

FINAL

2020 Tailings Porewater Characterization Report

Faro Mine, Yukon Territory, Canada

Crown-Indigenous Relations and Northern Affairs Canada



Faro Mine Remediation Project
Projet d'assainissement de la mine Faro



SRK Consulting (Canada) Inc. ■ 1CA030.025 ■ July 2021



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Faro Mine, Yukon Territory, Canada

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Contents

Useful Definitions	vi
Executive Summary	vii
1 Introduction and Scope	9
2 Background	10
2.1 Rose Creek Tailings Area	10
2.2 Tailings Geochemistry	10
2.2.1 Mineralogy	10
2.2.2 Acid-Base Accounting and Solids Chemistry	10
2.2.3 Porewater Chemistry	11
3 Methods	12
3.1 Site Selection Rationale	12
3.2 Field Program	12
3.2.1 SRK20-SD-MW05 and SRK20-SD-MW06	13
3.2.2 SRK20-Tail-TP-A to SRK20-Tail-TP-H	13
3.2.3 Sample Selection and Collection Methods	15
3.3 Analytical Methods	16
3.3.1 Gravimetric Water Content and Particle Size Analysis	16
3.3.2 Porewater Extraction and Analysis	16
3.3.3 Acid-Base Accounting and Elemental Analysis	19
3.4 Quality Assurance and Quality Control	19
4 Results	21
4.1 Tailings Field Descriptions	21
4.2 Tailings Physical Characteristics	24
4.3 Acid-Base Accounting	26
4.3.1 Field Rinse Tests and Paste pH	26
4.3.2 Neutralization Potential	31
4.3.3 Sulphur Species	32
4.4 Solid Phase Elemental Content	33
4.4.1 Variation in Solid Phase Chemistry with Grain Size	37
4.5 Porewater Chemistry	38
4.5.1 Field and Laboratory Results	39
4.5.2 Variation with Grain Size	45
4.5.3 Dilution Corrected Porewater Chemistry	47
5 Discussion	49
6 Conclusion	52
7 Recommendations	54
References	56

Tables

Table 3-1: Summary of 2020 Tailings Drill Holes Test Pits	13
Table 3-2: Summary of Tailings Test Work Program	16
Table 3-3: Summary of Porewater Test Work Program	19
Table 4-1: Summary of Tailings Physical Characteristics	25
Table 4-3: Statistical Summary of ABA Data by Tailings Weathering Horizon	28
Table 4-4: Statistical Summary of Solid Phase Elemental Content by Tailings Weathering Horizon Compared to the RCTA Tailings Database from SRK (2019a)	35
Table 4-5: Summary of Tailings Porewater Physical Parameters, Nutrients, and Major Ion Chemistry	42
Table 4-6: Summary of Tailings Porewater Trace Element Chemistry	43
Table 4-6: Pearson Correlation Coefficients Between Volume Percent Sand and Porewater Chemistry	45
Table 4-8: Statistical Summary of Dilution Corrected Porewater Concentrations by Horizon Compared to Uncorrected Results	48

Figures

Figure 3-1: Test pit and drill hole locations	14
Figure 3-2: Tailings sample being purged with nitrogen gas before sealing sample bag in the field. Each bucket was then purged and sealed.	15
Figure 3-3: Porewater sampling of saturated tailing sample SRK20-Tail-TP-B05 (left) and piston squeezer apparatus (right)	18
Figure 3-4: Comparison of average and minimum porewater results to maximum porewater blank results	20
Figure 4-1: Example of typical weathering profile; SRK20-Tail-B; 0 to 0.9 m	22
Figure 4-2: Example of melanterite precipitates and the platy texture present within regions of the secondary mineral rich horizon (horizon B) of tailings profile; SRK20-Tail-TP-C 0.3 to 0.7 m depth	23
Figure 4-3: Example of typical un-weathered and bedded pyritic tailings (Horizon C); SRK20-Tail-TP-B; 3.5 to 4 m	24
Figure 4-4: Comparison of Rinse pH profiles at depth in all test pits	27
Figure 4-5: Comparison of rinse pH profiles from 2003 and 2020 for the Original, Secondary, and Intermediate Impoundments	30
Figure 4-6: TIC vs Modified Sobek NP	31
Figure 4-7: Paste pH vs. Modified Sobek neutralization potential	32
Figure 4-8: Distribution of HCl extractable sulphate sulphur with depth	33
Figure 4-9: Solids zinc content depth profile	36
Figure 4-10: Solids lead content depth profile	36
Figure 4-11: Solids copper content depth profile	36
Figure 4-12: Solids manganese content depth profile	36
Figure 4-13: Solids arsenic content profile	36
Figure 4-14: Solids cadmium content profile	36
Figure 4-15: Sulphate sulphur vs Volume % Silt	38
Figure 4-16: Modified Sobek NP vs volume % silt	38
Figure 4-17: Lab pH vs field pH	44
Figure 4-18: Field Eh vs field pH	44
Figure 4-19: pH-Eh Diagram for Iron with activity of 0.5 (equivalent to 25,000 mg/L Fe) in the presence of sulphate with an activity of 0.5 (equivalent to 44,000 mg/L SO ₄)	44
Figure 4-20: Dissolved sulphate vs lab pH	44
Figure 4-21: Dissolved manganese vs lab pH	44

Figure 4-22: Dissolved copper vs lab pH.....	44
Figure 4-23: Dissolved sulphate vs volume % sand, plotted by location.....	46
Figure 4-24: Dissolved sulphate vs volume % sand, plotted by tailings weathering horizon	46
Figure 4-25: Dissolved iron vs volume % sand, plotted by location	46
Figure 4-26: Dissolved iron vs volume % sand, plotted by tailings weathering horizon.....	46
Figure 4-27: Dissolved antimony vs volume % sand, plotted by tailings weathering horizon	46
Figure 4-28: Dissolved arsenic vs volume % sand, plotted by tailings weathering horizon	46

Appendices

Appendix A	Summary of Geochemical Test Work Program
Appendix B	QA/QC Results
Appendix C	Test Pit Photo Logs
Appendix D	Test Pit Logs, Rinse Test Results, and Field Meter Calibration Logs
Appendix E	Particle Size Analysis Results
Appendix F	ABA and Elemental Data
Appendix G	Porewater Chemistry Data

Useful Definitions

This list contains definitions of symbols, units, abbreviations, and terminology that may be unfamiliar to the reader.

ABA	Acid-Base Accounting
ARD	Acid rock drainage
CA	Crustal abundance
DV-SIS	Down Valley seepage interception system
EC	Electrical conductivity
Eh	Standardized measure of oxidation-reduction potential of a solution
FMC	Faro Mine Complex
Global ARD	Global ARD Testing Services Inc.
GWC	Gravimetric water content
ICP-MS	Inductively coupled plasma mass spectrometry
mg/L	Milligrams per litre
ML	Metal leaching
NP	Neutralization Potential
OD	Outside diameter
ORP	Oxidation reduction potential
PAG	Potentially acid generating
PSA	Particle size analysis
RCTA	Rose Creek Tailings Area
SFE	Shake-flask extraction
TDS	Total dissolved solids
TIC	Total inorganic carbon
TOC	Total organic carbon
Wt %	Weight percent
µS/cm	Microsiemens per centimetre

Executive Summary

In 2020, SRK initiated a field investigation to expand upon the available dataset for tailings porewater chemistry in the Rose Creek Tailings Area (RCTA). The results will be used to refine tailings source terms which are important inputs to the water quality predictions (SRK 2019a) used to determine water collection and treatment requirements for the site.

The 2020 investigation included:

- Sampling and testing of two drill holes within the Secondary Impoundment for solids chemistry, particle size analysis, and porewater chemistry.
- Sampling and testing seven test pits within the Original, Secondary and Intermediate Impoundments for solids chemistry, porewater chemistry, and particle size analysis. All test pits were logged for geochemical characteristics, including rinse pH and EC, presence of secondary minerals, colour and other indications of depth of oxidation and depth of the acidic pH front.

Interpretation of the geochemical logs and solids chemistry, particle size analysis, and porewater chemistry data indicated the following:

- Tailings Weathering Profile
 - The test pits encountered three distinctive horizons within the tailings profile. These were defined as:
 - **Horizon A**, which was characterized by dark grey to pale olive color, dry moisture content, the absence of pyrite and frequently observed <0.5 mm voids indicative of leached out pyrite. Horizon A had strongly acidic pHs <2, lowest zinc, manganese, and arsenic solids content, highest porewater concentrations of arsenic, aluminum, chromium, cobalt, nickel and vanadium, and lowest porewater concentrations of zinc.
 - **Horizon B**, which was characterized by orangish to reddish brown color, dry moisture content, and abundant iron oxide, oxy-hydroxide, and sulphate secondary minerals. Horizon B had acidic pHs ranging from pH 2 to pH 3 and differed from horizon A by higher pH, lower Eh, lower porewater arsenic concentrations and higher porewater copper, manganese, and zinc concentrations.
 - **Horizon C**, which was characterized by dark grey color, dry to saturated moisture content, an absence of visually identifiable secondary minerals, and abundant fresh and unoxidized pyrite. Horizon C had acidic pHs ranging from 3 to 5.5 and differed from horizon A and B by higher solids arsenic, cadmium, copper, manganese, and zinc concentrations. Horizon C had the highest porewater concentrations of zinc and manganese and lowest porewater concentrations of arsenic, copper, chromium, cobalt, nickel, and vanadium.
- Grain Size
 - Grain size showed large variations vertically within the tailings profile. The expanded grain size dataset indicates spatial zonation from spigoting points may not be as well developed as previously understood.

■ Porewater Chemistry

- Concentrations of sulphate and iron showed very high concentrations across the tailings profile with concentrations ranging from 25,000 mg/L to 180,000 mg/L sulphate and 6,500 mg/L to 100,000 mg/L iron.
- Zinc and manganese showed increasing trends with depth with median zinc concentrations of 220 mg/L, 890 mg/L, and 1,600 mg/L and median manganese concentrations of 50 mg/L, 120 mg/L, and 510 mg/L in horizons A, B, and C respectively.
- Concentrations of arsenic, cadmium, chromium, cobalt, copper, and nickel were highest under the strongly acidic (pH <3) conditions present within horizons A and B and showed lower concentrations in horizon C. Lead remained relatively immobile throughout the tailings profile, with concentrations consistently below 7 mg/L.
- Comparison of porewater chemistry and grain size showed finer grain sizes correlated with increased porewater concentrations of sulphate, iron, antimony, and arsenic.

1 Introduction and Scope

SRK Consulting (Canada) Inc. has been retained by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) to advance remediation plans for the Faro Mine Complex (FMC) and to support an environmental assessment and eventual water license application for the Faro Mine Remediation Project. Tailings from the former mining and milling operations are stored within the Rose Creek Tailings Area (RCTA) located on alluvial sediments within the Rose Creek valley. The tailings contain high concentrations of sulphides and are a major source of metal leaching/acid rock drainage (ML/ARD) under both current and future conditions at the site. Remedial measures for the RCTA include non-contact water diversions, land-forming and covers to reduce the amount of infiltration and runoff that comes into contact with the tailings, and implementation of the Down Valley seepage interception system (DV-SIS) to collect tailings affected groundwater for later treatment.

Current and future seepage water quality (source terms) for the tailings are important inputs to the water quality predictions (SRK 2019a) used to determine water collection and treatment requirements for the site and to provide inputs to the assessment of residual effects that may occur after remedial works have been completed. The source terms for tailings in SRK (2019a) were developed in 2018 based on a compilation of data from 30 years of geochemical characterization studies on the tailings and underlying aquifer solids (SRK 2019b). However, the available datasets did not include any direct measurements of porewater chemistry within the unsaturated zone of the tailings. In October 2018, SRK initiated an additional tailings investigation to characterize specific gaps in the understanding of the mineralogy and tailings porewater chemistry (SRK 2021a). The investigation included direct characterization of porewater chemistry extracted using a piston squeezing method. The results showed that concentrations of a number of key parameters were higher than the predicted source terms for future seepage water quality from the tailings. Due to the relatively limited spatial coverage provided by that investigation, SRK initiated a follow-up investigation in November 2020 to obtain a larger more representative set of tailings porewater chemistry samples. It is anticipated that the results will be used to refine tailings source terms in later phases of design and water licensing.

This report documents the methods and results of the 2020 field and laboratory testing program.

2 Background

2.1 Rose Creek Tailings Area

During mine operations from 1969 to 1992 tailings were progressively deposited within the Original, Intermediate and Secondary Tailings Impoundments (Figure 3-1). After 1992, tailings were deposited into the mined-out Faro Pit.

The surface of the tailings in the Original and Secondary Impoundments is generally free draining with groundwater levels typically in the range of 5 to 10 metres below the tailings surface. Ponded water and more saturated tailings have resulted in somewhat more limited exposure to oxygen within the Intermediate Impoundment and parts of the Original and Secondary Impoundments.

Since the cessation of tailings deposition in the RCTA in 1992, the RCTA has remained relatively unchanged and tailings have therefore weathered under mostly unsaturated and variably oxidizing conditions. Water and load balance modelling (i.e. RGC (2006) and SRK (2019a)) has indicated that the tailings are contributing significant loads of sulphate, zinc, manganese, and other elements to the Rose Creek aquifer and that these loads will increase as the acidic and oxidizing front moves deeper into the tailings profile.

Remediation plans for the RCTA include construction of non-contact water diversion channels, land-forming and placement of a cover on the tailings to reduce infiltration and construction of a Down-Valley seepage interception system (DV-SIS) to intercept tailings affected groundwater and prevent it from reaching Rose Creek.

2.2 Tailings Geochemistry

2.2.1 Mineralogy

Tailings consist predominantly of sulphides and silicates with lesser sulphate, oxide, and carbonate minerals (SRK 2021a). The dominant sulphide within the tailings is pyrite (15 to 80 wt%), while marcasite, chalcopyrite, galena, sphalerite, and pyrrhotite occur in abundances <4 wt%. Quartz is the dominant silicate mineral (10 to 75%), with lesser muscovite (0.5 to 15 wt%) orthoclase and plagioclase (<5 wt%). Barite (2 to 8 wt%) is the dominant primary sulphate mineral, while secondary sulphates gypsum, jarosite, anglesite, rozenite, and other iron-sulphates are present in abundances <5 wt%. Oxides consist of primary magnetite and rutile and secondary hematite and goethite. Carbonates consist of calcite and siderite in abundances <10%.

2.2.2 Acid-Base Accounting and Solids Chemistry

Due to very high concentrations of sulphide minerals and relatively low amounts of neutralization potential (NP), tailings are consistently classified as potentially acid generating (PAG) (SRK 2019b). Exposure of the tailings to oxidizing conditions has resulted in oxidation of the sulphides and exposed tailings are typically acidic with high concentrations of soluble metals.

Tailings are consistently enriched in silver, arsenic, bismuth, cadmium, copper, mercury, lead, antimony, selenium, and zinc compared to 10x average crustal abundances (CA), with greatest enrichments in lead (330x CA on average), zinc (150x CA on average), silver (140x CA on average), arsenic (290x CA on average), antimony, (120x CA on average), cadmium (110x CA on average), and bismuth (93x CA on average) (SRK 2019b).

2.2.3 Porewater Chemistry

Weathering of the tailings over the decades since mine operations ceased has created a weathering profile that has been described by RGC (2006) and SRK (2019b) as follows:

- Oxidized acidic zone (pH < 2) from the surface of all impoundments to depths of approximately 1 m. This zone has highest concentrations sulphate minerals, depleted levels of carbonate, and high rates of metal leaching as indicated by high concentrations of sulphate, iron, zinc, manganese and other metals.
- An acidic front with pH between 2 and 4 extending from the base of the oxidized zone to approximately 4 to 6 m deep in all Impoundments and up to 10 m deep in the Original and Secondary Impoundments. This zone also contains high porewater levels of sulphate, iron, zinc, manganese, and other metals.
- A mildly acidic front with pH between 4 and 6, and elevated iron, manganese and zinc concentrations extending from the base of the acidic front to depths below the water table in some areas of the RCTA. For all Impoundments and particularly for the Original and Secondary Impoundments, acidic conditions can persist to the base of the tailings.
- Non-acidic tailings (pH >6) with elevated levels of sulphate occur in selected areas within the deeper tailings and in the underlying aquifer in all three impoundments.

Tailings porewater quality within the RCTA was first characterized by RGC (2006) by interpreting data from porewater monitoring wells for saturated tailings. Results from monitoring wells screened in tailings indicated that some wells still showed elevated sodium concentrations (i.e. 100 to 400 mg/L) suggesting that tailings porewaters were still affected by process water and that effects of tailings oxidation were not yet observed within the wells. At wells where the front of porewater affected by tailings oxidation was observed, tailings porewaters indicated elevated and increasing levels of sulphate (10,000 to 80,000 mg/L), zinc (660 to 5500 mg/L), and magnesium (570 to 630 mg/L). More recent results from the tailings monitoring wells were reported in SRK (2019a). As of 2019, the wells screened in the tailings showed high levels of sulphate (max of 56,000 mg/L), zinc (max of 4,100 mg/L), iron (max of 26,000 mg/L), and manganese (max of 490 mg/L).

3 Methods

3.1 Site Selection Rationale

Sample locations were selected based on review of existing monitoring wells and targeted different physical characteristics (fine versus coarse tailings) within each of the impoundment areas of the RCTA using the delineation of tailings grain size adopted by RGC 2006. SRK selected seven test pit locations with the following rationale (Table 3-1 and Figure 3-1):

- Test pits SRK20-Tail-TP-A, SRK20-Tail-TP-B, and SRK20-Tail-TP-C were located in the Intermediate Impoundment between existing monitoring wells X21-96 and P03-08.
- Test pits SRK20-Tail-TP-G and SRK20-Tail-TP-H were located to provide a range of expected grain size within the Original Impoundment.
- In the Secondary Impoundment, SRK20-Tail-TP-D was located in what was expected to be fine tailings in between existing monitoring wells (X21A-96 and P03-06), whereas SRK20-Tail-TP-E was located in what was expected to be coarse tailings near P03-06.

3.2 Field Program

The original plan for the field program was to drill eight drill holes within the RCTA to expand upon the work completed in 2018 and develop a larger and more representative dataset of tailings porewater chemistry. In addition to sampling, SRK planned to install monitoring wells screened within the tailings at each location.

The number of planned drill holes was reduced to seven following completion of two groundwater monitoring wells near the edge of the Secondary Impoundment as part of another scope of work, and then later converted to a test pitting program as a result of a mechanical breakdown that rendered the drill inoperative just prior to initiation of the program (November 4, 2020).

The two Secondary Impoundment drill holes were completed on September 2 and 3, 2020 with logging and sampling completed by SRK engineer Ameeta Bhabra, EIT (BC). Samples were collected and submitted to the University of Saskatoon geochemistry laboratory for porewater extraction.

The test pitting program was conducted by SRK geochemists Jonathon Doherty, GIT (BC) and Melanie St-Arnault, PGeo (BC) between November 7 and 12, 2020. The test pits were distributed across the RCTA (Figure 3-1 and Table 3-1) and samples were collected for porewater extraction. Most of the porewater extractions were completed on site, but due to time constraints, some samples were processed at an off-site laboratory after completion of the field program.

Table 3-1: Summary of 2020 Tailings Drill Holes Test Pits

Location	Test Pit or Drill Hole ID	Easting	Northing	Depth (m)	Nearby Existing Monitoring Well	Inferred Tailings Grain size (RGC 2016)
Intermediate Impoundment	SRK20-Tail-TP-A	581272	6913746	3.75		Coarse
	SRK20-Tail-TP-B	581781	6913557	4.5	X21-96A	Coarse
	SRK20-Tail-TP-C	581802	6913383	3.5	P03-04	Fine
Secondary Impoundment	SRK20-Tail-TP-D	582078	6913503	5.5		Fine
	SRK20-Tail-TP-E	582395	6913457	5.5	P03-06	Coarse
	SRK20-SD-MW05	583306	6912723	15.2		Coarse
	SRK20-SD-MW06	583244	6912635	15.2		Fine
Original Impoundment	SRK20-Tail-TP-G	582505	6913319	5.5	P03-07	Fine
	SRK20-Tail-TP-H	583169	6913028	5.85		Fine

Source: This Document

3.2.1 SRK20-SD-MW05 and SRK20-SD-MW06

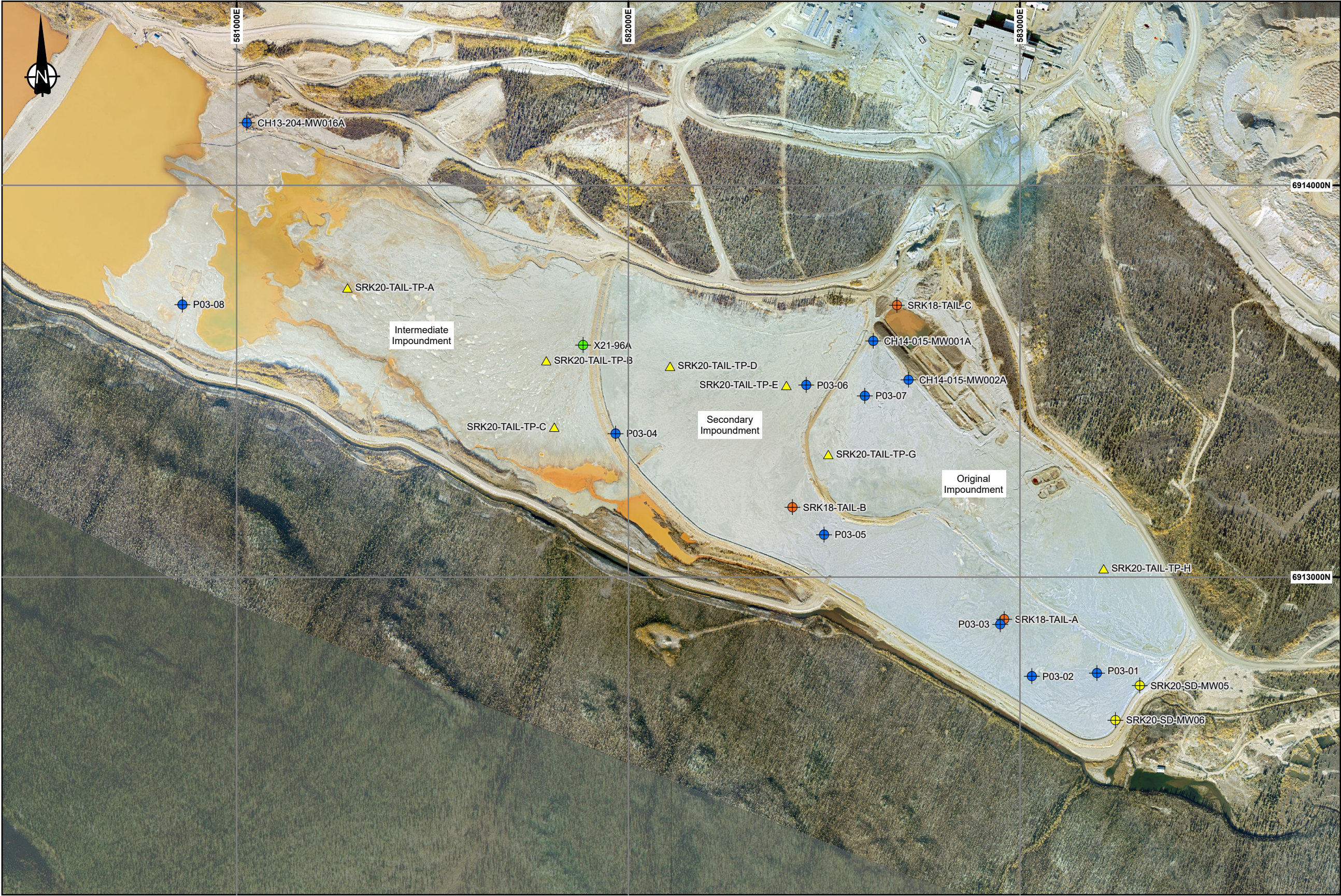
The sonic drilling was carried out using a track mounted Terra Sonic drill rig by drilling contractor Geotech Drilling. Drill fluids were not used for either of the two tailings drill holes. The core barrel had an outside diameter of 12 cm (4.75 inches). Drilling was stopped once the monitoring well target depth beneath the base of the tailings was reached.

SRK conducted geotechnical logging of the drill core. Geotechnical logging consisted of characterization of material grain size, moisture content, gradation, cohesion, plasticity according to the Unified Soil Classification System (ASTM D2488), and color using the Munsell classification system.

3.2.2 SRK20-Tail-TP-A to SRK20-Tail-TP-H

Seven test pits were completed to depths between 3.50 m to 5.85 m until maximum reach of the excavator or unstable pit walls began collapsing. SRK conducted geotechnical and geochemical logging of the different horizons identified within each test pit. Geotechnical logging consisted of characterization of material grain size, moisture content, gradation, cohesion, and plasticity according to the Unified Soil Classification System (ASTM D2488). Geochemical logging included characterization of the presence of secondary minerals, sulphide content and mineral assemblage, fizz rating with 10% hydrochloric acid, color using the Munsell classification system, and rinse tests for pH and electrical conductivity using the MEND (2009) method (1:1 liquid to solid ratio by mass).

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LEGEND

Tailings Porewater Monitoring Station with Rinse Test Data

Tailings Porewater Monitoring Station

2018 Tailings Drillhole

2020 Tailings Drillhole

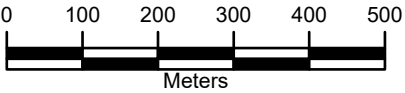
2020 Tailings Test Pits

NOTES

1. Coordinates for rinse test profile DH3-88 (1989) not available.

REFERENCES

NAD 1983 CSRS UTM Zone 8N.
Aerial imagery collected by McElhanney and AeroGeometrics in September 2019.



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SRK JOB NO: 1CA030.025		Faro Mine		2020 Drill Hole and Test Pit Locations	
FILENAME: 1CA030_025_RCTA_Monitoring				Date: Mar 2021	Approved: JED
				Figure: 3-1	

3.2.3 Sample Selection and Collection Methods

Within each drill hole and test pit, samples were selected to represent unique horizons within the tailings noted by differences in color, grain size, or mineral content. Sample intervals therefore did not overlap horizon contacts as identified by geotechnical and geochemical logging.

The drilling program included collection of two 1.5 to 2.5 m long samples from each drill hole. The test pitting program involved the collection of a total of 61 samples for rinse test of pH and electrical conductivity (EC), 39 samples for gravimetric water content (GWC), and 41 samples of solids from each representative horizon at all locations for the purpose of tailings solid and porewater characterization.

To minimize cross contamination, samples were collected using a trowel that was either wiped clean with a clean paper towel or repetitively pressed into the discarded material from the same horizon that was being sampled. Samples from both the drillholes and test pits were bagged in high density polyethylene sample bags, placed in 5L plastic pails with sealable lids, and purged with nitrogen gas before sealing the bags and pails to minimize oxidative effects (Figure 3-2). For each test pit sample collected, a 100 to 300 g sub-sample was collected for gravimetric moisture content analysis and placed in a sealed 100 mL plastic cup. Following sample collection, the tailings samples were frozen to further minimize oxidative effects. Samples collected from the drillholes were shipped in a cooler to the University of Saskatoon (USask) Geochemical Laboratory and remained frozen prior to sub-sampling and porewater extraction. Samples from the test pits underwent subsampling and porewater extraction both onsite and at USask. Test pit samples processed onsite remained fully frozen prior to processing while samples shipped to USask completely thawed due to long shipping delays.

Following thawing and prior to porewater extraction, a 1 kg aliquot of each sample was removed and placed in a polyethylene sample bag for solids characterization. Solids samples were shipped to Global ARD Testing Service Inc. (Global ARD) in Burnaby, British Columbia for analysis.



Figure 3-2: Tailings sample being purged with nitrogen gas before sealing sample bag in the field. Each bucket was then purged and sealed.

3.3 Analytical Methods

The geochemical test work program according to sample type and drillhole is summarized in Table 3-2, with a complete inventory of analyses by sample provided in Appendix A.

Table 3-2: Summary of Tailings Test Work Program

Test Pit ID	Rinse Test	GWC ⁱ	PSA ⁱⁱ	ABA ⁱⁱⁱ	Elemental Analysis	Porewater Analysis Squeezed (on site)	Porewater Analysis Squeezed (USask)	Not Analyzed
SRK20-Tail-TP-A	8	4	3	5	5	2	3	
SRK20-Tail-TP-B	8	5	2	5	5	3	2	
SRK20-Tail-TP-C	7	5	1	5	5	4	1	
SRK20-Tail-TP-D	9	5	3	5	5	2	3	
SRK20-Tail-TP-E	9	6	3	5	5	2	3	1
SRK20-Tail-TP-G	9	6	2	5	5	3	2	1
SRK20-Tail-TP-H	11	8	0	9	9	8	0	1
SRK20-SD-MW05	0	0	2	2	2	0	2	1
SRK20-SD-MW05	0	0	2	2	2	0	2	1
Total	61	40	18	43	43	24	18	5

Source: \\srk.ad\DFS\alvan\Projects\01_SITES\Faro\101_Investigations\2020_Tailings_Drilling_Geochem\4 Working File\Compiled2020TailingsSolid_1CA030.025_MS_Rev00.xlsx

Notes:

ⁱ Gravimetric water content

ⁱⁱ Particle Size Analysis

ⁱⁱⁱ Acid Base Accounting

3.3.1 Gravimetric Water Content and Particle Size Analysis

The gravimetric water content (GWC) was measured on site by drying 150 to 250g of the wet sample in an oven at 105°C for 24 hours. The GWC (%) was calculated by the difference between the weight of wet and dry samples.

Particle size analysis (PSA) was conducted on each sample shipped to USask (Table 3-2) using a Malvern Mastersizer with data grouped into size fractions using the United Soil Classification System.

3.3.2 Porewater Extraction and Analysis

Porewater from 25 samples was extracted on site to reduce post-sampling oxidative effects. 14 selected samples were shipped to the USask for porewater extraction and subsequent test work. Samples extracted at USask showed oxidative effects, notably the lack of the green color typical of Faro tailings porewaters.

Porewater Simulation Method

Previous extraction of porewater from tailings at Faro (SRK 2021a) demonstrated that samples with GWC less than 15% generally did not produce sufficient porewater to meet minimum analytical volume requirements. Laboratory supplied de-ionized water was therefore added to selected samples based on GWC and/or absence of visible moisture. The volume of DI water added to the samples to simulate porewater ranged from 0.2 to 0.8 L, with water being added to 3 to 6 kg of tailings until the sample was fully saturated. The volume of water and solids was recorded for later use in calculating the resulting amount of dilution. Following addition of DI water, samples were homogenized within the sample bag, re-purged with nitrogen gas, and allowed to react at room temperature for 12 to 22 hours prior to porewater extraction.

Porewater Extraction Method

Porewater was directly sampled from the sample bag for some fully saturated samples (Figure 3-3). Porewater extraction was conducted on site by SRK geochemists J. Doherty and M. St-Arnault and at USask by Erin Schmeling (Research Assistant) with oversight from Tom Kotzer (SRK geochemist) between November 7, 2020 and December 16, 2020. Extraction of samples with lower rinse pH and higher rinse EC was prioritized on site to minimize oxidative processes of the tailings during storage and transportation.

Porewater extraction was conducted using a piston squeezer apparatus (Figure 3-3) which consisted of:

- a hydraulic press;
- a 12.5 cm diameter steel cylinder;
- an epoxy resin plunger equipped with heavy duty O-rings; and
- an epoxy resin removable base unit which was equipped with heavy-duty O-rings and a threaded outlet which attached to a 1/8" hose barb connected to replaceable tubing and a stop-cock.

Prior to extraction of each sample, the cylinder, base, plunger, and stop cock were scrubbed clean with brushes and bristle pads in warm water and soap and then rinsed with distilled water. Following cleaning, the O-rings on the piston plunger and base were lubricated with silicon grease, the tubing was replaced, and a 250-micron Nitex mesh screen and 11-micron Whatman filter paper were placed in the base of the piston. 300 to 400 mL of laboratory supplied de-ionized water was then passed through the filter papers, tubing, and stopcock as a final rinse. Tailings were then loaded into the cylinder and the plunger was inserted. A 60 mL syringe was then threaded to the stop-cock and the sample was squeezed in the piston cylinder using the hydraulic press, to extract the porewater which exited from the base of the cylinders, into the collection tubing and the syringes (Figure 3-3). The syringes and collection tubing were changed between each sample. The same extraction method was used at the project site and at USask.

The analytical matrix was prioritized to ensure that the most important analytes/parameters were measured. The minimum sample volume of 15 mL was first collected and preserved for the dissolved metals scan. 125 mL unpreserved bottles were then filled to capacity for general parameters.

Remaining porewater was used to meet the minimum sample volume for carbon and ammonia, and to measure pH, EC, and oxidation-reduction potential (ORP). Where additional volume was available, it was used to top off excess space in the metal and carbon/ammonia bottles.

Porewater blanks were collected roughly every five samples by passing laboratory supplied de-ionized water through the piston squeezer apparatus prior to sampling, with the de-ionized water collected for analysis using the same methods as those used for the porewater samples.

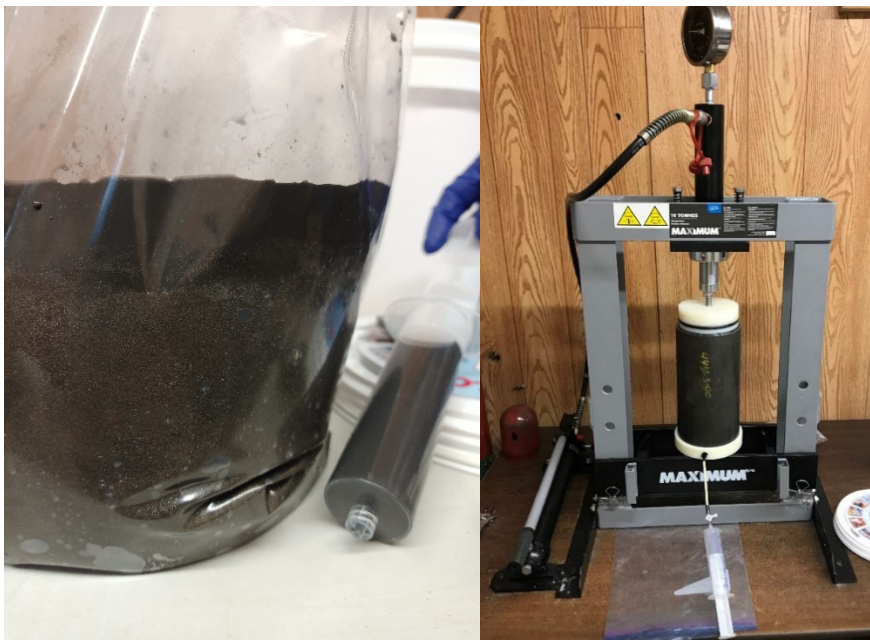


Figure 3-3: Porewater sampling of saturated tailing sample SRK20-Tail-TP-B05 (left) and piston squeezer apparatus (right)

Porewater Analysis

Porewater samples were refrigerated following extraction and were shipped by courier to ALS Environmental in Burnaby, BC every three to four days during the squeezing process. The samples were shipped cold with ice packs in sealed coolers. Samples were analyzed for specific conductance, pH, oxidation-reduction potential (ORP), total dissolved solids (TDS), acidity, alkalinity, ammonia, nitrate, nitrite, bromide, chloride, fluoride, sulphate, total carbon, total inorganic carbon, and dissolved metals (Al, Sb, As, Ba, Be, Bi, B, Cd, Ca, Cs, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Hg, Mo, Ni, P, K, Rb, Se, Si, Ag, Na, Sr, S, Te, Tl, Th, Sn, Ti, W, U, V, Zn, Zr). Inorganic anions were analyzed by Ion Chromatography with conductivity and/or UV detection. Dissolved metals were analyzed by Collision/Reaction Cell ICP-MS and dissolved mercury by Cold Vapor Atomic Absorption Spectrometry. Organic/Inorganic Carbon were analyzed by the high temperature combustion method with measurement by an infrared detector. Acidity and alkalinity were determined by potentiometric titration to a specified endpoint.

The geochemical test work program according to sample type and test pit is summarized in Table 3-3, with a complete inventory of analyses by sample provided in Appendix A.

Table 3-3: Summary of Porewater Test Work Program

Test Pit ID	Physical Test (After Extraction)	General Parameters	Dissolved Metals	Carbon and Ammonia	Field Blank
SRK20-Tail-TP-A	4	5	5	5	2
SRK20-Tail-TP-B	4	5	5	4	
SRK20-Tail-TP-C	3	5	4	5	
SRK20-Tail-TP-D	4	5	3	5	1
SRK20-Tail-TP-E	2	5	4	2	2
SRK20-Tail-TP-G	1	5	4	2	
SRK20-Tail-TP-H	5	9	9	6	3
SRK20-SD-MW05	0	2	2	2	
SRK20-SD-MW06	0	2	2	2	
Total	23	43	43	33	8

3.3.3 Acid-Base Accounting and Elemental Analysis

Samples were analyzed for acid-base accounting (ABA) and elemental analysis at Global ARD. ABA procedures included paste pH (Sobek et. al 1978), total inorganic carbon (TIC) by HCl leach and subsequent coulometric analysis of evolved CO₂, Modified Sobek Neutralization Potential (NP) (MEND 1991), total sulphur by Leco, and sulphate sulphur by HCl leach.

Elemental analysis included inductively coupled plasma mass spectrometry (ICP-MS) following an aqua regia digestion and single element assays for samples with over limit zinc and lead concentrations.

3.4 Quality Assurance and Quality Control

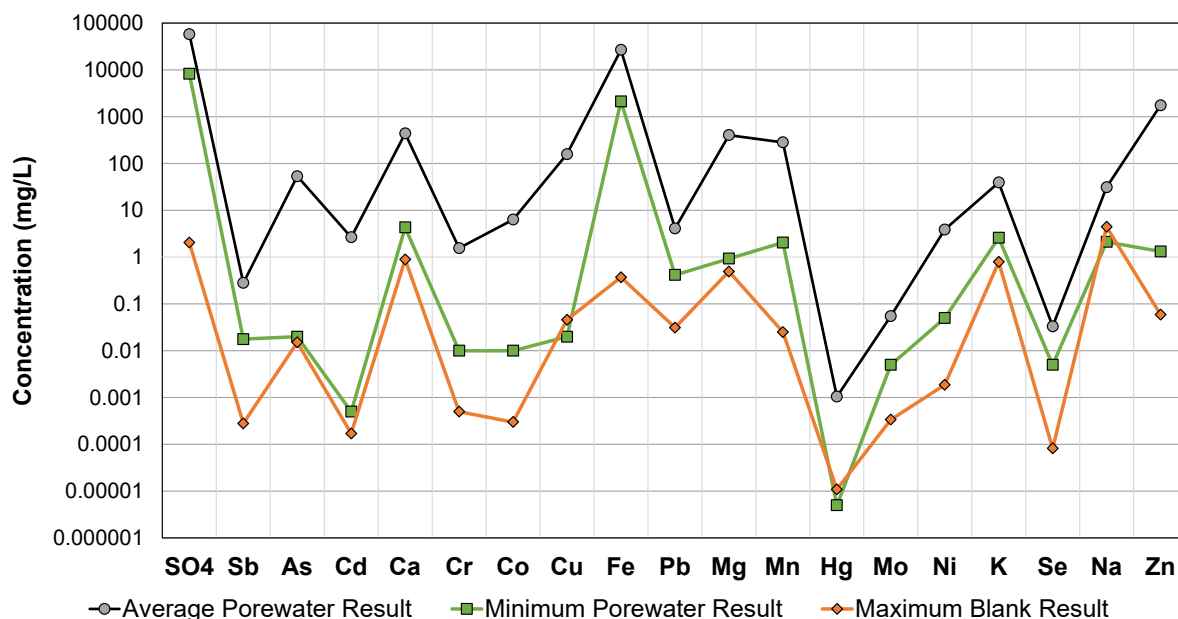
QA/QC checks performed by SRK on the laboratory data for solid tailings ABA and elemental analysis as well as porewater data are documented in Appendix B.

The ABA and elemental analyses data all passed the QAQC criteria and were considered acceptable for the study.

For the porewater results, the laboratory-initiated blanks, duplicates, and standards passed the QA/QC criteria. For ion balance, ten porewater samples had ion balances exceeding the criteria with values

ranging from 10 to 30%. In each case, the ion balances were off due to anions (sulphate) being low relative to cations. The results were confirmed by analytical rechecks or data review by the laboratory chemist. The recheck results were therefore accepted.

Blank porewater samples passed through the piston squeezer apparatus contained somewhat elevated concentrations of trace elements, indicating incomplete removal of contaminants during cleaning or leaching from the piston squeezing apparatus itself. To determine whether the contamination materially affected the results, the average and minimum porewater results were compared to the maximum blank result for a select set of parameters (Figure 3-4). The results showed that the average porewater results were significantly (i.e. more than two orders magnitude) higher than the maximum blank results for most parameters. Incorporating the full analytical dataset (Figure 3-4 and Appendix G), the average porewater result exceeded the maximum blank result for all parameters. The maximum blank result exceeded the minimum porewater result for total inorganic carbon, barium, boron, cerium, copper, mercury, and sodium. The magnitude of concentrations in the blanks therefore indicates that while a small degree of contamination is associated with the squeezing process which affects interpretation of some elements detected at low levels, levels of contamination did not impact results for the main constituents within the porewaters. The porewater data were therefore considered acceptable for this study.



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Figure 3-4: Comparison of average and minimum porewater results to maximum porewater blank results

4 Results

4.1 Tailings Field Descriptions

Weathering Profile

Visual test pit logs are provided in Appendix C with full tabulated logs provided in Appendix D. The drill hole logs are provided in SRK (2021b).

Within the central area of the Original and Secondary Impoundments (SRK20-TAIL-TP-D, E, G, and H), the tailings test pits showed a similar weathering profile (Figure 4-1) defined from the surface to depth by:

- a 0.16 m to 0.75 m thick horizon of grey to dark grey tailings (referred to as horizon A)
- a 0.30 to 0.97 m thick horizon of orangish to reddish brown tailings (referred to as horizon B) which typically extended to maximum depths of 1.4 m, except in SRK20-Tail-TP-H located in the Original Impoundment which had oxidized tailings with reddish brown secondary minerals to a depth of 1.85 m and lenses of reddish tailings to 4.0 m.
- an un-weathered horizon of dark grey tailings (referred to as horizon C) extending from the base of horizon B to the base of each test pit (typically 1.2 m to >5 m) which contained no visible secondary minerals.

The drill holes SRK20-SD-MW05 and 06 located near the edge of the Secondary Impoundment dam intercepted a much more developed weathering profile, with horizon A extending to depths of 4.5 and 5.1 m respectively and horizon B extending to depths of 5.2 and 7.3 m respectively.

Within the Intermediate Impoundment (SRK20-TAIL-TP-A, B, and C), the weathering profile was less developed with horizon A extending to maximum depths of only 0.05 to 0.30 m and horizon B extending to maximum depths of 0.70 m. Additionally, horizon A had a pale yellow to olive color.

Compared to previous descriptions of the tailings oxidation front (i.e. RGC (2006) and SRK (2019b)), horizons A and B reflect a more detailed distinction within the “acidic front”, while horizon C represents the elevated zinc concentration front. Detailed descriptions of each horizon are provided in the following sub-sections.



Figure 4-1: Example of typical weathering profile; SRK20-Tail-B; 0 to 0.9 m

Horizon A

Horizon A within the tailings profile was interpreted to represent the fully oxidized acidic zone where tailings porewaters were too acidic for secondary iron oxide and oxy-hydroxide minerals to precipitate. This observation was confirmed by strongly acidic rinse pHs ($\text{pH} < 2.1$) in all horizon A samples (Section 4.3.1). Horizon A was characterized by dark grey to pale olive color, clay to fine sand grain size, dry moisture content, the absence of visible pyrite and frequently observed < 0.5 mm voids indicative of leached out pyrite, no fizz upon reaction with 10% HCl, and partially cemented and variably foliated texture. Within the test pits, horizon A extended to the greatest depths in the Original (0.28 to 0.7) and Secondary (0.5 to 0.8) Impoundments relative to the Intermediate Impoundment (0.16 to 0.3 m), where the horizon also had a more yellowish grey color compared to the dark grey color observed in the Original and Intermediate Impoundments.

Horizon B

Horizon B was identified in all test pits except SRK20-Tail-TP-G. Horizon B was characterized by dry to moist, loose to weakly cemented and variably platy textured tailings (Figure 4-2) with secondary minerals present as pervasively yellowish, brownish, or reddish layers and patches reflective of iron oxides or oxy-hydroxides. Horizon B also contained a discontinuous < 4 cm thick stiff hardpan layer and several test pits contained layers with abundant blue-green, vitreous, and sub-transparent secondary minerals (Figure 4-2) identified as melanterite ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$). Horizon B contained variable pyrite content (undetectable to 25%) indicative of sulphide oxidation with no fizz upon reaction with 10% HCl. SRK20-Tail-TP-G was unique in the absence of a well developed secondary mineral rich horizon and contained discontinuous melanterite bearing lenses in the top 70 cm but no continuous layer as observed in the other test pits.

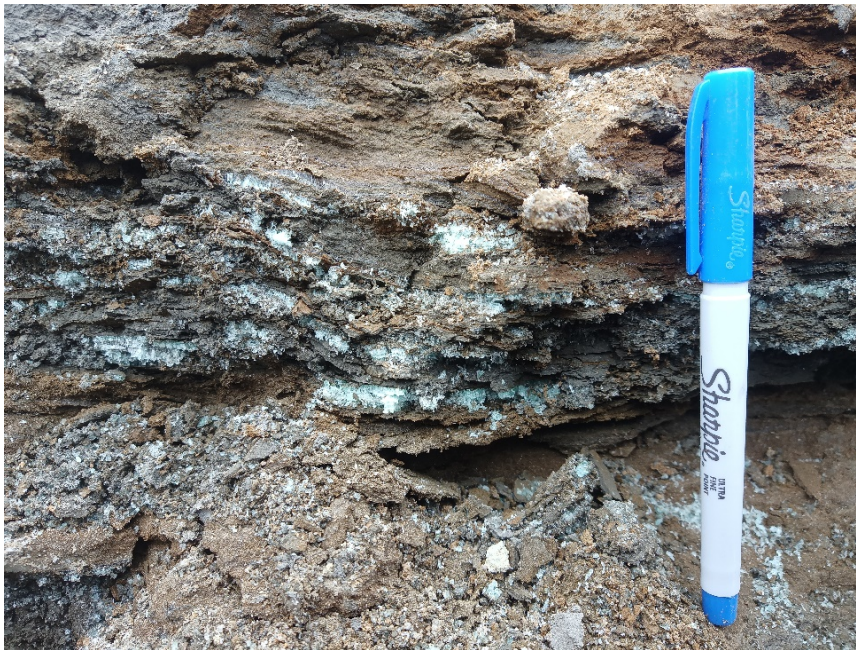


Figure 4-2: Example of melanterite precipitates and the platy texture present within regions of the secondary mineral rich horizon (horizon B) of tailings profile; SRK20-Tail-TP-C 0.3 to 0.7 m depth

Horizon C

Horizon C consisted of loose, bedded, and dry to saturated tailings with silt to fine-sand sized olive colored pyrite in a dark grey clay to silt sized matrix. Visible pyrite modal abundances varied by layer within the un-weathered tailings from 15 to 80%. Within each of the test pits, grain size was observed to vary within each bedded layer of the tailings profile. Observations of moisture content were linked to grain size, as coarser sand size and generally more pyrite rich tailings were typically moist to dry and loose whereas silt and clay sized tailings were typically either moist or fully saturated and cohesive. Horizon C notably did not contain the platy texture present within horizons A and B which was interpreted to be an artefact of the precipitation of secondary minerals. The presence of reddish oxidized patches within horizon C of SRK20-Tail-TP-H may be indicative of buried horizon B layers reflecting exposure and then subsequent burial of oxidized tailings during operations.



Figure 4-3: Example of typical un-weathered and bedded pyritic tailings (Horizon C); SRK20-Tail-TP-B; 3.5 to 4 m

4.2 Tailings Physical Characteristics

Results of particle size analysis by Malvern Mastersizer and gravimetric moisture content are provided in Table 4-1 with the full laboratory report provided in Appendix E and Appendix G respectively.

The laboratory particle size analysis data grouped using the USCS classification system compared well with visual observations made in the field. Overall, the tailings sampled had an average particle size distribution of 54% sand, 44% silt, and 1% clay. The particle size analysis results confirmed the field observations, with most test pits showing a range of particle size with depth.

Moisture content ranged from 5 to 29% and did not show a consistent trend with depth. Moisture content showed a statistically significant correlation ($r = 0.46$) with the combined abundance of silt and clay at a 90% confidence interval, further confirming the field observations that more saturated zones within the tailings located above the water table were typically associated with finer grain sizes and that sandy tailings were typically more dry.

There were no consistent spatial trends in the particle size or moisture content by impoundment or location relative to previously defined “fine” versus “coarse” tailings zones within the tailings (SRK 2019a) with the possible exception of SRK20-TAIL-TP-C which generally consisted of finer grained tailings with higher moisture content.

Table 4-1: Summary of Tailings Physical Characteristics

Impoundment	Sample ID	Start	Finish	Visual Grain Size		Volume % clay	Volume % silt	Volume % sand	Grain size (PSA)	Moisture Content
		m	m			≤2µm	2µm< x <60 µm	60µm< x <2mm		%
Original Impoundment	SRK20-Tail-TP-G01	0	0.7	Silt and clay with fine sand		4.0	89	6.62	Silt	21%
	SRK20-Tail-TP-G02	0.7	1.03	Silt with fine sand		0	32	67.71	Silty Sand	7%
	SRK20-TAIL-TP-G03	1.03	1.5	Fine sand with silt		-	-	-	-	19%
	SRK20-TAIL-TP-G04	2	2.7	Silt with fine sand		-	-	-	-	12%
	SRK20-TAIL-TP-G06	5	5.5	Clay and silt		-	-	-	-	29%
	SRK20-TAIL-TP-H01	0	0.25	Fine sand with silt		-	-	-	-	6%
	SRK20-TAIL-TP-H02	0.28	0.65	Fine sand		-	-	-	-	10%
	SRK20-TAIL-TP-H03	0.65	0.94	Fine sand with silt		-	-	-	-	13%
	SRK20-TAIL-TP-H04	1.1	1.7	Fine sand with silt		-	-	-	-	14%
	SRK20-TAIL-TP-H05	1.9	2.4	Fine sand with silt		-	-	-	-	8%
	SRK20-TAIL-TP-H06	2.7	3.4	Fine sand with silt		-	-	-	-	13%
	SRK20-TAIL-TP-H07	3.6	4	Clay and silt with fine sand		-	-	-	-	22%
	SRK20-TAIL-TP-H08	4.3	5	Silt and clay		-	-	-	-	15%
	SRK20-TAIL-TP-H09	5	5.85	Silt and clay		-	-	-	-	
Intermediate Impoundment	SRK20-Tail-TP-A01	0	0.3	Fine sand with silt		2.1	54	44	Silty Sand	8%
	SRK20-Tail-TP-A02	0.4	0.7	Fine sand with silt		0	8.0	92	Sand	28%
	SRK20-TAIL-TP-A03	0.7	1.2	Fine sand with silt		0.46	29	71	Silty Sand	6%
	SRK20-Tail-TP-A04	2.2	2.75	Silty sand with clay		0.92	49	50	Silt-Sand	23%
	SRK20-TAIL-TP-A05	3.25	3.75	Silty sand with clay		-	-	-	-	
	SRK20-Tail-TP-B01	0	0.28	Fine sand with silt		1.6	20	78	Silty Sand	10%
	SRK20-Tail-TP-B02	0.28	0.7	Fine sand with silt		3.0	32	65	Silty Sand	11%
	SRK20-TAIL-TP-B03	0.7	1.7	Silt with fine sand		-	-	-	-	13%
	SRK20-TAIL-TP-B04	2	2.7	Fine sand and silt		-	-	-	-	5%
	SRK20-TAIL-TP-B05	3.5	4	Silt with fine sand		-	-	-	-	20%
	SRK20-TAIL-TP-B06	4	4.5	Silt with fine sand		-	-	-	-	-
	SRK20-TAIL-TP-C01	0.05	0.16	Fine sand with silt		-	-	-	-	16%
	SRK20-Tail-TP-C02	0.28	0.7	Silt with fine sand		0.86	76.01	23	Silt with sand	28%
	SRK20-TAIL-TP-C03	0.7	1.3	Silt with fine sand		-	-	-	-	18%
	SRK20-Tail-TP-C04	1.7	2.3	Silt with fine sand		-	-	-	-	23%
	SRK20-TAIL-TP-C05	3	3.5	Silt with fine sand		-	-	-	-	27%
Secondary Impoundment	SD-GC-01 023839 ¹	0.00	1.83	Silt		0.95	79	20	Silt with sand	-
	SD-GC-03 023841	6.86	8.69	Silt		0.15	11	89	Sand	-
	SD-GC-04 023849 ²	0.61	3.05	Silt with fine sand		0	28	72	Silty Sand	-
	SD-GC-05 023850	3.66	6.10	Silt		1.3	73	26	Silt with sand	-
	SRK20-Tail-TP-D01	0	0.75	Fine sand with silt and gravel (secondary minerals)		2.3	67.31	30	Silt with sand	24%
	SRK20-Tail-TP-D02	0.85	1.2	Silt and clay with fine sand		1.1	43.82	55	Silty Sand	16%
	SRK20-Tail-TP-D03	1.8	2.2	Fine sand with silt		1.1	50.87	48	Silt-Sand	18%
	SRK20-TAIL-TP-D04	3.5	4	Silt with fine sand		-	-	-	-	19%
	SRK20-TAIL-TP-D05	5	5.5	Silt with clay		-	-	-	-	26%
	SRK20-Tail-TP-E01	0	0.32	Silt with fine sand		0.30	36	64	Silty Sand	5%
	SRK20-Tail-TP-E02	0.32	0.8	Silt with fine sand		2.3	53	45	Silt with sand	14%
	SRK20-Tail-TP-E03	0.8	1.2	Fine sand with silt		0.70	12	87	Sand	6%
	SRK20-TAIL-TP-E04	1.3	2.5	Fine sand with silt		-	-	-	-	8%
	SRK20-TAIL-TP-E06	4	4.8	Fine sand with silt		-	-	-	-	5%

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Notes:

¹ SD-GC-01 and SD-GC-03 collected from drill hole SRK20-SD-MW05

² SD-GC-04 and SD-GC-05 collected from drill hole SRK20-SD-MW06

4.3 Acid-Base Accounting

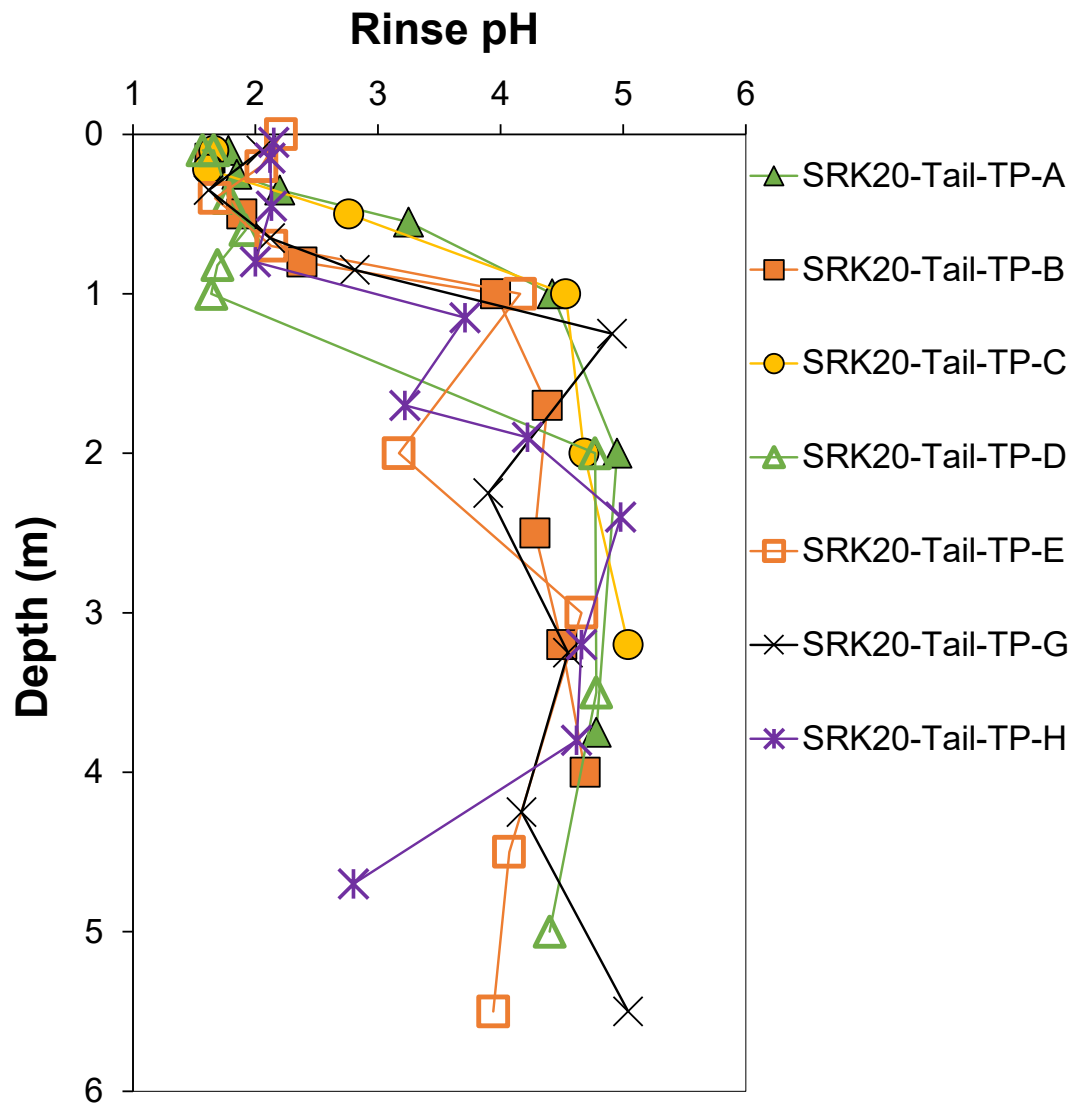
The full set of ABA analytical data is provided in Appendix F, with a summary of ABA characteristics by tailings weathering horizon in Table 4-3. The results are interpreted in the following sections with an emphasis on characterizing trends in ABA characteristics with depth and how those relate to the ongoing progression of oxidation. ARD potential is not assessed, as the ARD potential of tailings within the RCTA are well established (i.e. SRK 2019b).

4.3.1 Field Rinse Tests and Paste pH

Field rinse pH profiles of the test pits samples are provided in Figure 4-4 and Appendix D with a statistical summary of rinse pH and paste pH by tailings weathering horizon provided in Table 4-3 (Rinse tests were not completed on the drill hole samples). Due to the limited depth of the test pits, the test pits did not reach tailings with neutral pH (pH >6) characterized by previous investigations (i.e. SRK 2019b and RGC 2006).

Field rinse and paste pH for all test pits indicated strongly acidic pH (pH 1.6 to 2.1; median pH = 1.7) within horizon A, acidic pH (pH 1.7 to 4.7; median = 2.8) that tended to increase with depth within horizon B, and rinse pH ranging from of 2.8 to 5.0 (median = 4.7) reflecting some buffering but depleted levels of carbonate within horizon C. The large increase in rinse and paste pH across horizon B likely explains the abundant secondary mineral precipitates observed within that horizon (Section 4.1). Low pH anomalies within horizon C may be indicative of buried horizon B layers reflecting exposure and then subsequent burial of oxidized tailings during operations.

Paste pH and rinse pH generally showed similar profiles, although paste pH was more acidic for several intervals likely reflecting the acidification of some samples during sample transport due to hydrolysis of iron upon exposure to oxygen.



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Figure 4-4: Comparison of Rinse pH profiles at depth in all test pits

Table 4-2: Statistical Summary of ABA Data by Tailings Weathering Horizon

Tailings Weathering Horizon ¹	Statistic	Field Rinse pH	Field Rinse EC	Paste pH	TIC	Modified Sobek NP	Total S	Sulphate (HCL Leach)	NP/AP
Units		s.u.	µS/cm	s.u.	kg CaCO ₃ /t	kg CaCO ₃ /t	%S	%S	
A	min	1.6	5500	2	1.7	-100	17	0.37	-0.1
	P25	1.7	8600	2.3	1.7	-20	17	0.52	-0.04
	median	1.7	11000	2.3	1.7	-20	23	1.7	-0.02
	P75	1.9	11000	2.5	1.7	-9	26	1.9	-0.01
	max	2.1	20000	3.6	24	-7	27	4.1	-0.01
	count	7	7	9	9	9	9	9	9
B	min	1.7	3600	2.2	1.7	-100	5.4	0.4	-0.2
	P25	2.1	4400	2.5	1.7	-40	18	0.64	-0.05
	median	2.8	8200	2.6	5	-10	24	0.94	-0.03
	P75	3.9	16000	2.9	18	-9	29	1.8	-0.02
	max	4.7	20000	3.1	47	-7	34	4.2	-0.006
	count	11	11	11	11	11	11	11	11
C	min	2.8	4200	2.6	1.7	-20	9.4	0.06	-0.03
	P25	4.2	5700	3.3	37	-10	25	0.36	-0.01
	median	4.6	7200	3.7	49	-4	27	0.56	-0.004
	P75	4.9	10000	4	60	0.1	31	0.85	0.00016
	max	5	14000	4.6	80	5.7	43	1.2	0.016
	count	18	18	20	20	20	20	20	20

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Notes

¹ Tailings Horizons, A = Upper dark grey to pale yellow acidic zone, B = orangish to reddish brown secondary mineral rich horizon, C = dark grey unoxidized tailings with no visibly observable secondary minerals
All values provided in two significant figures

Comparison to Historical Rinse pH Data

Rinse test profiles from the 2020 test pits were compared to the historical data from SRK (2019b) in Figure 4-5 to determine the rate of advancement of the upper acidic front (horizon A) within the tailings profile and the overall level of acidification of the tailings profile. Comparisons were made when test pits were located near historical drill holes for which rinse pH data were available (Figure 3-1), with results discussed by tailings impoundment.

Original Impoundment

In the Original Impoundment, the rinse pH profile from pit SRK20-Tail-TP-G was compared to P03-07 from 2003.

The comparison showed no difference in rinse pH within horizon A, but there has been a shift towards slightly more acidic pH in tailings beneath 2 m depth (horizon C) over time.

Secondary Impoundment

In the Secondary Impoundment, the rinse pH profile from SRK20-Tail-TP-E was compared to P03-06 from 2003.

The comparison showed that pH has decreased in horizon A and B compared to 2003 measurements, with conditions progressing from pHs near 2.5 to pHs as low as 1.5. The depth of tailings with pH <3 has also advanced downward roughly 0.4 m between 2003 and 2020. Rinse test profiles below depths of 1 m showed similar trends.

These results indicate that in the vicinity of SRK20-Tail-TP-E the upper acidic front migrated downward at a rate of approximately 2 cm/year. The average pH of the acidic front acidified at a rate of 0.04 standard pH units per year from 2003 to 2020.

Intermediate Impoundment

In the Intermediate Impoundment, the rinse pH profile from SRK20-Tail-TP-A was compared to P03-08 from 2003.

The comparison showed that the zone with pH <4 migrated downward roughly 0.5 m. Tailings below the upper acidic zone (horizon A and B) showed a decrease in pH of one to three pH units between 2003 and 2020.

These results indicate that in the Intermediate Impoundment in the vicinity of SRK20-Tail-TP-A, the upper acidic front including horizon A and B migrated downward at a rate of approximately 4 cm/year, while the pH of the tailings profile below 1 m depth acidified at a rate of 0.08 to 0.23 pH units per year from 2003 to 2020. The Intermediate Impoundment was in use until 1992. The more rapid progression of acidification in the Intermediate impoundment is therefore attributed to the comparatively short period of exposure (~11 years) prior to the 2003 investigation.

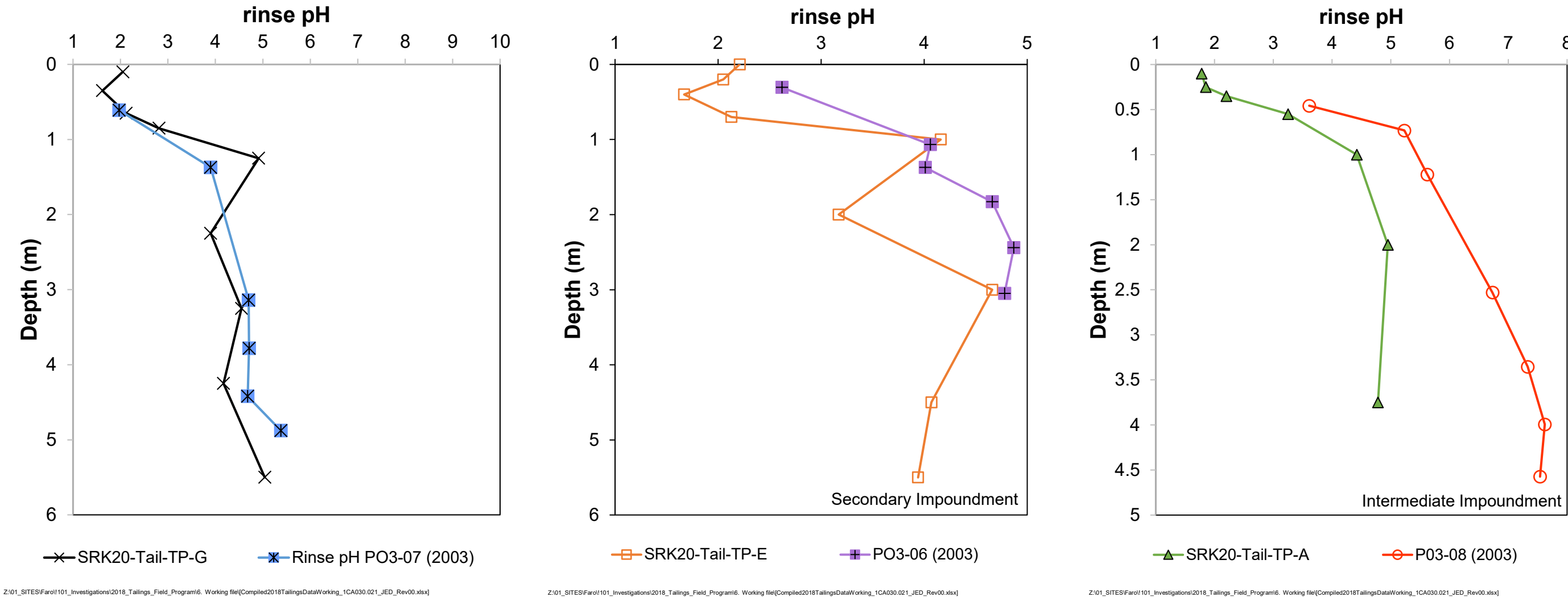


Figure 4-5: Comparison of rinse pH profiles from 2003 and 2020 for the Original, Secondary, and Intermediate Impoundments

4.3.2 Neutralization Potential

Total inorganic carbon (TIC or carbonate) is compared to Modified Sobek NP in Figure 4-6.

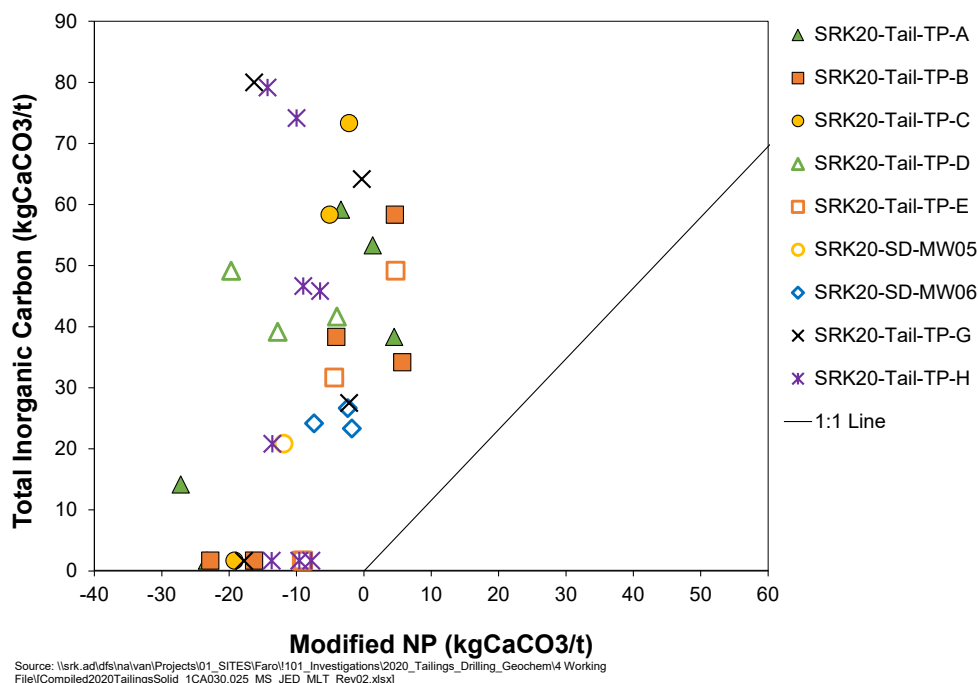


Figure 4-6: TIC vs Modified Sobek NP

TIC was notably higher than Modified Sobek NP in tailings samples. This has similarly been observed in samples collected in 2018 (SRK 2021a) and is explained by the presence of siderite as the dominant carbonate mineral. Fe²⁺ in siderite oxidizes to generate acidity after mineral dissolution, which means that it does not contribute to NP under the oxidizing conditions used to measure Modified Sobek NP. TIC showed medians of 1.7 kg CaCO₃/t, 5.0 kg CaCO₃/t, and 49 kg CaCO₃/t in horizons A, B, and C respectively (Table 4-3), indicating ongoing dissolution and depletion of siderite under the more acidic conditions observed in horizons A and B. It is noteworthy that under the reducing conditions present at depth in the tailings, oxidation of Fe²⁺ is not expected to occur, and the siderite is capable of buffering pH within the tailings mass. Additionally, this data shows that oxidation of iron sulphide minerals is not the only source of iron mobilized within the tailings.

Modified Sobek NP results for all tailings samples ranged from 5.7 to -100 kg CaCO₃/t¹ with median values of -20 kg CaCO₃/t, -10 kg CaCO₃/t, and -3 kg CaCO₃/t in horizons A, B, and C respectively (Table 4-3). Paste pH showed a strong positive correlation ($r = 0.8$) with Modified Sobek NP (Figure 4-7) for all samples with Modified Sobek NP greater than 30 kg CaCO₃/t. Modified Sobek NP was

¹ Negative NP is a valid test result for acidic samples

either positive or near zero for all samples with paste pH greater than 3.5, indicating low levels of NP were buffering tailings that had higher pHs.

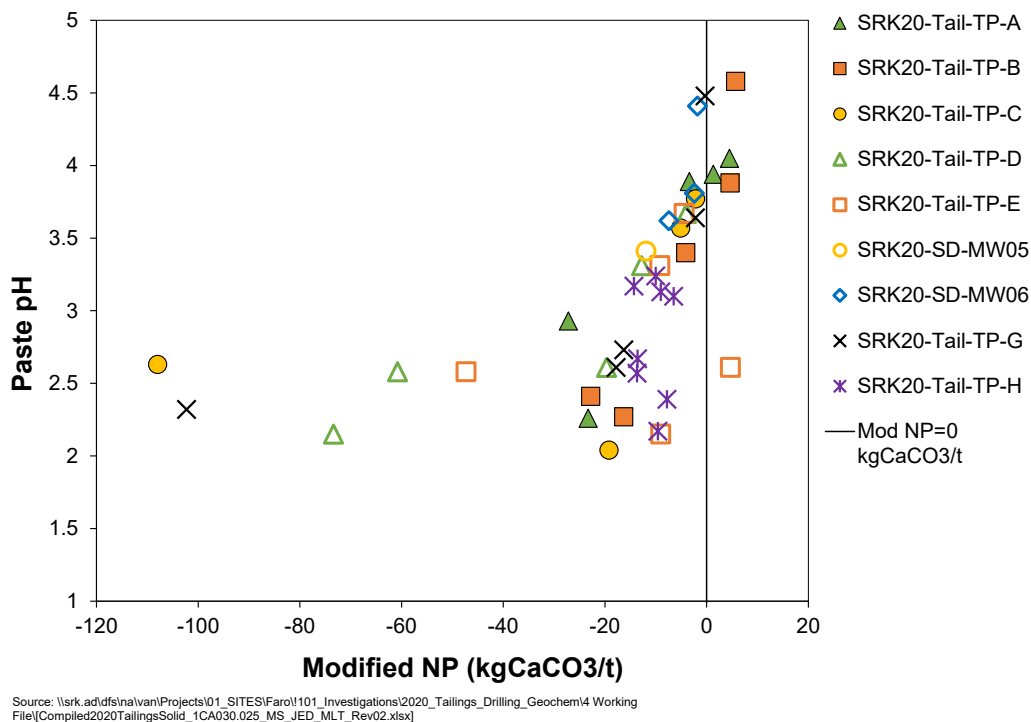


Figure 4-7: Paste pH vs. Modified Sobek neutralization potential

4.3.3 Sulphur Species

Total sulphur content averaged 25% in all samples and showed a slight increasing trend with depth with medians of 23%, 24%, and 27% sulphur in horizons A, B, and C respectively. Sulphate sulphur showed highest concentrations in horizon A (median = 1.7% S) and horizon B (median = 0.94% S), with a lower median in horizon C (0.56 % S) and an overall decreasing trend with depth (Figure 4-8). Where individual test pits included a sample within horizon A, sulphate sulphur concentrations tended to be somewhat lower than results for the next sample in horizon B, reflecting slightly depleted levels of sulphate sulphur in horizon A relative to horizon B.

These results likely reflect increased rates of sulphide oxidation and subsequent precipitation of sulphate minerals such as gypsum, melanterite, and jarosite within the upper oxygenated portion of the tailings profile and more specifically within horizon B. Secondary minerals were identified in the highest concentrations within the top 2 m of the drillholes sampled in 2018 (SRK 2021a) and within horizon B in the current study as described in the test pit logs (Section 4.1 and Appendix D).

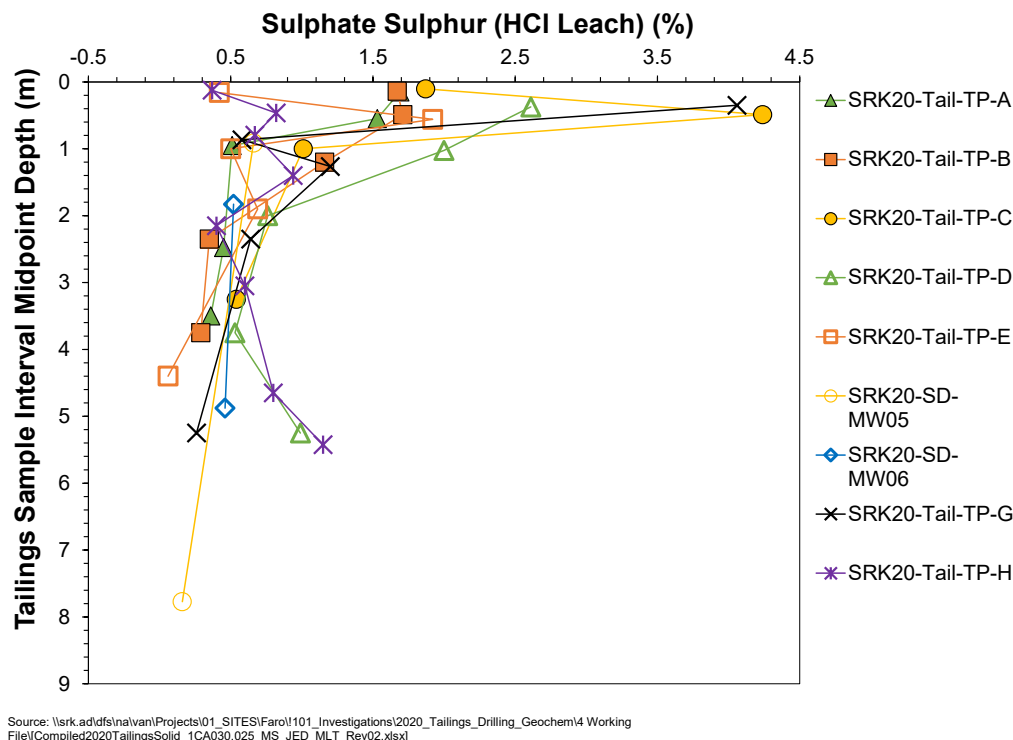


Figure 4-8: Distribution of HCl extractable sulphate sulphur with depth

4.4 Solid Phase Elemental Content

The full set of solid phase elemental data is provided in Appendix F, with a summary of elemental content by tailings weathering horizon provided in Table 4-4.

Comparing levels of major and trace elements within the 2020 dataset to the larger database of tailings from SRK (2019a), the tailings sampled in 2020 showed lower levels of bismuth, magnesium, and tungsten and did not show any significant enrichments relative to maximum values from the existing database.

Iron (5.2 to 40%) and sulphur (5.4 to 43%) were measured in the highest abundances within the tailings samples, cumulatively making up 11 to 83% of each sample by mass. Based on the subset of samples analyzed by whole rock digestion, silica ranged from 10 to 23% and was the third most abundant element within the tailings by mass reflecting the presence of quartz as the dominant silicate mineral. Whole-rock aluminum, calcium, magnesium, and potassium were not significant constituents of the tailings with whole rock solids concentrations below one percent. For the major elements, calcium, sodium, and potassium showed no differences in concentration with weathering horizon, while magnesium and iron showed higher medians in horizons B and C compared to horizon A suggesting these elements are being mobilized and depleted from horizon A under strongly acidic conditions.

Zinc (0.0089 to 2.3%), lead (0.26 to 1.3%), copper (87 to 4200 ppm), manganese (5 to 4,000 ppm), and arsenic (79 to 2,300 ppm) were the dominant trace elements within the tailings. Silver, bismuth,

cadmium, mercury, antimony, and selenium consistently occurred in concentrations exceeding 10x the average continental crustal abundance from Ronov and Yaroshevsky (1972) as referenced in Price (1997). Results for trace elements are discussed as follows:

- Zinc was notably depleted with horizon A (median = 0.053%; Figure 4-9) and to a lesser extent in horizon B (0.52%) compared to horizon C (median = 1.2%). This trend suggests there has been significant leaching of zinc out of the upper acidic horizon of the tailings. Below 1 m depth, zinc concentrations did not show any consistent trends (Figure 4-9).
- Lead showed slightly higher concentrations in horizon A relative to horizons B and C (Figure 4-10) with medians of 0.80%, 0.50% and 0.52% respectively. This trend suggests lead is remaining immobile within the strongly acidic conditions of horizon A.
- Copper generally showed lower levels in horizons A and B (Figure 4-11) relative to horizon C with medians of 760 ppm, 740 ppm, and 1100 ppm respectively. The difference in copper levels in horizon A relative to horizon C varied widely between test pits. The copper content of horizon A tailings was only one tenth of the levels found in horizon C within SRK20-Tail-TP-H, with other test pits including SRK20-Tail-TP-A showing similar levels of copper content between horizon A and C. SRK20-Tail-TP-G also showed higher copper content in horizon A relative to horizon C. These results suggest an overall decreasing trend in copper content that can be attributed to weathering and depletion within the upper acidic horizons of the tailings but that copper likely showed large local variations in solids content prior to the onset of weathering.
- Manganese showed a similar trend to zinc and was notably depleted within horizon A (median = 9.0 ppm; Figure 4-12) and to a lesser extent in horizon B (median = 240 ppm) compared to horizon C (median = 1,400 ppm). This trend suggests the majority of the manganese is being leached and mobilized from the upper acidic horizon of the tailings. Beneath horizon B, most test pits showed consistent trends in solids manganese content although some test pits including SRK20-Tail-TP B and C showed increased manganese concentrations in the upper portion of horizon C, potentially indicating attenuation of manganese at these depths. The large differences in manganese may be due to the association of manganese with iron carbonate minerals which are also depleted in horizon A.
- Arsenic showed a unique trend in solids content with consistently lower range (i.e. <350 ppm) concentrations in horizon A (Figure 4-13) and maximum concentrations consistently occurring within horizon B (median = 540 ppm) and the upper portion of horizon C (median = 580 ppm). This trend likely reflects leaching and mobilization of arsenic from horizon A with attenuation of arsenic at higher pH due to co-precipitation with iron in iron oxides and oxy-hydroxides resulting in increased solids arsenic content at these depths.
- Cadmium showed a similar trend to zinc, with depleted levels in horizon A (median = 0.29 ppm) relative to horizons B and C which had medians of 5.8 ppm and 13 ppm respectively. However, some test pits showed anomalously high concentrations of cadmium within horizon B and the uppermost portion of horizon C suggesting likely attenuation at higher pH.

For the remaining trace elements, silver, bismuth, mercury, antimony, and selenium showed no trends with weathering horizon and solid phase concentrations of these elements did not appear to be affected by the ongoing progression of sulphide oxidation.

Table 4-3: Statistical Summary of Solid Phase Elemental Content by Tailings Weathering Horizon Compared to the RCTA Tailings Database from SRK (2019a)

Tailings Weathering Horizon ¹	Statistic	Ag	As	Bi	Ca	Cd	Co	Cr	Cu	Fe	Hg	Mg	Mn	Mo	Na	Ni	Pb	Sb	Se	U	V	W	Zn
	Units	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	%	ppm	ppm	%	ppm	%	ppm	ppm	ppm	ppm	ppm	%
A	min	9.1	270	0.48	0.01	0.05	54	28	140	16	0.04	0.01	5	3.4	0.01	6.9	0.53	14	0.8	0.2	4	1.2	0.0089
	median	17	330	0.97	0.26	0.29	89	61	760	20	0.07	0.03	9	6.3	0.01	8.4	0.80	31	1.1	0.36	8	2.1	0.053
	max	24	1,400	1.7	1.1	30	120	90	1,900	29	0.11	0.1	320	7.3	0.01	30	1.3	39	1.5	3.3	41	3.4	0.78
	count	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
B	min	5.5	79	0.21	0.02	0.05	17	31	88	5.2	0.02	0.01	12	3.3	0.01	4.9	0.27	23	0.7	0.36	7	1.2	0.015
	median	13	540	0.9	0.24	5.8	110	49	740	25	0.05	0.06	240	4.8	0.01	18	0.5	32	1.1	1.3	15	1.8	0.52
	max	22	2,300	1.6	0.88	30	170	110	4,200	35	0.13	0.23	1,000	7.2	0.01	37	0.91	53	1.6	4.1	72	3.1	1.4
	count	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
C	min	4.4	240	0.11	0.06	6.2	34	26	390	12	0.01	0.03	26	2.6	0.01	9.2	0.26	11	0.7	0.81	9	0.53	0.42
	median	12	580	0.8	0.34	13	120	45	1,100	28	0.045	0.22	1,400	4.6	0.01	25	0.52	32	0.95	2.2	16	1.9	1.2
	max	15	1,100	1.3	0.76	40	190	71	2,300	40	0.1	0.34	4,000	8.3	0.01	59	0.99	57	1.8	6.1	43	3.8	2.1
	count	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Tailings Database from SRK (2019a)	min	1	80	0.24	0.000023	0.19	24	2	29	2.4	0.01	0.0004	19	2	0.01	1.0	0.0006	5	0.3	0.32	5	1.0	0.018
	median	12	500	20	0.19	3	100	21	950	15	0.03	0.17	750	2	0.01	19	0.12	31	1.4	1.2	36	200	1.0
	max	33	2,400	35	1.5	47	230	150	2,500	43	0.2	1.7	5,300	9.8	0.04	77	1.4	80	2.8	4	72	580	2.3
	count	110	150	110	150	170	110	110	170	170	110	170	170	110	110	70	180	110	77	24	110	93	180
10x Average Crustal Abundance		0.75	18	0.085	42	1.5	250	1000	600	56	21	23	9500	12	24	840	0.014	2	0.5	27	1200	13	0.07

Source: Z:\01_SITES\Farol\101_Investigations\2020_Tailings_Drilling_Geochem\4 Working File\[Compiled2020TailingsSolid_1CA030.025_MS_JED_MLT_Rev02.xlsx]

Notes:

¹ Tailings Horizons, A = Upper dark grey to pale yellow acidic zone, B = orangish to reddish brown secondary mineral rich horizon, C = dark grey unoxidized tailings with no visibly observable secondary minerals
All values provided in two significant figures
Values in bold exceed 10x the average crustal abundance

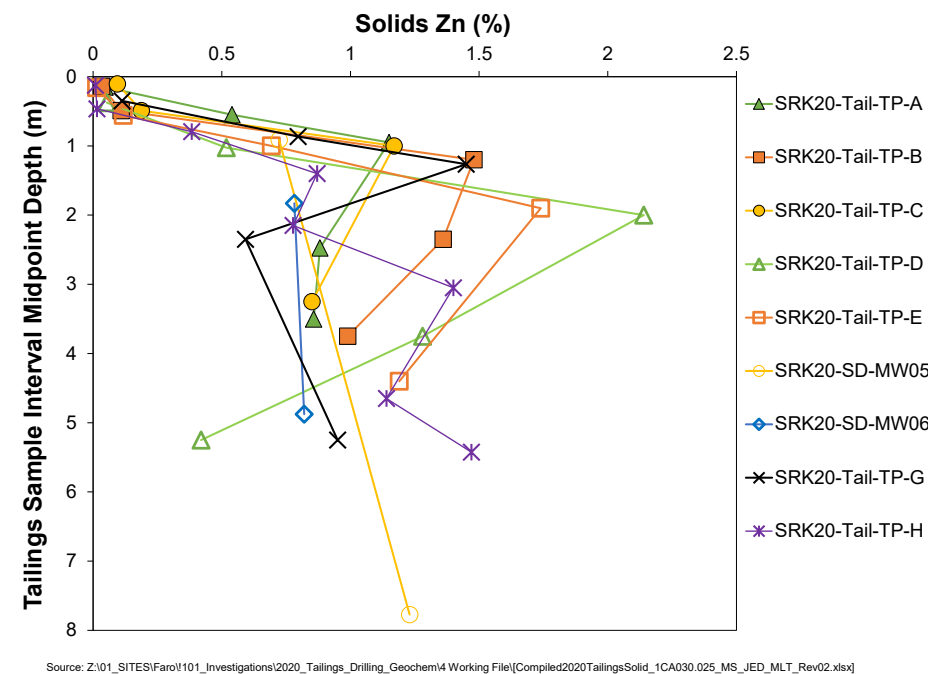


Figure 4-9: Solids zinc content depth profile

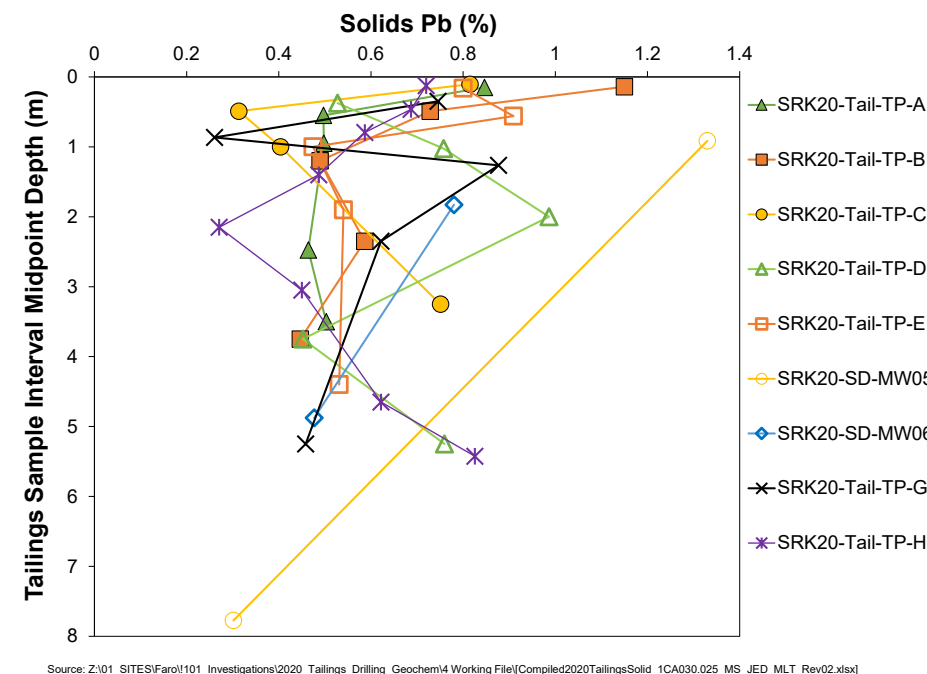


Figure 4-10: Solids lead content depth profile

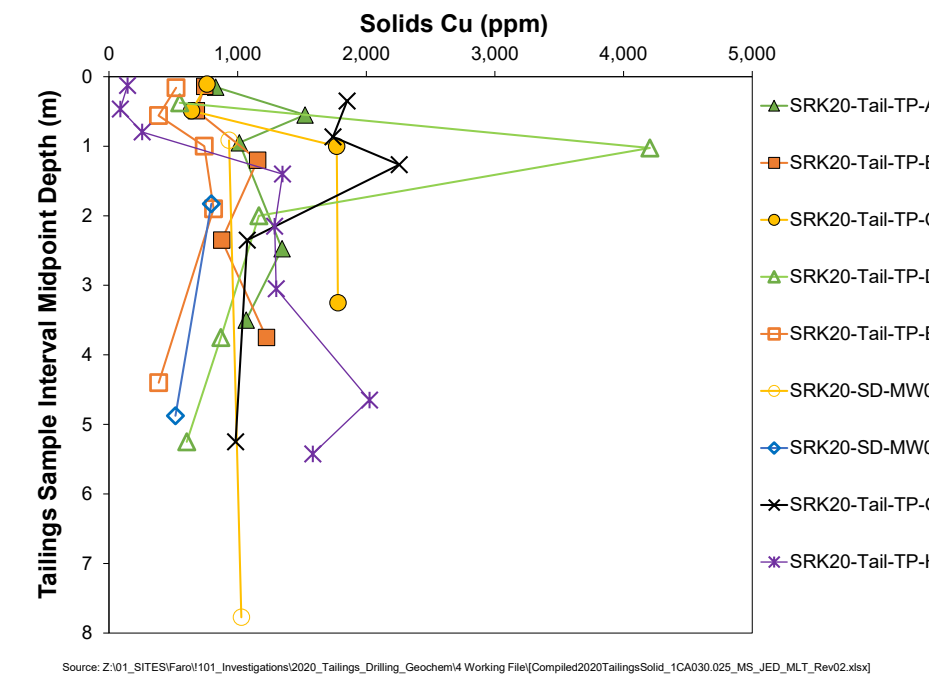


Figure 4-11: Solids copper content depth profile

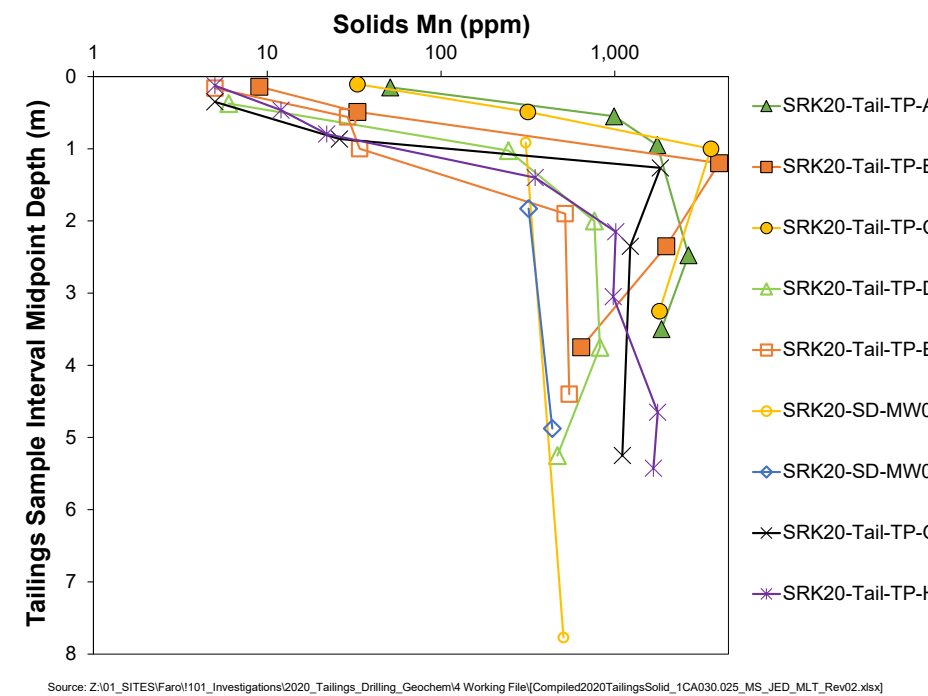


Figure 4-12: Solids manganese content depth profile

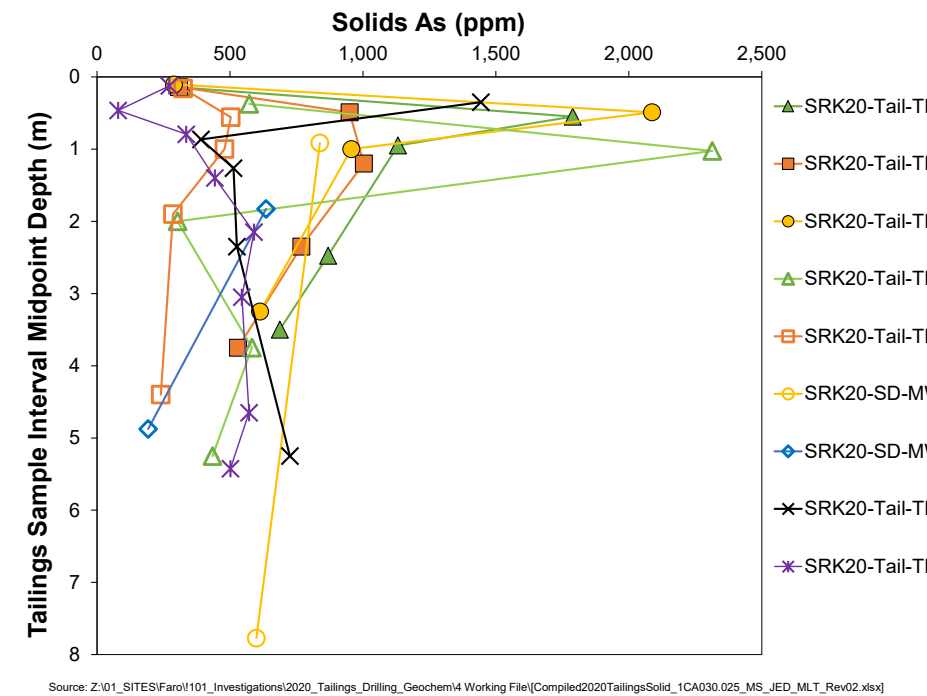


Figure 4-13: Solids arsenic content profile

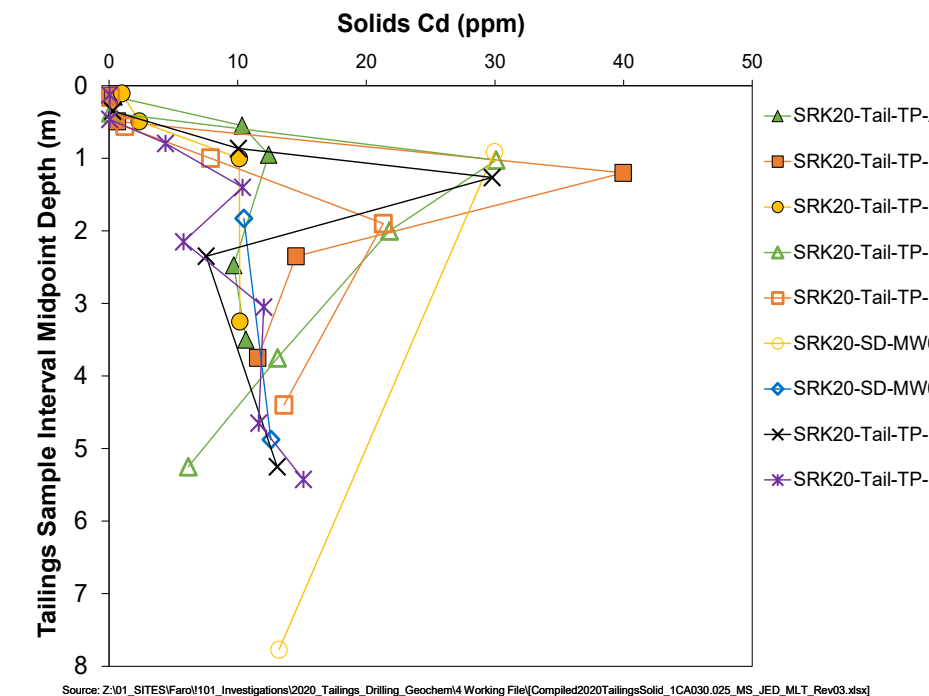


Figure 4-14: Solids cadmium content profile

4.4.1 Variation in Solid Phase Chemistry with Grain Size

Potential relationship between grain size on solids chemistry including total sulphur, sulphate sulphur, TIC, and Modified Sobek NP were first examined using a Pearson correlation matrix. Parameters which showed at least a moderate correlation ($r > 0.5$ or $r < -0.5$) were evaluated further. Sulphate sulphur and Modified Sobek NP were the only parameters in the solids which showed a moderate correlation with grain size, indicating that grain size was not a direct controlling factor on the major and trace element content of each sample. Sulphate sulphur showed a statistically significant positive correlation ($r = 0.53$) with volume percent silt using a 95% confidence interval, indicating that finer samples tended to have higher sulphate content (Figure 4-15). Modified Sobek NP showed a statistically significant negative correlation ($r = -0.54$) using a 95% confidence interval. Negative Modified Sobek NP is an indication of stored acidity within the samples. Therefore, this relationship suggests that finer samples tended to have more stored acidity (Figure 4-16).

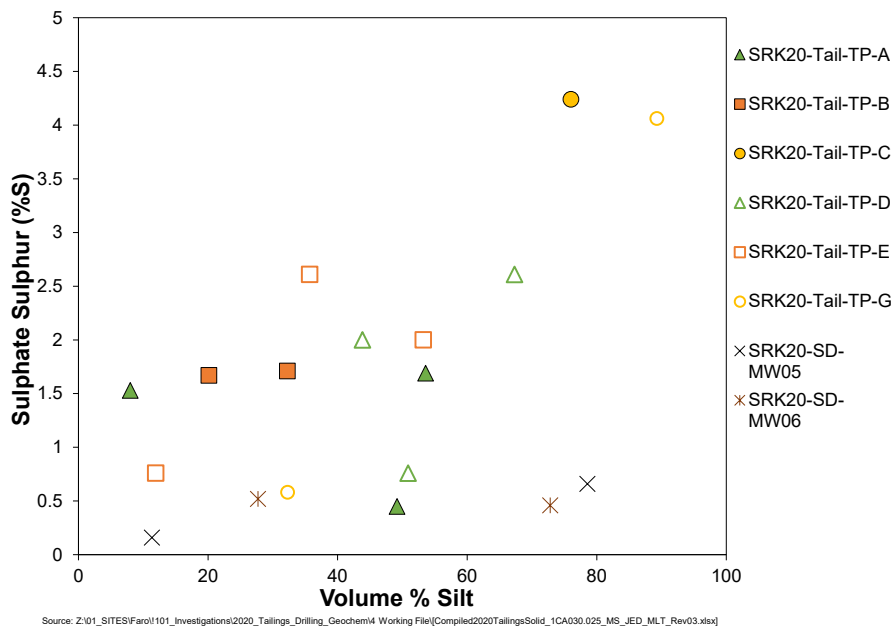


Figure 4-15: Sulphate sulphur vs Volume % Silt

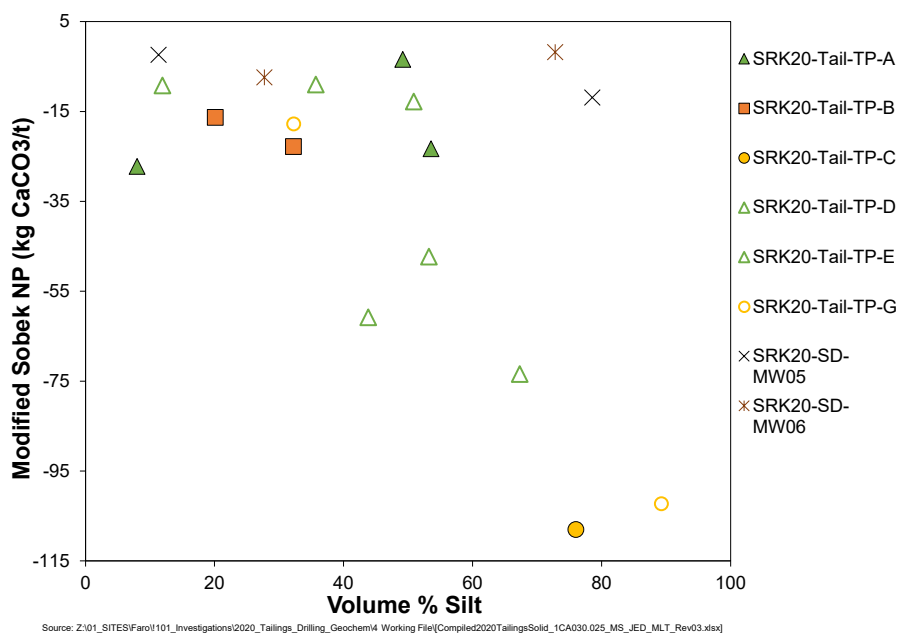


Figure 4-16: Modified Sobek NP vs volume % silt

4.5 Porewater Chemistry

Complete results of the porewater field and laboratory analyses are provided in Appendix G, with a summary of results provided in Table 4-5 and Table 4-6. Detection limits for some parameters are high due to the dilution required to analyze such concentrated samples.

4.5.1 Field and Laboratory Results

Comparison Between Simulated and Porewater Samples

The porewater chemistry data were first examined to determine whether the samples in which porewater was simulated by adding de-ionized water at low water to solid ratios (0.07 to 0.27 kg DI water per kilogram of tailings; Section 3.3.2) had chemistry similar to porewater samples. This comparison was completed for test pits which had adjacent samples which could be directly compared including samples SRK20-Tail-TP-A03 and A04, B04 and B05, G02 and G03, and G04 and G06 (Table 4-5 and Table 4-6).

Simulated porewater samples showed similar pHs to adjacent samples (Table 4-5) indicating the simulated pH conditions were reflective of actual porewaters. Comparing levels of electrical conductivity (EC) and sulphate, all twenty-six simulated porewater samples had lower levels of both EC and sulphate compared to adjacent samples (Table 4-5) indicating the simulated porewater samples are more dilute than actual porewaters despite maintaining low water to solid ratios. Considering the larger dataset of major and trace elements (Table 4-5 and Table 4-6), most simulated porewater samples had concentrations that were either similar to or within one order of magnitude of results from adjacent samples.

Although the simulated porewater samples appear to provide slightly more dilute concentrations, these samples provide key data on the porewater chemistry profile within the upper unsaturated portion of tailings within the RCTA where tailings are typically too dry for conventional porewater extraction. Understanding the chemistry within the upper oxidized horizons of the tailings is key to providing future predictions of tailings porewater chemistry as water in contact with these tailings moves through the tailings profile. Further discussion on the effect of dilution on the results is provided in Section 4.5.3.

Physical Parameters

Similar to comparisons between field rinse pH and paste pH, most samples showed slightly lower pH at the analytical lab compared to pH measured immediately following extraction (Figure 4-17). This difference is likely due to acidity generated through hydrolysis of iron during sample transportation.

Field pH ranged from 0.8 to 5.8. Consistent with findings from the rinse tests, the most acidic porewater pHs (pH <2) were measured in the upper dark grey to pale olive acidic horizon of the tailings profile (horizon A; Table 4-5). Within horizon B, field pH was slightly higher and ranged from 1.4 to 4.2. Within horizon C field pH ranged from 4.1 to 5.5.

Lab measured ORP consistently showed higher values compared to field ORP (Appendix G), suggesting there had been some oxidation of the samples during transport to the laboratory. Lab ORP did not show significantly higher values for samples suspected of oxidation during transport to USask, indicating that oxidative effects did not significantly change the redox state of the samples extracted at USask.

Field Eh was measured at 0.83 V in horizon A, 0.35 to 0.83 V in horizon B, and 0.17 to 0.62 V in horizon C indicating a transition from oxidizing to slightly reducing conditions with depth.

Field Eh showed an inverse correlation ($r = 0.91$) with field pH (Figure 4-18) significant at a 99% confidence interval, based on the expected relationship between pH and Eh.

Electrical conductivity was consistently high with medians of 44,00 $\mu\text{S}/\text{cm}$ in horizon A, 27,000 $\mu\text{S}/\text{cm}$ in horizon B, and 30,000 $\mu\text{S}/\text{cm}$ in horizon C.

Major Cations, Anions, and Nutrients

Iron was the dominant cation in all samples and accounted for >65% of the total positive charge in all samples with median concentrations of 21,000 mg/L in horizon A, 21,000 in horizon B, and 25,000 in horizon C. Calcium, magnesium and zinc made up the remainder of the major cations. Calcium showed consistent concentrations with depth (medians of 450 to 550 mg/L in all three horizons), while magnesium showed a consistent increasing trend with depth with medians of 76 mg/L, 180 mg/L, and 610 mg/L in horizons A, B, and C respectively. Zinc showed notably low concentrations (i.e. <200 mg/L) in strongly acidic samples collected from the shallowest depths and showed a consistent increasing trend with depth with medians of 220 mg/L, 890 mg/L, and 1600 mg/L in horizons A, B, and C respectively. This trend suggests zinc has been leached out of horizon A and remains mobile with depth.

Iron showed relatively consistent concentrations with depth, reflecting the stability of iron within the aqueous phase as either the FeSO_4 or $(\text{FeSO}_4)_2^-$ aqueous species (Figure 4-19) across the range of pH and Eh conditions observed. The stability of jarosite and iron hydroxides under higher pH and Eh conditions explains the presence of abundant iron secondary minerals within horizon B, where oxidized porewaters with $\text{Eh} > 0.5$ are buffered to $\text{pH} > 3$ resulting in precipitation of iron. At greater depths, iron remains soluble due to a decrease in Eh conditions below 0.5.

Sulphate was the dominant anion in all samples and showed relatively consistent concentrations with depth with medians of 49,000, 43,000 and 50,000 mg/L in horizons A, B, and C. Sulphate did not show any trends with pH (Figure 4-20) or Eh (Table 4-5) suggesting sulphate remained soluble within the iron sulphate aqueous species with depth due to low pH and comparatively low concentrations of calcium which limit the amount of sulphate that can precipitate as gypsum. Alkalinity was not detected while concentrations of chloride, bromide, and fluoride did not exceed 50 mg/L.

Ammonia was the dominant nitrogen form present within the tailings porewaters with concentrations ranging from 0.0013 to 31 mg/L as N. Nitrate and nitrite were not detected. Total carbon was consistently detected within tailings porewater in the range of 21 to 170 mg/L and did not show consistent trends with depth. Data for organic and inorganic carbon showed that organic carbon was the dominant carbon specie.

Trace Elements

Zinc, manganese, arsenic, and copper were measured in the highest concentrations while lead, cadmium, chromium, cobalt, nickel, uranium, and vanadium were consistently present. Concentrations of mercury, molybdenum, antimony, selenium, silver, and tungsten were near analytical detection limits

for most samples and are considered low. Concentrations and trends for each trace element are as follows:

- Manganese showed an increasing trend with depth with medians of 35 mg/L, 52 mg/L, and 610 mg/L for horizons A, B, and C respectively. This trend, combined with notably low manganese concentrations at lower pHs (Figure 4-21) suggests manganese has been mostly leached out of horizon A and is remaining mobile with depth.
- Arsenic showed highest concentrations in horizon A (2.6 to 600 mg/L; median 51 mg/L), with lower concentrations in horizons B and C with medians of 7.7 and 0.05 mg/L respectively. This trend suggests arsenic is most mobile within the strongly acidic (pH <2) conditions present with horizon A but that arsenic is not remaining mobile with depth.
- Copper showed highest concentrations in horizon B (0.04 to 2600 mg/L; median 47 mg/L), with median concentrations of 32 mg/L in horizon A and <0.1 mg/L in horizon C. All samples in horizon C, except the anomalous massive sulphide zone near surface sample SRK-20-Tail-TP-GO2 had near detection limit concentrations. The relationship between copper and pH (Figure 4-22) indicates that copper has limited solubility above pH 3, as almost all samples with pH in this range had below detection limit concentrations.
- Lead showed relatively low concentrations and did not show any consistent trends with depth with median concentrations of 4.1 mg/L, 2.4 mg/L, and 4.3 mg/L in horizons A, B, and C respectively. The range of lead concentrations suggests lead remains relatively immobile despite high solids concentrations within the tailings (Section 4.4).
- The elements cadmium, chromium, cobalt, nickel, and vanadium showed similar trends to arsenic with highest concentrations under the strongly acidic conditions in horizons A and B with lower or near detection limit concentrations in horizon C.
- Uranium did not show consistent trends with depth, Eh, or pH and ranged from 0.0011 to 3.3 mg/L with a median of 0.04 mg/L.

Table 4-4: Summary of Tailings Porewater Physical Parameters, Nutrients, and Major Ion Chemistry

Impoundment	Sample ID	Depth from	Depth to	Tailings Horizon ¹	Simulated PW?	Liquid to Solid Ratio	Field pH	Field Eh	Oxidation During Transport?	Lab pH	Lab EC	Acidity as CaCO3	SO4	Ammonia as N	NO3 as N	NO2 as N	Al	Ca	Fe	K	Mg	Na
	Detection Limit									0.10	2.0	2.0	0.30	0.005	0.005	0.001	0.001	0.05	0.01	0.05	0.005	0.05
	Unit	m	m				s.u.			pH units	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Original	SRK20-Tail-TP-G01	0	0.7	A			-	-		1.1	59,000	150,000	160,000	31	<20	<4	790	360	66,000	140	76	86
	SRK20-Tail-TP-G02	0.7	1.03	C	Yes	0.08	-	-	Yes	2.6	28,000	49,000	51,000	0	<5	<1	1000	480	15,000	<50	87	<25
	SRK20-Tail-TP-G03	1.03	1.5	C			-	-	Yes	3.5	44,000	130,000	130,000	3.4	<0.5	<0.1	35	470	57,000	<50	610	<50
	SRK20-Tail-TP-G04	2	2.7	C	Yes	0.10	4.5	0.34		3.8	22,000	34,000	34,000	0	<0.5	<0.1	1.1	400	18,000	<25	710	<25
	SRK20-Tail-TP-G06	5	5.5	C			-	-		3.2	26,000	36,000	40,000	12	<0.5	<0.1	0.58	450	19,000	65	350	71
	SRK20-Tail-TP-H01	0	0.25	A	Yes	0.13	-	-		1.6	15,000	7,600	8,300	-	<0.5	<0.1	8.6	4.3	2,100	2.6	0.93	2.1
	SRK20-Tail-TP-H02	0.28	0.65	B	Yes	0.13	-	-		1.5	22,000	20,000	20,000	-	<0.5	<0.1	63	280	4,800	5.2	3.5	11
	SRK20-Tail-TP-H03	0.65	0.94	B	Yes	0.13	1.4	0.63		1.4	27,000	14,000	15,000	0.18	<0.5	<0.1	62	460	4,100	14	3.9	15
	SRK20-Tail-TP-H04	1.1	1.7	B	Yes	0.13	4.3	0.38		3.1	34,000	52,000	55,000	0.59	<0.5	<0.1	180	530	29,000	<25	320	27
	SRK20-Tail-TP-H05	1.9	2.4	B	Yes	0.13	-	-		3.2	26,000	36,000	39,000	0.51	<0.5	<0.1	0.84	270	9,100	<10	92	11
	SRK20-Tail-TP-H06	2.7	3.4	B	Yes	0.13	4.5	0.35		3.2	27,000	38,000	43,000	1.9	<0.5	<0.1	16	480	21,000	49	180	38
	SRK20-Tail-TP-H08	4.3	5	C			4.1	0.38		3.2	43,000	85,000	87,000	3.1	<5	<1	1.3	280	26,000	<25	280	76
	SRK20-Tail-TP-H09	5	5.85	C			4.2	0.35		3.2	47,000	100,000	110,000	0.41	<10	<2	0.91	530	57,000	76	740	97
Secondary	SRK20-Tail-TP-D01	0	0.75	A	Yes	0.10	1.4	0.84	Yes	1.3	51,000	150,000	110,000	0.53	<0.5	<0.1	180	570	72,000	<50	82	<25
	SRK20-Tail-TP-D02	0.85	1.2	B	Yes	0.09	-	-	Yes	2.5	46,000	150,000	100,000	<0.5	<0.5	<0.1	4,400	530	57,000	<50	270	<25
	SRK20-Tail-TP-D03	1.8	2.2	C	Yes	0.11	4.3	0.62	Yes	3.3	25,000	140,000	39,000	5	<0.5	<0.1	<2	540	16,000	<100	440	<100
	SRK20-Tail-TP-D04	3.5	4	C	Yes	0.10	4.4	0.35		3.3	21,000	29,000	30,000	3	<0.5	<0.1	1.2	510	27,000	15	270	24
	SRK20-Tail-TP-D05	5	5.5	C			4.7	0.35		3.1	45,000	88,000	93,000	1.6	<0.5	<0.1	3	500	54,000	63	430	38
	SRK20-Tail-TP-E01	0	0.32	A	Yes	0.10	-	-	Yes	1.2	35,000	22,000	20,000	-	<5	<1	55	22	6,700	5.2	5.8	9.6
	SRK20-Tail-TP-E02	0.32	0.8	B	Yes	0.07	1.7	0.83	Yes	1.6	44,000	130,000	90,000	0.77	<0.5	<0.1	250	380	40,000	<50	<50	<25
	SRK20-Tail-TP-E03	0.8	1.2	B	Yes	0.13	-	-	Yes	2.5	15,000	43,000	15,000	-	<0.5	<0.1	240	430	6,900	<10	21	<10
	SRK20-Tail-TP-E04	1.3	2.5	C	Yes	0.07		-		3.3	27,000	53,000	50,000	-	<0.5	<0.1	5.6	460	22,000	<25	250	<25
	SRK20-Tail-TP-E06	4	4.8	C	Yes	0.27	4.5	0.37		3.7	9,800	9,100	11,000	0.41	<0.5	<0.1	0.49	380	5,700	<10	130	<10
	SD-GC-01 023839	0	1.83	A			-	-		2.4	-	39,000	38,000	1.2	<0.5	<0.1	610	460	19,000	71	320	29
	SD-GC-03 023841	6.86	8.69	C			-	-		-	-	-	-	-	-	-	0.24	230	9,100	21	200	14
	SD-GC-04 023849	0.61	3.05	A			-	-		4	-	45,000	49,000	-	<0.5	<0.1	1,000	560	22,000	190	570	84
Intermediate	SD-GC-05 023850	3.66	6.10	B+C			-	-		3.1	35,000	54,000	42,000	6.6	-	-	5.4	520	29,000	150	530	66
	SRK20-Tail-TP-A01	0	0.3	A	Yes	0.09	0.9	-	Yes	1.1	44,000	66,000	61,000	4.5	<5	<1	150	640	23,000	<5	89	7.4
	SRK20-Tail-TP-A02	0.4	0.7	B	Yes	0.11	3.4	0.70	Yes	3.1	24,000	35,000	40,000	0.016	<5	<1	720	510	14,000	<50	620	<25
	SRK20-Tail-TP-A03	0.7	1.2	C	Yes	0.13	-	-		3.3	23,000	30,000	34,000	0.46	<0.5	<0.1	7.5	450	13,000	<25	610	<25
	SRK20-Tail-TP-A04	2.2	2.75	C			4.5	-	Yes	3.3	38,000	65,000	76,000	3.9	<5	<1	1.6	540	36,000	<25	1,400	<25
	SRK20-Tail-TP-A05	3.25	3.75	C			5.0	0.25		3.2	32,000	46,000	53,000	5	<0.5	<0.1	1.7	420	25,000	21	930	<10
	SRK20-Tail-TP-B01	0	0.28	A	Yes	0.11	0.8	-	Yes	1.1	46,000	53,000	49,000	4.1	<5	<1	120	610	15,000	<5	47	16
	SRK20-Tail-TP-B02	0.28	0.7	B	Yes	0.09	-	-	Yes	1.5	35,000	84,000	81,000	-	<5	<1	610	590	34,000	<10	290	10
	SRK20-Tail-TP-B03	0.7	1.7	C	Yes	0.08	4.5	0.32		3.8	31,000	55,000	36,000	0.14	<0.5	<0.1	25	510	27,000	<25	750	<25
	SRK20-Tail-TP-B04	2	2.7	C	Yes	0.13	4.8	0.31		3.3	18,000	22,000	25,000	0.027	<0.5	<0.1	0.56	440	13,000	<10	380	<10
	SRK20-Tail-TP-B05	3.5	4	C			4.9	0.27		3.2	30,000	41,000	48,000	7	<0.5	<0.1	1.3	440	21,000	23	760	31
	SRK20-Tail-TP-C01	0.05	0.16	A	Yes	0.13	-	-		1.2	36,000	55,000	52,000	6.9	<0.5	<0.1	140	540	21,000	<5	61	14
	SRK20-Tail-TP-C02	0.28	0.7	B	Yes	0.09	2.4	0.79	Yes	2.3	35,000	23,000	140,000	<0.013	<0.5	<0.1	480	230	36,000	<10	200	<10
	SRK20-Tail-TP-C03	0.7	1.3	C			-	-		3.4	48,000	96,000	113,000	1.4	<0.5	<0.1	65	500	57,000	<50	1,600	<50
	SRK20-Tail-TP-C04	1.7	2.3	C			5.2	0.20		3.2	43,000	76,000	85,000	4.5	<0.5	<0.1	2.4	470	45,000	<25	1,200	<25
	SRK20-Tail-TP-C05	3	3.5	C			5.5	0.17		3.2	38,000	60,000	71,000	5.5	<0.5	<0.1	1.8	480	36,000	20	1,000	13

Source: Z:\01_SITES\Faro\101_Investigations\2020_Tailings_Drilling_Geochem\4 Working File\{PorewaterCompiled_1CA030.025_MS_JED_Rev00.xlsx}

Notes

¹ Tailings Horizons, A = Upper dark grey to pale yellow acidic zone, B = orangish to reddish brown secondary mineral rich horizon, C = dark grey unoxidized tailings with no visibly observable secondary minerals
All values provided in two significant figures

Table 4-5: Summary of Tailings Porewater Trace Element Chemistry

Impoundment	Sample ID	Depth from	Depth to	Tailings Horizon ¹	Simulated PW?	Field pH	Field Eh	Oxidation During Transport?	Lab pH	As	Cd	Cr	Co	Cu	Hg	Pb	Mn	Mo	Ni	Sb	Se	U	V	Zn
Original	Detection Limit								0.10	0.0001	0.000005	0.0001	0.0001	0.0002	0.000005	0.00005	0.0001	0.00005	0.0005	0.0001	0.00005	0.00001	0.0005	0.001
	Unit	m	m			s.u.			s.u.	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	SRK20-Tail-TP-G01	0	0.7	A		-	-		1.1	600	0.13	5.3	18	1000	<0.0001	4.5	13	0.32	3.4	1.8	0.043	0.22	4.6	420
	SRK20-Tail-TP-G02	0.7	1.03	C	Yes	-	-	Yes	2.6	0.32	4.6	4.8	11	1600	<0.000025	3	42	<0.025	3	<0.05	<0.025	0.53	6.7	3,400
	SRK20-Tail-TP-G03	1.03	1.5	C		-	-	Yes	3.5	<0.1	0.035	<0.1	0.79	<0.2	<0.00025	6.7	420	<0.05	4.6	<0.1	<0.05	2.3	<0.5	5,900
	SRK20-Tail-TP-G04	2	2.7	C	Yes	4.5	0.34		3.8	<0.05	<0.0025	<0.05	<0.05	<0.1	<0.0005	4.7	390	<0.025	0.36	<0.05	<0.025	0.026	<0.25	1,600
	SRK20-Tail-TP-G06	5	5.5	C		-	-		3.2	0.021	<0.0005	<0.01	<0.01	<0.02	<0.0005	1.5	170	<0.005	<0.05	0.018	<0.005	0.0027	<0.05	10
	SRK20-Tail-TP-H01	0	0.25	A	Yes	-	-		1.6	2.6	0.00081	0.14	0.64	1.9	0.00004	2.6	2.1	0.007	0.1	0.14	0.0072	0.0019	0.02	1
	SRK20-Tail-TP-H02	0.28	0.65	B	Yes	-	-		1.5	7.7	0.0037	0.29	1.9	4.7	0.00041	1.1	4.2	0.052	0.36	0.21	0.016	0.011	0.19	4
	SRK20-Tail-TP-H03	0.65	0.94	B	Yes	1.4	0.63		1.4	6.4	0.35	0.28	2	25	0.000019	2.4	4.8	0.059	0.7	0.069	0.0064	0.12	0.12	270
	SRK20-Tail-TP-H04	1.1	1.7	B	Yes	4.3	0.38		3.1	0.05	0.1	<0.05	8.2	<0.1	<0.0005	6.5	95	<0.025	8.7	<0.05	<0.025	0.87	<0.25	2,600
	SRK20-Tail-TP-H05	1.9	2.4	B	Yes	-	-		3.2	0.028	<0.001	<0.02	<0.02	<0.04	<0.000005	3.1	47	<0.01	0.26	<0.02	<0.01	0.024	<0.1	890
	SRK20-Tail-TP-H06	2.7	3.4	B	Yes	4.5	0.35		3.2	0.095	0.0081	<0.05	0.96	<0.1	<0.0005	5.5	78	<0.025	2.5	<0.05	<0.025	0.033	<0.25	1,500
	SRK20-Tail-TP-H08	4.3	5	C		4.1	0.38		3.2	<0.05	<0.0025	<0.05	0.18	<0.1	<0.0001	4.4	96	<0.025	0.86	<0.05	<0.025	<0.005	<0.25	1,500
	SRK20-Tail-TP-H09	5	5.85	C		4.2	0.35		3.2	<0.05	<0.0025	<0.05	<0.05	<0.1	<0.0001	6.4	310	<0.025	<0.25	<0.05	<0.025	<0.005	<0.25	3,300
Secondary	SRK20-Tail-TP-D01	0	0.75	A	Yes	1.4	0.84	Yes	1.3	90	0.23	2.8	20	450	0.000091	5.3	35	0.045	6.4	1.1	0.067	0.05	1.5	750
	SRK20-Tail-TP-D02	0.85	1.2	B	Yes	-	-	Yes	2.5	230	85	22	47	2600	0.00012	13	160	<0.025	18	1.3	<0.025	3.3	37	2,900
	SRK20-Tail-TP-D03	1.8	2.2	C	Yes	4.3	0.62	Yes	3.3	<0.2	0.25	<0.2	3.2	<0.4	0.00012	5.8	480	<0.1	26	<0.2	<0.1	0.29	<1	11,000
	SRK20-Tail-TP-D04	3.5	4	C	Yes	4.4	0.35		3.3	0.039	<0.001	<0.02	0.04	<0.04	<0.0005	6	150	<0.01	0.5	<0.02	<0.01	0.023	<0.1	880
	SRK20-Tail-TP-D05	5	5.5	C		4.7	0.35		3.1	<0.05	<0.0025	<0.05	<0.05	<0.1	<0.0005	5.7	200	<0.025	<0.25	<0.05	<0.025	0.029	<0.25	410
	SRK20-Tail-TP-E01	0	0.32	A	Yes	-	-	Yes	1.2	11	0.89	0.31	3.3	23	0.0017	3.1	6	0.04	0.48	0.32	0.024	0.017	0.15	14
	SRK20-Tail-TP-E02	0.32	0.8	B	Yes	1.7	0.83	Yes	1.6	150	1.5	5.3	12	370	0.0002	3.1	52	<0.025	2.4	1	0.053	0.22	4.2	1,600
	SRK20-Tail-TP-E03	0.8	1.2	B	Yes	-	-	Yes	2.5	12	0.98	1.3	4.1	210	0.00055	2.2	11	<0.01	1.2	0.049	<0.01	0.3	1.6	860
	SRK20-Tail-TP-E04	1.3	2.5	C	Yes		-		3.3	<0.05	0.41	<0.05	2.8	<0.1	<0.00005	5.1	200	<0.025	6	<0.05	<0.025	0.073	<0.25	3,000
	SRK20-Tail-TP-E06	4	4.8	C	Yes	4.5	0.37		3.7	<0.02	0.011	<0.02	0.2	<0.04	<0.000005	3.3	81	<0.01	1.5	<0.02	<0.01	0.017	<0.1	890
	SD-GC-01 023839	0	1.83	A		-	-		2.4	130	7.2	2.3	5.3	33	0.012	5.8	160	<0.025	1.8	0.25	<0.025	0.3	5.9	1,200
	SD-GC-03 023841	6.86	8.69	C		-	-		-	0.097	0.0025	-	0.027	<0.04	-	0.81	97	<0.01	0.11	<0.02	<0.01	<0.002	<0.1	870
	SD-GC-04 023849	0.61	3.05	A		-	-		4	250	1.3	4.4	8.2	<0.1	-	7.6	140	0.048	2.6	0.36	<0.025	0.42	11	2,200
	SD-GC-05 023850	3.66	6.10	B+C		-	-		3.1	0.13	0.0018	<0.02	0.17	<0.04	<0.000005	5.9	170	<0.01	1.3	<0.02	<0.01	0.032	<0.1	2,500
Intermediate	SRK20-Tail-TP-A01	0	0.3	A	Yes	0.9	-	Yes	1.1	50	0.093	1.6	9.5	40	0.0024	3.5	38	0.46	1.8	0.75	0.13	0.044	1.6	140
	SRK20-Tail-TP-A02	0.4	0.7	B	Yes	3.4	0.70	Yes	3.1	0.62	7.8	0.11	26	130	0.000027	1.9	630	<0.025	14	0.06	<0.025	0.32	0.85	2,200
	SRK20-Tail-TP-A03	0.7	1.2	C	Yes	-	-		3.3	0.13	0.0065	<0.05	13	<0.1	<0.00005	5.9	620	<0.025	15	0.053	<0.025	0.19	<0.25	2,700
	SRK20-Tail-TP-A04	2.2	2.75	C		4.5	-	Yes	3.3	0.15	<0.0025	<0.05	0.081	0.17	<0.0001	3.7	1200	0.026	0.58	<0.05	<0.025	<0.005	<0.25	3,500
	SRK20-Tail-TP-A05	3.25	3.75	C		5.0	0.25		3.2	0.037	0.0019	<0.02	0.045	<0.04	<0.0005	4.3	620	<0.01	0.19	<0.02	<0.01	0.0032	<0.1	990
	SRK20-Tail-TP-B01	0	0.28	A	Yes	0.8	-	Yes	1.1	29	0.024	1.2	5.9	15	0.00083	4.1	17	0.47	0.91	1.1	0.26	0.037	0.53	45
	SRK20-Tail-TP-B02	0.28	0.7	B	Yes	-	-	Yes	1.5	370	0.074	3.6	11	47	0.0012	0.88	32	0.013	3	0.49	0.047	0.087	2.9	380
	SRK20-Tail-TP-B03	0.7	1.7	C	Yes	4.5	0.32		3.8	0.13	0.095	<0.05	15	<0.1	<0.00005	4.3	980	<0.025	9.7	<0.05	<0.025	0.31	<0.25	3,000
	SRK20-Tail-TP-B04	2	2.7	C	Yes	4.8	0.31		3.3	0.046	0.001	<0.02	2.6	<0.04	<0.00005	4	500	<0.01	3.6	<0.02	<0.01	0.051	<0.1	1,200
	SRK20-Tail-TP-B05	3.5	4	C		4.9	0.27		3.2	0.032	<0.0005	<0.01	<0.01	<0.02	<0.0005	1.4	510	0.013	<0.05	0.022	<0.005	0.0045	<0.05	340
	SRK20-Tail-TP-C01	0.05	0.16	A	Yes	-	-		1.2	51	0.13	2	8.2	32	0.0023	2.6	57	0.087	1.8	0.57	0.037	0.039	0.67	220
	SRK20-Tail-TP-C02	0.28	0.7	B	Yes	2.4	0.79	Yes	2.3	260	0.61	5.3	9.8	170	0.013	0.42	100	<0.01	3.5	0.99	<0.01	0.2	3.5	600
	SRK20-Tail-TP-C03	0.7	1.3	C		-	-		3.4	0.35	0.03	<0.1	17	<0.2	<0.0005	7	1500	<0.05	15	<0.1	<0.05	0.86	<0.5	5,700
	SRK20-Tail-TP-C04	1.7	2.3	C		5.2	0.20		3.2	0.061	<0.0025	<0.05	0.83	<0.1	<0.0005	1.2	860	<0.025	1.3	<0.05	<0.025	0.009	<0.25	1,700
	SRK20-Tail-TP-C05	3	3.5	C		5.5	0.17		3.2	0.059	0.0013	<0.02	0.023	0.042	<0.0005	2.5	640	<0.01	0.19	<0.02	<0.01	<0.002	<0.1	480

Source: Z:\01_SITES\Faro\101_Investigations\2020_Tailings_Drilling_Geochem\4 Working File\{PorewaterCompiled_1CA030.025_MS_JED_Rev00.xlsx}

Notes

¹ Tailings Horizons, A = Upper dark grey to pale yellow acidic zone, B = orangish to reddish brown secondary mineral rich horizon, C = dark grey unoxidized tailings with no visibly observable secondary minerals

All values provided in two significant figures

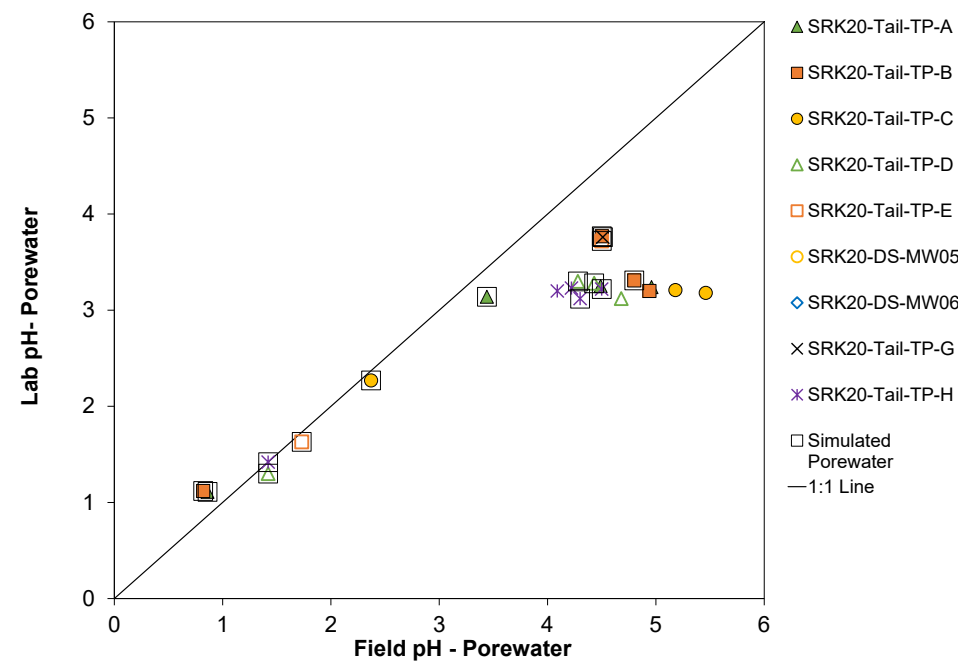


Figure 4-17: Lab pH vs field pH

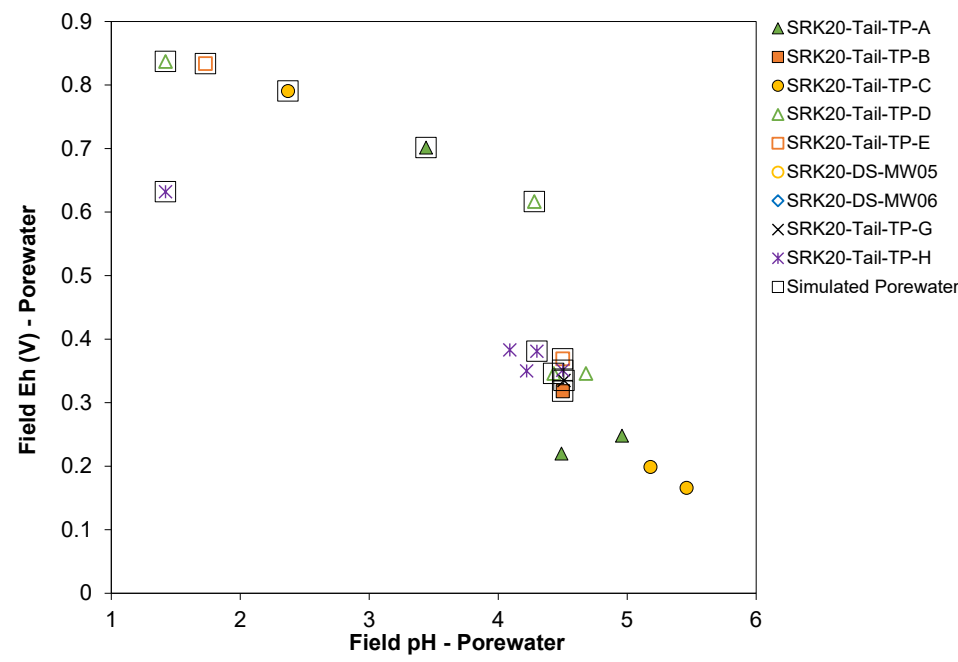


Figure 4-18: Field Eh vs field pH

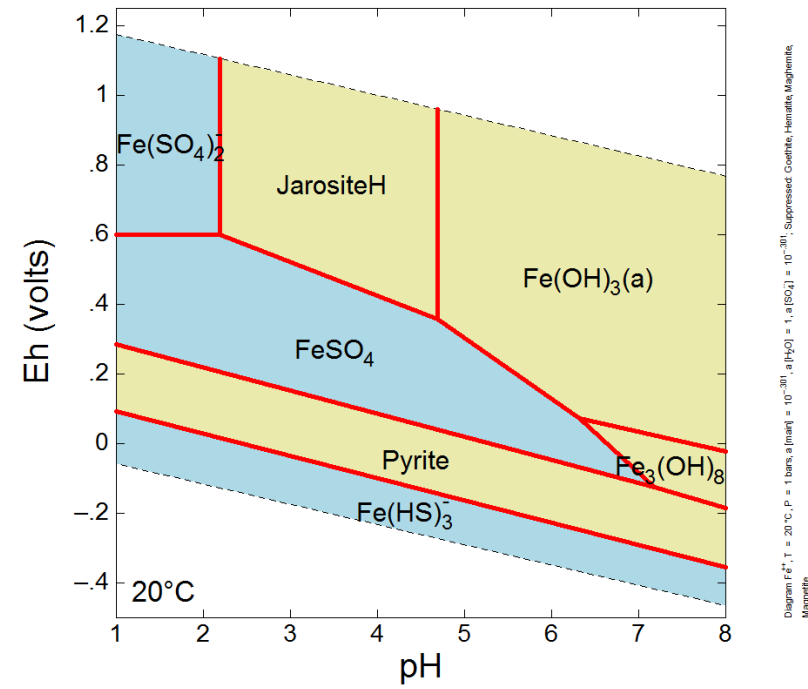


Figure 4-19: pH-Eh Diagram for Iron with activity of 0.5 (equivalent to 25,000 mg/L Fe) in the presence of sulphate with an activity of 0.5 (equivalent to 44,000 mg/L SO₄)

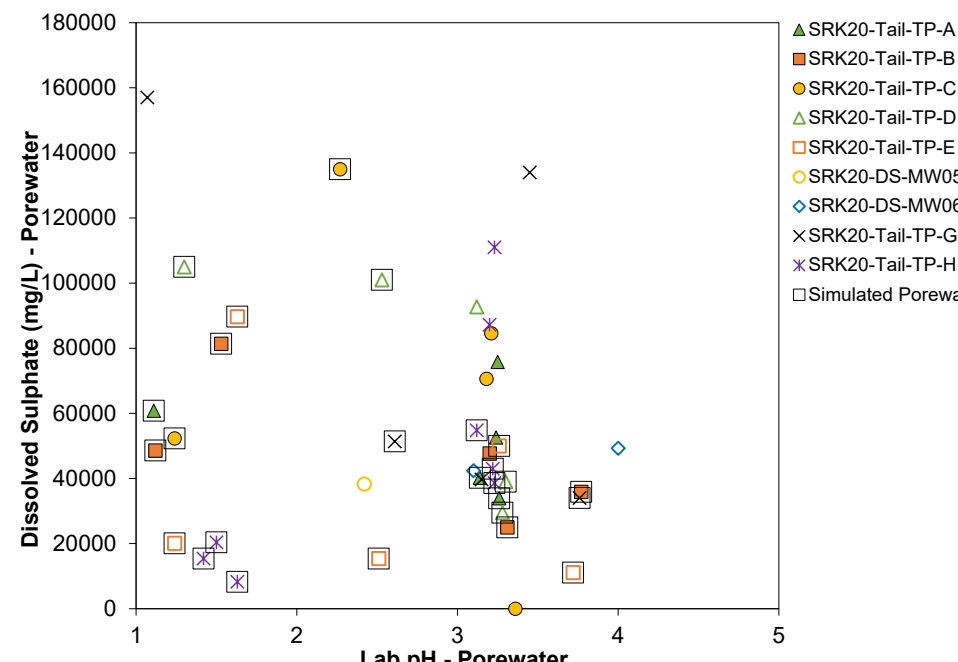


Figure 4-20: Dissolved sulphate vs lab pH

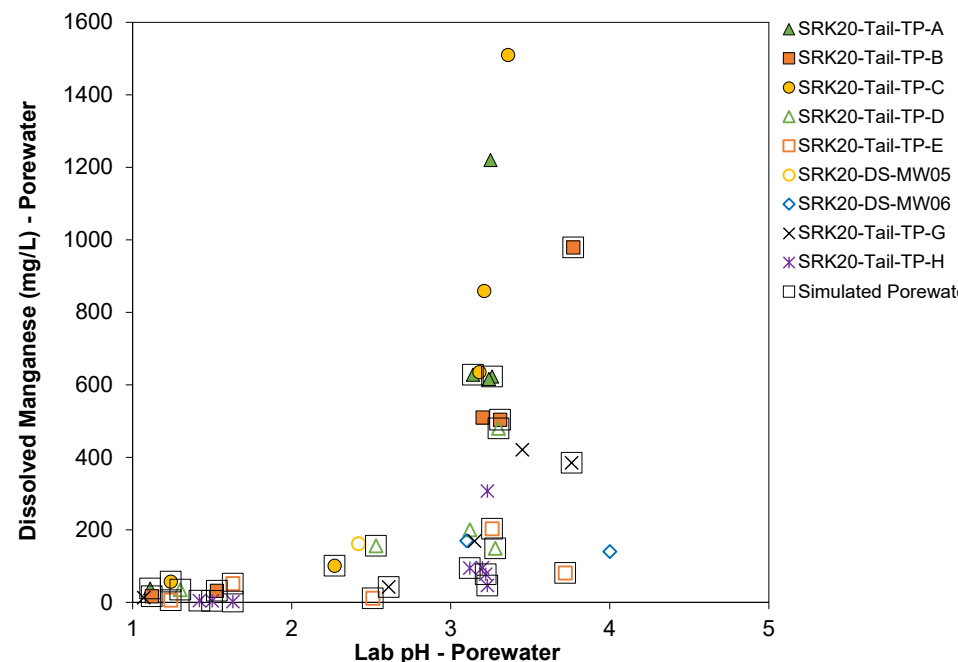


Figure 4-21: Dissolved manganese vs lab pH

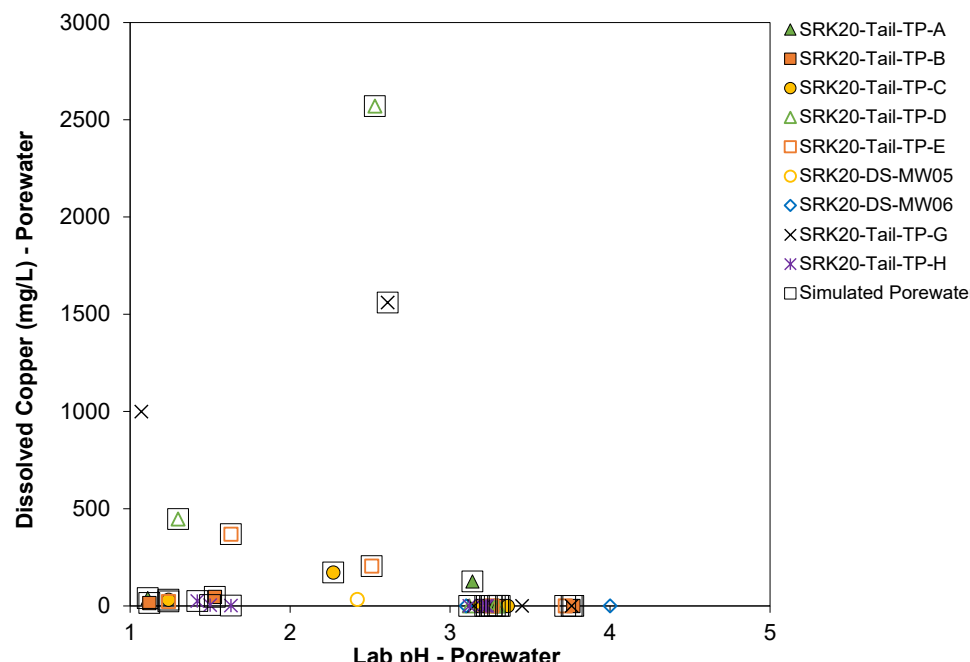


Figure 4-22: Dissolved copper vs lab pH

4.5.2 Variation with Grain Size

Potential relationships between grain size and porewater chemistry were first examined using a Pearson correlation matrix. Parameters which showed at least a moderate correlation ($r > 0.5$ or $r < -0.5$) with grain size are shown in Table 4-6. The data indicated that most parameters including pH, aluminum, cadmium, calcium, chromium, cobalt, copper, lead, magnesium, manganese, nickel, potassium, selenium, and zinc did not have a good correlation (i.e. $r > 0.4$ or $r < -0.4$) with grain size, but that sulphate, antimony, arsenic, and iron were all negatively correlated with coarser grain sizes. This relationship indicates that finer grain sizes are linked to increased concentrations of these parameters.

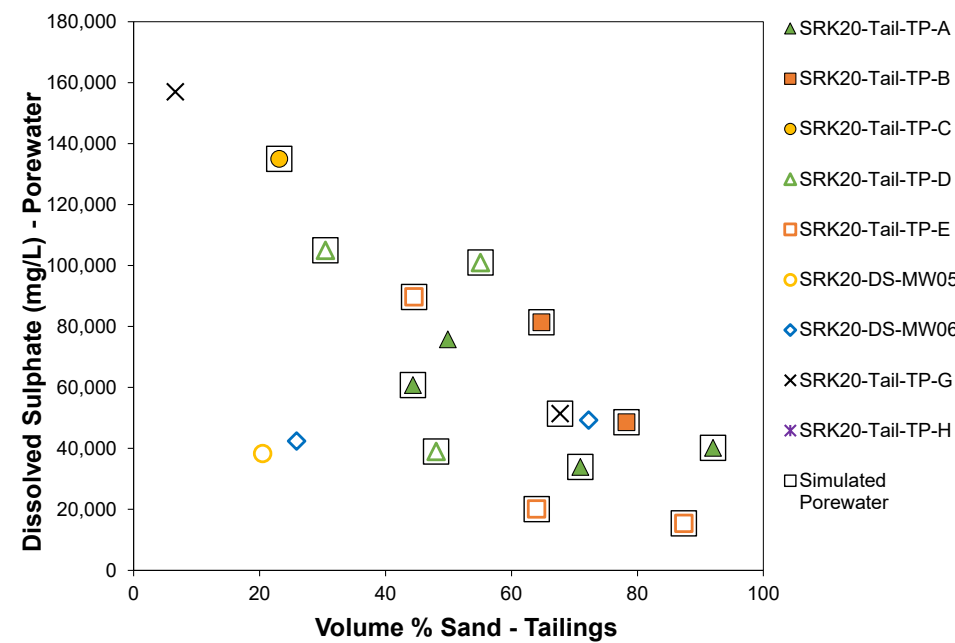
Table 4-6: Pearson Correlation Coefficients Between Volume Percent Sand and Porewater Chemistry

	Dissolved Sulphate	Dissolved Antimony	Dissolved Arsenic	Dissolved Iron
Volume Percent Sand	-0.71	-0.59	-0.54	-0.65

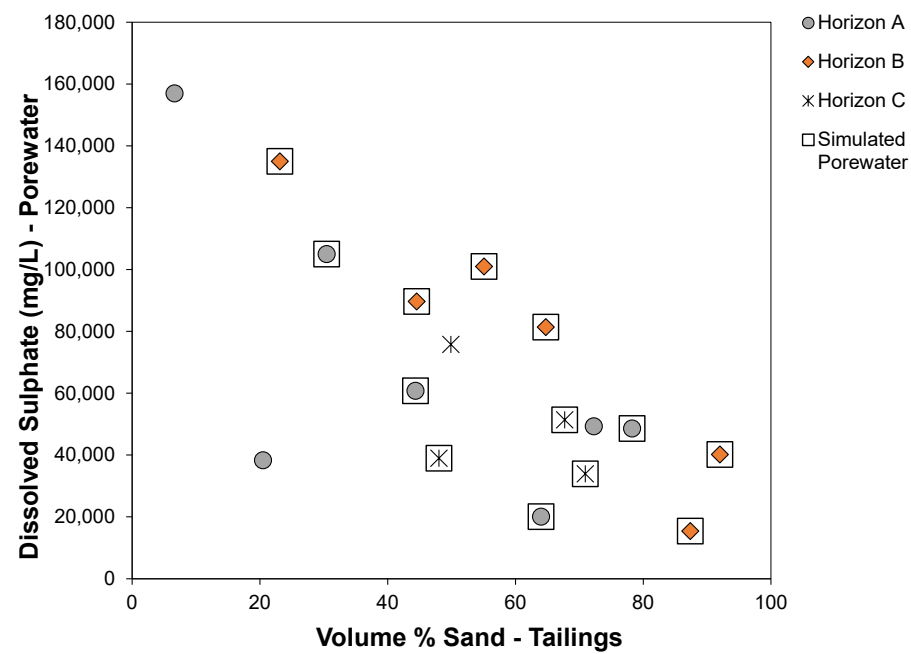
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To confirm that correlations were not influenced by spatial location or location within the tailings profile, sulphate concentrations were plotted by location and tailings weathering horizon in Figure 4-23 and Figure 4-24. The results showed that the inverse correlation between abundances of sand and dissolved sulphate occurred across the range of locations and weathering horizons. Antimony, arsenic, and iron showed similar trends (Figure 4-27 and Figure 4-28).

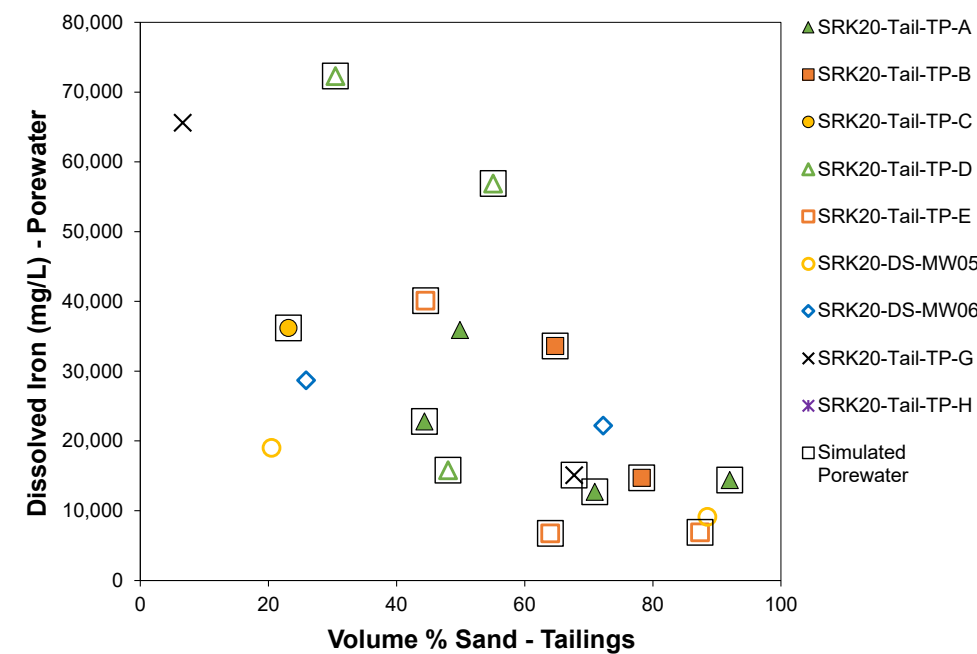
Comparing the overall grain size at each location, test pits SRK20-Tail-TP-C and G which had the finest grain sizes on average (Section 4.2) had higher average porewater concentrations for sulphate, iron, potassium, magnesium, sodium, arsenic, chromium, cobalt, copper, antimony, and zinc. Although this interpretation is constrained by the number of test pits in locations dominated by finer grain sizes, these results suggest the entire tailings profile likely shows more concentrated porewater chemistries in areas dominated by finer tailings.



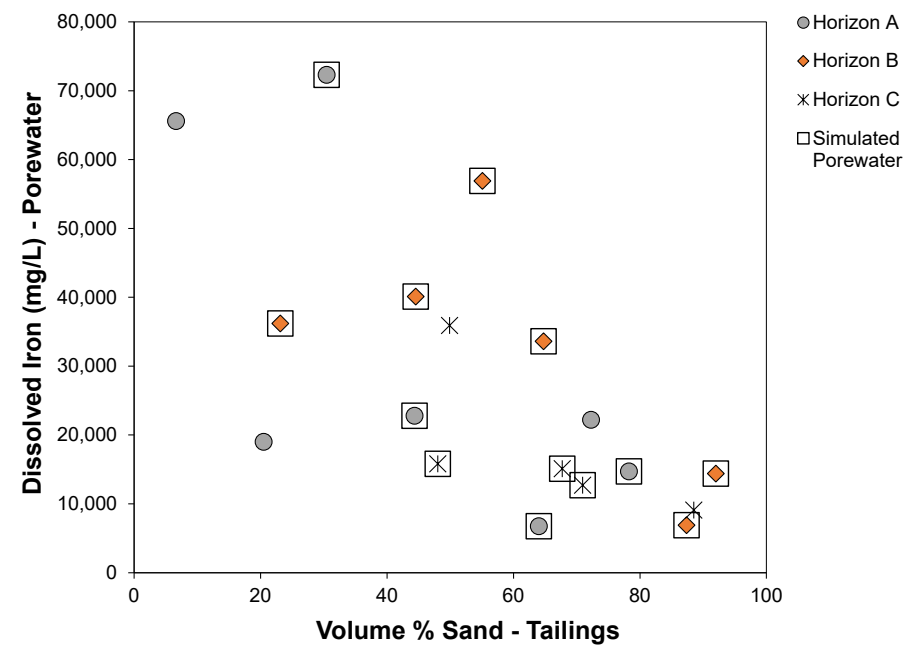
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Figure 4-23: Dissolved sulphate vs volume % sand, plotted by location



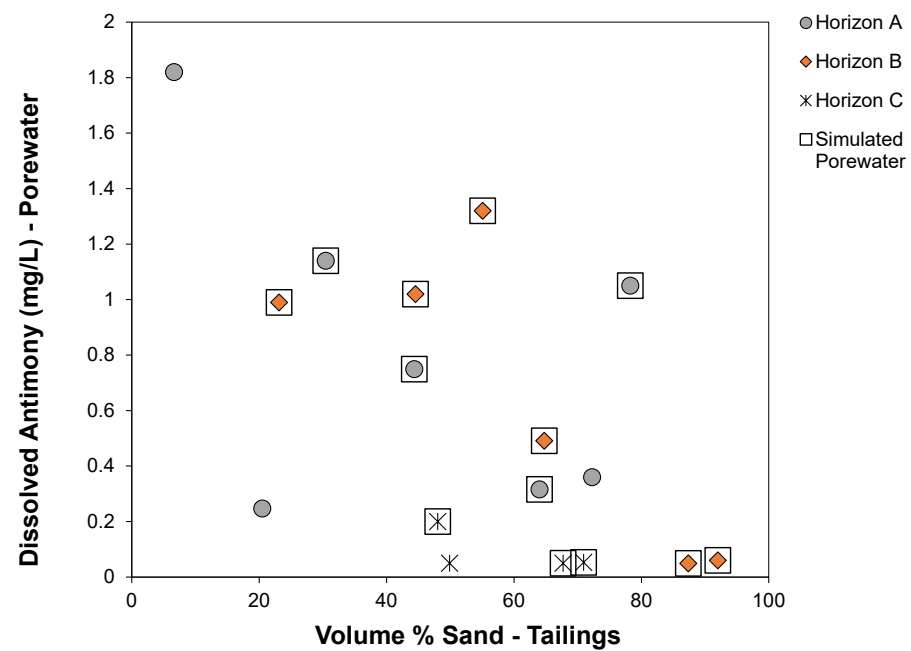
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Figure 4-24: Dissolved sulphate vs volume % sand, plotted by tailings weathering horizon



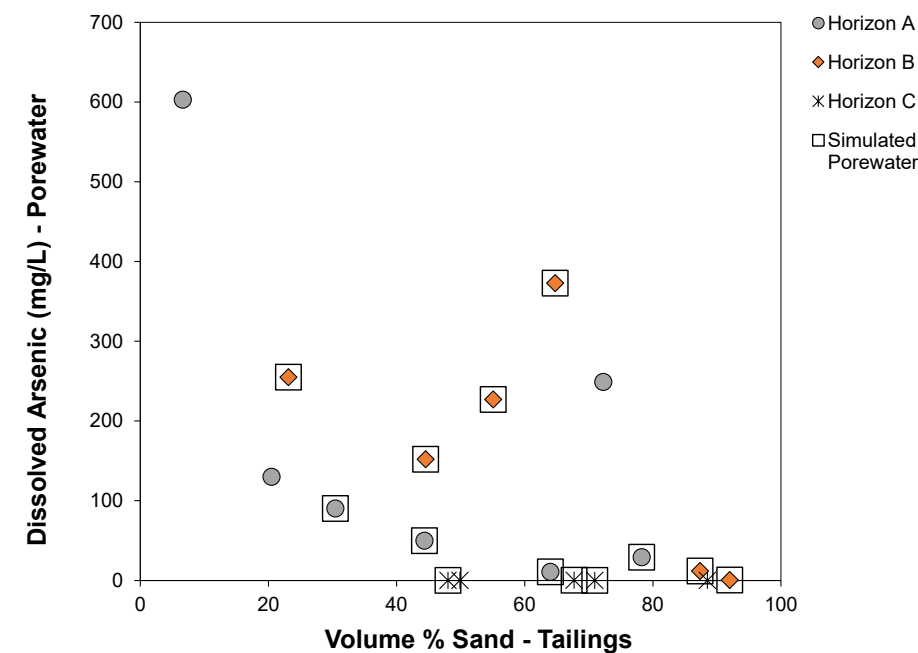
Source: Z:\01_SITES\Farol\101_Investigations\2020_Tailings_Drilling_Geochem\4 Working File(PorewaterCompiled_1CA030.025_MS_JED_Rev00.xlsx)
Figure 4-25: Dissolved iron vs volume % sand, plotted by location



Source: Z:\01_SITES\Farol\101_Investigations\2020_Tailings_Drilling_Geochem\4 Working File(PorewaterCompiled_1CA030.025_MS_JED_Rev00.xlsx)
Figure 4-26: Dissolved iron vs volume % sand, plotted by tailings weathering horizon



Source: Z:\01_SITES\Farol\101_Investigations\2020_Tailings_Drilling_Geochem\4 Working File(PorewaterCompiled_1CA030.025_MS_JED_Rev00.xlsx)
Figure 4-27: Dissolved antimony vs volume % sand, plotted by tailings weathering horizon



Source: Z:\01_SITES\Farol\101_Investigations\2020_Tailings_Drilling_Geochem\4 Working File(PorewaterCompiled_1CA030.025_MS_JED_Rev00.xlsx)
Figure 4-28: Dissolved arsenic vs volume % sand, plotted by tailings weathering horizon

4.5.3 Dilution Corrected Porewater Chemistry

To account for the effects of dilution within the simulated porewater samples, the undiluted concentration of these samples was calculated using the water to solids ratio of the simulated porewater and each sample's moisture content. The dilution corrected concentration for each parameter (y) as a function of tailings and DI water volume (V) and moisture content (M) is of the form:

$$\text{Corrected concentration (y)} = \frac{\text{concentration (y)} \times (V \text{ DI water added (L)} + (V \text{ tailings (kg)} \times M (\%)))}{V \text{ tailings (kg)} \times M (\%)}$$

Although the dilution corrected concentrations do not consider effects of solubility limits and may overestimate concentrations for some elements, the results were considered useful to determine potential upper range porewater concentrations. The results are provided in a statistical summary of concentrations by tailings weathering profile horizon in Table 4-8, which also shows the uncorrected results for comparison. Comparison of dilution corrected porewater concentrations to measured porewater concentrations is summarized as follows:

- Dilution corrected concentrations of several parameters including sulphate, iron, arsenic, chromium, cobalt, magnesium, manganese, potassium, sodium, vanadium and uranium showed a similar range of measured porewater concentrations for samples with comparable pH indicating dilution corrected concentrations for these parameters can be used with good confidence.
- Dilution corrected concentrations of aluminum, cadmium, copper, lead, nickel, and zinc were well above the range of measured porewater concentrations. These results indicate that concentrations of these elements are likely being controlled by solubility limits and that dilution corrected concentrations overestimate actual concentrations in tailings porewaters.

Key findings for parameters for which dilution corrected concentrations could be used with good confidence include:

- Sulphate and iron showed very high concentrations throughout the tailings profile with concentrations ranging from 25,000 mg/L to 180,000 mg/L and 6,500 mg/L to 100,000 mg/L respectively.
- Manganese and magnesium showed increasing trends with depth. Median concentrations of manganese in horizons A, B, and C were 50 mg/L, 120 mg/L, and 510 mg/L respectively while median concentrations of magnesium were 110 mg/L, 260 mg/L and 760 mg/L respectively.
- Median concentrations of arsenic were 110 mg/L, 18 mg/L, and 0.091 mg/L in horizons A, B, and C respectively.

Table 4-7: Statistical Summary of Dilution Corrected Porewater Concentrations by Horizon Compared to Uncorrected Results

Dataset	Horizon ¹	Statistic	SO4	Al	Ca	Fe	K	Mg	Na	As	Cd	Cr	Co	Cu	Pb	Mn	Ni	U	V	Zn
Raw Results (includes diluted samples)	A	min	8,300	9	4	2,100	2.6	0.93	2.1	2.6	0.0008	0.14	0.64	0.1	2.6	2	0.1	0.0019	0.02	1
		P50	49,000	150	540	21,000	5.2	76	16	51	0.13	2	8.2	32	4.1	35	1.8	0.044	1.5	220
		P75	61,000	610	570	23,000	71	89	29	130	0.89	2.8	9.5	40	5.3	57	2.6	0.22	4.6	750
		P95	140,000	910	630	70,000	170	470	85	460	4.9	4.9	19	780	6.9	150	5.2	0.37	8.8	1,800
		Max	160,000	1,000	640	72,000	190	570	86	600	7.2	5.3	20	1000	7.6	160	6.4	0.42	11	2,200
		Count	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
	B	min	15,000	1	230	4,100	5.2	3.5	10	0.028	0.001	0.02	0.02	0.04	0.42	4	0.26	0.011	0.1	4
		P50	43,000	240	460	21,000	14	180	15	7.7	0.35	0.29	8.2	47	2.4	52	2.5	0.2	0.85	890
		P75	86,000	540	520	35,000	49	280	25	190	1.2	4.4	11	190	4.3	98	6.1	0.31	3.2	1,900
		P95	120,000	2,500	560	49,000	50	470	32	310	46	14	36	1500	9.5	390	16	2.1	21	2,700
		Max	140,000	4,400	590	57,000	50	620	38	370	85	22	47	2600	13	630	18	3.3	37	2,900
		Count	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	C	min	11,000	0	230	5,700	10	87	10	0.02	0.0005	0.01	0.01	0.02	0.81	42	0.05	0.002	0.05	10
		P50	50,000	2	470	25,000	25	610	25	0.05	0.0025	0.05	0.18	0.1	4.3	420	0.86	0.023	0.25	1,600
		P75	80,000	6	500	36,000	50	760	50	0.13	0.03	0.05	2.8	0.1	5.8	620	4.6	0.19	0.25	3,300
		P95	110,000	65	540	57,000	76	1400	97	0.32	0.41	0.2	15	0.4	6.7	1,200	15	0.86	1	5,900
		Max	130,000	1,000	540	57,000	100	1600	100	0.35	4.6	4.8	17	1600	7	1,500	26	2.3	6.7	11,000
		Count	19	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Dilution Corrected Results	A	min	25,000	26	13	6,500	7.9	2.9	6.5	8.1	0.0025	0.43	2	0.1	4.5	6.3	0.31	0.0057	0.063	4
		P50	95,000	260	560	32,000	15	110	29	110	0.24	3.4	13	58	7.6	50	2.6	0.079	2.2	390
		P75	130,000	610	970	48,000	71	190	36	130	1.3	3.9	18	85	7.8	100	3.4	0.22	4.6	1,100
		P95	150,000	910	1,300	88,000	170	470	85	460	5.4	4.9	25	850	8.9	150	6.9	0.37	8.8	1,800
		Max	160,000	1,000	1,400	100,000	190	570	86	600	7.2	5.3	28	1,000	9	160	9.1	0.42	11	2,200
		Count	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
	B	min	31,000	2	300	8,200	12	7.9	13	0.075	0.0027	0.054	0.05	0.11	0.55	9.7	0.69	0.027	0.25	9
		P50	100,000	380	830	42,000	30	260	30	18	0.7	0.68	13	83	4.8	120	4.6	0.26	1.2	2,500
		P75	140,000	860	1,000	58,000	72	470	38	280	2.5	6.6	18	390	9.7	170	11	0.68	4.9	3,000
		P95	170,000	4,000	1,200	75,000	89	740	64	510	72	21	55	2,300	16	560	23	3.4	32	4,700
		Max	180,000	6,900	1,300	89,000	99	870	77	660	130	34	74	4,000	20	870	28	5.1	58	5,000
		Count	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
	C	min	40,000	0	230	9,100	20	180	10	0.021	0.0005	0.01	0.01	0.02	0.81	89	0.05	0.002	0.05	10
		P50	76,000	2	530	36,000	45	760	45	0.091	0.0025	0.05	0.18	0.14	6.4	510	0.86	0.034	0.25	3,300
		P75	92,000	10	830	45,000	63	1,200	63	0.16	0.035	0.1	5.2	0.2	9.2	860	11	0.46	0.5	5,600
		P95	110,000	65	1,600	57,000	100	1,600	97	0.41	0.74	0.32	24	0.65	18	1,800	41	1.1	1.6	8,200
		Max	130,000	2,200	2,400	57,000	160	1,900	160	0.66	9.7	9.9	39	3,300	21	1,900	46	2.3	14	18,000
		Count	19	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21

Source: Z:\01_SITES\Faro\1101_Investigations\2020_Tailings_Drilling_Geochem\4 Working File\{PorewaterCompiled_1CA030.025_MS_JED_Rev00.xlsx}

Notes

¹ Tailings Horizons, A = Upper dark grey to pale yellow acidic zone, B = orangish to reddish brown secondary mineral rich horizon, C = dark grey unoxidized tailings with no visibly observable secondary minerals
All values provided in two significant figures
Values highlighted in grey represent values which are interpreted to be underestimated (raw results) or overestimated (dilution corrected results)

5 Discussion

Detailed geochemical logging of tailings coupled with characterization of tailings solids and porewater chemistry from shallow tailings at a variety of locations within the RCTA has furthered the understanding of spatial (lateral) variations and changes over time in tailings porewater chemistry that are occurring due to the ongoing progression of weathering and sulphide oxidation. The excavation of test pits allowed characterization of the chemistry of each discrete layer within the upper 2 m of the tailings profile which had not previously been possible due to poor drill core recovery at shallow depths and sample volume constraints. Comparison between measured porewater chemistry and particle size has also fundamentally changed the understanding of the relationship between grain size and tailings porewater chemistry as compared to previous interpretations.

Evolution of the Tailings Profile Due to Ongoing Oxidation

Previous work characterized the tailings profile as an upper sulphate and metal rich acidic front (pH <2) extending to depths of ~1m, underlain by acidic front with pH 2 to 4 to depths of 4 m, and then underlain by mildly acidic tailings with pH 4 to 6 and non-acidic tailings which had elevated sulphate. Based on new information provided in this report, the upper acidic front can now be segregated into two horizons defined as:

1. Horizon A, which reaches maximum depths of 0.8 m and constitutes the uppermost dark grey layer of tailings which have reached pHs <2 under oxidizing conditions. Horizon A is characterized by depleted zinc, manganese, and arsenic in the tailings solids, the highest porewater concentrations of arsenic, aluminum, chromium, cobalt, nickel and vanadium, and the lowest concentrations of zinc and manganese.
2. Horizon B, which typically reaches maximum depths of 1.2 m (deeper in Original Impoundment) and represents the zone across which pHs are buffered from pHs less than 2 to pHs greater than 4 resulting in precipitation of iron sulphate, oxide, and oxy-hydroxide minerals. Horizon B is characterized by orangish to reddish brown color and contains the highest abundances of visually distinguishable iron sulphate and iron oxide and oxy-hydroxide minerals. Where hardpan layers are present, they also occur within this horizon. Horizon B is chemically distinguishable from horizon A by lower porewater arsenic concentrations and higher porewater copper, manganese, and zinc concentrations.

Based on synthesis of the rinse test, solids content, and porewater chemistry data, the following interpretations can be made on the evolution of the tailings profile's chemistry due to ongoing sulphide oxidation and weathering.

1. Comparison of historical to contemporary rinse test profiles suggests the depth of horizon B, which likely reflects the total oxygen penetration depth, is advancing at a rate of 0 to 4 cm/year, with the more rapid rates of progression observed in the Intermediate Impoundment where tailings have been exposed for a shorter duration. The acidity generated within horizons A and B is resulting in progressive acidification of the tailings profile within horizon C.

2. Oxidizing and strongly acidic conditions within horizon A and B are resulting in high rates of mobilization of sulphate, iron, zinc, manganese, copper, arsenic, chromium, cobalt, nickel, and vanadium. In horizon A, zinc and manganese concentrations are starting to diminish as a result of depletion of these highly mobile elements. Throughout horizon B and in the top portion of horizon C, buffering of porewater pHs by low levels of remaining neutralization potential is causing attenuation of copper, arsenic, chromium, cobalt, and nickel, but is not affecting concentrations of sulphate, iron, zinc and manganese which remain high throughout the tailings profile. As the remaining carbonates within horizon B and C become consumed, porewater concentrations throughout the entire tailings profile will continue to acidify resulting in increased concentrations of the elements currently being attenuated above pH 4.
3. Rates of oxidation are expected to diminish over time as the most reactive sulphide minerals are depleted from the upper part of the tailings profile. This is already clearly evident for zinc, but may also be occurring to some extent for sulphate and iron which are the dominant reaction products. As the thickness of the depleted zone increases, rates of oxygen ingress are expected to diminish over time. The high concentrations currently observed in the porewater reflect accumulation of oxidation products that occurred when maximum rates of oxidation were occurring, and are interpreted to represent an upper limit on porewater concentrations.

Effect of Particle Size on Porewater Chemistry

Previous work (i.e. RGC 2006; SRK 2019c) interpreted that tailings particle size is generally zoned on an impoundment scale with particle size decreasing with distance from spigoting points in each impoundment. The existing conceptual model interpreted that zones with coarser tailings would have more concentrated porewater chemistries due to increased rates of sulphide oxidation occurring in areas with coarser grain size due to higher rates of oxygen ingress.

However, interpretation of detailed geochemical logs and particle size analysis data from this dataset found that there were large variations in grain size with depth within the tailings profile and that zonation from spigoting points may not be as well developed as previously understood. The implication of this finding is that areas previously assumed to be comprised of finer tailings may actually include more of a mixture of fine and coarse tailings and may oxidize just as rapidly as areas previously assumed to be coarse tailings. The converse – i.e. a mixture of coarse and fine tailings in the coarse tailings areas may oxidize just as slowly as in areas previously assumed to be comprised of finer tailings.

In an apparent contrast to previous conceptual models that assumed coarser tailings would oxidize more rapidly due to higher rates of oxygen ingress, analysis of the solids and porewater chemistry data and grain size data showed that finer silt sized tailings had higher porewater concentrations of sulphate, iron, antimony, and arsenic compared to coarser sand sized tailings. These comparisons were validated by comparing differences in particle size between weathering horizons and solids chemistry to ensure grain size was the sole controlling variable for these differences in porewater chemistry. Although the existing dataset only contained two test pits which intersected a tailings profile dominated by fines, finer grain sizes appeared to result in higher concentrations of sulphate, iron,

antimony, and arsenic both on a sub-meter scale (i.e. silt sized tailings layer between two sand sized layers) and on a larger scale within each impoundment.

One key observation is that the correlation between grain size and porewater chemistry remained relatively consistent below the oxygen penetration depth in horizon C. Since fine or coarse tailings within horizon C can be situated beneath either fine or coarse tailings within horizons A and B where active oxidation of sulphide minerals is occurring, this suggests that the difference in porewater chemistry between fine and coarse tailings is not an artefact of differing rates of oxygen diffusion.

The difference in porewater chemistry between fine and coarse tailings is therefore likely caused by the increased surface area of the finer tailings relative to the coarser tailings which can increase leaching potential and/or hydraulic effects imposed by the differing permeability of the fine and coarse tailings. Finer tailings would be expected to have lower permeability and correspondingly lower flow leading to lower flushing of accumulated oxidation products. This could result in an increase in concentrations of parameters which are not limited by secondary mineral equilibria.

Further assessment is needed to conclusively determine whether differences in oxygen diffusion rates between fine and coarse tailings have a material impact on tailings porewater chemistry.

6 Conclusion

This report presents the results of a field drilling and test pitting investigation within the RCTA which was followed by a laboratory geochemical test work program. The program sought to characterize changes in tailings solids and porewater chemistry with depth to understand current conditions and provide insight into for the future evolution of porewater chemistry within the RCTA. This objective was met by logging and measuring the physical and mineralogical changes occurring in tailings with depth and through the collection of samples from each discrete horizon within the tailings. The samples were analyzed for moisture content, particle size analysis, field rinse tests, solids chemistry, and porewater chemistry following extraction of porewater from each sample.

The investigation found the following:

■ Tailings Weathering Profile

- The test pits encountered three distinctive horizons within the tailings profile. These were defined as:
 - **Horizon A**, which was characterized by dark grey to pale olive color, dry moisture content, the absence of pyrite and frequently observed <0.5 mm voids indicative of leached out pyrite. Horizon A had strongly acidic pHs <2, low zinc, manganese, and arsenic solids content, and highest porewater concentrations of arsenic, aluminum, chromium, cobalt, nickel and vanadium and lowest porewater concentrations of zinc.
 - **Horizon B**, which was characterized by orangish to reddish brown color, dry moisture content, and abundant iron oxide, oxy-hydroxide, and sulphate secondary minerals. Horizon B had acidic pHs ranging from pH 2 to pH 3 and differed from horizon A by higher pH, lower Eh, lower porewater arsenic concentrations and higher porewater copper, manganese, and zinc concentrations.
 - **Horizon C**, which was characterized by dark grey color, dry to saturated moisture content, an absence of visually identifiable secondary minerals, and abundant fresh and unoxidized pyrite. Horizon C had acidic pHs ranging from 3 to 5.5 and differed from horizon A and B by higher solids arsenic, cadmium, copper, manganese, and zinc concentrations. Horizon C had the highest porewater concentrations of zinc and manganese and lowest porewater concentrations of arsenic, copper, chromium, cobalt, nickel, and vanadium.

■ Grain Size

- Grain size showed large vertical variations within the tailings profile and spatial (lateral) zonation from spigoting points may not be as well developed as previously understood.
- Comparison of porewater chemistry and grain size showed finer grain sizes correlated with increased porewater concentrations of sulphate, iron, antimony, and arsenic and similar concentrations of other parameters.

■ Porewater Chemistry

- Concentrations of sulphate, and iron showed very high concentrations across the tailings profile with concentrations ranging from 25,000 mg/L to 180,000 mg/L sulphate and 6,500 mg/L to 100,000 mg/L iron.
- Zinc and manganese showed increasing trends with depth with median zinc concentrations of 220 mg/L, 890 mg/L, and 1,600 mg/L and median manganese concentrations of 50 mg/L, 120 mg/L, and 510 mg/L in horizons A, B, and C respectively.
- Concentrations of arsenic, cadmium, chromium, cobalt, copper, and nickel were highest under the strongly acidic (pH <3) conditions present within horizons A and B and showed lower concentrations in horizon C. Lead remained relatively immobile throughout the tailings profile, with concentrations not exceeding 7 mg/L.

7 Recommendations

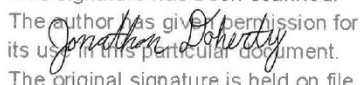
To improve the understanding of the evolution of tailings porewater chemistry to assist with development of improved water quality predictions (source terms), SRK recommends the following:

- A subset of the samples characterized for porewater be subjected to detailed particle size analysis. Given the importance of this data in understanding controls on oxidation rates, PSD should be completed on the rest of the samples.
- Future tailings investigations should include drillholes or test pits in the western region of the Intermediate Impoundment where the finest grain sizes are expected to be encountered to better understand porewater concentrations in areas dominated by fines.
- Particle size analysis data from other investigations on the RCTA should be compiled and interpreted to determine whether impoundment scale variations in grain size can be used to assist with application of tailings source terms.
- That the rate of advancement of the oxygen penetration depth either be modelled or measured through installation of in-situ multi-level pore gas monitoring wells. The rate at which the oxygen penetration depth advances will control how quickly the currently unoxidized tailings below horizon B undergo sulphide oxidation, which will control loadings to the underlying aquifer.

Closure

This report, Faro 2020 Tailings Porewater Characterization Report, was prepared by

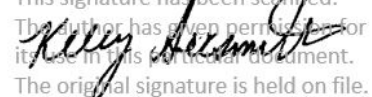
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Kelly Sexsmith, PGeo
Principal Consultant (Geochemistry)

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

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Appendix A Summary of Geochemical Test Work Program

Appendix A: Geochemical Test Work Program Summary

DH or Test Pit ID	Sample ID	Depth From (m)	Depth to (m)	Material Type	ABA					Elemental Analysis			
					PSA	Paste pH	TIC	Modified Sobek NP	Total S	Sulphate S (HCL Leach)	Aqua Regia Element Scan	Whole Rock Elemental Analysis	Porewater Analysis
SRK20-Tail-TP-A	SRK20-Tail-TP-A01	0	0.3	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-A02	0.4	0.7	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-A03	0.7	1.2	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-A04	2.2	2.75	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-A05	3.25	3.75	Tailings		x	x	x	x	x	x		x
SRK20-Tail-TP-B	SRK20-Tail-TP-B01	0	0.28	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-B02	0.28	0.7	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-B03	0.7	1.7	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-B04	2	2.7	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-B05	3.5	4	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-B06	4	4.5	Tailings		x	x	x	x	x	x		x
SRK20-Tail-TP-C	SRK20-Tail-TP-C01	0.05	0.16	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-C02	0.28	0.7	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-C03	0.7	1.3	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-C04	1.7	2.3	Tailings									x
	SRK20-Tail-TP-C05	3	3.5	Tailings		x	x	x	x	x	x		x
SRK20-Tail-TP-D	SRK20-Tail-TP-D01	0	0.75	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-D02	0.85	1.2	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-D03	1.8	2.2	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-D04	3.5	4	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-D05	5	5.5	Tailings		x	x	x	x	x	x		x
SRK20-Tail-TP-E	SRK20-Tail-TP-E01	0	0.32	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-E02	0.32	0.8	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-E03	0.8	1.2	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-E04	1.3	2.5	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-E06	4	4.8	Tailings		x	x	x	x	x	x		x
SRK20-Tail-TP-G	SRK20-Tail-TP-G01	0	0.7	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-G02	0.7	1.03	Tailings	x	x	x	x	x	x	x		x
	SRK20-Tail-TP-G03	1.03	1.5	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-G04	2	2.7	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-G06	5	5.5	Tailings		x	x	x	x	x	x		x
SRK20-Tail-TP-H	SRK20-Tail-TP-H01	0	0.25	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-H02	0.28	0.65	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-H03	0.65	0.94	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-H04	1.1	1.7	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-H05	1.9	2.4	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-H06	2.7	3.4	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-H07	3.6	4	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-H08	4.3	5	Tailings		x	x	x	x	x	x		x
	SRK20-Tail-TP-H09	5.00	5.85	Tailings		x	x	x	x	x	x		x
SRK20-SD-MW05	SD-GC-01 023839	0	1.83	Tailings	x	x	x	x	x	x	x	x	x
	SD-GC-03 023841	6.86	8.69	Tailings	x	x	x	x	x	x	x	x	x
SRK20-SD-MW06	SD-GC-04 023849	0.61	3.05	Tailings	x	x	x	x	x	x	x	x	x
	SD-GC-05 023850	3.66	6.10	Tailings	x	x	x	x	x	x	x	x	x

Appendix B QA/QC Results

Tailings Solids Summary QA/QC Table

QC Test	SRK QC Criteria	Results
paste pH		
Method Blank (n=0)	<2X detection limit (DL)	#N/A
Crush Duplicate (n=4)	For any samples, +/- 0.5 difference pH unit	All passed.
Pulp Duplicate (n=0)	For any samples, +/- 0.5 difference pH unit	#N/A
Standard Reference Material (n=3)	Within specified tolerance ranges.	All passed.
Total C and TIC		
Method Blank (n=6) for TIC	<2X detection limit (DL)	All passed.
Carbon balance (Total C > TIC) (n=0)	For samples > 10X the detection limit (DL), Total Carbon should be greater than Total Inorganic Carbon, if not the % difference should be within +/-20%	#N/A
Crush Duplicate (n=4) for TIC	For samples > 10X the detection limit (DL), % RPD within +/-30%	All passed.
Pulp Duplicate (n=7) for TIC	For samples > 10X the detection limit (DL), % RPD within +/-20%	All passed.
Standard Reference Material (n=7) for TIC	Within specified tolerance ranges.	All passed.
Total S & Total Sulphate		
Method Blank (n=3) for Total S, (n=3) for SO4	<2X detection limit (DL)	All passed.
Sulphur balance (Total S > Sulphate S) (n=43)	For samples > 10X the detection limit (DL), Total Sulphur should be greater than Total Sulphate, if not the % difference should be within +/-20%	All passed.
Crush Duplicate (n=4) for Total S, (n=4) for SO4	For samples > 10X the detection limit (DL), % RPD within +/-30%	All passed.
Pulp Duplicate (n=2) for Total S, (n=0) for Sulphate S	For samples > 10X the detection limit (DL), % RPD within +/-20%	All passed.
Standard Reference Material (n=3) for Total S, (n=3) for SO4	Within specified tolerance ranges.	All passed.
Modified NP		
Method Blank (n=0)	<2X detection limit (DL)	#N/A
NP consistent with paste pH (n=43)	Negative NP has paste pH <= 5	SRK20-TAIL-TP-A05, SRK20-TAIL-TP-B03, SRK20-TAIL-TP-B04, SRK20-TAIL-TP-E06, SRK20-TAIL-TP-A03 failed but still at the low range of NP. Data accepted.
Crush Duplicate (n=4)	% RPD better than +/- 15% for NP>20 kg/t, % RPD better than +/-20% for NP>10 kg/t, Difference within +/-5kg/t for NP<10 kg/t. Fizz test rating is the same.	All passed.
Pulp Duplicate (n=0)	% RPD better than +/- 15% for NP>20 kg/t, % RPD better than +/-20% for NP>10 kg/t, Difference within +/-5kg/t for NP<10 kg/t. Fizz test rating is the same.	#N/A
Fizz test rating with NP (n=43)	Max NP does not exceed fizz test rating	All passed.
Standard Reference Material (n=4) for KZK-1 (Slight)	Within specified tolerance ranges.	All passed.
Modified NP and TIC		
Comparison between Modified NP and TIC (n=43)	Check for trends/co-relation	General trend is TIC is higher than NP. SRK20-Tail-TP-A04 and SRK20-Tail-TP-D03 are particularly higher?
Total S-Leco and S-ICP		
Comparison between Total S-Leco and S-ICP (n=43)	For samples >10X detection limit (DL), % RPD within +/-20%	Most S-ICP are over range and they accurately quantitated in S-Leco. SD-GC-01 0238839 failed and lab replaced with recheck result. S-ICP are all over range which is provided by exact quantitation by Leco - COA 14 Faro Tail TP Samples (rec'd 24-Dec20).
Trace Elements (Aqua Regia Digestion with ICP Finish)		
Method Blank (n=3)	<2X Detection Limit	All passed.
Crush Duplicate (n=4)	For samples >10X detection limit (DL), % RPD within +/- 30%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion.	All passed.
Pulp Duplicate (n=1)	For samples >10X detection limit (DL), % RPD within +/- 20%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion.	All passed.
Standard Reference Material (n=3)	Within +/-15 % Difference	All passed.
WR-ICP		
Method Blank (n=1)	<2X Detection Limit	All passed.
Crush Duplicate (n=1)	For samples >10X detection limit (DL), % RPD within +/- 30%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion.	All passed.
Pulp Duplicate (n=0)	For samples >10X detection limit (DL), % RPD within +/- 20%, For ICP metal scan, it is acceptable for 10% of parameters to be outside of this criterion.	#N/A
Standard Reference Material (n=1)	Within +/-7.5 % Difference	All passed.

Porewater Summary QA/QC Table

QC Test	SRK QC Criteria	Results
Physical Tests¹		
Field Blank (n=8) for EC, (n=7) for TDS, (n=10) for Acidity, (n=8) for pH, (n=6) for ORP	<5X Detection Limit. pH is ~5 to 6.5	N/A; The field blanks were passed through the squeezers to determine the residual amount of contamination between samples.
Method Blank (n=11) for Acidity, (n=3) for TDS, (n=9) for EC, (n=1) for ORP	<2X Detection Limit	All passed.
Lab Dup (n=5) for EC, (n=7) for Acidity, (n=3) for TDS, (n=7) for pH, (n=7) for ORP	Within specified tolerance ranges	All passed.
Std. Reference Material (n=9) for EC, (n=3) for TDS, (n=11) for Acidity, (n=10) for pH, (n=9) for ORP	Within specified tolerance ranges	All passed.
Anions and Nutrients²		
Field Blank (n=8) for Total Ammonia, (n=9) for Total Alkalinity, (n=9) for Br, (n=9) for Cl, (n=9) for F, (n=9) for NO ₃ , (n=9) for NO ₂ , (n=9) for SO ₄	<5X Detection Limit.	N/A; The field blanks were passed through the squeezers to determine the residual amount of contamination between samples.
Method Blank (n=9) for Total Ammonia, (n=10) for Total Alkalinity, (n=8) for SO ₄ , (n=10) for Br, F, Cl, NO ₂ , NO ₃ (n=11) for SO ₄	<2X Detection Limit	All passed.
Lab Dup (n=9) for Total Ammonia, (n=5) for Total Alk, (n=7) for Br, (n=9) for Cl, (n=9) for F, (n=10) for NO ₂ & NO ₃ , (n=10) for SO ₄	Within specified tolerance ranges	All passed.
Std. Reference Material (n=9) for Total Ammonia, (n=8) for Total Alkalinity, (n=10) for Br, Cl, F, NO ₃ , & NO ₂ , (n=11) for SO ₄	Within specified tolerance ranges	All passed.
Organic / Inorganic Carbon (Matrix: Water)³		
Field Blank (n=9) for Total Organic Carbon, (n=2) for Dissolved Organic Carbon, (n=4) for Total Inorganic Carbon, (n=6) for Total Carbon	<5X Detection Limit.	N/A; The field blanks were passed through the squeezers to determine the residual amount of contamination between samples.
Method Blank (n=8) for Total Organic Carbon, (n=2) for Dissolved Organic Carbon, (n=5) for Total Inorganic Carbon	<2X Detection Limit	All passed.
Lab Dup (n=2) for Dissolved Organic Carbon, (n=8) for Total Organic Carbon, (n=5) for Total Inorganic Carbon	Within specified tolerance ranges	All passed.
Std. Reference Material (n=2) for Dissolved Organic Carbon, (n=8) for Total Organic Carbon, (n=3) for Total Inorganic Carbon	Within specified tolerance ranges	All passed.
Total Carbon vs. Dissolved Organic Carbon/Total Organic Carbon/Total Inorganic Carbon, (n=45) for Total Carbon, (n=2) for Dissolved Organic Carbon, (n=25) for Total Inorganic Carbon, (n=34) for Total Organic Carbon	Total Carbon >= Dissolved Organic Carbon/Total Organic Carbon, if not % RPD should be within +/-20%	1 sample failed: SD-GC-05 023850 Blank failed but the lab had "RRV" reported result verified by repeat analysis) lab qualifier.
Dissolved Metals by ICP		
Field Blank (n=11)	<5X Detection Limit.	N/A; The field blanks were passed through the squeezers to determine the residual amount of contamination between samples.
Method Blank (n=12)	<2X Detection Limit	All passed.
Lab Dup (n=12)	Within specified tolerance ranges	All passed.
Std. Reference Material (n=13)	Within specified tolerance ranges	All passed.
Ion Balance		
Ion Balance (n=41)	EC>100 uS/cm, % difference should be within +/-10%	10 samples failed with ion balances of 10 to 38%. The results were confirmed by analytical rechecks and were accepted as is.

1) Physical Tests- EC, Acidity, TDS, pH, ORP

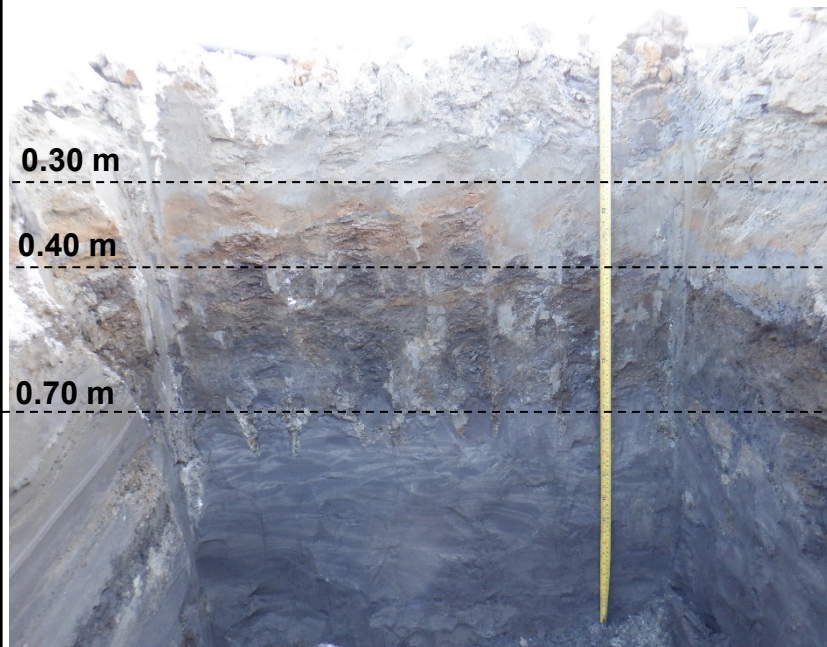
2) Anions and Nutrients- Total ammonia, Total Alkalinity Br, Cl, F, NO₃, NO₂, SO₄

3) Organic / Inorganic Carbon (Matrix: Water)- Total Carbon, Dissolved Organic Carbon

Appendix C Test Pit Photo Logs

SRK20-TAIL-TP-A

From 0 to 1.25m showing three different layers



From (m)	To (m)	Horizon	Grain Size	Munsell Color	Moisture	Staining/secondary minerals	Sulphide Content (%)	Samples
0	0.3	A	Silty sand	Pale olive	Dry	Yellowish staining	None visible	SRK20-Tail-TP-A01
0.3	0.4	B	Sandy Silt	Dark yellowish brown	Dry	Yellowish staining with reddish brown patches	15%	
0.4	0.7	B	Sandy Silt	Dark greyish brown	Moist	Brown staining	20%	SRK20-Tail-TP-A02
0.7	3.75	C	Silty Sand with laminations becoming Clayey Silt at 3.25m	Dark grey	Moist becoming wet at 2m	None visible	45-70%	SRK20-Tail-TP-A03 (0.7-1.2 m) SRK20-Tail-TP-A04 (2.21 – 2.75m) SRK20-Tail-TP-A05 (3.25-3.75m)

From 2.75m to 3.75m: sulphide rich laminae



Job No: 1CA030.025
Filename: Test_Pit_Photo_Log_1CA030.025_MS



Tailings Geochemical Characterization

Faro Tailings Test Pit Program
Nov 2020

SRK20-TAIL-TP-A

Date:
Nov 2020

Figure: **1**

From 0 to 0.91m

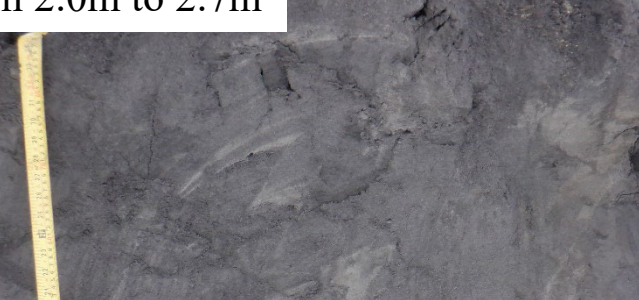
0.28 m

0.70 m

0.28 m

0.70 m

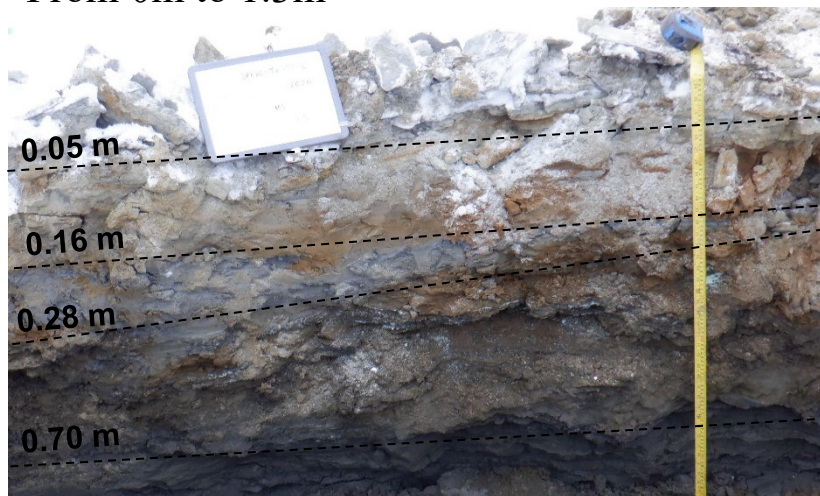
From 2.0m to 2.7m

A photograph showing a dark, silty sediment sample. A yellow measuring tape is placed vertically on the left side of the sample for scale. The sediment appears to be a dark grey or black color with some lighter, silty areas visible. The texture is somewhat granular and uneven. The background is a light, sandy surface.

From 3.5m to 4.0m		 Faro Mine Remediation Project Projet d'assainissement de la mine Faro	Faro Tailings Test Pit Program Nov 2020		
	Job No: 1CA030.025 Filename: Test_Pit_Photo_Log_1CA030.025_MS	Tailings Geochemical Characterization	SRK20-TAIL-TP-B	Date: Dec 2020	Figure: 2

SRK20-TAIL-TP-C

From 0m to 1.3m



From 0.3m to 0.7m: Secondary minerals



From 3.0m to 4.0m

From (m)	To (m)	Horizon	Grain Size	Munsell Color	Moisture	Staining/secondary minerals	Sulphide Content (%)	Samples
0	0.05	A	Silty Sand	Grey	Dry to moist	None visible	None visible	SRK20-Tail-TP-C01 (0.05-0.16m)
0.05	0.16	A	Silty Sand	Pale yellow	Dry to moist	Yellowish pervasive staining, reddish patches and lenses	15%	
0.16	0.28	A	Sandy Silt	Dark grey	Moist	None visible	None visible	
0.28	0.7	B	Silty Sand	Dark yellowish brown	Dry to Moist	Brown and reddish staining, teal-colored secondary minerals	Variable, rich pyrite lenses (>50%) with majority containing <10%	SRK20-Tail-TP-C02
0.7	3.5	C	Sandy Silt with laminations	Very dark grey	Moist to Wet	None visible	55%	SRK20-Tail-TP-C03 (0.7-1.3 m)
								SRK20-Tail-TP-C04 (1.7 – 2.3m)
								SRK20-Tail-TP-C05 (3.0-3.5m)



NOV 2020

SRK20-TAIL-TP-C

Job No: 1CA030.025

Filename: Test_Pit_Photo_Log_1CA030.025_MS

Tailings Geochemical Characterization

Date:
Dec 2020

Figure: **3**

SRK20-TAIL-TP-D

From 0 m to 1.4m



From 0.75m to 0.8m: Secondary mineral cement



From 4.5m to 5.0m

From (m)	To (m)	Horizon	Grain Size	Munsell Color	Moisture	Staining/secondary minerals	Sulphide Content (%)	Samples
0	0.5	A	Silty Sand	Grey	Dry to moist	Yellowish tan staining	35%	SRK20-Tail-TP-D01 (0-0.75m)
0.5	0.75	B	Silty Sand	Grey and Orangish brown	Dry to moist	Orangish brown staining with lenses of melanterite	20%	
0.75	0.8	B	Sandy Silt	Light brown to Grey	Moist	Secondary mineral cement (Melanterite)	None visible	
0.8	0.85	B	Sandy Silt	Light brown to Grey	Dry to Moist	Brown staining with light teal melanterite grains up to 3 mm	12%	
0.85	1.2	B	Sandy Silt with laminations	Dark grey	Moist to Wet	Lenses with brownish staining	20%	SRK20-Tail-TP-D02
1.2	1.4	B	Silty Sand	Orangish brown	Moist	Orangish brown staining	8%	
1.4	5.5	C	Sandy Silt with laminations becoming Clayey Silt at 5m	Dark grey	Moist to wet	None visible	50%	SRK20-Tail-TP-D03 (1.8-2.2 m) SRK20-Tail-TP-D04 (3.5-4.0 m) SRK20-Tail-TP-D05 (5.0-5.5 m)



Job No: 1CA030.025
Filename: Test_Pit_Photo_Log_1CA030.025_MS

Tailings Geochemical Characterization

Faro Tailings Test Pit Program Nov 2020		
SRK20-TAIL-TP-D		
Date: Dec 2020		Figure: 4

SRK20-TAIL-TP-E

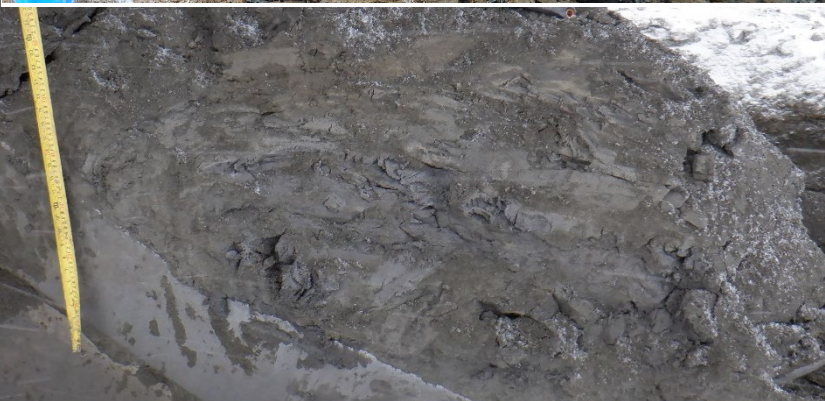
From 0 m to 1.2m

0.10 m

0.32 m

0.80 m

From 0.32m to 0.8m: Melanterite



From 3.0m to 3.5m

From (m)	To (m)	Horizon	Grain Size	Munsell Color	Moisture	Staining/secondary minerals	Sulphide Content (%)	Samples
0	0.1	A	Silt	Dark grey	Dry to moist	None visible	35%	SRK20-Tail-TP-E01 (0-0.32m)
0.1	0.32	A	silty sand	Grey	Dry to moist	Yellowish staining	25%	
0.32	0.8	B	Sandy silt	Dark grey	Moist	Brown stained patches and lenses of melanterite	25%	SRK20-Tail-TP-E02
0.8	1.3	B	Silty sand	Brown	Dry to Moist	Brown and reddish staining	10%	SRK20-Tail-TP-E03
1.3	3	C	Silty sand with silt lenses	Dark grey	Moist to Wet	None visible. Pyrite rich laminations	15-70%	SRK20-Tail-TP-E04 (1.3-2.5 m)
3	3.8	C	silt + clay	Dark grey	Moist	None visible Pyrite rich laminations	15-50%	SRK20-Tail-TP-E05 (3.0-3.5 m)
3.8	5.5	C	fine sand w/silt	Dark grey	Moist to wet	None visible Pyrite rich laminations	15%	SRK20-Tail-TP-E06 (4.0-4.8 m)



Job No: 1CA030.025
Filename: Test_Pit_Photo_Log_1CA030.025_MS



Tailings Geochemical Characterization

Faro Tailings Test Pit Program
Nov 2020

SRK20-TAIL-TP-E

Date:
Dec 2020

Figure: **5**

SRK20-TAIL-TP-G

From 0m to 1.5m



From 0m to 0.7m: Melanterite lenses



From 4.0m to 4.5m

From (m)	To (m)	Horizon	Grain Size	Munsell Color	Moisture	Staining/secondary minerals	Sulphide Content (%)	Samples
0	0.7	A	silt w/fine sand + clay	Dark grey	Dry to moist	Lenses with disseminated melanterite	15%	SRK20-Tail-TP-G01
0.7	1.03	C	Silty Sand	Olive	Dry to moist	None visible	90%	SRK20-Tail-TP-G02
1.03	1.6	C	Silty clay	Dark olive grey	Moist	None visible	15%	SRK20-Tail-TP-G03
1.6	5	C	Silty Sand with clay lenses	Dark grey	Dry to Moist	None visible Pyrite rich laminations	50%	SRK20-Tail-TP-G04 (2.0 – 2.7m) SRK20-Tail-TP-G05 (4.15-4.5m)
5.0	5.5	C	Silty clay	Dark grey	Moist to Wet	None visible	55%	SRK20-Tail-TP-G05



Faro Tailings Test Pit Program
Nov 2020

SRK20-TAIL-TP-G

Job No: 1CA030.025

Filename: Test_Pit_Photo_Log_1CA030.025_MS

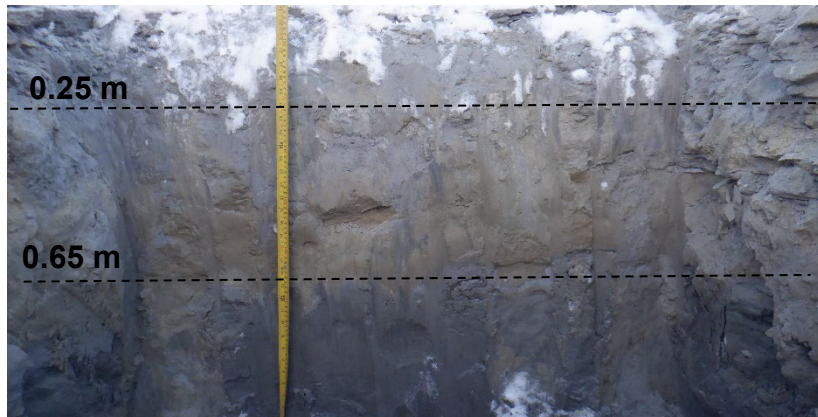
Tailings Geochemical Characterization

Date:
Dec 2020

Figure: **6**

SRK20-TAIL-TP-H

From 0 m to 1.1m



From 2.7m to 3.4m



From 5.0m to 5.8m

From (m)	To (m)	Horizon	Grain Size	Munsell Color	Moisture	Staining/secondary minerals	Sulphide Content (%)	Samples
0	0.25	A	fine sand w/silt	Light grey	Dry to moist	None visible	35%	SRK20-Tail-TP-H01
0.25	0.28	A	fine sand, silt, and clay	Grey	Dry to moist	None visible (hardpan)	0%	
0.28	0.65	B	fine sand w/silt	Pale brown	Dry to moist	Yellowish staining	10%	SRK20-Tail-TP-H02
0.65	1.1	B	silty fine sand	Grey	Dry to Moist	None visible	35%	SRK20-Tail-TP-H03 (0.65-0.94 m)
1.1	1.85	B	fine sand w/silt	Light olive brown	Dry to moist	Orangish staining	25%	SRK20-Tail-TP-H04 (1.1-1.7 m)
1.85	3.4	C	fine sand and silt	Dark grey	Moist	Orangish oxidized lenses	80%	SRK20-Tail-TP-H05 (1.9-2.4 m) SRK20-Tail-TP-H06 (2.7-3.4 m)
3.4	4.0	C	silt w/fine sand and clay	Very dark greyish brown	Moist	Brownish staining	35%	SRK20-Tail-TP-H07 (3.6-4.0 m)
4.0	5.85	C	silt and clay	Dark grey	Moist to wet	None visible	45%	SRK20-Tail-TP-H08 (4.3-5.0 m) SRK20-Tail-TP-H09 (5.0-5.85 m)



Job No: 1CA030.025

Filename: Test_Pit_Photo_Log_1CA030.025_MS

Tailings Geochemical Characterization

SRK20-TAIL-TP-H

Date:
Dec 2020

Figure:
7

Appendix D Test Pit Logs, Rinse Test Results, and Field Meter Calibration Logs

	Date Test Pitted11/10/2020			Easting581272	Northing6913746					
DH or TP ID	From (m)	To (m)	Material Type	Grain Size	Munsell Color	Color	Fizz Rating	Staining/secondary mins	Sulphide Content (%)	Description
SRK20-Tail-TP-A	0	0.3	Tailings	fine sand w/silt	Pale olive	5Y 6/4	None	Yellowish staining	None visible	Pale olive, dry, and loose fine sand with silt sized tailings with no visible pyrite, no fizz, and yellowish staining.
SRK20-Tail-TP-A	0.3	0.4	Tailings	fine sand w/silt	Dark yellowish brown	10YR 4/6	None	with reddish brown patches	15%	Dark yellowish brown, dry, ,platy, and foliated fine sand with silt sized tailings with reddish brown staining, no fizz, and 15% pyrite.
SRK20-Tail-TP-A	0.4	0.7	Tailings	fine sand w/silt	Dark greyish brown	10YR 4/2	None	Brown staining	20%	Dark greyish brown, foliated, and moist fine sand with silt sized tailings with brown staining, no fizz, and 20% pyrite.
SRK20-Tail-TP-A	0.7	3.75	Tailings	fine sand w/silt	Dark grey	10YR 4/1	None	None visible	45-70%	Dark grey, moist, and weakly cohesive fine sand (pyrite) with silt (dark grey to black) tailings with no fizz and pyrite ranging from 40% up to 70% in some layers. Starts to become more moist at 1.2 m, fully saturated at 2 m.

Hole started sloughing at 2.75 m, unable to dig beyond 3.75 m.

	Date Test Pitted11/8/2020			Easting 581781	Northing 6913557					
DH or TP ID	From (m)	To (m)	Material Type	Grain Size	Munsell Color	Color	Fizz Rating	Staining/secondary mins	Sulphide Content (%)	Description
SRK20-Tail-TP-B	0	0.28	Tailings	fine sand w/silt	Pale olive	5Y 6/4	None	Yellowish staining	none visible	Pale olive fine sand with silt, loose, and dry tailings with yellowish staining, no fizz, and no visible sulphides.
SRK20-Tail-TP-B	0.28	0.7	Tailings	fine sand w/silt	Reddish brown	5YR 4/3	None	Reddish brown staining	Trace visible	Reddish brown, moist, and cohesive fine sand with silt tailings with reddish staining, no fizz, abundant muscovite, and trace visible pyrite.
SRK20-Tail-TP-B	0.7	3.3	Tailings	fine sand + silt	Very dark grey	7.5 YR 3/1	None	None	45%	Very dark grey dry to moist and loose fine sand and silt sized tailings with no fizz, strong sulphur odor, and 40-50% fine sand pyrite in a black silt sized matrix. Contains some pyrite rich layers with up to 80% pyrite, moisture increases around 2.2 m.
SRK20-Tail-TP-B	3.3	4.5	Tailings	fine sand + silt	Very dark grey	7.5 YR 3/1	None	None	60%	Very dark grey loose and saturated fine sand and silt sized tailings with no fizz, average pyrite content of 65%, and no staining. Pyrite makes up fine sand portion, with dark grey to black silt making up the silt. Contains bedded pyrite layers that locally have up to 85% pyrite.

Hole kept sloughing starting at 2.5 m, couldn't dig any deeper.

	Date Test Pitted11/8/2020			Easting581802	Northing6913383					
DH or TP ID	From (m)	To (m)	Material Type	Grain Size	Munsell Color	Color	Fizz Rating	Staining/secondary mins	Sulphide Content (%)	Description
SRK20-Tail-TP-C	0	0.05	Tailings	fine sand + silt	Grey	2.5Y 5/1	None	None visible	None visible	Grey, dry, and cemented or frozen tailings with no fizz and void spaces from weathered out pyrite grains. No visible staining or secondary minerals.
SRK20-Tail-TP-C	0.05	0.16	Tailings	fine sand w/silt	Pale yellow	5Y 7/3	None	Yellowish pervasive staining, reddish patches and lenses	15%	Pale yellow, dry, and loose fine sand sized tailings with reddish brown patches and frequent <2cm pyrite lenses.
SRK20-Tail-TP-C	0.16	0.28	Tailings	silt + clay	Dary grey	5Y 4/1	None	None visible	None visible	Dark grey, very moist, and cohesive silt and clay sized tailings with no fizz and no visible staining or sulphides.
SRK20-Tail-TP-C	0.28	0.7	Tailings	fine sand w/silt	Dark yellowish brown	10YR 4/4	None	Brown and reddish staining, teal colored secondary minerals	Variable, rich pyrite lenses (>50%) with majority containing <10%	Dark yellowish brown, dry, and foliated fine sand and silt sized tailings with thin (<3cm) interlayered lenses of massive (>50%) pyrite, reddish brown tailings, and light teal colored melanterite seams.
SRK20-Tail-TP-C	0.7	3.5	Tailings	fine sand w/silt +	Very dark grey	7.5YR 3/1	None	None visible	55%	Very dark grey, moist, and cohesive fine sand with silt + clay sized tailings with no fizz. Pyrite abundance varies from layers with ~20% fine sand pyrite in a dark grey to black silt + clay sized matrix, to up to 20 cm thick pyrite rich layers which contain >50% fine sand sized pyrite. Water content increases at 1 m, becoming fully saturated at 1.7 m.

Hole started sloughing and caving in at 2 m, could not dig beyond 3.5 m.

	Date Test Pitted 11/10/2020			Easting 582078	Northing 6913503					
DH or TP ID	From (m)	To (m)	Material Type	Grain Size	Munsell Color	Color	Fizz Rating	Staining/secondary mins	Sulphide Content (%)	Description
SRK20-Tail-TP-D	0	0.5	Tailings	fine sand w/silt	Grey		None	Yellowish tan staining	35%	Grey, frozen and stiff to loose, and dry to moist fine sand with silt sized tailings with no fizz, patchy yellowish tan staining, and 35% pyrite.
SRK20-Tail-TP-D	0.5	0.75	Tailings	gravel (secondary mins)	Grey and Orangish brown		None	Orangish brown staining	20%	Grey, foliated and platy, and dry to moist fine sand with silt sized tailings with no fizz, moderate pervasive orangish brown staining, lenses of light teal colored melanterite, and 35% pyrite.
SRK20-Tail-TP-D	0.75	0.8	Hardpan	silt + clay w/fine sand	Light brown to Grey		None	Secondary mineral cement	None	Hardpan, stiff and cemented light brown to grey tailings with no fizz and no visible pyrite.
SRK20-Tail-TP-D	0.8	0.85	Tailings	silt + clay w/fine sand	Light brown to Grey		None	Brown staining with light teal melanterite grains up to 3 mm	12%	Well foliated light brown to grey platy silt and clay with fine sand sized tailings with abundant <2cm lenses of light teal colored melanterite and 12% pyrite.
SRK20-Tail-TP-D	0.85	1.2	Tailings	silt + clay w/fine sand	Dark grey		None	Lenses with brownish staining	20%	Dark grey, frozen and moist silt and clay with fine sand sized tailings with no fizz, 20% pyrite, and lenses with brownish staining.
SRK20-Tail-TP-D	1.2	1.4	Tailings	fine sand w/silt	Orangish brown		None	Orangish brown staining	8%	Orangish brown dry and loose fine sand w/silt sized tailings with no fizz, 20% pyrite, abundant muscovite, and pervasive orangish brown stainings.
SRK20-Tail-TP-D	1.4	5.5	Tailings	fine sand w/silt	Dark grey	2.5Y 4/1	None	None visible	50%	Dark grey, dry to moist, and loose to weakly cohesive fine sand w/silt sized tailings with average pyrite content of 50% and no fizz. Pyrite makes up fine sand portion of tailings, with dark grey to black silt sized matrix. Moisture increases at 2.0 m to very moist.

	Date Test Pitted11/9/2020			Easting582395Northing6913457						
DH or TP ID	From (m)	To (m)	Material Type	Grain Size	Munsell Color	Color	Fizz Rating	Staining/secondary mins	Sulphide Content (%)	Description
SRK20-Tail-TP-E	0	0.1	Tailings	fine sand + silt	Dark grey	2.5Y 4/1	None	None visible	35%	Dark grey, partially cemented or frozen, and dry fine sand w/silt tailings with 35% pyrite, no fizz, and no visible secondary minerals or staining.
SRK20-Tail-TP-E	0.1	0.32	Tailings	silt + clay w/fine sand	Grey	2.5Y 5/1	None	Yellowish staining	25%	Grey and yellow (2.5Y 7/6) interlayered silt + clay w/fine sand tailings and yellow fine to coarse alluvial? sand. Sand has no pyrite and weak fizz and dominant minerals are quartz and feldspar.
SRK20-Tail-TP-E	0.32	0.8	Tailings	silt + clay	Dark grey	2.5Y 4/1	None	Brown stained patches and lenses	25%	Dark grey moist and cohesive silt + clay sized tailings with no fizz, 25% pyrite, and reddish brown patches and lenses.
SRK20-Tail-TP-E	0.8	1.3	Tailings	fine sand w/silt	Brown	7.5YR 4/4	None	Brown and reddish staining	10%	Brown loose and dry fine sand w/silt sized tailings with strong pervasive brown staining, no fizz, and 10% pyrite.
SRK20-Tail-TP-E	1.3	3	Tailings	fine sand w/silt	Dark grey	2.5Y 4/1	None	None visible	15-70%	Dark grey, loose, and dry to moist fine sand + silt tailings with no fizz, and 15-70% pyrite ranging from layers dominantly composed of pyrite to layers with fine sand sized pyrite grains suspended in a dark grey to black silt sized matrix.
SRK20-Tail-TP-E	3	3.8	Tailings	silt + clay	Dark grey	2.5Y 4/1	None	None visible	15-50%	Dark grey, cohesive, and moist to saturated silt + clay sized tailings with no fizz, and 15-50% pyrite in a dark grey to black matrix.
SRK20-Tail-TP-E	3.8	5.5	Tailings	fine sand w/silt	Dark grey	2.5Y 4/1	None	None visible	15%	Dark grey, loose, and moist fine sand + silt tailings with no fizz, and 15-50% pyrite ranging from layers dominantly composed of pyrite to layers with fine sand sized pyrite grains suspended in a dark grey to black silt sized matrix.

	Date Test Pitted11/9/2020			Easting582505	Northing6913319					
DH or TP ID	From (m)	To (m)	Material Type	Grain Size	Munsell Color	Color	Fizz Rating	Staining/secondary mins	Sulphide Content (%)	Description
SRK20-Tail-TP-G	0	0.7	Tailings	silt w/fine sand + clay	Dark grey	2.5Y 4/1	None	None visible	15%	Dark grey silt w/fine sand sized tailings. Upper 15 cm is frozen or cemented? Beneath that tailings are moist and cohesive with 15% pyrite, no fizz, and no visible staining or secondary minerals.
SRK20-Tail-TP-G	0.7	1.03	Tailings	fine sand	Olive	5Y 5/3	None	None visible	90%	Olive (pyrite colored) moderately cohesive fine sand tailings that are composed dominantly of pyrite (90%). Most pyrite rich interval observed.
SRK20-Tail-TP-G	1.03	1.6	Tailings	silt + clay	Dark olive grey	5Y 3/2	None	None visible	15%	Dark olive grey, moist to saturated and cohesive silt+clay size tailings with 50% pyrite, no visible staining, and no fizz.
SRK20-Tail-TP-G	1.6	5	Tailings	fine sand w/silt	Dark grey	2.5Y 4/1	None	None visible	50%	Dark grey dry and loose fine sand w/silt sized tailings with 50% pyrite, no visible staining, and no fizz.
SRK20-Tail-TP-G	5	5.5	Tailings	clay + silt	Dark grey	2.5Y 4/1	None	None visible	55%	Dark grey wet and sturated clay + silt sized tailings with 55% pyrite, no visible staining, and no fizz.

	Date Test Pitted11/7/2020			Easting583169	Northing6913028					
DH or TP ID	From (m)	To (m)	Material Type	Grain Size	Munsell Color	Color	Fizz Rating	Staining/secondary mins	Sulphide Content (%)	Description
SRK20-Tail-TP-H	0	0.25	Tailings	fine sand w/silt	Light grey	2.5Y 7/1	None	None visible	35%	Light grey fine sand with silt sized tailings. Frozen, stratified into "bedded like" layers up to 10 cm in thickness, and dry.
SRK20-Tail-TP-H	0.25	0.28	Hardpan	fine sand, silt, and clay	Grey	2.5Y 5/1	None	None visible	0%	Grey firm and cemented fine sand, silt, and clay with thin (<2mm) laminations
SRK20-Tail-TP-H	0.28	0.65	Tailings	fine sand	Pale brown	2.5Y 7/4	None	Yellowish staining	10%	Pale brown fine sand tailings. Dominant minerals are quartz, feldspar, and pyrite
SRK20-Tail-TP-H	0.65	1.1	Tailings	silty fine sand	Grey	2.5Y 5/1	None	None visible	35%	Grey silty sand sized tailings that are moderately cohesive and dry to partially moist
SRK20-Tail-TP-H	1.1	1.85	Tailings	fine sand w/silt	Light olive brown	2.5Y 5/6	None	Orangish staining	25%	Light olive brown fine sand with silt sized tailings.
SRK20-Tail-TP-H	1.85	3.4	Tailings	fine sand and silt	Dark grey	2.5Y 4/1	Weak	Orangish oxidized lenses	80%	Massive pyrite fine sand with silt sized tailings. Loose to cohesive, dense, and moist with orangish grey colored oxidized lenses from 3.0 to 3.4 m depth
SRK20-Tail-TP-H	3.4	4	Tailings	silt w/fine sand and clay	Very dark greyish brown	2.5Y 3/2	None	Brownish staining	35%	Very dark greyish brown silt with fine sand and clay sized tailings with strong sulphur smell. Occasional dry and up to 20 cm thick massive pyrite (>50%) lenses that contain no staining or visible secondary minerals.
SRK20-Tail-TP-H	4	5.85	Tailings	silt and clay	Dark grey	2.5Y 4/1	Weak	None visible	45%	Dark grey silt and clay sized tailings with weak fizz, strong sulphur smell, and cohesive and wet texture.

Appendix D: Test Pit Logs, Rinse Test Results, and Field Meter Calibration Records

Date	Sample ID	pH	EC	ORP	Monitor
			uS/cm	mV	
11/7/2020	pH 7	7.00			DWB
	pH 10	10.01			DWB
	pH 4	4.00			DWB
	EC Standard - 1413		1432		DWB
	ORP 235 mV			235	DWB
	Distilled blank	5.77	9.8	175	DWB
11/8/2020	pH 7	7.03			JED
	pH 10	9.98			JED
	pH 4	3.99			JED
	EC Standard - 1413				JED
	ORP 235 mV	235			JED
	Distilled blank	5.85	34.3	199	JED
11/9/2020	pH 7	7.00			JED
	pH 10	10.12			JED
	pH 4	4.00			JED
	EC Standard - 1413		1413		JED
	ORP 237 mV			237	JED
	Distilled blank	6.39	3.4		JED
11/10/2020	pH 7	7.04			JED
	pH 10	10.14			JED
	pH 4	4.00			JED
	EC Standard - 1413		1404		JED
	ORP 237 mV			237	JED
	Distilled blank	5.84	2.3		JED
11/12/2020	pH 7	7.00			JED
	pH 10	10.01			JED
	pH 4	4.01			JED
	EC Standard - 1413		1413		JED
	ORP 237 mV			237	JED
	Distilled blank	5.45	6.3		JED

Date	Test Pit ID	Depth	pH	EC uS/cm	Monitor	Comment
11/7/2020	SRK20-Tail-TP-H	0.8	2.00	6750	DWB	
11/7/2020	SRK20-Tail-TP-H	0.45	2.13	4580	DWB	
11/7/2020	SRK20-Tail-TP-H	0.15	2.12	3890	DWB	
11/7/2020	SRK20-Tail-TP-H	0.05	2.15	3890	DWB	
11/7/2020	SRK20-Tail-TP-H	1.15	3.71	12690	DWB	
11/7/2020	SRK20-Tail-TP-H	1.7	3.22	8430	DWB	
11/7/2020	SRK20-Tail-TP-H	1.9	4.22	6150	DWB	
11/7/2020	SRK20-Tail-TP-H	2.4	4.98	9110	DWB	
11/7/2020	SRK20-Tail-TP-H	3.2	4.66	8200	DWB	
11/7/2020	SRK20-Tail-TP-H	3.8	4.62	6300	DWB	
11/8/2020	SRK20-Tail-TP-H-4.7	4.7	2.80	4460	JED	Sample likely reacted as it dried, wet samples will not be dried going forward
11/8/2020	SRK20-Tail-TP-C	0.1	1.66	10520	JED	
11/8/2020	pH 4.0 drift check		3.99		JED	
11/8/2020	SRK20-Tail-TP-C	0.22	1.62	15410	JED	
11/8/2020	SRK20-Tail-TP-C	0.22	1.61	13990	JED	Duplicate
11/8/2020	SRK20-Tail-TP-C	0.5	2.76	19200	JED	
11/8/2020	SRK20-Tail-TP-C	1	4.53	13680	JED	
11/8/2020	SRK20-Tail-TP-C	2	4.68	10500	JED	
11/8/2020	SRK20-Tail-TP-C	3.2	5.04	10290	JED	
11/8/2020	SRK20-Tail-TP-B	0.15	1.63	13380	JED	
11/8/2020	SRK20-Tail-TP-B	0.5	1.89	11860	JED	
11/8/2020	SRK20-Tail-TP-B	0.8	2.38	10750	JED	
11/8/2020	SRK20-Tail-TP-B	1	3.96	6720	JED	
11/8/2020	SRK20-Tail-TP-B	1.7	4.38	14510	JED	
11/8/2020	SRK20-Tail-TP-B	2.5	4.28	6420	JED	
11/8/2020	SRK20-Tail-TP-B	3.2	4.50	7230	JED	
11/8/2020	SRK20-Tail-TP-B	4	4.69	7070	JED	
11/10/2020	SRK20-Tail-TP-E	0	2.21	5110	JED	
11/10/2020	SRK20-Tail-TP-E	0.2	2.05	5450	JED	
11/10/2020	SRK20-Tail-TP-E	0.4	1.67	15180	JED	
11/10/2020	SRK20-Tail-TP-E	0.7	2.13	10470	JED	
11/10/2020	SRK20-Tail-TP-E	1	4.16	3560	JED	
11/10/2020	SRK20-Tail-TP-E	2	3.17	4170	JED	
11/10/2020	SRK20-Tail-TP-E	3	4.66	14670	JED	
11/10/2020	SRK20-Tail-TP-E	4.5	4.07	4160	JED	
11/10/2020	SRK20-Tail-TP-E	5.5	3.94	5150	JED	
11/10/2020	SRK20-Tail-TP-G	0.1	2.05	7610	JED	
11/10/2020	SRK20-Tail-TP-G	0.35	1.62	>20,000	JED	
11/10/2020	SRK20-Tail-TP-G	0.65	2.12	>20,000	JED	
11/10/2020	SRK20-Tail-TP-G	0.85	2.81	6580	JED	
11/10/2020	SRK20-Tail-TP-G	1.25	4.91	8750	JED	
11/10/2020	SRK20-Tail-TP-G	2.25	3.90	5830	JED	
11/10/2020	SRK20-Tail-TP-G	3.25	4.55	3520	JED	
11/10/2020	SRK20-Tail-TP-G	4.25	4.17	7440	JED	
11/10/2020	SRK20-Tail-TP-G	5.5	5.04	10,100	JED	
11/11/2020	SRK20-Tail-TP-A	0.1	1.78	10680	JED	
11/11/2020	SRK20-Tail-TP-A	0.25	1.85	10870	JED	
11/11/2020	SRK20-Tail-TP-A	0.35	2.20	6260	JED	
11/11/2020	SRK20-Tail-TP-A	0.55	3.25	4160	JED	
11/11/2020	SRK20-Tail-TP-A	1	4.42	5620	JED	
11/11/2020	SRK20-Tail-TP-A	2	4.95	6700	JED	
11/11/2020	SRK20-Tail-TP-A	3.75	4.78	7760	JED	
11/11/2020	SRK20-Tail-TP-D	0.1	1.57	13100	JED	
11/11/2020	SRK20-Tail-TP-D	0.1	1.66	10890	JED	Duplicate
11/11/2020	SRK20-Tail-TP-D	0.4	1.78	11210	JED	
11/11/2020	SRK20-Tail-TP-D	0.6	1.92	12410	JED	
11/11/2020	SRK20-Tail-TP-D	0.82	1.69	>20,000	JED	
11/11/2020	SRK20-Tail-TP-D	1	1.64	>20,000	JED	
11/11/2020	SRK20-Tail-TP-D	2	4.77	6490	JED	
11/11/2020	SRK20-Tail-TP-D	3.5	4.78	7900	JED	
11/11/2020	SRK20-Tail-TP-D	5	4.40	5610	JED	

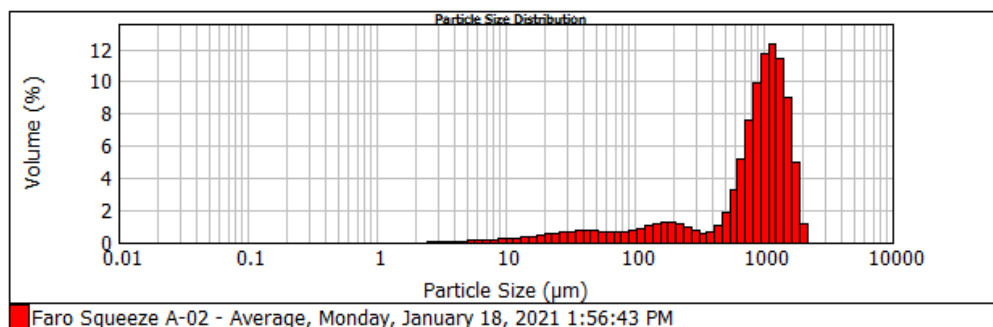
Methods
1:1 solid:solution

50g tailings
50 mL of distilled water

Appendix E Particle Size Analysis Results

Sample Name: Faro Squeeze A-02 - Average	SOP Name:	Measured: Monday, January 18, 2021 1:56:43 PM	
Sample Source & type: Supplier	Measured by: erin	Analysed: Monday, January 18, 2021 1:56:44 PM	
Sample bulk lot ref:	Result Source: Averaged		
Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 11.01 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 1.532 %	Result Emulation: Off
Concentration: 0.2719 %Vol	Span : 1.522	Uniformity: 0.434	Result units: Volume
Specific Surface Area: 0.0186 m ² /g	Surface Weighted Mean D[3,2]: 161.677 um	Vol. Weighted Mean D[4,3]: 908.183 um	Density: 2.000 g/cm ³
d(0.1): 90.409 um d(0.5): 960.596 um d(0.9): 1552.276 um			

Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	4.93	100.00	35	500	1.37	22.18	120	125	1.11	12.01
12	1700	12.58	95.07	40	425	0.84	20.80	140	106	0.92	10.90
14	1400	14.66	82.49	45	355	0.73	19.96	170	90	0.91	9.98
16	1180	14.53	67.82	50	300	1.15	19.23	200	75	0.84	9.07
18	1000	12.28	53.29	60	250	1.38	18.08	230	63	0.86	8.22
20	850	9.90	41.01	70	212	1.54	16.70	270	53	0.85	7.36
25	710	5.69	31.11	80	180	1.68	15.16	325	45	0.89	6.51
30	600	3.25	25.42	100	150	1.48	13.48	400	38		5.62
35	500		22.18	120	125		12.01				



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze E-02 rerun - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 2:10:42 PM

Analysed:
Monday, January 18, 2021 2:10:43 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 22.21 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 2.102 %	Result Emulation: Off

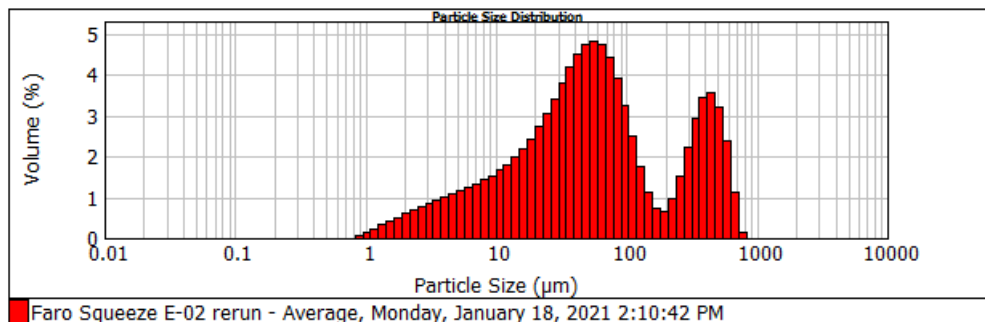
Concentration: 0.0541 %Vol	Span : 8.082	Uniformity: 2.03	Result units: Volume
Specific Surface Area: 0.177 m²/g	Surface Weighted Mean D[3,2]: 16.973 um	Vol. Weighted Mean D[4,3]: 127.131 um	Density: 2.000 g/cm³

d(0.1): 6.678 um d(0.5): 51.499 um d(0.9): 422.904 um

Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.00	100.00
12	1700	0.00	100.00
14	1400	0.00	100.00
16	1180	0.00	100.00
18	1000	0.00	100.00
20	850	0.20	100.00
25	710	1.80	99.80
30	600	1.80	98.00
35	500	3.74	94.26

Mesh No	Aperture µm	Volume In %	Vol Below %
35	500	4.13	94.26
40	425	4.47	90.13
45	355	3.37	85.66
50	300	2.43	82.29
60	250	1.25	79.87
70	212	0.80	78.61
80	180	1.06	77.82
100	150	1.06	76.76
120	125	1.90	74.86

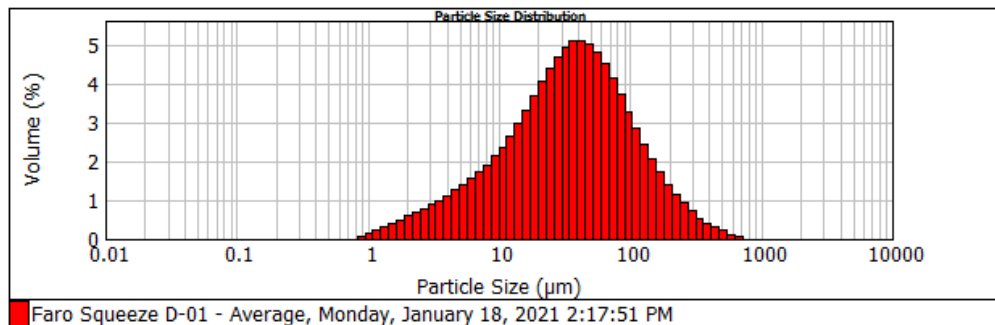
Mesh No	Aperture µm	Volume In %	Vol Below %
120	125	2.80	74.86
140	106	3.85	72.07
170	90	5.36	68.22
200	75	5.82	62.86
230	63	6.03	57.03
270	53	5.61	51.00
325	45	5.44	45.39
400	38		39.95



Operator notes: Pump Speed 1200 RPM

Sample Name: Faro Squeeze D-01 - Average	SOP Name:	Measured: Monday, January 18, 2021 2:17:51 PM	
Sample Source & type: Supplier	Measured by: erin	Analysed: Monday, January 18, 2021 2:17:52 PM	
Sample bulk lot ref:	Result Source: Averaged		
Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle Rf: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 12.38 %
Dispersant Name: Water	Dispersant Rf: 1.330	Weighted Residual: 0.422 %	Result Emulation: Off
Concentration: 0.0244 %Vol	Span : 3.653	Uniformity: 1.2	Result units: Volume
Specific Surface Area: 0.206 m²/g	Surface Weighted Mean D[3,2]: 14.592 um	Vol. Weighted Mean D[4,3]: 58.327 um	Density: 2.000 g/cm³
d(0.1): 6.111 um d(0.5): 35.063 um d(0.9): 134.180 um			

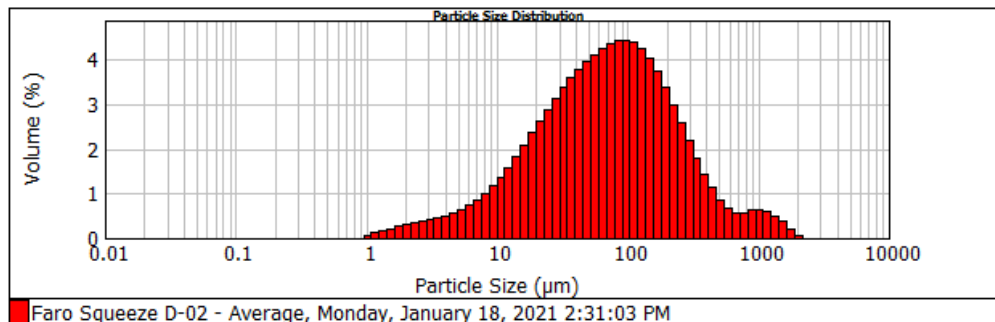
Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.00	100.00	35	500	0.36	99.70	120	125	3.29	88.77
12	1700	0.00	100.00	40	425	0.52	99.34	140	106	3.88	85.48
14	1400	0.00	100.00	45	355	0.68	98.82	170	90	5.05	81.59
16	1180	0.00	100.00	50	300	1.09	98.14	200	75	5.49	76.54
18	1000	0.00	100.00	60	250	1.31	97.05	230	63	5.95	71.06
20	850	0.00	100.00	70	212	1.66	95.74	270	53	5.93	65.11
25	710	0.07	100.00	80	180	2.35	94.08	325	45	6.24	59.18
30	600	0.23	99.93	100	150	2.96	91.73	400	38		52.94
35	500		99.70	120	125		88.77				



Operator notes: Pump Speed 1200 RPM

Sample Name: Faro Squeeze D-02 - Average	SOP Name:	Measured: Monday, January 18, 2021 2:31:03 PM	
Sample Source & type: Supplier	Measured by: erin	Analysed: Monday, January 18, 2021 2:31:04 PM	
Sample bulk lot ref:	Result Source: Averaged		
Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 12.85 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.284 %	Result Emulation: Off
Concentration: 0.0457 %Vol	Span : 4.294	Uniformity: 1.61	Result units: Volume
Specific Surface Area: 0.119 m ² /g	Surface Weighted Mean D[3,2]: 25.310 um	Vol. Weighted Mean D[4,3]: 145.475 um	Density: 2.000 g/cm ³
d(0.1): 11.959 um	d(0.5): 71.001 um	d(0.9): 316.852 um	

Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.22	100.00	35	500	1.25	94.64	120	125	5.20	68.02
12	1700	0.54	99.78	40	425	1.88	93.39	140	106	5.26	62.82
14	1400	0.67	99.24	45	355	2.32	91.50	170	90	5.83	57.56
16	1180	0.75	98.57	50	300	3.18	89.18	200	75	5.43	51.73
18	1000	0.75	97.82	60	250	3.48	86.00	230	63	5.18	46.29
20	850	0.73	97.07	70	212	4.00	82.52	270	53	4.68	41.11
25	710	0.71	96.34	80	180	5.02	78.51	325	45	4.58	36.42
30	600	0.99	95.63	100	150	5.48	73.49	400	38		31.85
35	500		94.64	120	125		68.02				



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze E-01 - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 2:38:14 PM

Analysed:
Monday, January 18, 2021 2:38:15 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 12.38 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 2.418 %	Result Emulation: Off

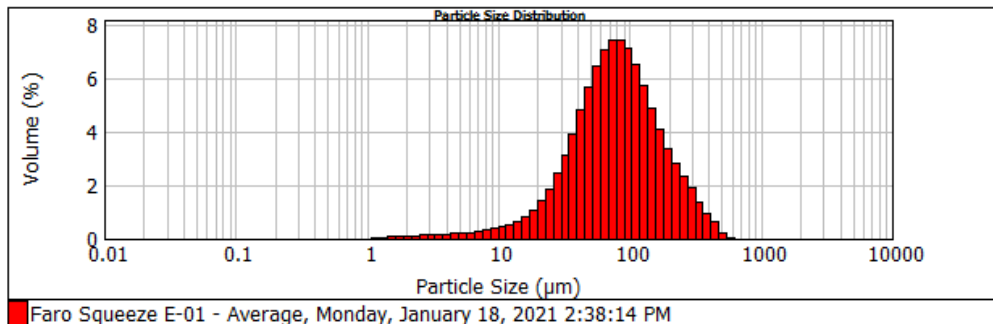
Concentration: 0.0796 %Vol	Span : 2.338	Uniformity: 0.72	Result units: Volume
Specific Surface Area: 0.0674 m ² /g	Surface Weighted Mean D[3,2]: 44.493 um	Vol. Weighted Mean D[4,3]: 102.308 um	Density: 2.000 g/cm ³

d(0.1): 27.224 um d(0.5): 78.637 um d(0.9): 211.045 um

Mesh No	Aperture um	Volume In %	Vol Below %
10	2000	0.00	100.00
12	1700	0.00	100.00
14	1400	0.00	100.00
16	1180	0.00	100.00
18	1000	0.00	100.00
20	850	0.00	100.00
25	710	0.00	100.00
30	600	0.00	100.00
35	500	0.11	99.89

Mesh No	Aperture um	Volume In %	Vol Below %
35	500	0.66	99.89
40	425	1.23	99.23
45	355	1.85	98.00
50	300	2.81	96.15
60	250	3.24	93.34
70	212	4.01	90.10
80	180	5.64	86.09
100	150	7.08	80.45
120	125		73.37

Mesh No	Aperture um	Volume In %	Vol Below %
120	125	7.63	73.37
140	106	8.44	65.74
170	90	9.86	57.30
200	75	9.20	47.43
230	63	8.29	38.23
270	53	6.73	29.94
325	45	5.66	23.21
400	38		17.55



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze G-02 - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 2:46:00 PM

Analysed:
Monday, January 18, 2021 2:46:01 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 12.03 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.255 %	Result Emulation: Off

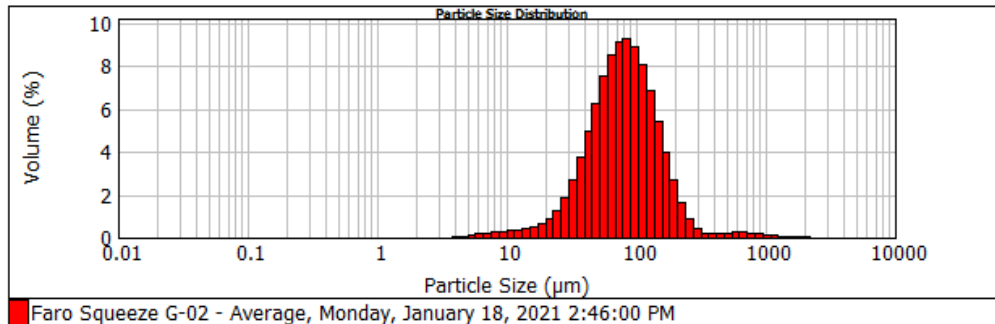
Concentration: 0.1055 %Vol	Span : 1.657	Uniformity: 0.628	Result units: Volume
Specific Surface Area: 0.0505 m²/g	Surface Weighted Mean D[3,2]: 59.409 um	Vol. Weighted Mean D[4,3]: 100.835 um	Density: 2.000 g/cm³

d(0.1): 34.912 um **d(0.5): 79.533 um** **d(0.9): 166.675 um**

Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.03	100.00
12	1700	0.07	99.97
14	1400	0.10	99.90
16	1180	0.12	99.81
18	1000	0.17	99.69
20	850	0.27	99.52
25	710	0.30	99.25
30	600	0.30	98.95
35	500	0.31	98.65

Mesh No	Aperture µm	Volume In %	Vol Below %
35	500	0.22	98.65
40	425	0.21	98.43
45	355	0.33	98.23
50	300	0.88	97.90
60	250	1.75	97.02
70	212	3.17	95.27
80	180	5.69	92.10
100	150	8.20	86.41
120	125		78.21

Mesh No	Aperture µm	Volume In %	Vol Below %
120	125	9.36	78.21
140	106	10.54	68.85
170	90	12.23	58.31
200	75	11.13	46.08
230	63	9.63	34.95
270	53	7.38	25.31
325	45	5.74	17.93
400	38		12.20



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze E-03 - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 2:53:16 PM

Analysed:
Monday, January 18, 2021 2:53:17 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 12.52 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.620 %	Result Emulation: Off

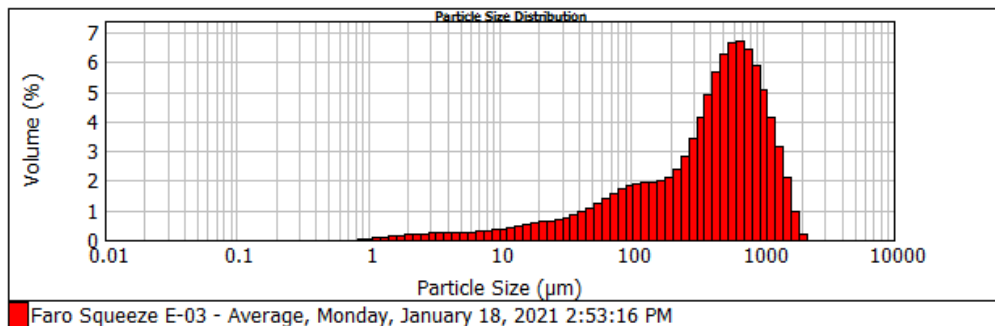
Concentration: 0.1120 %Vol	Span : 2.367	Uniformity: 0.737	Result units: Volume
Specific Surface Area: 0.0508 m ² /g	Surface Weighted Mean D[3,2]: 59.041 um	Vol. Weighted Mean D[4,3]: 520.060 um	Density: 2.000 g/cm ³

d(0.1): 43.746 um **d(0.5): 452.097 um** **d(0.9): 1114.049 um**

Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.90	100.00
12	1700	2.99	99.10
14	1400	4.31	96.10
16	1180	5.61	91.80
18	1000	6.70	86.19
20	850	8.39	79.49
25	710	8.19	71.10
30	600	8.56	62.91
35	500		54.35

Mesh No	Aperture µm	Volume In %	Vol Below %
35	500	6.85	54.35
40	425	6.39	47.51
45	355	4.78	41.12
50	300	4.04	36.35
60	250	2.94	32.30
70	212	2.53	29.36
80	180	2.62	26.84
100	150	2.56	24.22
120	125		21.66

Mesh No	Aperture µm	Volume In %	Vol Below %
120	125	2.28	21.66
140	106	2.18	19.38
170	90	2.24	17.20
200	75	1.88	14.96
230	63	1.60	13.08
270	53	1.28	11.48
325	45	1.13	10.20
400	38		9.07



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze D-03 rerun - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 3:09:28 PM

Analysed:
Monday, January 18, 2021 3:09:30 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 11.41 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.502 %	Result Emulation: Off

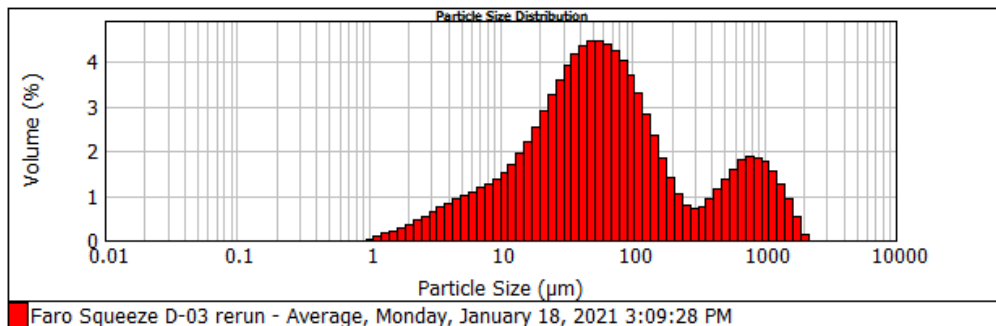
Concentration: 0.0385 %Vol	Span : 12.519	Uniformity: 3.09	Result units: Volume
Specific Surface Area: 0.138 m ² /g	Surface Weighted Mean D[3,2]: 21.665 um	Vol. Weighted Mean D[4,3]: 200.427 um	Density: 2.000 g/cm ³

d(0.1): 8.969 um **d(0.5): 56.689 um** **d(0.9): 718.661 um**

Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.53	100.00
12	1700	1.32	99.47
14	1400	1.70	98.15
16	1180	2.01	96.45
18	1000	2.16	94.43
20	850	2.44	92.27
25	710	2.12	89.84
30	600	1.98	87.72
35	500		85.78

Mesh No	Aperture µm	Volume In %	Vol Below %
35	500	1.42	85.78
40	425	1.20	84.34
45	355	0.89	83.14
50	300	0.98	82.25
60	250	1.16	81.27
70	212	1.64	80.11
80	180	2.57	78.47
100	150	3.44	75.90
120	125		72.46

Mesh No	Aperture µm	Volume In %	Vol Below %
120	125	3.83	72.46
140	106	4.37	68.63
170	90	5.38	64.25
200	75	5.48	58.87
230	63	5.57	53.40
270	53	5.26	47.82
325	45	5.26	42.57
400	38		37.30



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze C-02 - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 3:16:40 PM

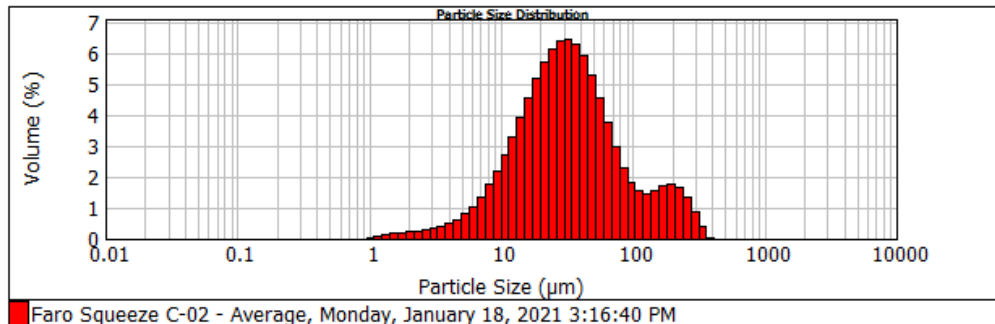
Analysed:
Monday, January 18, 2021 3:16:42 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 11.56 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 2.290 %	Result Emulation: Off

Concentration: 0.0314 %Vol	Span : 3.817	Uniformity: 1.11	Result units: Volume
Specific Surface Area: 0.156 m ² /g	Surface Weighted Mean D[3,2]: 19.197 um	Vol. Weighted Mean D[4,3]: 51.973 um	Density: 2.000 g/cm ³

d(0.1): 9.792 um **d(0.5): 31.295 um** **d(0.9): 129.239 um**

Mesh No	Aperture um	Volume In %	Vol Below %	Mesh No	Aperture um	Volume In %	Vol Below %	Mesh No	Aperture um	Volume In %	Vol Below %
10	2000	0.00	100.00	35	500	0.00	100.00	120	125	1.81	89.65
12	1700	0.00	100.00	40	425	0.05	100.00	140	106	2.15	87.83
14	1400	0.00	100.00	45	355	0.61	99.95	170	90	3.24	85.68
16	1180	0.00	100.00	50	300	1.50	99.33	200	75	4.26	82.44
18	1000	0.00	100.00	60	250	1.94	97.83	230	63	5.51	78.18
20	850	0.00	100.00	70	212	2.09	95.90	270	53	6.30	72.67
25	710	0.00	100.00	80	180	2.18	93.81	325	45	7.36	66.37
30	600	0.00	100.00	100	150	1.98	91.62	400	38		59.01
35	500	0.00	100.00	120	125		89.65				



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze A-04-rerun - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 3:34:19 PM

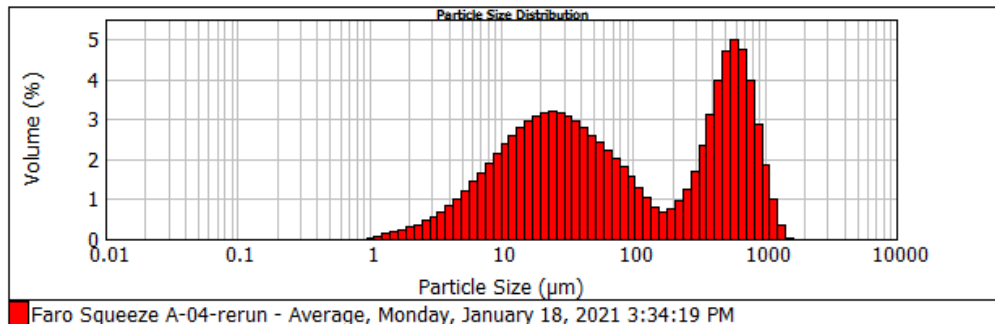
Analysed:
Monday, January 18, 2021 3:34:20 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 13.54 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.937 %	Result Emulation: Off

Concentration: 0.0427 %Vol	Span : 11.986	Uniformity: 3.8	Result units: Volume
Specific Surface Area: 0.142 m ² /g	Surface Weighted Mean D[3,2]: 21.106 um	Vol. Weighted Mean D[4,3]: 249.076 um	Density: 2.000 g/cm ³

d(0.1): 8.106 um **d(0.5): 59.851 um** **d(0.9): 725.505 um**

Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.00	100.00	35	500	4.89	76.98	120	125	1.48	59.28
12	1700	0.04	100.00	40	425	4.06	72.07	140	106	1.84	57.81
14	1400	0.68	99.98	45	355	2.61	68.02	170	90	2.44	55.97
16	1180	1.77	99.27	50	300	1.91	65.40	200	75	2.68	53.53
18	1000	3.07	97.50	60	250	1.20	63.50	230	63	2.96	50.85
20	850	5.14	94.44	70	212	0.88	62.30	270	53	3.08	47.88
25	710	5.91	89.30	80	180	0.93	61.42	325	45	3.44	44.81
30	600	6.43	83.39	100	150	1.22	60.50	400	38		41.37
35	500		76.98	120	125		59.28				



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze A-01 - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 3:40:33 PM

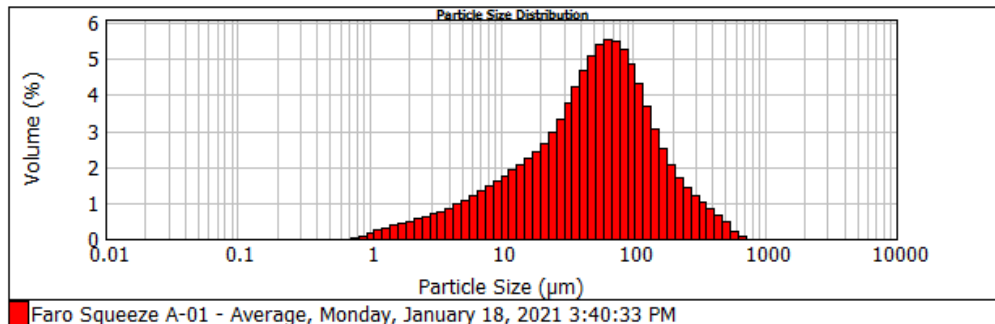
Analysed:
Monday, January 18, 2021 3:40:34 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle Rf: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 17.70 %
Dispersant Name: Water	Dispersant Rf: 1.330	Weighted Residual: 0.571 %	Result Emulation: Off

Concentration: 0.0423 %Vol	Span : 3.263	Uniformity: 1.06	Result units: Volume
Specific Surface Area: 0.172 m ² /g	Surface Weighted Mean D[3,2]: 17.439 um	Vol. Weighted Mean D[4,3]: 78.600 um	Density: 2.000 g/cm ³

d(0.1): 7.483 um **d(0.5): 52.110 um** **d(0.9): 177.503 um**

Mesh No	Aperture um	Volume In %	Vol Below %	Mesh No	Aperture um	Volume In %	Vol Below %	Mesh No	Aperture um	Volume In %	Vol Below %
10	2000	0.00	100.00	35	500	0.72	99.42	120	125	5.01	82.24
12	1700	0.00	100.00	40	425	1.09	98.71	140	106	5.75	77.24
14	1400	0.00	100.00	45	355	1.29	97.62	170	90	7.05	71.49
16	1180	0.00	100.00	50	300	1.73	96.33	200	75	7.00	64.43
18	1000	0.00	100.00	60	250	1.94	94.61	230	63	6.79	57.44
20	850	0.00	100.00	70	212	2.43	92.66	270	53	6.01	50.64
25	710	0.00	100.00	80	180	3.49	90.23	325	45	5.60	44.63
30	600	0.10	99.90	100	150	4.50	88.75	400	38		39.03
35	500	0.48	99.42	120	125		82.24				



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze B-01 - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 3:49:04 PM

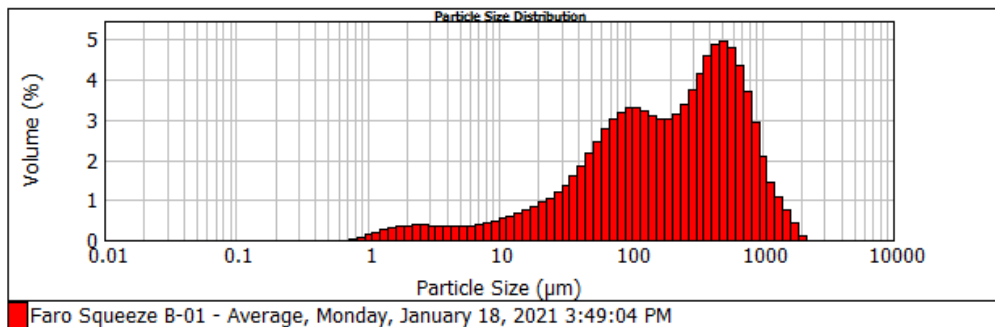
Analysed:
Monday, January 18, 2021 3:49:06 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 12.83 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.492 %	Result Emulation: Off

Concentration: 0.0617 %Vol	Span : 3.621	Uniformity: 1.18	Result units: Volume
Specific Surface Area: 0.0908 m ² /g	Surface Weighted Mean D[3,2]: 33.044 um	Vol. Weighted Mean D[4,3]: 331.265 um	Density: 2.000 g/cm ³

d(0.1): 22.688 um **d(0.5): 212.760 um** **d(0.9): 793.094 um**

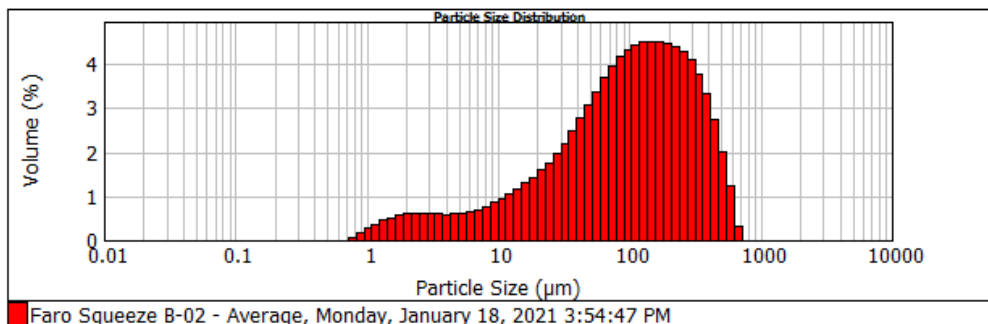
Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.42	100.00	35	500	5.77	74.97	120	125	3.90	38.15
12	1700	1.08	99.58	40	425	5.94	69.20	140	106	3.88	34.25
14	1400	1.48	98.49	45	355	4.92	63.25	170	90	4.15	30.37
16	1180	2.13	97.02	50	300	4.84	58.34	200	75	3.63	26.22
18	1000	3.18	94.88	60	250	3.77	53.70	230	63	3.15	22.60
20	850	4.81	91.71	70	212	3.58	49.92	270	53	2.54	19.44
25	710	5.46	86.90	80	180	4.02	46.34	325	45	2.20	16.90
30	600	6.47	81.44	100	150	4.18	42.33	400	38		14.71
35	500		74.97	120	125		38.15				



Operator notes: Pump Speed 1200 RPM

Sample Name: Faro Squeeze B-02 - Average	SOP Name:	Measured: Monday, January 18, 2021 3:54:47 PM	
Sample Source & type: Supplier	Measured by: erin	Analysed: Monday, January 18, 2021 3:54:49 PM	
Sample bulk lot ref:	Result Source: Averaged		
Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle Rf: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 12.64 %
Dispersant Name: Water	Dispersant Rf: 1.330	Weighted Residual: 0.856 %	Result Emulation: Off
Concentration: 0.0312 %Vol	Span : 3.472	Uniformity: 1.05	Result units: Volume
Specific Surface Area: 0.154 m ² /g	Surface Weighted Mean D[3,2]: 19.511 um	Vol. Weighted Mean D[4,3]: 146.578 um	Density: 2.000 g/cm ³
d(0.1): 9.787 um d(0.5): 100.362 um d(0.9): 358.222 um			

Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.00	100.00	35	500	3.04	97.14	120	125	5.31	57.04
12	1700	0.00	100.00	40	425	4.34	94.10	140	106	5.13	51.73
14	1400	0.00	100.00	45	355	4.72	89.76	170	90	5.43	46.61
16	1180	0.00	100.00	50	300	5.56	85.04	200	75	4.80	41.18
18	1000	0.00	100.00	60	250	5.24	79.48	230	63	4.31	36.38
20	850	0.00	100.00	70	212	5.30	74.24	270	53	3.63	32.08
25	710	0.00	100.00	80	180	5.95	68.94	325	45	3.30	28.45
30	600	0.70	99.30	100	150	5.95	62.99	400	38		25.15
35	500	2.16	97.14	120	125	5.95	57.04				



Operator notes: Pump Speed 1200 RPM

Sample Name:
Faro Squeeze G-01 - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Monday, January 18, 2021 4:01:08 PM

Analysed:
Monday, January 18, 2021 4:01:09 PM

Particle Name: Pyrite	Accessory Name: Hydro 2000MU (A)	Analysis model: General purpose	Sensitivity: Normal
Particle RI: 1.810	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 20.58 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.635 %	Result Emulation: Off

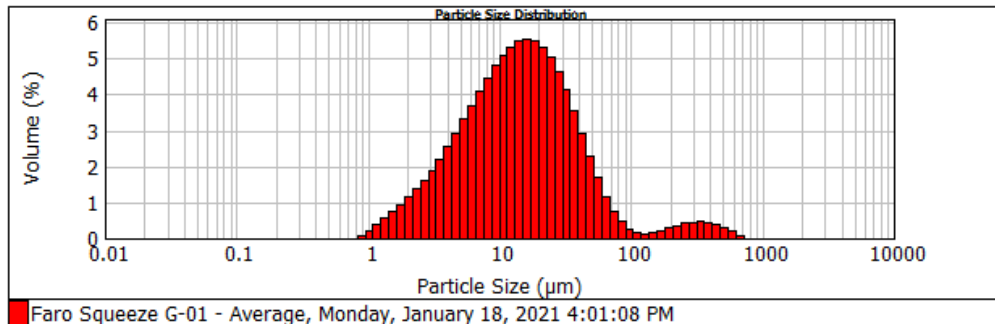
Concentration: 0.0243 %Vol	Span : 3.098	Uniformity: 1.64	Result units: Volume
Specific Surface Area: 0.363 m ² /g	Surface Weighted Mean D[3,2]: 8.272 um	Vol. Weighted Mean D[4,3]: 30.290 um	Density: 2.000 g/cm ³

d(0.1): 3.552 um **d(0.5): 14.085 um** **d(0.9): 47.193 um**

Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.00	100.00
12	1700	0.00	100.00
14	1400	0.00	100.00
16	1180	0.00	100.00
18	1000	0.00	100.00
20	850	0.00	100.00
25	710	0.15	100.00
30	600	0.35	99.85
35	500		99.50

Mesh No	Aperture µm	Volume In %	Vol Below %
35	500	0.41	99.50
40	425	0.55	99.09
45	355	0.55	98.54
50	300	0.57	97.99
60	250	0.44	97.41
70	212	0.32	96.98
80	180	0.24	96.65
100	150	0.17	96.41
120	125		96.24

Mesh No	Aperture µm	Volume In %	Vol Below %
120	125	0.18	96.24
140	106	0.32	96.06
170	90	0.71	95.74
200	75	1.23	95.03
230	63	1.97	93.80
270	53	2.70	91.83
325	45	3.72	89.13
400	38		85.41



Operator notes: Pump Speed 1200 RPM

Sample Name:
SD-GC-01 Faro 2020 Tails - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Tuesday, October 13, 2020 2:15:30 PM

Analysed:
Tuesday, October 13, 2020 2:15:32 PM

Particle Name:
soft clay

Particle RI:
1.550

Dispersant Name:
Water

Accessory Name:
Hydro 2000MU (A)

Absorption:
0

Dispersant RI:
1.330

Analysis model:
Multiple narrow modes

Size range:
0.020 to 2000.000 μm

Weighted Residual:
0.788 %

Sensitivity:
Enhanced

Obscuration:
13.35 %

Result Emulation:
Off

Concentration:
0.0243 %Vol

Span :
24.873

Uniformity:
6.27

Result units:
Volume

Specific Surface Area:
0.452 m^2/g

Surface Weighted Mean D[3,2]:
13.279 μm

Vol. Weighted Mean D[4,3]:
144.653 μm

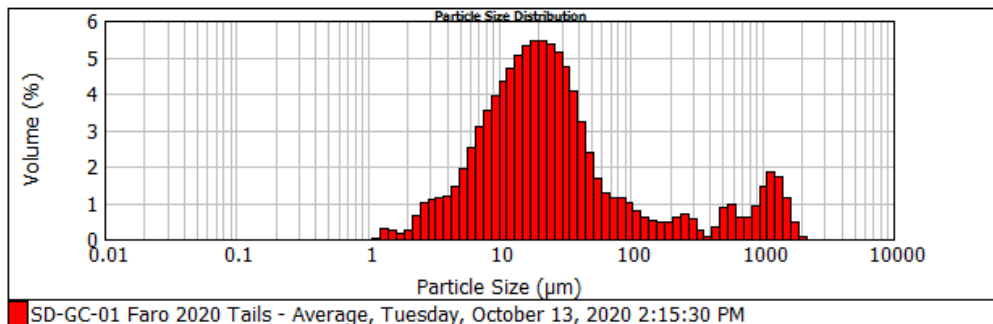
Density:
1.000 g/cm^3

d(0.1): 5.948 μm **d(0.5): 21.285 μm** **d(0.9): 535.362 μm**

Mesh No	Aperture μm	Volume In %	Vol Below %
10	2000	0.41	100.00
12	1700	1.61	99.59
14	1400	2.27	97.98
16	1180	2.00	95.71
18	1000	1.23	93.71
20	850	0.80	92.49
25	710	0.82	91.68
30	600	1.31	90.86
35	500		89.55

Mesh No	Aperture μm	Volume In %	Vol Below %
35	500	0.50	89.55
40	425	0.11	89.05
45	355	0.39	88.93
50	300	0.85	88.54
60	250	0.73	87.70
70	212	0.56	86.97
80	180	0.64	86.40
100	150	0.74	85.77
120	125		85.02

Mesh No	Aperture μm	Volume In %	Vol Below %
120	125	0.90	85.02
140	106	1.18	84.12
170	90	1.49	82.95
200	75	1.50	81.46
230	63	1.96	79.96
270	53	2.83	78.00
325	45	4.22	75.17
400	38		70.95



Operator notes: Pump Speed 1300 RPM

Sample Name:
SD-GC-02 Faro 2020 Tails - Average

Sample Source & type:
Supplier

Sample bulk lot ref:

SOP Name:

Measured by:
erin

Result Source:
Averaged

Measured:
Tuesday, October 13, 2020 2:24:14 PM

Analysed:
Tuesday, October 13, 2020 2:24:15 PM

Particle Name: soft clay	Accessory Name: Hydro 2000MU (A)	Analysis model: Multiple narrow modes	Sensitivity: Enhanced
Particle Rf: 1.550	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 7.92 %
Dispersant Name: Water	Dispersant Rf: 1.330	Weighted Residual: 0.534 %	Result Emulation: Off

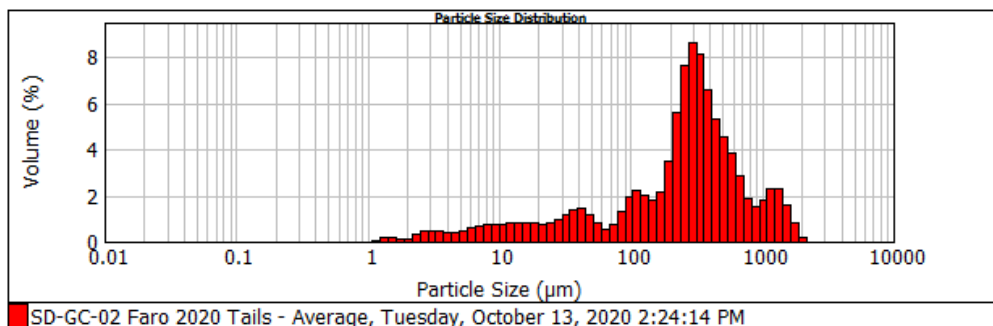
Concentration: 0.0464 %Vol	Span : 2.978	Uniformity: 0.855	Result units: Volume
Specific Surface Area: 0.145 m ² /g	Surface Weighted Mean D[3,2]: 41.483 um	Vol. Weighted Mean D[4,3]: 372.485 um	Density: 1.000 g/cm ³

d(0.1): 19.441 um d(0.5): 285.464 um d(0.9): 869.600 um

Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.79	100.00
12	1700	2.30	99.21
14	1400	2.92	96.92
16	1180	2.41	94.00
18	1000	1.83	91.58
20	850	2.47	89.75
25	710	3.83	87.28
30	600	5.55	83.45
35	500		77.90

Mesh No	Aperture µm	Volume In %	Vol Below %
35	500	5.99	77.90
40	425	8.61	71.90
45	355	10.18	63.29
50	300	10.85	53.12
60	250	7.21	42.27
70	212	4.12	35.07
80	180	2.62	30.94
100	150	2.50	28.32
120	125		25.83

Mesh No	Aperture µm	Volume In %	Vol Below %
120	125	2.62	25.83
140	106	2.30	23.21
170	90	1.51	20.91
200	75	0.72	19.40
230	63	0.91	18.68
270	53	1.41	17.77
325	45	1.73	16.36
400	38		14.63

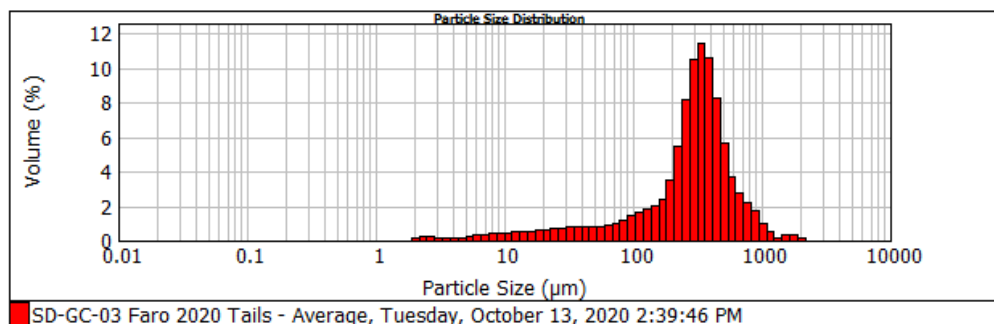


SD-GC-02 Faro 2020 Tails - Average, Tuesday, October 13, 2020 2:24:14 PM

Operator notes: Pump Speed 1300 RPM

Sample Name: SD-GC-03 Faro 2020 Tails - Average	SOP Name:	Measured: Tuesday, October 13, 2020 2:39:46 PM	
Sample Source & type: Supplier	Measured by: erin	Analysed: Tuesday, October 13, 2020 2:39:47 PM	
Sample bulk lot ref:	Result Source: Averaged		
Particle Name: soft clay	Accessory Name: Hydro 2000MU (A)	Analysis model: Multiple narrow modes	Sensitivity: Enhanced
Particle RI: 1.550	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 5.39 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.261 %	Result Emulation: Off
Concentration: 0.0526 %Vol	Span : 1.797	Uniformity: 0.544	Result units: Volume
Specific Surface Area: 0.0796 m²/g	Surface Weighted Mean D[3,2]: 75.345 um	Vol. Weighted Mean D[4,3]: 338.298 um	Density: 1.000 g/cm³
d(0.1): 46.945 um d(0.5): 311.132 um d(0.9): 606.108 um			

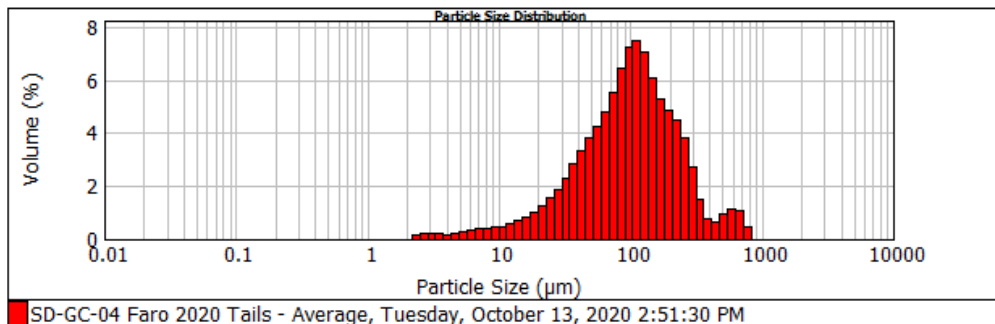
Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.39	100.00	35	500	9.00	83.64	120	125	2.01	18.09
12	1700	0.45	99.61	40	425	13.73	74.63	140	106	1.89	16.08
14	1400	0.27	99.17	45	355	13.79	60.91	170	90	1.49	14.39
16	1180	0.92	98.90	50	300	12.24	47.12	200	75	1.16	12.90
18	1000	1.79	97.97	60	250	7.18	34.88	230	63	1.03	11.74
20	850	2.89	96.18	70	212	4.16	27.70	270	53	0.97	10.72
25	710	3.54	93.29	80	180	2.97	23.53	325	45	1.03	9.75
30	600	6.11	89.75	100	150	2.47	20.56	400	38		8.72
35	500		83.64	120	125		18.09				



Operator notes: Pump Speed 1300 RPM

Sample Name: SD-GC-04 Faro 2020 Tails - Average	SOP Name:	Measured: Tuesday, October 13, 2020 2:51:30 PM	
Sample Source & type: Supplier	Measured by: erin	Analysed: Tuesday, October 13, 2020 2:51:32 PM	
Sample bulk lot ref:	Result Source: Averaged		
Particle Name: soft clay	Accessory Name: Hydro 2000MU (A)	Analysis model: Multiple narrow modes	Sensitivity: Enhanced
Particle RI: 1.550	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 7.51 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.453 %	Result Emulation: Off
Concentration: 0.0526 %Vol	Span : 2.355	Uniformity: 0.79	Result units: Volume
Specific Surface Area: 0.12 m ² /g	Surface Weighted Mean D[3,2]: 50.105 um	Vol. Weighted Mean D[4,3]: 134.729 um	Density: 1.000 g/cm ³
d(0.1): 27.774 um d(0.5): 101.299 um d(0.9): 266.303 um			

Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.00	100.00	35	500	0.84	96.74	120	125	8.89	61.34
12	1700	0.00	100.00	40	425	1.03	95.90	140	106	8.57	52.45
14	1400	0.00	100.00	45	355	2.22	94.88	170	90	8.22	43.88
16	1180	0.00	100.00	50	300	4.39	92.65	200	75	6.46	35.66
18	1000	0.00	100.00	60	250	5.25	88.26	230	63	5.45	29.20
20	850	0.58	100.00	70	212	5.73	83.02	270	53	4.50	23.76
25	710	1.32	99.42	80	180	7.20	77.28	325	45	3.95	19.25
30	600	1.36	98.10	100	150	8.75	70.09	400	38		15.31
35	500		96.74	120	125		61.34				



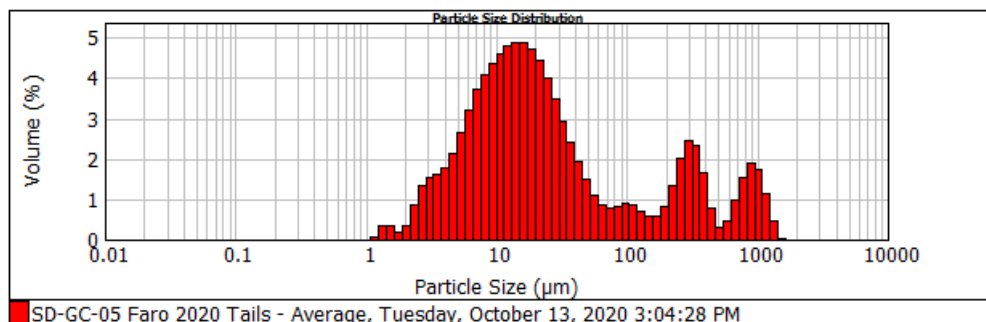
Operator notes: Pump Speed 1300 RPM

Sample Name: SD-GC-05 Faro 2020 Tails - Average	SOP Name:	Measured: Tuesday, October 13, 2020 3:04:28 PM	
Sample Source & type: Supplier	Measured by: erin	Analysed: Tuesday, October 13, 2020 3:04:29 PM	
Sample bulk lot ref:	Result Source: Averaged		
Particle Name: soft clay	Accessory Name: Hydro 2000MU (A)	Analysis model: Multiple narrow modes	Sensitivity: Enhanced
Particle RI: 1.550	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 23.11 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.789 %	Result Emulation: Off
Concentration: 0.0383 %Vol	Span : 20.447	Uniformity: 6.46	Result units: Volume
Specific Surface Area: 0.514 m²/g	Surface Weighted Mean D[3,2]: 11.664 um	Vol. Weighted Mean D[4,3]: 129.666 um	Density: 1.000 g/cm³
d(0.1): 4.867 um d(0.5): 18.616 um d(0.9): 385.520 um			

Mesh No	Aperture um	Volume In %	Vol Below %
10	2000	0.00	100.00
12	1700	0.06	100.00
14	1400	0.85	99.94
16	1180	1.77	99.08
18	1000	2.21	97.31
20	850	2.00	95.10
25	710	1.01	93.10
30	600	0.40	92.09
35	500		91.69

Mesh No	Aperture um	Volume In %	Vol Below %
35	500	0.71	91.69
40	425	2.14	90.97
45	355	2.95	88.83
50	300	2.97	85.88
60	250	1.77	82.91
70	212	0.99	81.14
80	180	0.76	80.15
100	150	0.85	79.39
120	125		78.54

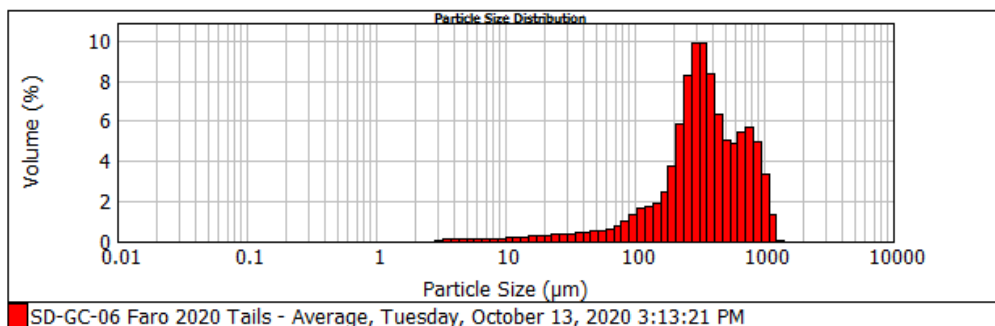
Mesh No	Aperture um	Volume In %	Vol Below %
120	125	0.99	78.54
140	106	1.06	77.54
170	90	1.07	76.49
200	75	1.01	75.42
230	63	1.31	74.41
270	53	1.78	73.10
325	45	2.50	71.31
400	38		68.81



Operator notes: Pump Speed 1300 RPM

Sample Name: SD-GC-06 Faro 2020 Tails - Average		SOP Name:	Measured: Tuesday, October 13, 2020 3:13:21 PM
Sample Source & type: Supplier		Measured by: erin	Analysed: Tuesday, October 13, 2020 3:13:22 PM
Sample bulk lot ref:		Result Source: Averaged	
Particle Name: soft clay	Accessory Name: Hydro 2000MU (A)	Analysis model: Multiple narrow modes	Sensitivity: Enhanced
Particle RI: 1.550	Absorption: 0	Size range: 0.020 to 2000.000 um	Obscuration: 8.09 %
Dispersant Name: Water	Dispersant RI: 1.330	Weighted Residual: 0.833 %	Result Emulation: Off
Concentration: 0.1724 %Vol	Span : 2.107	Uniformity: 0.599	Result units: Volume
Specific Surface Area: 0.0421 m²/g	Surface Weighted Mean D[3,2]: 142.419 um	Vol. Weighted Mean D[4,3]: 410.240 um	Density: 1.000 g/cm³
d(0.1): 110.191 um		d(0.5): 339.485 um	d(0.9): 825.470 um

Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %	Mesh No	Aperture µm	Volume In %	Vol Below %
10	2000	0.00	100.00	35	500	6.98	71.01	120	125	1.98	11.54
12	1700	0.00	100.00	40	425	10.87	84.03	140	106	1.61	9.56
14	1400	0.00	100.00	45	355	12.20	93.18	170	90	1.27	7.96
16	1180	0.38	99.62	50	300	12.01	40.96	200	75	0.84	6.69
18	1000	5.43	96.58	60	250	7.57	28.95	230	63	0.69	5.84
20	850	7.32	91.16	70	212	4.44	21.37	270	53	0.61	5.16
25	710	6.44	83.84	80	180	3.00	16.94	325	45	0.58	4.55
30	600	6.39	77.40	100	150	2.40	13.94	400	38		3.97
35	500		71.01	120	125		11.54				



SD-GC-06 Faro 2020 Tails - Average, Tuesday, October 13, 2020 3:13:21 PM

Operator notes: Pump Speed 1300 RPM

Appendix F ABA and Elemental Data

	ABA Data								Aqua Regia Element Scan																					
Sample ID	Paste pH	Total S	Sulphate (HCL Leach)	Sulphide Calc	TIC	Equiv. CaCO3	Fizz Test	Modified Sobek NP	Mo	Cu	Pb	Zn	Ag	Ni	Co	Mn	Fe	As	U	Au	Th	Sr	Cd	Sb	Bi	V	Ca	P	La	Cr
	S.U.	% S	% S	% S	%C	kg CaCO3/t	Visual	kg CaCO3/t	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppb	ppm	ppm	ppm	ppm	ppm	ppm	%	%	ppm	ppm
Detection Limit	0.2	0.005	0.01	0.01	0.02	1.7		0.5	0.05	0.2	0.2	1	0.01	0.2	0.1	5	0.01	0.1	0.05	0.0005	0.2	0.2	0.01	0.05	0.01	1	0.01	10	0.2	1
SD-GC-01 023839	3.41	17.3	0.66	16.64	0.25	20.8	None	-11.9	7.09	933.4	<10000	7228	18.12	29.8	86.7	307	16.76	838.1	3.33	0.093	1.7	21.8	29.97	38.76	1.66	41	0.26	630	5.3	72
SD-GC-03 023841	3.81	36	0.16	35.84	0.32	26.7	None	-2.4	3.04	1029.3	3014.3	<10000	5.3	14.7	193.9	507	34.09	599.4	0.85	0.0618	0.4	4.7	13.21	19.5	0.55	12	0.06	56	3	56
SD-GC-04 023849	3.62	16.7	0.52	16.18	0.29	24.2	None	-7.4	6.49	794.9	7800.3	7818	11.88	23.4	61.2	319	16.34	635.4	2.8	0.073	1.5	15.5	10.48	31.7	1.3	37	0.26	399	4.5	90
SD-GC-05 023850	4.41	7.68	0.46	7.22	0.28	23.3	None	-1.8	5.47	516.5	4769.1	8204	7.94	46	53.6	437	10.15	191.7	3.08	0.0278	3	33.1	12.59	21.87	1.06	47	0.73	627	11.2	89
SRK20-Tail-TP-A01	2.26	23	1.69	21.31	<0.02	<1.7	None	-23.3	7.34	829.8	8461.9	465	20.97	8.4	88.9	51	20.47	325.8	0.36	0.3433	0.4	22	0.39	32.58	1.29	10	1.01	32	0.8	46
SRK20-Tail-TP-A02	2.93	23.6	1.53	22.07	0.17	14.2	None	-27.2	5.54	1523.2	4969.1	5397	13.18	32.2	107.2	991	24.56	1788.8	2.33	0.1221	1	22.8	10.34	37.25	0.63	31	0.88	482	1.5	49
SRK20-TAIL-TP-A03	4.05	26.4	0.51	25.89	0.46	38.3	None	4.5	5.01	1012.2	4978.5	<10000	11.32	33.4	136.2	1754	27.47	1131.8	2.08	0.1058	0.4	14.2	12.41	35.49	0.95	15	0.39	183	1.1	54
SRK20-Tail-TP-A04	3.89	25.5	0.45	25.05	0.71	59.2	Slight	-3.4	6.89	1344.8	4641	8813	15.49	21.9	79.5	2655	26.37	868.9	2.31	0.1437	0.6	16	9.69	29.78	0.88	21	0.54	282	1.2	45
SRK20-TAIL-TP-A05	3.94	25.9	0.36	25.54	0.64	53.3	Slight	1.3	4.23	1065.9	5029.9	8569	12.24	26.4	123.3	1856	27.72	687.1	1.36	0.131	0.5	15.2	10.63	31	1.27	16	0.34	214	1.8	47
SRK20-Tail-TP-B01	2.27	25.3	1.67	23.63	<0.02	<1.7	None	-16.3	6.57	744.2	<10000	332	23.98	8.4	98	9	22.47	307.9	0.4	0.354	<0.2	17.8	0.26	24.18	1.12	4	0.58	13	0.5	50
SRK20-Tail-TP-B02	2.41	27.2	1.71	25.49	<0.02	<1.7	None	-22.8	4.81	678.3	7286.7	1088	15.7	12.1	114.4	33	25.52	949.6	0.43	0.2384	0.3	17.3	0.65	38.56	0.92	11	0.69	50	0.6	57
SRK20-TAIL-TP-B03	3.88	22.5	1.16	21.34	0.7	58.3	Slight	4.6	5.37	1156.1	4894.9	<10000	14.22	59	126	3985	24.63	1003.1	2.84	0.1827	0.5	23.3	39.96	39.45	1.09	15	0.72	224	1.3	45
SRK20-TAIL-TP-B04	4.58	25	0.35	24.65	0.41	34.2	Slight	5.7	4.85	876	5864.6	<10000	12.01	20.4	91.7	1976	25.06	768.1	1.59	0.8492	0.4	15.4	14.53	30.44	0.73	16	0.38	162	1.3	68
SRK20-TAIL-TP-B05	3.4	31.1	0.29	30.81	0.46	38.3	None	-4.1	4.08	1224	4467.8	9892	9.94	22.5	148.2	641	31.16	530	0.92	0.0574	0.5	9.8	11.55	25.58	0.79	14	0.12	114	2	52
SRK20-TAIL-TP-B06	3.58	22.4	0.74	21.66	0.67	55.8	None	-5.2	5.63	1204.8	6125.6	9071	11.54	35.3	108.8	1758	24.18	651.9	1.91	0.0693	0.8	16.5	10.12	29.9	1.48	20	0.44	302	2.5	49
SRK20-TAIL-TP-C01	2.04	17.4	1.87	15.53	<0.02	<1.7	None	-19.2	6.3	762.3	8148.5	944	17.02	7.8	66.3	33	16.04	289.4	0.32	0.2103	0.2	26.8	0.99	31.31	0.86	7	1.08	38	1	61
SRK20-Tail-TP-C02	2.63	22.1	4.24	17.86	0.06	5	None	-108	4.34	642.2	3131.2	1871	10.29	18	81.8	316	24.64	2087	1.32	0.1025	0.8	13.9	2.35	34.46	0.97	22	0.38	537	1.1	44
SRK20-TAIL-TP-C03	3.77	26.9	1.01	25.89	0.88	73.3	Slight	-2.2	5.28	1770.4	4038.2	<10000	10.87	44.8	165.2	3574	29.66	956.1	2.98	0.1382	0.5	21.7	10.13	28.38	0.97	15	0.76	200	2	35
SRK20-TAIL-TP-C05	3.57	24	0.54	23.46	0.7	58.3	None	-5.1	6.43	1779.6	7509.1	8505	12.23	29	114.6	1806	26.53	612.6	2	0.1031	0.9	16.2	10.17	32.65	1.05	16	0.34	259	3.3	38
SRK20-Tail-TP-D01	2.15	25.6	2.61	22.99	<0.02	<1.7	None	-73.4	4.9	549.1	5275.4	530	15.07	15.8	120.7	6	23.97	572.3	0.34	0.9499	0.4	15.8	0.11	37.01	0.88	8	0.13	109	2.2	44
SRK20-Tail-TP-D02	2.58	20.6	2	18.6	0.07	5.8	None	-60.8	5.25	4204	7578	5178	16.58	27.4	110.1	244	21.64	2313.8	2.9	0.094	1.1	17.1	30.08	53.02	1.63	72	0.24	2853	2.2	111
SRK20-Tail-TP-D03	3.31	30.2	0.76	29.44	0.47	39.2	None	-12.8	5.6	1165	9862.5	<10000	12.86	25.3	101.4	763	28.82	303.1	2.74	0.0386	0.5	8.5	21.8	25.37	0.79	15	0.33	248	1.4	39
SRK20-TAIL-TP-D04	3.67	26.1	0.53	25.57	0.5	41.7	None	-4	4.52	869	4520.2	<10000	12.97	26.4	112.1	820	27.63	582.4	1.96	0.0523	0.8	12.8	13.1	35.07	0.72	20	0.2	404	2.3	51
SRK20-TAIL-TP-D05	2.61	22.1	0.99	21.11	0.59	49.2	None	-19.7	6.23	603.7	7595.3	4194	11.05	25.2	86.2	467	25.19	433.9	2.38	0.0465	1.4	13.5	6.16	28.22	0.62	24	0.22	313	3.9	40
SRK20-Tail-TP-E01	2.46	27.4	0.42	26.98	<0.02	<1.7	None	-9	6.13	521.4	7999.4	138	19.01	7.6	104	<5	23.49	323.8	0.26	0.1166	0.3	10.1	0.13	16.29	0.97	7	<0.01	28	1.7	65
SRK20-Tail-TP-E02	2.17	29.8	1.92	27.88	<0.02	<1.7	None	-47.3	6.15	384.7	9093.4	1171	21.82	13.1	138	29	24.98	503.1	0.47	0.1232	0.5	14.1	1.23	35.01	0.97	15	0.12	289	2	48
SRK20-Tail-TP-E03	2.88	11.9	0.5	11.4	<0.02	<1.7	None	-9.2	6.73	740.4	4742.5	6928	11.85	16.4	52.3	34	12.54	479.4	1.27	0.0793	1.7	10.1	7.89	22.51	0.68	15	0.12	356	2.7	71
SRK20-TAIL-TP-E04	4.04	28	0.69	27.31	0.38	31.7	None	-4.4	4.63	812.7	5402.8	<10000	10.48	25.1	120.5	518	27.93	285.3	1.32	0.0836	0.7	9.7	21.32	26	0.59	14	0.22	193	1.9	55
SRK20-TAIL-TP-E06	4.62	9.44	0.06	9.38	0.59	49.2	None	4.7	8.28	386	5311.8	<10000	14.95	38.6	33.6	547	11.88	239.4	3.18	0.048	1.5	25.5	13.6	37.86	0.71	43	0.24	758	3.3	71
SRK20-Tail-TP-G01	2.32	26.7	4.06	22.64	<0.02	<1.7	None	-102.3	3.39	1850.1	7453.8	1120	9.13	13.7	101	<5	28.59	1443.6	1.5	0.0496	2	9.9	0.29	27.24	0.61	21	0.3	681	2.5	28
SRK20-Tail-TP-G02	2.61	43.2	0.58	42.62																										

	Aqua Regia Element Scan																		
Sample ID	Mg	Ba	Ti	B	Al	Na	K	W	Sc	Tl	S	Hg	Se	Ga	Te	Y	Zn	Zr	Pb
	%	ppm	%	ppm	%	%	%	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	%	ppm	%	ppm
Detection Limit	0.01	10	0.005	10	0.01	0.01	0.01	0.05	0.1	0.02	0.01	0.05	0.2	0.05	0.01	0.05	1	0.5	0.2
SD-GC-01 023839	0.09	16	<0.005	23	0.6	0.01	0.11	2.27	2.4	10.66	>10	8.225	1.5	5.41	0.05	2.6	7228	5.8	>10000
SD-GC-03 023841	0.09	11	<0.005	48	0.1	<0.01	0.03	2.55	0.8	4.21	>10	5.352	1.8	2.27	0.02	1.17	>10000	1.1	3014.3
SD-GC-04 023849	0.1	<10	0.005	16	0.48	0.01	0.1	2.18	2.1	7.58	>10	7.117	1	3.68	0.04	2.51	7818	5.6	7800.3
SD-GC-05 023850	0.48	15	0.042	15	1.35	0.05	0.26	1.33	3.3	5.18	7.92	4.148	0.9	5.86	0.06	5.74	8204	8.6	4769.1
SRK20-Tail-TP-A01	0.03	206	<0.005	24	0.12	<0.01	0.07	1.95	0.3	11.7	>10	6.838	1.4	2.77	0.01	0.36	465	2.2	8461.9
SRK20-Tail-TP-A02	0.23	235	<0.005	26	0.62	<0.01	0.07	1.66	1.9	7.43	>10	3.916	0.9	8.64	0.03	1.93	5397	3.7	4969.1
SRK20-TAIL-TP-A03	0.22	118	<0.005	31	0.26	<0.01	0.04	1.37	1	7.61	>10	4.436	1.1	2.16	<0.01	2.17	>10000	2	4978.5
SRK20-Tail-TP-A04	0.32	308	<0.005	28	0.29	<0.01	0.05	1.63	1.2	6.81	>10	3.262	0.8	4.35	0.03	3.28	8813	2.6	4641
SRK20-TAIL-TP-A05	0.25	114	<0.005	39	0.2	<0.01	0.04	2.12	1.2	6.17	>10	3.654	1.1	1.95	0.03	2.71	8569	1.8	5029.9
SRK20-Tail-TP-B01	0.02	228	<0.005	20	0.08	<0.01	0.07	1.55	0.1	10.16	>10	9.597	1.1	1.29	<0.01	0.25	332	1.6	>10000
SRK20-Tail-TP-B02	0.05	262	<0.005	26	0.13	<0.01	0.05	1.21	0.5	7.78	>10	6.338	1.4	1.96	0.04	0.44	1088	2.5	7286.7
SRK20-TAIL-TP-B03	0.31	121	<0.005	30	0.4	<0.01	0.04	2.29	1.7	7.43	>10	3.741	0.8	3.12	0.02	3.42	>10000	2.1	4894.9
SRK20-TAIL-TP-B04	0.21	88	<0.005	28	0.23	<0.01	0.04	0.95	1.6	6.73	>10	5.584	0.9	2.03	0.01	2.37	>10000	1.7	5864.6
SRK20-TAIL-TP-B05	0.16	97	<0.005	44	0.15	<0.01	0.04	1.97	1	4.61	>10	4.263	1.4	1.37	0.02	2.19	9892	1.7	4467.8
SRK20-TAIL-TP-B06	0.28	127	<0.005	29	0.33	<0.01	0.07	2.75	1.6	5.52	>10	3.65	1.1	2.22	0.04	3.98	9071	3.2	6125.6
SRK20-TAIL-TP-C01	0.03	122	<0.005	18	0.1	<0.01	0.08	2.13	0.4	10.66	>10	7.575	0.9	1.26	0.04	0.36	944	1.9	8148.5
SRK20-Tail-TP-C02	0.08	173	<0.005	26	0.28	<0.01	0.03	1.34	0.6	6.13	>10	2.129	0.8	10.03	<0.01	1.03	1871	2	3131.2
SRK20-TAIL-TP-C03	0.34	107	<0.005	40	0.29	<0.01	0.04	2.15	1.4	5.5	>10	2.879	1.2	2.7	0.03	4.31	>10000	2.5	4038.2
SRK20-TAIL-TP-C05	0.26	133	<0.005	34	0.24	<0.01	0.06	3.59	1.6	4.82	>10	3.476	1.3	2	<0.01	3.86	8505	3.2	7509.1
SRK20-Tail-TP-D01	0.03	119	<0.005	28	0.12	<0.01	0.04	2.68	0.3	7.1	>10	3.12	1.4	1.08	<0.01	0.63	530	2	5275.4
SRK20-Tail-TP-D02	0.06	221	0.007	21	0.47	<0.01	0.09	2.94	5.9	14.41	>10	4.164	1.1	22.71	0.03	1.93	5178	8.9	7578
SRK20-Tail-TP-D03	0.17	276	<0.005	29	0.22	<0.01	0.05	1.44	1.2	6.07	>10	8.148	0.9	3.53	0.03	2.98	>10000	2.1	9862.5
SRK20-TAIL-TP-D04	0.18	128	<0.005	33	0.28	<0.01	0.05	3.24	1.4	8.22	>10	5.021	0.9	2	0.02	3.02	>10000	2.8	4520.2
SRK20-TAIL-TP-D05	0.19	44	<0.005	31	0.37	<0.01	0.1	3.76	1.7	6.65	>10	2.025	1.1	1.92	0.01	4.78	4194	4.3	7595.3
SRK20-Tail-TP-E01	0.02	76	<0.005	23	0.11	<0.01	0.06	3.35	0.1	4.77	>10	6.904	1.2	0.78	0.04	0.39	138	1	7999.4
SRK20-Tail-TP-E02	0.02	137	<0.005	21	0.15	<0.01	0.04	3.02	0.3	8.02	>10	8.41	1.6	2.99	0.07	0.62	1171	2	9093.4
SRK20-Tail-TP-E03	0.03	38	<0.005	10	0.21	<0.01	0.05	2.36	0.7	4.95	>10	4.212	1.1	2.43	0.06	0.84	6928	2.9	4742.5
SRK20-TAIL-TP-E04	0.18	92	0.005	35	0.23	<0.01	0.06	1.37	1.3	7.11	>10	8.094	1	1.88	<0.01	2.24	>10000	2.1	5402.8
SRK20-TAIL-TP-E06	0.15	211	<0.005	11	0.7	<0.01	0.08	1.95	2	9.58	9.6	5.272	1.2	3.31	0.04	5.22	>10000	5.1	5311.8
SRK20-Tail-TP-G01	0.02	128	<0.005	30	0.25	<0.01	0.07	1.18	1	7.17	>10	3.367	1	3.53	0.05	0.71	1120	7.1	7453.8
SRK20-Tail-TP-G02	0.03	257	<0.005	41	0.12	<0.01	0.02	0.74	0.8	2.72	>10	2.327	0.8	4.81	<0.01	0.52	7967	0.9	2604
SRK20-TAIL-TP-G03	0.3	135	<0.005	48	0.29	<0.01	0.05	1.23	2.5	5.58	>10	4.191	1.1	3.68	<0.01	4.2	>10000	2.8	8768.9
SRK20-TAIL-TP-G04	0.26	138	<0.005	35	0.25	<0.01	0.06	1.38	1.7	5.58	>10	2.739	0.7	2.45	<0.01	3.85	5922	2.8	6217.1
SRK20-TAIL-TP-G06	0.13	66	<0.005	46	0.04	<0.01	<0.01	0.53	0.5	4.05	>10	6.199	0.7	2.14	<0.01	5.37	9499	0.7	4581
SRK20-TAIL-TP-H01	0.01	31	<0.005	22	0.09	<0.01	0.05	2.02	0.3	3.29	>10	10.483	0.8	0.71	<0.01	0.42	89	0.7	7199.9
SRK20-TAIL-TP-H02	<0.01	69	<0.005	10	0.15	<0.01	0.13	2.64	0.4	12.19	5.25	8.454	0.7	1.24	<0.01	0.7	150	1.8	6868.1
SRK20-TAIL-TP-H03	0.02	50	0.005	16	0.22	<0.01	0.08	1.47	0.6	6.63	10	10.104	1	1.18	<0.01	0.65	3830	2.9	5866
SRK20-TAIL-TP-H04	0.15	136	0.006	41	0.28	<0.01	0.06	3.07	1.8	5.69	10	3.416	0.9	1.81	<0.01	2.87	8705	2.4	4866.2
SRK20-TAIL-TP-H05	0.16	113	<0.005	50	0.09	<0.01	0.02	1.46	0.9	3.64	10	2.327	1.3	1.71	<0.01	1.96	7769	1.1	2704.2
SRK20-TAIL-TP-H06	0.17	142	<0.005	43	0.14	<0.01	0.03	1.75	1.3	4.31	10	3.939	1.2	1.75	<0.01	3.06	>10000	1.5	4501.8
SRK20-TAIL-TP-H07	0.23	123	<0.005	42	0.19	<0.01	0.07	1.25	1.6	4.26	10	4.079	1.6	2.09	0.04	2.81	>10000	2.8	5556.5
SRK20-TAIL-TP-H08	0.28	130	<0.005	46	0.17	<0.01	0.03	1.95	1.6	5.91	10	4.767	0.9	3.02	<0.01	3.72	>10000	2.2	6218
SRK20-TAIL-TP-H09	0.32	144	<0.005	38	0.39	<0.01	0.08	1.85	1.9	6.26	10	5.635	0.8	3.56	<0.01	5.21	>10000	3.7	8253.2

Appendix G Porewater Chemistry Data

Porewater Squeezing Information and Field Parameters														Laboratory Data										
Sample ID	Depth from	Depth to	Date Squeezed	pH	ORP	EC	Gravimetric Moisture Content	Simulated PW	Mass DI Water	Mass Tails	liquid to solid ratio	Reaction Time	Comment	ALS Sample ID	Lab pH	Conductivity	solids, total dissolve d [TDS]	acidity (as CaCO3)	alkalinity, total (as CaCO3)	hardness (as CaCO3), dissolved	oxidation-reduction potential [ORP]	ammonia, total (as N)	bromide	chloride
Detection Limit	m	m		s.u.	mV	uS/cm	%		kg	kg		hr			0.10	2.0	10	2.0	1.0	0.60	0.10	0.0050	0.050	0.50
	m	m													pH units	µS/cm	mg/L	mg/L	mg/L	mV	mg/L	mg/L	mg/L	
SRK20-Tail-TP-A01	0	0.3	12/11/2020	0.86		133500	8%	Yes	0.4	4.3	0.09	17	Tailing Oxidation during transport	VA20C3331-001	1.11	44400	84800	65800	<1	1970	462	4.46	<50	<500
SRK20-Tail-TP-A02	0.4	0.7	12/16/2020	3.44	481.5	75200	28%	Yes	0.4	3.7	0.11	19	Green Porewater/Tailing Oxidation during transport	VA20C3880-001	3.14	23900	70500	35400	<1	3840	324	0.0156	<50	<500
SRK20-Tail-TP-A03	0.7	1.2	11/12/2020				6%	Yes	0.5	4	0.13	18		WR2001211-006	3.26	22700	51000	30000	<1	3650	284	0.463	<5	<50
SRK20-Tail-TP-A04	2.2	2.75	12/10/2020	4.49		110300	23%						Tailing Oxidation during transport	VA20C3331-004	3.25	38400	118000	65400	<1	7230	305	3.88	<50	<500
SRK20-Tail-TP-A05	3.25	3.75	11/12/2020	4.96	28	>20,000								WR2001211-007	3.24	32200	80800	45600	<1	4870	83.5	4.99	<5	<50
SRK20-Tail-TP-B01	0	0.28	12/11/2020	0.82		135000	10%	Yes	0.4	3.6	0.11	17	Tailing Oxidation during transport	VA20C3331-002	1.12	46000	64300	53000	<1	1720	459	4.14	<50	<500
SRK20-Tail-TP-B02	0.28	0.7	12/11/2020				11%	Yes	0.4	4.5	0.09	17	Tailing Oxidation during transport	VA20C3331-003	1.53	35000	117000	83500	<1	2680	437	0	<50	<500
SRK20-Tail-TP-B03	0.7	1.7	11/11/2020	4.5	98	>20,000	13%	Yes	0.4	5	0.08	19		WR2001220-001	3.77	30800	68500	55000	<1	4380	116	0.143	<5	<50
SRK20-Tail-TP-B04	2	2.7	11/10/2020	4.8	91	19060	5%	Yes	0.4	3	0.13	14		WR2001198-010	3.31	18200	40300	21900	<1	2680	161	0.027	<5	<50
SRK20-Tail-TP-B05	3.5	4	11/8/2020	4.94	51	>20,000	20%							WR2001198-011	3.2	29800	71300	41200	<1	4220	177	6.97	<5	<50
SRK20-Tail-TP-C01	0.05	0.16	11/10/2020				16%	Yes	0.4	3	0.13	22		WR2001220-002	1.24	36200	74000	55100	<1	1590	499	6.91	<5	<50
SRK20-Tail-TP-C02	0.28	0.7	12/14/2020	2.37	570.5	144300	28%	Yes	0.4	4.7	0.09	15	Tailing Oxidation during transport	L2540527-1	2.27	34700	173000	22900	<1	1400	361	<0.013	<5	<50
SRK20-Tail-TP-C03	0.7	1.3	11/9/2020				18%							WR2001198-008	3.36	47500	78200	96300	<1	7790	390	1.38	<5	<50
SRK20-Tail-TP-C04	1.7	2.3	11/8/2020	5.18	-21	>20,000	23%							WR2001198-009	3.21	42800	134000	75700	<1	5940	39.5	4.54	<5	<50
SRK20-Tail-TP-C05	3	3.5	11/8/2020	5.46	-54	>20,000	27%							WR2001198-003	3.18	38300	109000	59900	<1	5460	151	5.54	<5	<50
SRK20-Tail-TP-D01	0	0.75	12/15/2020	1.42	617.1	161000	24%	Yes	0.4	3.9	0.10	19	Tailing Oxidation during transport	VA20C3440-001	1.3	51300	225000	151000	<1	1750	401	0.529	<25	<50
SRK20-Tail-TP-D02	0.85	1.2	12/15/2020				16%	Yes	0.4	4.5	0.09	19	Tailing Oxidation during transport	VA20C3440-002	2.53	45900	256000	147000	<1	2450	330	<0.5	<25	<50
SRK20-Tail-TP-D03	1.8	2.2	12/14/2020	4.28	396.6	92300	18%	Yes	0.4	3.6	0.11	15	Green Porewater/Tailing Oxidation during transport	L2540527-2	3.3	24800	67600	139000	<1	3150	290	5	<5	<50
SRK20-Tail-TP-D04	3.5	4	11/12/2020	4.43	126	>20,000	19%	Yes	0.4	4	0.10	17		WR2001211-004	3.28	21200	58400	28500	<1	2390	176	3.04	<5	<50
SRK20-Tail-TP-D05	5	5.5	11/12/2020	4.68	126	>20,000	26%							WR2001211-005	3.12	44700	149000	88100	<1	3030	270	1.6	<5	<50
SRK20-Tail-TP-E01	0	0.32	12/16/2020				5%	Yes	0.4	4.1	0.10	19	Tailing Oxidation during transport	VA20C3880-002	1.24	34800	28700	22300	<1	78	433		<50	<500
SRK20-Tail-TP-E02	0.32	0.8	12/15/2020	1.73	613.7	138700	14%	Yes	0.4	5.9	0.07	19	Tailing Oxidation during transport	VA20C3440-003	1.63	43700	214000	132000	<1	946	402	0.772	<25	<50
SRK20-Tail-TP-E03	0.8	1.2	12/14/2020				6%	Yes	0.375	3	0.13	15	Tailing Oxidation during transport	L2540527-3	2.51	14500	24000	43300	<1	1150	395	0	<5	<50
SRK20-Tail-TP-E04	1.3	2.5	11/12/2020				8%	Yes	0.2	3	0.07	17		WR2001220-005	3.26	27300	75900	53200	<1	2180	292		<5	<50
SRK20-Tail-TP-E06	4	4.8	11/12/2020	4.5	149	10120	5%	Yes	0.8	3	0.27	15		WR2001220-007	3.72	9760	18300	9130	<1	1490	245	0.411	<5	<50
SRK20-Tail-TP-G01	0	0.7	12/10/2020				21%							VA20C3331-005	1.07	59200	226000	147000	<1	1210	392	31.3	<200	<2000
SRK20-Tail-TP-G02	0.7	1.03	12/16/2020				7%	Yes	0.4	5.1	0.08	19	Green Porewater/Tailing Oxidation during transport	VA20C3880-003	2.61	28300	91500	48900	<1	1560	360		<50	<500
SRK20-Tail-TP-G03	1.03	1.5	11/11/2020				19%						Tailing Oxidation during transport	WR2001220-003	3.45	43900	198000	129000	<1	3690	227	3.44	<5	<50
SRK20-Tail-TP-G04	2	2.7	11/12/2020	4.51	115	15580	12%	Yes	0.4	4	0.10	17		WR2001220-004	3.76	21500	54900	34300	<1	3940	170		<5	<50
SRK20-Tail-TP-G06	5	5.5	11/9/2020				29%							WR2001198-005	3.15	26000	59800	35700	<1	2560	198	12.2	<5	<50
SRK20-Tail-TP-H01	0	0.25	11/9/2020				6%	Yes	0.4	3	0.13	14		WR2001198-001	1.63	14900	10400	7610	<1	14.6	452	0	<5	<50
SRK20-Tail-TP-H02	0.28	0.65	11/9/2020				10%	Yes	0.4	3	0.13	14		WR2001198-002	1.5	22200	25700	19500	<1	715	47.4	0	<5	<50
SRK20-Tail-TP-H03	0.65	0.94	11/10/2020	1.42	412	>20,000	13%	Yes	0.4	3	0.13	20		WR2001211-001	1.42	26700	20500	14300	<1	1160	421	0.178	<5	<50
SRK20-Tail-TP-H04	1.1	1.7	11/10/2020	4.3	161	>20,000	14%	Yes	0.4	3	0.13	16		WR2001211-002	3.12	33900	87700	52400	<1	2630	288	0.586	<5	<50
SRK20-Tail-TP-H05	1.9	2.4	11/9/2020				8%	Yes	0.4	3	0.13	13		WR2001198-006	3.23	25600	49000	35800	<1	1040	185	0.511	<5	<50
SRK20-Tail-TP-H06	2.7	3.4	11/10/2020	4.5	131	>20,000	13%	Yes	0.4	3	0.13	13		WR2001198-007	3.22	27200	66200	37900	<1	1910	167	1.9	<5	<50
SRK20-Tail-TP-H08	4.3	5	11/7/2020	4.09	163	>20,000	15%							WR2001191-002	3.2	42800	116000	85200	<1	1860	265	3.09	<50	<500
SRK20-Tail-TP-H09	5	5.85	11/7/2020	4.22	130	>20,000								WR2001191-001	3.23	47000	174000	101000	<1	4370	251	0.411	<100	<1000
SD-GC-01 023839	0	1.8288	07-Oct-2020											VA20B7582-001	2.42			38800	<1	2460		1.16	<5	<50
SD-GC-03 023841	6.858	8.6868	01-Oct-2020											VA20B7018-001										
SD-GC-04 023849	0.6096	3.048	06-Oct-2020											VA20B7501-001	4			45100	<1	3720			<5	<50
SD-GC-05 023850	3.6576	6.096	30-Sep-2020											VA20B7019-001	3.1	34600	102000	54000		3490	291	6.62		

Laboratory Data																														
ALS Sample ID	fluoride	nitrate (as N)	nitrite (as N)	sulfate (as SO4)	carbon, total [TC]	carbon, dissolved organic [DOC]	carbon, total inorganic [TIC]	carbon, total organic [TOC]	aluminum, dissolved	antimony, dissolved	arsenic, dissolved	barium, dissolved	beryllium, dissolved	bismuth, dissolved	boron, dissolved	cadmium, dissolved	calcium, dissolved	cesium, dissolved	chromium, dissolved	cobalt, dissolved	copper, dissolved	iron, dissolved	lead, dissolved	lithium, dissolved	magnesium, dissolved	manganese, dissolved	mercury, dissolved	molybdenum, dissolved	nickel, dissolved	
	0.020	0.0050	0.0010	0.30	0.50	0.50			0.0010	0.00010	0.00010	0.00010	0.000100	0.000050	0.010	0.0000050	0.050	0.000010	0.00010	0.00010	0.00020	0.010	0.000050	0.0010	0.0050	0.00010	0.0000050	0.000050	0.00050	
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
VA20C3331-001	<20	<5	<1	60800	109		1.09	108	149	0.749	50	0.0187	<0.01	0.0324	<1	0.0925	644	0.0222	1.62	9.48	40.3	22800	3.5	0.183	88.6	38.3	0.00235	0.455	1.78	
VA20C3880-001	22.2	<5	<1	40200	52			37	715	0.0604	0.623	<0.05	0.0578	<0.025	<5	7.84	510	<0.005	0.111	25.9	126	14400	1.87	2.1	624	628	0.000027	<0.025	13.6	
WR2001211-006	2.92	<0.5	<0.1	33900	53.3		15.5	37.8	7.54	0.053	0.134	<0.05	<0.05	<0.025	<5	0.0065	450	<0.005	<0.05	12.7	<0.1	12700	5.89	<0.5	614	623	<0.00005	<0.025	15.3	
VA20C3331-004	<20	<5	<1	75800	51.2		<0.5	51.2	1.59	<0.05	0.149	<0.05	<0.05	<0.025	<5	<0.0025	538	<0.005	<0.05	0.0809	0.165	35900	3.74	<0.5	1430	1220	<0.0001	0.0262	0.584	
WR2001211-007	3.21	<0.5	<0.1	52600	57		33.3	23.7	1.7	<0.02	0.037	<0.02	<0.02	<0.01	<2	0.00193	421	0.00385	<0.02	0.045	<0.04	25100	4.31	<0.2	928	616	<0.0005	<0.01	0.194	
VA20C3331-002	<20	<5	<1	48600	108		0.5	108	120	1.05	29.2	0.0645	<0.01	0.0321	<1	0.0241	611	0.0317	1.18	5.9	14.9	14700	4.05	0.111	47.2	16.9	0.000834	0.466	0.907	
VA20C3331-003	30.7	<5	<1	81400					610	0.491	373	0.0967	<0.02	<0.01	<2	0.0742	594	0.0286	3.56	10.5	46.9	33600	0.876	0.586	290	32.1	0.00124	0.0127	3.02	
WR2001220-001	6	<0.5	<0.1	35900	130			91.5	24.5	<0.05	0.129	<0.05	<0.05	<0.025	<5	0.0949	509	0.00669	<0.05	14.5	<0.1	27300	4.3	<0.5	754	979	<0.00005	<0.025	9.68	
WR2001198-010	<2	<0.5	<0.1	25000	71.8		32.2	39.6	0.564	<0.02	0.0455	<0.02	<0.02	<0.01	<2	0.00104	442	<0.002	<0.02	2.59	<0.04	12800	4.02	<0.2	382	504	<0.00005	<0.01	3.56	
WR2001198-011	4.36	<0.5	<0.1	47700	31.9		12.2	19.7	1.33	0.0218	0.0323	0.0102	<0.01	<0.005	<1	<0.0005	443	0.00819	<0.01	<0.01	<0.02	21400	1.43	0.164	757	510	<0.0005	0.0129	<0.05	
WR2001220-002	5.4	<0.5	<0.1	52300	155			142	144	0.565	51.1	0.0611	<0.01	0.00953	<1	0.131	536	0.0284	2.01	8.23	32	20500	2.62	0.127	60.9	57.1	0.00229	0.0868	1.82	
L2540527-1	51.2	<0.5	<0.1	135000	148		<1	148	479	0.99	255	0.06	<0.02	<0.01	<2	0.608	229	<0.002	5.26	9.83	172	36200	0.417	0.37	200	101	0.0134	<0.01	3.54	
WR2001198-008	40	<0.5	<0.1	113000	168		76.6	91.5	65	<0.1	0.352	<0.1	<0.1	<0.05	<10	0.0298	502	<0.01	<0.1	16.7	<0.2	56600	7.02	<1	1590	1510	<0.0005	<0.05	15.3	
WR2001198-009	3.48	<0.5	<0.1	84600	114		43.6	70.9	2.43	<0.05	0.0607	<0.05	<0.05	<0.025	<5	<0.0025	470	0.00578	<0.05	0.834	<0.1	44900	1.18	<0.5	1160	859	<0.0005	<0.025	1.26	
WR2001198-003	5.97	<0.5	<0.1	70600	56		7.6	48.4	1.78	<0.02	0.059	0.481	<0.02	<0.01	<2	0.00128	480	0.00707	<0.02	0.0234	0.0424	35700	2.46	<0.2	1030	635	<0.0005	<0.01	0.189	
VA20C3440-001	10.2	<0.5	<0.1	105000	46		<0.5	46	175	1.14	90.3	<0.05	0.0166	<0.025	<5	0.225	567	0.0381	2.76	19.6	447	72300	5.32	<0.5	81.6	35.1	0.0000911	0.0454	6.37	
VA20C3440-002	68.3	<0.5	<0.1	101000	106		2.37	104	4370	1.32	227	0.106	1.94	0.115	<5	84.8	529	0.0173	22	47	2570	56900	12.6	5.19	274	156	0.000121	<0.025	17.7	
L2540527-2	<2	<0.5	<0.1	39000	35.8		3.3	32.5	<2	<0.2	<0.2	<0.2	<0.2	<0.1	<20	0.254	540	<0.02	<0.2	3.22	<0.4	15800	5.83	<2	438	480	0.00012	<0.1	25.5	
WR2001211-004	<2	<0.5	<0.1	29500	32.9		<0.5	32.9	1.16	<0.02	0.0391	<0.02	<0.02	<0.01	<2	<0.001	509	0.00642	<0.02	0.0398	<0.04	27000	6.04	<0.2	273	149	<0.0005	<0.01	0.5	
WR2001211-005	<2	<0.5	<0.1	92700	40.8		5.56	35.2	3.02	<0.05	<0.05	<0.05	<0.05	<0.025	<5	<0.0025	503	0.00565	<0.05	<0.05	<0.1	54400	5.65	<0.5	430	200	<0.0005	<0.025	<0.25	
VA20C3880-002	<20	<5	<1	20100					54.6	0.316	10.7	0.0146	0.0044	0.0224	<0.5	0.886	21.7	0.023	0.307	3.25	23.3	6740	3.09	<0.05	5.79	5.95	0.00168	0.0403	0.478	
VA20C3440-003	17.9	<0.5	<0.1	89700	109		0.86	108	251	1.02	152	<0.05	0.0186	<0.025	<5	1.45	379	0.0237	5.25	11.5	369	40100	3.1	<0.5	<50	51.7	0.000199	<0.025	2.36	
L2540527-3	10.1	<0.5	<0.1	15400				0	240	0.049	11.9	0.028	0.06	<0.01	<2	0.975	427	0.0136	1.34	4.1	205	6890	2.21	<0.2	20.9	11.3	0.00055	<0.01	1.17	
WR2001220-005	6.4	<0.5	<0.1	50000					5.62	<0.05	<0.05	<0.05	<0.05	<0.025	<5	0.406	460	<0.005	<0.05	2.82	<0.1	21900	5.1	<0.5	251	203	<0.00005	<0.025	6.01	
WR2001220-007	<2	<0.5	<0.1	11100	27.7			12.8	0.49	<0.02	<0.02	<0.02	<0.02	<0.01	<2	0.0112	380	0.00278	<0.02	0.197	<0.04	5700	3.28	<0.2	131	81.1	<0.000005	<0.01	1.5	
VA20C3331-005	<80	<20	<4	157000	65.2		<0.5	65.2	788	1.82	603	0.131	<0.05	<0.025	<5	0.13	358	0.212	5.33	17.5	999	65600	4.51	0.652	76.4	12.9	<0.0001	0.319	3.35	
VA20C3880-003	20.7	<5	<1	51400					1040	<0.05	0.315	<0.05	0.356	<0.025	<5	4.63	482	<0.005	4.76	11.4	1560	15100	2.98	3.01	86.7	42.4	<0.000025	<0.025	3.01	
WR2001220-003	35.8	<0.5	<0.1	134000	58			49.8	34.6	<0.1	<0.1	<0.1	<0.1	<0.05	<10	0.0346	467	<0.01	<0.1	0.787	<0.2	56800	6.68	<1	614	421	<0.00025	<0.05	4.57	
WR2001220-004	3.25	<0.5	<0.1	34000					1.05	<0.05	<0.05	<0.05	<0.05	<0.025	<5	<0.0025	404	<0.005	<0.05	<0.05	<0.1	17800	4.67	<0.5	711	385	<0.0005	<0.025	0.358	
WR2001198-005	<2	<0.5	<0.1	39700	28.7		1.04	27.7	0.583	0.0177	0.0211	<0.01	<0.01	<0.005	<1	<0.0005	4													

Laboratory Data																			
ALS Sample ID	phosphorus, dissolved	potassium, dissolved	rubidium, dissolved	selenium, dissolved	silicon, dissolved	silver, dissolved	sodium, dissolved	strontium, dissolved	sulfur, dissolved	tellurium, dissolved	thallium, dissolved	thorium, dissolved	tin, dissolved	titanium, dissolved	tungsten, dissolved	uranium, dissolved	vanadium, dissolved	zinc, dissolved	zirconium, dissolved
	0.050	0.050	0.00020	0.000050	0.050	0.000010	0.050	0.00020	0.50	0.00020	0.000010	0.00010	0.00010	0.00030	0.00010	0.000010	0.00050	0.0010	0.00020
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
VA20C3331-001	7.18	<5	0.0851	0.125	51.4	0.0893	7.4	0.657	22600	<0.02	0.142	0.0391	0.0225	1.28	0.0306	0.0443	1.6	139	0.191
VA20C3880-001	<25	<50	<0.1	<0.025	142	<0.005	<25	2.32	12800	<0.1	<0.005	<0.0500	<0.05	<0.15	<0.05	0.32	0.848	2210	<0.1
WR2001211-006	<25	<25	<0.1	<0.025	<25	<0.005	<25	0.878	11400	<0.1	<0.005	<0.05	<0.05	<0.15	<0.05	0.187	<0.25	2710	<0.15
VA20C3331-004	<25	<25	0.114	<0.025	<25	<0.005	<25	0.253	26800	<0.1	<0.005	<0.05	<0.05	<0.15	<0.05	<0.005	<0.25	3450	<0.1
WR2001211-007	<10	21	0.0795	<0.01	<10	<0.002	<10	0.202	19400	<0.04	0.00415	<0.02	<0.02	<0.06	<0.02	0.00322	<0.1	991	<0.06
VA20C3331-002	<5	<5	0.174	0.263	51.2	0.0138	16.4	0.39	15600	<0.02	0.272	0.0214	0.036	2.04	0.0268	0.0366	0.528	44.7	0.282
VA20C3331-003	41.8	<10	<0.04	0.0471	79.9	0.0042	10.3	0.546	28400	<0.04	0.0051	0.138	0.0306	4.75	<0.02	0.0866	2.89	381	0.223
WR2001220-001	<25	<25	<0.1	<0.025	<25	<0.005	<25	3.51	19100	<0.1	<0.005	<0.05	<0.05	<0.15	<0.05	0.314	<0.25	3020	<0.1
WR2001198-010	<10	<10	<0.04	<0.01	<10	<0.002	<10	0.211	9870	<0.04	<0.002	<0.02	<0.02	<0.06	<0.02	0.0512	<0.1	1180	<0.06
WR2001198-011	<5	23	0.0904	<0.005	16.3	<0.001	31.2	0.283	16600	<0.02	0.00388	<0.01	<0.01	<0.03	<0.01	0.0045	<0.05	344	<0.03
WR2001220-002	<5	<5	0.166	0.0369	45.8	0.0316	13.7	0.501	18800	<0.02	0.229	0.0567	0.0448	2.74	0.0121	0.039	0.674	216	0.331
L2540527-1	71	<10	<0.04	<0.01	24	<0.002	<10	0.081	24700	<0.04	<0.002	0.201	0.089	0.236	<0.02	0.198	3.48	603	0.04
WR2001198-008	<50	<50	<0.2	<0.05	<50	<0.01	<50	4.95	42500	<0.2	<0.01	<0.1	<0.1	<0.3	<0.1	0.863	<0.5	5660	<0.3
WR2001198-009	<25	<25	<0.1	<0.025	<25	<0.005	<25	0.634	30800	<0.1	0.00707	<0.05	<0.05	<0.15	<0.05	0.00895	<0.25	1700	<0.15
WR2001198-003	<10	20.2	0.11	<0.01	<10	<0.002	12.5	1.07	25000	<0.04	0.00712	<0.02	<0.02	<0.06	<0.02	<0.002	<0.1	480	<0.06
VA20C3440-001	<25	<50	<0.1	0.0673	<25	0.00582	<25	0.264	51200	<0.1	0.152	<0.05	<0.05	1.84	<0.05	0.0496	1.52	748	0.231
VA20C3440-002	322	<50	<0.1	<0.025	201	<0.005	<25	0.285	46900	<0.1	0.0414	0.173	0.578	3.81	0.0576	3.27	37	2880	0.928
L2540527-2	<100	<100	<0.4	<0.1	<100	<0.02	<100	<0.4	16700	<0.4	<0.02	<0.2	<0.2	<0.6	<0.2	0.286	<1	11300	<0.4
WR2001211-004	<10	15.1	0.112	<0.01	18	<0.002	24.2	0.0474	19300	<0.04	<0.002	<0.02	<0.02	<0.06	<0.02	0.0226	<0.1	879	<0.06
WR2001211-005	<25	63.4	0.156	<0.025	<25	<0.005	37.8	0.15	40100	<0.1	<0.005	<0.05	<0.05	<0.15	<0.05	0.029	<0.25	406	<0.15
VA20C3880-002	<2.5	5.21	0.132	0.024	36.3	0.00344	9.63	0.141	7540	<0.01	0.193	0.0109	0.0355	0.915	0.0157	0.0169	0.146	13.8	0.0593
VA20C3440-003	108	<50	<0.1	0.0529	29.5	<0.005	<25	0.344	29500	<0.1	<0.005	0.140	0.0893	2.03	<0.05	0.217	4.24	1640	0.158
L2540527-3	20	<10	<0.04	<0.01	35	<0.002	<10	0.191	5730	<0.04	<0.002	<0.02	<0.02	<0.06	<0.02	0.302	1.55	855	0.042
WR2001220-005	<25	<25	0.119	<0.025	<25	<0.005	<25	<0.1	15000	<0.1	<0.005	<0.05	<0.05	<0.15	<0.05	0.0725	<0.25	3020	<0.1
WR2001220-007	<10	<10	0.0452	<0.01	10.2	<0.002	<10	<0.04	4230	<0.04	0.0128	<0.02	<0.02	<0.06	<0.02	0.0172	<0.1	887	<0.04
VA20C3331-005	185	139	2	0.0434	<25	0.0107	85.8	0.562	46600	<0.1	2.9	0.114	1.62	23.1	0.0626	0.22	4.6	418	4.11
VA20C3880-003	<25	<50	<0.1	<0.025	88.3	<0.005	<25	0.232	14600	<0.1	0.0112	0.119	<0.05	<0.15	<0.05	0.525	6.65	3350	<0.1
WR2001220-003	<50	<50	<0.2	<0.05	<50	<0.01	<50	<0.2	37800	<0.2	<0.01	<0.1	<0.1	<0.3	<0.1	2.33	<0.5	5860	<0.2
WR2001220-004	<25	<25	<0.1	<0.025	<25	<0.005	<25	<0.1	12500	<0.1	<0.005	<0.05	<0.05	<0.15	<0.05	0.0257	<0.25	1570	<0.1
WR2001198-005	<5	64.5	0.152	<0.005	<5	<0.001	70.6	0.138	14300	<0.02	0.00126	<0.01	<0.01	<0.03	<0.01	0.00265	<0.05	10	<0.03
WR2001198-001	<0.5	2.59	0.0215	0.00718	7.24	0.000375	2.12	0.0676	2480	<0.002	0.0339	0.00348	0.00427	0.101	0.00244	0.00185	0.0204	1.32	0.00494
WR2001198-002	2.55	5.2	0.144	0.0158	31	0.0017	10.6	0.28	5670	<0.004	0.221	0.0329	0.00961	0.303	0.00434	0.0114	0.185	3.91	0.023
WR2001211-001	<2.5	13.8	0.162	0.00637	47.8	<0.0005	14.6	0.148	5300	<0.01	0.271	0.057	<0.005	0.451	<0.005	0.117	0.122	274	0.0546
WR2001211-002	<25	<25	<0.1	<0.025	<25	<0.005	26.5	<0.1	21200	<0.1	<0.005	<0.05	<0.05	<0.15	<0.05	0.872	<0.25	2570	<0.15
WR2001198-006	<10	<10	0.045	<0.01	<10	<0.002	10.7	0.0491	7260	<0.04	<0.002	<0.02	<0.02	<0.06	<0.02	0.0243	<0.1	887	<0.06
WR2001198-007	<25	48.5	0.292	<0.025	<25	<0.005	38	<0.1	16100	<0.1	<0.005	<0.05	<0.05	<0.15	<0.05	0.0325	<0.25	1480	<0.15
WR2001191-002	<25	<25	0.106	<0.025	<25	<0.005	76.1	0.206	16000	<0.1	<0.005	<0.05	<0.05	<0.15	<0.05	<0.005	<0.25	1530	<0.1
WR2001191-001	<25	75.9	0.181	<0.025	<25	<0.005	97.2	0.459	36700	<0.1	0.022	<0.05	<0.05	<0.15	<0.05	<0.005	<0.25	3330	<0.1
VA20B7582-001	53.3	70.7	0.498	<0.025	28	<0.005	29	0.135	15200	<0.1	0.468	<0.05	0.061	0.29	<0.05	0.298	5.91	1190	<0.1
VA20B7018-001	0	21.4	0	<0.01	<10	<0.002	13.7	0.155	6290	0	<0.002	0	<0.02	<0.06	0	<0.002	<0.1	874	0
VA20B7501-001	128	185	1.37	<0.025	29.3	<0.005	83.8	0.269	16600	<0.1	0.0833	<0.05	<0.05	0.77	<0.05	0.416	10.8	2230	<0.15
VA20B7019-001	<10	154	0.455	<0.01	21	<0.002	65.8	0.339	20100	<0.04	0.00256	<0.02	0.036	<0.06	<0.02	0.0317	<0.1	2490	<0.04