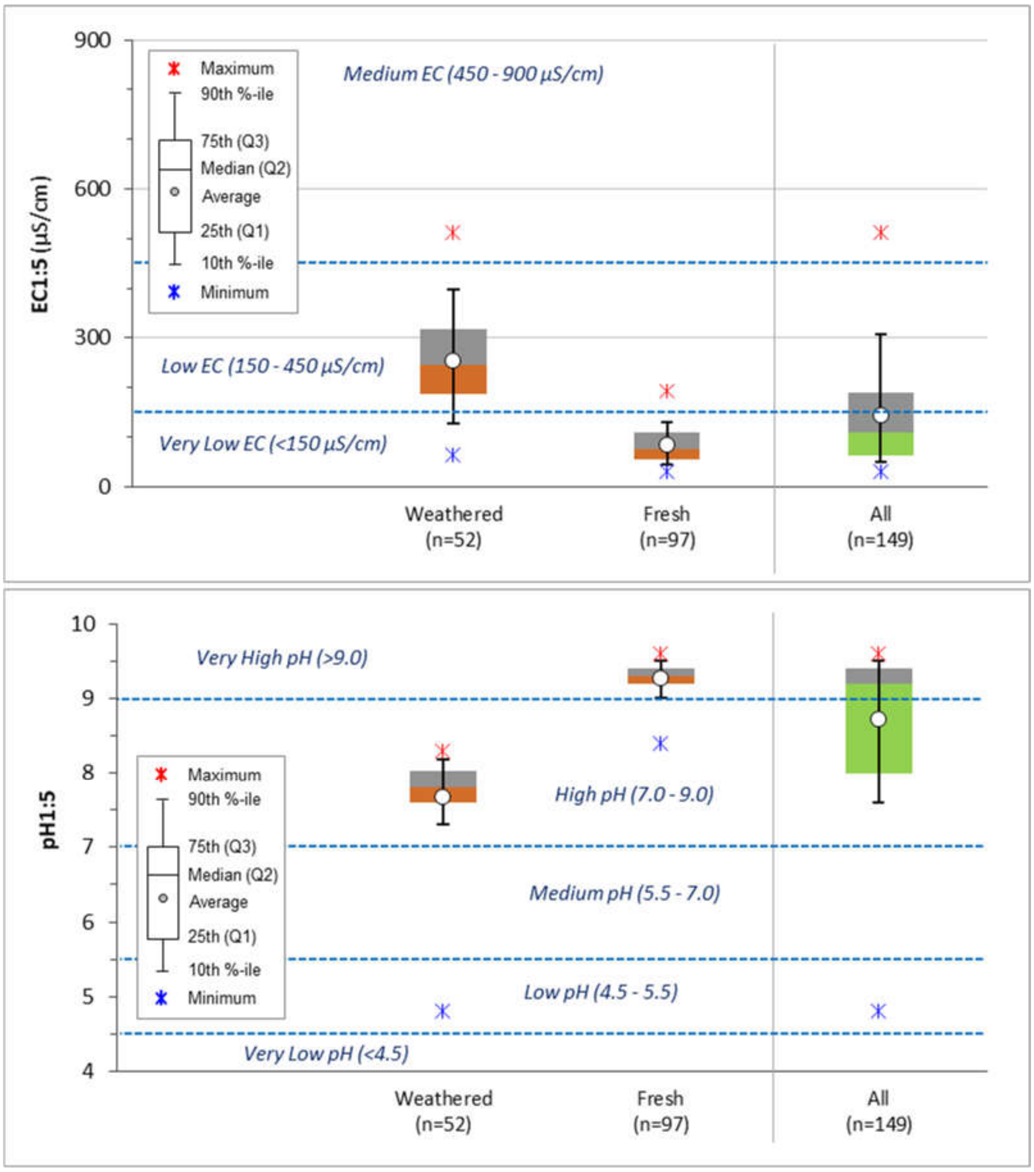
3.4 Salinity and pH

EC and pH results were measured on all weathered samples and about half of the fresh samples, with the results plotted in **Figure 3-10**.

The $EC_{1:5}$ of the samples ranged from 30 to 511 μS/cm, with relatively low median and 90th percentile values of 108 and 309 μS/cm, respectively, with the fresh samples having lower EC compared to the weathered samples. As such, the weathered samples are regarded as having ‘low’ EC and the fresh samples are regarded as having ‘very low’ EC. For context, the EC of groundwater at the Project ranges from 1022 to 10,883 μS/cm (average = 4828 μS/cm).

The samples are all pH-neutral to alkaline, with $pH_{1:5}$ values ranging from pH 4.8 to 9.6, with a median value of pH 9.2 and 10th percentile value of pH 7.6 – indicating a lack of readily soluble acidity. For context, the pH of groundwater at the Project ranges from pH 6.53 to pH 7.68 (average pH 6.97).

Figure 3-10. Distribution of Electrical Conductivity (EC) and pH of Potential Waste Rock



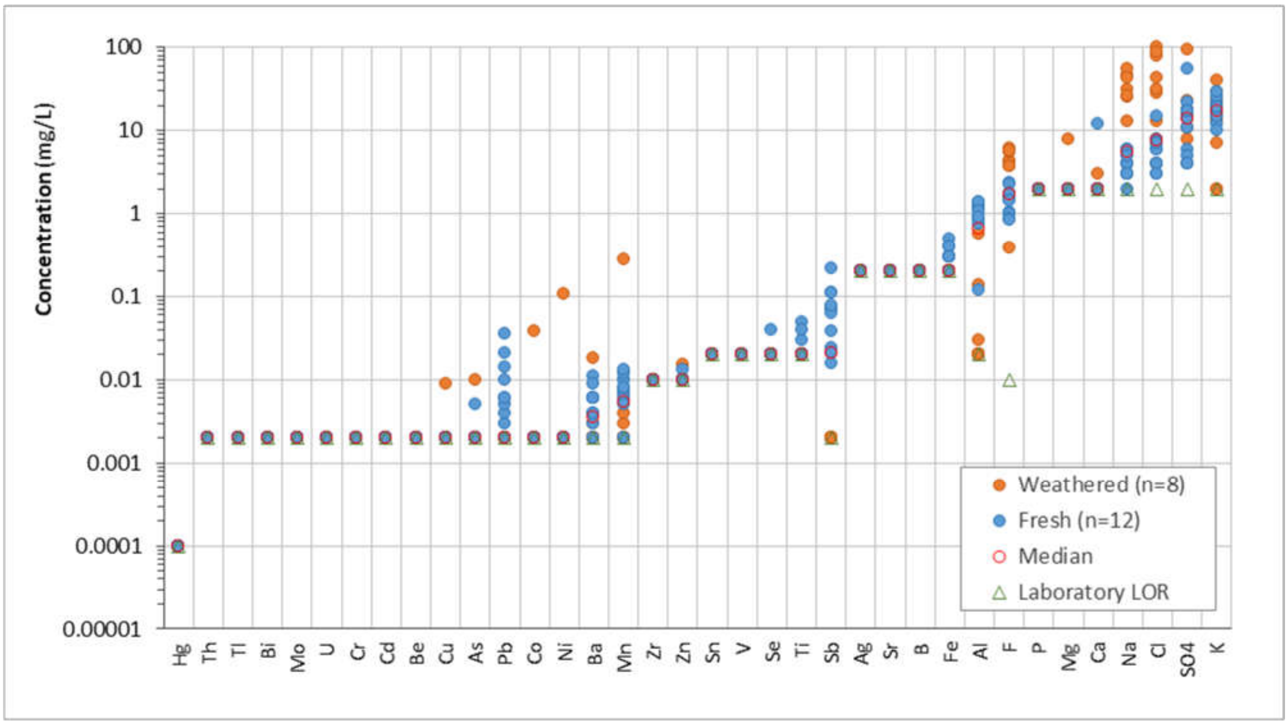
3.5 Solubility of Waste Rock – Water Extract Solutions

To evaluate the initial solubility of multi-elements in samples, water extract tests were completed for 20 samples (8 weathered samples and 12 fresh samples). The samples underwent a 1:5 w:v (solid:water) deionised water bottle leach procedure on pulps.

The results from these tests are provided in **Appendix B** and summarised in **Figure 3-11**. The median concentrations of environmentally important elements and major ions in water extracts are listed below. For context, the median concentrations of metals and metalloids listed below are similar to or slightly lower than the average concentration for the same metals and metalloids in groundwater (refer to the groundwater section of the EIS for groundwater information).

- ≤ 0.001 mg/L mercury (Hg)
- ≤ 0.01 mg/L arsenic (As), cadmium (Cd), cobalt (Co), chromium (Cr), copper (Cu), manganese (Mn), molybdenum (Mo), nickel (Ni), lead (Pb), zinc (Zn)
- ≤ 0.1 mg/L antimony (Sb), selenium (Se), tin (Sn), vanadium (V)
- ≤ 1.0 mg/L silver (Ag), aluminium (Al), boron (B), iron (Fe)
- ≤ 10 mg/L chloride (Cl), fluoride (F), phosphorous (P), sodium (Na)
- ≤ 100 mg/L sulfate (SO_4)

Figure 3-11. Distribution of Element and Major Ion Concentrations in Water Extracts of Potential Waste Rock



Several of the weathered samples had the highest soluble element concentrations (compared to the fresh samples), however for most samples the soluble metals and metalloids are relatively low – and at concentrations below or marginally above the laboratory limit of reporting (LOR) – hence the median concentrations shown in **Figure 3-11** for many elements equal the laboratory LOR for that element. Some elements, particularly lead, zinc, iron and aluminium are relatively soluble under pH-neutral conditions, however for most samples the solubilities of these elements were relatively low.

It is important to note that the soluble metal/metalloid results presented in this report represent an ‘assumed worst case’ scenario. The leaching was undertaken on a pulped sample (85 % passing 75 μm) – therefore these samples have a very high surface area compared to similar material in the field.

No comparison has been made between bottle leachate results and water quality guideline values, such as ANZG (2018), as such a comparison is inappropriate. The guideline values provided in ANZG (2018) are for receiving water environments (*eg.* creeks and rivers), whereas the soluble element data in this assessment is ‘point source’ obtained from a finely-pulped sample subjected to rigorous and artificial extraction to obtain a concentration approaching ‘near maximum’ under normal pH, redox (oxidation) and EC conditions. Furthermore, as contact water reports to the receiving environments a number of geochemical reactions will take place, including: retardation, adsorption and precipitation – and also likely dilution, which will attenuate the concentration as seepage/contact water migrates from the source. These processes are not accounted for in a laboratory setting.

The environmental significance of identified soluble metal/metalloid concentrations in mineral waste material in terms of risk is discussed in **Section 5**.

3.6 Solubility of PAF Waste Rock – NAG Leachate Solutions

The leachate produced during the NAG test from one (1) slightly weathered and 11 fresh potential waste rock samples was analysed at the completion of the NAG test. Ten (10) of the samples were classified as PAF-LC or PAF, one (1) sample classified as ‘Uncertain’ and one (1) sample classified as UC(PAF). These same 12 samples also underwent K-NAG tests (as discussed in Section 3.1). The purpose of the NAG test is to completely oxidise the sample and therefore encourage the generation of acid/acidity (as far as the acid generating and acid neutralising reactions will allow). Analysis of the NAG leachate provides an indication of the potential acidity and potential solute concentration of acid/acidic drainage that could be generated by [mostly PAF] waste rock if allowed to completely and freely oxidise.

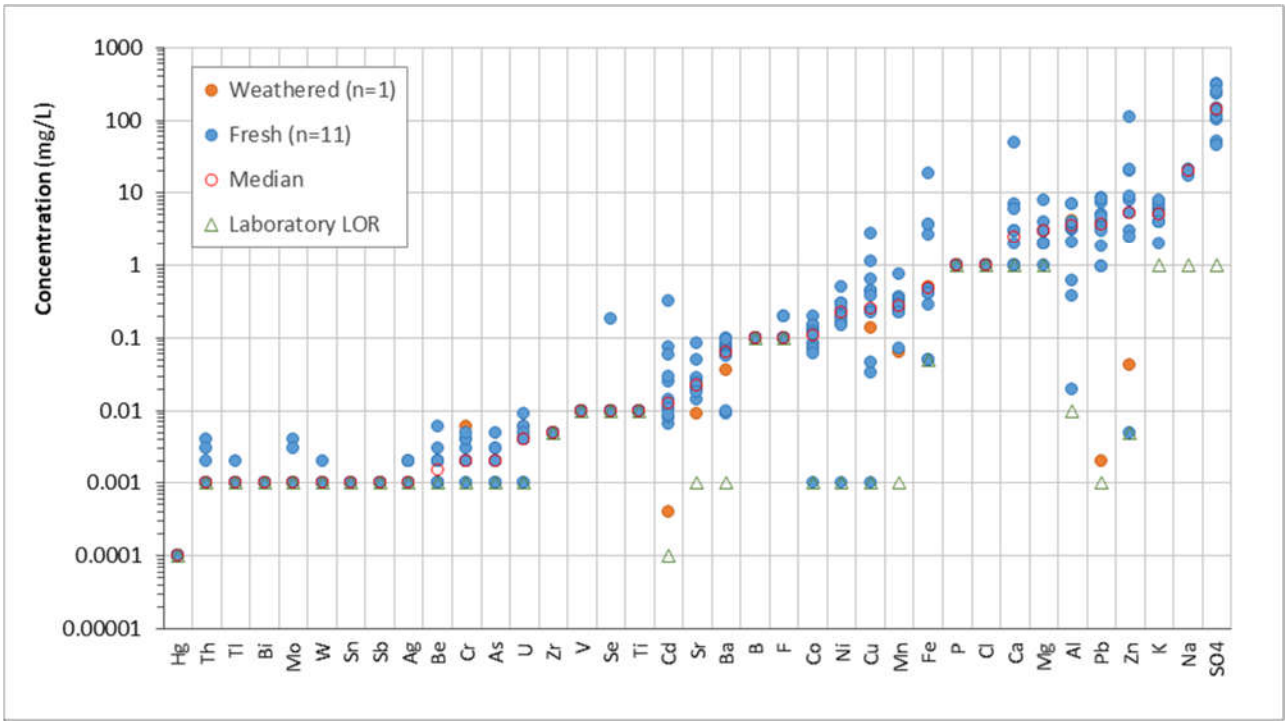
The results from these tests are provided in **Appendix B** and summarised in **Figure 3-12**. The median concentrations of environmentally important elements and major ions in NAG leachate were as follows:

≤ 0.0001 mg/L	mercury (Hg)
≤ 0.001 mg/L	antimony (Sb), molybdenum (Mo), silver (Ag), tin (Sn)
≤ 0.01 mg/L	arsenic (As), chromium (Cr), selenium (Se), vanadium (V)
≤ 0.1 mg/L	boron (B), cadmium (Cd), fluoride (F)
≤ 1.0 mg/L	chloride (Cl), cobalt (Co), copper (Cu), iron (Fe), manganese (Mn), nickel (Ni), phosphorous (P)
≤ 10 mg/L	aluminium (Al), lead (Pb), zinc (Zn)
≤ 100 mg/L	sodium (Na)
≤ 1000 mg/L	sulfate (SO_4)

As evident by the results, the NAG leachate is significantly more concentrated in several elements and sulfate compared to the water extract solutions – showing that under acid/acidic conditions waste rock will generate elevated metal and metalloid loads.

For many of the elements the concentrations were at or marginally above the laboratory LOR. However, for several environmentally important elements and compounds – such as cadmium (Cd), cobalt (Co), copper (Cu), nickel (Ni), aluminium (Al), lead (Pb), zinc (Zn) and sulfate (SO_4) – the concentrations in the NAG leachate were well above the laboratory LOR.

Figure 3-12. Distribution of Element and Major Ion Concentrations in NAG Leachate of Potential Waste Rock



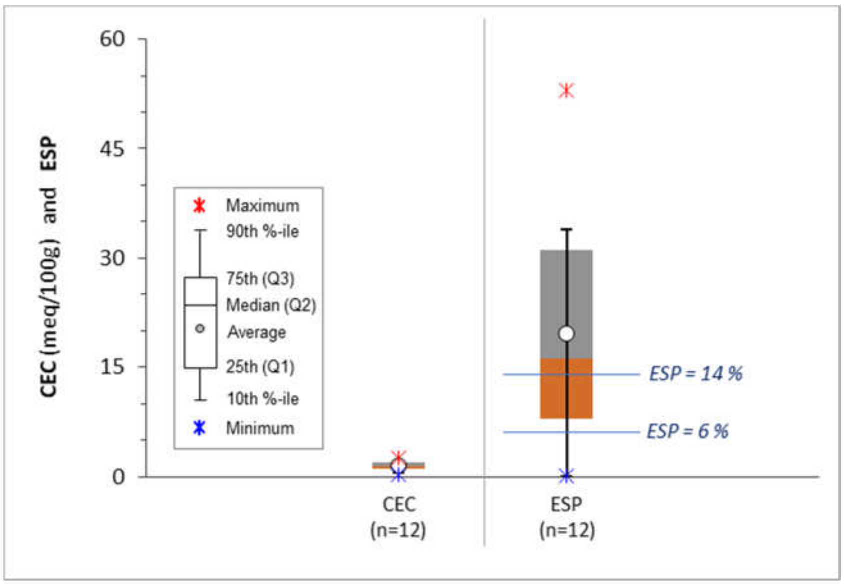
3.7 Cation Exchange Capacity, Sodicity and Dispersion

To evaluate the potential 'soil quality' of weathered waste rock material, exchangeable cation concentrations were measured on 12 potential weathered waste rock samples. The results are presented in Appendix B and summarised in Figure 3-13. Weathered waste rock is currently not proposed to be used in rehabilitation; however the cation exchange capacity (CEC) and exchangeable sodium percentage (ESP) data provides useful information with respect to potential erosion/dispersion of weathered waste rock materials and/or to guide potential waste rock usage in rehabilitation activities.

The CEC values were very low, ranging from 0.2 to 2.6 milliequivalents per 100 grams (meq/100g), with a very low median CEC value of 1.5 meq/100g. The ESP results range from less than 0.2 % to 53 %, with a median ESP of 16 %.

To put these results into context, an ESP value of 6 % or greater generally indicates that soil material is regarded as sodic and may be prone to dispersion (Isbell, 2002) and soil with an ESP value greater than 14 % is regarded as strongly sodic (Northcote and Skene, 1972). However, other important factors such as clay mineralogy, soil sodium concentration, soil salinity and irrigation water (rainwater) chemistry may enhance or limit that potential for soil to be sodic or become sodic over time. Therefore, sodicity ratings (based on the above general interpretation) are a general guide only and should not be taken as definitive.

Figure 3-13. Cation Exchange Capacity (CEC) and Exchangeable Sodium Percentage (ESP) of Potential Weathered Waste Rock



Eight (8) of the 12 samples had ESP values greater than 14 % and, therefore, are regarded as being 'strongly sodic'. One sample was 'sodic'. Three samples were 'non sodic'. Five (5) samples had ESP values greater than 28%. As most samples are sodic (to varying degrees), mineral waste represented by these samples – which is the box-cut material – can be expected to have potential for dispersion.

During operations, waste rock will be stockpiled on pads with run-off and sediment captured, therefore erosion and dispersion of waste rock will not pose an environmental risk. Any waste rock remaining at the surface at the end of operations would be land formed, topsoiled and revegetated to manage potential erosion and dispersion.

The environmental significance of exchangeable cation values and sodicity levels in weathered waste rock material in terms of risk and potential revegetation management is outlined in Section 5, however readers should consult the separate soils assessment undertaken as part of the environmental approvals for the Project for a detailed assessment of soil properties with regard to rehabilitation.

4 Geochemical Test Results – Potential Tailings

Tailings geochemical data was obtained from three (3) trial samples from a bench process, and comprised:

1. Master composite;
2. High talc and clay 'end member'; and
3. High sulfide 'end member'.

The 'master composite' is the most relevant of these three samples – as being broadly representative of the large majority of tailings to be generated by the project. The two 'end members' are considered to be the 'possible extremes' of the proposed tailings process – and have been included in the assessment for context.

The ABA geochemical results are presented in **Table 4-1**. All other geochemical results are tabulated in **Appendix B**. The laboratory reports can be provided on request.

4.1 Acid-Base Accounting (Potential for Acid Generation)

The Master Composite tailings sample – being broadly representative of likely tailings at the Project – has moderate to high total S (and sulfide): 1.4 % and 1.15 %, respectively and the NAG results indicate that tailings represented by this sample are capable of generating in the order of 33 kg H_2SO_4/t. Comparatively, the total ANC is lower (23 kg H_2SO_4/t) and the ABCC data indicates that about one-quarter of this ANC is likely to be present in a readily-available form, with the carbonate minerals potentially being Fe-dolomite and siderite.

As such, the Master Composite sample is classified as PAF, with a moderate to high potential to generate acid/acidic drainage. Due to the moderate to high total S (and sulfide) concentrations, the potential for Saline Drainage (SD) (sulfate-derived salinity from sulfide oxidation) is also moderate to high.

As may be expected, the two 'end member' tailings samples have ABA geochemical characteristics either side of the Master Composite sample.

The High Talc sample had less than half the total S and Scr concentration of the Master Composite, over twice the ANC of the Master Composite sample and approximately 40% of the ANC was in a readily available form (potentially as Fe. Dolomite). The High Talc sample produced a high NAGpH of 9.0. As such, the High Talc sample is classified as NAF, with a low potential to generate acid/acidic drainage. Due to the low to moderate total S (and sulfide) concentrations, the potential for SD (sulfate-derived salinity from sulfide oxidation) is also low.

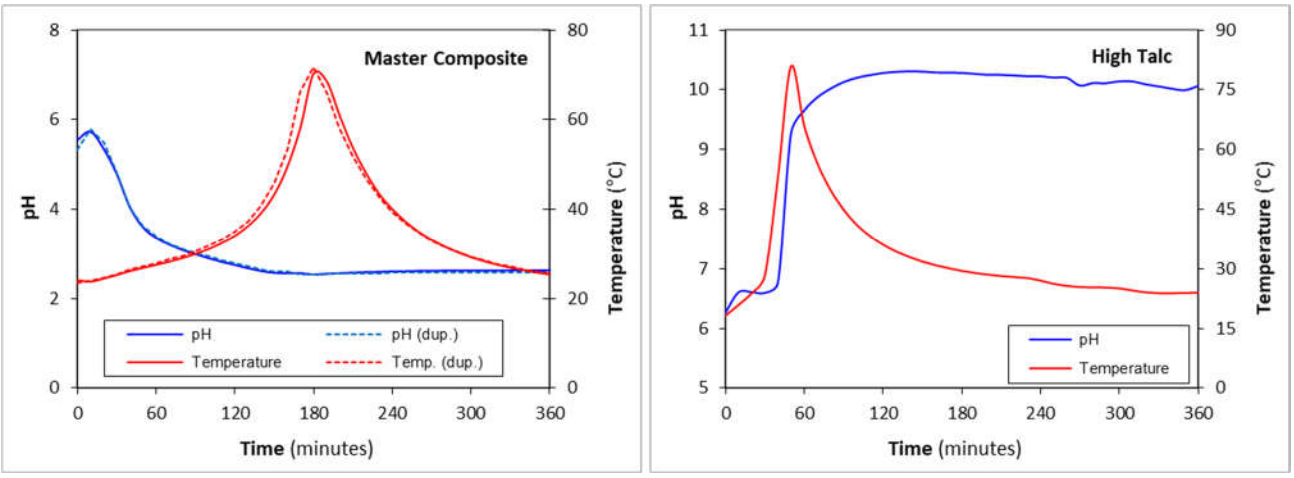
Comparatively, the High Sulfide 'end member' had very high total S and Scr concentrations of 5.5 % and 4.0 %, respectively, coupled with a modest ANC value – of which about one quarter of this ANC is likely to be present in a readily-available form, with the carbonate minerals potentially being siderite and/or magnesite. The very high total S (and Scr) required the NAG test to be undertaken in five stages (as sequential NAG [S-NAG]), which produced a very high final NAG capacity of 115 kg H_2SO_4/t, relative to a total ANC value of 17 kg H_2SO_4/t. As such, the High Sulfide sample is classified as PAF, with a very high potential to generate significant acid/acidic drainage. Due to the very high total S (and sulfide) concentrations, the potential for SD (sulfate-derived salinity from sulfide oxidation) is also very high.

K-NAG tests were undertaken on the Master Composite and High Talc samples (**Figure 4.1**) – and confirmed the PAF and NAF classifications, respectively, of these two samples. The K-NAG data can also be used to infer indicative lag times until acid generation. For the Master Composite sample the time until acidification (pH 4) is in the order of 2 to 6 months – consistent with most of the PAF waste rock samples. It is important to note that this indicative lag time is not a substitute for a true kinetic analysis to determine lag times, however it provides a coarse indicator of lag timeframes.

Table 4-1. Geochemical Results for Potential Tailings

Tailing Sample:	**Master Composite**	**High Talc**	**High Sulfide**
Total S (%)	1.4	0.51	5.5
Sulfide [Scr] (%)	1.15	0.44	4.0
Total C (%)	0.09	0.24	0.12
Carb.NP (kg H2SO4/t)	7.4	20	9.8
ANC (kg H2SO4/t)	23	57	17
ANC @ pH 4.5 [ABCC] (kg H2SO4/t)	5.9	23	4.5
Proportion of ANC 'readily available'	26 %	40 %	27 %
Carbonate mineralogy inferred from ABCC	Siderite; some Fe. Dolomite	Fe. Dolomite	Siderite/Magnesite
MPA (kg H2SO4/t) [calculated from S]	43	16	168
ANC/MPA ratio	0.5	3.6	0.1
NAPP (kg H2SO4/t)	20	-41	152
NAGpH [single addition or S-NAG Stg 1]	2.8	9.0	2.1
NAG @ pH 4.5 (kg H2SO4/t)	24.5	<0.1	53.8
NAG @ pH 7.0 (kg H2SO4/t)	32.9	<0.1	81.3
S-NAGpH [Stg 2]	-	-	2.4
S-NAG Stg 2 @ pH 4.5 (kg H2SO4/t)	-	-	21.1
S-NAG Stg 2 @ pH 7.0 (kg H2SO4/t)	-	-	24.5
S-NAGpH [Stg 3]	-	-	3.3
S-NAG Stg 3 @ pH 4.5 (kg H2SO4/t)	-	-	2.4
S-NAG Stg 3 @ pH 7.0 (kg H2SO4/t)	-	-	4.2
S-NAGpH [Stg 4]	-	-	3.9
S-NAG Stg 4 @ pH 4.5 (kg H2SO4/t)	-	-	0.8
S-NAG Stg 4 @ pH 7.0 (kg H2SO4/t)	-	-	1.4
S-NAGpH [Stg 5]	-	-	4.6
S-NAG Stg 5 @ pH 4.5 (kg H2SO4/t)	-	-	<0.1
S-NAG Stg 5 @ pH 7.0 (kg H2SO4/t)	-	-	3.6
NAG Total @ pH 4.5 (kg H2SO4/t)	24.5	<0.1	78.1
NAG Total @ pH 7.0 (kg H2SO4/t)	32.9	<0.1	115
Acid Classification	PAF	NAF	PAF

Figure 4-1. Kinetic Net Acid Generation (K-NAG) pH and Temperature Profiles for Potential Tailings Samples

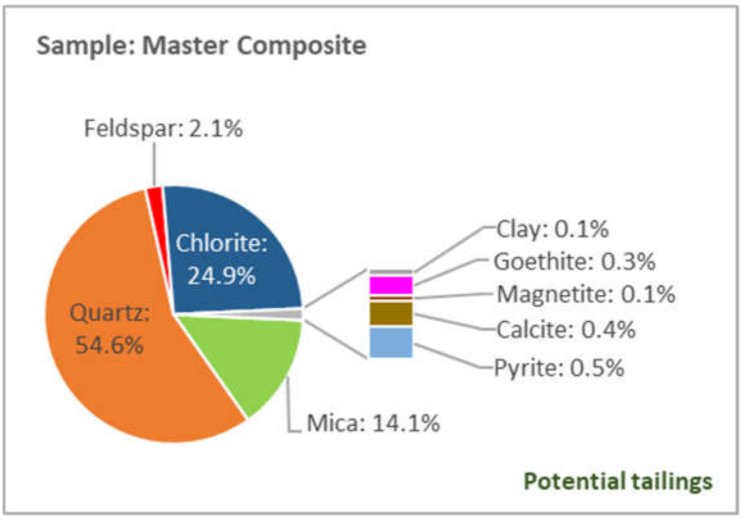


4.2 Mineralogy

Data is available for the Master Composite potential tailings sample that underwent mineralogical analysis by QXRD.

The QXRD result shows that the Master Composite tailings sample is dominated by quartz, with significant concentrations of chlorite and mica (predominantly muscovite) minerals (Figure 4-2). The sample has relatively low sulfide mineral proportions (confirming the analytical chemistry results for sulfide). Sulfide is present as pyrite. Carbonate group minerals are present only as calcite, and in low mineral proportions.

Figure 4-2. Mineralogy of Potential Tailings Sample



4.3 Metals and Metalloids (Assay)

Multi-element (metal and metalloid) data is available for all three tailings samples. The test results are presented in **Appendix B**.

The results are compared to background concentrations for each element, based on average elemental abundance in soil in the earth's crust. The comparison is determined by the GAI, as outlined in **Section 2.4**. GAI values of one or two are regarded as 'slightly to moderately' enriched (with respect to average elemental abundance), GAI values of three or more are regarded as 'significantly' enriched. The GAI values are presented in **Appendix B**.

The GAI values show that all three tailings samples were enriched to varying degrees with regard to silver (Ag), beryllium (Be), cadmium (Cd), copper (Cu), molybdenum (Mo) lead (Pb), sulfur (S), antimony (Sb), tungsten (W) and zinc (Zn). Tailings are fine grained waste rock from the processing of highly mineralised rock (ore). As such, enrichment of tailings from metalliferous ore is expected, and the degree of enrichment of these tailings samples is consistent with the mineralogy of the deposit – indicating that metalliferous drainage is plausible.

4.4 Solubility of Tailings – Water Extract Solutions

To evaluate the initial pH, EC and solubility of multi-elements in potential tailings samples, water extract tests were completed. The samples underwent a 1:5 w:v (solid:water) deionised water bottle leach procedure on the 'as received' size fraction, which was very fine-grained. The results from these tests are summarised in **Table 4-3** for pH, EC, major ions and metals/metalloids where the concentration was greater than the laboratory LOR.

The solubility results show that the soluble metals and metalloids concentrations are generally low – and at concentrations generally below or marginally above the laboratory limit of reporting (LOR). Some elements, particularly lead, zinc, iron and aluminium are relatively soluble under pH-neutral conditions, however for these tailings samples the solubilities of these elements were low.

No comparison has been made between bottle leachate results and water quality guideline values, such as ANZG (2018), as such a comparison is inappropriate. The guideline values provided in ANZG (2018) are for receiving water environments (*eg*. creeks and rivers), whereas the soluble element data in this assessment is 'point source' obtained from a finely-pulped sample subjected to rigorous and artificial extraction to obtain a concentration approaching 'near maximum' under normal pH, redox (oxidation) and EC conditions. Furthermore, as contact water reports to the receiving environments a number of geochemical reactions will take place, including: retardation, adsorption and precipitation – and also likely dilution, which will attenuate the concentration as seepage/contact water migrates from the source. These processes are not accounted for in a laboratory setting.

The environmental significance of identified soluble metal/metalloid concentrations in mineral waste material in terms of risk is discussed in **Section 5**.

Table 4-2. Solubility Summary Results for Potential Tailings

Tailing Sample:	**Master Composite**	**High Talc**	**High Sulfide**
pH	8.2	8.4	6.9
EC (µS/cm)	308	284	295
Alkalinity – Total (mg/L as CaCO3)	225	2190	122
Alkalinity – HCO3 (mg/L as CaCO3)	225	2190	122
Alkalinity – CO3 (mg/L as CaCO3)	<1	18.1	<1
Alkalinity – OH (mg/L as CaCO3)	<1	<1	<1
Acidity (mg/L as CaCO3)	1.6	<1	2.4
Sulfate (SO4)	143	127	173
Chloride (Cl)	26	23	29
Fluoride (F)	4.33	0.9	2.76
Calcium (Ca)	41	33	37
Magnesium (Mg)	6	8	6
Sodium (Na)	8	10	10
Potassium (K)	10	6	14
Barium (Ba)	0.009	0.036	0.029
Cobalt (Co)	<0.002	<0.002	0.004
Manganese (Mn)	0.127	0.061	1.15
Molybdenum (Mo)	<0.002	0.006	<0.002
Nickel (Ni)	<0.002	<0.002	0.006
Lead (Pb)	<0.002	0.005	0.007
Antimony (Sb)	0.004	0.008	<0.002
Strontium (Sr)	0.2	<0.2	<0.2
Zinc (Zn)	0.018	0.013	0.459

All results mg/L, except EC and pH. Concentrations of soluble Ag, Al, As, B, Be, Bi, Cd, Cr, Cu, Fe, Hg, P, Se, Sn, Th, Ti, Tl, U, V, Zr are all below the laboratory LOR for these elements. Full results are presented in Appendix B.

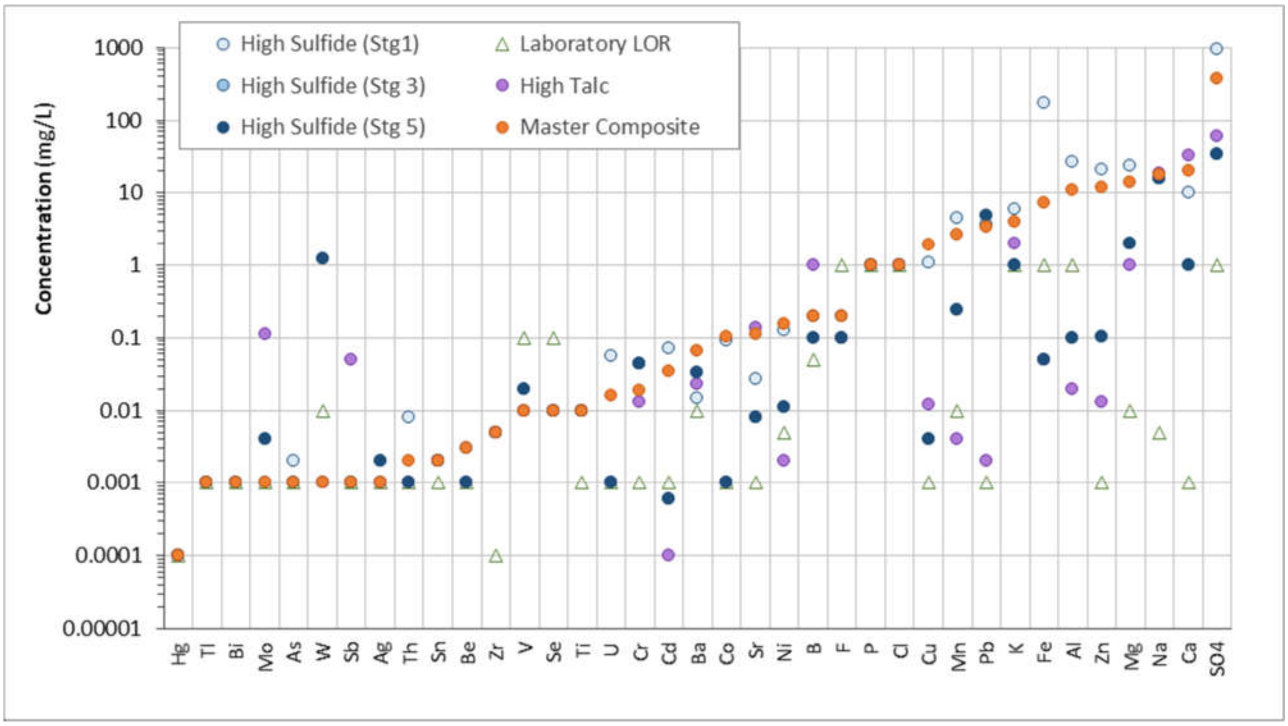
4.5 Solubility of Tailings – NAG Leachate Solutions

The leachate produced during the NAG test from the tailings samples – including the sequential NAG test of the High Sulfide sample – was analysed at the completion of the NAG test. For the High Sulfide sample the NAG leachate was analysed after Stages 1, 3 and 5. The results from these tests are provided in Appendix B and summarised in Figure 4-3. The concentrations of environmentally important elements and major ions in NAG leachate in the Master Composite tailings sample are listed below.

As evident by the results, the NAG leachate is significantly more concentrated in several elements and sulfate compared to the water extract solution (for this same Master Composite sample) – showing that under acid/acidic conditions the Master Composite tailings will generate elevated metal and metalloid loads – similar to the PAF waste rock samples.

- ≤ 0.0001 mg/L mercury (Hg)
- ≤ 0.001 mg/L antimony (Sb), arsenic (As), molybdenum (Mo), silver (Ag)
- ≤ 0.01 mg/L selenium (Se), tin (Sn), vanadium (V)
- ≤ 0.1 mg/L cadmium (Cd), chromium (Cr)
- ≤ 1.0 mg/L boron (B), chloride (Cl), cobalt (Co), fluoride (F), nickel (Ni), phosphorous (P)
- ≤ 10 mg/L copper (Cu), iron (Fe), lead (Pb), manganese (Mn)
- ≤ 100 mg/L aluminium (Al), sodium (Na), zinc (Zn)
- ≤ 1000 mg/L sulfate (SO_4)

Figure 4-3. Distribution of Element and Major Ion Concentrations in NAG Leachate of Potential Tailings



5 Geochemical Characteristics and Hazards of Mineral Wastes

The geochemical characteristics of potential waste rock and tailings from the Project have been assessed. The assessment was undertaken to understand the environmental geochemical characteristics of these samples, as being representative of their respective mineral waste types, such that appropriate management measures can be implemented (for the Project) during operations and post-closure.

The environmental geochemical characteristics of the materials are summarised in the following sub-sections and relate to the characteristics of mineral waste materials likely to be mined/ produced by the Project.

5.1 AMD Potential

Potential Waste Rock

Weathered waste rock (from the box-cut) is expected to generate pH-neutral to slightly alkaline contact water (run-off and seepage) when initially exposed. Fresh waste rock is expected to generate alkaline contact water when initially exposed.

The total S concentration of this material is generally low, with a modest 90th percentile total S concentration of 0.24 %, of which most of this is present as sulfide. The weathered samples had much lower total S (and sulfide) compared to the fresh samples. As such, the MPA that could be generated by potential waste rock samples is also relatively modest, with a 90th percentile MPA of 25.7 kg H_2SO_4/t. As expected by the total S values, the fresh samples have greater MPA values compared to the weathered samples.

The ANC values are generally very low, with a low median ANC value for all samples of 2.5 kg H_2SO_4/t. The carbonate mineralogy is dominated by dolomite and calcite (based on mineralogical data), however based on the ABCC data only about one quarter to one third of the ANC is likely to be readily available. As such, the NAPP test alone may be somewhat unreliable for classifying these potential waste rock materials, however the NAG test results have confirmed that essentially all weathered waste rock is classified as NAF (with very few PAF samples) and most fresh waste rock (indicatively 85 %) is classified as PAF and PAF-LC. Overall, fresh waste rock can be classified as PAF-LC.

As expected from a mineralised area, most samples had some total metal and metalloid concentrations that were 'enriched' to varying degrees compared to average element abundance in soil in the earth's crust – predominantly with respect to Ag, Be, Bi, Cs, Sb, Ti and W. The weathered samples were also enriched in As. The fresh samples were also enriched in Cd, Pb and Zn. However, for the most part, the solubility of these elements is low.

Under pH-neutral to slightly alkaline conditions, potential waste rock is expected to produce leachate with generally low concentrations of soluble metals and metalloids. Comparatively, analysis of NAG leachate from selected PAF and PAF-LC waste rock samples has shown that under acid generating conditions leachate (from fresh waste rock) is likely to contain moderate to high concentrations of soluble metals and metalloids – particularly Al, Cd, Co, Cu, Ni, Pb and Zn – and soluble SO_4 (due to sulfide oxidation).

Based on the results:

- Highly to moderately weathered waste rock – representative of potential box-cut material – has a very low potential to generate acid/acidic drainage (AD) and/or NMD. Due to the very low total S (and sulfide) concentrations, the potential for Saline Drainage (SD) (sulfate-derived salinity from sulfide oxidation) from highly to moderately weathered waste rock is also very low. Some slightly weathered materials from the base of the box-cut (at the oxidation zone) may have a higher potential to generate AMD (a small proportion of this deeper, slightly weathered material may be PAF).
- Fresh waste rock – representative of waste rock from the decline and underground operational areas – has a high potential to generate AD, likely at a modest capacity. Overall, fresh waste rock (as a bulk material) can be broadly classified as PAF-LC. Due to the higher total S (and sulfide) concentrations (compared to weathered waste rock), the potential for SD (sulfate-derived salinity from sulfide oxidation) from fresh waste rock is moderate to high. The results from K-NAG testing suggest lag times until the potential onset of acid/acidic drainage is in the order of 2 to 6 months – under unmitigated oxidising conditions.

Salinity is discussed below in Section 5.2.

Potential Tailings (Master Composite)

Tailings material to be generated by the Project – represented by the Master Composite sample – is expected to generate pH-alkaline contact water (run-off and seepage) when initially produced/disposed.

The total S concentration of the Master Composite material is moderate to high (S = 1.4 %), with a similarly moderate to high sulfide concentration (Scr = 1.15 %). As such, the MPA that could be generated by this sample is moderate (MPA of 43 kg H_2SO_4/t).

The ANC is moderate for the Master Composite sample (23 kg H_2SO_4/t), however ABCC test-work indicates that only about one-quarter of the ANC will likely be in a readily available form (likely as calcite, based on the mineralogical data). As such, the NAPP test alone was somewhat unreliable for classifying potential tailings materials. However, the various NAG test results have confirmed that the Master Composite sample is classified as PAF, and K-NAG testing suggests lag times until the potential onset of acid/acidic drainage is in the order of 2 to 6 months – under unmitigated oxidising conditions.

As expected from processing mineralised ore, the Master Composite sample had some total metal and metalloid concentrations that were 'enriched' to varying degrees compared to average element abundance in soil in the earth's crust – predominantly with respect to Ag, Be, Cd, Cu, Pb, S, Sb, W and Zn – suggesting that metalliferous drainage from tailings is plausible.

Under pH-neutral conditions leachate from potential tailings (represented by the Master Composite sample) is expected to contain low concentrations of soluble metals and metalloids. Under acid generating conditions (based on the analysis of the NAG leachate) leachate from potential tailings is likely to contain moderate to high concentrations of soluble metals and metalloids – particularly Al, B, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb and Zn – and soluble SO_4 (due to sulfide oxidation).

Based on the results, tailings – represented by the Master Composite sample – has a high potential to generate AD. Due to the moderate to high total S (and sulfide) concentration, the potential for SD (sulfate-derived salinity from sulfide oxidation) from tailings is moderate to high.

Salinity is discussed below in Section 5.2.

'End Member' Tailings

The geochemical results from two 'end member' tailings samples were also assessed – a high talc sample and a high sulfide sample. As may be expected, the two 'end member' tailings samples have ABA geochemical characteristics either side of the Master Composite sample.

The High Talc sample had less than half the total S and Scr concentration of the Master Composite, over twice the ANC of the Master Composite sample and approximately 40% of the ANC was in a readily available form (potentially as Fe. Dolomite). The High Talc sample produced a high NAGpH of 9.0. As such, the High Talc sample is classified as NAF, with a low potential to generate acid/acidic drainage. Due to the low to moderate total S (and sulfide) concentrations, the potential for SD (sulfate-derived salinity from sulfide oxidation) is also low.

Comparatively, the High Sulfide 'end member' had very high total S and Scr concentrations of 5.5 % and 4.0 %, respectively, coupled with a modest ANC value – of which about one quarter of this ANC is likely to be present in a readily-available form, with the carbonate minerals potentially being siderite and/or magnesite. The very high total S (and Scr) required the NAG test to be undertaken in five stages (as sequential NAG [S-NAG]), which produced a very high final NAG capacity of 115 kg H_2SO_4/t, relative to a total ANC value of 17 kg H_2SO_4/t. As such, the High Sulfide sample is classified as PAF, with a very high potential to generate significant AD. Due to the very high total S (and sulfide) concentrations, the potential for SD (sulfate-derived salinity from sulfide oxidation) is also very high.

These two 'end member' samples are not representative of bulk tailings; however, they do represent the potential extremes of tailings characteristics that could be generated by the Project.

5.2 Salinity, Sodicity and Dispersion Potential

Potential Waste Rock from the Box-cut

The $EC_{1:5}$ of the samples ranged from 30 to 511 μS/cm, with relatively low median and 90th percentile values of 108 and 309 μS/cm, respectively, with the fresh samples having lower EC compared to the weathered samples. On this basis, waste rock is expected to generate low-salinity contact water (run-off and seepage). Due to the very low total S concentrations of weathered waste rock, the potential for sulfate-derived salinity (from sulfide oxidation) from weathered waste rock is negligible. Comparatively, fresh waste rock has a higher potential for sulfate-derived salinity (from sulfide oxidation), due to the higher total S (and sulfide) concentration of fresh waste rock.

Weathered waste rock samples (n=12) had very low CEC values and high ESP values, resulting in most samples being classified as 'strongly sodic' or 'sodic'. Three samples were classified as 'non-sodic'. As such, weathered waste rock is expected to be sodic (to varying degrees). The CEC and ESP values suggest that this material type would likely be subject to some degree of dispersion. The management of this material is discussed in Section 6.

Potential Tailings (Master Composite)

The Master Composite tailings sample has an EC of 308 μS/cm. On this basis, and consistent with waste rock, tailings materials are expected to generate low-salinity contact water (run-off and seepage). Due to the moderate to high total S (and sulfide) concentration, the potential for sulfate-derived salinity (from sulfide oxidation) is moderate to high.

6 Management and Mitigation Measures

6.1 Waste Rock Management Strategy

Of a potential 1.5 million tonnes of waste rock to be mined, about 60% will report to the surface during the first seven years (approximately) of operations, with the remainder disposed underground as backfill. Waste rock brought to the surface will be placed in one or more waste rock stockpile areas, depending upon the environmental geochemical classification (to segregate NAF from PAF waste rock as much as practical). Run-off and seepage (leachate) from the waste rock stockpile areas will be captured in lined leach ponds (Figure 2-1) before use in the mine water management system.

Weathered waste rock is expected to be NAF, and poses a very low potential to generate AMD and low potential to generate salinity and NMD. As such, weathered rock from the box-cut will be stockpiled separately to fresh rock, as much as practical, and potentially used to backfill the box-cut; for other rehabilitation and construction activities; or transported to Hera Mine and disposed underground. Run-off and seepage of weathered waste rock stockpiles will be monitored for 'standard' water quality parameters (refer below).

Fresh waste rock is expected to be PAF, and poses a high potential to generate low to moderate-level AMD (as a bulk material). Fresh rock from the underground will report to the waste rock stockpiles, where run-off and seepage (leachate) will be captured in lined leach ponds before use in the mine water management system. PAF waste rock that is brought to the surface will either be transported back underground (during or post operations) for use as backfill or transported to Hera Mine and disposed underground. No PAF waste rock is proposed to remain at the surface at closure.

PAF waste rock used as underground backfill would be placed well below the final groundwater level (approximately 60 to 80m below natural surface) where oxidation within the saturated zone would be very low (negligible). PAF waste rock initially placed above the water table (*ie*. whilst groundwater recovers) does pose a short-term risk of generating AMD, however the potential impact to groundwater during the groundwater recovery period would be limited and very localised to the placement area. As such, backfilled waste rock would pose a low environmental risk with respect to AD and/or NMD.

Weathered waste rock is expected to be sodic to varying degrees with potential for dispersion and erosion. During operations, waste rock will be stockpiled on pads with run-off and sediment captured, therefore erosion and dispersion of waste rock will not pose an environmental risk. Any waste rock remaining at the surface at the end of operations would be land formed, topsoiled and revegetated to manage potential erosion and dispersion.

Where rock is used for construction activities, this should be limited to competent NAF waste rock. Regardless of the rock type, especially where engineering or geotechnical stability is required, laboratory testing and/or field trials should be undertaken to determine the suitability of the rock for the proposed use.

Surface water run-off and seepage (leachate) from waste rock stockpiles will be captured in lined leach ponds (Figure 2-1) before use in the mine water management system. This water will be monitored for 'standard' water quality parameters including, but not limited to, pH, EC, major anions (sulfate, chloride, alkalinity), acidity, major cations (sodium, calcium, magnesium, potassium), total dissolved solids (TDS) and a broad suite of soluble metals/metalloids by ICP-MS (or equivalent high-resolution analysis).

With the implementation of the proposed management and mitigation measures, the waste rock is regarded as posing a low risk of environmental harm.

6.2 Tailings Management Strategy

Based on the current assessment, tailings (Master Composite) are regarded as posing a moderate to high AMD hazard with respect to generation of acidity and sulfate.

A small quantity of ore (approximately 10 %) may be transported to Peak Gold Mine (near Cobar) for processing in the initial years, with tailings from that ore remaining at Peak Gold Mine. The majority of ore from the Federation deposit (approximately 90 %) will be processed at Hera Mine. Approximately 60 % of the tailings produced from Federation ore will be thickened and returned underground (at Federation mine) for backfilling underground stopes. The remaining tailings will be disposed/managed under the current approved tailings management measures at Hera Mine, which comprises the disposal of tailings slurry into a dedicated tailings storage facility.

Under the proposed management strategies, tailings will either be disposed into the approved TSF (where oxidation will be limited by rapid and subsequent burial by fresh tailings), or tailings will be paste thickened and returned underground at Federation Mine as backfill, eventually residing below the post-closure groundwater level. Tailings paste is similar to cement (a mix of general purpose cement and 'slag' will be used as the binder), which hardens within weeks resulting in a concrete-like material, which therefore binds the material into a permanently cemented matrix where oxidation of sulfide minerals is significantly limited. Furthermore, the tailings paste will be alkaline due to the cement binder. Tailings paste initially placed above the water table (*ie*. during operations and whilst groundwater recovers) may pose a very short-term and limited risk of generating AMD (potentially as NMD or SD) whilst the paste hardens, however the potential impact to groundwater during this time (and then during the groundwater recovery period) would be limited and very localised to the placement area.

As such the risk of environmental harm and health-risk that emplaced tailings poses is low.

6.3 ROM Stockpiles

ROM ore is not mining waste, and surface water run-off and seepage from ROM pads and stockpiles would not report off-site and would be managed as part of the mine water management system.

ROM ore would be stored on-site for a relatively short period of time (days to weeks) compared to mineral waste materials, which would be stored at the site in perpetuity (at various surface and underground locations). Management practices are therefore different for ROM ore (compared to waste rock and tailings) and would largely be based around the operational (day-to-day) management of surface water run-off from ROM stockpiles, as is currently accepted practice at mines in Australia.

Surface water run-off from ROM stockpiles would report to a lined leach pond and be monitored for 'standard' water quality parameters including, but not limited to, pH, EC, major anions (sulfate, chloride, alkalinity), acidity, major cations (sodium, calcium, magnesium, potassium), TDS, and a broad suite of soluble metals/metalloids ICP-MS (or equivalent high-resolution analysis).

7 References

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Appendix A

Summary Information for Sampled Drill-holes

Table A1. Summary Information for Sampled Drill-Holes

Drill-hole ID	Purpose	Easting *	Northing *	Collar Elevation	Azimuth	Dip	Date Drill	Sample Types Collected
FDD102	Box-cut & portal	434088.17	6437140.9	320.21	12.82	-69.87	Sep. 2020	21 core
FDD103	Box-cut	434062.55	6437089.4	320.63	16.65	-69.96	Sep. 2020	16 core
FDD104	Portal and upper-decline	434092.91	6437204.8	319.37	193.62	-70.39	Sep. 2020	15 core
FDD110W1	Deep waste rock	434091.07	6437194.8	319.48	139.94	-60.66	Jan. 2021	8 core
FDD110W2	Deep waste rock	434091.07	6437194.8	319.48	139.94	-60.66	Feb. 2021	9 core
FDD111W1	Deep waste rock	434403.82	6437404.7	320.16	140.58	-64.50	Feb. 2021	10 core
FDD113	Deep waste rock	433988.03	6437200.9	317.56	122.61	-64.32	Feb. 2021	10 core
FDD113W1	Deep waste rock	433988.03	6437200.9	317.56	122.61	-64.32	Mar. 2021	10 core
FDD113W6	Mid-level and deep waste rock	434266.63	6437026.2	323.61	101.30	-60.68	Apr. 2021	10 core
FDD119	Mid-level waste rock	434328.03	6437043.9	324.11	182.36	-55.13	Mar. 2021	5 core
FDD121	Upper- and mid-level waste rock	434310.79	6437059.3	323.98	144.11	-55.49	Mar. 2021	10 core
FDD123	Upper- and mid-level waste rock	433937.55	6437284.8	316.36	114.19	-59.97	Apr. 2021	5 core
FDD126	Deep waste rock	433937.55	6437284.8	316.36	114.19	-59.97	May 2021	10 core
FDD126W2	Deep waste rock	434207.04	6437170.3	321.38	121.93	-59.78	May 2021	10 core
FDD140	Upper- and mid-level decline	434088.17	6437140.9	320.21	12.82	-69.87	July 2021	52 core

* GDA94; MGA zone 55 (EPSG: 28355)

Appendix B

Static Geochemical Results Tables

* Results table for acid-base characteristics of potential tailings included in main body of report (Section4.1).

Table B1. Acid-Base Characteristics of Potential Waste Rock

Sample ID	Drill-hole ID & Sample Interval (m)	Weathering	Description	pH 1:5	EC1:5	S	ScR	C	MPA	Carb. NP	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG @ pH4.5	NAG @ pH7.0	Acid Classification
					µS/cm	%			kg H_2SO_4/t						kg H_2SO_4/t		
DM56192-WR	FDD103_2-3m	Highly	Saprock; Fragmental; Friable; Hematite, Limonite & Clay alteration	7.3	366	0.02		0.02	0.6	1.6	6.7	-6.1	10.9				NAF
DM56146-WR	FDD102_4-5m	Highly	Saprock & Sandstone; Bleached; Limonite, Mn.Oxide and Hematite alteration	8.3	288	0.02		0.04	0.6	3.3	4.6	-4.0	7.5				NAF
DM56148-WR	FDD102_6-7m	Highly	Sandstone; Bleached; Limonite & Manganese Oxide alteration	7.7	378	0.01		0.02	0.3	1.6	4.0	-3.7	13.1				NAF
DM56196-WR	FDD103_6-7m	Moderately	Sandstone Marl; Limonite & Hematite alteration	8.1	244	<0.01		0.03	0.2	2.5	5.4	-5.2	35.3				NAF
DM56151-WR	FDD102_8-9m	Moderately	Sandstone; Limonite & Manganese Oxide & minor Hem. alteration	8	255	<0.01		0.03	0.2	2.5	4.5	-4.3	29.4				NAF
DM56198-WR	FDD103_8-9m	Moderately	Sandstone Marl; Limonite & Hematite alteration	8.2	107	<0.01		0.03	0.2	2.5	5.0	-4.8	32.7				NAF
DM56153-WR	FDD102_10-11m	Moderately	Sandstone; Limonite & Manganese Oxide alteration	8	194	<0.01		0.03	0.2	2.5	3.9	-3.7	25.5				NAF
DM56201-WR	FDD103_10-11m	Highly	Sandstone Marl; Bedded; Fractured; Limonite, Hematite & Clay alteration	7.7	308	0.01		0.02	0.3	1.6	5.4	-5.1	17.6				NAF
DM56155-WR	FDD102_12-13m	Moderately	Sandstone; Limonite & Manganese Oxide alteration	7.8	337	<0.01		0.04	0.2	3.3	4.3	-4.1	28.1				NAF
DM56203-WR	FDD103_12-13m	Highly	Sandstone Marl; Bedded; Fractured; Limonite, Hematite & Clay alteration	7.5	317	<0.01		0.02	0.2	1.6	4.6	-4.4	30.0				NAF
DM56157-WR	FDD102_14-15m	Moderately	Sandstone; Limonite & Manganese Oxide alteration	8.1	127	<0.01		0.03	0.2	2.5	4.2	-4.0	27.4				NAF
DM56205-WR	FDD103_14-15m	Slightly	Sandstone Marl; Bedded; Fractured; Limonite, Hematite & Hematite alteration	8	207	<0.01		0.03	0.2	2.5	4.8	-4.6	31.3				NAF
DM56159-WR	FDD102_16-17m	Moderately	Sandstone Marl; Bedded; Bleached; Limonite, Hematite & Carb. alteration	7.4	414	<0.01		0.04	0.2	3.3	4.2	-4.0	27.4				NAF
DM56207-WR	FDD103_16-17m	Slightly	Sandstone Marl; Bedded; Fractured; Limonite, Hematite & Hematite alteration	8	233	<0.01		0.04	0.2	3.3	4.8	-4.6	31.3				NAF
DM56245-WR	FDD104_16-17m	Moderately	Sandstone Marl; Bedded; Hematite, Limonite & Carb. alteration	7.4	401	0.01		0.06	0.3	4.9	7.8	-7.5	25.5				NAF
DM56161-WR	FDD102_18-19m	Moderately	Sandstone Marl; Bedded; Bleached; Limonite, Hematite & Carb. alteration	7.6	209	<0.01		0.03	0.2	2.5	3.8	-3.6	24.8				NAF
DM56209-WR	FDD103_18-19m	Slightly	Sandstone Marl; Bedded; Fractured; Limonite, Hematite & Hematite alteration	7.7	333	0.01		0.04	0.3	3.3	4.7	-4.4	15.3				NAF
DM56247-WR	FDD104_18-19m	Moderately	Sandstone Marl; Bedded; Hematite, Limonite & Carb. alteration	7.7	511	<0.01		0.07	0.2	5.7	7.9	-7.7	51.6				NAF
DM56163-WR	FDD102_20-21m	Moderately	Sandstone Marl; Bedded; Bleached; Limonite, Hematite & Carb. alteration	7.2	405	0.01		0.04	0.3	3.3	3.7	-3.4	12.1				NAF
DM56211-WR	FDD103_20-21m	Slightly	Sandstone Marl; Bedded; Fractured; Limonite, Hematite & Hematite alteration	7.6	317	0.01		0.04	0.3	3.3	5.2	-4.9	17.0				NAF
DM56249-WR	FDD104_20-21m	Moderately	Sandstone Marl; Bedded; Hematite, Limonite & Carb. alteration	7.8	336	<0.01		0.05	0.2	4.1	9.0	-8.8	58.8				NAF
DM56165-WR	FDD102_22-23m	Moderately	Sandstone Marl; Bedded; Bleached; Limonite, Hematite & Carb. alteration	7.4	239	<0.01		0.03	0.2	2.5	4.4	-4.2	28.7				NAF
DM56213-WR	FDD103_22-23m	Slightly	Sandstone Marl; Bedded; Fractured; Limonite, Hematite & Hematite alteration	5.5	311	0.24	0.222	0.04	7.4	3.3	4.5	2.9	0.6	3.1	5.0	7.5	PAF-LC
DM56253-WR	FDD104_23-24m	Highly	Sandstone Marl; Bedded; Limonite, Hematite & Manganese Oxide alteration	7.9	252	<0.01		0.05	0.2	4.1	3.2	-3.0	20.9				NAF
DM56167-WR	FDD102_24-25m	Moderately	Sandstone Marl; Bedded; Bleached; Limonite, Hematite & Carb. alteration	7.8	248	<0.01		0.04	0.2	3.3	4.1	-3.9	26.8				NAF
DM56215-WR	FDD103_24-25m	Slightly	Sandstone Marl; Bedded; Fractured; Limonite, Hematite & Hematite alteration	7.9	163	<0.01		0.03	0.2	2.5	4.6	-4.4	30.0				NAF
DM56255-WR	FDD104_25-26m	Highly	Sandstone Marl; Bedded; Limonite, Hematite & Manganese Oxide alteration	7.8	438	0.01		0.05	0.3	4.1	2.7	-2.4	8.8				NAF
DM56169-WR	FDD102_26-27m	Moderately	Sandstone Marl; Bedded; Bleached; Limonite, Hematite & Carb. alteration	7.3	503	0.01		0.04	0.3	3.3	3.3	-3.0	10.8				NAF
DM56217-WR	FDD103_26-27m	Slightly	Sandstone Marl; Bedded; Fractured; Limonite, Hematite & Hematite alteration	7.4	222	0.04		0.04	1.2	3.3	5.2	-4.0	4.2				NAF
DM56257-WR	FDD104_27-28m	Highly	Sandstone Marl; Bedded; Limonite, Hematite & Manganese Oxide alteration	8	292	<0.01		0.06	0.2	4.9	5.1	-4.9	33.3				NAF
DM56171-WR	FDD102_28-29m	Moderately	Sandstone Marl; Bedded; Limonite, Manganese Oxide & Carb. alteration	7.9	164	0.01		0.04	0.3	3.3	4.0	-3.7	13.1				NAF
DM56219-WR	FDD103_28-29m	Slightly	Sandstone Marl; Bleached; Bedded; Limonite, Hematite & Mn. Oxide alteration	7.6	188	<0.01		0.04	0.2	3.3	5.2	-5.0	34.0				NAF
DM56259-WR	FDD104_29-30m	Slightly	Sandstone Marl; Bedded; Limonite, Hematite & Carb. alteration	7.8	286	<0.01		0.04	0.2	3.3	5.3	-5.1	34.6				NAF
DM56173-WR	FDD102_30-31m	Moderately	Sandstone Marl; Bedded; Limonite, Manganese Oxide & Carb. alteration	7.7	188	<0.01		0.04	0.2	3.3	4.8	-4.6	31.3				NAF
DM56221-WR	FDD103_30-31m	Slightly	Sandstone; Hematite, Hematite & Carb. alteration	7.1	173	0.12	0.115	0.05	3.7	4.1	4.6	-0.9	1.3	3.6	2.5	4.2	PAF-LC
DM56261-WR	FDD104_31-32m	Slightly	Sandstone Marl; Bedded; Limonite, Hematite & Carb. alteration	7.9	262	<0.01		0.05	0.2	4.1	5.2	-5.0	34.0				NAF
DM56176-WR	FDD102_32-33m	Moderately	Sandstone Marl; Bedded; Limonite, Manganese Oxide & Carb. alteration	8.1	118	<0.01		0.04	0.2	3.3	7.0	-6.8	45.7				NAF
DM56223-WR	FDD103_32-33m	Slightly	Sandstone; Hematite, Hematite & Carb. alteration	5.5	245	0.5	0.416	0.04	15.3	3.3	4.0	11.3	0.3	2.6	12.8	18	PAF
DM56263-WR	FDD104_33-34m	Slightly	Sandstone Marl; Bedded; Limonite, Hematite & Carb. alteration	8.3	162	<0.01		0.04	0.2	3.3	5.9	-5.7	38.5				NAF
DM56178-WR	FDD102_34-35m	Moderately	Sandstone Marl; Bedded; Limonite, Manganese Oxide & Carb. alteration	7.6	186	0.01		0.04	0.3	3.3	7.6	-7.3	24.8				NAF
DM56226-WR	FDD103_34-35m	Slightly	Sandstone; Hematite, Hematite & Carb. alteration	4.8	377	0.48	0.413	0.04	14.7	3.3	3.9	10.8	0.3	2.6	11.2	13.1	PAF

pH and EC on 1:5 water extracts [on pulp]; S = total sulfur; Scr = sulfide [chromium reducible sulfur]; C = total carbon; Carb.NP = Carb. neutralising potential; MPA = Maximum potential acidity; ANC = Acid neutralising capacity
NAPP = Net acid producing potential; NAG = Net acid generation; MPA is calculated from Total S; Carb.NP is calculated from Total C; NAPP is calculated from MPA and ANC. Refer to main body of the report for further explanation.

Table B1 (cont.) Acid-Base Characteristics of Potential Waste Rock

Sample ID	Drill-hole ID & Sample Interval (m)	Weathering	Description	pH 1:5	EC1:5	S	ScR	C	MPA	Carb. NP	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG @ pH4.5	NAG @ pH7.0	Acid Classification
					µS/cm	%			kg H_2SO_4/t						kg H_2SO_4/t		
DM56265-WR	FDD104_35-36m	Slightly	Sandstone Marl; Bedded; Limonite, Hematite & Carb. alteration	8.1	264	<0.01		0.04	0.2	3.3	6.7	-6.5	43.8				NAF
DM56180-WR	FDD102_36-37m	Moderately	Sandstone Marl; Bedded; Limonite, Manganese Oxide & Carb. alteration	8	141	<0.01		0.03	0.2	2.5	11.8	-11.6	77.1				NAF
DM56267-WR	FDD104_37-38m	Slightly	Sandstone Marl; Bedded; Limonite, Hematite & Carb. alteration	8.3	187	<0.01		0.04	0.2	3.3	5.6	-5.4	36.6				NAF
DM56182-WR	FDD102_38-39m	Moderately	Sandstone Marl; Bedded; Limonite, Manganese Oxide & Carb. alteration	8.2	78	<0.01		0.03	0.2	2.5	8.7	-8.5	56.8				NAF
DM56269-WR	FDD104_39-40m	Slightly	Sandstone Marl; Bedded; Limonite, Hematite & Carb. alteration	8	250	<0.01		0.03	0.2	2.5	3.8	-3.6	24.8				NAF
DM56184-WR	FDD102_40-41m	Slightly	Sandstone Marl; Bedded; Limonite, Hematite & Carb. alteration	8.3	82	<0.01		0.03	0.2	2.5	7.9	-7.7	51.6				NAF
DM56271-WR	FDD104_41-42m	Moderately	Sandstone Marl; Bedded; Hematite, Limonite & Carb. alteration	7.9	221	<0.01		0.05	0.2	4.1	4.5	-4.3	29.4				NAF
DM56186-WR	FDD102_42-43m	Slightly	Sandstone Marl; Bedded; Limonite, Hematite & Carb. alteration	8.1	65	<0.01		0.04	0.2	3.3	9.0	-8.8	58.8				NAF
DM56273-WR	FDD104_43-44m	Moderately	Sandstone Marl; Bedded; Hematite, Limonite & Carb. alteration	7.8	214	<0.01		0.05	0.2	4.1	6.2	-6.0	40.5				NAF
DM56188-WR	FDD102_44-45m	Slightly	Sandstone Marl; Bedded; Limonite, Hematite & Carb. alteration	8.1	264	0.01		0.05	0.3	4.1	15.4	-15.1	50.3				NAF
DM56276-WR	FDD104_45-45.9m	Moderately	Sandstone Marl; Bedded; Hematite, Limonite & Carb. alteration	8.1	138	<0.01		0.05	0.2	4.1	5.1	-4.9	33.3				NAF
M78216WR	FDD140_60-61m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Limonite & Hematite alteration; Iron Oxide (0.3%)			0.63	0.569	0.03	19.3	2.5	6.3	13.0	0.3	2.6	13	16.5	PAF
M78219WR	FDD140_63-64m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Limonite & Hematite alteration; Iron Oxide (0.3%)			0.11	0.088	0.02	3.4	1.6	1	2.4	0.3	4	0.5	2.7	PAF-LC
M78222WR	FDD140_66-67m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Limonite & Hematite alteration; Iron Oxide (0.3%)			0.6	0.545	0.03	18.4	2.5	3.6	14.8	0.2	2.5	15.2	17.6	PAF
M78226WR	FDD140_69-70m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Limonite & Hematite alteration; Iron Oxide (0.3%)			0.78	0.497	0.03	23.9	2.5	<0.5	23.9	0.0	2.5	15	17.3	PAF
M78229WR	FDD140_72-73m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Limonite & Hematite alteration; Iron Oxide (0.3%)			0.84	0.704	0.03	25.7	2.5	2.4	23.3	0.1	2.4	19.6	23.3	PAF
M78232WR	FDD140_75-76m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Limonite & Hematite alteration; Iron Oxide (0.3%)			0.7	0.592	0.04	21.4	3.3	3	18.4	0.1	2.4	17.8	20.3	PAF
M78235WR	FDD140_78-79m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Limonite & Hematite alteration; Iron Oxide (0.3%)			0.67	0.633	0.03	20.5	2.5	2.8	17.7	0.1	2.5	16.8	18.9	PAF
M78238WR	FDD140_81-82m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Limonite & Hematite alteration; Iron Oxide (0.3%)			0.52	0.447	0.03	15.9	2.5	2.4	13.5	0.2	2.6	10.8	13.5	PAF
M78241WR	FDD140_84-85m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Silica & Mn.Oxide alteration; Iron Oxide (0.3%)			0.59	0.531	0.14	18.1	11.4	4.6	13.5	0.3	2.5	14.2	17.3	PAF
M78244WR	FDD140_87-88m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Silica & Mn.Oxide alteration; Iron Oxide (0.3%)			0.7	0.685	0.16	21.4	13.1	3	18.4	0.1	2.5	17.9	22.3	PAF
M78247WR	FDD140_90-91m	Fresh (fract.ox.)	Siltstone; Bedded; Sericitic, Silica & Mn.Oxide alteration; Iron Oxide (0.3%)			0.41	0.402	0.15	12.6	12.3	2.1	10.5	0.2	2.8	8.8	10.9	PAF
M78251WR	FDD140_93-94m	Fresh	Siltstone; Bedded; Sericitic, Silica & Mn.Oxide alteration; Pyrr. (0.3%)			0.41	0.34	0.07	12.6	5.7	4.8	7.8	0.4	2.8	8.2	11.8	PAF-LC
M78254WR	FDD140_96-97m	Fresh	Siltstone; Bedded; Sericitic, Silica & Mn.Oxide alteration; Pyrr. (0.3%)			0.55	0.268	0.17	16.8	13.9	5.7	11.1	0.3	2.9	6.6	9	PAF
M78257WR	FDD140_99-100m	Fresh	Siltstone; Bedded; Sericitic, Silica & Mn.Oxide alteration; Pyrr. (0.3%)			0.22	0.169	0.09	6.7	7.4	8.4	-1.7	1.2	3.4	2.5	4.9	PAF-LC
DM69601-WR	FDD121_100-101m	Fresh (fract.ox.)	Sandstone; Fractured; Silica, Limonite & Carb. alteration	9.2	41	0.01		0.04	0.3	3.3	13.3	-13.0	43.4				NAF
M78260WR	FDD140_102-103m	Fresh	Siltstone; Bedded; Foliated; Sericitic, Silica & Mn.Oxide alteration; Pyrr. (0.3%)			0.24	0.236	0.05	7.4	4.1	6	1.4	0.8	3	5.2	7.5	PAF-LC
M78263WR	FDD140_105-106m	Fresh	Siltstone; Bedded; Foliated; Sericitic, Silica & Mn.Oxide alteration; Pyrr. (0.3%)			0.23	0.187	0.09	7.0	7.4	7.6	-0.6	1.1	3.2	3.4	5.4	PAF-LC
M78266WR	FDD140_108-109m	Fresh	Siltstone; Bedded; Foliated; Sericitic, Silica & Mn.Oxide alteration; Pyrr. (0.3%)			0.2	0.187	0.05	6.1	4.1	6.5	-0.4	1.1	3.4	2.6	4.3	PAF-LC
DM69611-WR	FDD121_110-111m	Fresh (fract.ox.)	Sandstone; Fractured; Silica, Limonite & Carb. alteration	9	39	0.01		0.04	0.3	3.3	11.7	-11.4	38.2				NAF
M78269WR	FDD140_111-112m	Fresh	Siltstone; Bedded; Foliated; Sericitic, Silica & Mn.Oxide alteration; Pyrr. (0.3%)			0.24	0.206	0.11	7.4	9.0	8.6	-1.3	1.2	3.4	2.6	5.6	PAF-LC
M78272WR	FDD140_114-115m	Fresh	Siltstone; Bedded; Foliated; Sericitic, Silica & Mn.Oxide alteration; Pyrr. (0.3%)			0.3	0.151	0.06	9.2	4.9	7.5	1.7	0.8	3.4	2	3.7	PAF-LC
M78276WR	FDD140_117-118m	Fresh	Siltstone; Broken; Sericitic, Silica & Clay alteration; Pyrr. (0.3%)			0.16	0.155	0.05	4.9	4.1	7.6	-2.7	1.6	3.2	4	6.3	PAF-LC
DM69621-WR	FDD121_120-121m	Fresh	Sandstone; Bedded; Silica & Carb. alt.; Sph. (0.01%); Gal. (0.01%); CuPy. (0.01%)	8.8	48	0.04		0.04	1.2	3.3	14.4	-13.2	11.8				NAF
M78279WR	FDD140_120-121m	Fresh	Siltstone; Broken; Sericitic, Si. & Clay alteration; Pyrr. (0.3%)			0.23	0.214	0.07	7.0	5.7	7.2	-0.2	1.0	3.2	4.1	6.7	PAF-LC
DM70204-WR	FDD123_125-126m	Fresh	Sandstone Marl; Interbedded; Carb. alteration	9	72	0.22	0.222	0.04	6.7	3.3	15.8	-9.1	2.3	4.4	0.2	3.2	UC(PAF)
DM69632-WR	FDD121_130-131m	Fresh	Sandstone (fault zone); Brecc.; Clay alt.; Sph. (0.01%); Gal. (0.01%); CuPy. (0.01%)	8.7	63	0.16	0.152	0.04	4.9	3.3	16.0	-11.1	3.3	4.8	<0.1	2.0	NAF
DM70214-WR	FDD123_135-136m	Fresh	Sandstone Marl; Interbedded; Carb. alteration	9.4	120	0.28	0.28	0.16	8.6	13.1	23.4	-14.8	2.7	8.0	<0.1	<0.1	NAF
DM69642-WR	FDD121_140-141m	Fresh	Sandstone; Bedded; Si. alteration; Sph. (0.01%); Gal. (0.01%); CuPy. (0.01%)	9.3	106	0.28	0.263	0.06	8.6	4.9	16.6	-8.0	1.9	4.0	0.6	3.7	UC(PAF)
DM70224-WR	FDD123_145-146m	Fresh	Mudstone Siltstone; Massive; Si. alteration	9.2	54	0.24	0.236	0.03	7.4	2.5	13.6	-6.3	1.9	3.5	2.2	5.1	UC(PAF)
DM69653-WR	FDD121_150-151m	Fresh	Sandst.; weakly sheared; Chl., Si & Carb. alt.; Sph.(0.2%); Gal.(0.01%); CuPy.(0.02%)	9	60	0.4	0.39	0.03	12.3	2.5	16.2	-4.0	1.3	3.0	6.1	9.6	PAF-LC

pH and EC on 1:5 water extracts [on pulp]; S = total sulfur; Scr = sulfide [chromium reducible sulfur]; C = total carbon; Carb.NP = Carb. neutralising potential; MPA = Maximum potential acidity; ANC = Acid neutralising capacity
NAPP = Net acid producing potential; NAG = Net acid generation; MPA is calculated from Total S; Carb.NP is calculated from Total C; NAPP is calculated from MPA and ANC. Refer to main body of the report for further explanation.

Table B1 (cont.) Acid-Base Characteristics of Potential Waste Rock

Sample ID	Drill-hole ID & Sample Interval (m)	Weathering	Description	pH 1:5	EC1:5	S	ScR	C	MPA	Carb. NP	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG @ pH4.5	NAG @ pH7.0	Acid Classification
					µS/cm	%			kg H_2SO_4/t						kg H_2SO_4/t		
DM70235-WR	FDD123_155-156m	Fresh	Mudstone Siltstone; Massive; Si. alteration	9.4	97	0.22	0.22	0.05	6.7	4.1	15.0	-8.3	2.2	3.6	1.8	3.9	UC(PAF)
DM69663-WR	FDD121_160-161m	Fresh	Sandstone; w eak. sheared; Chl., Si. & Carb. alt.; Sph.(0.2%); Gal.(0.01%); CuPy.(0.02%)	9.4	135	0.31	0.29	0.08	9.5	6.5	18.6	-9.1	2.0	4.0	0.6	3.3	UC(PAF)
DM70245-WR	FDD123_165-166m	Fresh	Mudstone Siltstone; Massive; Si. alteration	8.6	108	0.45	0.44	0.04	13.8	3.3	13.2	0.6	1.0	3.2	4.8	9.6	PAF-LC
DM69673-WR	FDD121_170-171m	Fresh	Sandstone; Bedded; Carb. & Si. alt.; Sph. (0.2%); Gal. (0.01%); CuPy. (0.02%)	9.4	166	0.36	0.301	0.07	11.0	5.7	16.6	-5.6	1.5	3.8	1.3	4.9	UC(PAF)
DM69684-WR	FDD121_180-181m	Fresh	Sandstone; Bedded; Carb. & Si. alteration; Sph. (0.2%); Gal. (0.01%); CuPy. (0.02%)	9.4	137	0.65	0.6	0.07	19.9	5.7	15.6	4.3	0.8	3.3	3.6	11	PAF-LC
DM69694-WR	FDD121_190-191m	Fresh	Siltstone; Laminated; Chl., Si. & Pyrr. alt.; Sph. (0.2%); Gal. (0.01%); CuPy. (0.02%)	9.5	113	0.26	0.235	0.06	8.0	4.9	17.4	-9.4	2.2	4.0	0.7	3.2	UC(PAF)
DM68831-WR	FDD119_210-211m	Fresh	Sandstone; Laminated; Bioturbated; Si. & Chl. alt.; Sph. (1%); Gal. (1%); CuPy. (0.2%)	8.8	83	0.21	0.187	0.03	6.4	2.5	13.0	-6.6	2.0	3.6	1.4	5.9	UC(PAF)
DM68841-WR	FDD119_220-221m	Fresh	Sandstone; Laminated; Bioturbated; Si. & Chl. alt.; Sph. (1%); Gal. (1%); CuPy. (0.2%)	9.3	163	0.26	0.226	0.33	8.0	27.0	35.1	-27.1	4.4	8.5	<0.1	<0.1	NAF
DM68852-WR	FDD119_230-231m	Fresh	Sandstone; Laminated; Si. & Chl. alt.; Sph.(0.5%); Gal.(0.5%); CuPy.(0.1%)	9.3	136	0.08		0.06	2.5	4.9	15.2	-12.8	6.2				NAF
DM68862-WR	FDD119_240-241m	Fresh	Sandstone Siltstone; thinly bedded; Si. & Chl. alt.; Sph.(0.5%); Gal.(0.5%); CuPy.(0.1%)	9.4	113	0.13	0.14	0.17	4.0	13.9	23.7	-19.7	6.0	9.6	<0.1	<0.1	NAF
DM68872-WR	FDD119_250-251m	Fresh	Sandstone Siltstone; thinly bedded; Si. & Chl. alt.; Sph.(0.5%); Gal.(0.5%); CuPy.(0.1%)	9	137	0.3	0.297	0.04	9.2	3.3	14.5	-5.3	1.6	3.2	4.9	7.3	UC(PAF)
DM69728-WR	FDD113W6_320-321m	Fresh	Siltstone; ; Sph. (0.1%); Gal. (0.1%)	9.4	112	0.59	0.442	0.08	18.1	6.5	19.4	-1.3	1.1	3.1	5.6	9.5	PAF-LC
DM69738-WR	FDD113W6_330-331m	Fresh	Siltstone Sandstone; Silica, Sericitic & Pyrr. alteration	9.4	123	1.4	1.25	0.05	42.9	4.1	21.9	21.0	0.5	2.7	28.3	34.2	PAF
DM69748-WR	FDD113W6_340-341m	Fresh	Siltstone Sandstone; Silica, Sericitic & Pyrr. alteration	8.7	112	3.13	2.92	0.03	95.9	2.5	15.1	80.8	0.2	2.2	76.8	84.0	PAF
DM69759-WR	FDD113W6_350-351m	Fresh	Siltstone; Laminated; Silica, Chl. & Pyrr. alt.; CuPy. (0.1%); Sph. (0.1%)	9.4	90	0.75	0.605	0.03	23.0	2.5	14.8	8.2	0.6	2.7	13.3	18.6	PAF-LC
DM69769-WR	FDD113W6_360-361m	Fresh	Siltstone; Laminated; Silica, Chl. & Pyrr. alt.; CuPy. (0.1%); Sph. (0.1%)	9.5	97	0.48	0.421	0.04	14.7	3.3	15.7	-1.0	1.1	2.9	7.0	10.2	PAF-LC
DM69780-WR	FDD113W6_370-371m	Fresh	Siltstone; Laminated; Silica, Chl. & Pyrr. alt.; CuPy. (0.1%); Sph. (0.1%)	9.5	90	0.44	0.426	0.03	13.5	2.5	14.4	-0.9	1.1	2.9	7.0	11.4	PAF-LC
DM69790-WR	FDD113W6_380-381m	Fresh	Siltstone Fault Zone or Shear Zone; Sheared; Brecciated; Si., Chl. & Pyrr. alt.; minor Sph.	8.8	168	0.5	0.345	0.04	15.3	3.3	15.2	0.1	1.0	2.9	7.4	12.8	PAF-LC
DM69801-WR	FDD113W6_390-391m	Fresh	Siltstone Sandstone; Laminated; Weakly Foliated; Si., Chl. & Pyrr. alt.; Sph. (0.2%)	9.5	56	0.43	0.394	0.03	13.2	2.5	15.1	-1.9	1.1	3.0	7.0	10.5	PAF-LC
DM69811-WR	FDD113W6_400-401m	Fresh	Siltstone Sandstone; Sheared; fractured; Si., Chl. & Pyrr. alt.; Sph. (0.6%); Gal. (0.4%)	9.4	125	0.24	0.211	0.16	7.4	13.1	23.7	-16.4	3.2	7.3	<0.1	<0.1	NAF
DM69821-WR	FDD113W6_410-411m	Fresh	Siltstone; Black Chl. & Silica alteration	9.3	101	0.14	0.134	0.04	4.3	3.3	15.7	-11.4	3.7	4.6	<0.1	6.4	NAF
DM64409-WR	FDD110W1_450-451m	Fresh	Siltstone Sandstone; Interbedded; Massive; Chl., Silica & Pyrr. alt.; Sph. (0.1%)	9.3	128	0.68	0.684	0.05	20.8	4.1	7.7	13.1	0.4	2.9	8.8	15.9	PAF
DM64430-WR	FDD110W1_470-471m	Fresh	Siltstone Sandstone; Interbedded; Massive; Chl., Silica & Pyrr. alt.; Sph. (0.1%)	9.3	56	0.33	0.248	0.02	10.1	1.6	4.6	5.5	0.5	3.0	6.6	10.1	PAF-LC
DM66789-WR	FDD113_520-521m	Fresh	Sandstone; Bedded; Silica & Chl. alteration; Pyrr. (2%); Pyrite (0.2%)	9.2	58	0.87	0.763	0.03	26.6	2.5	6.1	20.5	0.2	2.4	19.4	24.1	PAF
DM64492-WR	FDD110W1_530-531m	Fresh	Siltst. Sandst.; Si., Chl., Pyrr. alt.; Pyrr.(0.02%); Sph.(0.01%); Gal.(0.01%); CuPy.(0.01%)	9.3	53	0.52	0.511	<0.02	15.9	<1.6	5.2	10.7	0.3	2.6	11.8	17.0	PAF
DM66799-WR	FDD113_530-531m	Fresh	Siltstone Sandstone; Interbedded; Silica & Chl. alt.; Pyrr. (1%); Pyrite (0.1%)	9.2	93	0.72	0.581	0.02	22.1	1.6	12.7	9.4	0.6	2.6	13.2	17.2	PAF-LC
DM66810-WR	FDD113_540-541m	Fresh	Siltst. Sandst.; Interbed.; Si., Chl. & Pyrr. alt.; Pyrr.(1.5%); Sph.(0.4%); Gal.(0.1%)	9.3	84	0.86	0.742	0.04	26.3	3.3	14.4	11.9	0.5	2.6	11.4	18	PAF
DM66820-WR	FDD113_550-551m	Fresh	Sandstone Siltstone; Silica & Pyrr. alteration; Pyrr. (0.5%); Sph. (0.1%)	9.5	74	0.61	0.556	0.02	18.7	1.6	15.2	3.5	0.8	2.6	8.6	14.7	PAF-LC
M78727WR	FDD140_550-551m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Q alt.; Pyrr. (0.5%)			0.08	0.072	<0.02	2.5	<1.6	7.3	-4.9	3.0	4.3	0.2	3.7	UC(PAF)
M78730WR	FDD140_553-554m	Fresh	Siltstone Sandstone; Interbedded; Si. & Q alt.; Sph. (2%); Gal. (0.5%); Pyrr. (0.5%)			0.28	0.196	<0.02	8.6	<1.6	9.9	-1.3	1.2	3.7	1.5	4	PAF-LC
M78733WR	FDD140_556-557m	Fresh	Siltstone Chl. Schist; Replacement textures; Sph.(2%); Gal.(0.5%); Pyrr.(0.5%)			1.52	1.19	0.02	46.6	1.6	7.6	39.0	0.2	3.4	3.4	24.8	PAF
M78736WR	FDD140_559-560m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Si. alt.; Pyrr. (0.5%); Pyrite (0.5%)			0.47	0.451	<0.02	14.4	<1.6	8.2	6.2	0.6	3.5	2.1	5.8	PAF-LC
DM64523-WR	FDD110W1_560-561m	Fresh	Sandst.; Brecc.; Si., Chl. & Seri. alt.; Sph.(1.5%); Gal.(1%); Pyrr.(0.5%); CuPy.(0.01%)	9.2	56	0.58	0.519	<0.02	17.8	<1.6	4.0	13.8	0.2	3.0	7.9	14.1	PAF
DM65777-WR	FDD110W2_560-561m	Fresh	Siltstone; Bedded; Silica, Sericitic & Pyrr. alteration; Pyrr. (2.5%)	9.1	106	1.14	1.02	<0.02	34.9	<1.6	5.7	29.2	0.2	2.8	30.8	40.4	PAF
DM66831-WR	FDD113_560-561m	Fresh	Sandstone Siltstone; Interbedded; Silica & Pyrr. alt.; Pyrr. (0.5%); Gal. (0.3%)	9	82	0.67	0.169	0.03	20.5	2.5	12.3	8.2	0.6	2.6	10.8	14.3	PAF-LC
M78739WR	FDD140_562-563m	Fresh	Fault Breccia Siltstone & Sandstone; Fractured; Si. & Clay alt.; Pyrr. (0.5%); Pyrite (0.5%)			0.14	0.127	<0.02	4.3	<1.6	6	-1.7	1.4	3.8	1	3.2	UC(PAF)
M78742WR	FDD140_565-566m	Fresh	Siltstone Sandstone; Interbedded; Si. & Black Chl. alt.; Pyrr.(0.5%); Py.(0.5%)			0.08	0.078	0.03	2.5	2.5	7.2	-4.8	2.9	5	<0.1	3.4	NAF
M78745WR	FDD140_568-569m	Fresh	Siltstone Sandstone; Interbedded; Si. & Black Chl. alt.; Pyrr.(0.5%); Py.(0.5%)			0.36	0.345	<0.02	11.0	<1.6	7.2	3.8	0.7	3.1	5.5	7.8	PAF-LC
DM64534-WR	FDD110W1_570-571m	Fresh	Siltst. Sandst.; part brecc.; Si., Chl. & Pyrr. alt.; Sph.(1.5%); Gal.(1%); Pyrr.(0.5%)	9.2	66	0.56	0.511	<0.02	17.2	<1.6	5.7	11.5	0.3	2.8	8.3	13.7	PAF
DM65787-WR	FDD110W2_570-571m	Fresh	Siltstone; Bedded; Silica, Sericitic & Pyrr. alteration; Pyrr. (2.5%)	9.3	193	0.85	0.535	0.03	26.0	2.5	6.3	19.7	0.2	2.8	11.2	21.1	PAF
DM66841-WR	FDD113_570-571m	Fresh	Sandstone; Silica & Chl. alteration; Gal. (0.3%); CuPy. (0.2%); Sph. (0.1%)	8.9	54	0.15	0.156	0.03	4.6	2.5	11.4	-6.8	2.5	3.6	1.5	4.0	UC(PAF)

pH and EC on 1:5 w ater extracts [on pulp]; S = total sulfur; Scr = sulfide [chromium reducible sulfur]; C = total carbon; Carb.NP = Carb. neutralising potential; MPA = Maximum potential acidity; ANC = Acid neutralising capacity
NAPP = Net acid producing potential; NAG = Net acid generation; MPA is calculated from Total S; Carb.NP is calculated from Total C; NAPP is calculated from MPA and ANC. Refer to main body of the report for further explanation.

Table B1 (cont.) Acid-Base Characteristics of Potential Waste Rock

Sample ID	Drill-hole ID & Sample Interval (m)	Weathering	Description	pH 1:5	EC1:5	S	ScR	C	MPA	Carb. NP	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG @ pH4.5	NAG @ pH7.0	Acid Classification
					µS/cm	%			kg H_2SO_4/t						kg H_2SO_4/t		
DM67297-WR	FDD113W1_570-571m	Fresh	Sandst. Siltst.; thinly bedded; Chl., Si. & Pyrr. alt.; Sph.(0.3%); Gal.(0.2%); Pyrr.(1%)	9.3	58	1.3	1.14	0.02	39.8	1.6	11.4	28.4	0.3	2.6	28.3	35.6	PAF
M78748WR	FDD140_571-572m	Fresh	Siltstone Sandstone; Interbed.; Si. & Black Chl. alt.; Sph. (2%); Gal. (1%); CuPy. (0.5%)			0.36	0.309	<0.02	11.0	<1.6	8	3.0	0.7	3.7	1.6	7.7	PAF-LC
M78752WR	FDD140_574-575m	Fresh	Siltstone Sandstone; Interbed.; Si. & Black Chl. alt.; Sph. (2%); Gal. (1%); CuPy. (0.5%)			0.95	0.819	0.02	29.1	1.6	8	21.1	0.3	3.2	3.7	14.5	PAF
M78755WR	FDD140_577-578m	Fresh	Siltstone Sandstone; Interbedded; Silica & Black Chl. alt.; Pyrr. (0.5%)			0.2	0.195	<0.02	6.1	<1.6	8.6	-2.5	1.4	3.6	2.1	4.1	PAF-LC
DM64544-WR	FDD110W1_580-581m	Fresh	Siltstone Sandstone; Interbedded; Silica, Chl. & Pyrr. alteration; Pyrr. (0.5%)	9.5	137	0.68	0.546	0.05	20.8	4.1	12.1	8.7	0.6	2.9	7.8	15.5	PAF-LC
DM65797-WR	FDD110W2_580-581m	Fresh	Siltstone; Bedded; Silica, Pyrr. & Sericitic alteration; Pyrr. (1.5%)	9.5	110	0.78	0.694	<0.02	23.9	<1.6	6.5	17.4	0.3	2.8	11.9	20	PAF
DM66852-WR	FDD113_580-581m	Fresh	Siltstone; Silica & Chl. alteration; Sph. (3%); Gal. (1.5%)	9.1	102	0.32	0.287	0.02	9.8	1.6	14.7	-4.9	1.5	3.7	1.1	4.3	UC(PAF)
DM67308-WR	FDD113W1_580-581m	Fresh	Sandst. Siltst.; bedded; Si., Seri. & Pyrr. alt.; Sph.(0.2%); Gal.(0.1%); Pyrr.(2.5%)	9.3	57	1.02	0.922	0.03	31.2	2.5	11.6	19.6	0.4	2.4	19.6	23.3	PAF
M78758WR	FDD140_580-581m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (0.5%)			0.16	0.157	<0.02	4.9	<1.6	8.8	-3.9	1.8	3.7	1.1	3	PAF-LC
M78761WR	FDD140_583-584m	Fresh	Siltstone Sandstone; Interbedded; Si. & Black Chl. alt.; Sph. (0.5%); Pyrr. (0.5%)			0.12	0.114	<0.02	3.7	<1.6	9	-5.3	2.4	4	0.3	2	UC(PAF)
M78764WR	FDD140_586-587m	Fresh	Siltstone Sandstone; Interbedded; Si. & Black Chl. alt.; Sph. (0.5%); Pyrr. (0.5%)			0.28	0.269	0.03	8.6	2.5	11.2	-2.6	1.3	3.3	2.9	5.2	PAF-LC
M78767WR	FDD140_589-590m	Fresh	Siltstone Sandstone; Interbedded; Si. & Black Chl. alt.; Sph. (0.5%); Pyrr. (0.5%)			0.64	0.541	0.03	19.6	2.5	10.9	8.7	0.6	2.9	7.8	9.6	PAF-LC
DM64555-WR	FDD110W1_590-591m	Fresh	Siltstone Sandstone; Interbedded; Silica, Chl. & Pyrr. alt.; Pyrr. (0.5%)	9.5	101	0.67	0.568	0.03	20.5	2.5	7.6	12.9	0.4	2.8	10.5	16.5	PAF
DM65808-WR	FDD110W2_590-591m	Fresh	Siltstone Sandstone; Interbedded; Silica, Chl. & Sericitic alt.; Pyrr. (2.5%)	9.2	58	1.12	1.06	<0.02	34.3	<1.6	6.7	27.6	0.2	2.7	28.2	41.1	PAF
DM66862-WR	FDD113_590-591m	Fresh	Siltstone; Silica & Chl. alteration; Sph. (1%); Gal. (0.3%)	9.3	47	0.06		0.02	1.8	1.6	11.1	-9.3	6.0				NAF
DM67318-WR	FDD113W1_590-591m	Fresh	Siltst. Sandst.; thinly bedded & laminated; Si., Chl. & Pyrr. alt.; Sph. (0.2%); Gal. (0.1%)	9.5	76	0.9	0.785	0.04	27.6	3.3	16.8	10.8	0.6	2.6	12.8	18.3	PAF
M78770WR	FDD140_592-593m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (1%)			0.32	0.319	0.03	9.8	2.5	9.7	0.1	1.0	3.2	3.8	5.3	PAF-LC
M78773WR	FDD140_595-596m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (1%)			0.24	0.204	0.02	7.4	1.6	9.5	-2.2	1.3	3.3	2.6	4.1	PAF-LC
M78777WR	FDD140_598-599m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (1%)			0.31	0.307	0.04	9.5	3.3	7.5	2.0	0.8	3.2	4.4	6.1	PAF-LC
DM64565-WR	FDD110W1_600-601m	Fresh	Siltstone Sandstone; Interbedded; Silica, Chl. & Pyrr. alteration; Pyrr. (0.5%)	9.5	125	0.34	0.282	0.03	10.4	2.5	7.1	3.3	0.7	3.3	4.3	7.8	PAF-LC
DM65818-WR	FDD110W2_600-601m	Fresh	Sandstone; Bedded; Silica, Chl. & Pyrr. alteration; Pyrr. (0.5%); Sph. (0.1%)	9.2	52	1.3	0.95	<0.02	39.8	<1.6	6.6	33.2	0.2	2.8	25.2	41.3	PAF
DM66121-WR	FDD111W1_600-601m	Fresh	Siltstone Chl. Schist; Banded; Bleached; Silica & Chl. alt.; Pyrr. (2%); Sph. (0.25%)	9.1	42	0.57	0.524	<0.02	17.5	<1.6	3.6	13.9	0.2	2.8	8.1	13.3	PAF
DM66872-WR	FDD113_600-601m	Fresh	Fault Zone or Shear Zone Siltstone; Brecciated; Silica & Chl. alt.; minor Sph. & Gal.	9.4	60	0.07		<0.02	2.1	<1.6	14.2	-12.1	6.6				NAF
DM67329-WR	FDD113W1_600-601m	Fresh	Siltstone; Bioturbated; Soft Sediment Slumps; Si. & Chl. alt.; Sph. (0.3%); Gal. (0.2%)	9.6	108	0.77	0.673	0.64	23.6	52.3	59.3	-35.7	2.5	8.1	<0.1	<0.1	NAF
M78780WR	FDD140_601-602m	Fresh	Siltstone Sandstone; Interbedded; Si. & Black Chl. alt.; Sph. (0.5%); Pyrr. (0.5%)			0.42	0.416	<0.02	12.9	<1.6	8.2	4.7	0.6	3	5.6	8.4	PAF-LC
M78783WR	FDD140_604-605m	Fresh	Siltstone Sandstone; Interbedded; Si. & Black Chl. alt.; Sph. (0.5%); Pyrr. (0.5%)			0.37	0.313	0.05	11.3	4.1	11.7	-0.4	1.0	3.2	3.4	5.9	PAF-LC
M78786WR	FDD140_607-608m	Fresh	Siltstone Sandstone; Interbedded; Si. & Black Chl. alt.; Sph. (0.5%); Pyrr. (0.5%)			0.7	0.628	0.04	21.4	3.3	8	13.4	0.4	3.2	4.2	13.2	PAF
DM65829-WR	FDD110W2_610-611m	Fresh	Sandstone; Bedded; Silica, Chl. & Pyrr. alteration; Pyrr. (1.5%)	9.4	47	0.44	0.422	<0.02	13.5	<1.6	6.5	7.0	0.5	2.9	11.1	14.8	PAF-LC
DM66132-WR	FDD111W1_610-611m	Fresh	Siltstone Sandstone; Interbedded; Soft Sediment Slumps; Si. & Chl. alt.; Pyrr. (0.5%)	9.1	42	0.5	0.442	<0.02	15.3	<1.6	6.2	9.1	0.4	3.1	5.4	11.7	PAF-LC
DM66884-WR	FDD113_610-611m	Fresh	Siltstone; Silica, Chl. & Pyrr. alteration; Pyrr. (0.1%)	9.6	50	0.01		0.02	0.3	1.6	14.9	-14.6	48.7				NAF
DM67339-WR	FDD113W1_610-611m	Fresh	Siltstone; Bioturbated; Soft Sediment Slumps; Si. & Chl. alt.; Sph. (0.3%); Gal. (0.2%)	9.4	101	0.82	0.752	0.02	25.1	1.6	15.3	9.8	0.6	2.6	14.8	21.4	PAF-LC
M78789WR	FDD140_610-611m	Fresh	Siltstone Sandstone; Interbedded; Silica & Black Chl. alt.; Sph. (0.5%); Pyrr. (0.5%)			0.35	0.35	0.02	10.7	1.6	7.6	3.1	0.7	3.3	3.4	5.6	PAF-LC
M78792WR	FDD140_613-614m	Fresh	Siltst. Sandst.; Interbedded; Si. & Black Chl. alt.; Pyrr. (1%); Sph. (0.5%); Gal. (0.25%)			0.19	0.187	<0.02	5.8	<1.6	8.9	-3.1	1.5	3.7	1.5	4.7	UC(PAF)
M78795WR	FDD140_616-617m	Fresh	Siltst. Sandst.; Interbedded; Si. & Black Chl. alt.; Pyrr. (1%); Sph. (0.5%); Gal. (0.25%)			0.33	0.301	0.03	10.1	2.5	9.3	0.8	0.9	3.2	3.9	7.5	PAF-LC
M78798WR	FDD140_619-620m	Fresh	Siltst. Sandst.; Interbedded; Si. & Black Chl. alt.; Pyrr. (1%); Sph. (0.5%); Gal. (0.25%)			0.32	0.322	0.03	9.8	2.5	10	-0.2	1.0	3.2	3.7	7.6	PAF-LC
DM65839-WR	FDD110W2_620-621m	Fresh	Siltstone Sandstone; Interbedded; Chl. & Pyrr. alteration; Pyrr. (1.5%)	9.4	54	0.2	0.208	<0.02	6.1	<1.6	5.8	0.3	0.9	3.5	6.3	9.7	PAF-LC
DM66142-WR	FDD111W1_620-621m	Fresh	Siltstone Sandstone; Interbedded; Soft Sediment Slumps; Si. & Chl. alt.; Pyrr. (0.5%)	9.5	89	0.18	0.152	0.02	5.5	1.6	5.9	-0.4	1.1	3.8	2.0	3.4	PAF-LC
DM67349-WR	FDD113W1_620-621m	Fresh	Siltstone; Bioturbated; Soft Sediment Slumps; Si. & Chl. alt.; Sph. (0.3%); Gal. (0.2%)	9.5	76	0.84	0.758	0.03	25.7	2.5	14.8	10.9	0.6	2.6	15	33.1	PAF
M78802WR	FDD140_622-623m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (1%)			0.92	0.751	0.04	28.2	3.3	12.2	16.0	0.4	2.8	10.2	16.1	PAF
M78805WR	FDD140_625-626m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (1%)			0.4	0.34	0.03	12.3	2.5	8.8	3.5	0.7	3	5.5	7.6	PAF-LC
M78808WR	FDD140_628-629m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (1%)			0.33	0.324	0.03	10.1	2.5	9	1.1	0.9	3.2	4.2	6.4	PAF-LC

pH and EC on 1:5 water extracts [on pulp]; S = total sulfur; Scr = sulfide [chromium reducible sulfur]; C = total carbon; Carb.NP = Carb. neutralising potential; MPA = Maximum potential acidity; ANC = Acid neutralising capacity
NAPP = Net acid producing potential; NAG = Net acid generation; MPA is calculated from Total S; Carb.NP is calculated from Total C; NAPP is calculated from MPA and ANC. Refer to main body of the report for further explanation.

Table B1 (cont.) Acid-Base Characteristics of Potential Waste Rock

Sample ID	Drill-hole ID & Sample Interval (m)	Weathering	Description	pH 1:5	EC1:5	S	ScR	C	MPA	Carb. NP	ANC	NAPP	ANC/MPA ratio	NAG pH after ox.	NAG @ pH4.5	NAG @ pH7.0	Acid Classification
					µS/cm	%			kg H_2SO_4/t						kg H_2SO_4/t		
DM65849-WR	FDD110W2_630-631m	Fresh	Siltstone Sandstone; Interbedded; Chl. & Sericitic alt.; Pyrr. (1.5%); Sph. (0.1%)	9.4	56	0.33	0.308	0.02	10.1	1.6	5.0	5.1	0.5	3.1	6.0	8.4	PAF-LC
DM66153-WR	FDD111W1_630-631m	Fresh	Siltstone Sandstone; Interbedded; Si. & Chl. alt.; Sph. (0.5%); Gal. (0.2%); Pyrr. (1%)	9.4	73	0.26	0.272	<0.02	8.0	<1.6	6.3	1.7	0.8	4.6	<0.1	3.1	Uncertain
DM67360-WR	FDD113W1_630-631m	Fresh	Siltstone; Bioturbated; Soft Sediment Slumps; Si. & Chl. alt.; Sph. (0.3%); Gal. (0.2%)	9.5	125	1.36	1.14	0.02	41.7	1.6	14.6	27.1	0.4	2.4	55.8	71	PAF
M78811WR	FDD140_631-632m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (1%)			0.21	0.206	0.02	6.4	1.6	8.2	-1.8	1.3	3.6	2.3	5.7	PAF-LC
M78814WR	FDD140_634-635m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (1%)			0.39	0.385	<0.02	11.9	<1.6	9.3	2.6	0.8	3	5.6	9.1	PAF-LC
M78817WR	FDD140_637-638m	Fresh	Siltstone Sandstone; Interbedded; Bioturbated; Silica & Black Chl. alt.; Pyrr. (1%)			0.35	0.263	0.03	10.7	2.5	9.4	1.3	0.9	3.3	3.4	5.4	PAF-LC
DM65860-WR	FDD110W2_640-641m	Fresh	Siltst. Sandst.; Interbedded; Chl. & Sericitic alt.; Sph. (1.5%); Gal. (0.5%); Pyrr. (0.5%)	9.4	111	0.44	0.315	0.08	13.5	6.5	13.9	-0.4	1.0	5.2	<0.1	3.5	NAF
DM66163-WR	FDD111W1_640-641m	Fresh	Siltstone Sandstone; Interbedded; Soft Sediment Slumps; Si. & Chl. alt.; Pyrr. (1%)	9.5	95	0.3	0.277	0.02	9.2	1.6	5.9	3.3	0.6	3.2	4.3	8.0	PAF-LC
DM67370-WR	FDD113W1_640-641m	Fresh	Sandstone; Recrystallised; Chl., Silica & Albite alt.; Sph. (0.3%); Gal. (0.2%)	9.4	75	0.68	0.604	0.03	20.8	2.5	14.7	6.1	0.7	2.8	8.0	14.8	PAF-LC
M78820WR	FDD140_640-641m	Fresh	Siltst. Sandst.; Interbedded; Si. & Black Chl. alt.; Pyrr. (1%); Sph. (1%); Gal. (0.25%)			1.08	0.86	0.03	33.1	2.5	9.7	23.4	0.3	3.4	2.1	17	PAF
DM66173-WR	FDD111W1_650-651m	Fresh	Siltstone Sandstone; Interbedded; Soft Sediment Slumps; Si. & Chl. alt.; Pyrr. (1%)	9.3	45	0.21	0.205	0.03	6.4	2.5	4.7	1.7	0.7	3.3	2.3	5.0	PAF-LC
DM67381-WR	FDD113W1_650-651m	Fresh	Sandstone; Recrystallised; Chl., Silica & Albite alt.; Sph. (0.3%); Gal. (0.2%)	9.5	88	0.31	0.3	0.04	9.5	3.3	14.4	-4.9	1.5	3.3	4.7	8.1	PAF-LC
DM72186-WR	FDD126W2_650-651m	Fresh	Siltst.; Brecciated; Si. & Chl. alt.; Sph. (0.6%); Gal. (0.4%); CuPy. (0.1%)	9.2	58	0.58	0.577	<0.02	17.8	<1.6	13.3	4.5	0.7	2.8	10.4	14.4	PAF-LC
DM66184-WR	FDD111W1_660-661m	Fresh	Siltst. Sandst.; Interbedded; Si. alt.; Sph. (3%); Gal. (1%); CuPy. (0.5%); Pyrr. (1%)	9.3	55	0.93	0.847	<0.02	28.5	<1.6	5.4	23.1	0.2	3.1	5.0	20.6	PAF
DM67391-WR	FDD113W1_660-661m	Fresh	Siltstone Sandstone; Faulted; fractured; Silica & Chl. alt.; Sph. (0.3%); Gal. (0.2%)	9.3	149	0.36	0.311	0.06	11.0	4.9	17.0	-6.0	1.5	3.4	2.8	6.0	UC(PAF)
DM71744-WR	FDD126_660-661m	Fresh	Sandstone Siltstone; Qtz veining; Silica, Chl. & Albite alt.; Pyrr. (1%); Pyrite (0.25%)	9.1	53	0.12	0.121	0.02	3.7	1.6	12.5	-8.8	3.4	4.0	0.7	2.6	UC(PAF)
DM72197-WR	FDD126W2_660-661.1m	Fresh	Siltstone; Brecciated; Si. & Chl. alt.; Sph. (0.6%); Gal. (0.4%); CuPy. (0.1%)	9.4	114	0.72	0.689	0.12	22.1	9.8	21.1	0.9	1.0	6.6	<0.1	0.6	Uncertain
DM66194-WR	FDD111W1_670-671m	Fresh	Siltst. Sandst.; Interbedded; Si. & Chl. alt.; Sph.(3%); Gal.(1%); CuPy.(0.5%); Pyrr.(1%)	9.3	44	0.2	0.195	0.02	6.1	1.6	5.0	1.1	0.8	3.4	2.3	5.4	PAF-LC
DM71755-WR	FDD126_670-671m	Fresh	Sandstone Siltstone; Qtz veining; Silica, Chl. & Albite alt.; Pyrr. (1%); Pyrite (0.25%)	9	75	0.16	0.162	0.03	4.9	2.5	14.2	-9.3	2.9	3.6	1.8	4.2	UC(PAF)
DM73089-WR	FDD126W2_670-671m	Fresh	Siltstone; Sheared; Faulted; Silica & Chl. alt.; Sph. (4%); Gal. (3%); CuPy. (0.5%)	9.3	108	0.92	0.797	0.13	28.2	10.6	25.4	2.8	0.9	6.8	<0.1	0.4	Uncertain
DM66205-WR	FDD111W1_680-681m	Fresh	Siltstone Sandstone; Interbedded; Si. & Chl. alt.; Sph. (0.25%); Pyrr. (1%)	9.3	63	0.19	0.199	0.02	5.8	1.6	5.8	0.0	1.0	3.4	3.1	5.5	PAF-LC
DM71765-WR	FDD126_680-681m	Fresh	Sandst. Siltst.; Interbed.; Qtz veins; Si., Chl. & Albite alt.; Gal.(15%); CuPy.(0.25%)	9.3	120	2.0	1.64	0.20	61.3	16.3	30.6	30.7	0.5	6.3	<0.1	0.4	Uncertain
DM73101-WR	FDD126W2_680-681m	Fresh	Siltstone Sandstone; Chl., Si. & Albite alt.; Sph. (1.3%); Gal. (0.7%); CuPy. (0.2%)	9.4	79	0.16	0.162	0.02	4.9	1.6	15.4	-10.5	3.1	3.9	1.1	3.4	UC(PAF)
DM66215-WR	FDD111W1_690-691m	Fresh	Siltst. Sandst.; Interbedded; Si. & Chl. alt.; Pyrr. (2%); Sph. (0.1%); Pyrite (0.25%)	9.5	93	0.3	0.316	0.04	9.2	3.3	6.5	2.7	0.7	3.2	4.5	7.3	PAF-LC
DM71776-WR	FDD126_690-691m	Fresh	Sandst. Siltst.; Interbedded; Qtz veining; Si., Chl. & Albite alt.; Gal. (5%); CuPy. (0.5%)	9.2	46	0.13	0.133	0.02	4.0	1.6	18.0	-14.0	4.5	5.2	<0.1	1.0	NAF
DM73111-WR	FDD126W2_690-691m	Fresh	Siltstone Sandstone; Chl., Si. & Albite alt.; Sph. (1.3%); Gal. (0.7%); CuPy. (0.2%)	9.3	51	0.58	0.491	0.02	17.8	1.6	15.6	2.2	0.9	3.7	1.5	5.6	PAF-LC
DM71786-WR	FDD126_700-701m	Fresh	Sandst. Siltst.; Interbedded; Qtz veining; Si., Chl. & Albite alt.; Sph. (2%); Gal. (0.25%)	9.5	84	0.08		0.10	2.5	8.2	18.6	-16.2	7.6				NAF
DM73122-WR	FDD126W2_700-701m	Fresh	Siltstone Sandstone; Chl., Si. & Albite alt.; Sph. (0.3%); Gal. (0.2%); CuPy. (0.05%)	9.2	78	0.23	0.231	<0.02	7.0	<1.6	15.8	-8.8	2.2	4.2	0.3	3.8	UC(PAF)
DM71796-WR	FDD126_710-711m	Fresh	Sandst. Siltst.; Qz veins; Si., Chl. & Albite alt.; Sph.(0.75%); Gal.(0.25%); Pyrr.(0.5%)	9.4	42	0.1		0.02	3.1	1.6	13.9	-10.8	4.5				NAF
DM73133-WR	FDD126W2_710-711m	Fresh	Siltstone Sandstone; Chl., Si. & Albite alt.; Sph. (0.3%); Gal. (0.2%); CuPy. (0.05%)	8.4	30	0.07		<0.02	2.1	<1.6	14.5	-12.4	6.8				NAF
DM71807-WR	FDD126_720-721m	Fresh	Sandst. Siltst.; Qz veins; Si., Chl. & Albite alt.; Sph.(0.75%); Gal.(0.25%); Pyrr.(0.5%)	9.2	36	0.24	0.239	0.02	7.4	1.6	12.0	-4.7	1.6	3.3	3.2	5.2	PAF-LC
DM73143-WR	FDD126W2_720-721m	Fresh	Siltst. Vein Quartz; Brecciated; Chl. & Si. alt.; Sph. (0.3%); Gal. (0.2%); CuPy. (0.05%)	9.4	76	0.15	0.142	<0.02	4.6	<1.6	14.1	-9.5	3.1	4.0	0.6	2.3	UC(PAF)
DM71817-WR	FDD126_730-731m	Fresh	Sandst. Siltst.; Qz veins; Si., Chl. & Albite alt.; Sph.(0.75%); Gal.(0.25%); Pyrr.(0.5%)	9.2	41	0.46	0.429	<0.02	14.1	<1.6	12.9	1.2	0.9	3.2	4.5	10	PAF-LC
DM73154-WR	FDD126W2_730-731m	Fresh	Siltstone; weakly foliated; Chl. & Si. alt.; Sph. (0.3%); Gal. (0.2%); CuPy. (0.05%)	9.4	44	0.12	0.113	<0.02	3.7	<1.6	14.5	-10.8	3.9	4.1	0.4	1.8	UC(PAF)
DM71828-WR	FDD126_740-741m	Fresh	Sandstone Siltstone; Interbedded; Si., Chl. & Albite alt.; Pyrr. (1%); Pyrite (0.25%)	9.4	53	0.07		0.02	2.1	1.6	13.3	-11.2	6.2				NAF
DM73164-WR	FDD126W2_740-741m	Fresh	Siltstone; Sheared; Chl. & Si. alt.; Sph. (0.3%); Gal. (0.2%); CuPy. (0.05%)	9.3	68	0.14	0.142	0.03	4.3	2.5	13.7	-9.4	3.2	3.8	1.2	3.1	UC(PAF)
DM71838-WR	FDD126_750-751m	Fresh	Sandstone Siltstone; Interbedded; Si., Chl. & Albite alt.; Pyrr. (1%); Pyrite (0.25%)	9.4	52	0.11	0.116	0.03	3.4	2.5	15.0	-11.6	4.5	4.3	0.2	2.0	UC(NAF)

pH and EC on 1:5 water extracts [on pulp]; S = total sulfur; Scr = sulfide [chromium reducible sulfur]; C = total carbon; Carb.NP = Carb. neutralising potential; MPA = Maximum potential acidity; ANC = Acid neutralising capacity
NAPP = Net acid producing potential; NAG = Net acid generation; MPA is calculated from Total S; Carb.NP is calculated from Total C; NAPP is calculated from MPA and ANC. Refer to main body of the report for further explanation.

Table B2. Total Element Concentrations and Geochemical Abundance Indices for Potential Waste Rock

Sample ID:	DM56201-WR	DM56155-WR	DM56209-WR	DM56176-WR	DM56223-WR	DM56267-WR	DM56186-WR	DM56276-WR	Median Soil Abundance	DM56201-WR	DM56155-WR	DM56209-WR	DM56176-WR	DM56223-WR	DM56267-WR	DM56186-WR	DM56276-WR
Drillhole & Depth:	FDD103 10-11m	FDD102 12-13m	FDD103 18-19m	FDD102 32-33m	FDD103 32-33m	FDD104 37-38m	FDD102 42-43m	FDD104 45-45.9m		FDD103 10-11m	FDD102 12-13m	FDD103 18-19m	FDD102 32-33m	FDD103 32-33m	FDD104 37-38m	FDD102 42-43m	FDD104 45-45.9m
Weathering:	Highly	Moderately	Slightly	Moderately	Slightly	Slightly	Slightly	Moderately		Highly	Moderately	Slightly	Moderately	Slightly	Slightly	Slightly	Moderately
Element	All results mg/kg except where shown									Geochemical Abundance Index (GAI)							
Ag	1.155	0.074	0.299	0.08	0.272	0.08	0.05	0.089	0.05	4	-	2	-	2	-	-	-
Al	9.38%	9.43%	9.38%	9.58%	9.7%	9.48%	8.76%	9.55%	7.1%	-	-	-	-	-	-	-	-
As	53.3	34.3	334	20.1	24.3	23.3	15.2	25.3	6	3	2	5	1	1	1	1	1
Ba	620	560	700	560	690	570	520	560	500	-	-	-	-	-	-	-	-
Be	3.6	4.03	3.84	3.36	3.85	3.54	3.33	3.34	0.3	3	3	3	3	3	3	3	3
Bi	1.1	1.21	0.743	0.988	0.661	0.889	1.525	0.817	0.2	2	2	1	2	1	2	2	1
Ca	0.01%	0.01%	0.01%	0.13%	0.02%	0.15%	0.14%	0.13%	1.5%	-	-	-	-	-	-	-	-
Cd	0.112	0.093	0.347	0.077	0.077	0.047	0.086	0.064	0.35	-	-	-	-	-	-	-	-
Co	0.981	3.87	24.8	14.15	9.98	16.5	17.4	12.9	8	-	-	1	-	-	-	1	-
Cr	69	72.1	66.7	70.6	74.9	69.9	65.2	72.2	70	-	-	-	-	-	-	-	-
Cs	18.7	16.35	19.6	19.95	21.8	17.15	18.2	19.85	4	2	1	2	2	2	2	2	2
Cu	12.05	38.7	23.6	32.6	18.65	33.6	37.1	29.1	30	-	-	-	-	-	-	-	-
Fe	4.79%	4.91%	2.86%	3.98%	3.45%	4.40%	4.61%	4.26%	4%	-	-	-	-	-	-	-	-
Hg	0.014	0.009	0.019	0.005	<0.005	0.006	<0.005	0.008	0.06	-	-	-	-	-	-	-	-
K	4.17%	3.82%	4.28%	4.17%	4.23%	2.98%	3.77%	3.81%	1.4%	1	1	1	1	1	1	1	1
Li	26.6	24.8	34.1	39.1	36	45.2	43.2	38.3	25	-	-	-	-	-	-	-	-
Mg	0.49%	0.45%	0.5%	0.93%	0.9%	1.37%	1.1%	1.12%	0.5%	-	-	-	-	-	1	1	1
Mn	118	457	323	321	237	789	2200	557	1000	-	-	-	-	-	-	1	-
Mo	0.13	0.25	0.21	0.16	0.15	0.18	0.35	0.1	1.2	-	-	-	-	-	-	-	-
Na	0.074%	0.081%	0.073%	0.07%	0.053%	0.07%	0.057%	0.067%	0.5%	-	-	-	-	-	-	-	-
Ni	18.1	21.7	34.3	25.5	32.8	37.0	48.5	38.2	50	-	-	-	-	-	-	-	-
P	0.063%	0.063%	0.029%	0.07%	0.034%	0.069%	0.067%	0.067%	0.08%	-	-	-	-	-	-	-	-
Pb	36.8	54.5	26.9	29.8	23.5	41.2	37.5	23.7	35	-	-	-	-	-	-	-	-
S	0.01%	0.01%	0.01%	0.01%	0.56%	0.01%	0.01%	0.01%	0.07%	-	-	-	-	2	-	-	-
Sb	6.37	5.1	7.83	3.58	6.1	5.58	5.06	3.81	1	2	2	2	1	2	2	2	1
Se	0.068	0.178	0.135	0.203	0.091	0.087	0.084	0.091	0.4	-	-	-	-	-	-	-	-
Sn	6.76	6.55	6.94	6.87	7.09	6.7	6.44	7.23	4	-	-	-	-	-	-	-	-
Sr	27.5	27.7	27	26.8	36.4	27.7	44.6	33.2	250	-	-	-	-	-	-	-	-
Te	0.03	0.037	0.017	0.028	0.014	0.025	0.038	0.025	0.02	1	1	-	1	-	1	1	1
Th	17.95	17	18.35	18.3	18.6	19.3	17.7	18.2	9	-	-	-	-	-	1	-	-
Ti	0.411%	0.401%	0.426%	0.416%	0.428%	0.411%	0.399%	0.41%	0.5%	-	-	-	-	-	-	-	-
Tl	2.030	1.705	2.170	1.670	2.340	1.535	1.590	1.570	0.2	3	3	3	2	3	2	2	2
U	3.2	6.02	3.71	3.19	4.28	2.64	2.79	3.13	2	-	1	-	-	1	-	-	-
V	100.5	101	98.9	103	103.5	99.3	93.3	102	90	-	-	-	-	-	-	-	-
W	4.41	3.16	3.88	3.46	3.86	3.39	3.57	3.23	1.5	1	-	1	1	1	1	1	1
Zn	98.1	151.5	102.5	133	58.9	105.5	96.2	159.5	90	-	-	-	-	-	-	-	-

4-acid digest. ICP-MS analysis. Results for selected minor elements (Ce, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y, Zr) not shown, and all have GAI values of <1.

Table B2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Potential Waste Rock

Sample ID:	DM69653-WR	DM68862-WR	DM69769-WR	DM69821-WR	DM66820-WR	DM64534-WR	*Median Soil Abundance*	DM69653-WR	DM68862-WR	DM69769-WR	DM69821-WR	DM66820-WR	DM64534-WR
Drillhole & Depth:	FDD121 150-151m	FDD119 240-241m	FDD113W6 360-361m	FDD113W6 410-411m	FDD113 550-551m	FDD110W1 570-571m		FDD121 150-151m	FDD119 240-241m	FDD113W6 360-361m	FDD113W6 410-411m	FDD113 550-551m	FDD110W1 570-571m
Weathering:	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh		Fresh	Fresh	Fresh	Fresh	Fresh	Fresh
Element	All results mg/kg except where shown							Geochemical Abundance Index (GAI)					
Ag	0.261	0.047	0.231	0.186	0.02	0.317	*0.05*	2	-	2	1	-	2
Al	8.73%	6.9%	8.85%	8.4%	6.82%	4.88%	*7.1%*	-	-	-	-	-	-
As	24	9.87	15.85	22.3	2.61	3.61	*6*	1	-	1	1	-	-
Ba	600	440	530	530	1050	353	*500*	-	-	-	-	-	-
Be	3.46	2.77	3.37	3.17	3.15	2.03	*0.3*	3	3	3	3	3	2
Bi	0.295	0.053	1.535	0.429	0.152	0.185	*0.2*	-	-	2	1	-	-
Ca	0.15%	0.65%	0.46%	0.41%	0.36%	0.13%	*1.5%*	-	-	-	-	-	-
Cd	1.8	0.17	1.42	2.45	0.131	7.77	*0.35*	2	-	1	2	-	4
Co	15.95	7.95	15.8	15.45	11.6	9.25	*8*	-	-	-	-	-	-
Cr	67.2	51.5	66.2	61.6	49.6	36	*70*	-	-	-	-	-	-
Cs	19.55	14.2	13.25	12.1	8.85	6.81	*4*	2	1	1	1	1	-
Cu	78.9	14.6	43.6	124	24.4	406	*30*	1	-	-	1	-	3
Fe	4.34%	2.93%	4.05%	3.9%	3.25%	2.39%	*4%*	-	-	-	-	-	-
Hg	<0.005	<0.005	<0.005	0.005	<0.005	0.006	*0.06*	-	-	-	-	-	-
K	3.55%	3.31%	3.76%	3.62%	2.8%	2.32%	*1.4%*	1	1	1	1	-	-
Li	29.1	23.4	29.6	29	29.5	13.9	*25*	-	-	-	-	-	-
Mg	1.22%	1.00%	1.69%	1.53%	2.42%	0.81%	*0.5%*	1	-	1	1	2	-
Mn	1260	970	987	1055	870	578	*1000*	-	-	-	-	-	-
Mo	0.23	0.08	0.09	0.06	1.03	1.68	*1.2*	-	-	-	-	-	-
Na	0.313%	0.039%	0.506%	0.418%	0.036%	0.047%	*0.5%*	-	-	-	-	-	-
Ni	33.8	24.5	33.2	32.6	27.2	19.95	*50*	-	-	-	-	-	-
P	0.063%	0.055%	0.067%	0.068%	0.062%	0.053%	*0.08%*	-	-	-	-	-	-
Pb	580	146.5	188.5	378	40.9	1370	*35*	3	1	2	3	-	5
S	0.4%	0.14%	0.41%	0.16%	0.59%	0.56%	*0.07%*	2	-	2	1	2	2
Sb	4.67	1.94	4.01	2.48	2.38	2.79	*1*	2	-	1	1	1	1
Se	0.055	0.013	0.098	0.071	0.033	0.038	*0.4*	-	-	-	-	-	-
Sn	5.94	4.82	6.37	5.85	5.16	2.95	*4*	-	-	-	-	-	-
Sr	23.5	23	30	29.1	21	15.2	*250*	-	-	-	-	-	-
Te	0.008	<0.005	0.05	0.012	<0.005	0.005	*0.02*	-	-	2	-	-	-
Th	16.9	15.4	17.7	16.5	14.25	12.05	*9*	-	-	-	-	-	-
Ti	0.404%	0.364%	0.445%	0.422%	0.344%	0.269%	*0.5%*	-	-	-	-	-	-
Tl	2.510	1.340	1.235	1.230	1.005	1.020	*0.2*	3	2	2	2	2	2
U	3.19	2.97	3.44	3.09	2.76	2.27	*2*	-	-	-	-	-	-
V	100	78.3	96.6	92.1	74.2	54.5	*90*	-	-	-	-	-	-
W	5.08	2.27	2.86	2.84	2.8	3.47	*1.5*	1	-	-	-	-	1
Zn	613	102	651	828	171	1910	*90*	2	-	2	3	-	4

4-acid digest. ICP-MS analysis. Results for selected minor elements (Ce, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y, Zr) not shown, and all have GAI values of <1.

Table B2 (cont.) Total Element Concentrations and Geochemical Abundance Indices for Potential Waste Rock

Sample ID:	DM65818-WR	DM66872-WR	DM66142-WR	DM67360-WR	DM71765-WR	DM73101-WR		DM65818-WR	DM66872-WR	DM66142-WR	DM67360-WR	DM71765-WR	DM73101-WR
Drillhole & Depth:	FDD110W2 600-601m	FDD113 600-601m	FDD111W1 620-621m	FDD113W1 630-631m	FDD126 680-681m	FDD126W2 680-681m	Median Soil Abundance	FDD110W2 600-601m	FDD113 600-601m	FDD111W1 620-621m	FDD113W1 630-631m	FDD126 680-681m	FDD126W2 680-681m
Weathering:	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh		Fresh	Fresh	Fresh	Fresh	Fresh	Fresh
Element	All results mg/kg except where shown							Geochemical Abundance Index (GAI)					
Ag	0.407	0.115	0.158	0.445	27.7	0.32	0.07	2	1	1	3	9	2
Al	6.35%	4.81%	5.96%	7.36%	3.64%	6.28%	8.2 %	-	-	-	-	-	-
As	0.48	3.69	5.32	0.5	6.75	7.2	6	-	-	-	-	-	-
Ba	372	218	402	560	184	363	500	-	-	-	-	-	-
Be	2.29	1.68	2.19	3.03	1.27	2.44	0.3	2	2	2	3	1	2
Bi	1.26	0.099	0.279	1.03	44.5	0.477	0.2	2	-	-	2	7	1
Ca	0.21%	0.28%	0.24%	0.49%	0.81%	0.4%	1.5%	-	-	-	-	-	-
Cd	6.26	3.44	2.63	3.13	3.71	1.015	0.35	4	3	2	3	3	1
Co	17.15	5.72	7.72	11.45	9.09	9.94	8	1	-	-	-	-	-
Cr	50	34.3	43.5	56.2	26.8	46.8	70	-	-	-	-	-	-
Cs	8.96	4.43	9.55	11.4	3.38	8.3	4	1	-	1	1	-	-
Cu	161	5.65	6.49	22	70.2	12.75	30	2	-	-	-	1	-
Fe	4.92%	2.85%	2.78%	3.49%	3.24%	3.09%	4%	-	-	-	-	-	-
Hg	0.007	<0.005	0.005	<0.005	<0.005	<0.005	0.06	-	-	-	-	-	-
K	2.74%	1.54%	2.79%	3.89%	1.23%	2.7%	1.4%	-	-	-	1	-	-
Li	22.6	26.6	17.6	17.5	11.3	20	25	-	-	-	-	-	-
Mg	1.59%	2.36%	1.05%	0.89%	1.08%	1.48%	0.5%	1	2	-	-	1	1
Mn	945	1155	804	374	1285	753	1000	-	-	-	-	-	-
Mo	10.45	1.22	0.37	0.34	0.08	0.31	1.2	3	-	-	-	-	-
Na	0.033%	0.022%	0.038%	0.049%	0.056%	0.033%	0.5%	-	-	-	-	-	-
Ni	28.8	17.35	23.3	28.1	12.25	24.7	50	-	-	-	-	-	-
P	0.068%	0.048%	0.064%	0.077%	0.032%	0.065%	0.08%	-	-	-	-	-	-
Pb	809	839	449	708	110500	643	35	4	4	3	4	11	4
S	0.99%	0.07%	0.17%	0.99%	1.95%	0.17%	0.07%	3	-	1	3	4	1
Sb	2.52	2.08	2.23	3.94	76.5	2.78	1	1	-	1	1	6	1
Se	0.107	0.042	0.045	0.11	93.3	0.135	0.4	-	-	-	-	7	-
Sn	4.07	3.12	3.96	4.94	2.6	4.29	4	-	-	-	-	-	-
Sr	14.15	10.45	16.2	22.9	14.9	13.9	250	-	-	-	-	-	-
Te	0.022	<0.005	0.01	0.035	0.569	0.011	0.02	1	-	-	1	5	-
Th	15.6	11.05	14.65	17.45	8.26	15.2	9	-	-	-	-	-	-
Ti	0.354%	0.27%	0.363%	0.424%	0.189%	0.365%	0.5%	-	-	-	-	-	-
Tl	1.125	0.487	1.100	1.280	1.315	0.961	0.2	2	1	2	2	2	2
U	2.93	2.06	2.86	3.44	1.49	2.94	2	-	-	-	-	-	-
V	70.2	53	66.5	81	37.6	70	90	-	-	-	-	-	-
W	3.78	2.41	3.73	3.29	1.83	3.37	1.5	1	-	1	1	-	1
Zn	2050	888	833	906	149.5	346	90	4	3	3	3	-	1

4-acid digest. ICP-MS analysis. Results for selected minor elements (Ce, Ga, Ge, Hf, In, La, Nb, Rb, Re, Sc, Ta, Y, Zr) not shown, and all have GAI values of <1.

Table B3. Total Element Concentrations and Geochemical Abundance Indices for Potential Tailings

Sample ID: Drillhole & Depth:	Master Composite (Tailings)	High Talc (Tailings)	High Sulfide (Tailings)	Median Soil Abundance	Master Composite (Tailings)	High Talc (Tailings)	High Sulfide (Tailings)
Weathering:	Fresh	Fresh	Fresh		Fresh	Fresh	Fresh
Element	All results mg/kg except where shown				Geochemical Abundance Index (GAI)		
Ag	0.361	1.09	0.698	0.07	2	3	3
Al	5.23%	7.38%	4.04%	8.2%	-	-	-
As	8.07	3.92	2.58	6	-	-	-
Ba	189	26	60	500	-	-	-
Be	1.44	0.99	0.87	0.3	2	1	1
Bi	0.09	0.226	0.044	0.2	-	-	-
Ca	0.31%	1.02%	0.2%	1.5%	-	-	-
Cd	3.4	8.06	8.75	0.35	3	4	4
Co	12.85	8.25	12.2	8	-	-	-
Cr	87.5	83.9	73.3	70	-	-	-
Cs	6.61	7.25	21.5	4	-	-	2
Cu	237	183	205	30	2	2	2
Fe	7.49%	7.26%	14.25%	4%	-	-	1
Hg	0.042	0.02	0.418	0.06	-	-	2
K	1.09%	0.17%	0.48%	1.4%	-	-	-
Li	34.5	42.4	25.6	25	-	-	-
Mg	3.06%	11.4%	2.34%	0.5%	2	4	2
Mn	2520	3870	2640	1000	1	1	1
Mo	4.54	23.4	2.94	1.2	1	4	1
Na	0.045%	0.008%	0.254%	0.5%	-	-	-
Ni	28.1	43.6	23.2	50	-	-	-
P	0.051%	0.102%	0.038%	0.08%	-	-	-
Pb	1365	2850	3210	35	5	6	6
Re	0.0028	0.008	0.0175	0.0004	2	4	5
S	1.15%	0.54%	4.09%	0.07%	3	2	5
Sb	11	27.8	17.25	1	3	4	4
Se	0.065	0.425	0.023	0.4	-	-	-
Sn	2.25	1.25	0.69	4	-	-	-
Sr	19.4	32.6	36.3	250	-	-	-
Te	<0.005	0.007	<0.005	0.02	-	-	-
Ti	0.195%	0.222%	0.07%	0.5%	-	-	-
Tl	0.575	0.338	0.715	0.2	1	-	1
U	4.05	13.8	9.03	2	-	2	2
V	58	91.3	105.5	90	-	-	-
W	104.5	5.5	1370	1.5	6	1	9
Zn	1370	3420	2890	90	3	5	4

4-acid digest. ICP-MS analysis. Results for selected minor elements (Ce, Ga, Ge, Hf, In, La, Nb, Rb, Sc, Ta, Th, Y, Zr) not shown, and all have GAI values of <1.

The Master Composite sample is representative of expected tailings from the Project. The High Talc and High Sulfide samples are possible tailings ‘end members’.

Table B4. Quantitative X-Ray Diffraction Results for Potential Waste Rock and Tailings

	Sample ID:	DM56201-WR	DM56155-WR	DM56223-WR	DM56267-WR	DM69653-WR	DM68862-WR	DM66820-WR	DM65818-WR	DM67360-WR	DM73101-WR	Master Composite Tailings
	Drillhole & Depth:	FDD103 10-11m	FDD102 12-13m	FDD103 32-33m	FDD104 37-38m	FDD121 150-151m	FDD119 240-241m	FDD113 550-551m	FDD110W2 600-601m	FDD113W1 630-631m	FDD126W2 680-681m	
	Weathering:	Highly	Moderately	Slightly	Slightly	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh
Mineral	Mineral Group	Quantitative XRD weight %										
Pyrite	Sulfides	0.4	<0.1	1.4	0.1	0.1	0.1	0.1	0.3	0.1	<0.1	0.5
Goethite	Oxides	1.0	**4.4**	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	0.3
Hematite		0.5	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Magnetite		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	0.1
Albite	Silicates	0.6	0.3	<0.1	0.6	**3.8**	0.4	0.3	0.8	0.4	0.3	0.5
Biotite		**4.9**	**3.2**	**3.2**	**4.9**	**3.8**	**2.9**	**2.5**	**2.8**	**3.4**	**2.9**	**2.4**
Chlorite		<0.1	<0.1	**2.3**	**7.2**	**6.2**	**8.1**	**12.9**	**13.2**	**4.2**	**10.5**	**24.9**
Kaolinite		**9.5**	**9.4**	**2.3**	**6.7**	**2.5**	0.5	0.2	0.9	0.4	0.8	0.1
Microcline		1.5	1.3	1.3	1.7	**2.4**	**2.0**	1.5	1.4	**3.7**	**2.1**	1.6
Muscovite		**40.6**	**37.7**	**48.9**	**42.1**	**40.5**	**34.0**	**22.5**	**24.3**	**37.5**	**29.4**	**11.7**
Quartz		**35.4**	**34.1**	**34.0**	**36.5**	**40.5**	**51.2**	**54.4**	**52.3**	**50.2**	**51.6**	**54.6**
Stipnomelane		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	**2.9**
Calcite	Carbonates	<0.1	<0.1	<0.1	<0.1	0.1	0.7	<0.1	<0.1	<0.1	<0.1	0.4
Dolomite		0.4	0.2	0.3	0.3	0.3	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Siderite		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Amorphous / Non-diffracting	Non-crystalline or non-diffracting	**5.1**	**9.5**	**6.3**	<0.1	<0.1	<0.1	**5.5**	**3.9**	<0.1	**2.3**	<0.1

Mineral proportions greater than or equal to 2% shown in bold

Table B5. Exchangeable Cations Results for Potential Waste Rock (weathered samples)

Sample ID	Drill-hole ID & Sample Interval	Weathering	Description	pH 1:5	EC 1:5	Exch. Acidity	Exch. Al	Exch. Ca	Exch. Mg	Exch. K	Exch. Na	CEC	ESP	Sodicity Rating
					µS/cm	meq/100g							%	
DM56148-WR	FDD102_6-7m	Highly	Sandstone; Limonite & Mn_3O_4 alteration	7.7	357			<0.2	1.1	0.2	0.6	2	32.6	strongly sodic
DM56196-WR	FDD103_6-7m	Moderately	Sandstone Marl; Limonite & Hematite alteration	8.0	218			<0.2	0.4	0.3	0.4	1.1	34.1	strongly sodic
DM56201-WR	FDD103_10-11m	Highly	Sandstone Marl; Fractured; Limonite, Hematite & Clay alteration	7.9	296			<0.2	0.6	0.2	0.3	1.1	28.6	strongly sodic
DM56155-WR	FDD102_12-13m	Moderately	Sandstone; Limonite & Mn3O4 alteration	7.8	332			<0.2	0.7	0.2	0.4	1.3	30.6	strongly sodic
DM56209-WR	FDD103_18-19m	Slightly	Sandstone Marl; Fractured; Limonite & Hematite alteration	7.8	314			<0.2	<0.2	0.4	<0.2	0.4	<0.2	non-sodic
DM56165-WR	FDD102_22-23m	Moderately	Sandstone Marl; Limonite, Hematite & CO_3 alteration	7.3	217			0.3	0.5	0.2	1.1	2.2	52.9	strongly sodic
DM56215-WR	FDD103_24-25m	Slightly	Sandstone Marl; Fractured; Limonite & Hematite alteration	7.8	149			<0.2	<0.2	0.2	<0.2	0.2	<0.2	non-sodic
DM56176-WR	FDD102_32-33m	Moderately	Sandstone Marl; Limonite, Mn3O4 & CO_3 alteration	8.2	116			0.8	1.3	<0.2	0.4	2.6	16.2	strongly sodic
DM56223-WR	FDD103_32-33m	Slightly	Sandstone; Hematite & CO_3 alteration	5.4	240	0.8	0.4	<0.1	0.4	0.2	<0.1	1.5	10.5	sodic
DM56267-WR	FDD104_37-38m	Slightly	Sandstone Marl; Limonite, Hematite & CO_3 alteration	8.1	187			0.4	0.8	0.3	0.2	1.8	14.3	strongly sodic
DM56186-WR	FDD102_42-43m	Slightly	Sandstone Marl; Limonite, Hematite & CO_3 alteration	8.2	66			0.4	0.8	<0.2	<0.2	1.4	<0.2	non-sodic
DM56276-WR	FDD104_45-45.9m	Moderately	Sandstone Marl; Hematite, Limonite & CO_3 alteration	8.0	141			0.6	0.9	<0.2	0.3	1.9	16	strongly sodic

pH and EC on 1:5 w ater extracts; CEC = Cation exchange capacity; ESP = Exchangeable sodium percentage.

Table B6. Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Waste Rock

Sample ID:	DM56201-WR	DM56155-WR	DM56209-WR	DM56176-WR	DM56223-WR	DM56267-WR	DM56186-WR	DM56276-WR
Drillhole & Depth:	FDD103 10-11m	FDD102 12-13m	FDD103 18-19m	FDD102 32-33m	FDD103 32-33m	FDD104 37-38m	FDD102 42-43m	FDD104 45-45.9m
Weathering:	Highly	Moderately	Slightly	Moderately	Slightly	Slightly	Slightly	Moderately
pH	7.7	7.8	7.7	8.1	5.5	8.3	8.1	8.1
EC (µS/cm)	308	337	333	118	245	187	65	138
Alk.^ - Total	133	145	146	132	18	156	147	168
Alk.^ - HCO3	133	145	146	132	18	156	147	168
Alk.^ - CO3	<1	<1	<1	<1	<1	<1	<1	<1
Alk.^ - OH	<1	<1	<1	<1	<1	<1	<1	<1
Acidity^	6.9	10.3	6	6.9	87.6	6.9	4.3	10.3
SO4	23	18	16	8	96	14	4	11
Cl	80	100	88	28	8	44	13	31
F	4.25	4.38	3.74	5.47	0.38	6.24	3.68	5.77
Ca	<2	<2	<2	<2	<2	<2	<2	<2
Mg	<2	<2	<2	<2	8	<2	<2	<2
Na	46	56	43	25	4	31	13	26
K	20	14	29	<2	40	13	<2	7
Ag	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Al	<0.02	<0.02	<0.02	<0.02	0.14	0.03	<0.02	<0.02
As	<0.002	<0.002	0.01	<0.002	<0.002	<0.002	<0.002	<0.002
B	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ba	<0.002	<0.002	<0.002	<0.002	0.018	<0.002	<0.002	<0.002
Be	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Bi	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cd	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Co	<0.002	<0.002	<0.002	<0.002	0.038	<0.002	<0.002	<0.002
Cr	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cu	<0.002	<0.002	<0.002	<0.002	0.009	0.002	<0.002	<0.002
Fe	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	<0.002	<0.002	<0.002	<0.002	0.285	0.002	0.003	<0.002
Mo	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ni	<0.002	<0.002	<0.002	<0.002	0.108	0.002	<0.002	<0.002
P	<2	<2	<2	<2	<2	<2	<2	<2
Pb	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Sb	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Se	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sn	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sr	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Th	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ti	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Tl	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
U	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
V	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Zn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

All results mg/L except EC (µS/cm) and pH. ^ Alkalinity and acidity as CaCO3.

Table B6 (cont.) Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Waste Rock

Sample ID:	DM69653-WR	DM68862-WR	DM69769-WR	DM69821-WR	DM66820-WR	DM64534-WR
Drillhole & Depth:	FDD121 150-151m	FDD119 240-241m	FDD113W6 360-361m	FDD113W6 410-411m	FDD113 550-551m	FDD110W1 570-571m
Weathering:	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh
pH	9.0	9.4	9.5	9.3	9.5	9.2
EC (µS/cm)	60	113	97	101	74	66
Alk.^ - Total	146	929	158	195	133	127
Alk.^ - HCO3	141	898	141	176	126	122
Alk.^ - CO3	5.2	30.9	17.2	18.9	6.9	5.2
Alk.^ - OH	<1	<1	<1	<1	<1	<1
Acidity^	<1	<1	<1	<1	<1	<1
SO4	15	11	6	11	18	22
Cl	4	4	3	4	6	8
F	2.33	1.64	1.04	1.52	2.31	1.63
Ca	<2	3	<2	<2	<2	<2
Mg	<2	<2	<2	<2	<2	<2
Na	4	3	6	3	6	3
K	15	23	21	25	17	18
Ag	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Al	1.17	0.57	1.25	0.89	0.87	1.37
As	0.005	0.002	<0.002	0.002	<0.002	<0.002
B	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ba	0.006	0.003	0.006	0.004	0.011	0.009
Be	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Bi	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cd	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Co	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cr	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cu	<0.002	<0.002	<0.002	<0.002	<0.002	0.002
Fe	0.3	<0.2	0.3	0.3	0.2	0.5
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	0.007	0.004	0.01	0.008	0.007	0.01
Mo	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ni	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
P	<2	<2	<2	<2	<2	<2
Pb	0.006	<0.002	<0.002	0.003	<0.002	0.021
Sb	0.215	0.021	0.11	0.039	0.024	0.07
Se	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sn	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sr	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Th	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ti	0.02	<0.02	0.03	<0.02	0.02	0.05
Tl	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
U	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
V	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Zn	<0.01	<0.01	<0.01	<0.01	<0.01	0.013
Zr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

All results mg/L except EC (µS/cm) and pH. ^ Alkalinity and acidity as CaCO3.

Table B6 (cont.) Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Waste Rock

Sample ID:	DM65818-WR	DM66872-WR	DM66142-WR	DM67360-WR	DM71765-WR	DM73101-WR
Drillhole & Depth:	FDD110W2 600-601m	FDD113 600-601m	FDD111W1 620-621m	FDD113W1 630-631m	FDD126 680-681m	FDD126W2 680-681m
Weathering:	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh
pH	9.2	9.4	9.5	9.5	9.3	9.4
EC (µS/cm)	52	60	89	125	120	79
Alk.^ - Total	103	113	130	196	2490	142
Alk.^ - HCO3	94.4	103	115	175	2500	125
Alk.^ - CO3	8.6	10.3	15.4	20.6	39.5	17.2
Alk.^ - OH	<1	<1	<1	<1	<1	<1
Acidity^	<1	<1	<1	<1	<1	<1
SO4	14	5	4	17	55	4
Cl	6	7	4	7	15	3
F	0.99	1.51	0.88	1.79	0.84	1.46
Ca	<2	<2	<2	<2	12	<2
Mg	<2	<2	<2	<2	<2	<2
Na	4	6	4	5	2	3
K	12	10	19	29	15	19
Ag	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Al	1.39	0.9	0.75	1.07	0.12	0.9
As	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
B	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Ba	0.006	0.003	0.004	0.006	<0.002	0.004
Be	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Bi	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cd	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Co	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cr	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Cu	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Fe	0.4	0.3	0.4	<0.2	<0.2	0.3
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	0.012	0.013	0.006	0.005	<0.002	0.008
Mo	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ni	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
P	<2	<2	<2	<2	<2	<2
Pb	0.01	0.014	0.004	0.005	0.036	0.006
Sb	0.076	0.021	0.064	0.11	0.016	0.079
Se	<0.02	<0.02	<0.02	<0.02	0.04	<0.02
Sn	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Sr	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Th	0.002	0.002	0.002	<0.002	<0.002	<0.002
Ti	0.04	0.02	0.02	0.02	<0.02	0.02
Tl	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
U	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
V	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Zn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Zr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

All results mg/L except EC (µS/cm) and pH. ^ Alkalinity and acidity as CaCO3.

Table B7. Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in Water Extracts from Potential Tailings

The Master Composite sample is representative of expected tailings from the Project. The High Talc and High Sulfide samples are possible tailings 'end members'.

Sample ID and Type:	Master Composite (Tailings)	High Talc (Tailings)	High Sulfide (Tailings)
Weathering:	Fresh	Fresh	Fresh
pH	8.2	8.4	6.9
EC (µS/cm)	308	284	295
Alk.^ - Total	225	2190	122
Alk.^ - HCO3	225	2190	122
Alk.^ - CO3	<1	18.1	<1
Alk.^ - OH	<1	<1	<1
Acidity^	1.6	<1	2.4
SO4	143	127	173
Cl	26	23	29
F	4.33	0.9	2.76
Ca	41	33	37
Mg	6	8	6
Na	8	10	10
K	10	6	14
Ag	<0.2	<0.2	<0.2
Al	<0.02	<0.02	<0.02
As	<0.002	<0.002	<0.002
B	<0.2	<0.2	<0.2
Ba	0.009	0.036	0.029
Be	<0.002	<0.002	<0.002
Bi	<0.002	<0.002	<0.002
Cd	<0.002	<0.002	<0.002
Co	<0.002	<0.002	0.004
Cr	<0.002	<0.002	<0.002
Cu	<0.002	<0.002	<0.002
Fe	<0.2	<0.2	<0.2
Hg	<0.0001	<0.0001	<0.0001
Mn	0.127	0.061	1.15
Mo	<0.002	0.006	<0.002
Ni	<0.002	<0.002	0.006
P	<2	<2	<2
Pb	<0.002	0.005	0.007
Sb	0.004	0.008	<0.002
Se	<0.02	<0.02	<0.02
Sn	<0.02	<0.02	<0.02
Sr	0.2	<0.2	<0.2
Th	<0.002	<0.002	<0.002
Ti	<0.02	<0.02	<0.02
Tl	<0.002	<0.002	<0.002
U	<0.002	<0.002	<0.002
V	<0.02	<0.02	<0.02
Zn	0.018	0.013	0.459
Zr	<0.01	<0.01	<0.01

All results mg/L except EC (µS/cm) and pH. ^ Alkalinity and acidity as CaCO3.

Table B8. Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in NAG Leachate from Potential Waste Rock (selected PAF samples)

Sample ID:	DM56223-WR	DM69653-WR	DM69738-WR	DM69769-WR	DM66820-WR	DM64534-WR
Drillhole & Depth:	FDD103 32-33m	FDD121 150-151m	FDD113W6 330-331m	FDD113W6 360-361m	FDD113 550-551m	FDD110W1 570-571m
Weathering:	Slightly	Fresh	Fresh	Fresh	Fresh	Fresh
ABA class.:	PAF	PAF-LC	PAF	PAF-LC	PAF-LC	PAF
pH	2.73	3.03	2.49	2.97	2.79	3.01
EC (µS/cm)	981	638	1710	704	964	738
Alk.^ - Total	<1	<1	<1	<1	<1	<1
Alk.^ - HCO3	<1	<1	<1	<1	<1	<1
Alk.^ - CO3	<1	<1	<1	<1	<1	<1
Alk.^ - OH	<1	<1	<1	<1	<1	<1
Acidity^ calc.	*118*	*77*	*215*	*83*	*112*	*117*
SO4	134	102	316	112	161	146
Cl	1	<1	<1	<1	<1	<1
F	0.1	<0.1	0.2	0.1	0.2	0.1
Ca	<1	<1	7	3	3	<1
Mg	2	3	8	3	6	3
Na	20	19	20	19	19	21
K	5	6	6	5	5	7
Ag	0.002	<0.001	0.001	<0.001	<0.001	<0.001
Al	4.17	3.16	7.04	3.3	4.58	3.77
As	<0.001	0.001	0.005	0.003	0.002	0.002
B	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Ba	0.036	0.082	0.101	0.078	0.173	0.068
Be	<0.001	0.003	0.006	0.002	0.002	0.001
Bi	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cd	0.0004	0.0144	0.0066	0.0107	0.0013	0.0761
Co	0.072	0.150	0.200	0.125	0.106	0.086
Cr	0.006	0.003	0.002	0.004	0.004	0.002
Cu	0.137	0.637	0.244	0.454	0.254	2.77
Fe	0.51	0.46	2.71	0.41	0.64	3.68
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	0.063	0.242	0.770	0.358	0.316	0.227
Mo	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ni	0.207	0.296	0.506	0.292	0.254	0.192
P	<1	<1	<1	<1	<1	<1
Pb	0.002	4.03	3.46	0.971	0.553	8.47
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sn	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sr	0.009	0.02	0.083	0.027	0.031	0.028
Th	<0.001	<0.001	0.004	<0.001	<0.001	<0.001
Ti	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tl	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
U	0.006	0.006	0.009	0.004	0.003	0.004
V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
W	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn	0.043	5.3	3.01	5.21	1.31	20.6
Zr	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

All results mg/L except EC (µS/cm) and pH. ^ Alkalinity and acidity as CaCO3. Acidity calculated.
NAG leachate analysed after single addition NAG (ie. stage 1)

Table B8 (cont.) Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in NAG Leachate from Potential Waste Rock (selected PAF samples)

Sample ID:	DM65818-WR	DM66142-WR	DM67360-WR	DM66184-WR	DM71765-WR	DM73101-WR
Drillhole & Depth:	FDD110W2 600-601m	FDD111W1 620-621m	FDD113W1 630-631m	FDD111W1 660-661m	FDD126 680-681m	FDD126W2 680-681m
Weathering:	Fresh	Fresh	Fresh	Fresh	Fresh	Fresh
ABA class.:	PAF	PAF-LC	PAF	PAF	Uncertain	UC(PAF)
pH	2.69	3.91	2.46	3.10	5.53	3.85
EC (µS/cm)	1230	264	1820	847	416	245
Alk.^ - Total	<1	<1	<1	<1	8	<1
Alk.^ - HCO3	<1	<1	<1	<1	8	<1
Alk.^ - CO3	<1	<1	<1	<1	<1	<1
Alk.^ - OH	<1	<1	<1	<1	<1	<1
Acidity^ calc.	*196*	*22*	*238*	*231*	*5*	*17*
SO4	232	52	308	250	134	45
Cl	<1	<1	<1	<1	<1	<1
F	<0.1	<0.1	0.2	<0.1	<0.1	<0.1
Ca	1	3	6	<1	49	2
Mg	4	2	3	2	<1	2
Na	20	21	19	20	17	20
K	4	4	8	5	2	4
Ag	<0.001	0.001	0.002	0.002	<0.001	0.002
Al	4.02	0.38	7.12	2.12	0.02	0.61
As	0.002	<0.001	0.002	0.002	<0.001	<0.001
B	<0.1	0.1	<0.1	<0.1	<0.1	<0.1
Ba	0.06	0.058	0.095	0.009	0.01	0.057
Be	0.002	<0.001	0.002	<0.001	<0.001	<0.001
Bi	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cd	0.058	0.0247	0.0289	0.324	0.0082	0.0087
Co	0.151	0.073	0.122	0.113	<0.001	0.060
Cr	0.001	0.002	0.002	0.005	<0.001	0.002
Cu	1.15	0.033	0.222	0.383	<0.001	0.046
Fe	18.6	<0.05	3.75	0.29	<0.05	<0.05
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	0.330	0.254	0.303	0.293	0.072	0.221
Mo	<0.001	0.004	<0.001	<0.001	<0.001	0.003
Ni	0.248	0.162	0.292	0.198	0.001	0.148
P	<1	<1	<1	<1	<1	<1
Pb	5.01	1.86	4.64	7.22	8.39	3.05
Sb	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	<0.01	<0.01	<0.01	<0.01	0.18	<0.01
Sn	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sr	0.019	0.021	0.024	0.014	0.05	0.018
Th	0.002	<0.001	0.003	<0.001	<0.001	<0.001
Ti	<0.01	<0.01	0.01	<0.01	<0.01	0.01
Tl	<0.001	<0.001	<0.001	<0.001	0.002	<0.001
U	0.004	<0.001	0.005	0.004	<0.001	<0.001
V	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
W	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
Zn	21.2	7.85	9.12	113	<0.005	2.49
Zr	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

All results mg/L except EC (µS/cm) and pH. ^ Alkalinity and acidity as CaCO3. Acidity calculated.
NAG leachate analysed after single addition NAG (ie. stage 1)

Table B9. Soluble Major Ions, pH, Electrical Conductivity and Metal/Metalloid Concentrations in NAG Leachate from Potential Tailings

The Master Composite sample is representative of expected tailings from the Project. The High Talc and High Sulfide samples are possible tailings ‘end members’.

Sample ID and Type:	Master Composite Tailings (after Stg 1)	High Talc Tailings (after Stg 1)	High Sulfide Tailings (after Stg 1)	High Sulfide Tailings (after Stg 3)	High Sulfide Tailings (after Stg 5)
Weathering:	Fresh	Fresh	Fresh		
ABA class.:	PAF	NAF	PAF		
pH	2.62	7.32	2.13	3.64	4.84
EC (µS/cm)	1580	298	4460	238	137
Alk.^ - Total	<1	28	<1	<1	<1
Alk.^ - HCO3	<1	28	<1	<1	<1
Alk.^ - CO3	<1	<1	<1	<1	<1
Alk.^ - OH	<1	<1	<1	<1	<1
Acidity^ calc.	*222*	*<1*	*872*	*15*	*1*
SO4	370	60	968	34	17
Cl	<1	<1	<1	1	<1
F	0.2	0.1	0.2	<0.1	<0.1
Ca	20	33	10	<1	1
Mg	14	<1	24	2	1
Na	18	19	16	16	19
K	4	2	6	<1	<1
Ag	<0.001	<0.001	<0.001	0.002	<0.001
Al	10.9	0.02	26.7	0.1	<0.01
As	0.001	<0.001	0.002	<0.001	<0.001
B	0.2	1	0.2	<0.1	<0.1
Ba	0.066	0.023	0.015	0.033	0.002
Be	0.003	<0.001	0.003	<0.001	<0.001
Bi	<0.001	<0.001	<0.001	<0.001	<0.001
Cd	0.0347	0.0001	0.0708	0.0006	<0.0001
Co	0.103	<0.001	0.092	0.001	<0.001
Cr	0.019	0.013	0.045	0.044	0.004
Cu	1.93	0.012	1.07	0.004	<0.001
Fe	7.41	<0.05	172	<0.05	<0.05
Hg	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Mn	2.65	0.004	4.60	0.244	0.054
Mo	<0.001	0.112	<0.001	0.004	<0.001
Ni	0.157	0.002	0.128	0.011	<0.001
P	<1	<1	<1	<1	<1
Pb	3.38	0.002	3.63	4.94	0.1
Sb	<0.001	0.049	<0.001	<0.001	<0.001
Se	<0.01	<0.01	<0.01	<0.01	<0.01
Sn	0.002	0.002	0.002	0.002	0.001
Sr	0.111	0.138	0.027	0.008	0.003
Th	0.002	<0.001	0.008	<0.001	<0.001
Ti	<0.01	<0.01	<0.01	<0.01	<0.01
Tl	<0.001	<0.001	0.001	<0.001	<0.001
U	0.016	<0.001	0.057	<0.001	<0.001
V	<0.01	<0.01	<0.01	0.02	<0.01
W	<0.001	<0.001	<0.001	1.25	0.01
Zn	11.8	0.013	20.7	0.104	0.008
Zr	<0.005	<0.005	<0.005	<0.005	<0.005

All results mg/L except EC (µS/cm) and pH. ^ Alkalinity and acidity as CaCO3. Acidity calculated.
NAG leachate analysed after NAG stage as indicated.

Appendix C

Acid Buffering Characterisation Curves

Figure C1. Acid-Buffering Characterisation Curves for Potential Waste Rock

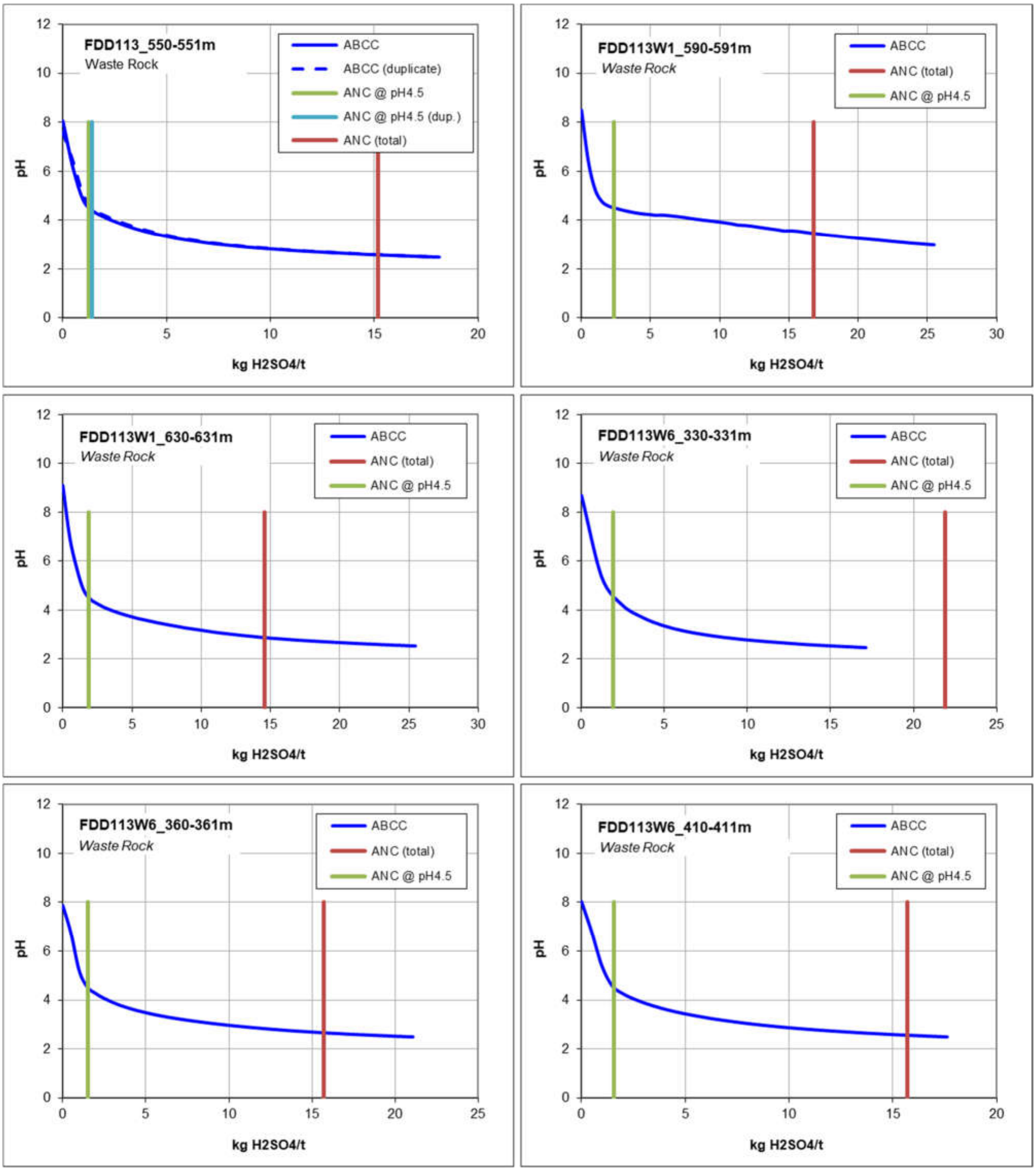


Figure C1 (cont.) Acid Buffering Characterisation Curves for Potential Waste Rock

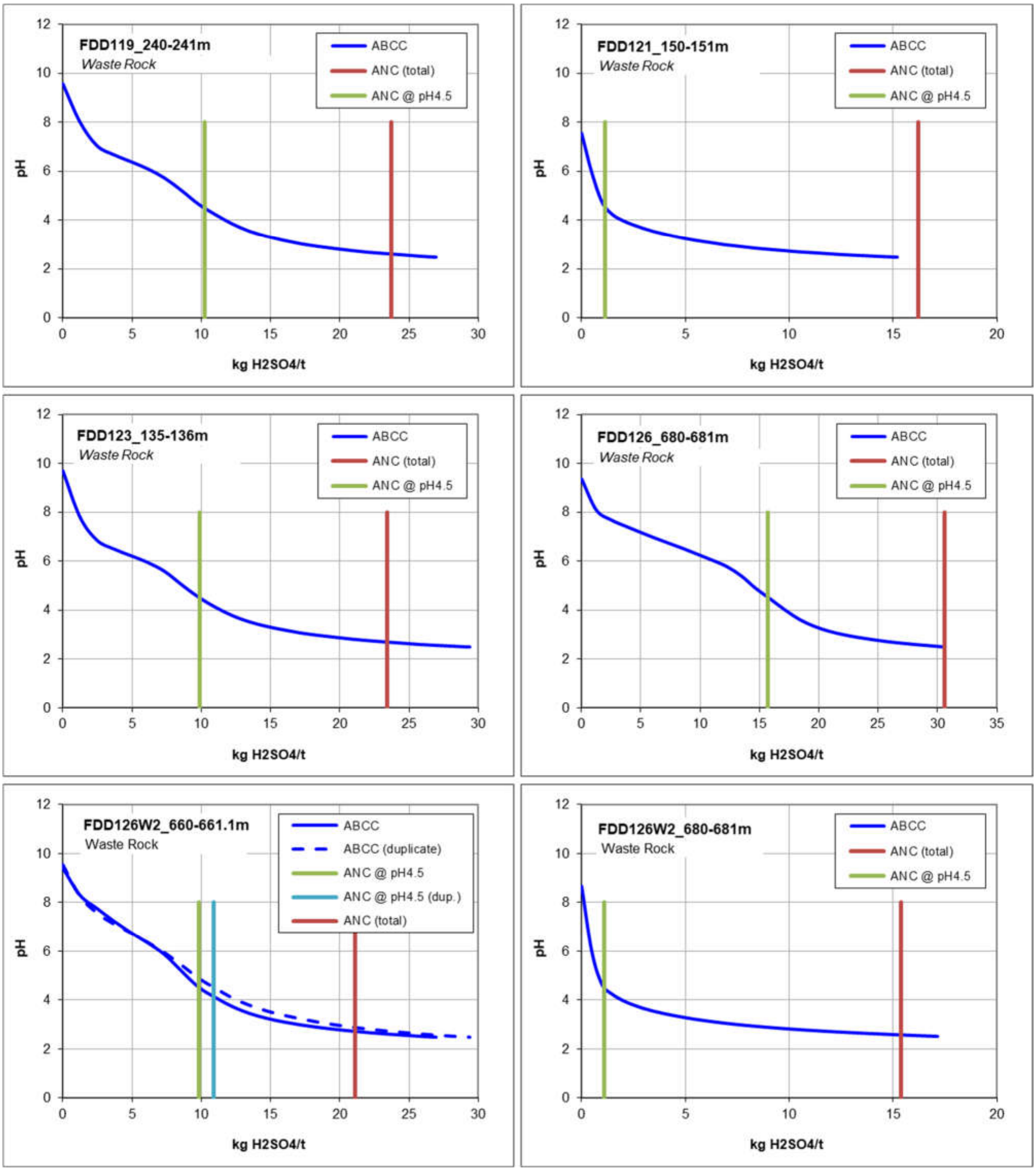
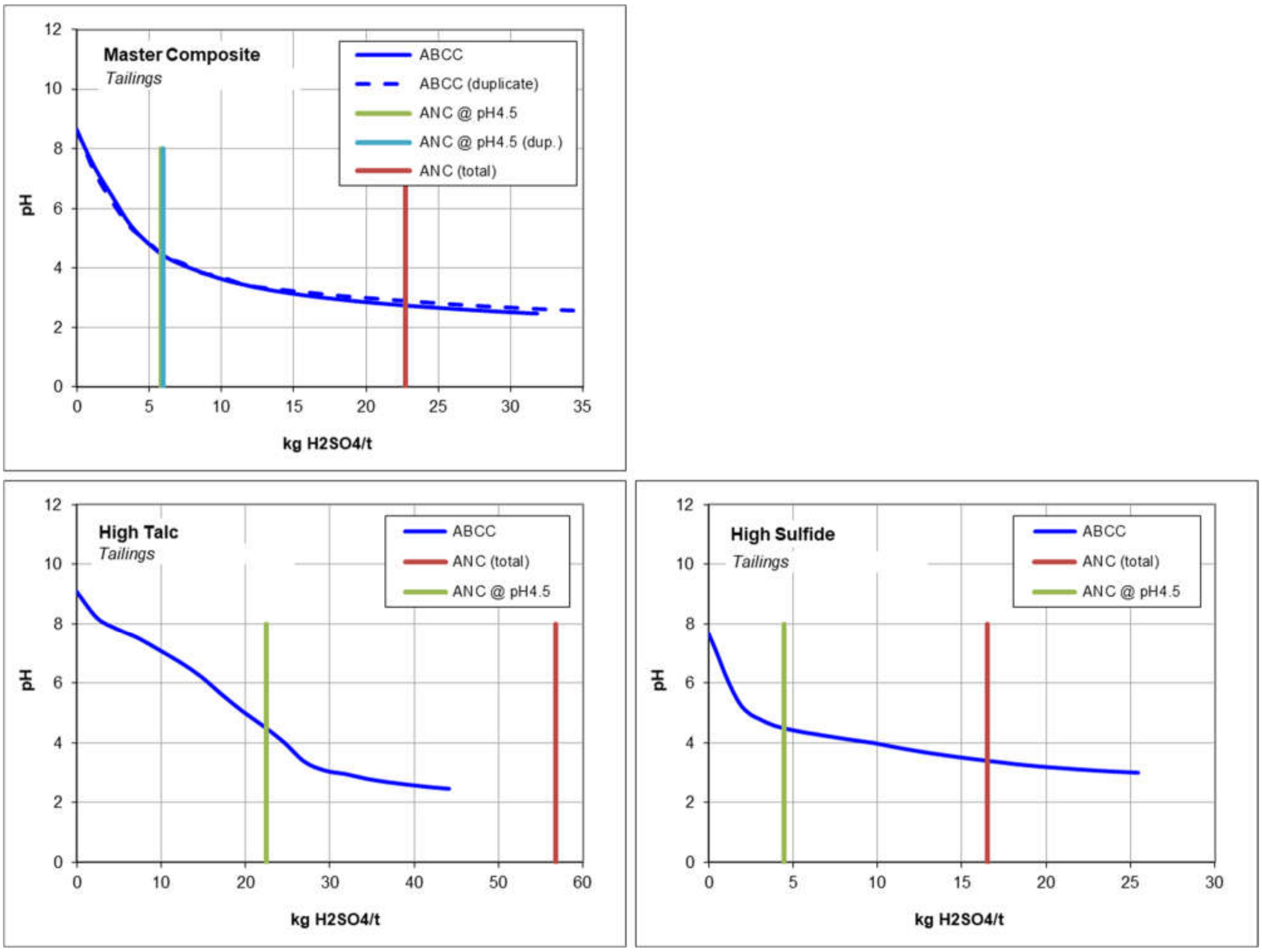


Figure C2. Acid-Buffering Characterisation Curves for Potential Tailings (Master Composite) and 'End member' Tailings

The Master Composite sample is representative of expected tailings from the Project. The High Talc and High Sulfide samples are possible tailings 'end members'.



Appendix D

Kinetic NAG Graphs

Figure D1. Kinetic NAG Graphs for Potential Waste Rock

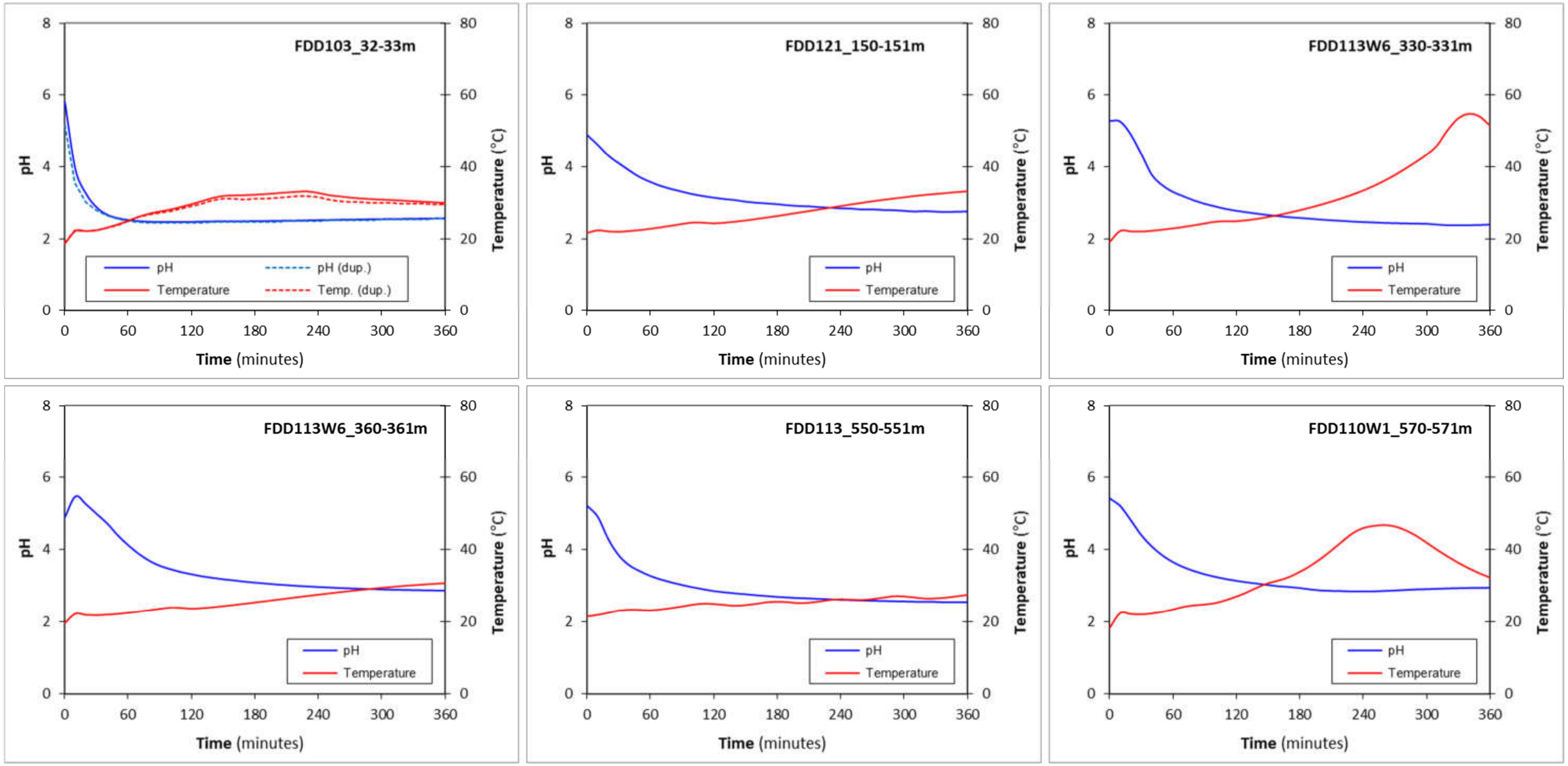


Figure D1 (cont.) Kinetic NAG Graphs for Potential Waste Rock

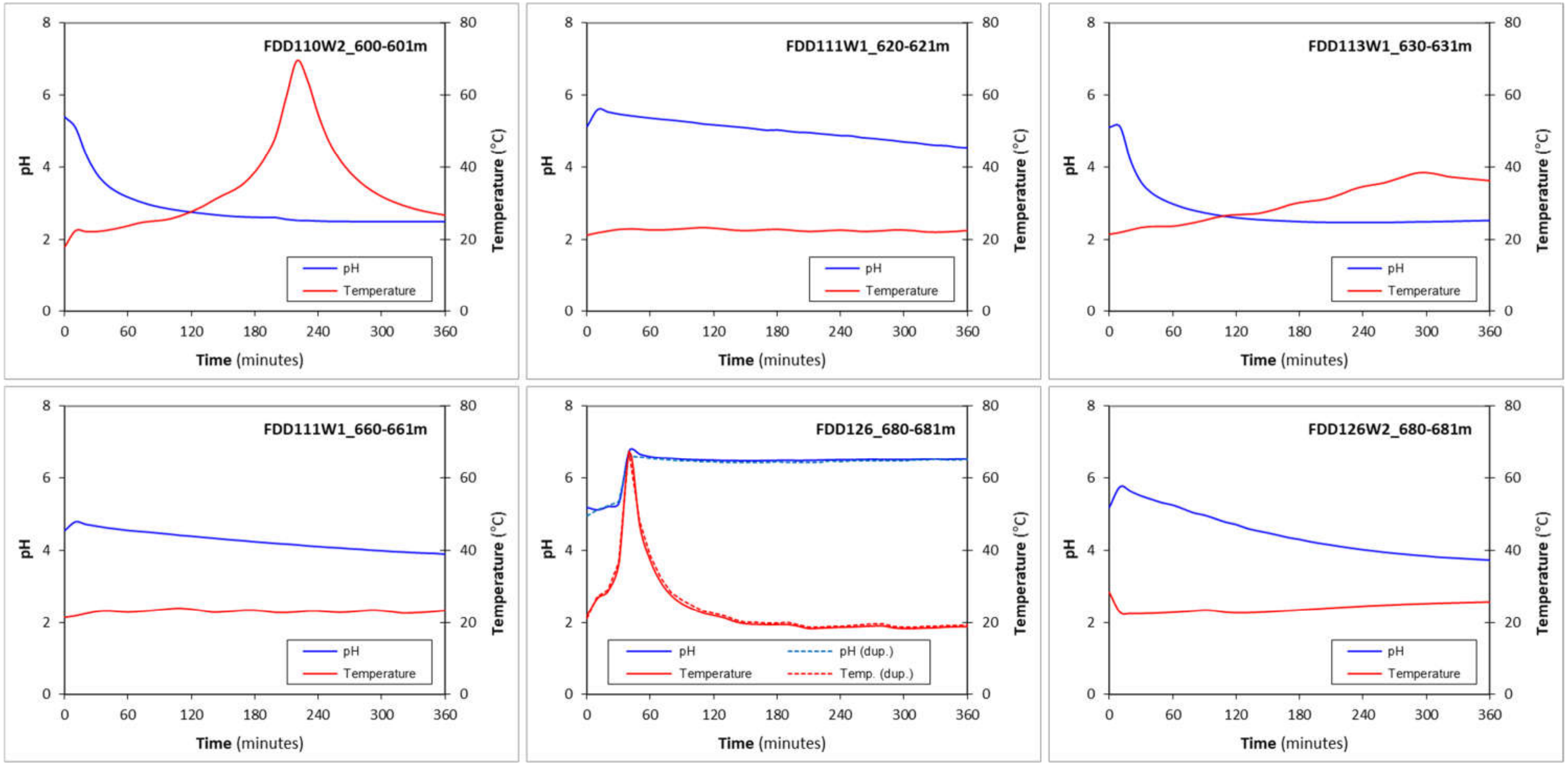
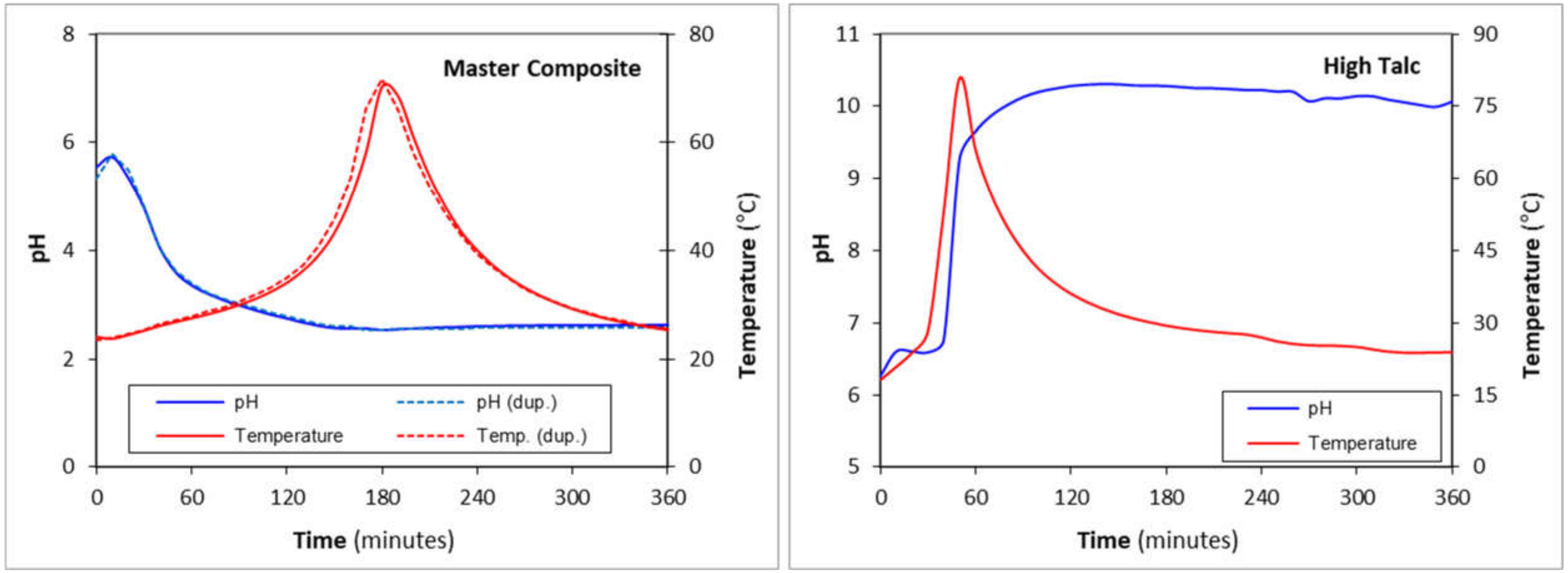


Figure D2. Kinetic NAG Graphs for Potential Tailings

The Master Composite sample is representative of expected tailings from the Project. The High Talc sample is a possible tailings 'end member'.



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