Tabba Tabba Project

Tailings Characterisation Report

13 August 2025

J-AU0389-002-R-Rev0

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Tailings Characterisation Report

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EXECUTIVE SUMMARY

Mine Waste Management Pty Ltd (MWM) has developed this tailings geochemical characterisation report for Wildcat Resources Limited’s (WRL) Tabba Tabba Lithium-Tantalum Project (Tabba Tabba). This report was completed in accordance with MWM proposal J-AU0389-002-P-Rev0 (11 January 2024).

The objectives of this scope of work were to complete a geochemical waste characterisation of the tailings sample provided and use the collected data to assess the potential for geoenvironmental hazards to exist within the provided Tabba Tabba tailings sample.

The scope of work completed included development of a sampling and analysis plan, coordination of the laboratory program, analysis and interpretation of the collected data, and reporting of the potential geoenvironmental hazards for the project.

The key findings are:

- The risk of generating neutral metalliferous drainage or saline drainage associated with neutralisation of oxidation products (derived from sulfide minerals) is unlikely from the tested tailings sample.
- Mineral fibres were not detected in the tailings sample submitted for fibrous mineral screening, suggesting a low hazard potential.
- The leachate generated from static leach testing was circum-neutral, fresh, and generally contained low levels of anions, cations, and trace elements, suggesting a low metal leaching potential.
- Based on the total uranium and thorium concentration of the tailings sample tested, combined head-of-chain activity concentrations for the natural U and Th decay series was 0.04 Bq/g. Therefore, the NORM hazard potential for the materials tested is low.
- The tailings samples tested has a low acid generating hazard potential due to containing very low total sulfur and sulfide concentrations.

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1 INTRODUCTION

Mine Waste Management Pty Ltd (MWM) has developed this geochemical tailing characterisation report for Wildcat Resources Limited's (WRL) Tabba Tabba Lithium-Tantalum Project (Tabba Tabba). This report was completed in accordance with MWM proposal J-AU0389-002-P-Rev0 (11 January 2024).

1.1 Objectives

The objectives of this scope of work were to:

- Complete a geochemical waste characterisation of the tailings sample provided.
- Use the collected data to assess the potential for geoenvironmental hazards to exist within the provided Tabba Tabba tailings sample.

1.2 Scope of Work

The following scope of works was completed:

- TASK 1 – Develop a sampling and analysis plan (SAP) and provide assistance to WRL in selecting appropriate proxy tailings samples.
- TASK 2 – Coordinate laboratory program. Liaise with the selected commercial laboratory during the analysis program.
- TASK 3 – Data analysis and interpretation. Collate, analyse, and interpret the dataset to identify the environmental geochemistry hazards for the project.
- TASK 4 – Report preparation. Develop a concise report that discusses the potential environmental geochemistry hazards for the project. Where required, provide further works recommendations including recommendations for the development of practicable management options for identified geochemical hazards.

2 PROJECT SETTING

The following section provides basic Tabba Tabba Project background and geology information.

2.1 Background

The Project tenements are located approximately 50 kilometres southeast of Port Hedland and have been the focus of historic alluvial tin and tantalum mining (early 20th century) as well as more recent mining and processing of tantalum ores by the Pilbara Minerals / Nagrom joint venture. Recent mining occurred during 2015, after which the process infrastructure was removed, and existing mine landforms were rehabilitated. The tenements are currently occupied by a shallow open pit and rehabilitated waste rock dump, tailings storage facility (TSF), and stockpiles (run of mine and low-grade ore).

The lithium resource is hosted across numerous pegmatite outcrops, and WRL are currently undertaking a drilling program to establish a maiden lithium resource estimate (current resource is defined for tantalum). WRL is planning an open pit lithium operation which, over a projected 13 year mine life, will likely consume the existing pit, rehabilitated waste rock dump, and low grade ore stockpile.

2.2 Geology

The main Tabba Tabba pegmatite intrusive outcrops as a southeast to north-westerly striking body at the surface. It dips to the northeast at 35-40° over a distance of approximately 500 m and has a maximum width of up to 70 m. It is thickest in its south-eastern portion and reduces to some 8-10 m width two-thirds of the way along its outcropping length until in disappears below the detritus (interpreted as granite/granodiorite basement) to the northwest. The pegmatite has intruded a narrow, southwest to northeast trending greenstone belt comprising a sheared metagabbro sill of amphibolite facies on the south-western boundary of the main pegmatite and mafic schists and amphibolite of the Warrawoona Group Sediments from the southeast to northwest of the pegmatite. The weathering profile at Tabba Tabba is very thin, and that negligible volumes of highly weathered waste rock ('oxide') are expected to be disturbed during mining.

2.3 Predicted Material Volumes

The Project has a proposed 11 years of mining with an additional 2 years of ore processing. Figure 1 and Table 1 present material quantities per type for the project and predicted schedule.[1] WRL has recently developed a sulfur block model for the deposit. Interrogation of the provided block model export for modelled sulfur content is provided in Table 2 and Figure 2.

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[1] *Quantities and schedule provided by Wildcat Resources (Matt Holmes) 22 October 2024.*

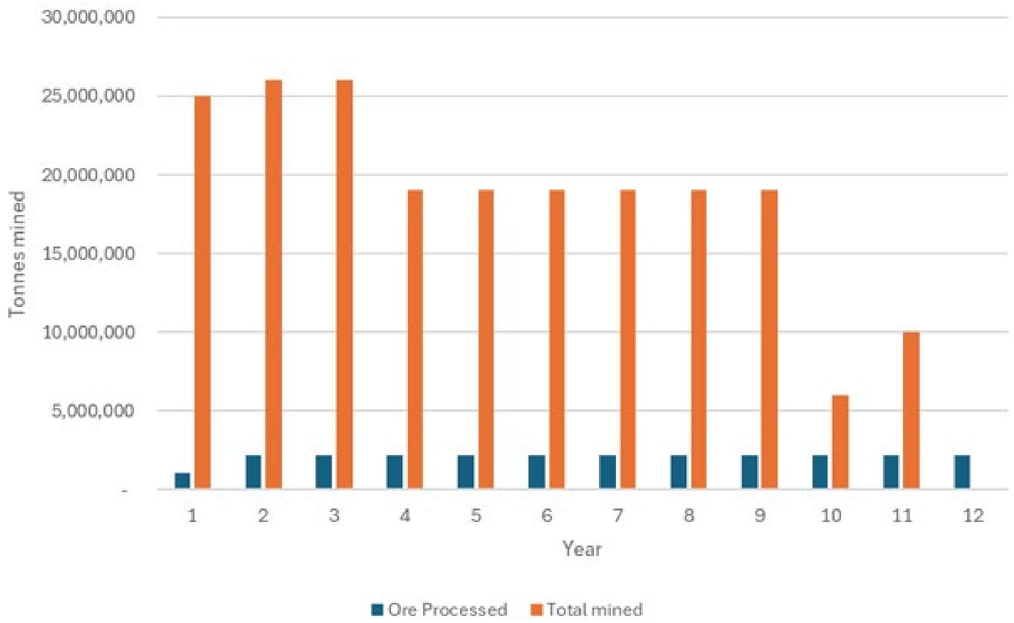

Figure 1: Materials schedule.

Table 1: Predicted material quantities to be mined over an 11-year period.

ROCK TYPE	ORE TONNES	WASTE TONNES	% OF TOTAL WASTE
TRANSITION			
Dolerite		8,100,000	4.3
Pegmatite		1,100,000	0.6
Proterozoic Dolerite		700,000	0.4
Cordierite-Biotite Schist		6,600,000	3.5
FRESH			
Dolerite		109,000,000	57.9
Pegmatite	24,000,000	13,400,000	7.1
Proterozoic Dolerite		9,700,000	5.1
Cordierite-Biotite Schist		39,800,000	21.1
TOTAL	24,000,000	188,400,000[1]	

[1] *Approximately equivalent to 65,000,000 m^3.*

Table 2: Block model results.

MATERIAL TYPE	VOLUME (m^3)	MASS (t)	MASS (t) WITH S ≥0.2 wt%	% OF BLOCKS WITH S ≥0.2 wt%
1 (ore)	14,416,000	38,419,000	0	0.0%
2 (waste)	58,921,000	173,818,000	6,085,000	3.5%
TOTAL	73,337,000	212,237,000	6,085,000	2.8%

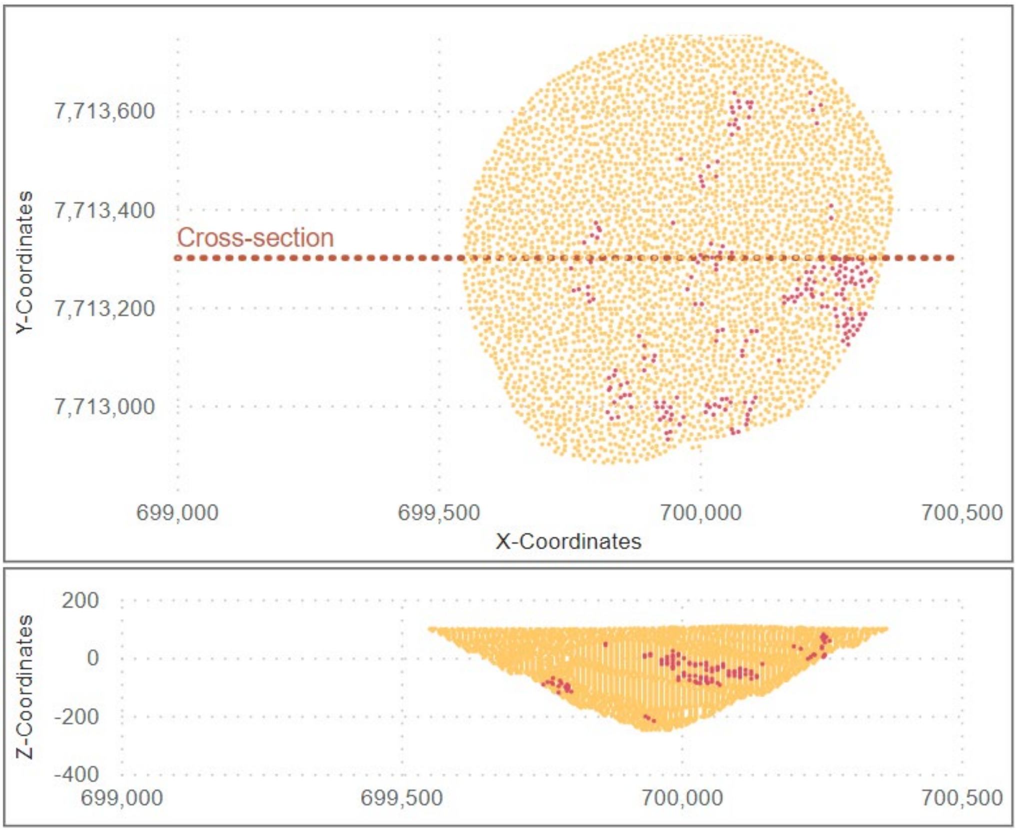

Figure 2: Block model export demonstrating approximate distribution of blocks with modelled sulfur greater than 0.2 wt% S (red circles).

3 MATERIALS CHARACTERISATION METHOD

The following section provides details for the sample selection method, analysis program development, and the geochemical tailings hazard assessment approach.

3.1 Sample Selection and Sampling

MWM liaised with WRL and BHM Process Consultants to obtain representative tailings material for the program. Due to the stage of the project, only one tailings slurry sample could be provided to ALS Environmental for testing. This sample was to be split between geochemical and geotechnical testwork. Therefore, MWM coordinated the splitting of the slurry so that separate tailings samples were available for both programs without having to rely upon retesting of already tested material.

Figure 3: Slurry samples received by ALS Environmental.

ALS Environmental decanted the supernatant and dried the residue to recover approximately 7.5 kg of solids. ALS Environmental retained approximately 1.2 kg for the geochemical testing program and approximately 0.1 L of the supernatant for water quality analysis. The remaining material was provided to CMW Geosciences for geotechnical test work. Although initially retaining the supernatant for water quality analysis, the laboratory mistakenly discarded the supernatant. Therefore, leaching tests of the collected solids were added to the program to obtain data for potential leachable constituents.

3.2 Analysis Program

Table 3 presents the laboratory analyses completed for the recovered tailings solids.

Table 3: Analysis program.

PARAMETER	SAMPLES
Paste pH/EC	1
Total sulfur (LECO – combustion furnace)	1
Acid neutralisation capacity (ANC)	1
Total carbon (TC)	1
Sulfide sulfur (chromium reducible sulfur)	1
Net acid generating (NAG) testing	1
Mineralogy (XRD)	1

PARAMETER	SAMPLES
Total elemental analysis	1
Short-term leach testing	
Exchangeable cations	1
Soil particle density	1
Soil classification	1
Asbestos presence/absence	1

3.3 Hazard Assessment

To facilitate the hazard assessment, the laboratory test results received have been subjected to quality assurance and quality control (QA/QC), tabulation, figure generation, and interpretation. The key interpretation components of the characterisation have and will include:

- Hazard classification of the materials for acidic seepage potential using best-practise acid base accounting (ABA) approaches (e.g., non-acid forming, potentially acid forming, acid forming).
- Screening of leachate testing results for indications that the materials tested may generate saline and/or neutral metalliferous drainage (acid base accounting results will also be considered in this hazard screening).
- Identification of elemental enrichment patterns versus typical levels in crustal rock.
- Screening for naturally occurring radioactive materials (NORM) related to natural uranium and thorium series radionuclides, as calculated from total uranium and thorium concentrations.
- Screening for potential presence of fibrous minerals, based on mineralogical test results

4 RESULTS AND DISCUSSION

Key results from laboratory testing are reported and discussed in this section with supporting information found in:

- Appendix B: Tabulated Results;
- Appendix C: Laboratory Method Details;
- Appendix D: Results Dashboard; and
- Appendix E: Laboratory Certificates.

4.1 Acid Generating Potential

This assessment is designed to identify specific potential acid generation or acid neutralisation characteristics associated with the tailings material. It was completed to highlight both acid generation hazards as acid neutralisation capacity.

The key data source interrogated was the environmental geochemical dataset for the single tailings sample. The environmental geochemical dataset was used to assess the geochemical properties of key materials via standard industry AMD[2] characterisation procedures (Appendix C). ABA was conducted to predict the acid generation characteristics tailings material through determination of the ANC, the maximum potential acidity (MPA), and the net acid production potential (NAPP). The environmental geochemical dataset provides detailed results regarding the potential acidity, neutralising potential, and elemental mobility under oxidising conditions.

Key results are:

- The tailings sample has very low total sulfur and sulfide concentrations (<0.01 wt%S and 0.009 wt%S respectively), generated circum-neutral to alkaline ($pH_{1:2}$ 8.8) and fresh ($EC_{1:2}$ 52 µS/cm) pastes, has a negative NAPP value (-2.4 kg H_2SO_4/t), generated a circum-neutral to slightly acidic NAG pH of 6.2, and is classified non-acid forming (NAF). Therefore, the tailings solids tested have a low acid generating hazard potential.
- ANC is low for the tailings samples (2.7 kg H_2SO_4/t), supported by ABCC testing. Therefore, there is little available buffering capacity within the tailings solids.

4.2 Saline and Neutral Metalliferous Drainage Potential

High sulfate is a characteristic of both neutral metalliferous drainage (NMD) and saline drainage (SD), therefore, in the absence of elevated sulfur, NMD and SD would be unlikely. Sulfur and ANC results were interrogated to identify high sulfur material (>1 wt%S) with accompanying high ANC so that the resulting NAPP is either negative or slightly positive.

The risk of generating NMD or SD associated with neutralisation of oxidation products is unlikely, when assessing the sample results presented in Appendix B. The tailings sample collected contained less than 0.1 wt%S.

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[2] *Acid and metalliferous drainage*

4.3 Elemental Enrichment

Concentrations of major and trace elements in the samples were used to calculate geochemical abundance index (GAI) values, which provide an indication of elemental enrichment relative to the average abundance of a specific element in rocks of the Earth's crust (see Appendix C for further detail). Full elemental composition results, as well as the corresponding GAI values, are presented in Tables B3 and B4 (Appendix B). A GAI of 0 indicates that the content of the element is less than, or similar to, the average crustal abundance, whereas a GAI of 3 corresponds to a 12-fold enrichment above the average crustal-abundance. Generally, a GAI of 3 or greater signifies enrichment that warrants further examination such as leachate testing. It is also important to note that elemental enrichment is not unexpected in samples from mineralised areas and that enrichment does not necessarily mean that specific elements will be environmentally mobile and bioavailable. Elements that were found to be enriched in the samples tested are presented in Table 4.

Table 4: Elements with GAI values ≥3 (enriched).

ELEMENT	GAI	CONCENTRATION (mg/kg)	AVERAGE CRUSTAL ABUNDANCE (mg/kg)
Cs	4	50	430
Li	5	1905	30
Mo	4	329	900
Te	4	22	70

NOTE: Tellurium (Te) was not measured above the limit of reporting. The exceedance noted is due to the application of half the LOR in the GAI calculation.

4.4 Metal Leaching Potential

The tailings solids sample was subjected to leach testing with deionised (DI) water at a 2:1 liquid to solid ratio. The leachate test results are presented in Table B5 (Appendix B), with the key findings being:

- The leachate generated was circum-neutral (pH = 7.5) and fresh (EC = 80 μS/cm).
- Aluminium (1.43 mg/L) was the only element measured above 1 mg/L.
- Iron (0.18 mg/L), lithium (0.237 mg/L), and manganese (0.15 mg/L) were identified at concentrations between 0.1 and 1 mg/L.

4.5 Naturally Occurring Radioactive Materials

Naturally occurring radioactive materials (NORMs) are typically geological materials enriched with respect to long-lived radioactive isotopes arising from the presence of elevated levels of uranium (^{238}U decay series) and thorium (^{232}Th decay series). The activity concentrations (level of radioactivity present at the source) of geological samples can be calculated based on elemental concentrations (U and Th), assuming secular equilibrium and using established specific activities. Note that the assumption of secular equilibrium is valid for the waste rock materials tested, given no chemical alteration of the materials is expected to occur.

Specific activities, which relate elemental concentration to activity concentration for naturally occurring proportions of the isotopes considered, were 12,500 Bq/g U (^{238}U) and 4,090 Bq/g Th (^{232}Th) (DMP, 2010; IAEA, 2006).

Based on the total uranium and thorium concentrations of the samples tested (Table B3, Appendix B), combined head-of-chain activity concentrations for the natural U and Th decay series was <0.04 Bq/g. A level of 1 Bq/g head of chain activity concentration is considered ‘inherently safe’ for uranium and thorium series radionuclides (IAEA, 2004; IAEA, 2006) and the materials tested would not be classifiable as radioactive wastes for the purposes of occupational safety management or in relation to restrictions on transporting the materials (ARPANSA, 2014).

4.6 Fibrous Minerals Potential Screening

The collected sample was submitted for fibrous minerals screening. Fibres were not detected in the sample suggesting a low hazard potential for the tailing material (Table B2, Appendix B).

5 KEY FINDINGS AND RECOMMENDATIONS

The following sections provide key preliminary findings and potential management implications.

5.1 Summary of Key Findings

The key findings are:

- The risk of generating NMD or SD associated with neutralisation of oxidation products (derived from sulfide minerals) is unlikely from the tested tailings sample, presented in Appendix B.
- Mineral fibres were not detected in the tailings sample submitted for fibrous mineral screening, suggesting a low hazard.
- The leachate generated from static leach testing was circum-neutral, fresh, and generally contained low levels of anions, cations, and trace elements, suggesting a low metal leaching potential.
- Based on the total uranium and thorium concentration of the tailings sample tested, combined head-of-chain activity concentrations for the natural U and Th decay series was 0.04 Bq/g. Therefore, the NORM hazard potential for the materials tested is low.
- The tailings samples tested has a low acid generating hazard potential due to containing very low total sulfur and sulfide concentrations.

5.2 Implications for Management

Based on the results, limited if any, management is required to manage the environmental geochemistry hazards assessed. However, this is based off one sample and therefore could require confirmatory testing throughout the project lifecycle.

5.3 Recommendations

The key recommendation is to continue to test the low environmental geochemistry hazard assumption:

- Further testing should be completed once more material is available via pilot processing programs that covers the range of ore to be processed.
- Ongoing routine testing (weekly/monthly) throughout operations should be completed to continuously confirm key parameters and characteristics of the material with time.

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7 LIMITATIONS

Attention is drawn to the document “Limitations”, which is included in Appendix F of this report. The statements presented in this document are intended to provide advice on what the realistic expectations of this report should be, and to present recommendations on how to minimise the risks associated with this project. The document is not intended to reduce the level of responsibility accepted by Mine Waste Management, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in doing so.

APPENDIX A ABBREVIATIONS AND DEFINITIONS

ABBREVIATION	DEFINITION
ABA	Acid base accounting
ABCC	Acid buffering characteristic curve
AD	Acidic drainage
AMD	Acid and metalliferous drainage, which can also include low metal saline drainage
AMDMP	Acid and metalliferous drainage management plan
ANC	Acid neutralisation capacity
CSM	Conceptual site model
DWER	Department of Water and Environmental Regulation
DMIRS	Department of Mines, Industry Regulation and Safety
LOM	Life of mine
Mt	Million tonnes
MPA	Maximum potential acidity
MWM	Mine Waste Management Pty Ltd
NAF	Non-acid forming
NAPP	Net acid production potential
NP	Net percolation
PAF	Potentially acid forming
PSD	Particle size distribution
QA/QC	Quality assurance and quality control
ROM	Run of mine
SD	Saline drainage
TSF	Tailings storage facility
WRD	Waste rock dump

TERM	DEFINITION
Acid Base Accounting	Conducted to predict acid generation and neutralisation characteristics of a waste rock material.
Acid Neutralisation Capacity	This is a measure of the insitu neutralising potential of a sample. Expressed as kg H_2SO_4 equivalent per tonne.
Acid and Metalliferous Drainage	Includes both acidic drainage typically caused from the oxidation of exposed sulfides, and metalliferous drainage resulting from elevated levels of toxic metals and salinity. Saline drainage can also occur. In all instances sulfate is high.
Acidic Drainage	A form of AMD, characterised by low pH, elevated toxic metal concentrations, high sulfate concentrations and high salinity.
Maximum Potential Acidity	Is a measure of the insitu acid production of a sample. Expressed as kg H_2SO_4 equivalent per tonne.
Metalliferous Drainage	A form of AMD characterised by near-neutral pH, elevated heavy metal concentrations, and high sulfate salinity.
Net Acid Production Potential	Is a measure of the samples overall acid generating capacity and is calculated by subtracting the ANC from MPA. A negative NAPP indicates a net neutralising capacity and a positive NAPP indicates a net acid generating capacity. NAPP, MPA, and ANC are expressed in kg H_2SO_4 per tonne equivalent.

APPENDIX B TABULATED RESULTS

Appendix B1: Acid Base Accounting Data

		DATA TYPE	ACID-BASE ACCOUNTING										SINGLE ADDITION NAG			AMD CLASS.
		PARAMETER	$pH_{1:2}$	$EC_{1:2}$	TS	CRS	MPA	ANC	ENC	NAPP	ANC/MPA	TC	NAG pH	$NAG_{4.5}$	NAG_7	
		UNITS	pH unit	µS/cm	wt.%S		kg H_2SO_4/t				no unit	%	pH unit	kg H_2SO_4/t		
SAMPLE ID	MATERIAL	LOR	0.1	10	0.01	0.01		0.5	0.1	0.5		0.01	0.1	0.1	0.1	
Tails	TAILINGS		8.8	52	<0.01	0.009	0.3	2.7	1.2	-2.4	9.8	0.06	6.2		5.4	NAF

KEY

$pH_{1:5}$ = pH of 1:5 extract

$EC_{1:5}$ = Electrical Conductivity of 1:5 extract (µS/m)

TS = Total Sulfur

CRS = Sulfide Sulfur

MPA = Maximum Potential Acidity (kg H2SO4/t) = CRS x 30.6

ANC = Acid Neutralising Capacity (kg H2SO4/t)

Effective Neutralising Capacity (ENC) = ABCC @pH4.5

NAPP = Net Acid Producing Potential (kg H2SO4/t) = MPA - ANC

TC = Total Carbon

Appendix B2: Mineralogy and Fibre Screening

			XRD																			FIBRE SCREENING			
		PARAMETER	Amphibole group	Boehmite	Chlorite group	Clinopyroxene subgroup	Epidote	Garnet group	Ilmenite	Mica group	Petalite	Potassium Feldspar	Plagioclase	Quartz	Serpentine subgroup	Smectite group	Sodium Plagioclase	Spodumene	Zeolite	Zirconium Titanate	Total	Asbestos Detected	Asbestos (Trace)	Synthetic Mineral Fibre	Organic Fibre
		UNITS	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%	wt%				
SAMPLE ID	MATERIAL	LOR	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				
EP2412893	Tailings				<1					5	4	13	37	38				3	<1		100	NO	NO	NO	NO

Appendix B3: Total Elemental Results

		PARAMETER	Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	Fe	Ga	Ge	Hf
		UNITS	ppm	%	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm
SAMPLE ID	MATERIAL																		
EP2412893-001	Tailings		0.01	6.92	0.2	50	59.7	1.75	0.29	<0.02	0.9	4.6	252	114.5	16	0.33	36.3	0.05	0.4

		PARAMETER	Hg	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb
		UNITS	ppm	ppm	%	ppm	ppm	%	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm
SAMPLE ID	MATERIAL																		
EP2412893-001	Tailings		<0.005	<0.005	2.5	<0.5	1905	0.03	329	53.1	2.98	43.8	232	140	4.3	1965	0.005	<0.01	0.12

		PARAMETER	Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr		
		UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	ppm		
SAMPLE ID	MATERIAL																		
EP2412893-001	Tailings		0.7	<1	36.4	27.9	29.5	<0.05	2.01	<0.005	16.15	2.1	3	1.2	1.2	22	2.3		

Appendix B4: Geochemical Abundance Indices

PARAMETER		Ag	Al	As	Ba	Be	Bi	Ca	Cd	Ce	Co	Cr	Cs	Cu	F	Fe	Ga	Ge
Average Crustal Abundance		0.07	8	2	430	3	0.2	3	0.18	45	25	200	3	60	500	5	17	15
SAMPLE ID	MATERIAL																	
EP2412893-001	Tailings	0	0	0	0	3	2	0	0	0	0	0	4	0	0	2	0	0

PARAMETER		Hg	In	K	La	Li	Mg	Mn	Mo	Na	Nb	Ni	P	Pb	Rb	Re	S	Sb
Average Crustal Abundance		0.08	0.1	2.6	30	30	2.1	900	2	2.4	20	80	1000	16	90	0.0004	0.026	0.2
SAMPLE ID	MATERIAL																	
EP2412893-001	Tailings	0	0	0	0	5	0	0	4	0	0	0	0	0	3	3	0	0

PARAMETER		Sc	Se	Sn	Sr	Ta	Te	Th	Ti	Tl	U	V	W	Y	Zn	Zr		
Average Crustal Abundance		16	0.2	2.5	350	2	0.001	10	5000	1	3	150	1	30	70	160		
SAMPLE ID	MATERIAL																	
EP2412893-001	Tailings	0	0	3	0	3	4	0	0	3	0	0	0	0	0	0		

Appendix B5: DI Water Leach Results

PARAMETER			pH	EC	TOT-ALK	SO4 as S	Cl	Ca	K	Mg	Na	Ag	Al	As	Ba	Be	Bi
UNITS			pH units	µS/cm	mg CaCO3 / 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
SAMPLE ID	MAT.		0.1	10	1	1	1	1	1	1	1	0.001	0.01	0.001	0.001	0.001	0.001
EP2500512-001	Tailings		7.5	81	38	<1	8	8	1	1	15	<0.001	1.43	<0.001	0.321	0.002	<0.001

PARAMETER			Cd	Co	Cr	Cu	Fe	Hg	La	Li	Mn	Mo	Ni	Pb	Sb	Se	Sn
UNITS			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
SAMPLE ID	MAT.		0.0001	0.001	0.001	0.001	0.05	0.00004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.01	0.001
EP2500512-001	Tailings		<0.0001	<0.001	0.008	0.002	0.18	<0.00004	<0.001	0.237	0.15	0.027	0.003	<0.001	<0.001	<0.01	0.001

PARAMETER			Sr	Ta	Te	Th	Ti	Tl	U	V	W	Zn					
UNITS			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L					
SAMPLE ID	MAT.	LOR	0.001	0.001	0.005	0.001	0.01	0.001	0.001	0.01	0.001	0.005					
EP2500512-001	Tailings		0.039	<0.001	<0.005	0.002	<0.01	<0.001	0.004	<0.01	<0.001	0.009					

Appendix B6: Physical Characterisation Data

		DATA TYPE	EXCHANGEABLE-CATIONS									
		PARAMETER	CEC	Ca	Mg	K	Na	Al	Ca	Mg	K	Na
		UNITS	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	meq/100g	%	%	%	%
SAMPLE ID	MATERIAL	LOR	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
EP2412893-001	TAILINGS		0.7	0.6	<0.1	<0.1	0.1	<0.1	74.8	6.2	5.6	13.4

		DATA TYPE	PHYSICAL-CLASSIFICATIONS					
		PARAMETER	Clay	Silt	Fine Sand	Coarse Sand	Gravel	SPD
		UNITS	%	%	%	%	%	g/cm3
SAMPLE ID	MATERIAL	LOR	1.0	1.0	11.0	1.0	1.0	
EP2412893-001	TAILINGS		6.0	14.0	59.0	21.0	<1	2.6

APPENDIX C LABORATORY METHODS

ACID BASE ACCOUNTING

Acid base accounting (ABA) is conducted to predict the acid generation characteristics of a waste rock material through determination of the acid neutralising capacity (ANC) and the maximum potential acidity (MPA). Although analysis of pH using distilled water is not a standard ABA test, it is often completed to aid in the interpretation of the ABA data as ancillary information.

The net acid production potential (NAPP) is a measure of the samples overall acid generating capacity and is calculated by subtracting the ANC of the sample from the MPA. A negative NAPP indicates that the sample has a net neutralising capacity and a positive NAPP indicates that the sample has a net acid generating capacity. NAPP, MPA, and ANC are expressed in kg H_2SO_4/tonne equivalent.

ANC is determined by acid digestion (using HCl) of the sample followed by back-titration (using NaOH) to determine the quantity of acid consumed by neutralising minerals within the rock sample. MPA is based on total wt% sulfur (or wt% sulfide sulfur if available) multiplied by the stoichiometric conversion factor 30.63. This conversion factor is determined from the stoichiometry of pyrite oxidation. NAPP is calculated from the below equation (all units are in kg H_2SO_4/tonne):

Equation: $NAPP = MPA - ANC$

Thus potentially acid forming (PAF) rocks have a positive NAPP and non-acid forming (NAF) rocks have a negative NAPP.

ABA analysis typically includes determination of the following:

- Paste pH/EC: Pulverised sample (25 g) is equilibrated with deionised water at a 1:2 ratio and left for 12 hours (or overnight) before pH and EC measurements of the slurry are recorded (AMIRA, 2002).
- Total sulfur (TS): Measured by heating a pulverised sample (< 2 g) in a LECO furnace to ~1,650°C and measuring the sulfur dioxide production. Assay sulfur values measured by XRF analysis on pelletised samples can be used as a substitute for total sulfur measured by LECO.
- Total carbon (TC): Measured by heating a pulverised sample (< 2 g) in a LECO furnace to ~1,650°C and measuring the carbon dioxide production.
- Acid soluble sulfur (SHCl): Method uses hydrochloric acid to extract soluble and slightly soluble sulfate from a pulverised sample (< 2 g). Sulfides should not react and would normally be expelled; extracted sulfur is determined by ICP analysis of the digestion liquor.
- Chromium Reducible Sulfur (CRS): Method is based on the conversion of reduced inorganic sulfur to H_2S by a hot acidic CrCl2 solution. The evolved H2S is trapped in a zinc acetate solution as ZnS which is then quantified by iodometric titration (Ahern et al., 2004).
- Sulfide sulfur: Typically calculated if both total sulfur and sulfate sulfur (SSO4) have been measured.

Equation: $Sulfide\ Sulfur = TS - SSO4$

- Maximum potential acidity (MPA): A measure of the maximum potential of a sample to generate acidity. MPA can be calculated using TS or sulfide sulfur (all units are in kg H2SO4/tonne):

$$Equation: \qquad MPA = TS \times 30.63$$

- Acid neutralising capacity (ANC): Measures the amount of hydrochloric acid (HCl) a pulped sample (2 g) can neutralise with gentle heating and the addition of hydrogen peroxide (2 drops of 30%) to dissolve any ferrous iron present (AMIRA, 2002).
- Net acid production potential (NAPP): The NAPP value is calculated as the difference between MPA and ANC as per Equation 1. A negative NAPP value indicates that a sample may have sufficient ANC to prevent acid generation and conversely, if MPA exceeds ANC, the material may be acid generating.
- Single Addition Net Acid Generation (NAG) Test: A pulverised sample (2.5 g) is digested with 250 mL of 15% hydrogen peroxide and allowed to react to completion before measuring the pH of the NAG liquor. The NAG liquor is then titrated with NaOH to pH 4.5 and pH 7. Acidity measured by the titration to pH 4.5 is due to free hydrogen ion as well as acidity from aluminium and iron (AMIRA, 2002). Additional acidity measured by the titration to pH 7 can be attributed to metal hydrolysis reactions such as copper and zinc (AMIRA, 2002).
- Sequential NAG Test: Involves conducting a series of single addition NAG tests to obtain the maximum NAG acidity value. This may be required for high sulfide bearing samples where complete oxidation may not occur. Incomplete oxidation can also be due to the catalytic decomposition of the hydrogen peroxide from high organic carbon contents (AMIRA, 2002).

TOTAL ELEMENTAL ANALYSIS

The results from solid phase total or near-total analysis such as total elemental (TE) analysis or x-ray fluorescence (XRF) analysis can be used to make an inference regarding elements of potential environmental concern. Results can be assessed using tools such as the geochemical abundance index (GAI) to identify elements that may be enriched in respect to average values. However, an enrichment in a specific element does not imply mobility or bioavailability.

It is important to understand the strengths and weaknesses of each method, particularly the various digestions to ensure drainage predictions are not adversely affected (Price 2009).

Solid samples are digested to enable analysis with inductively coupled plasma mass spectrometry (ICP-MS) or ICP atomic emission spectrometry (ICP-AES). Various digestions can be utilised depending on the mineralogy of the sample or if specific elements are targeted, such as:

- Lithium borate fusion: Lithium borate flux is mixed with a pulped sample to lower the melting point and is then fused to produce a glass disc. The glass disc is either analysed directly by XRF or if a lower detection limit is required, the disc can be dissolved and analysed by ICP (Price, 2009).
- Sodium peroxide fusion: Sodium peroxide and sodium hydroxide is added to a pulped sample before being heated to 550°C. Diluted nitric acid is then used to dissolve the digested residue

before analysis with ICP. This flux is typically used to digest samples with sulfide contents greater than 5% or other refractory or resistant minerals (Price, 2009).

- Four acid digest: Hydrofluoric acid, perchloric acid and nitric acid are added to a pulped sample and taken to near dryness before leaching the nearly dry cake with hydrochloric acid (Price, 2009).
- Aqua regia digest: Samples digested in a heated water bath with a 3:1 mixture of hydrochloric acid and nitric acids (less complete digestion than the four acid digest).

MINERALOGICAL ANALYSIS

Mineralogical analysis is an essential part of geochemical assessments because the mineralogical properties determine the physical and geochemical stability and relative weathering rates of waste rock under different weathering conditions (Price, 2009). Quantitative mineralogy assessment was undertaken utilising powder x-ray diffraction (XRD) technology using a PANalytical Cubix3 with copper radiation and graphite monochromater. Qualitative analysis was undertaken using Bruker Diffracplus Search/Match (ICDD PDF-2 (2011) database) and SIROQUANT Version 4 software was used for quantitative analysis.

STATIC LEACH TESTING

Methods for static (or short-term) leach tests can vary widely, however, all tests generally measure readily soluble constituents of mine wastes and geologic materials. The short-term nature of static leach tests provides a snapshot in time of a material's environmental stability. Test results depend entirely on the present disposition of the sample (e.g., unoxidised vs. oxidised; oxidation products absent vs. oxidation products present). For reactive rocks (e.g., material that contains oxidisable sulfur), the transient processes that lead to changes in solution chemistry during water-rock interactions often develop over periods of time that are much greater than is stipulated in the testing protocols. Therefore, the results from short-term leach tests generally cannot be applied to develop reaction rates and predict long-term mine water quality, but should instead be used to get an initial indication of parameters of constituents of interest.

The method was completed on provided pulps. The sample (100 g) was leached with distilled water at a ratio of 20:1 (liquid to solid) for a period of 12 hours (bottle rolled). The leachate was then filtered through a 0.45 µm filter prior to analysis for a range of parameters.

CARBON SPECIATION

Total carbon (TC) is measured in the sample by oxidising all carbon to carbon dioxide gas in a tube furnace using oxygen to aid the oxidation process. The evolved carbon dioxide is measure by an infra-red cell. The infra-red cell output is calibrated against the value of a known standard sample to provide the TC concentration of the sample.

Total organic carbon (TOC) is measured by pre-treating the sample with hydrochloric acid to remove any inorganic carbon (carbonate). The residual carbon in the sample, representing TOC, is then measured again using the tube furnace and infra-red method.

Total inorganic carbon (TIC) can then be calculated by subtracting TOC from TC:

Equation: $TIC = TC - TOC$

ACID BUFFERING CHARACTERISTIC CURVES

Acid buffering characteristic curve (ABCC) testing (AMIRA, 2002) were carried out to confirm the effective neutralising capacity (ENC) of specific samples. This should be used to provide some indication of reactive and available ANC and then be considered as part of the acid base accounting procedure. The ABCC test involves slow titration of a sample to pH 2.5 with acid while continuously monitoring pH. The ENC is equal to the amount of acid added to decrease the pH to 4.5. These data provide an indication of the portion of the ANC measured in a sample that is readily available for acid neutralisation.

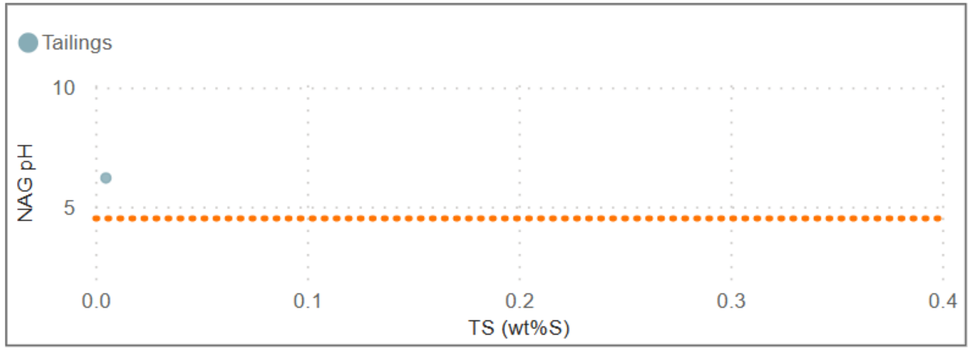
APPENDIX D RESULTS DASHBOARD

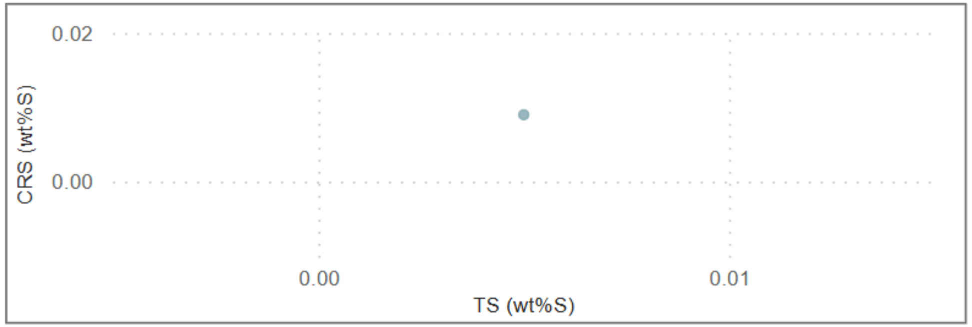
MINE WASTE MANAGEMENT

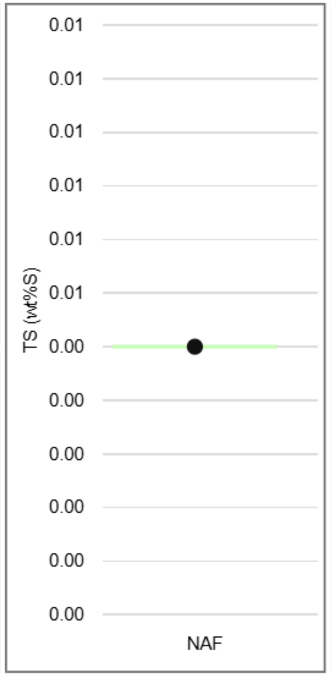
Acid Production

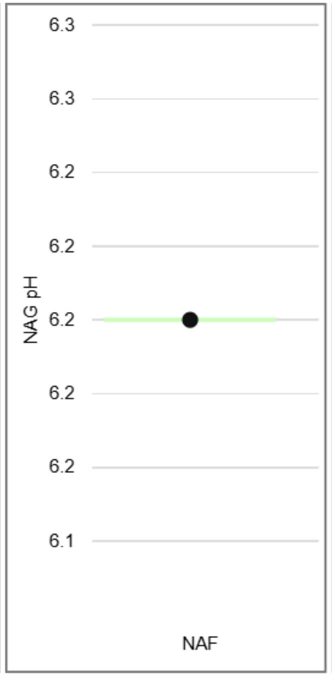
TABBA TABBA

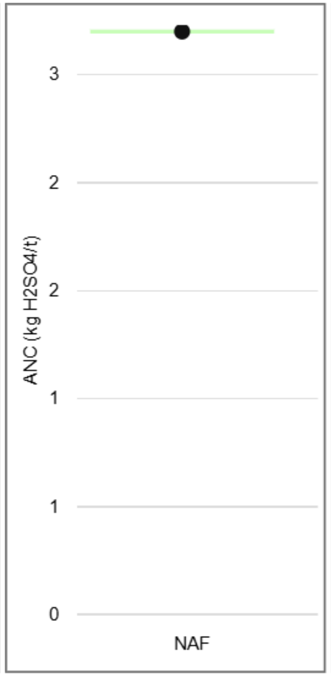
- ☐ Basalt
- ☐ Dolerite
- ☐ Gabbro
- ☐ Interbedded sediments
- ☐ Pegmatite
- ☐ Phyllite
- ☐ Schist
- ☐ Siltstone
- ■ Tailings

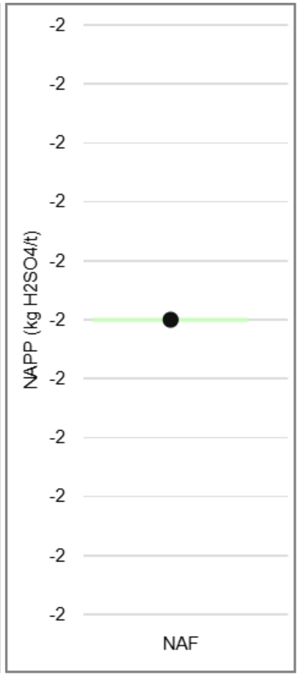


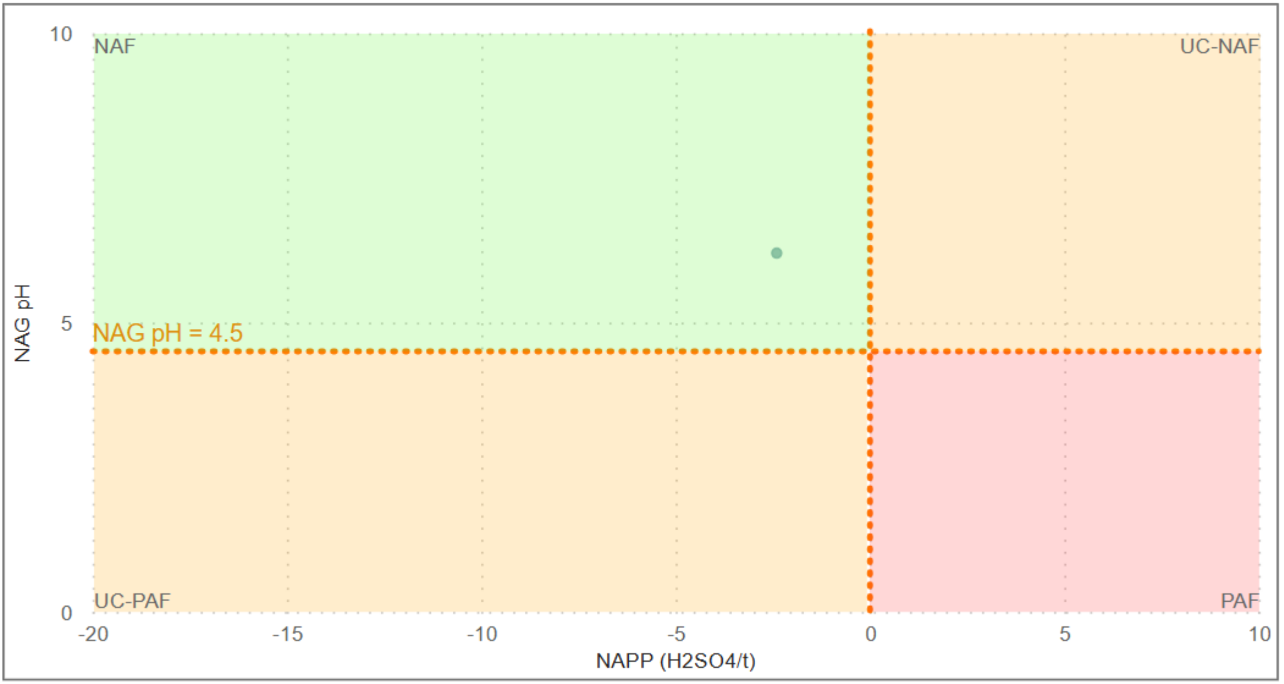


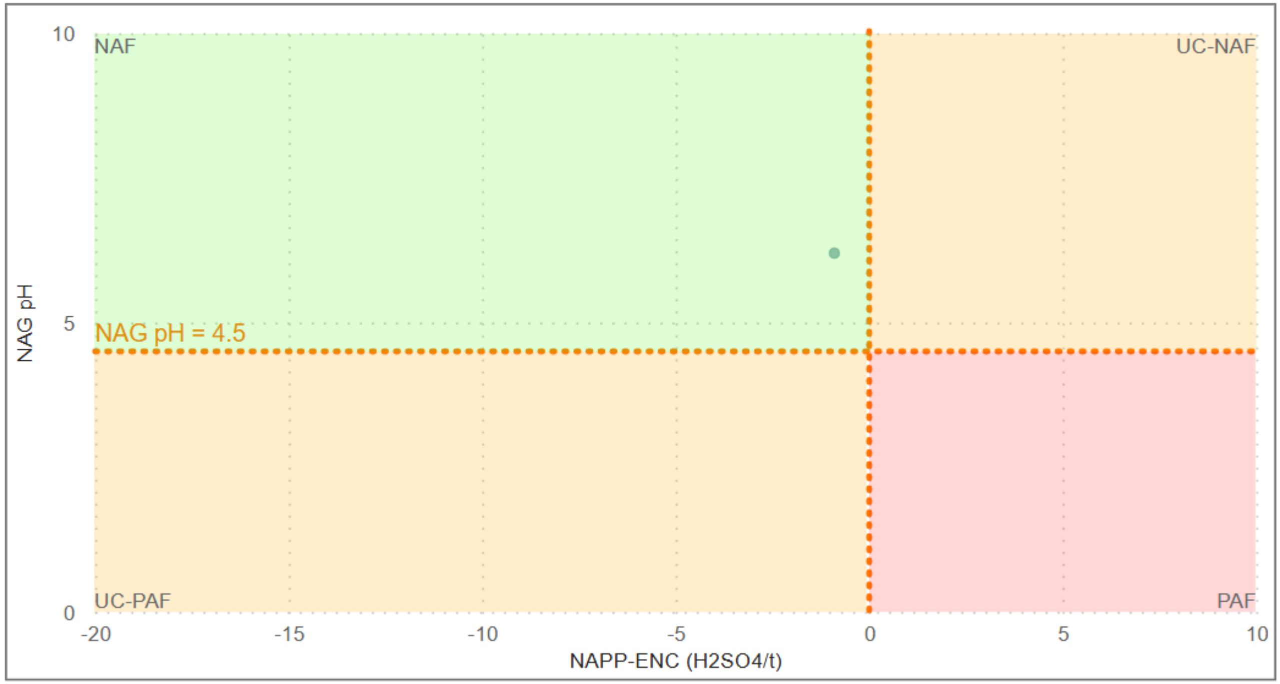












APPENDIX E LABORATORY CERTIFICATES

Provided separately as compiled zip file.

APPENDIX F LIMITATIONS

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MINE WASTE
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