FRIEDA RIVER

Frieda River Limited

Sepik Development Project

Environmental Impact Statement

Appendix 1 – Assessment of the Geochemical Characteristics of Waste Rock and Process Tailings

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Frieda River Copper-Gold Project, PNG

Assessment of the Geochemical Characteristics of Waste Rock and Process Tailings

August 2018

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Executive Summary

This report presents the results from static and column leach testing of drill core and samples of laboratory-generated tailings for the Frieda River Copper-Gold Project being developed by Frieda River Limited (FRL) in the Saudaun (West Sepik) and East Sepik Provinces of Papua New Guinea (PNG). The main aims of the geochemical testing program were to define the range of acid forming characteristics likely to be exhibited by waste rock and tailings from development of the Horse/Ivaal/Trukai (HIT), Ekwai and Koki deposits, and to assess the potential for acid rock drainage (ARD) generation and metals release during mining and waste disposal operations.

A total of 461 drill core samples from the HIT deposit were assessed for acid forming potential in studies carried out by EGi in 1996, 2009 and 2016, and by SRK Consulting in 2011. A further 26 samples from the Ekwai deposit and 54 samples from the Koki deposit were assessed by EGi in 2016. The samples were selected by FRL geology personnel in consultation with EGi and SRK Consulting, with the aim of covering the different lithology and alteration styles exhibited within the three deposits and, to the extent possible, providing reasonable spatial coverage of waste rock across the proposed open-pits.

The geochemical characteristics of tailings samples were also assessed. The tailings were generated from locked-cycle tests and large-scale flotation tests carried out by G&TMS in Canada involving representative HIT ore types.

This report is a compilation of geochemical results from studies carried out by EGi and SRK Consulting on HIT, Ekwai and Koki drill core samples and HIT tailings samples. Overall, the results were conclusive in terms of identifying significant ARD potential within mine waste materials. The main findings from the geochemical testing program and general implications for waste rock and tailings management were as follows.

Findings and Implications for Waste Rock Management

The main findings of the static and column leach testing of waste rock samples were as follows:

- Most HIT samples had a high to very sulfur contents and a low acid neutralising capacity (ANC).
- Median sulfur contents for Horse Microdiorite (HMD), Frieda Diorite Porphyry (FDP) and Debom Volcanics (DV), which were the three most represented lithologies, were 2.5, 3.0 and 2.1 %S, respectively. These sulfur contents correspond to maximum potential acidities (MPAs) of 77, 92 and 64 kg H_2SO_4/t, respectively. The corresponding median ANCs for these lithologies were only 2, 14 and 4 kg H_2SO_4/t, respectively.
- Overall, it is expected that most waste from the HIT deposit will be potentially acid forming (PAF). Approximately 73% of HIT samples tested were classified as PAF based on positive net acid producing potential (NAPP) and net acid generation (NAG) values. Approximately 22% were classified as non-acid forming (NAF), whilst the other 5% of samples could not be classified definitively due to conflicting NAPP and NAG results.

- Similarly, it is expected that most waste rock from the Ekwai and Koki deposits will be PAF. Of the 26 drill core samples tested from Ekwai approximately 54% were classified PAF, 31% NAF, and 15% uncertain. For Koki, approximately 65% of the 64 samples tested were PAF, 33% NAF, and 2% uncertain.
- As sulfur content is generally high, and ANC generally low, it is expected that most PAF waste rock would acidify within a short time if exposed to atmospheric conditions (*i.e.* short lag of weeks to months). However, there will be some waste rock that has moderate ANC which could exhibit a lag of many months and possibly a year or more.
- In addition to sulfur, it is expected that most waste rock will also be significantly enriched with copper, selenium and molybdenum in comparison to concentrations typically reported for background soils. There could also be minor enrichment of some waste with zinc, cadmium and bismuth.

For planning and operational management of waste rock it is recommended that a "traffic light" system of waste classification is used based on sulfur content. The proposed criteria for waste rock classification are as follows:

- Green waste <0.5 %S Assume NAF
- Amber waste 0.5 to 1 %S Assume PAF - but likely mix of NAF & low capacity PAF
- Red waste 1 to 3 %S Assume PAF - but possible minor NAF
- High Red waste >3 %S Assume PAF - worst case material

Under the proposed scheme all material containing more than 0.5 %S is considered to be PAF, but the waste classification system allows for identification of PAF materials that potentially have low, medium, and high capacities for acid generation.

As most *Red* and *High Red* waste will be highly reactive, strategies that rapidly isolate such material from atmospheric oxygen will be needed. To achieve this it is recommended that underwater (or subaqueous) placement of all *Red* and *High Red* waste rock within the Integrated Storage Facility (ISF) is undertaken. With subaqueous placement the rate of ingress of oxygen into the submerged rock will be of such low magnitude that the rates of sulfide oxidation should be negligible.

During the early years of operation when mining weathered zone rock there may be opportunities to dispose of low sulfur, *Green* waste rock in a constructed waste rock dump. Such a dump might also incorporate some lower capacity *Amber* waste, but the feasibility of constructing waste rock emplacements with effective oxidation control for PAF material will depend on the amount and production schedule of NAF rock, and the ability to construct compacted layers in a timely manner through the construction period. Although testing to date has not identified any high carbonate rock (such as limestone or dolomite) within open-pit limits it is understood that limestone outcrops do occur within the general vicinity of the Frieda River Copper-Gold Project. Judicious application of crushed limestone to the surface of *Amber* material during construction of a waste rock emplacement would provide some additional operational control on ARD generation.

Implications for Pit Water Quality

The high acid generating potentials of most of the drill core samples tested also has implications for pit water quality given that the same rock units will be exposed around the walls and benches of open-pits during operations and post-closure. The results of static and column leach testing suggest that pit water will invariably be acidic, but overall water quality will depend on the time dependent distribution of ARD rock types exposed within the open-pits, the extent of leaching of pit walls by rainfall, the flushing of the mine rubble accumulated on mine benches, groundwater influxes, as well as any surface runoff from upstream catchment. At closure, the final RL of the pit lake will also be a factor.

Findings and Implications for Tailings Management

The results of this study suggest that:

- Final tailings will likely contain between 0.5 to 1.0 %S and be PAF.
- Final tailings will have a small inherent neutralising capacity, which should delay the onset of acid conditions if the tailings are exposed to atmospheric conditions within the Integrated Storage facility (ISF).
- The lag period for HIT final tailings containing 0.5 to 1 %S should extend for at least a year and possibly for several years.
- Sulfur will be preferentially concentrated in cleaner tailings, hence rougher tailings will have a relatively low sulfur content.
- Based on the samples tested by EGi it is anticipated that the sulfur content of rougher tailings will be around 0.2 to 0.4 %S and have an average ANC of around 10 kg H_2SO_4/t. This being the case, it is likely that rougher tailings will be borderline NAF to PAF(low capacity).

From an operational viewpoint, the tailings slurry will initially be moderately alkaline as a consequence of lime added during the flotation process. If there is subaqueous deposition of tailings into the ISF and the tailings solids remain permanently submerged, or at least fully saturated, then there will be minimal opportunity for sulfide oxidation to occur, and hence acidity and/or metals release from the solids should remain negligible.

In the event that some tailings do beach within the ISF then oxygen would inevitably diffuse into the air-filled pore space and react with any sulfides exposed on the surfaces of tailings particles. The extent of sulfide oxidation in beached tailings would depend on the reactivity of the sulfides present and the exposure duration. Provided the exposure time was within the ARD lag period and/or the beached tailings remained close to saturation for most of the time, the alkalinity input of the tailings discharge should exceed the overall rate of acid generation from the exposed tailings. In such a situation, it is expected that the quality of water within the ISF would primarily be influenced by the chemistry of the tailings liquor and the natural river inflow rather than geochemical reactions with the tailings solids.

The preferential concentration of sulfur in the cleaner tailings results in significant differences in the acid forming potentials of the rougher and cleaner tailings. This may present an opportunity for separate disposal of cleaner and rougher tailings to assist with ARD control, if required. It may be feasible to discharge NAF rougher tailings into the ISF without any requirement for permanent inundation of tailings solids, however the much smaller volume of high sulfur, cleaner tailings would need to be discharged subaqueously and maintained under a permanent water cover.

1.0 Introduction

This report presents the results and findings of studies carried out to assess the geochemical characteristics of mine waste materials that will be produced at the Frieda River Copper-Gold Project being developed by Frieda River Limited (FRL) in the Saudaun (West Sepik) and East Sepik Provinces of Papua New Guinea (PNG) within the Sepik River catchment (Figure 1).

The greenfield Frieda River Copper-Gold Project is based on the Horse, Ivaal, Trukai, Ekwai and Koki (HITEK) porphyry copper-gold deposits which contain an estimated total combined Measured, Indicated and Inferred Mineral Resource (JORC classifications) of approximately 2.64 billion tonnes at an average grade of 0.45% copper and 0.24 grams per tonne gold.

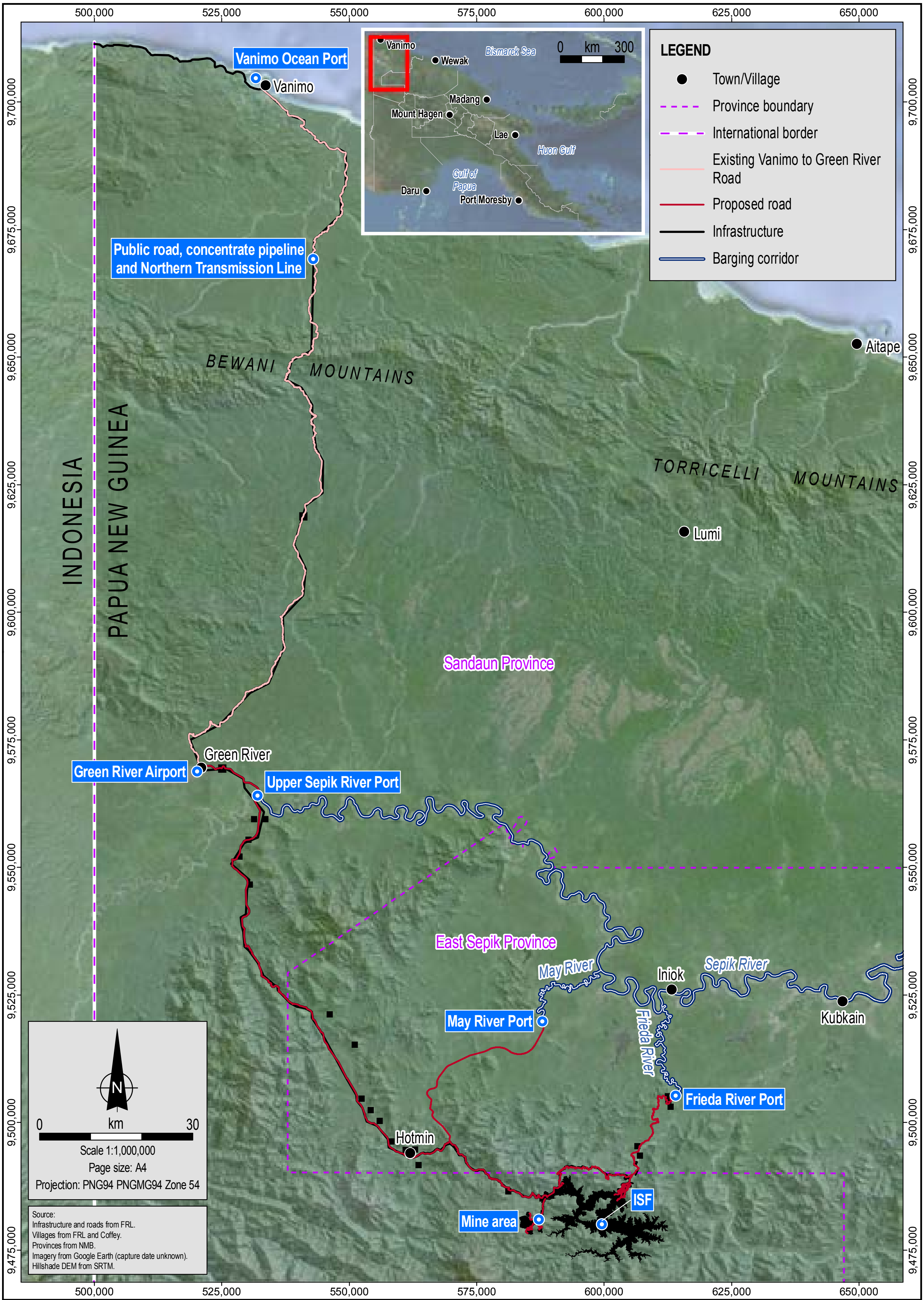
The Frieda River Copper-Gold Project comprises a large-scale open-pit mine operation feeding ore to a comminution and flotation process plant producing a copper-gold concentrate for export to custom smelters. Figure 2 shows the general layout around the HITEK open-pit and supporting infrastructure.

Mining inventory comprises approximately 1,500 Mt of mill feed. The average annual copper-gold concentrate production will be 735,000 wet tonnes and the average annual metal in concentrate production will be 175,000 tonnes (t) copper and 230,000 ounces (oz) gold. The FRCGP will have mine life of approximately 33 years preceded by a seven-year implementation period.

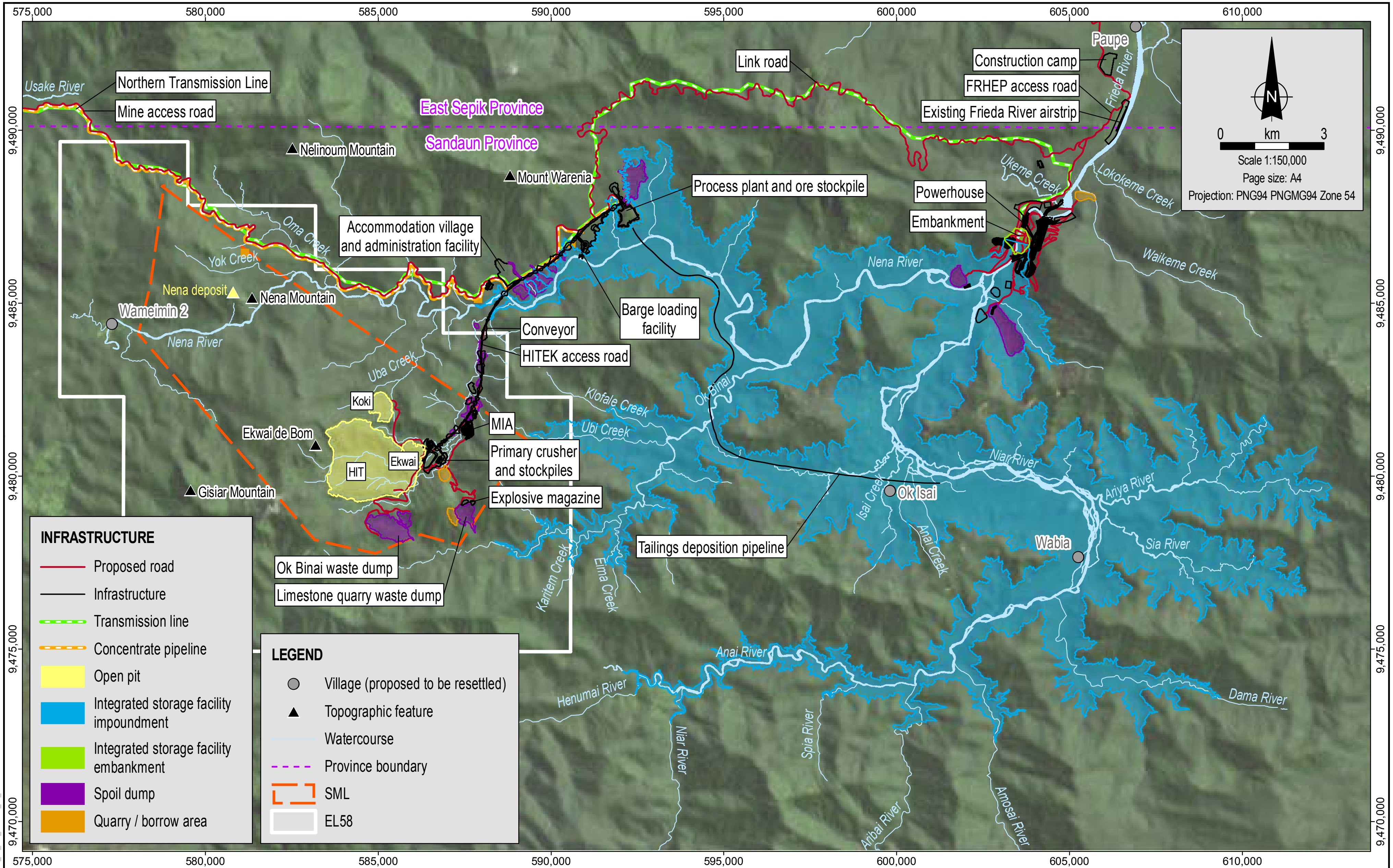
A concentrate pipeline will transport the copper-gold concentrate produced at the process plant to a concentrate dewatering, storage and export facility located at the Vanimo Ocean Port.

An engineered Integrated Storage Facility (ISF) will be constructed as part of a separate, albeit, dependent project, called the Frieda River Hydroelectric Project. The ISF will located in the Frieda River Valley downstream of the mine site (see Figure 2) and provide subaqueous storage for mine waste produced as part of the Frieda River Copper-Gold Project, including waste rock and tailings. A spoil dump will also be developed in the headwaters of the Ok Binai to store non-acid forming (NAF) waste rock from Year -1 and organic pre-strip material over the 33-year mine life. All waste rock (other than that reporting to the Ok Binai waste dump), including potentially-acid forming (PAF) waste rock, will be barge placed within the ISF. Thickened tailings will be pumped via a dedicated pipeline from the process plant for subaqueous storage in the ISF.

Preliminary testing of HIT drill core by Environmental Geochemistry International Pty Ltd (EGi) in 1996 identified sulfidic rock units with the potential to generate acid rock drainage (ARD) if exposed to atmospheric conditions. In recognition of this potential, EGi was commissioned in 2009 by Xstrata Frieda River Limited (XFRL), then owner of the Frieda Project, to undertake more detailed assessments of the geochemical characteristics of waste rock and ore grade materials within the limits of the proposed HIT open-pit, and also the tailings that will be produced from processing of different ore types.



coffey A TETRA TECH COMPANY	Date: 15.08.2018 Project: 754-ENAUABTF11575B File Name: 11575_11_F01.02_GIS	Frieda River Limited Sepik Development Project	FRIEDA RIVER	Project overview	Figure No: 1



Source:
Infrastructure, roads and tenements from FRL.
Villages, topographic features, watercourses and water bodies from FRL and Coffey.
Provinces from NMB.
Landsat satellite imagery from FRL (capture date unknown).
Hillshade DEM from SRTM.

MXD Reference: 11575B_11_BM_GIS002_v0_10

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Date: 15.08.2018
Project: 754-ENAUABTF11575A
File Name: 11575_11_F01.03_GIS

Frieda River Limited
Sepik Development Project

FRIEDA RIVER

Mine and ISF area

Figure No: 2

The assessment of HIT waste rock was supplemented by further testing of drill core by SRK in 2011 to provide greater spatial coverage of the proposed HIT open-pit, and by EGi in 2016 to provide greater coverage of totally oxidised (TOX) material within the near-surface weathered zone of HIT. Drill core samples representing waste materials within the Ekwai and Koki deposits were also assessed by EGi in 2016.

The main objectives of the geochemical test programs undertaken by EGi and SRK were:

- To determine the range of acid forming characteristics of the major waste rock units that will be mined during development of the HIT, Koki and Ekwai open-pits and to provide sufficient data for a preliminary assessment of the likelihood of occurrence of acid generating waste rock types.
- To assess the reactivity of the sulfide mineralisation within major waste rock units under controlled laboratory conditions, and to make preliminary estimates of the likely geochemical behaviour and lag times for acidification to occur under field conditions.
- To assess the forms and reactivities of any carbonate or silicate mineralisation within major rock units that might delay or mitigate the generation of ARD.
- To identify any elemental enrichments within major rock units that might be environmentally significant and to assess the potential for mobilisation of any elements which could impact the qualities of waters within open-pits and within the ISF.
- To assess the geochemical implications for mine water management and the need for long-term control of ARD around the mine site and final open-pits.

The geochemistry of the tailings that will be produced from processing of different HIT ore types was also investigated. The geochemical assessments of tailings were based on laboratory generated samples of process tailings produced by G&T Metallurgical Services Ltd (G&TMS) in Canada as part of the metallurgical testing program for the Frieda River Copper-Gold Project. The tailings samples were sourced from locked-cycle testing of a range of HIT ore types and also from larger scale flotation testing of HIT ores. The main objectives of the geochemical assessment program for tailings were:

- To determine the range of acid forming characteristics of the tailings that will be produced from processing of different ore types from the HIT deposit and investigate the extent of any preferential reporting of sulfur between the cleaner and rougher tailings streams.
- To assess the reactivity of the sulfide mineralisation within tailings under laboratory conditions, and to make preliminary estimates of the likely geochemical behaviour and lag times for acidification to occur under field conditions in the event that tailings solids were exposed to atmospheric conditions.
- To identify any elemental enrichments within process tailings that might be environmentally significant and which potentially could impact the quality of water within the ISF and downstream.
- To assess the geochemical implications for tailings solids and tailings liquor management at the site and the need for long term control of ARD from tailings within the ISF.

The geochemical assessment of samples of drill core and laboratory-generated tailings involved both static and column leach test methods. Static testing primarily involved analysis of specific parameters to define the acid forming potentials, whereas the column leach tests were set-up to determine the real-time reactive behaviour when exposed to atmospheric conditions.

This report presents the methods and results of the static and column leach testing programs involving drill core and tailings for the Frieda River Copper-Gold Project. The implications for pit water quality and for waste rock and tailings handling and management are also discussed.

2.0 Geological Setting

The Frieda River Copper-Gold Project area includes the HIT, Koki and Ekwai porphyry deposits. These deposits are hosted within the Frieda River Igneous Complex (FRIC), which lies in the northern foothills of the central range of PNG, towards the southern margin of the New Guinea Thrust Belt. The FRIC is a remnant stratovolcano that roughly extends over an area of 17 x 7 km and consists predominantly of lavas and pyroclastic rocks of andesitic composition.

The FRIC is interstratified in the Wogamush Formation which is made up of three units, the Upper Wogamush unit (comprising a thick sequence of volcanoclastic and calcareous sandstone interbedded with limestone and conglomerates), the Middle Wogamush unit (comprising mainly andesitic lava, pyroclastic rock, and volcanoclastic sediment and calcareous mudstone) and the Lower Wogamush unit (comprising mainly mudstone, limestone and conglomerate). The basement geology in the vicinity of the FRIC is predominantly metamorphosed volcanics and sediments of the Ok Binai Phyllite.

Figure 3 shows a geological map for the Frieda River Copper-Gold Project area. The HIT, Koki and Ekwai deposits comprise a number of microdiorite bodies that intrude into the volcanic complex, which are collectively known as the Frieda Complex porphyries. Porphyry copper mineralisation accompanies these intrusives to varying extents, predominantly as veins and disseminations of chalcopyrite, and to a lesser extent bornite. There is also a zone of supergene chalcocite-covellite associated with the HIT deposit.

The main lithologies that will be mined as waste rock at the Frieda River Copper-Gold Project include *Debom Volcanic (DV), Frieda Diorite Porphyry (FDP), Horse Microdiorite (HMD), Hornblende Monzonite (HBM), Knob Diorite (KD), Lower Wogamush (LW)* and *Flimtem Trachyandesite (FT).*

Alteration of the FRIC is extensive and typical of other Pacific rim porphyry systems, being characterised by an inner core area of *potassi*c (PO) alteration, which is succeeded outward by *phyllic (PH)*, then *propylitic (PR)* alterations. Other significant alteration types that are recognised within the FRIC include: *argillic (AR)*, *silica-alunite (SA)*, and *quartz-illite-pyrite (QIP)*.

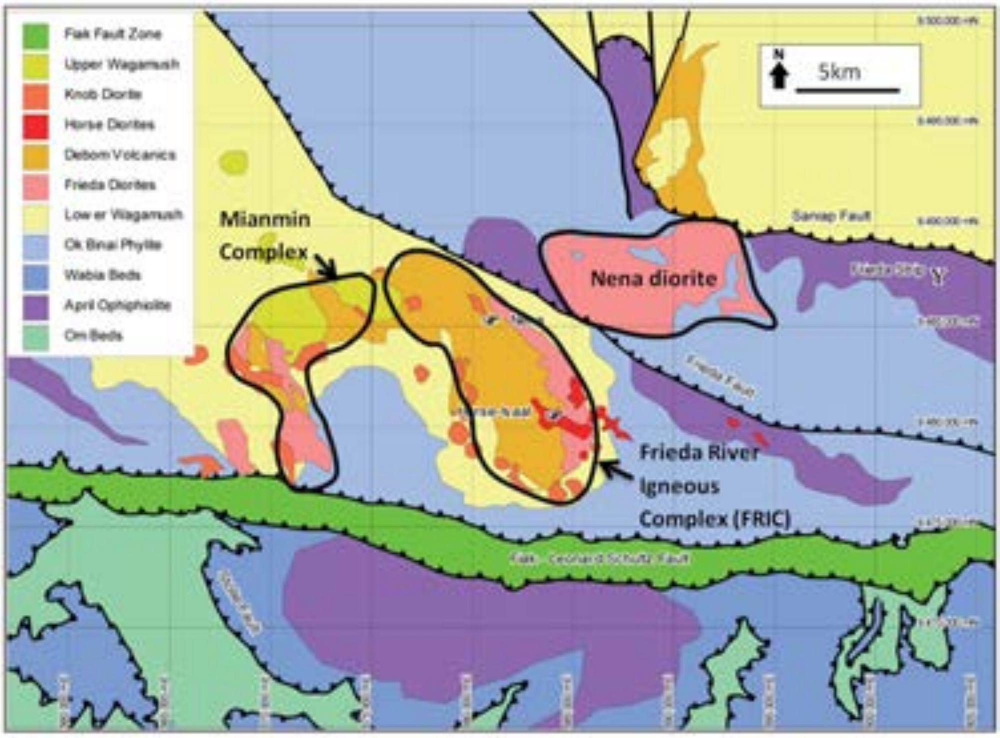

FIGURE 3: *Geology of the Frieda River Copper-Gold Project area*

3.0 Chronology of Geochemistry Studies

There have been a number of studies looking at the geochemical characteristics of drill core and process tailings associated with the Frieda River Copper-Gold Project. They include:

- **EGi (1996)**. *Preliminary evaluation of the acid forming potential of waste roc*k. *Horse Ivaal Prospect, PNG.* Report prepared for Highland Gold Limited by Environmental Geochemistry International Pty Ltd, Document No. 9301/298, November 1996.
- **SRK (2009)**. *Geochemical assessment of Horse/Ivaal waste rock. Scoping of geochemical characterisation program.* Memorandum prepared for Xstrata (M. Hawkins) by SRK Consulting, 13 January 2009.
- **EGi (2009)**. *Preliminary report on ARD testing of HIT drill core samples.* Memorandum prepared for Xstrata Frieda River Limited (M Hawkins) by Environmental Geochemistry International Pty Ltd, 28 September 2009.
- **EGi (2010)**. *Column leach testing of waste rock from the HIT deposit and tailings produced from HIT and Nena ores. Frieda River Copper Project.* Report prepared for Xstrata Frieda River Limited by Environmental Geochemistry International Pty Ltd, Document No. 2047/923, Interim Report July 2010.
- **EGi (2010)**. *Assessment of the ARD and geochemical characteristics of laboratory generated tailings produced from HIT and Nena ores. Frieda River Copper Project* Report prepared for Xstrata Frieda River Limited by Environmental Geochemistry International Pty Ltd, Document No. 2047/930, September 2010.

- **SRK (2011)**. *Site water quality estimates - Frieda River Project*. Report prepared for Xstrata Frieda River Limited by SRK Consulting, Document No. XST014/015, September 2011.
- **EGi (2011)**. *Assessment of the geochemical characteristics of waste rock and process tailings associated with the development of the Horse-Ivaal-Trukai porphyry copper deposit.* Report prepared for Xstrata Frieda River Limited by Environmental Geochemistry International Pty Ltd, Document No. 2047/933, November 2011.

The preliminary evaluation by EGi in 1996 examined the acid forming potential of 10 drill core samples from the HIT deposit, three of which represented oxidised diorite within the weathered zone of the deposit and seven samples representing altered diorite within the primary rock zone. Static testing included measurements of sulfur content, acid neutralising capacity (ANC), net acid producing potential (NAPP), and net acid generation (NAG) capacity. Two of the three weathered zone samples were essentially barren with respect to sulfur and were classified as *non-acid forming* (NAF). The third sample had a relatively small sulfur content (0.37 %S) and was classified as *potentially acid forming* (PAF) based on positive NAPP and NAG test results, albeit with a relatively low capacity for acid generation. The sulfur contents of the seven primary rock samples ranged from moderate to high (0.57 to 2.52 %S), and ANCs were generally low (0 to 14 kg H_2SO_4/t). All but one of the primary rock samples were classified as PAF and it was concluded that waste rock as represented by the samples would pose a significant risk in relation to ARD if exposed to atmospheric conditions. Furthermore, the low availability of ANC in PAF rock suggested that acidification could occur within a relatively short time of rock being mined and exposed to atmospheric conditions.

The low availability of neutralisation capacity was also reported by SRK (2009) during an early scoping study for the project. A total of 44 composite samples were assayed for total and inorganic carbon, and the results subsequently used to calculate the carbonate neutralising value (CNV) for each sample. It was reported that approximately 52% of the samples assayed had negligible carbon contents and hence negligible neutralisation capacities (*i.e.* CNVs less than 1 kg H_2SO_4/t). A further 39% of samples had very limited neutralisation capacity (CNVs between 1 and 14 kg H_2SO_4/t). Only five of the 44 samples had neutralisation capacities that would be regarded as significant, with CNVs ranging between 35 to 91 kg H_2SO_4/t.

In the period 2009 to 2011 more detailed geochemical investigations were commissioned by Xstrata Frieda River Limited (then owners of the site) to determine the amount and spatial occurrence of PAF waste material within the proposed HIT open-pit in sufficient detail to produce a NAF/PAF waste schedule, ascertain appropriate strategies for waste rock handling and disposal, and quantify potential impacts on pit water quality from PAF rock exposed on walls and benches within the open-pit shell. These studies included static testing of 130 drill core pulp samples by EGi in 2009, and 221 drill core samples by SRK in 2011. Kinetic based testing was also carried out on selected waste rock and tailings samples by EGi in 2009-2010.

In 2016, testing of 26 drill core samples from the Ekwai deposit and 54 samples from the Koki deposit were assessed by EGi, together with another 67 drill core samples from HIT. In the latter case the samples were representative of representing TOX material within the near-surface weathered zone of the HIT deposit. The targeting of TOX material was to ensure that weathered zone waste rock was adequately represented in the geochemical database for the project.

The geochemical results for all drill core and tailings samples as reported in studies conducted by EGi and SRK were compiled and are presented and discussed in following sections of this report.

4.0 Sample Selection and Preparation

4.1 Drill Core Selection and Preparation

1996 HIT Test Program

Ten drill core samples were tested by EGi in 1996 during the exploration phase of the project to provide preliminary data on acid forming characteristics. The samples were selected by personnel from Highlands Gold Limited (then owners of the site) from seven cores and included three samples from the weathered rock zone and seven samples representing primary rock. The samples were provided as pulps, each representing a 2 m interval of core.

2009 HIT Test Program

A more detailed geochemical investigation of drill core samples was carried out by EGi in 2009 during the Prefeasibility stage of the project. The study involved static testing of 163 drill core samples primarily representing waste rock internal to the ore deposit. The 163 samples were selected by FRL geology personnel in consultation with EGi, with the aim of covering different lithology and alteration styles exhibited within the porphyry deposit and, to the extent possible, providing reasonable spatial coverage of waste rock across the proposed open-pit. The rationale behind sample selection as documented by XFRL (2011)[1] was as follows:

> *The sample selection assumed that the control on acid weathering behaviour was likely to be dominated by the mineralogy of the material, especially pyrite content. At the Frieda River Project, apart from the mudstones, the different lithologies have a monotonous mineralogy dominated by feldspar-hornblende-biotite-quartz. Therefore, within the igneous rocks, alteration is expected to be the principal control. In particular, both PH alteration and acid sulfate weathering tend to generate pyrite. The initial sample suite, therefore, comprised material spanning volcanics/intrusives to mudstones, and fresh through PO, PH, and clay rich alteration/weathering.*
>
> *Drilling in the waste rock was quite widely spaced when the sample selection was undertaken in June 2009. Samples were sought from the available drill holes to provide coverage of the lithology-alteration spectrum discussed above and, as far as the geology permitted, to achieve a wide spatial coverage across the likely waste rock body.*

The selection of samples for ARD testing was limited by the availability of appropriate drill core at the time selections were made. Where possible, samples were selected from recently drilled holes, but for some waste types it was necessary to take samples from holes that were drilled in earlier drilling programs. The approximate age distribution of samples selected for ARD testing was as follows:

- 82 samples from holes drilled in 2007 to 2009,
- 38 samples from holes drilled in 2002 to 2005,
- 29 samples from holes drilled in 1997-1999, and
- 14 samples from holes drilled in the 1970's.

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1 XFRL (2011). Selection of drill core samples for geochemical assessment. Memorandum prepared by Xstrata Frieda River Limited (Steve Windle), June 2011.

Samples from holes drilled after 2002 were stored as pulps (-180 micron) at Australian Laboratory Services Pty Ltd (ALS) in Australia. The pulps were contained in paper sample bags within ALS storage facilities located in Brisbane or Townsville. These facilities were weather-proof but were not climate controlled. Samples from holes drilled prior to 2002 were taken from core stored on site. The appropriate intervals were sampled then crushed and pulverised on-site by XFRL. Some oxidation was noted for these older samples.

The 2009 program included nine samples that were used in the column leach tests (see Section 8). These samples were provided as drill core pieces. Following inspection, they were forwarded to Sydney Environmental and Soil Laboratory Pty Ltd where they were crushed to less than 4 mm size by conventional jaw crusher for use in the column tests. A 200 g sub-sample of crushed material was also milled to less than 75 micron using a zirconia pulverising bowl for static testing.

2011 HIT Test Program

A supplemental testing program was subsequently carried out by SRK in 2011 involving 221 drill core samples that were selected by SRK in conjunction with XFRL. The samples were sourced from 12 drill holes, most of which were holes specifically drilled for geotechnical purposes targeting the final pit wall. There were also some holes located within the open-pit shell to provide better spatial coverage of internal pit waste for areas that were poorly represented in the 2009 program.

2016 HIT Test Program

A total of 67 drill core pulps were provided by FRL for geochemical assessment. The test samples were selected by FRL geologists from drill core pulps stored at ALS's National Storage Facility in Townsville. The pulps were sourced from 36 holes that were drilled in 2009, 2010 or 2011. To select samples, FRL initially identified a total of 612 drill core samples representing TOX lying within the open-pit limits of the first five years of mining. The existing assay data indicated most of the 612 TOX samples had low sulfur contents, which is to be expected for the weathered zone. Approximately 86% of the 612 TOX samples contained less than 0.1 %S, and approximately 96% contained less than 0.5 %S. FRL attribute sulfur enrichment in the remaining small percentage of samples (~4%) containing more than 0.5 %S to inclusions of resistant cobbles or boulders that are an inherent part of the TOX. The majority of test samples were chosen by applying a random selection method[2] to the 612 TOX samples identified by FRL. This approach contributed 60 of the 67 samples provided for geochemical testing. Another seven samples with sulfur contents in the range 0.14 to 0.98%S were selectively chosen to provide additional data to support refinement of a sulfur cut-off grade for planning and operational NAF/PAF classification of waste material.

2016 Ekwai and Koki Program

A total of 26 drill core samples representing the Ekwai deposit and 54 samples representing the Koki deposit were selected by FRL geologists from cores drilled in 2015 (Ekwai) or 2016 (Koki). Samples were provided as drill core pulps that were prepared by ALS as part of the resource evaluation program.

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2 The selection process used by FRL involved assigning a random number to each of the 612 samples described as TOX then filtering out all but 10% of samples.

Spatial Distribution of HIT Drill Core Samples

Figure 4 shows the spatial arrangement of drill core samples selected for geochemical characterisation, with different orientations for open-pits shown.

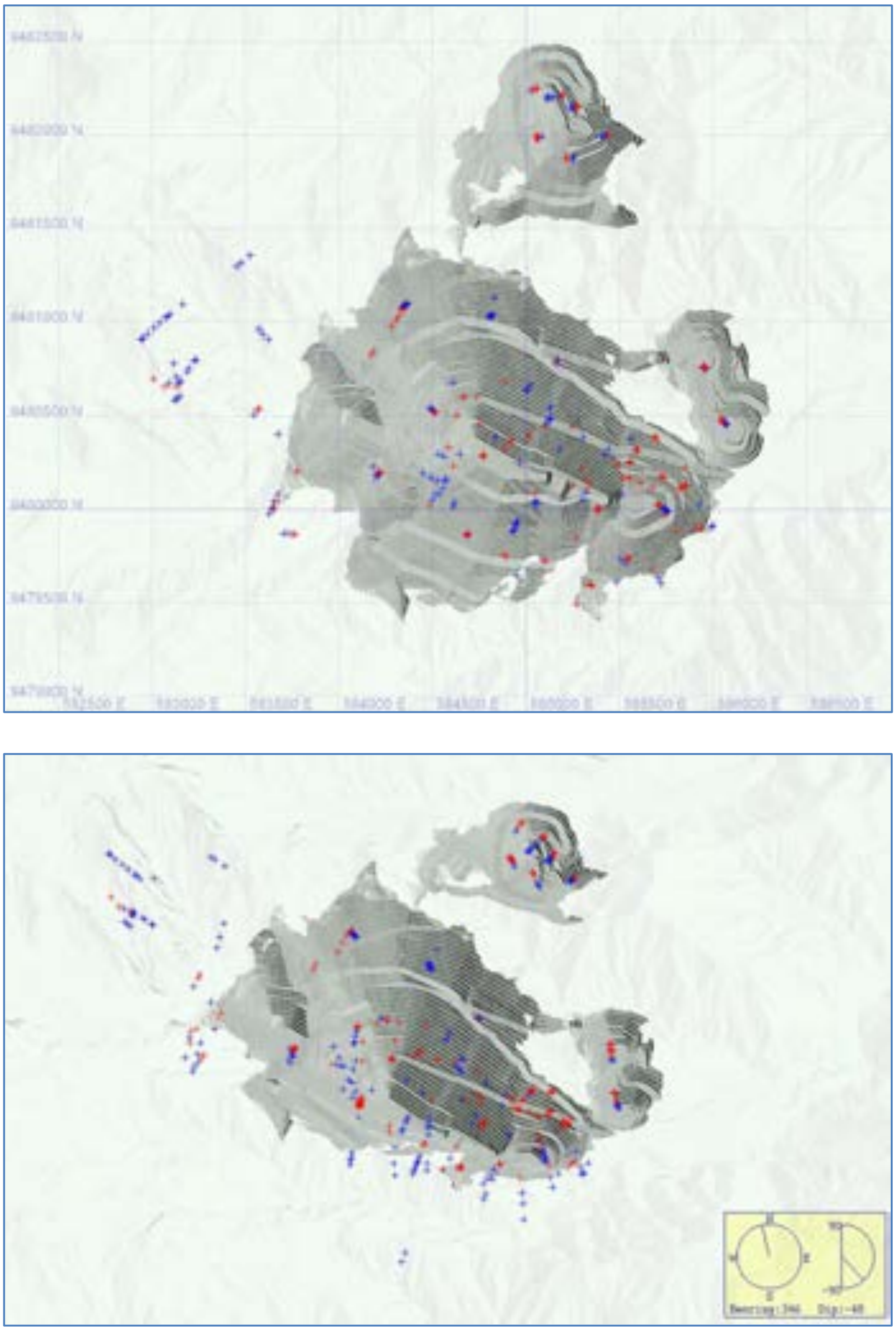

FIGURE 4: *Spatial arrangement of drill core samples in relation to proposed open-pits*
(red = weathered, blue = fresh rock)

Lithology-Alteration Distribution of HIT Drill Core Samples

Table 1 gives the percentage distribution of the drill core samples in relation to lithology and alteration, and Table 2 gives the percent distribution in relation to weathering. All of the dominant lithologies and alteration styles were well represented, and the combination of HIT drill core samples from the 1996, 2009, 2011 and 2016 programs is considered to be a reasonable representation of the waste rock that will be mined from the HIT open-pit, albeit that the actual distribution of waste rock between lithology/alteration types may differ slightly from that of the drill core dataset. Similarly, all weathering states were represented by the drill core dataset, although totally oxidised (TOX) and partially oxidised (POX) waste may be over-represented at the expense of fresh (FR) waste.

TABLE 1: *Percentage distribution of drill core samples* split by lithology and alteration*

Lithology	Alteration					
	Phyllic (PH)	Potassic (PO)	Propylitic (PR)	Quartz-Illite-Pyrite (QIP)**	Silica-Alunite (SA)	Weathered (WT)
Debom Volcanics (DV)	13.3%	-	1.2%	4.2%	5.6%	-
Frieda Diorite Porphyry (FDP)	18.3%	0.5%	7.7%	2.3%	0.2%	0.5%
Flimtem Trachyandesite (FT)	-	-	-	-	-	0.2%
Hornblende Monzonite (HBM)	-	-	-	-	-	0.5%
Horse Microdiorite (HMD)	17.3%	6.1%	1.2%	4.7%	0.5%	10.8%
Lower Wogamush Sediment (LW)	1.2%	1.6%	-	0-	-	0.7%
Scree (SC)	-	-	1.4%	-	-	-

* *Based on 427 samples (note:34 samples from other minor lithologies/alterations not included)*
** *QIP includes samples with AR alteration*

TABLE 2: *Percentage distribution of drill core samples split by weathering and comparison with the distribution for waste rock tonnage*

Weathering	Sample Distribution	% Mineral Resource Waste Tonnage
Alluvium (AL)	1.3%	3.0%
Supergene Enrichment (SEG)	2.0%	0.8%
Total Oxidation (TOX)	15.2%	4.2%
Partial Oxidation (POX)	15.2%	9.6%
Fresh (FR)	66.4%	82.4%

4.2 Tailings Selection and Preparation

Tailings samples from 13 locked cycle tests involving representative HIT ore types were provided as dried pulps by G&TMS in Canada. In additional, tailings samples from three large-scale flotation tests involving HIT ores were also provided for geochemical assessment and use in column leach tests. These samples were provided as slurries.

5.0 Geochemical Assessment Methodology

5.1 Static Testing Procedures

The static testing of tailings solids and drill core pulps included analysis of the following parameters:

- Total sulfur and carbon contents
- Maximum potential acidity (MPA)
- Carbonate neutralising value (CNV)
- Acid neutralising capacity (ANC)
- Net acid producing potential (NAPP)
- Net acid generation (NAG) capacity

The drill core pulps in the SRK (2011) study were also assayed for sulfate-sulfur content, and the difference between the total sulfur and sulfate-sulfur contents was assumed to be sulfide-sulfur, which it turn was used to calculate acid potential (AP).

The NAPP and NAG test results from the 2009 and 2016 programs were reviewed and then some samples were selected for more detailed analysis to clarify the ARD classifications or to assess sulfide reactivity, acid buffering characteristics and elemental enrichments. The detailed testing of selected drill core and tailings samples included one or more of the following:

- Sequential NAG tests
- Kinetic NAG tests
- Acid buffer characteristic curves
- Solids multi-element analysis
- Water extractable elements
- Peroxide extractable elements

The methods used were compliant with procedures documented in the GARD Guide[3]. Brief summaries of the procedures are given below.

Total Sulfur and Carbon Analyses

Sulfur and carbon assays were carried out by ALS in Brisbane under a quality assurance system certified as complying with international standards ISO 9001:2000 and ISO 17025:2005. Both total sulfur and total carbon were determined by the Leco furnace method.

3 Most of the methods used in this study are documented in the *Global Acid Rock Drainage Guide* (GARD Guide), produced by the International Network for Acid Prevention (INAP), 13 December 2010 (http://www.gardguide.com).

Maximum Potential Acidity

The MPA is the amount of acid that theoretically could be generated by a sample if all the sulfur occurred as reactive pyrite and there was complete oxidation of the pyrite according to the following reaction:

$$FeS_2 + 15/4\ O_2 + 7/2\ H_2O \Rightarrow Fe(OH)_3 + 2\ H_2SO_4$$

MPA was expressed in units of kg H_2SO_4/t and was calculated from the total sulfur content as follows:

$$MPA\ (kg\ H_2SO_4/t) = Total\ \%S \times 30.6$$

Acid Potential

The determination of sulfate-sulfur in the 1996 and 2011 programs allowed calculation of AP, which is based on sulfide-sulfur content rather than total sulfur. As sulfate-sulfur is already oxidised it does not contribute to acid generation. The APs of the 1996 and 2011 samples were calculated as follows:

$$AP\ (kg\ H_2SO_4/t) = (Total\ \%S - Sulfate\ \%S) \times 30.6$$

Acid Neutralising Capacity

The ANC of each sample was determined using the Sobek Method[4]. This method involves reacting a sample with acid to provide a direct measurement of the amount of acid that can be consumed by carbonate and other minerals within a sample. A sub-sample of pulverised material was acidified with a known amount of acid at between pH 1 to 2 for approximately 1 to 2 hours. The amount of acid remaining after the reaction stage was determined by back-titration, and the amount of acid consumed by the sample (again expressed in terms of kg H_2SO_4/t) determined by difference.

Carbonate Neutralising Value

The CNV is an indirect measure of the inherent buffering capacity within a sample based on carbon content and assuming that all the carbon occurs as reactive carbonate. CNV was calculated as follows:

$$CNV\ (kg\ H_2SO_4/t) = Total\ \%C \times 81.67$$

Net Acid Producing Potential

The NAPP is the amount of acid that potentially can be produced by a sample after allowance for the ANC. The NAPP of each sample was calculated by subtracting the ANC value from either the MPA value when only a total sulfur was available, or from the AP value when both total and sulfate-sulfur assays were available. When the NAPP is negative it is likely that the material has sufficient inherent buffering capacity to prevent acid generation. Conversely, when the NAPP is positive a material may be acid generating.

4 Sobek, A.A., W.A. Schuller, J.R. Freeman, and R.M. Smith (1978). Field and Laboratory Methods Applicable to Overburdens and Minesoils. U.S. Environmental Protection Agency 600/2-78-054, Washington DC.

Net Acid Generation Test

NAG is a direct oxidation procedure for estimating the acid forming potential of a sample. The NAG test involved reaction of 2.5 g sample with 250 mL of 15% hydrogen peroxide to rapidly oxidise any sulfide minerals present. Both acid generation and acid neutralisation occur simultaneously during the NAG test, hence the end result represents a direct measurement of the net amount of acid that a sample can generate. If the pH of the NAG liquor after reaction is less than 4.5 (*i.e.* NAGpH<4.5) then the sample is considered to be acid forming. The actual amount of acidity generated is then determined by titration of the mixture.

With high sulfur samples the oxidation of sulfides is often not completed in a single stage NAG test, and a sequential multi-stage procedure is needed to ensure all sulfides are fully oxidised. In the sequential NAG test a 2.5 g sub-sample of tailings is reacted several times with 250 mL aliquots of 15% hydrogen peroxide. At the end of each stage, the sample is filtered to separate the solids and NAG liquor. The NAG liquor is assayed for pH and acidity, as per a standard NAG test. The solids are recovered and the oxidation process continued by another addition of hydrogen peroxide. The overall NAG capacity of a sample is determined by summing the individual acid capacities from each stage.

Kinetic NAG Tests

Kinetic NAG tests were carried out to assess the reactivity of the sulfides present and to provide an indication of the likely lag period for acid generation to occur under oxidising conditions. The kinetic NAG test is essentially the same as the standard NAG test, except that the kinetics of the peroxide oxidation reaction are monitored via continuous measurements of the pH and temperature of the NAG solution. The reaction kinetics are then extrapolated to the field situation using correlations previously derived from an extensive database comprising results of kinetic NAG tests, leach column tests, and field observations across a wide range of rock types.

Acid Buffer Characteristic Curve

An acid buffer characteristic curve was produced by slowly titrating a sample suspension with dilute HCl acid over a period of 16 to 24 hours. This titration method provides a far less aggressive treatment of a sample than that applied in the ANC method and hence provides a measure of the buffering provided by more soluble carbonates within a sample.

Multi-Element Analysis of Solids

Elemental analysis of solids was carried out by ALS in Brisbane. Samples were digested by multi-acid addition (*i.e.* hydrofluoric, nitric, perchloric and hydrochloric acids) and the digests were analysed using inductively coupled plasma optical mass spectrometry for the following elements: Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, K, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Se, Sn, Sr, Th, U and Zn. Mercury was also assayed but an aqua regia digestion was used to ensure minimal volatilisation followed by analysis using inductively coupled plasma mass spectrometry.

Geochemical Abundance Indices

The multi-element data were used to calculate Geochemical Abundance Indices (GAIs) for each sample. The GAI compares the concentration of an element in a sample with the median soil abundance[5] for that element. The main purpose of the GAI is to highlight any elemental enrichments that may be of environmental importance. GAIs were calculated as follows:

$$GAI = \log_2 [C / (1.5*S)]$$

where C is the concentration of the element in the sample and S is the median soil content for that element. GAIs are truncated to integer increments (0 through to 6, respectively) which correspond to the following enrichment ranges:

Little or No Enrichment	GAI=0	< 3 times median soil
Minor Enrichment	GAI=1	3 to <6 times median soil
	GAI=2	6 to <12 times median soil
Significant Enrichment	GAI=3	12 to <24 times median soil
	GAI=4	24 to <48 times median soil
	GAI=5	48 to <96 times median soil
	GAI=6	≥ 96 times median soil

Generally, enrichment equivalent to a GAI of 3 or more is deemed to warrant further examination.

Water Extractable Elements

The water-soluble components within a sample were determined by extraction of 100 g of sample in 200 g of deionised water (*i.e.* a solid:liquor ratio of 1:2) for 24 hours. The extraction containers were periodically shaken throughout the equilibration period to disperse the solids, and at completion the pH and electrical conductivity (EC) of each extract were recorded. The liquor fraction was then filtered through a 0.45 micron membrane filter, preserved with a few drops of high purity HNO_3 acid, then dispatched to ALS in Sydney for multi-element analysis.

Peroxide Extractable Elements

Elements that may be mobilised as a consequence of sulfide oxidation were determined by reacting 2.5 g of sample with 250 mL of 15% hydrogen peroxide, as per the NAG test procedure described above. After completion of the oxidation reaction, the NAG liquor was re-adjusted to 250 mL with deionised water. A 100 mL sub-sample was then taken for determination of pH and NAG value, and a second 100 mL sub-sample was filtered through a 0.45 micron membrane filter, preserved with a few drops of high purity HNO_3 acid, then dispatched to ALS in Sydney for multi-element analysis.

5 References for median soil data were: (1) Bowen, H.J.M. (1997) Environmental Chemistry of the Elements. Academic Press, London. (2) Berkman, D.A. (1976) Field Geologists' Manual, The Australian Institute of Mining and Metallurgy, Parkville, Victoria, Australia

5.2 Kinetic Testing Procedures

A series of column leach tests were commissioned as part of the geochemical assessment for the Frieda River Copper-Gold Project. The column tests involved samples of crushed drill core from the HIT deposit or laboratory generated tailings produced from processing of HIT ores. The column leach program involved nine columns containing HIT waste rock samples and four columns containing HIT tailings. The test materials were as follows:

Waste Rock

- three columns with HMD waste rock
- two columns with DV waste rock
- two columns with FDP waste rock
- one column with KDP waste rock
- one column with LW waste rock

Tailings

- one column with final[6] tailings
- three columns with rougher tailings

The main objective of the column leach testing program was to determine the geochemical behaviours of the various waste rock and tailings types under controlled laboratory conditions. The procedure allows geochemical reactions to be monitored at real time rates when the test materials are exposed to atmospheric conditions conducive to sulfide oxidation. In particular, the column leach program was designed to:

- Quantify the reactivity of the sulfide mineralisation within waste rock and tailings;
- Determine the likely time frame for acidification to occur (*i.e*. quantify any lag period); and
- Identify any environmentally significant elements that are mobilised from the exposed materials.

The waste rock and tailings samples were placed in large Buchner funnels for column leach testing. The set-up of the column leach tests involving waste rock is shown in Figure 5, and the tailings column leach tests are shown in Figures 6 and 7. The columns were positioned on a rack beneath heat lamps to maintain a surface temperature of about 30 to 35 ºC for approximately 8 hours each day. This ensured some drying of samples between water additions.

The Buchner funnel configuration provided a relatively high surface area/weight ratio and allowed samples to freely drain following the addition of deionised water. The waste rock columns comprised approximately 6.0 kg of crushed drill core within a funnel measuring 250 mm diameter and 120 mm height. The exception was the column containing HIT WR-2, which comprised only 3.6 kg of drill core due to limited availability of sample. The tailings columns comprised approximately 2.0 kg of tailings solids within a funnel measuring 175 mm diameter and 100 mm height.

[6] The final tailings includes the tailings fractions from both the rougher process circuit and the cleaner process circuit.

FIGURE 5: *Larger column leach tests involving HIT waste rock samples*

FIGURE 6: *Side view of column leach tests involving tailings*

FIGURE 7: *Top view of column leach tests involving tailings*

The waste rock and tailings columns were operated on a four-week leach cycle. During the first three weeks of each cycle the samples were moistened by a once weekly addition of deionised water at a rate equivalent to 100 mL/kg/wk. As a general rule, none of this water leached from the columns but was retained within the rock or was evaporated. On the fourth week of each cycle the samples were flushed with deionised water at a rate equivalent to 400 mL/kg/week, with leachates collected in plastic containers positioned beneath the columns over a period of about three days.

Leachate volumes were recorded and sub-samples then taken for analysis. The analysis of leachates included measurements of pH, EC, and alkalinity or acidity. A filtered sub-sample was also submitted to ALS in Sydney for elemental analysis which included: Ag, Al, As, B, Ba, Be, Ca, Cd, Cl, Co, Cr, Cu, F, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, SO_4, Sr, Th, U and Zn.

5.3 Sulfur Oxidation Chamber Measurements

Intrinsic oxidation rates (IORs) for the waste rock and tailings samples undergoing column leach testing were measured using apparatus commonly referred to as a Sulfide Oxidation Chamber (SOC). The SOC apparatus is shown in Figure 8. It comprised an airtight Perspex chamber specifically designed to house the smaller leach columns. The chamber was connected via tubing to an oxygen meter that was used to measure the concentration of oxygen within the chamber once a day over a period of five to seven days. The decrease in oxygen concentration within the chamber over the measurement period was used to calculate an average IOR. The SOC measurements on waste rock were made between weeks 16 and 20 of column operation, and for tailings between weeks 36 and 40 of column operation.

FIGURE 8: *Sulfide oxidation chamber (SOC) used to measure intrinsic oxidation rate*

6.0 Static Testing of HIT Waste Rock

6.1 ARD Classification Methodology

The acid forming characteristics of individual drill core samples and the ARD classifications assigned to each sample are given in Appendix A1, with the samples arranged by drill hole and depth.

Two methods were used to assess the acid forming potential of each drill core sample. The first method that is commonly referred to as an acid-base account involved separate measurements of acid potential and neutralisation potential. The difference between these two components represents the NAPP, which is customarily expressed in terms of weight of acid generation per unit weight of rock (kg H_2SO_4/t). The NAPP may be positive or negative depending on the relative magnitudes of the acid producing and acid neutralising components.

The second method was the NAG test which involved direct laboratory measurement of a sample's net acid potential by reaction with hydrogen peroxide. The peroxide oxidises any sulfide present, and the net amount of acid generated is determined by the sulfide content, the forms of sulfide, and any inherent neutralisation provided by carbonates (and to a lesser extent silicates) that are also present. A sample is considered to have a positive NAG capacity if it acidifies to pH of less than 4.5, and the actual NAG[7] value (as kg H_2SO_4/t) is determined by titration. As the NAG test is completely independent of the NAPP approach, the combination of the NAPP and NAG results provides greater certainty to the assessment of ARD potential.

In summary, the criteria that were used to classify the ARD potential of each sample were as follows:

- ***Non-Acid Forming*** *(NAF)* - A sample was considered to be NAF if it had a negative NAPP and the sample did not acidify to any significant extent when oxidised with peroxide in the NAG test (*i.e.* NAG=0 or NAGpH≥4.5). Although sulfides may be present in such samples, the inherent ANC is generally sufficient to neutralise any acid that may be produced by sulfide oxidation.

- ***Potentially Acid Forming*** *(PAF)* - A sample was considered to be PAF if it had both a positive NAPP and positive NAG capacity. The exposure of such a material to atmospheric conditions is likely to result in sulfide oxidation and material acidification.

- **Uncertain** *(UC)* - An *uncertain* (UC) classification was assigned when there was a disparity between the NAPP and NAG test results. A disparity may occur if the NAPP is negative but the sample acidifies to less than pH 4.5 in the NAG test, or when the NAPP is positive but it does not acidify under NAG test conditions. The former may occur when the ANC within a sample is not readily available, and the latter may occur when some sulfur occurs as sulfate or as sulfides that do not generate acid when oxidised.

7 Note: A sample may have a positive, zero or negative NAPP, but the NAG value can only be positive if acidification (i.e. NAGpH≤4.5) occurs, or zero if there is no acidification in the NAG test.

6.2 ARD Classification Plot

Figure 9 shows an ARD classification plot for the HIT drill core samples. This type of plot illustrates the concurrence of the NAPP and NAG test results and delineates the NAF or PAF status of a sample. As previously noted, the NAG test is a direct oxidation procedure completely independent of the NAPP approach, hence concurrence of the NAPP and NAG results provides greater assurance in the ARD classification assigned to a sample.

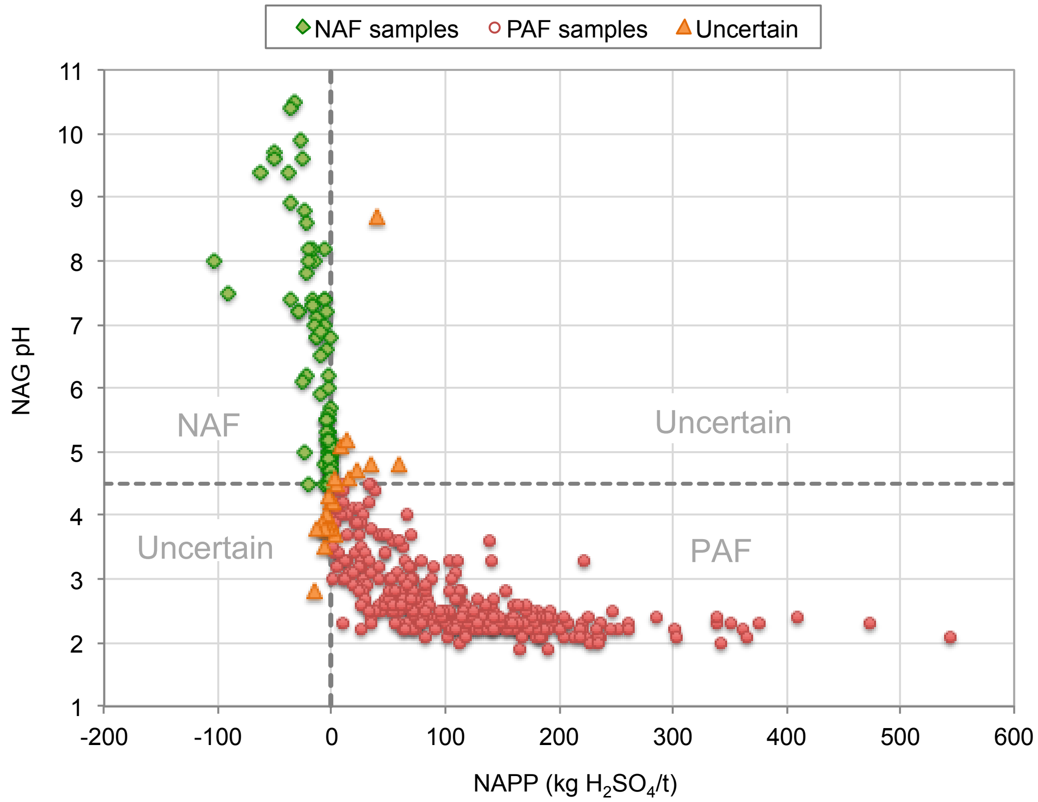

FIGURE 9: *ARD classification plot for HIT drill core samples*

(Note results for sequential NAG test used when available. Otherwise based on single-stage NAG test)

Samples plotting in the lower right PAF quadrate of Figure 9 had positive NAPPs and they also acidified to less than pH 4.5 when oxidized with peroxide in the NAG test (*i.e.* they produced a positive NAG result). Of the 461 drill core samples tested, 336 samples plotted in this quadrate (*i.e.* approximately 73% of total drill core samples tested). The preponderance of PAF samples in the dataset suggests that the majority of waste rock from the HIT deposit will be PAF, and it is likely that the materials these samples represent will be high risk in terms of generation of ARD if exposed to atmospheric conditions following mining.

There were 101 samples (approximately 22%) that plotted in the upper left NAF quadrate, signifying a negative NAPP and a negative response under NAG test conditions (*i.e.* the samples remained above pH 4.5). These samples were predominantly representative of HMD that was TOX (44 samples) or fresh FDP (12 samples). Most NAF samples were representative of rock with little, or relatively minor, sulfur enrichment.

There were 24 samples (approximately 5%) located in the *uncertain* quadrates. Most were from the SRK (2011) test program. Nine had negative NAPPs but acidified to less than pH 4.5 under NAG test conditions. This suggests that some of the ANC in these *uncertain* samples may not have been available under conditions generated within the NAG tests. Another eight *uncertain* samples had positive NAPPs but did not acidify under NAG test conditions. In this group, six samples had high sulfur contents (1.1 to 4.9%S) and moderate to high ANCs (34 to 77 kg H_2SO_4/t). With such samples a sequential NAG test is often required to ensure all sulfide is fully oxidised, and it is considered that the six samples were most likely PAF (see discussion in Section 6.6). The remaining seven *uncertain* samples had only low sulfur contents (0.05 to 0.12 %S) but when reacted with peroxide in the NAG test the final pHs were slightly acidic (3.7 to 4.6). All of these samples were from the weathered zone and were described as TOX. They also had little or no ANC. It is probable the NAG test results for these samples reflect the barren nature of the samples with respect to ANC, and are not a true reflection of acid potential associated with sulfide. As such, it is considered that the seven samples would likely be NAF.

6.3 Acid-Base Account Plot

Figure 10 shows a plot of ANC versus sulfur content for the HIT drill core samples. This type of plot is commonly referred to as an acid-base account plot. Figure 10 clearly indicates a preponderance of samples plotting well below the ANC/MPA=1 line, indicating strong positive NAPPs and hence likely to have a strong propensity for ARD generation.

The acid-base account plot also illustrates the relative balance between the two parameters. The majority of the PAF samples had ANC/MPA ratios less than 0.2, and most had ratios less than 0.1. This signifies that the acid potentials associated with the contained sulfur were significantly greater than any neutralisation capacity that might also be present.

Conversely, for a NAF sample an ANC/MPA ratio greater than 3 indicates that the material has a relatively large excess of neutralisation capacity, and signifies that the material would be highly unlikely to be a source of ARD. Of the 101 samples classified as NAF a total of 46 samples (~46%) had ANC/MPA ratios greater than 3, and another 12 NAF samples (~12%) had ratios between 2 and 3.

Most of the NAF samples also had low sulfur contents, with 70 of the 101 NAF samples containing less than 0.1 %S and a further 13 NAF samples containing between 0.1 to 0.5%S.

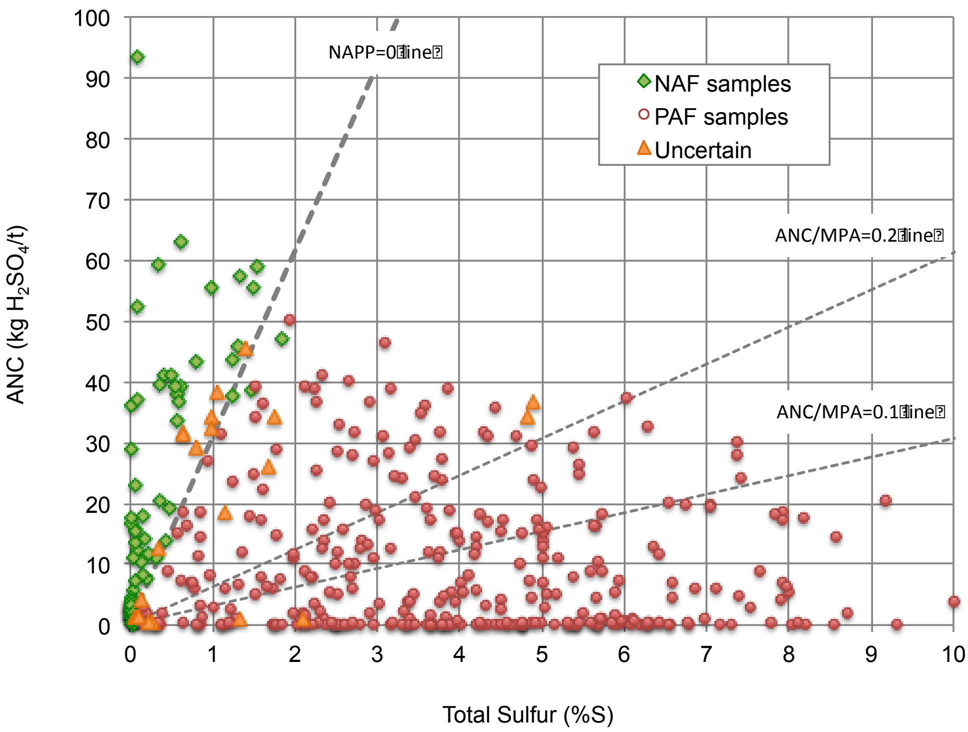

FIGURE 10: *Acid-base account plot for HIT drill core samples*
(12 PAF samples containing more than 10 %S and one NAF sample with ANC greater than 100 kg H_2SO_4/t not shown)

6.4 Summary of ARD Characteristics for Individual Lithologies

A summary of the acid forming characteristics for each lithology is given in Table 3. The results suggest the acid forming characteristics typically exhibited by samples from the three most represented lithologies, namely DV, FDP, and HMD were quite similar. The sulfur contents for these lithologies were wide ranging, but the majority of samples had high to very sulfur contents and low ANCs. In many cases the ANCs were effectively zero. The median sulfur contents for HMD, FDP and DV were 2.51, 3.01 and 2.12 %S, respectively. The corresponding median ANCs were only 2, 14 and 4 kg H_2SO_4/t, respectively.

The sample numbers for other lithologies were relatively small and hence the values for the ARD parameters listed in Table 3 may have limited statistical validity. Notwithstanding this limitation, the results for other samples were generally consistent with the characteristics exhibited by samples from the major lithologies, and once again suggest a preponderance of PAF rock with high sulfur content and low ANC.

TABLE 3: *Summary of acid-base account results for HIT drill core samples split by lithology*

Parameter	Statistic	AL	DV	FDP	FT	HBM	HMD	KDP	LW
No. of Samples	Count	6	107	126	24	2	174	7	15
NAF/PAF Distribution	PAF NAF Uncertain	4 2 0	79 18 10	102 17 7	17 7 0	2 0 0	115 54 5	6 1 0	11 2 2
Sulfur %S	Min Median Max	0.08 1.88 3.45	0.33 2.12 13.40	0.02 3.01 10.35	0.01 5.52 10.65	0.38 0.63 0.88	0.01 2.51 15.45	0.04 5.46 11.20	0.02 3.57 17.85
ANC kg H_2SO_4/t	Min Median Max	0 21 52	0 4 63	0 14 126	1 7 93	1 2 2	0 2 50	0 6 25	0 8 36
NAPP kg H_2SO_4/t	Min Median Max	-50 53 77	-62 56 410	-104 62 304	-91 152 194	10 18 26	-36 74 473	-5 166 343	-2 73 543

6.5 Summary of ARD Characteristics Versus Weathering

Table 4 summarises the acid forming characteristics of HIT drill core samples for different states of weathering. Relatively few samples representing alluvium and supergene were assessed consistent with these waste types representing less than 4% of waste that will be mined. Given the small numbers of samples the NAF/PAF distributions and the statistical data for alluvium and supergene are considered indicative only.

TABLE 4: *Summary of acid-base account results for HIT drill core samples split by weathering*

Parameter	Statistic	Alluvium (AL)	Supergene (SG)	Total Oxidation (TOX)	Partial Oxidation (POX)	Fresh (FR)	All Samples
Number	Count	6	9	70	70	306	461
NAF/PAF Distribution	PAF NAF Uncertain	4 2 0	7 2 0	11 52 7	54 10 6	260 35 11	336 101 24
Sulfur %S	Min Median Max	0.08 1.88 3.45	0.05 4.57 6.75	0.01 0.03 1.85	0.02 3.55 9.32	0.01 3.50 17.85	0.01 2.70 17.85
ANC kg H_2SO_4/t	Min Median Max	0 21 52	0 6 23	0 2 59	0 6 126	0 8 93	0 5 126
NAPP kg H_2SO_4/t	Min Median Max	-50 53 77	-23 140 194	-23 -1 57	-104 84 285	-91 82 543	-104 66 543

The NAF/PAF distributions for TOX, POX and FR samples are shown graphically in Figure 11. Approximately 85% of FR samples and 77% of POX samples were classified PAF based on the NAPP and NAG test results. Furthermore, it is likely that most of the FR and POX samples that could not be definitively classified and were therefore designated "uncertain" were also PAF. If that is the case then close to 90% of FR and POX samples tested were PAF.

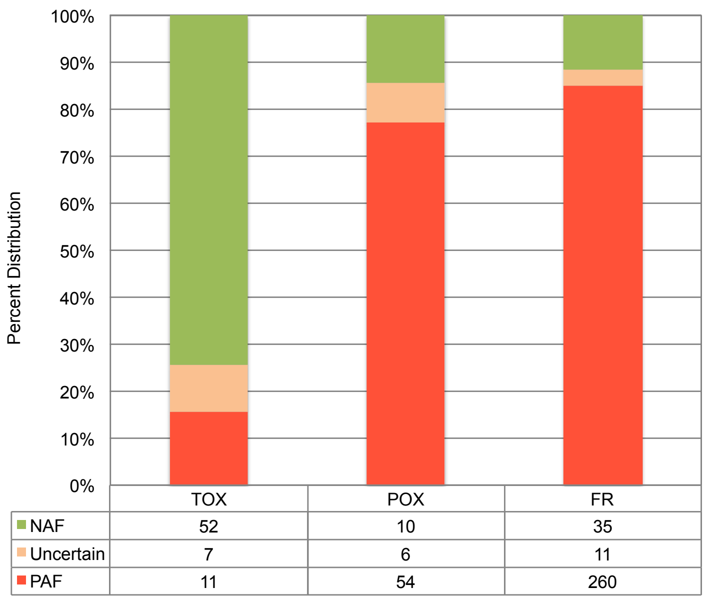

FIGURE 11: *NAF/PAF distributions for HIT drill core samples for different states of weathering*

Conversely, of the 70 TOX samples tested approximately 74% were classified as NAF. Also, as all of the "uncertain" TOX samples contained less than 0.1 %S they were most likely NAF. There was a small number of samples identified by FRL as TOX that were classified as PAF based on the NAPP and NAG test results. The total sulfur contents of these 12 samples ranged from 0.16 to 1.85 %S, but six of the 12 contained less than 0.5 %S, and most had NAPPs at the lower end of the range in comparison to PAF fresh rock. Only two samples contained more than 1 %S, and although both were located within the weathered zone the results suggest they were not truly fully oxidised and probably should be described as POX.

6.6 Relationship between NAPP and NAG

Figure 12 shows a plot of NAG capacity versus NAPP, with NAG capacities derived using the single-stage peroxide oxidation test. With some exceptions, the single-stage NAG values were noticeably smaller than the corresponding NAPP values, with the difference becoming more marked with increasing NAPP. Differences in NAPP and NAG capacity can sometimes be attributed to the form of sulfur present. For example, NAG capacity will be lower if some sulfur occurs as sulfate which is non-acid generating, or as other sulfide forms that do not produce as much acid as pyrite[8] when fully oxidized. However, with high sulfur samples the NAPP-NAG differences can be due to incomplete oxidation of sulfides in the single stage NAG tests. This is a well known occurrence when testing samples containing more than about 2 %S and it comes about because of catalytic decomposition of the peroxide during the test.

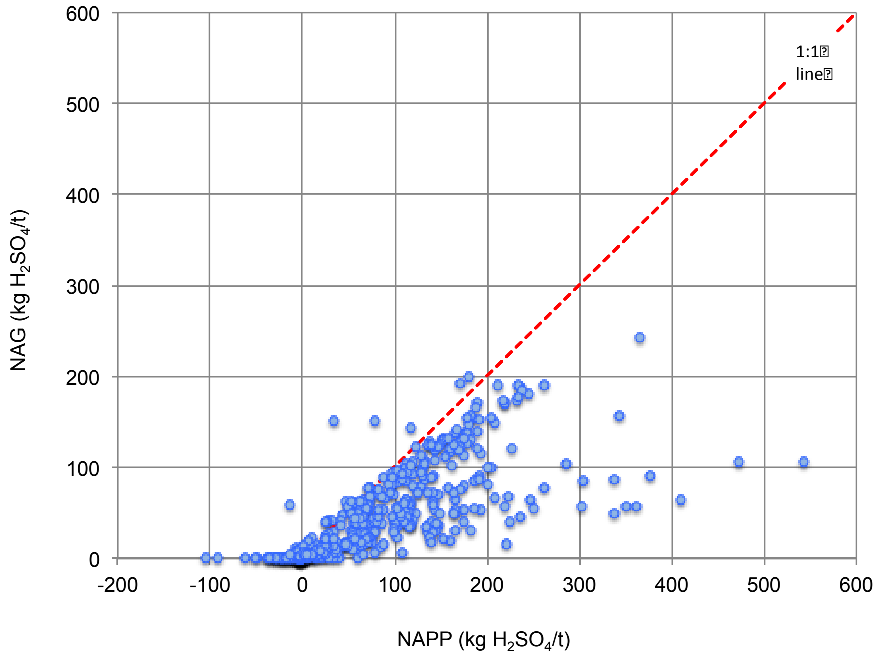

FIGURE 12: *Relationship between NAPP and NAG values for HIT drill core samples using the single-stage NAG test procedure*

Twenty-seven HIT samples were selected for sequential NAG testing to clarify the cause of the NAPP-NAG discrepancies with HIT drill core. All of the samples had high to very high sulfur contents (*i.e.* 0.95 to 6.98 %S) and the NAG results from single stage reactions were markedly less than indicated by the NAPP values. Included in the 27 were four samples (#39087, #39059, #38836 and #39075) that remained circum-neutral in the single stage NAG test (*i.e.* NAG of zero) even though the corresponding NAPP results were strongly positive. The other 23 samples all acidified to less than pH 4.5 when reacted in the single stage NAG tests but the resultant NAG values were typically only one-third to a half of the corresponding NAPP values.

The sequential NAG test involved reacting each sample with peroxide a number of times until there was no longer any discernable reactivity remaining in the sample (see Section 5.1). The total amount of acidity produced by a sample was then determined by summing the acidities produced from the series of reaction stages. Up to seven stages were carried out.

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[8] The NAPP of a sample was calculated from the total sulfur content, assuming that all of the sulfur was present as reactive pyrite as described in Section 5.1.

The results of the sequential NAG tests are summarised in Appendix A2 and a plot of NAPP versus sequential NAG values is given in Figure 13. The agreement between NAPP and NAG values was considerably better when the sequential NAG test procedure was used, with all but seven samples plotting close to the 1:1 line shown in Figure 13. The similarity of the sequential NAG and NAPP results confirms that most of the sulfur was likely present as reactive pyrite and/or chalcopyrite. Consequently, the under-estimation of NAG using the single-stage test procedure was primarily due to premature decomposition of the peroxide.

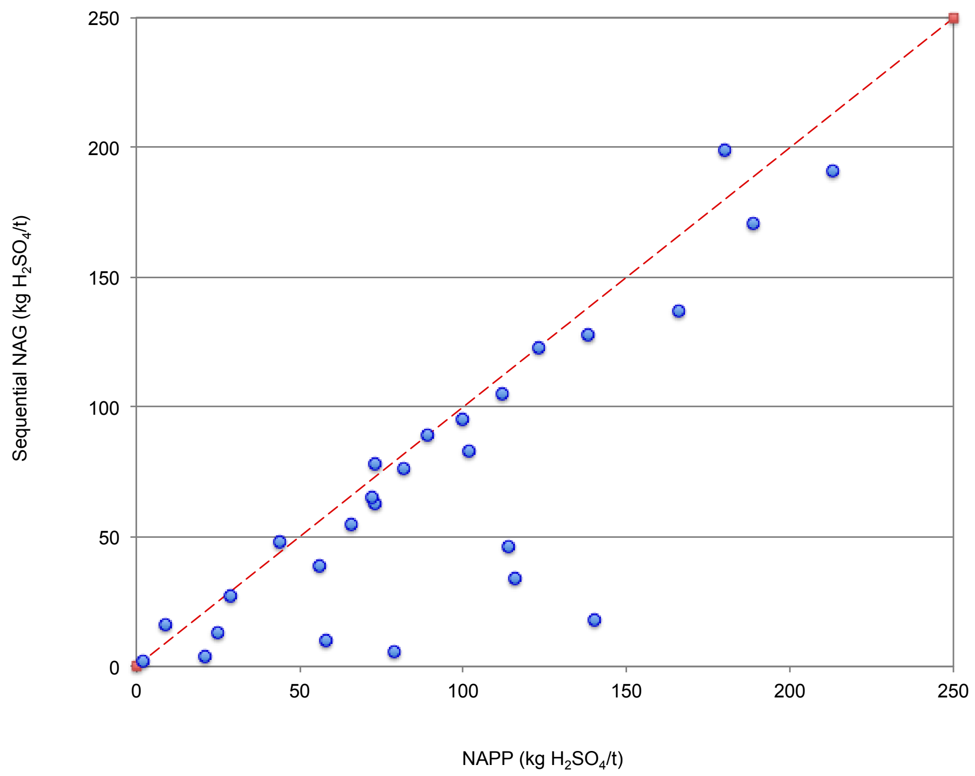

***FIGURE 13:** Relationship between NAPP and sequential NAG values for selected HIT drill core samples*

There were seven samples that produced sequential NAG values that were still markedly smaller than the corresponding NAPP results. They included three HMD samples (38817, 39075 and 39112), three DV samples (39059, 39060 and 39093), and one LW sample (38818). The NAG/NAPP ratios for these samples ranged from 0.08 to 0.5. The most likely explanation for the lower NAG values is that most of the sulfur in these samples was present as sulfate[9].

9 It is also possible that some sulfur may have occurred as sulfides that do not produce as much acidity as pyrite when oxidized. This could include copper sulfides such as bornite (Cu_5FeS_4) or chalcocite (Cu_2S) that do not generate that same amount of acidity as pyrite or chalcopyrite when oxidised. However, the multi-element data available for four of the samples (#38818, 39059, 39060 and 39075) indicate total copper contents in the range 0.064 to 0.60 %Cu, which would suggest that any contribution from bornite or chalcocite to total sulfur content would be relatively small for these samples.

There were four samples that did not acidify in the single-stage NAG tests but did so in the sequential test, either during the second stage (samples 39087, 39059, 38836) or the third stage (sample 39075). In such cases the use of the single stage NAG test results would have resulted in *"uncertain"* classifications but the uncertainty was resolved by extending the assessment to a sequential NAG.

6.7 Sulfur Content Distribution

Figure 14 shows a cumulative distribution plot of total sulfur concentrations for the HIT drilling core samples. The same data are also presented as a sulfur frequency distribution plot in Figure 15. The main points to note are as follows:

- The median sulfur content for all samples was 2.7 %S. If present as pyrite, this amount of sulfur could theoretically produce the equivalent of 83 kg H_2SO_4/t. The average sulfur content was slightly higher than the median at 3.2 %S.
- Only 29% of the samples contained less than 1 %S.
- The 90th percentile was 6.75 %S. This represents an exceedingly high MPA of 206 kg H_2SO_4/t.

Figure 16 shows the cumulative sulfur distributions for HMD, FDP and DV which were the three dominant lithologies represented by the test samples. The median sulfur contents for these lithologies were comparable (2.51, 3.01 and 2.12 %S, respectively), and the sulfur distributions were also similar except that HMD included an over-representation of low sulfur, TOX samples from the weathered zone.

Figure 17 shows sulfur distribution plots for PH, SA, QIP, PO, PR and AR alteration styles. Overall, the degree of sulfur enrichment was greatest for SA altered rock and least for rock with PR alteration, but for other alteration styles the sulfur distributions were reasonably comparable.

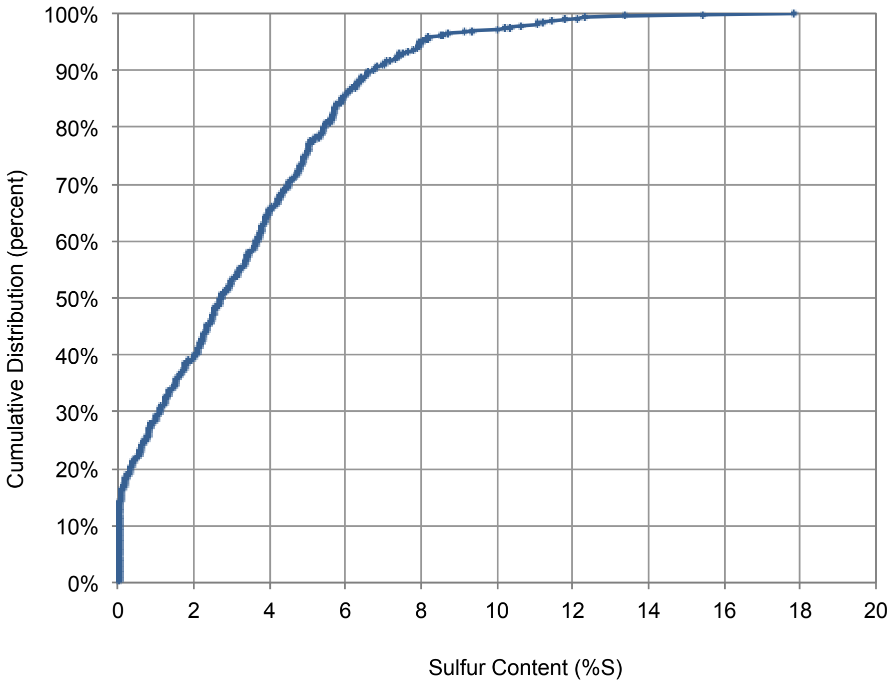

FIGURE 14: *Cumulative distribution plot for the sulfur contents of HIT drill core samples*

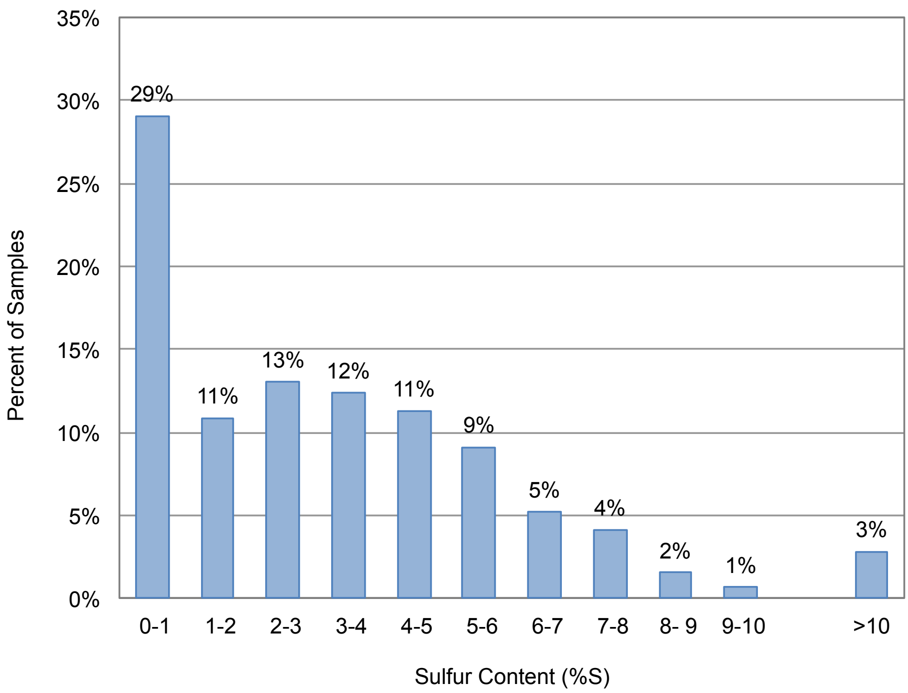

FIGURE 15: *Frequency distribution plot for the sulfur contents of HIT drill core samples*

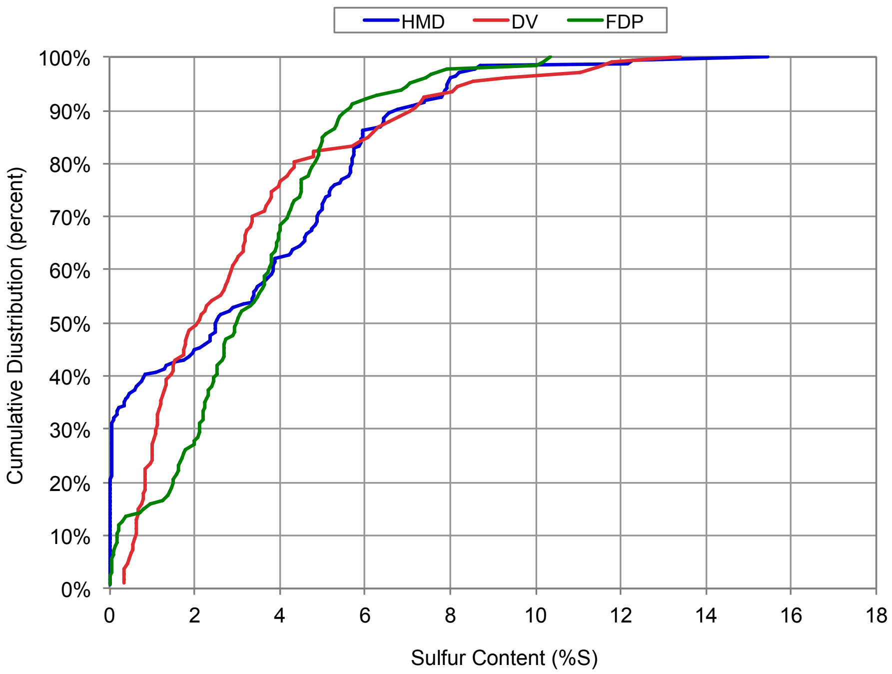

***FIGURE 16:** Cumulative distribution of sulfur contents for different lithologies*

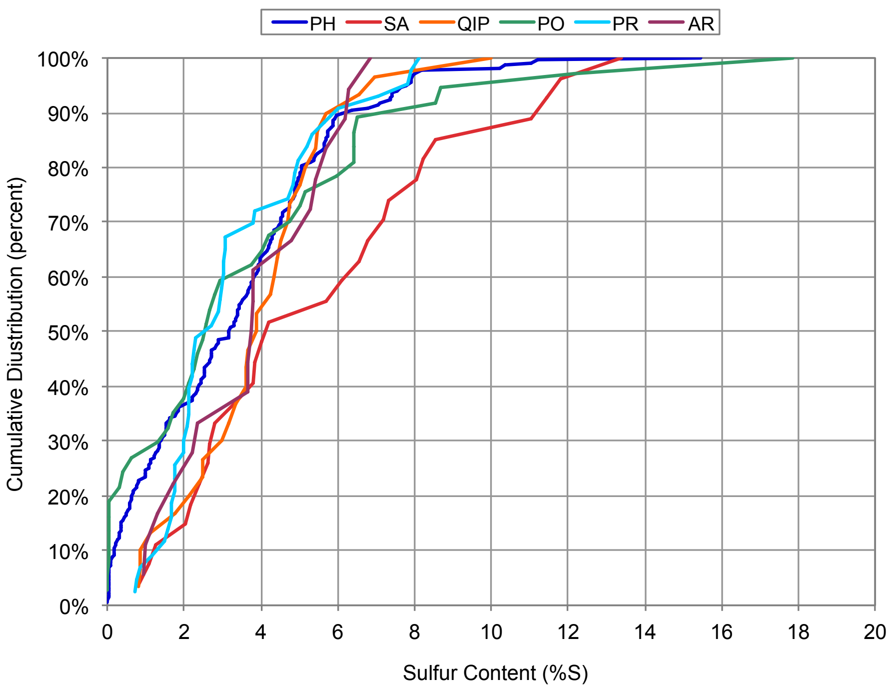

***FIGURE 17:** Cumulative distribution of sulfur contents for different alterations*

6.8 Neutralisation Characteristics

This inherent capacity of waste rock to neutralise acid was quantified using two independent methods, the results from which are respectively referred to as ANC and CNV. In addition to these two measures, a number of samples with higher ANCs were selected to assess carbonate reactivity via determination of their acid buffer characteristic curves.

Acid Neutralisation Capacity

ANC based on the Sobek procedure is the most widely used measure of neutralisation capacity for mine waste materials. The measurement of ANC involves the addition of acid to a sample to determine the actual amount that can be consumed or neutralised by a sample. The ANCs of the drill core samples are shown graphically in Figure 18 (cumulative distribution) and Figure 19 (frequency distribution). The median ANC for the HIT samples tested was 5 kg H_2SO_4/t and the average was slightly higher at 12 kg H_2SO_4/t.

Overall, the results indicate that most HIT waste rock will have only limited neutralising capacity. Approximately one-third of samples tested had negligible ANCs (*i.e.* 134 samples had ANCs of 1 or less), and the ANCs of another third were low (*i.e.* 148 samples had ANCs of 2 to 10 kg H_2SO_4/t). By way of comparison, an ANC of 10 kg H_2SO_4/t approximates the acid potential of only 0.3 %S as pyrite. Given that 80% of samples had sulfur contents exceeding 0.3 %S (and in most cases markedly higher), the results highlight the disparity between acid potential and the lack of inherent buffer capacity to counter-act or delay the generation of ARD.

There were 62 HIT drill core samples with ANCs exceeding 30 kg H_2SO_4/t. Most were representative of FDP (42%) or DV (39%).

Carbonate Neutralising Value

CNV is sometimes used as an adjunct or alternative to ANC as a carbon assay can be carried out at the same time as a total sulfur assay using a Leco high temperature furnace. The CNVs of the HIT drill core samples are included in Appendix A1. The CNVs were determined by multiplying the total carbon contents of the samples, expressed as %C, by a factor of 81.67 (see Section 5.1). This calculation assumes that the carbon occurs exclusively as carbonate, which is generally the case for samples with high neutralisation capacity, but the relative contribution of other minerals (e.g. silicates) may be significant for samples with low ANC, and/or some carbon could occur as organic carbon.

There were 230 HIT drill core samples that were assayed for total carbon from which CNVs were calculated. Overall, the total carbon contents of the HIT drill core samples were very low, with 86% of samples containing no more than 0.1 %C, and the median for all samples was only 0.03 %C. The corresponding median CNV was only 2.5 kg H_2SO_4/t, which is relatively consistent with the median ANC of samples that were assayed for carbon of 1.5 kg H_2SO_4/t.

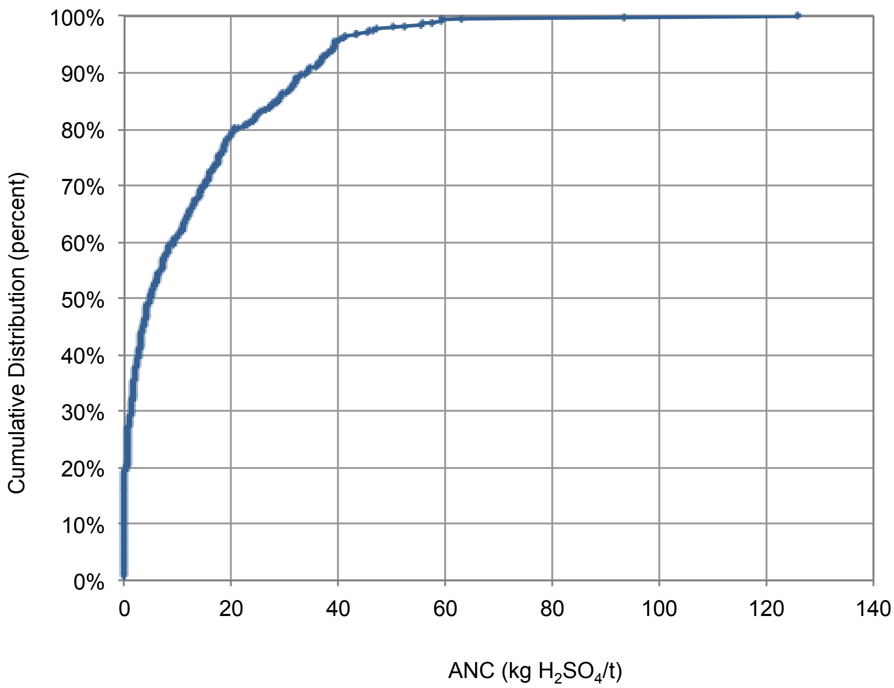

FIGURE 18: *Cumulative distribution plot for the ANCs of HIT drill core samples*

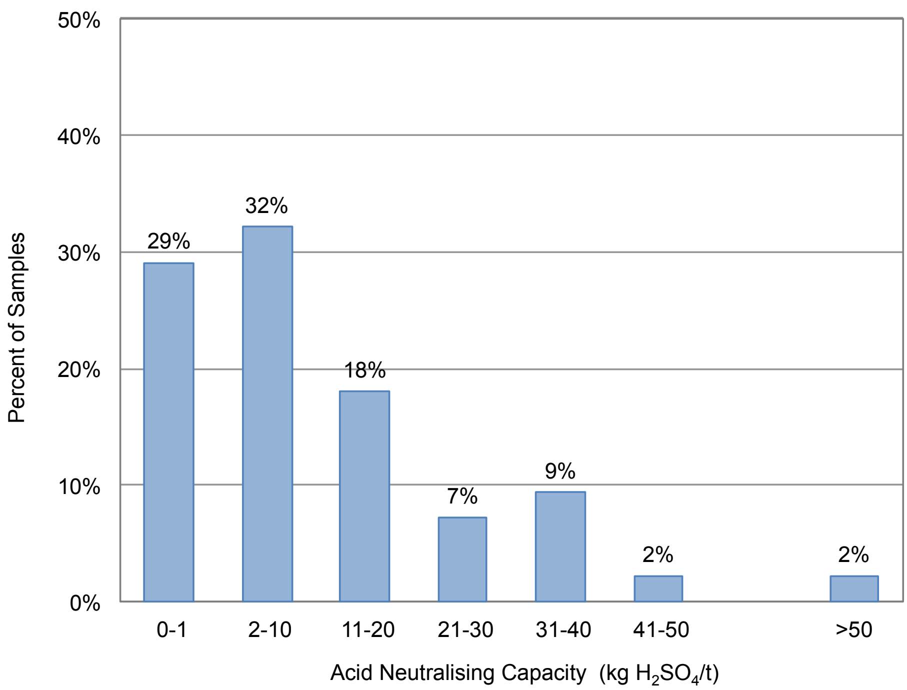

FIGURE 19: *Frequency distribution plot for the ANCs of HIT drill core samples*

Figure 20 shows a plot of CNV versus ANC for the HIT drill core samples. When the data are viewed over the full range of values recorded for HIT drill core samples there is reasonable agreement in the neutralisation values produced by the two methods. Whilst there were differences for some individual samples, overall it was generally the case that samples with low ANCs invariably also had low CNVs and, similarly, samples with elevated ANCs typically had comparatively high CNVs. There were relatively few samples assayed that had intermediate ANCs, so it is difficult to derive a statistically significant relationship on the data that are currently available.

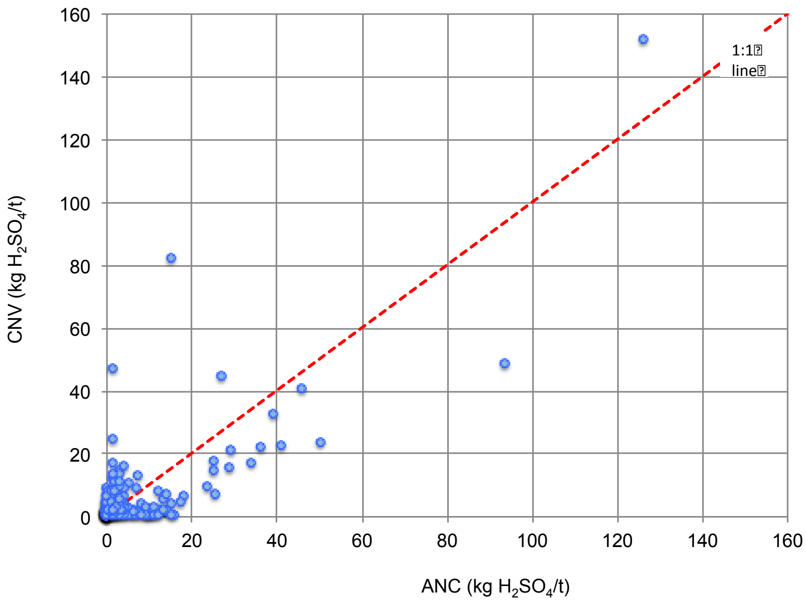

FIGURE 20: *Relationship between ANC and CNV for HIT drill core samples*

Although the CNV approach lacks the precision for accurately quantifying neutralisation capacity at the low end of the range (as indicated in Figure 20 by the seemingly random scatter of points for samples with ANCs less than about 20 kg H_2SO_4/t), there could be potential for using carbon analysis as an operational tool for differentiation of rock with moderate or high neutralisation capacity from rock that has only minimal ANC.

Acid Buffer Characteristic Curves

The results of this study suggest that, on average, waste rock from the HIT deposit will have little inherent neutralisation capacity. However a limited number of drill core samples with ANCs indicative of moderate neutralisation capacity were observed as indicated by the ANC frequency distribution plot in Figure 19. As the Sobek method used to measure ANC involves reacting a sample under relatively strong acid conditions (*i.e.* typically around pH 1 to 2) the method represents an aggressive treatment of the sample and accounts for buffer capacity provided not only by the more readily-available carbonate minerals such as calcite and dolomite but also less reactive forms such as ferroan dolomite, magnesite and some clay minerals.

Acid buffer characteristic curves were determined for a selection of 14 samples that had ANCs greater than 25 kg H_2SO_4/t to define the reactivity of the mineralisation responsible for the ANC under circum-neutral and weak acid conditions. The buffer curves were produced by recording the pH of sample suspensions titrated with dilute H_2SO_4 over a period of about 18 to 24 hours. The slow acid addition represents a milder treatment of a sample than that applied in the Sobek method. An advantage of the buffer curve is that it can be used to identify if carbonate mineralisation is available to buffer at neutral pH, a characteristic that is usually required to produce a substantial lag phase and which is essential for maintaining low metal solubilities.

Figure 21 shows the acid buffer curve for drill core sample #39061 that had an ANC of 126 kg H_2SO_4/t, the highest value recorded for HIT drill core. This sample was described as FDP with PR alteration. Also shown on Figure 21 are curves for reference samples representing calcite and dolomite. The HMD sample produced a well-defined, but downward trending buffer plateau at between pH 8 to 5. The plateau extended to the equivalent of about 130 kg H_2SO_4/t, which approximates the ANC measured using the Sobek method. The downward sloping plateau exhibited by this sample commonly signifies that the buffering was primarily associated with dissolution of dolomite[10].

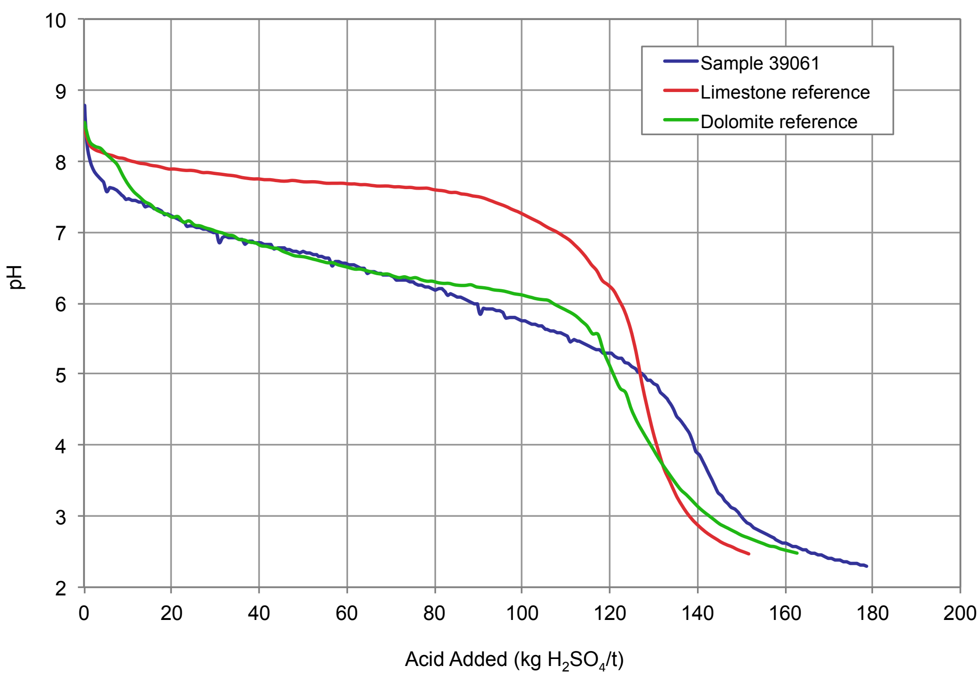

FIGURE 21:* *Acid buffer characteristic curve for HIT drill core sample # 39061

Drill Hole = 076NOR05 (30-32m), Lithology = FDP, Alteration = PR, ANC = 126 kg H_2SO_4/t
(Note: buffer curves for limestone and dolomite assume ANC of 130 kg H_2SO_4/t)

10 Calcite and limestone are usually readily available for neutralisation and can maintain a plateau at circum-neutral pH up until almost all of the ANC is consumed. Dolomite is also usually reactive, however the reactivity may decline when there is significant iron substitution, such as with ferroan dolomite. In contrast, magnesite and siderite are usually poorly reactive at circum-neutral pH, and significant dissolution of these carbonates often only occurs under laboratory conditions when the pH drops below about 4.

Figure 22 shows the buffer curve for drill core sample #38838 which had an ANC of 93 kg H_2SO_4/t, the second highest value recorded for HIT samples. The initial plateau for this sample representing FT was flatter than for the HMD sample and the buffer curve was initially closely aligned with the shape typically exhibited by limestone, which is generally highly reactive and therefore readily available for buffering at circum-neutral pH. However, the plateau only extended to the equivalent of around 50 kg H_2SO_4/t, after which the pH decreased sharply to less than 3. The plateau was therefore only about half of the measured ANC of 93 kg H_2SO_4/t.

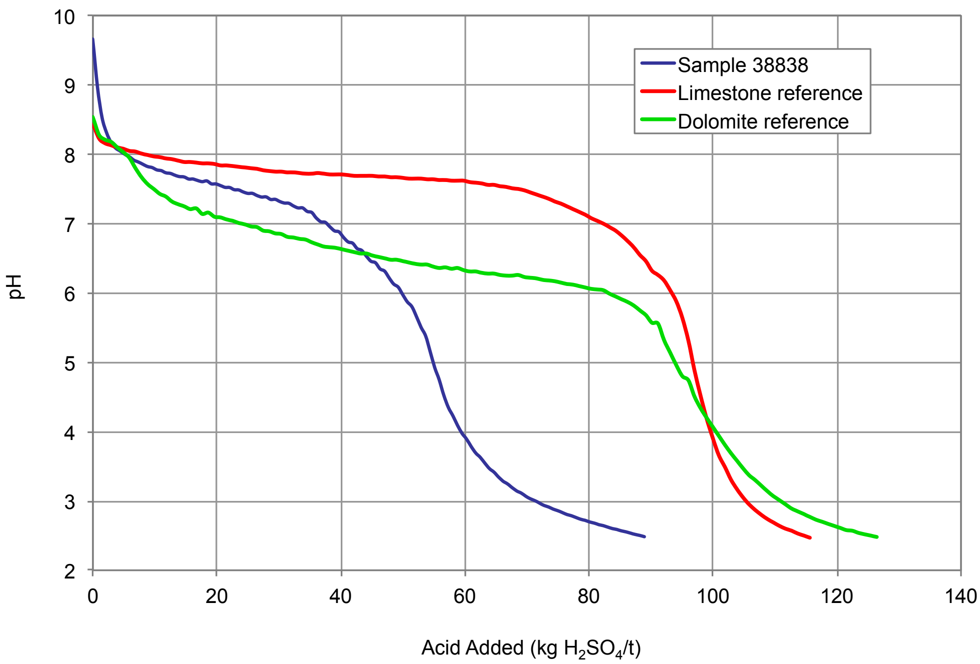

FIGURE 22: *Acid buffer characteristic curve for HIT drill core sample # 38838*

Drill Hole = 235XC09 (232-234m), Lithology = FT, Alteration = FR, ANC = 93 kg H_2SO_4/t
(Note: buffer curves for limestone and dolomite assume ANC of 100 kg H_2SO_4/t)

Buffer curves for another 12 samples with ANCs ranging from 25 to 50 kg H_2SO_4/t are presented in Appendix A7. Most exhibited well-defined plateau regions indicative of pH buffering at circum-neutral pH.

There is no definitive method of quantifying the fraction of ANC that is readily available, but a useful guide adopted by EGi is the amount of acid that is required to acidify a sample to pH 5. As a general rule, most buffer curves decline sharply once the pH decreases below 5, then begin to taper out again between pH 2 and 3. Table 5 gives the estimated readily-available fractions for the 14 samples, based on the pH 5 criteria. With the exception of two samples (#38834 and #39060), the readily-available fractions were between 50 to 100% of the measured ANCs. The average for the 14 samples was 70% readily-available. Such results generally signify that dolomite and/or limestone are the dominant sources of buffering and that these minerals will generally undergo dissolution (buffer) at circum-neutral pH. It would also generally be expected that similar PAF rock with an ANC exceeding 25 kg H_2SO_4/t would be likely to exhibit some lag period prior to acidification, although the duration of the lag will also depend on the magnitude and the reactivity of sulfide mineralisation present.

***TABLE 5:** Estimation of readily available neutralisation capacity based on acid buffer characteristic curves*

Sample Code	Description	ANC* (kg H_2SO_4/t)	# Readily Available (kg H_2SO_4/t)	Percent Readily Available
39061	FDP / PR	126	131	104%
38838	FT / FR	93	55	59%
38836	HMD / PH	50	28	56%
38822	HMD / PO	46	30	65%
38842	HMD / PO	41	36	88%
39075	HMD / PR	39	34	87%
38832	FT / FR	34	19	56%
38837	FT / FR	29	28	97%
39060	DVp / PR	29	14	48%
39087	FDP / AR	27	22	81%
39059	DVp / PR	25	19	76%
39068	KDP / PH	25	18	72%
38834	HMD / PO	25	10	40%
38823	FT / FR	23	12	52%
			Average	70%

** ANC based on Sobek Method*
 # Readily-available ANC based on acid required to acidify a sample to pH 5

6.9 Kinetic NAG Testing and Sulfide Reactivity

The kinetic NAG procedure was used to gain an insight into the reactivity of sulfides within HIT waste rock and to obtain a quick, qualitative assessment of the likely lag time for acidification of PAF waste rock to occur under field conditions. As noted in Section 5.1, the kinetic NAG test is similar to the standard NAG test, the only difference being that the pH and temperature of the NAG liquor are monitored to provide an indication of reaction kinetics.

Whilst kinetic NAG testing is not a replacement for column leach tests, the profiles obtained by the accelerated procedure provide a qualitative estimate of lag period to the extent that acidification of PAF rock is likely to occur rapidly (weeks to months), within the short term (many months to one or two years), or medium to long term (several years).

A total of 29 PAF samples were selected for kinetic NAG testing. They included nine samples that were subsequently subjected to column leach testing as discussed in Section 8. The reaction profiles exhibited by the 29 samples are respectively shown in Appendix A8. In addition, key parameters from the kinetic tests are summarised in Table 6, including the starting pH, the time taken for a sample to acidify to pH 3, and the minimum pH recorded.

***TABLE 6:** Key reaction parameters from kinetic NAG testing of HIT waste rock samples, including samples used in the column leach testing program*

EGi Sample Code	Total Sulfur (%S)	ANC kg H_2SO_4/t	NAPP kg H_2SO_4/t	KNAG Profile Ref.*	Column Test Ref.	KNAG Start pH	KNAG Min. pH	Time to pH 3 (min)
Very fast reacting samples with negligible lag expected								
39088	6.56	0	201	A8-18	n.a.	2.6	0.5	0
39103	2.96	0	91	A8-20	n.a.	2.9	0.2	0
39548	6.19	0	189	A8-21	HIT WR-1	3.2	0.7	<1
39556	5.41	0	166	A8-29	HIT WR-9	3.3	0.7	<1
39072	5.30	0	162	A8-16	n.a.	3.6	0.5	3
39550	3.66	0	112	A8-23	HIT WR-3	3.3	0.7	3
39033	4.79	0	147	A8-8	n.a.	3.6	0.4	5
39549	2.68	0	82	A8-22	HIT WR-2	3.4	1.0	5
39071	6.26	6	192	A8-15	n.a.	4.4	0.6	6
39021	3.59	0	110	A8-7	n.a.	4.4	0.9	9
39065	4.50	0	138	A8-12	n.a.	3.8	0.4	9
39056	2.38	0	73	A8-9	n.a.	3.5	0.7	18
39554	2.72	10	73	A8-27	HIT WR-7	4.5	0.7	19
39099	3.40	4	100	A8-19	n.a.	4.0	0.8	28
39552	3.38	1	102	A8-25	HIT WR-5	4.4	1.9	28
Slower reacting samples with considerable lag expected (i.e. at least several years)								
39070	0.78	6	18	A8-14	n.a.	4.9	1.8	43
38819	2.66	10	71	A8-3	n.a.	5.4	1.3	49
39553	2.12	9	56	A8-26	HIT WR-6	5.1	1.9	65
39551	2.81	14	72	A8-24	HIT WR-4	6.0	1.5	126
39555	1.35	12	29	A8-28	HIT WR-8	5.6	1.3	137
Slower reacting samples with considerable lag expected (i.e. at least several years)								
38818	4.19	14	114	A8-2	n.a.	4.7	2.3	252
39068	5.46	25	142	A8-13	n.a.	5.8	0.8	252
38813	1.59	46	41	A8-1	n.a.	5.0	2.8	278
38824	2.34	17	54	A8-5	n.a.	5.6	2.6	557
38823	1.25	23	15	A8-4	n.a.	6.1	3.7	n.a.
38834	2.25	25	43	A8-6	n.a.	6.7	3.1	n.a.
39059	1.50	25	21	A8-10	n.a.	5.8	na	n.a.
39060	1.78	29	25	A8-11	n.a.	5.8	na	n.a.
39075	3.85	39	79	A8-17	n.a.	6.1	6.1	n.a.

* Kinetic NAG (KNAG) test profiles are included in Appendix A8

The kinetic NAG results indicate significant variation in the reactivities of the waste rock samples. Some typical responses exhibited in the kinetic NAG tests are discussed below, with references made to implications for field behaviour in terms of reactivity and duration of any lag period[11].

[11] The lag times provided in this report should be used as a guide only and are based on correlations previously derived by EGi from comparison of kinetic NAG profiles with results from real time testing of the same materials (*e.g.* leach column tests) and field observations at actual mine sites.

Fast Reacting, High Sulfur Waste Rock

Figure 23 shows the classic kinetic NAG response for highly reactive, high sulfide rock that is essentially devoid of any inherent neutralising capacity. Such material will almost certainly acidify within a very short time of exposure to atmospheric conditions. This sample (#39549) was representative of DV with SA alteration and was included in the column leach testing program (see results for HIT WR-2 in Section 8). It contained 2.7 %S, which is just below the median for drill core samples tested in this study, and the NAPP was 82 kg H_2SO_4/t.

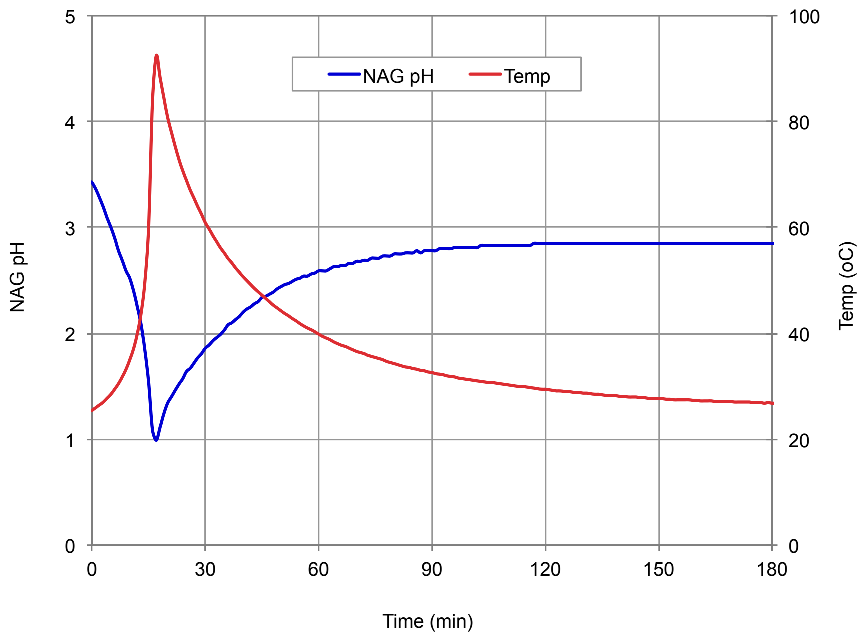

***FIGURE 23:** Kinetic NAG profiles for HIT drill core sample #39549 (Column Test HIT WR-2)*

Drill Hole = 057NOR05 (366-370m), Lithology = DVp, Alteration = SA
2.7 %S, ANC = 0 kg H_2SO_4/t, NAPP = 82 kg H_2SO_4/t, NAGpH = 2.1

The starting pH was already moderately acidic at 3.4, and the sample acidified to less than pH 3 within 5 minutes of reaction with hydrogen peroxide. The absence of any buffer plateau at the start of the pH curve accords with the lack of ANC in the sample. The sample continued to acidify to a minimum of pH 1, and there was a concurrent increase in temperature, with the NAG liquor effectively reaching boiling point at around the 20 minute mark, primarily caused by catalytic decomposition[12] of the peroxide. The pH then increased again to approximately 2.8 as the temperature of the NAG liquor cooled.

[12] The temperature of the NAG solution also provides an insight into sulfide reactivity. Some of the initial temperature rise may be attributed to the oxidation of pyrite, which is an exothermic (heat generating) process. However, as the oxidation process continues and soluble metals are released, there is an increasing tendency for the hydrogen peroxide to catalytically decompose, a process that is also exothermic. This markedly accelerates the heating of the NAG solution. The main catalyst for peroxide decomposition is likely to be dissolved iron that is released during pyrite oxidation.

The acidification pattern exhibited by this sample, and also similar patterns exhibited by another 14 samples as listed in Table 6 are consistent with very high rates of sulfide oxidation and negligible lag times. They include another three samples used in column leach tests, namely HIT WR-1, HIT WR-3 and HIT WR-9. It is EGi's experience from laboratory and field test work for other mine sites that waste rock with similar reaction profiles to those presented are likely to acidify and produce ARD almost immediately upon exposure to atmospheric conditions (*i.e.* acidification within weeks).

Fast Reacting but Some Lag Possible

The kinetic NAG test profile for sample #39553 (Figure 24) was consistent with the profile commonly produced by rock that is likely to exhibit a lag period on the scale of many months to possibly one or two years. This sample, representing PO altered LW, contained 2.1 %S and had a NAPP of 56 kg H_2SO_4/t. It was also included in the column leach program as sample HIT WR-6.

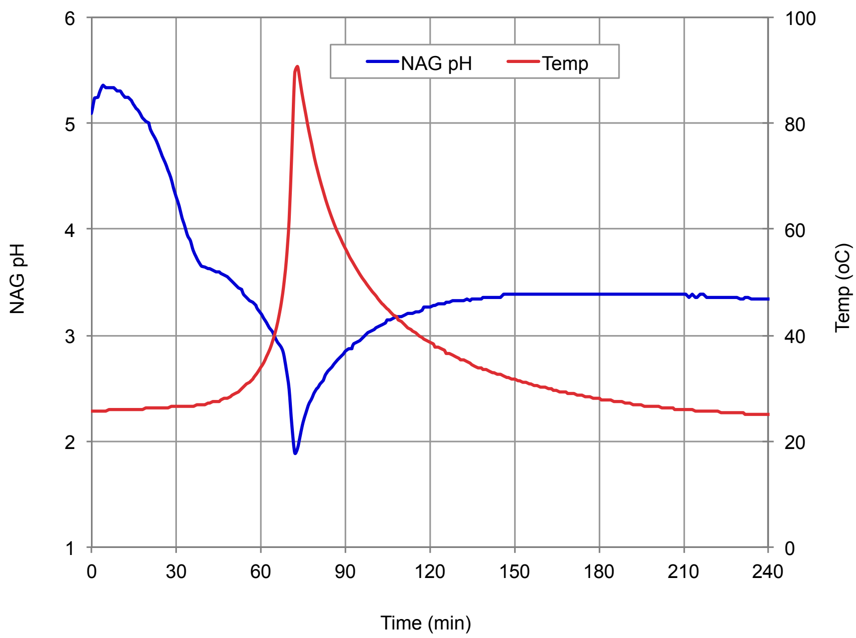

***FIGURE 24:** Kinetic NAG profiles for HIT drill core sample #39553 (Column Test HIT WR-6)*

Drill Hole = 218XC09 (110-114m), Lithology = LW, Alteration = PO
2.1 %S, ANC = 9 kg H_2SO_4/t, NAPP = 56 kg H_2SO_4/t, NAGpH = 2.7

There was a short but well-defined buffer plateau at about pH 5 that extended for the first 20 minutes of the test. This plateau can presumably be attributed to the sample having some inherent neutralising capacity (albeit relatively small at 9 kg H_2SO_4/t). Once this neutralising capacity was exhausted, the pH of the NAG liquor rapidly decreased to a minimum of 1.9 after 65 minutes, at which time there was a significant increase in temperature. The extent of the initial pH plateau and the time taken to acidify to less than pH 3 would suggest that rock as represented by this sample would have a field lag time of at least a year if the rock were exposed to atmospheric conditions.

Slower Reacting with Extended Lag

Figure 25 shows the reaction profile for a slower reacting sample. There were also a number of other samples (see Appendices A8-1, A8-2, A8-5 and A8-13) that acidified only slowly, taking several hours to reach pH 3 under NAG test conditions, and other samples (see Appendices A8-4, A8-6, A8-10, A8-11 and A8-17) that did not reach pH 3 at all during the peroxide oxidation phase, and only did so during the final boiling step[13] of the NAG test. As a general rule such slow responses in the kinetic NAG test extrapolate to lag time under field conditions of several years. All of the samples exhibiting slower kinetics had moderate ANCs, ranging from 14 up to 46 kg H_2SO_4/t.

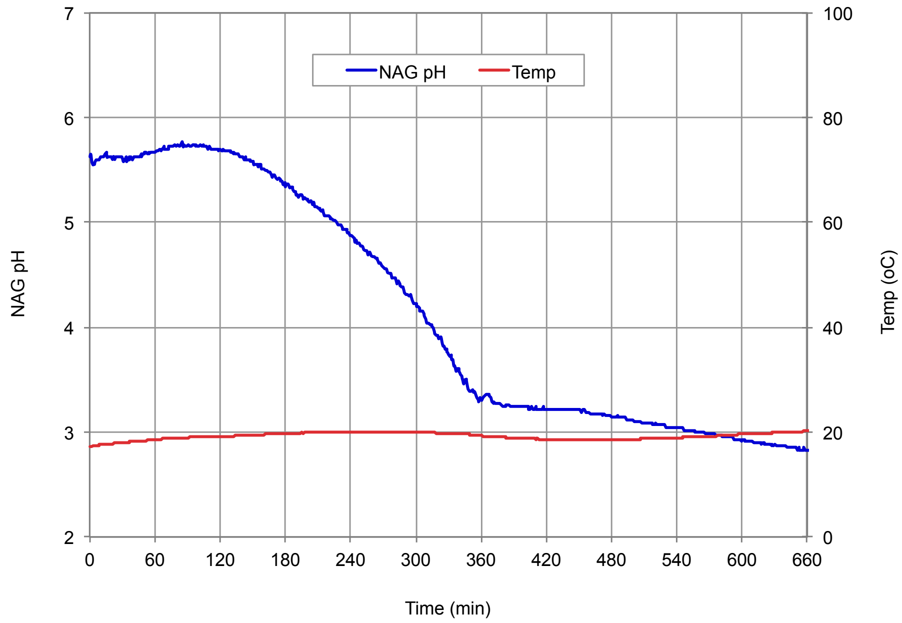

FIGURE 25: *Kinetic NAG test profiles for HIT drill core sample # 38824*

Drill Hole = 184XC08 (282-284m), Lithology = HMD, Alteration = PH
2.34%S, ANC = 17 kg H_2SO_4/t, NAPP = 54 kg H_2SO_4/t, NAGpH = 2.8

13 The peroxide oxidation phase in the NAG test is generally continued until no further reaction is visible (i.e. no visible effervescence), then the reaction flask is gently boiled on a hot plate for approximately two hours before the NAGpH is recorded. The purpose of the boiling step is two-fold. Firstly it completes the oxidation process. Secondly it decomposes any residual peroxide which otherwise tends to interfere with the titration step in which the amount of acidity produced by the sample is quantified.

6.10 Use of Sulfur Content for ARD Classification

In the geochemical studies included in this report the classification of the ARD potential was based on measurements of sulfur content, ANC, NAPP and NAG capacity. This suite of measurements is essential for understanding the acid forming characteristics of mine waste materials that are likely to be encountered over the life of a mining project. However, the determination of all these parameters is often not warranted (or practical) for operational NAF/PAF classification of waste rock.

The results of this study also suggest that lithology and/or alteration type will not be useful in differentiation of waste rock with respect to ARD type. However, most HIT waste rock will have no ANC or only limited ANC and hence would be expected to have a relatively short lag period. This means the acid generating potential of most waste rock will closely correlate with sulfur content, and as such there could be scope for developing an operational waste rock classification scheme based on on-site determination of total sulfur[14] content alone.

What constitutes an appropriate sulfur cut-off for differentiating NAF and PAF rock at the Frieda River Copper-Gold Project may require more sampling of core and confirmation from field trials, but the currently available results provide a "first-pass" indication of sulfur content in relation to NAF/PAF classification. It is EGi's experience from other mining operations similar to the Frieda River Copper-Gold Project that rock containing less than 0.1 %S will invariably be NAF, and that a higher cutoff of between 0.3 to 0.5 %S is often appropriate for operational identification NAF/PAF identification of waste rock.

Figure 26 shows a plot of NAGpH versus sulfur content for HIT drill core samples assessed for acid forming potential, and Table 7 shows the NAF-PAF distributions for different sulfur content ranges.

There were 75 samples containing less than 0.1 %S, of which 70 were definitively classified as NAF based on negative NAPP and NAG test results, and the other five were considered likely to be NAF. A further 13 samples contained between 0.1 and 0.3 %S, none off which were classified PAF.

The lowest sulfur content for a sample classified PAF was 0.33 %S, and the 13 samples containing between 0.3 to 0.5 %S were fairly evenly split between NAF and PAF. However, the NAG values for the PAF samples with sulfur contents in this range were small, ranging between 2 to 5 kg H_2SO_4/t.

[14] A Leco sulfur analyser (or comparable high temperature furnace) is well suited to on-site use because of its simplicity, high throughput, and fast turn-around time which are essential for operational testing of cuttings from ore grade drilling and /or blast holes.

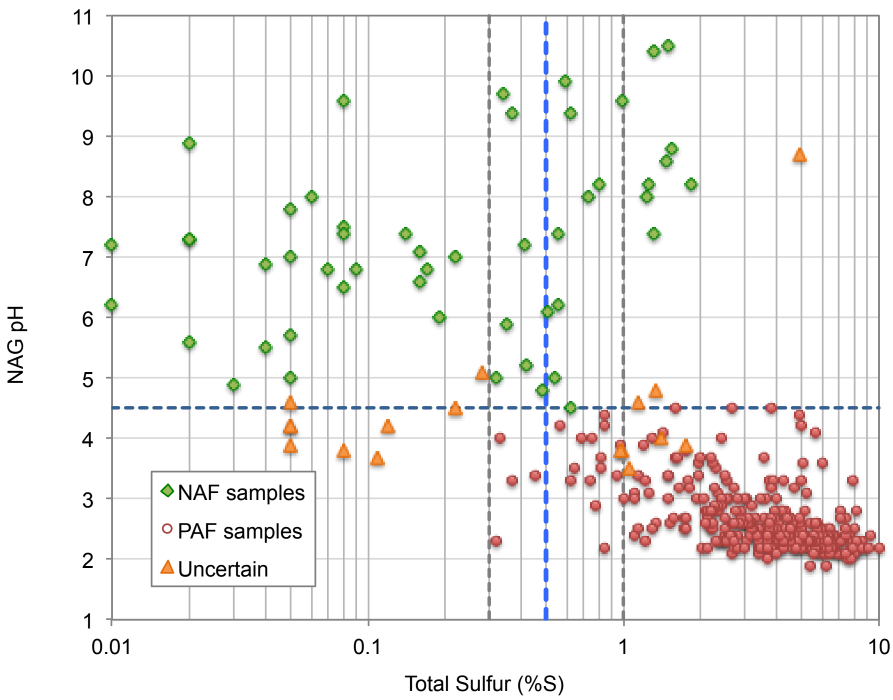

FIGURE 26: *Relationship between NAGpH and total sulfur content for HIT drill core samples*

TABLE 7: *NAF-PAF distribution of HIT drill core samples split by sulfur content*

Sulfur Range	NAF	PAF	Uncertain (NAF)	Uncertain (PAF)	Total
Sample Counts					
<0.1 %S	70	0	5	0	**75**
0.1-0.3	6	3	4	0	**13**
0.3-0.5	7	5	0	1	**13**
0.5-1.0	10	18	0	5	**33**
1.0-3.0	8	95	0	7	**110**
>3 %S	0	215	0	2	**217**
Overall	**101**	**336**	**9**	**15**	**461**
NAF/PAF Distribution for Sulfur Range					
<0.1 %S	93%	0%	7%	-	**100%**
0.1-0.3	46%	23%	31%	-	**100%**
0.3-0.5	54%	38%	-	8%	**100%**
0.5-1.0	30%	55%	-	15%	**100%**
1.0-3.0	7%	86%	-	6%	**100%**
>3 %S	0%	99%	-	1%	**100%**
Overall	**22%**	**73%**	**2%**	**3%**	**100%**

Within the total sulfur range 0.5 to 1.0 %S there were 33 samples, of which 10 were classified NAF and the other 23 were classified PAF or considered likely to be PAF. This suggests considerable variability in acid forming potential can be expected for waste rock with sulfur contents in this range.

As sulfur content increases above 1 %S the probability of the material being PAF increases markedly, and based on available results virtually all HIT waste rock containing more than 2 %S will have the potential to generate ARD if exposed to atmospheric conditions.

Overall, the evidence from current studies indicates that HIT waste rock containing up to 0.3 %S will be NAF. It is expected such material will primarily occur near the surface where the rock is highly weathered and oxidised. There will be a degree of uncertainty for some waste rock that contains between about 0.3 to 0.5 %S, but given the variability that could be expected within a typical mining block, and the degree of mixing that occurs during mining and waste rock handling, it is expected that run-of-mine waste containing less than 0.5 %S will have little or no acid forming potential. A cutoff of 0.5 %S would therefore seem appropriate for planning purposes.

The maximum amount of acidity that theoretically could be produced by waste rock with an average sulfur content of 0.5 %S is 16 kg H_2SO_4/t, but this could only occur if all the sulfur was present as reactive pyrite and there was no neutralisation capacity. A more realistic scenario is no net acid generation or at worst only a few kg H_2SO_4/t for a mining block overall.

For planning and operational management of waste rock it is recommended that a "traffic light" system of waste classification is used based on sulfur content. The proposed criteria for waste rock classification are as follows:

- Green waste — <0.5 %S — Assume NAF
- Amber waste — 0.5 to 1 %S — Assume PAF - but likely mix of NAF & low capacity PAF
- Red waste — 1 to 3 %S — Assume PAF - but could include minor NAF
- High Red waste — >3 %S — Assume PAF - worst case material

Under the proposed scheme all material containing more than 0.5 %S is considered to be PAF, but the waste classification system allows for identification of PAF materials that potentially have low, medium, and high capacities for acid generation. The waste classification types assigned to individual samples assessed by EGi and SRK are included in Appendix A1. The relationship between NAPP and sulfur content overlayed by material type criteria is also shown in Figure 27.

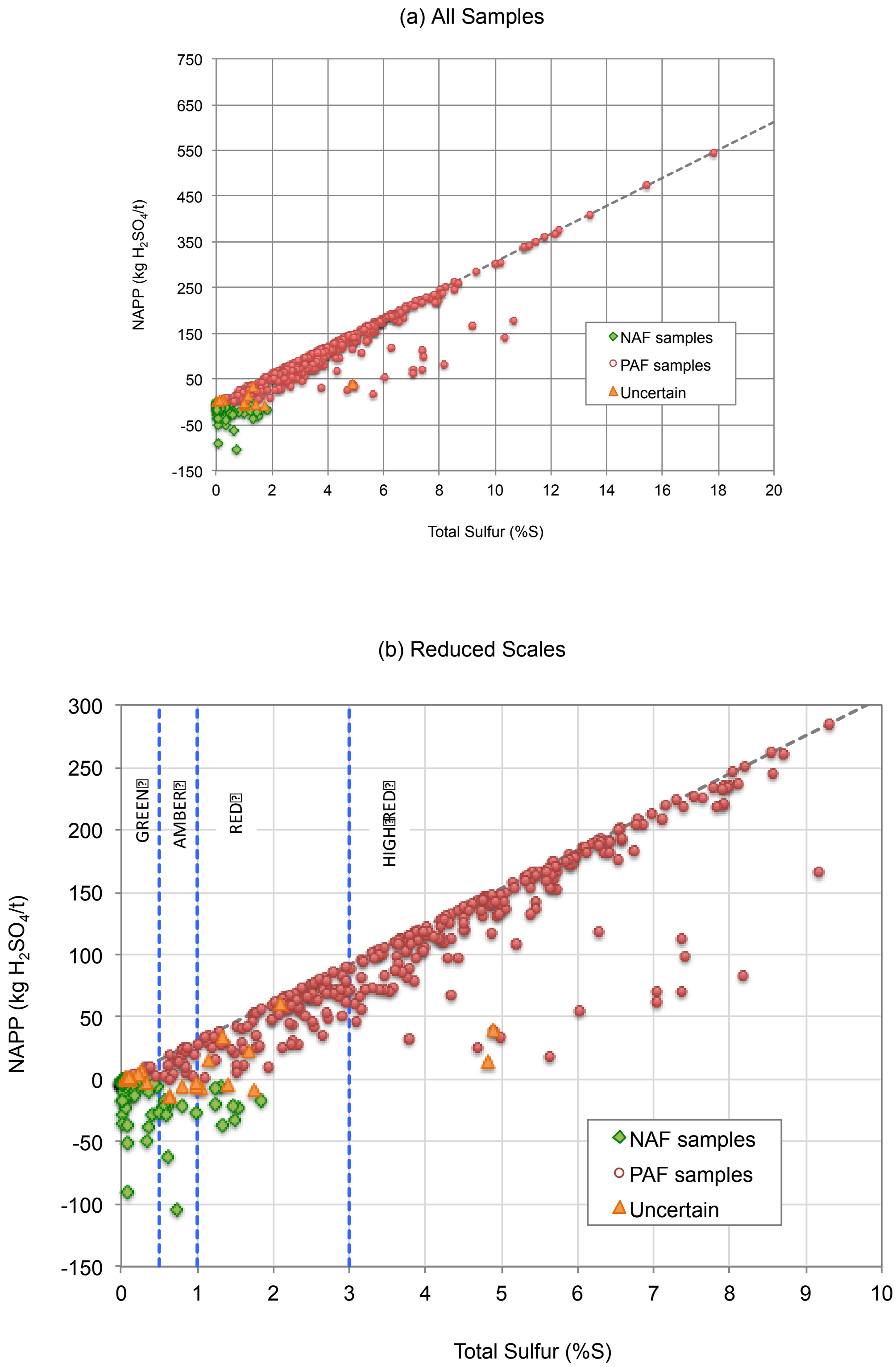

FIGURE 27: *Relationship between total sulfur content and NAPP for HIT drill core samples*

Note: 12 PAF samples containing more than 10 %S not shown in Figure 27(b)

6.11 Elemental Composition of HIT Waste Rock

Multi-element scans were run on the solids of 41 HIT drill core samples from the 2011 EGi study and another 221 HIT drill core samples from the 2011 SRK study. The elemental suite included: Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Se, Sn, Sr, Th, U, V, and Zn. In addition, elemental data were provided by FRL for HIT drill core samples assayed in 2016.

The elemental compositions of the HIT rock samples are given in Appendix A3, and Figure 28 gives a statistical box plot summary for each element. The median elemental abundance[15] values for typical background soil are also shown in Figure 28.

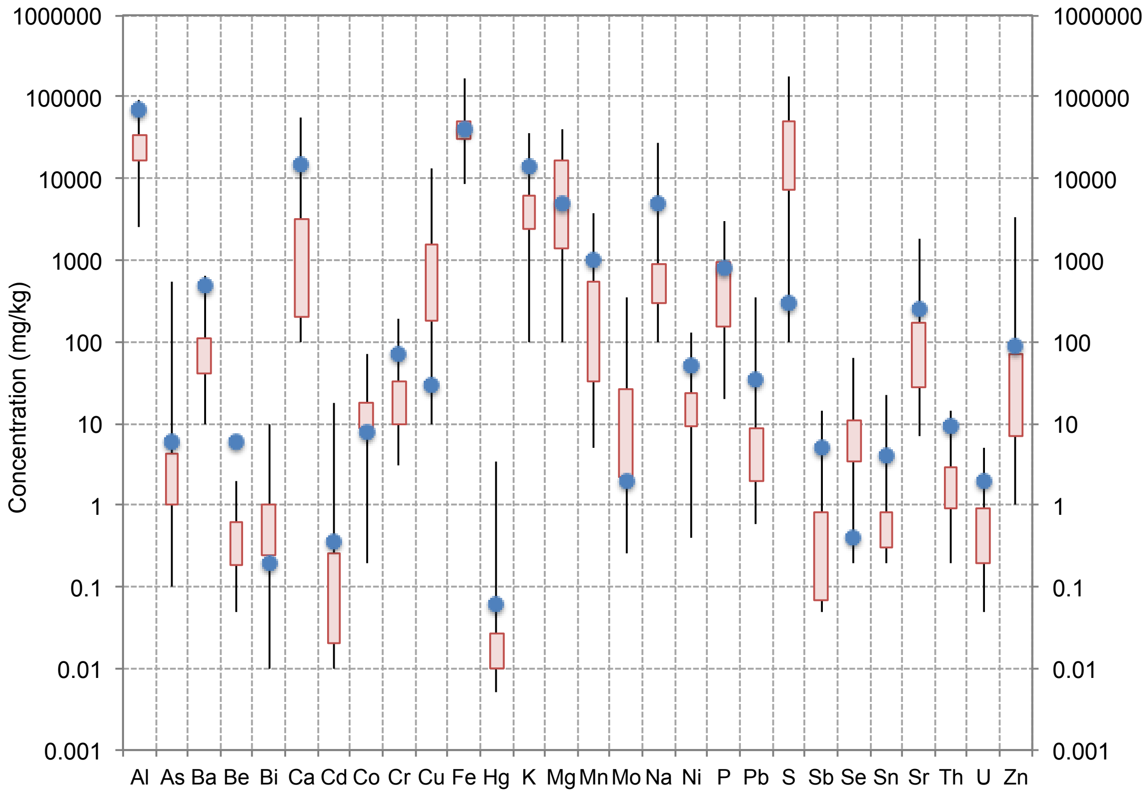

FIGURE 28: *Box plot of multi-element data for HIT drill core samples*
(line = min to max range, red box = 25 to 75 percentile range, blue dot = median background soil)

15 References for median soil data were: (1) Bowen, H.J.M. (1997) Environmental Chemistry of the Elements. Academic Press, London. (2) Berkman, D.A. (1976) Field Geologists' Manual, The Australian Institute of Mining and Metallurgy, Parkville, Victoria, Australia

Geochemical Abundance Indices (GAIs) were also calculated for each sample and are presented in Appendix A4. As described in Section 5.1, a GAI provides a measure of elemental enrichment relative to median soil abundance values, with integer values ranging from 0 to 6 as follows:

- GAI=0 *Little or No Enrichment* (< 3 times median soil content)
- GAI=1 or 2 *Minor Enrichment* (from 3 to <12 times median soil content)
- GAI=3 to 6 *Significant Enrichment* (from 12 times to ≥96 times median soil content)

Figure 29 shows the distribution of GAIs for each element for HIT drill core samples. Sulfur was significantly enriched (GAI≥3) in 80% of HIT samples assayed. Other elements that exhibited significant enrichment across a wide range of samples included selenium (68%), copper (61%) and molybdenum (27%).

The copper concentrations in the waste rock samples were typically one to two orders-of-magnitude greater than the median soil content of 30 mg/kg that is commonly reported in the international literature for background soils. The median copper content for the HIT samples assayed was approximately 497 mg/kg.

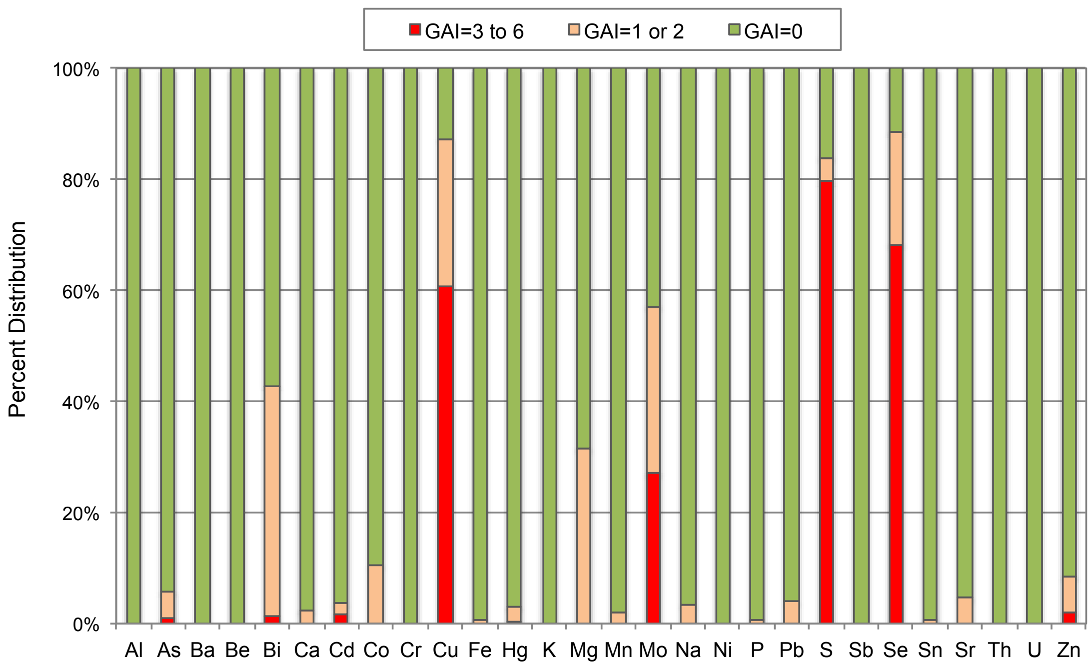

FIGURE 29: *Distributions of GAIs based on analysis of HIT drill core*

A few other elements were significantly enriched is a small percentage of samples, including zinc (2%), cadmium (2%) and bismuth (1%), but there was no evidence of significant enrichment of environmentally important elements such as manganese, mercury, nickel, chromium, antimony or tin. The absence of significant enrichment of these environmentally important metals does not preclude the possibility of some mobilisation under strongly acidic conditions, as the solubilities of most metals in geological materials are commonly pH-dependent. Elemental mobility is discussed in Sections 6.12 and 6.13.

6.12 Water Extractable Elements

Batch water extraction tests provide an insight into elemental solubilities within recently mined rock. Water extractions were carried out on 32 of the 41 samples from the 2009 EGi study that were submitted for elemental analysis. The other nine samples were subjected to long-term column testing as discussed in Section 8. The samples were extracted with deionised water for 24 hours, which is generally sufficient for chemical equilibrium to be established. Extract pHs were recorded after the equilibration period, then the liquors were filtered and analysed for a suite of elements, the results of which are given in Appendix A5.

Most of the samples had high sulfide contents and high acid producing potentials, but only two samples produced extracts that were strongly acidic. The extract of sample #39088 was pH 2.5 and the extract of sample #39017 or was pH 2.8. A third sample, #39102, produced an extract that was moderately acidic at pH 4.4. The low pHs for these three samples suggest some geochemical degradation of the core prior to testing by EGi and such behaviour confirms that some waste rock will be extremely reactive and will likely acidify almost immediately upon exposure to the atmosphere following mining.

In all other cases the extracts were circum-neutral or only slightly acidic. This is more consistent with the samples being representative of fresh, non-degraded core, and in such cases the water extract results relate to elemental solubilities more likely to be encountered for run-off from mine rock prior to significant sulfide oxidation taking place (*i.e.* shortly after exposure).

A box plot summary of range and median concentrations is shown graphically in Figure 30, with elements arranged in order of median concentrations.

The concentrations of most elements were wide ranging, typically extending over two or three orders-of-magnitude. Although the test samples were primarily from recent drill core, there was clear evidence of some sulfide oxidation with some samples. Sulfate was the dominant anion with a median concentration for the test samples of 490 mg/L, but ranging up to 6620 mg/L in the extract of one of the highly acidic samples. There were also high concentrations of iron, aluminium, copper and zinc in the acidic samples (*i.e.* typically hundreds of mg/L), but the median values for these metals across all of the tests were markedly lower at 1.9, 4.4, 0.48 and 0.11 mg/L, respectively. These median concentrations are consistent with the majority of the extracts being circum-neutral or only slightly acidic. The leaching of manganese was more consistent across samples, with more than half of the extracts containing between 1 and 11 mg/L and a median of 1.2 mg/L.

The median concentrations of other environmentally important elements were generally low, including antimony (≤0.001 mg/L), arsenic (≤0.001 mg/L), cadmium (0.0005 mg/L), chromium (0.002 mg/L), cobalt (0.048 mg/L), lead (0.003 mg/L), mercury (≤0.0001 mg/L), molybdenum (≤0.001 mg/L), nickel (0.05 mg/L), selenium (≤0.01 mg/L) and tin (≤0.001 mg/L).

Overall, the results of the water extraction tests indicate that run-off from recently mined rock will likely be circum-neutral or slightly acidic and contain some soluble salts, but metal concentrations will be relatively low in comparison to what could be expected if the rock is exposed to atmospheric conditions. However, the results for samples #39088 and # 39017 provide some indication of the high concentrations of some metals that can be expected under acidic conditions. The potential for metal and metalloid releases following sulfide oxidation is also discussed further in the following section.

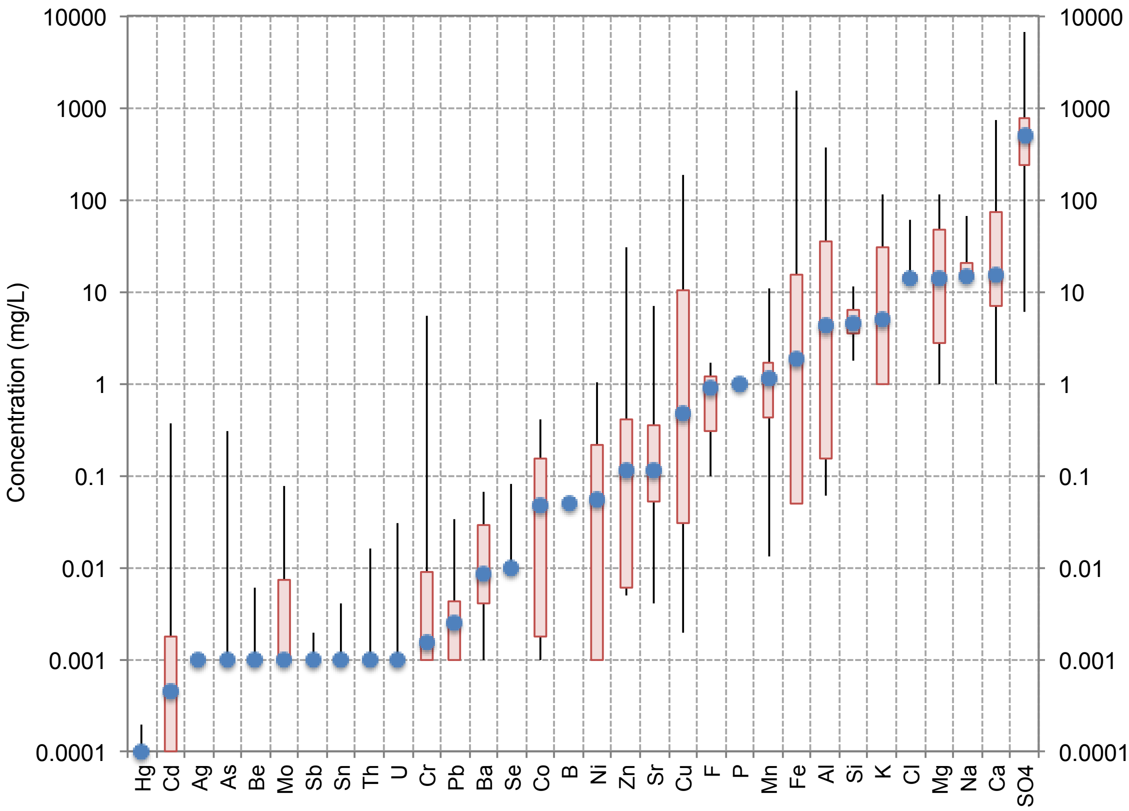

***FIGURE 30:** Box plot of elemental concentrations in water extracts of HIT drill core samples*
(line = min to max range, red box = 25 to 75 percentile range, blue dot = median)

6.13 Peroxide Extractable Elements

A series of accelerated oxidation tests based on the NAG test procedure were also carried out to provide indicative data on metals and metalloids that are likely to occur in acidic runoff from PAF rock that is subject to oxidation processes. As described in Section 5.1, the NAG test involves reaction of a sample with hydrogen peroxide to rapidly oxidise any sulfides that are present. Normally only the pH and acidity of the NAG solution are measured following the oxidation stage, but elemental analysis of the NAG liquor can also be carried out to provide data on the release of elements that may be of interest.

The peroxide extraction tests were carried out on the same 32 samples that were selected for water extractions. The compositions of the peroxide extracts are given in Appendix A6. Twenty-six of the samples acidified to less than pH 4, and most to less than pH 3, when oxidised. The NAGpHs of the other six samples ranged from 4.7 to 8.2. They included the three NAF samples (#38829, 38832 and 39061) and three PAF samples (#39059, 39075 and 39060). In the latter case the PAF samples had moderately high ANCs (25 and 39 kg H_2SO_4/t) and it would have required sequential NAG testing to reach an acidic state.

The actual concentrations reported in Appendix A6 are not of themselves meaningful for the field situation, and there are fundamental differences in the way results from the peroxide extractions should be interpreted, compared to the water extraction results discussed in Section 6.12. The composition of a water extract basically represents a state of chemical equilibration between the liquor and solids phases, and the results are therefore generally directly applicable to the same material in the field. On the other hand, the composition of a peroxide extract reflects the chemical load released from a sample as a consequence of sulfide oxidation and acidification, and the actual concentrations in the extract are a direct function of the liquor:solid ratio at which the test is carried out. For the NAG test this ratio is 100:1 (*i.e.* 250 mL of peroxide per 2.5 g of sample), which is a high ratio in comparison to leach rates typically used in long term, column leach tests. For example, the column tests routinely run by EGi (and discussed in Section 8) typically have average leach rates around 50 to 100 mL/kg/week. If, for discussion purposes, the oxidation processes within a column of waste rock containing 1 to 2 %S were substantially completed over a five-year period, and the average leaching rate during that period was 75 mL/kg/week, then the effective ratio of liquor to solids after five years would be approximately 20:1. This ratio is about five-times lower than the liquor to solids ratio for the NAG test. Therefore, it is expected that the concentrations recorded in the NAG test (with a higher liquor to solids ratio) would under-estimate concentrations likely to be produced by the same material type in the field.

Figure 31 shows a box plot summary of range and median concentrations for the peroxide extracts with a 5-times scaling factor[16] applied so that the compositions more closely relate to "average" leachate quality that might be expected from the same samples under standard column leach test conditions. Using this rudimentary approach, the data overall suggest that sulfate concentrations in leachate from actively oxidising waste rock could be of the order of 3,000 mg/L, and probably peaking at more than 7,000 mg/L for some highly sulfidic waste rock exposed to atmospheric conditions. After scaling, the median concentrations for iron, aluminium and copper were about 140, 90 and 40 mg/L, respectively, with peak concentrations possibly of the order of 1000 mg/L for iron and 400 mg/L for aluminium and copper.

The compositions of the peroxide extracts also suggest that leachate from actively oxidising waste rock could contain:

- in excess of 2 mg/L of manganese, possibly peaking as high as 50 mg/L,
- more than 1 mg/L of zinc, possibly peaking to 25 mg/L,
- nickel and cobalt at around 0.5 to 1 mg/L,
- chromium at around 0.1 to 2 mg/L, and
- cadmium at around 0.003 to 0.3 mg/L.

[16] Clearly, a single scaling factor will not be appropriate for all material types given that geochemical behaviour under column leach conditions depends on a number of variables including sulfide content, the extent of any lag period, and the reactivity of the sulfides present. From past experience, NAG test concentrations typically need to be multiplied by between 3 to 10 times to provide a reasonable guide to what might be expected from column leach tests.

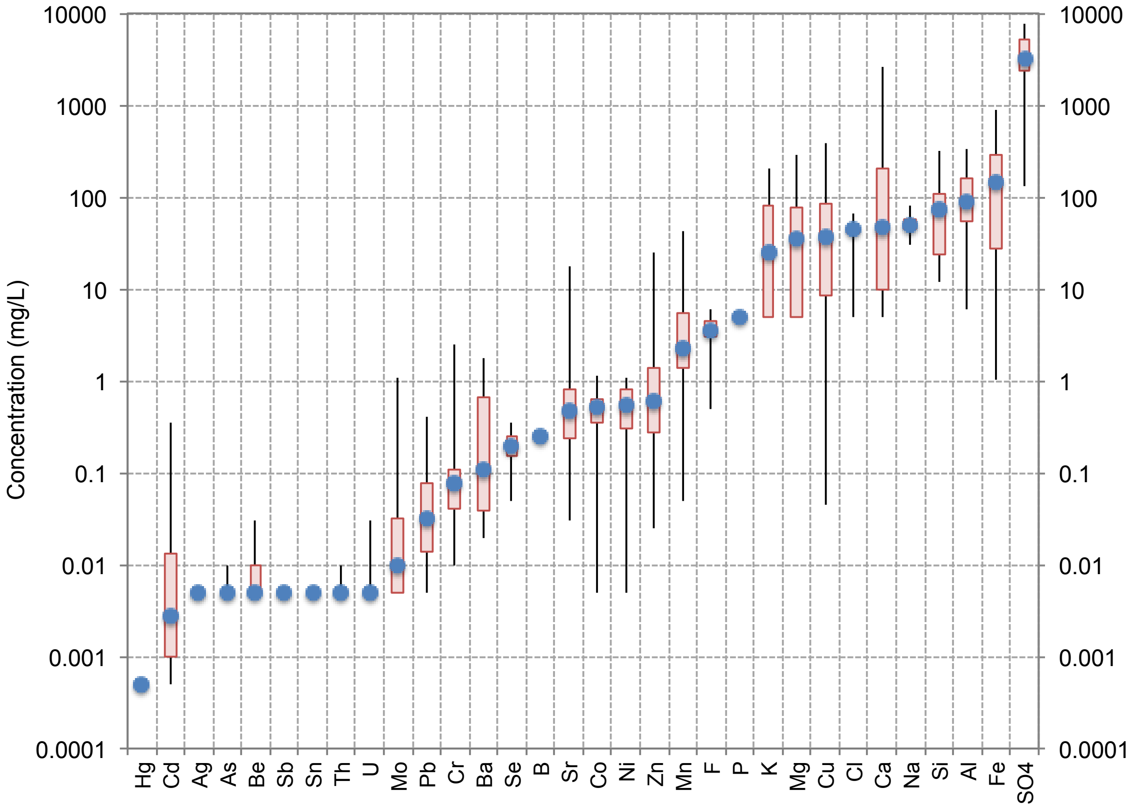

FIGURE 31: *Box plot of peroxide extractable elements for HIT drill core samples, with a 5-times scaling factor applied (see discussion Section 6.13)*

(line = min to max range, red box = 25 to 75 percentile range, blue dot = median)

7.0 Static Testing of Ekwai and Koki Waste Rock

The static testing programs for the Ekwai and Koki deposits included 26 and 54 drill core samples, respectively. The samples were selected by FRL to provide representation of the range of waste rock that will be mined during development of the Ekwai and Koki deposits Table 8 gives the lithological distributions of samples, split by weathering. The majority of samples from both deposits were representative of HMD.

***TABLE 8:** Lithology and weathering of Ekwai and Koki drill core samples*

Sulfur Range	Supergene Enrichment	Total Oxidation	Partial Oxidation	Fresh
Ekwai Samples				
HMD	5	1	7	3
FT	-	-	-	1
LW	-	-	2	4
SC	-	1	1	-
OAP	-	-	-	1
Total	**5**	**2**	**10**	9
Koki Samples				
HMD	-	7	4	25
FT	-	-	-	2
LW	-	2	-	-
SC	-	2	-	-
KDP	-	2	3	7
Total	**-**	**13**	**7**	**34**

The testing of drill core samples from these two deposits included assessment of acid forming characteristics of all samples using standard static testing procedures. In addition, kinetic NAG profiles, acid buffer curves, and peroxide extractable elements were determined for selected samples, and elemental data for all samples were provided by FRL. The main findings in relation to the acid forming characteristics and elemental compositions of waste rock from these two deposits are discussed below.

7.1 Acid Forming Characteristics

Acid-base account and ARD classification plots for the Ekwai drill core samples are given in Figures 32 and 33, respectively. The same plots for the Koki samples are given in Figures 34 and 35, respectively.

NAF/PAF classifications were assigned to each sample based on the NAPP and NAG test results. The NAF/PAF distributions for each deposit are given in Table 9. Approximately one-third of the samples from each deposit were classified as PAF. The remainder of the samples were NAF, apart for four Ekwai samples and one Koki sample that could not be definitively classified and were designated "uncertain". The "uncertain" samples contained between 0.36 and 0.91 %S.

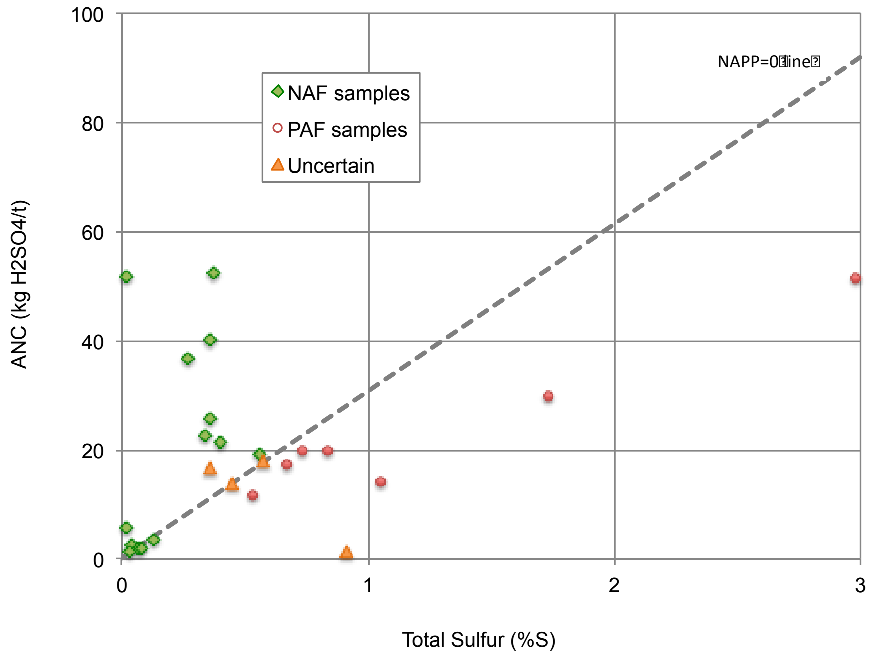

FIGURE 32: *Acid-base account plot for Ekwai drill core samples*
(Excludes one PAF sample with a total sulfur content of 8.95 %S)

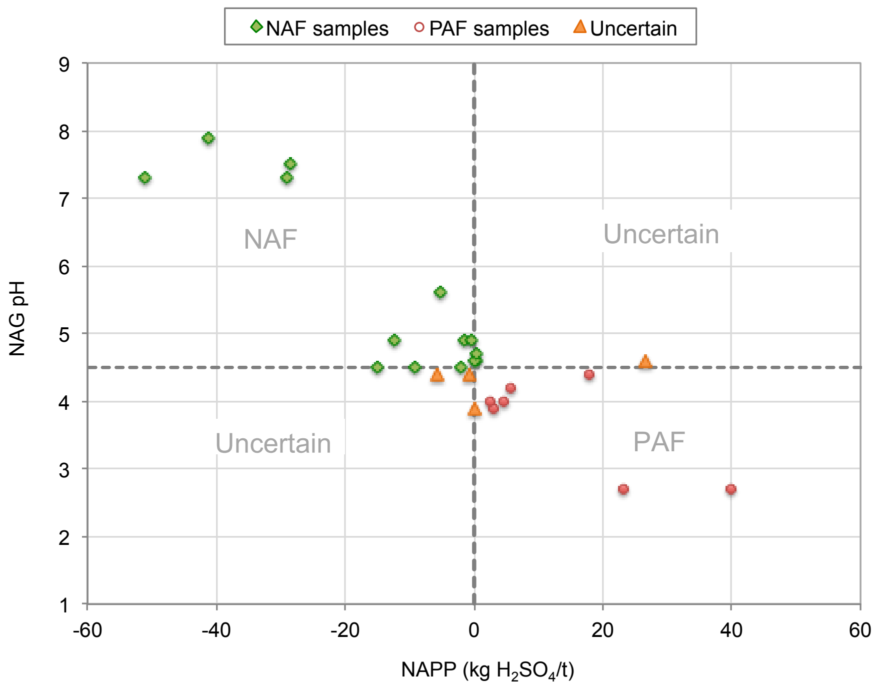

FIGURE 33: *ARD classification plot for Ekwai drill core samples*
(Excludes one PAF sample with NAPP of 274 kg H_2SO_4/t)

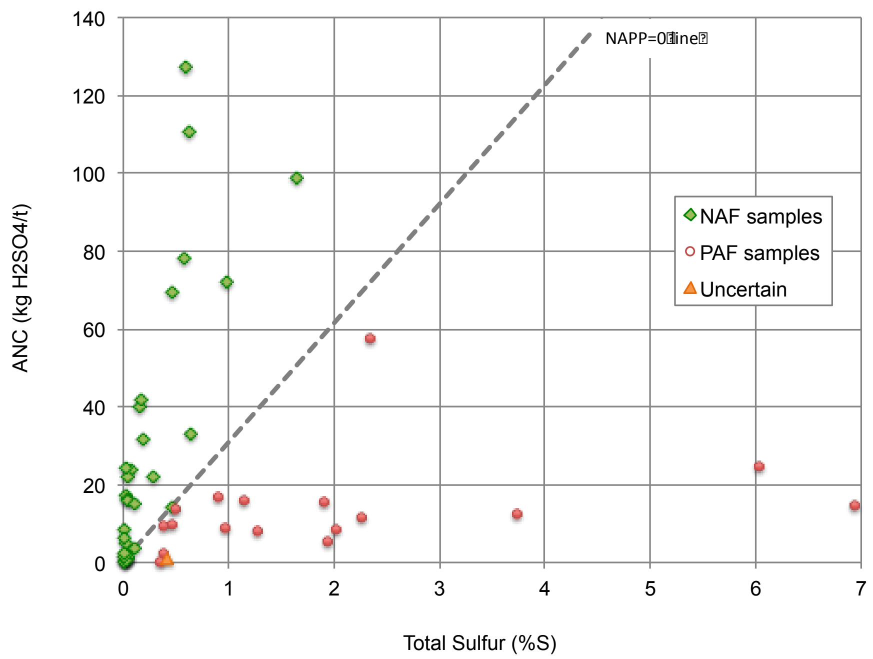

FIGURE 34: *Acid-base account plot for Koki drill core samples*
(Excludes one PAF sample with a total sulfur content of 11.45 %S)

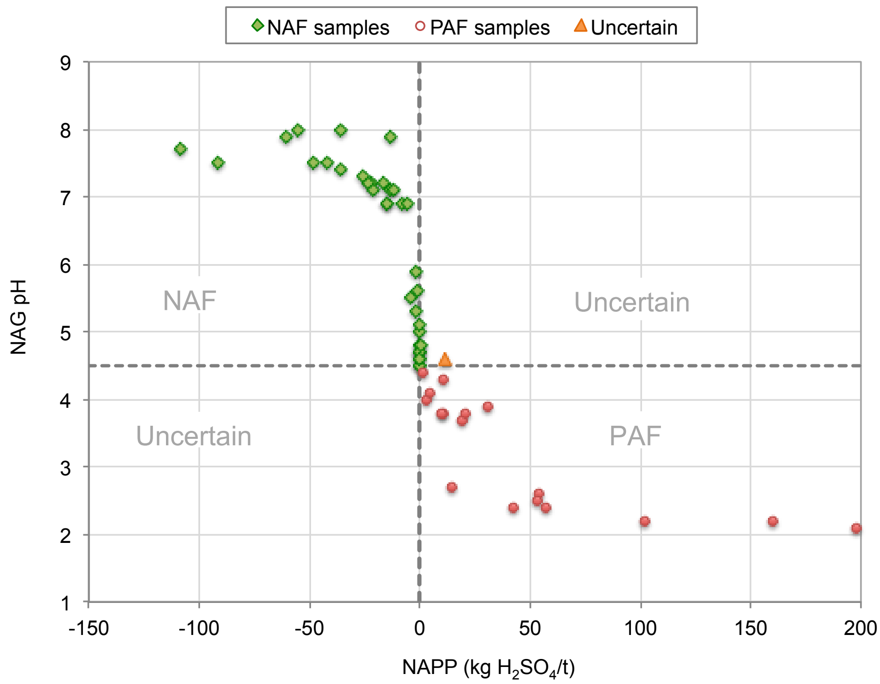

FIGURE 35: *ARD classification plot for Koki drill core samples*
(Excludes one PAF sample with NAPP of 330 kg H_2SO_4/t)

TABLE 9: *Summary of acid-base account results for Ekwai and Koki drill core samples*

Parameter	Statistic	Ekwai	Koki
Number	Count	26	54
NAF/PAF Distribution	NAF PAF Uncertain	14 (54%) 8 (31%) 4 (15%)	35 (65%) 18 (33%) 1 (2%)
Sulfur %S	Min Median Max	0.02 0.39 8.95	0.01 0.32 11.45
ANC kg H_2SO_4/t	Min Median Max	0 18 52	0 13 127
NAPP kg H_2SO_4/t	Min Median Max	-51 0 274	-109 0 330

Ekwai

Although the number of samples from Ekwai was relatively small, the available results suggest a significant portion of waste rock from Ekwai could be NAF, with a sulfur content less than 0.5 %S (*i.e.* Green waste) and a low to moderate ANC. Furthermore, of the eight samples that were classified as PAF there were four that contained between 0.5 to 1.0 %S, which corresponds with the definition of Amber waste. The other four PAF samples had high sulfur contents, with three classed as Red waste with between 1 and 3 %S and one as High Red with a sulfur content of 8.95 %S.

The ANCs of Ekwai samples were wide ranging (*i.e.* 0 to 52 kg H_2SO_4/t) but overall the results for the test samples suggest a moderate availability of neutralisation capacity for Ekwai waste, with 17 of the 26 samples tested having ANCs exceeding 10 kg H_2SO_4/t, and a median of 18 kg H_2SO_4/t. This median would be sufficient to neutralise the acid potential of approximately 0.6 %S as pyrite. It is expected that PAF waste rock with an ANC of this magnitude or higher would exhibit a reasonable lag phase of at least many months if exposed to atmospheric conditions.

Kinetic NAG tests carried out on two Ekwai samples representing PAF Red waste (see Appendix A8-30 and A8-31) confirmed significant lag times for acidification when oxidised with peroxide, and the laboratory test results suggest that field lag times could be in the order of many months and probably more than a year. The two samples (# 10641 and 10654) had with ANCs of 51 and 30 kg H_2SO_4/t, respectively. Additionally, the acid buffer curve for sample #10641 (see Appendix A7-15) had a well-defined plateau at circum-neutral pH consistent with the presence of readily available calcite or dolomitic mineralisation. Again, this suggests Ekwai waste as represented by this PAF sample would require an extended period of exposure to atmospheric conditions before acidifying.

Koki

The range of acid forming characteristics exhibited by the Koki samples were similar to those described for Ekwai. For the 64 Koki samples tested, there were 35 (65%) classified as NAF, one uncertain but probably NAF, and 18 (33%) classified as PAF.

Most of the NAF samples contained less than 0.5 %S (Green waste), but there were six NAF samples with higher sulfur contents (five Amber and one Red) that had moderate to high ANCs and consequently NAPPs that were definitively negative. Acid buffer curves were produced for two of these samples (#10679 and 10697) which had ANCs of 111 and 99 kg H_2SO_4/t, respectively. The curves had well defined buffer plateaus (see Appendices A7-17 and A7-19) that suggested that the neutralisation potential should be readily available at circum-neutral pH. As such, it is expected that waste rock as represented by these higher sulfur NAF samples should remain circum-neutral but could generate sulfate-rich drainage if exposed to atmospheric conditions.

The 18 Koki samples classified as PAF had wide ranging sulfur contents and generally low to moderate ANCs. There were five PAF samples containing between 0.35 and 0.49 %S that had small positive NAPPs and acidified slightly (pH 3.8 to 4.4) under NAG test conditions. Such PAF material would be expected to have only a low capacity for acid generation (*i.e.* less than 10 kg H_2SO_4/t) if exposed to atmospheric conditions.

Most of the remaining PAF samples from Koki contained more than 1 %S, with seven samples containing between 1 to 3%S (Red waste) and another four exceeding 3 %S (High Red waste). The waste represented by such samples would be expected to generate significant acidity if there was long term exposure to atmospheric conditions. However, there could be a delay in the onset of acid conditions for at least some PAF waste from Koki, as the results for the test samples suggest some Red and High Red waste will have low to moderate ANC. The median ANC for Koki PAF samples was 13 kg H_2SO_4/t and the highest result was 127 kg H_2SO_4/t.

Kinetic NAG tests were run on three PAF samples (see Appendix A8-24, 25 and 26) with ANCs ranging from 9 to 15 kg H_2SO_4/t. One sample (#10690) produced a well-defined buffer plateau at about pH 6 that extended for approximately two hours of the test, before gradually acidifying. The other two samples did not exhibit extended plateaus but the pHs decreased only slowly. The times taken to acidify to less than pH 4 under NAG test conditions ranged from approximately one to four hours. Therefore, although it is expected that PAF waste from Koki would eventually acidify and generate acid drainage if there was long term exposure to atmospheric conditions, there could be a lag period of many months, and for some waste possibly several years, before significant acidification occurs.

7.2 Elemental Composition

Elemental data from the resource drilling program was provided by FRL for Ekwai and Koki drill core samples included in the geochemical assessment program. The elemental data are included in Appendix A3 and corresponding GAIs are included in Appendix A4. Figure 36 gives a statistical box plot summary for each element for the 80 Ekwai and Koki samples included in the geochemical assessment, and Figure 37 shows the distribution of GAIs for each element.

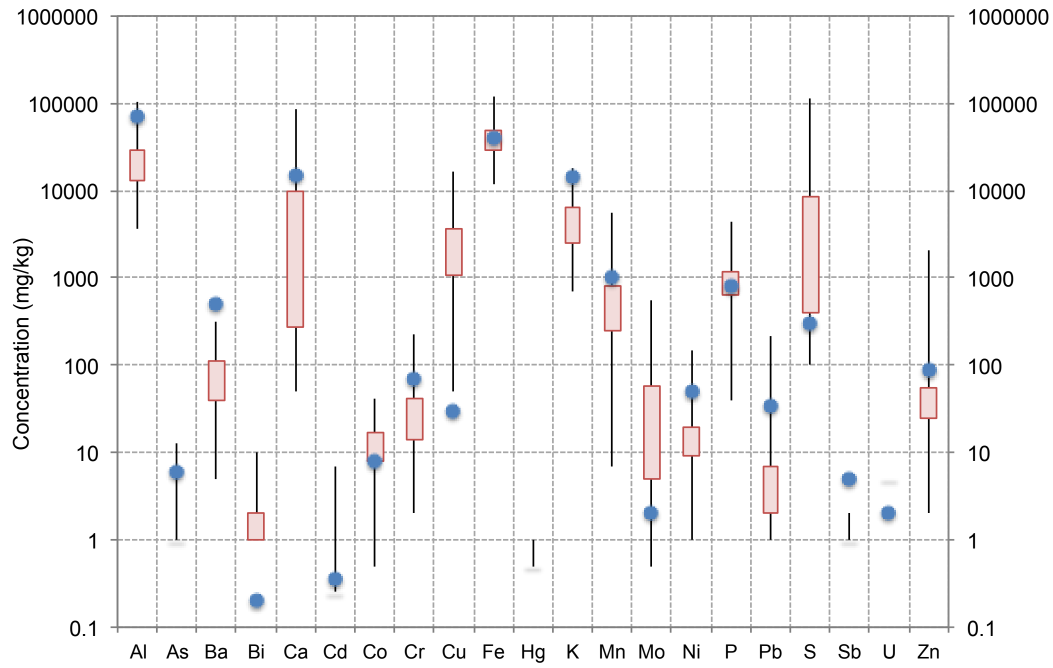

FIGURE 36: *Box plot of multi-element data for Ekwai and Koki drill core samples*
(line = min to max range, red box = 25 to 75 percentile range, blue dot = median soil)

*[**Note:** For most samples, the contents of As, Bi, Cd, Hg, Sb, and U were below, or close to the analytical detection limits of 1, 1, 0.25, 0.5, 1 and 5 mg/kg, respectively. Consequently the 25-75 percentile ranges for these elements are not show]*

As was the case for HIT samples, there was significant enrichment of a wide range of samples with copper, molybdenum and sulfur. There were also slightly elevated concentrations (relative to median soil) of cobalt, lead, manganese and zinc in small numbers of samples, but otherwise there was no evidence of significant heavy metal or metalloid enrichments (apart from copper) that are typically regarded as environmentally important.

The copper concentrations in Ekwai samples ranged from 50 to 9,390 mg/kg and the median was 2,965 mg/kg. For Koki samples the range was 160 to 16,500 mg/kg and the median 2,000 mg/kg. It should be noted that approximately half of the Ekwai drill core samples tested, and approximately 30% of the Koki samples had copper contents exceeding 3,000 mg/kg (or 0.3 %Cu) and as such could be representative of material reporting as ore.

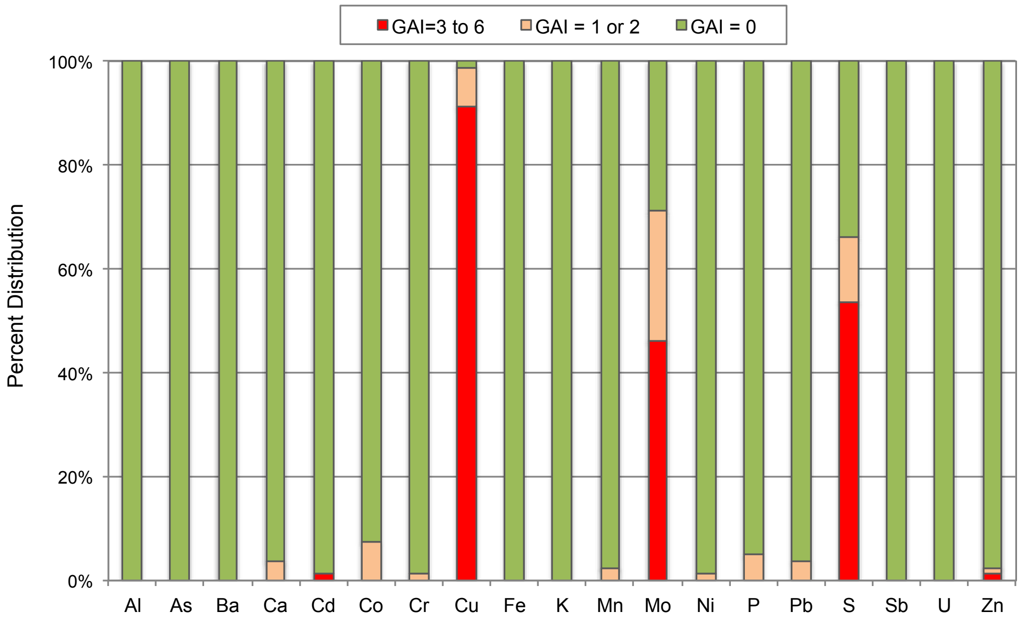

FIGURE 37: *Distributions of GAIs based on analysis of Ekwai and Koki drill core samples*

*[**Note:** Mercury and bismuth not shown as Hg concentrations in all samples, and Bi concentrations in most samples, were less than the respective analytical detection limits, and these limits were greater than the respective median soil concentrations used to calculate GAI.]*

7.3 Peroxide Extractable Elements

Accelerated peroxide oxidation tests were also carried out on four Ekwai samples and six Koki samples to provide indicative data on drainage quality from mined rock with prolonged exposure to atmospheric conditions. The samples selected for peroxide extraction were representative of the following material types:

- PAF High Red - 1 sample
- PAF Red - 3 samples
- PAF Amber - 3 samples
- NAF Red - 2 samples
- NAF Amber - 1 sample

The compositions of the peroxide extracts are given in Appendix A6. The seven PAF samples acidified to less than pH 4, whereas the NAGpHs of the three NAF samples remained circum-neutral (pH 7.4 to 7.7) notwithstanding that they had elevated sulfur contents. As discussed previously for HIT samples (see Section 6.13), a five-times scaling factor was applied to the peroxide assay data to provide compositions that relate more closely to what would be expected in the field if the same materials were exposed to atmospheric conditions. Figure 38 shows a box plot summary of range and median concentrations for the peroxide extracts with a 5-times scaling factor applied.

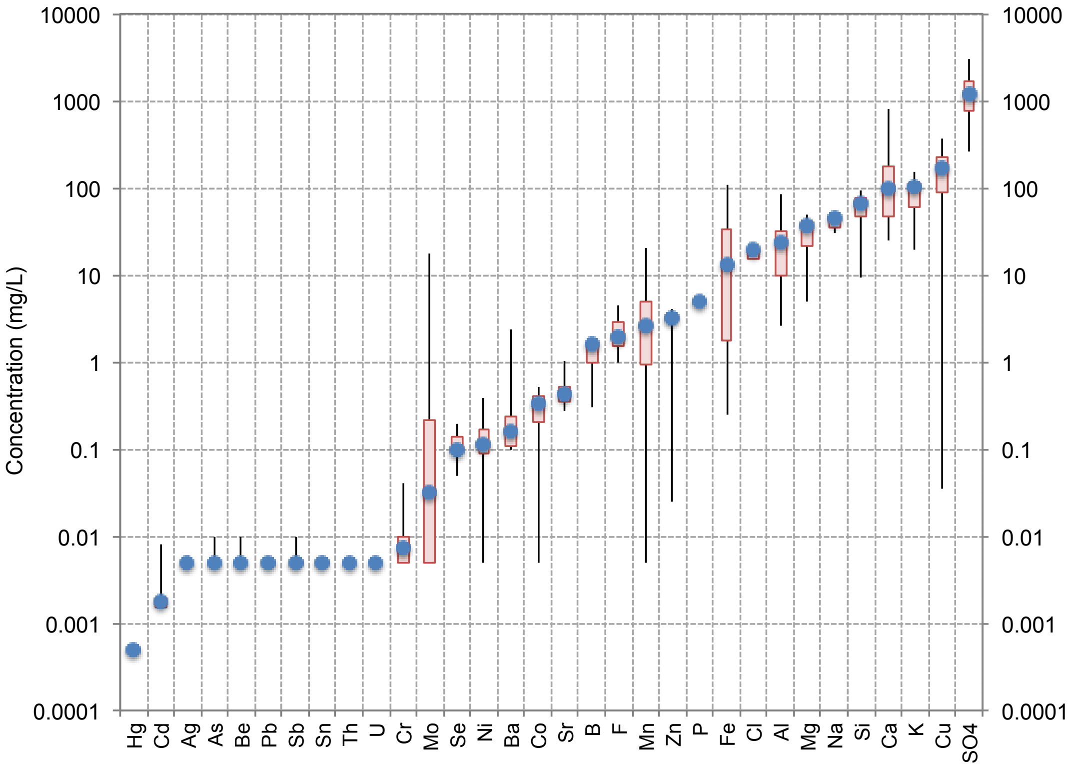

FIGURE 38: *Box plot of peroxide extractable elements for Ekwai and Koki drill core samples, with a 5-times scaling factor applied*

line = min to max range, red box = 25 to 75 percentile range, blue dot = median

*[**Note:** In most cases the concentrations of Hg, Cd, Ag, As, Be, Pb, Sb, Sn, Th, and U in the peroxide extracts were below, or close to the analytical detection limits.]*

Overall, the results for the Ekwai and Koki samples are comparable to those obtained for HIT samples in that they suggest that sulfate concentrations in leachate from actively oxidising Red material could be of the order of 1,000 to 2,000 mg/L, and probably more than 3,000 mg/L for High Red material. The results also suggest that acidic drainage from oxidising PAF rock could also contain:

- 10's to 100's mg/L of copper, aluminium and iron.
- 1 to 10 mg/L of manganese and zinc,
- 0.1 to 1 mg/L of cobalt and nickel, and
- 0.01 to 0.1 mg/L molybdenum.

However, there was no evidence of significant release of arsenic, mercury, cadmium, tin or lead.

8.0 Column Leach Testing of Waste Rock

The main objective of the column leach testing program was to determine the geochemical behaviours of a selection of waste rock types under controlled laboratory conditions, including assessment of the reactivity of the sulfide mineralisation, the time frame for acidification to occur (*i.e.* lag period), and the potential for mobilisation of elements that could be environmentally important.

8.1 Sample Descriptions

HIT waste rock samples for column leaching testing were taken from diamond drill core stored on site. The drill hole numbers, sampling intervals and geological descriptions for the nine waste rock samples included in the column leach testing program were as follows:

- Column HIT WR-1 057NOR05 (50-58 m) DVp (AR alteration)
- Column HIT WR-2 057NOR05 (366-370 m) DVp (SA alteration)
- Column HIT WR-3 073NOR05 (54-70 m) HMD (AR alteration)
- Column HIT WR-4 270XC09 (242-246 m) HMD (PO alteration)
- Column HIT WR-5 262XC09 (130-136 m) HMD (PH alteration)
- Column HIT WR-6 218XC09 (110-114 m) LW (PO alteration)
- Column HIT WR-7 109XC7 (110-116 m) FDP (PR alteration)
- Column HIT WR-8 109XC7 (170-176 m) FDP (PH alteration)
- Column HIT WR-9 254XC09 (210-216 m) KDP (PH alteration)

The samples were supplied as drill core pieces, which were subsequently crushed to minus 4 mm for use in the column leach tests. A sub-sample of 6 kg of crushed material was then taken for the respective column leach tests, except for HIT WR-2 where only 3.5 kg was used due to limited availability of this core. Another split of around 200 gm of crushed sample was also pulverised and used for the initial geochemical characterisation of each sample, the results of which are summarised below.

Acid Forming Characteristics

The acid forming characteristics of the nine column leach tests samples are given in Table 10. The main findings were as follows:

- Total sulfur contents were high to very high (1.4 to 6.2 %S) whilst the ANCs were low and in most cases negligible.
- All samples had positive NAPPs, with values ranging from 29 to 189 kg H_2SO_4/t.
- The sequential NAG values were of similar magnitude to the corresponding NAPP values as illustrated in Figure 39. The NAG values were 81 to 100% of NAPPs, except for WR-6 which was 70%. This similarity of NAPP and NAG values indicates that the majority of the sulfur occurred as reactive sulfide, with pyrite likely to be the dominant sulfide present.

***TABLE 10**: Acid forming characteristics of HIT waste rock samples used in the column leach test program*

Column Code	Sample Code	Description	%S	MPA	%C	CNV	ANC	NAPP	NAG	NAG pH	ARD Class
HIT WR-1	39548	DVp/AR	6.2	189	0.03	2	0	189	171	1.9	PAF
HIT WR-2	39549	DVp/SA	2.7	82	0.05	4	0	82	76	2.1	PAF
HIT WR-3	39550	HMD/AR	3.7	112	0.03	2	0	112	105	2.0	PAF
HIT WR-4	39551	HMD/PO	2.8	86	0.09	7	14	72	65	2.2	PAF
HIT WR-5	39552	HMD/PH	3.4	103	0.01	1	1	102	83	2.1	PAF
HIT WR-6	39553	LW / PO	2.1	65	0.04	3	9	56	39	2.7	PAF
HIT WR-7	39554	FDP/PR	2.7	83	0.03	2	10	73	63	2.2	PAF
HIT WR-8	39555	FDP/PH	1.4	41	0.10	8	12	29	27	2.6	PAF
HIT WR-9	39556	KDP/PH	5.4	166	0.02	2	0	166	137	1.9	PAF

Lithology
DVp = Debom Volcanics - Pyroclastics
FDP = Frieda Diorite Porphyry
HMD = Horse Microdiorite
KDP = Koki Diorite Porphyry
LW = Lower Wogamush Sediment

Alteration
AR = Argillic   PO = Potassic
PH = Phyllic   PR = Propylitic
SA = Silica-Alunite

ARD Characteristics
MPA = Maximum Potential Acidity (kg H_2SO_4/t)
CNV = Carbon Neutralising Value(kg H_2SO_4/t)
ANC = Acid Neutralising Capacity (kg H_2SO_4/t)
NAPP = Net Acid Producing Potential (kg H_2SO_4/t)
NAG = Net Acid Generation capacity (kg H_2SO_4/t)
NAGpH = pH of NAG liquor
PAF = Potentially Acid Forming

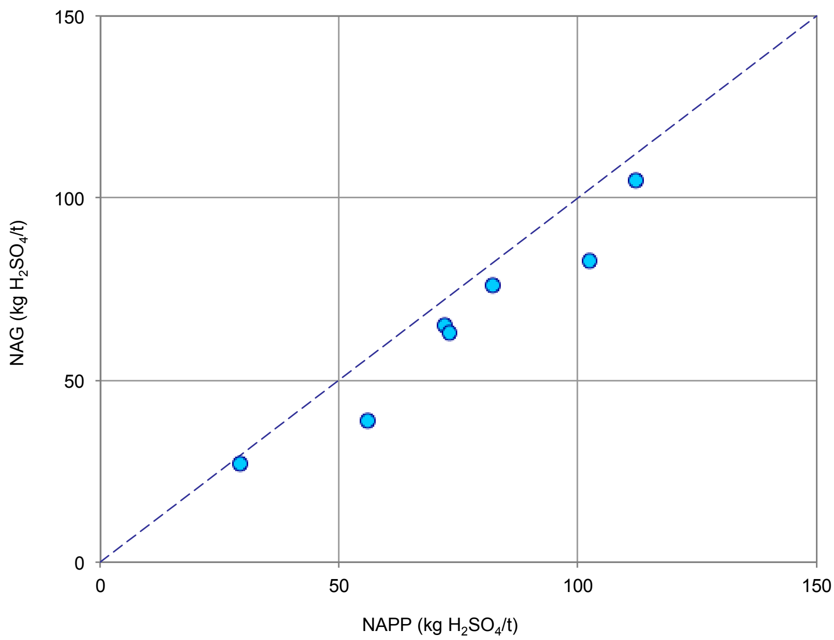

***FIGURE 39:** Relationship between NAPP and sequential NAG values for HIT waste rock samples used in the column leach test program*

Figure 40 shows an acid-base account plot for the waste rock samples. All nine samples plot well to the right of the ANC/MPA=1 line in Figure 40. This not only emphasises that the net acid potentials were high, but also illustrates that the neutralising capacities were small (and in some cases negligible) in comparison to the acid potentials associated with the pyrite contents of the samples.

An ARD classification plot for the waste rock samples is given in Figure 41. Again, all nine samples clearly lie within the lower right quadrate which designates positive results for both the NAPP and NAG test. Therefore, on the basis of the positive NAPP and NAG values the nine waste rock samples can be regarded as PAF, with high to very high capacities for acid generation if exposed to atmospheric conditions.

Kinetic NAG Tests

The temperature and pH profiles recorded during the kinetic NAG tests on the nine waste rock samples are presented in Appendices A8-21 to A8-29, respectively, and key parameters of the kinetic NAG tests are summarised in Table 6 as discussed in Section 6.9. Overall, the responses exhibited by the waste rock samples under NAG test conditions confirm the reactive nature of the sulfide mineralisation present. Several samples (HIT WR-1, WR-2, WR-3, and WR-9) were already moderately acidic at the start of kinetic NAG testing, with starting pHs of between 3.2 and 3.4. These low pHs are consistent with the absence of any ANC within the samples. Furthermore, these samples acidified rapidly when oxidised with peroxide, with pH minimums of between 0.7 to 1.9 recorded within 15 to 27 minutes of reaction. The pH minimums closely align to the temperature peaks recorded during the kinetic NAG tests. Thereafter the pH of the NAG solutions increased slightly to values around pH 2.5 to 3 as the solutions cooled and reached chemical equilibrium with the solids.

Samples HIT WR-4, WR-6, and WR-8 generally had higher starting pHs (*i.e.* 5.1 to 6.0) and also required longer reaction times to reach the minimum pH values (*i.e.* 72 to 165 minutes). The slower reaction kinetics are consistent with these samples having some, albeit small ANCs of between 9 to 14 kg H_2SO_4/t. However, the minimum pHs (*i.e.* 1.3 and 1.9) were still indicative of very high acid generation, and these samples also produced strong temperature peaks (primarily due to catalytic decomposition of the peroxide) which coincided with pH minimums.

Overall, the fast reaction times exhibited in the kinetic NAG tests, together with the absence of significant ANC, suggest that the waste rock samples selected for column leach testing should begin to oxidise and acidify rapidly following exposure to atmospheric conditions in the field. Based on the kinetic NAG test results the only samples that might be expected to exhibit some initial lag would be HIT WR-4, WR-6 and WR-8 due to the presence of some ANC.

Elemental Composition

The elemental data are given in Table 11. Apart from sulfur, most of the waste rock samples were significantly enriched (GAI≥3) with copper (163 to 8420 mg/kg) and selenium (3 to 12 mg/kg). There was also significant enrichment of HIT WR-7 with cadmium and zinc, and significant enrichment of HIT WR-3 and WR-5 with molybdenum. Other environmentally important elements that exhibited minor enrichment (GAI=1 or 2) included arsenic (WR-2 and 7), bismuth (WR-1, 2, 3 and 7), cobalt (WR-1, 2 and 9), and lead (WR-1, 2, 3, 7 and 8).

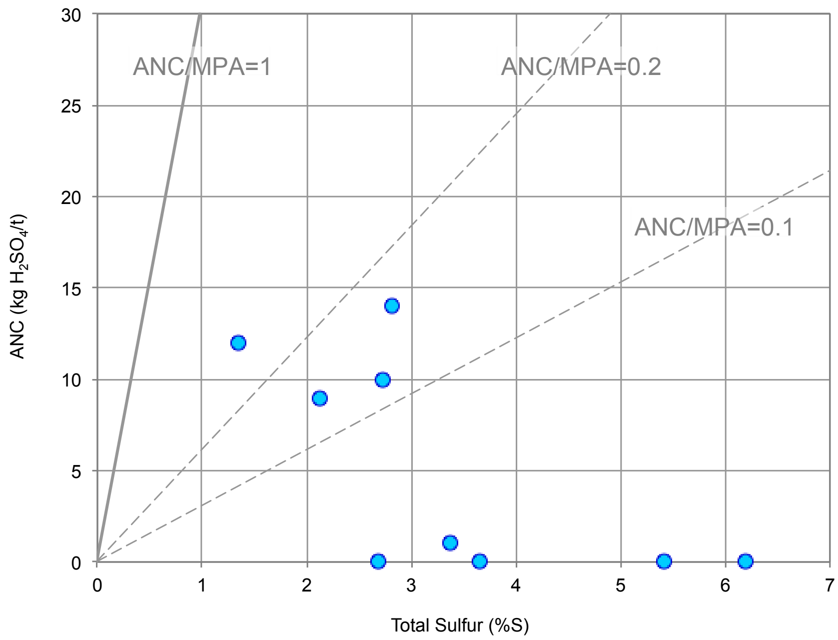

***FIGURE 40:** Acid-base account plot for HIT waste rock samples used in the column leach test program*

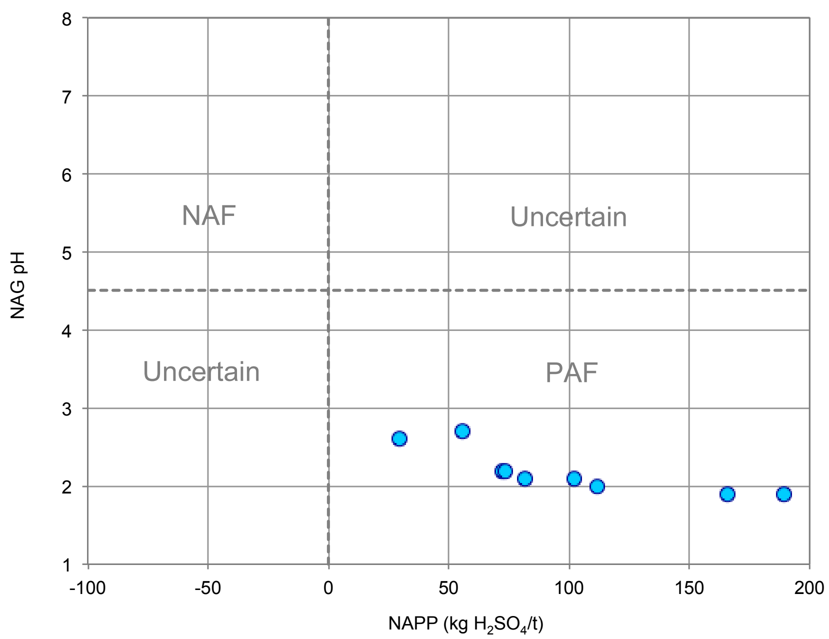

***FIGURE 41:** ARD Classification plot for HIT waste rock samples used in the column leach test program*

TABLE 11: *Elemental composition and geochemical abundance indices for HIT waste rock samples used in the column leach test program*

Element	Unit	Elemental Composition									Median Soil Content #	Geochemical Abundance Indices *								
		HIT WR-1 39548 DVp/AR	HIT WR-2 39549 DVp/SA	HIT WR-3 39550 HMD/AR	HIT WR-4 39551 HMD/PO	HIT WR-5 39552 HMD/PH	HIT WR-6 39553 LW/PO	HIT WR-7 39554 FDP/PR	HIT WR-8 39555 FDP/PH	HIT WR-9 39556 KDP/PH		HIT WR-1 39548 DVp/AR	HIT WR-2 39549 DVp/SA	HIT WR-3 39550 HMD/AR	HIT WR-4 39551 HMD/PO	HIT WR-5 39552 HMD/PH	HIT WR-6 39553 LW/PO	HIT WR-7 39554 FDP/PR	HIT WR-8 39555 FDP/PH	HIT WR-9 39556 KDP/PH
S	%	6.2	2.7	3.7	2.8	3.4	2.1	2.7	1.4	5.4	0.03	**6**	**5**	**6**	**5**	**6**	**5**	**5**	**4**	**6**
Al	%	8.3	9.1	8.1	7.6	7.7	7.2	7.3	7.6	7.9	7.1	0	0	0	0	0	0	0	0	0
Ca	%	0.1	0.09	0.1	1.7	0.05	0.7	1.2	1.4	0.1	1.5	0	0	0	0	0	0	0	0	0
Fe	%	5.3	3.0	4.0	4.4	4.1	5.3	4.7	4.5	5.0	4	0	0	0	0	0	0	0	0	0
K	%	1.5	2.2	1.6	1.1	2.7	2.0	2.4	1.8	3.5	1.4	0	0	0	0	0	0	0	0	0
Mg	%	0.2	0.2	0.1	1.7	0.7	2.3	2.3	2.2	1.4	0.5	0	0	0	1	0	1	1	1	0
Na	%	0.1	0.09	0.06	2.6	0.2	2.7	1.1	2.3	0.2	0.5	0	0	0	1	0	1	0	1	0
As	mg/kg	11	33	9.1	0.4	1.6	0.3	36	15	2.4	6	0	1	0	0	0	0	2	0	0
Ba	mg/kg	410	510	440	150	410	350	430	420	470	500	0	0	0	0	0	0	0	0	0
Be	mg/kg	0.5	0.5	0.4	1.2	0.6	1.3	1.1	1.0	1.3	6	0	0	0	0	0	0	0	0	0
Bi	mg/kg	1.0	1.7	2.1	0.2	0.5	0.3	0.8	0.3	0.3	0.2	1	2	2	0	0	0	1	0	0
Cd	mg/kg	0.9	0.1	0.4	0.05	0.04	0.05	13	2.2	0.08	0.4	0	0	0	0	0	0	**4**	2	0
Co	mg/kg	25	32	18	15	13	21	20	19	25	8	1	1	0	0	0	0	0	0	1
Cr	mg/kg	71	46	88	45	48	117	63	58	13	70	0	0	0	0	0	0	0	0	0
Cu	mg/kg	459	2030	619	353	4340	8420	438	384	163	30	**3**	**5**	**3**	2	**6**	**6**	**3**	**3**	1
Hg	mg/kg	0.12	0.019	0.027	0.005	0.010	0.008	0.15	0.078	0.022	0.06	0	0	0	0	0	0	0	0	0
Mn	mg/kg	26	12	14	261	39	263	2220	1640	75	1000	0	0	0	0	0	0	0	0	0
Mo	mg/kg	16	7.2	28	1.2	34	22	4.2	8.2	14	2	2	1	**3**	0	**3**	2	0	1	2
Ni	mg/kg	60	31	32	27	23	89	38	31	10	50	0	0	0	0	0	0	0	0	0
P	mg/kg	1400	1400	1230	1090	320	570	1810	1580	1570	800	0	0	0	0	0	0	0	0	0
Pb	mg/kg	151	357	107	6.7	7	5.8	261	134	7.0	35	1	2	1	0	0	0	2	1	0
Sb	mg/kg	0.6	0.5	0.4	0.1	0.1	0.07	1.5	0.6	0.3	5	0	0	0	0	0	0	0	0	0
Se	mg/kg	12	8	10	3	12	9	6	4	11	0.4	**4**	**3**	**4**	2	**4**	**3**	**3**	2	**4**
Sn	mg/kg	3.7	6.6	8.5	1.3	3.6	2	1.5	1.8	3	4	0	0	0	0	0	0	0	0	0
Sr	mg/kg	1175	1610	956	535	287	170	237	373	1330	250	1	2	1	0	0	0	0	0	1
Th	mg/kg	3.5	3.9	4.3	3.3	3.4	4.8	2.8	3.5	3.4	9	0	0	0	0	0	0	0	0	0
U	mg/kg	0.9	0.7	1.0	0.7	0.8	0.4	0.7	0.7	1.1	2	0	0	0	0	0	0	0	0	0
Zn	mg/kg	75	40	113	27	14	32	3370	670	33	90	0	0	0	0	0	0	**4**	2	0

Underlined values indicate concentration below the analytical detection limit.

Median soil data from:

Bowen, H.J.M. (1979) Environmental Chemistry of the Elements. Academic Press, London.

Berkman, D.A. (1976) Field Geologists' Manual, The Australian Institute of Mining and Metallurgy, Vic.

* Geochemical Abundance Indices (GAI)

GAI=0 represents <3 times median soil con

GAI=1 represents 3 to 6 times

GAI=2 represents 6 to 12 times

GAI=4 represents 24 to 48 times

GAI=5 represents 48 to 96 times

GAI=6 represents more than 96 times

8.2 Column Test Results

The waste rock column tests commenced on 20 November 2009, with an initial leachate collection (T=0) made on 23 November 2009. A total of 13, four-week cycles were carried out over the one year period of column operation. The leachate quality results for the nine waste rock column leach tests are given in Appendix B1. The analysis of leachates includes measurements of pH, acidity, and EC and the following suite of elements: Ag, Al, As, B, Ba, Be, Ca, Cd, Cl, Co, Cr, Cu, F, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, SO_4, Sr, Th, U and Zn.

8.3 Waste Rock Acidification

Time series plots for leachate pH and leachate acidity are presented in Figures 42 and 43, respectively. All of the nine waste rock samples generated acidic leachate but there were marked differences between some of the columns in the degree of acid generation during the 52 weeks of testing.

Samples WR-1, WR-2, WR-3 and WR-4

Waste rock samples HIT WR-1, 2, 3 and 9 did not exhibit any lag phase and all four samples were strongly acidic at the outset of the column leach testing. The pHs of the initial leachates from the four samples were 2.1, 2.5, 1.9 and 2.6, respectively. The absence of any lag phase is consistent with the kinetic NAG tests results as discussed in Section 8.1. Leachate pHs continued to fluctuate around pH 2 throughout the 52 week test period, and the acidities were correspondingly high to very high during this period. The average pHs and acidities over the 52 week period were as follows:

- HIT WR-1 pH = 1.8 acidity = 10,890 mg $CaCO_3$/L
- HIT WR-2 pH = 2.2 acidity = 5,360 mg $CaCO_3$/L
- HIT WR-3 pH = 1.9 acidity = 19,220 mg $CaCO_3$/L
- HIT WR-9 pH = 2.2 acidity = 5,110 mg $CaCO_3$/L

Samples WR-4, WR-6, and WR-8

Waste rock samples HIT WR-4, 6 and 8 differed from other samples in that they were initially only slightly acidic with starting pHs of 5.9, 5.9 and 5.4, respectively. Similar pHs were recorded after 4 weeks, then there were gradual decreases in leachate pHs over the following few months. By week 16 leachate pHs were moderately acid at 3.6, 4.4 and 4.0, respectively, but the actual acidities remained relatively low in comparison to other column leachate, staying less than 100 mg $CaCO_3$/L.

The higher pHs and lower acidities exhibited by these three samples are again consistent with the slower reaction kinetics exhibited in the respective kinetic NAG tests. Beyond week 16 the acidities of the leachates draining from these samples remained relatively steady, and over the 52 week period the pH and acidity averages were as follows:

- HIT WR-4 pH = 4.1 acidity = 44 mg $CaCO_3$/L
- HIT WR-6 pH = 5.3 acidity = 21 mg $CaCO_3$/L
- HIT WR-8 pH = 4.3 acidity = 53 mg $CaCO_3$/L

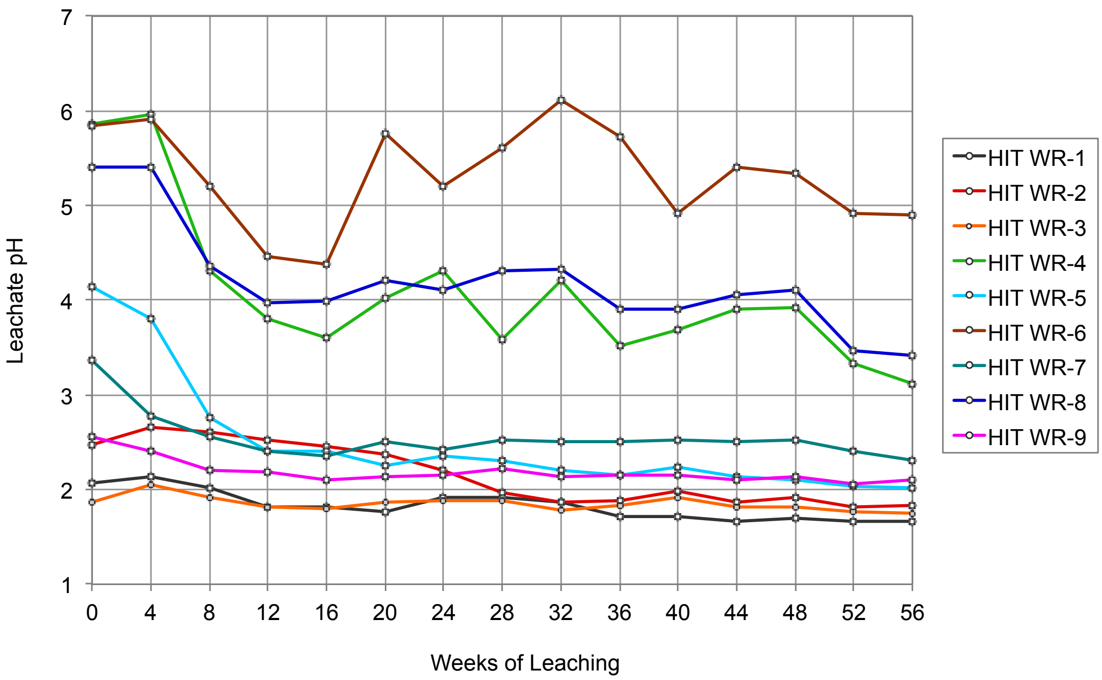

FIGURE 42: *Plot of leachate pH versus time for HIT waste rock column tests*

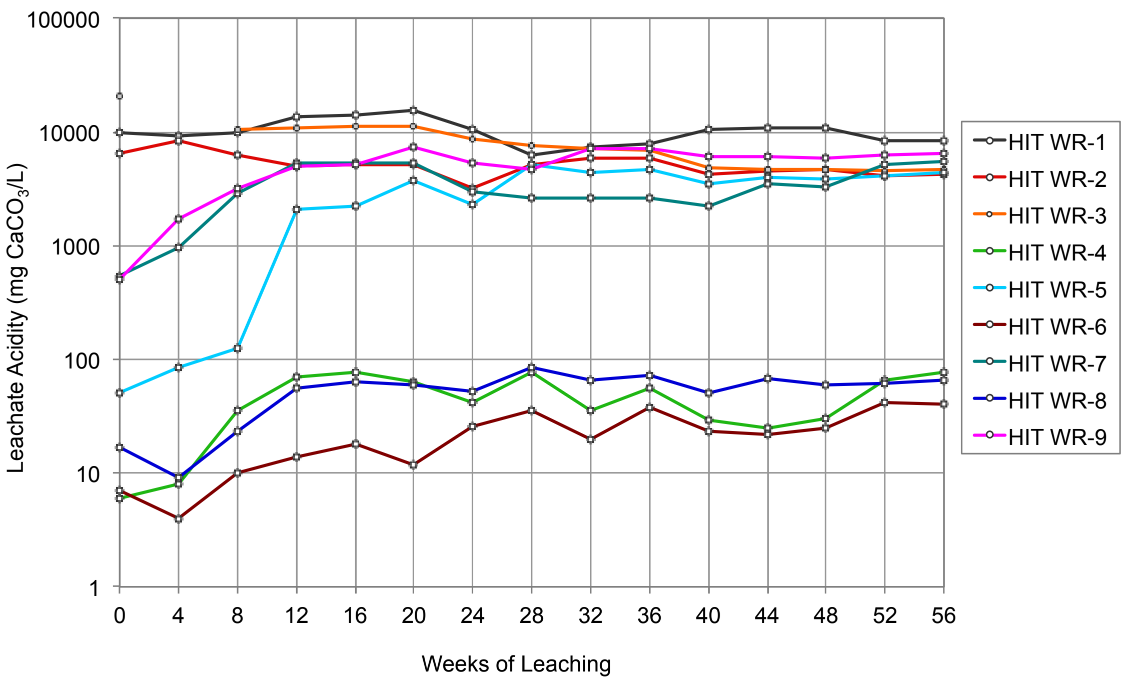

FIGURE 43: *Plot of leachate acidity versus time for HIT waste rock column tests*

Samples WR-5 and WR-7

The behaviours of waste rock samples HIT WR-5 and 7 were intermediate between the very fast reacting group (HIT WR-1, 2, 3 and 9) and the slower reacting group (HIT WR-4, 6 and 8) as discussed above. The starting pHs for WR-5 and WR-7 were 4.1 and 3.4, respectively, but both samples acidified to around pH 2.3 to 2.5 within the first few months of leaching. The decreasing pHs were accompanied by increasing acidities which typically ranged between 2,000 to 5,000 mg $CaCO_3$/L from week 12 onward. The pH and acidity averages for these two waste rock samples over the 52 week period were as follows:

- HIT WR-5 pH = 2.5 acidity = 2,890 mg $CaCO_3$/L
- HIT WR-7 pH = 2.6 acidity = 3,250 mg $CaCO_3$/L

8.4 Solute Leaching

Time series plots for selected elements in column leachates are presented in the Appendix B2. As is normally the case, the low pH and high acid release rates from the PAF rock samples were accompanied by high rates of leaching of soluble salts, primarily involving sulfate (Appendix B2-4), iron (Appendix B2-7) and aluminium (Appendix B2-8). The concentrations of these elements were particularly high in leachates from the six samples that acidified to less than pH 3 (*i.e.* HIT WR-1, 2, 3, 5, 7, 9), and from around week 20 onward there was comparatively little difference between the six samples in the leaching of these key ARD constituents. There were also high concentrations of copper (Appendix B2-9) and zinc (Appendix B2-10) in leachates, especially under very low pH conditions.

The relationships between leachate pH and the concentrations of a range of solutes from the nine waste rock columns are shown in Appendix B3. With most elements there was a strongly inverse correlation between pH and concentration, and typically the concentrations in leachates that were less than pH 3 were at least ten-times, and commonly one-hundred times, greater than concentrations in leachates of pH 4 and above. The typical concentration ranges recorded for environmentally significant elements in leachates of pH less than 3, compared to leachates of pH 4 to 6, are summarised in Table 12.

TABLE 12: *Typical concentration ranges for leachates of pH less than 3 compared to leachates of pH 4 to 6*

Parameter	Leachate pH<3	Leachate pH 4-6
EC (dS/cm)	1 - 15	0.2 - 1
SO_4 (mg/L)	1200 - 7,000	0.1 - 10
Fe (mg/L)	200 - 7,000	0.1 - 10
Al (mg/L)	150 - 1000	0.01 - 1
Cu (mg/L)	2 - 2000	0.01 - 1
Zn (mg/L)	0.5 - 200	0.01 - 1
Mn (mg/L)	0.1 - 40	0.1 - 10
Co (mg/L)	0.4 - 7	0.01 - 0.1
Ni (mg/L)	0.3 - 10	0.001 - 0.1
As (mg/L)	0.01 - 2	<0.001
Cr (mg/L)	0.02 - 1	<0.001
Cd (mg/L)	0.001 - 1	0.0001 - 0.01

Environmentally important elements that were not released to any significant extent from the waste rock samples during the 52 week testing period included:

- B (typically less than 0.1 mg/L)
- Hg (typically less than 0.0001 mg/L),
- Mo (typically less than 0.05 mg/L but up to 0.17 mg/L for WR-9 leachate),
- Pb (typically less than 0.05 mg/L but up to 0.3 mg/L for WR-8 leachate),
- Sb (less than 0.001 mg/L),
- Se (typically less than 0.3 mg/L), and
- Sn (less than 0.001 mg/L).

Overall, the results from the waste rock column leach tests corroborate the expectation that PAF rock from the HIT deposit will have a high to very high potential for ARD generation if the rock is exposed to atmospheric conditions following mining. Based on the initial results of this study it is expected that oxidation processes would evolve rapidly within exposed PAF waste and, given the limited ANC generally available, it is likely that strong acid conditions would develop within a matter of weeks to a few months of exposure. Any waste rock that does have some ANC may take slightly longer to acidify (*i.e.* possibly months to a year), but the evidence to date suggests it is unlikely there will be significant waste rock with a high ANC that would provide a prolonged lag period (*i.e.* many years) during which circum-neutral drainage would be produced.

8.5 Sulfate Release Rates

The amount of sulfate released from a column is commonly used to estimate the rate of sulfide oxidation occurring within the sample. Figure 44 shows a time series plot of sulfate release rate (SRR) expressed as mg SO_4/kg/week for each waste rock sample over the 52 weeks of column operation. The average and maximum SRRs for each sample are given in Table 13.

To provide some perspective to these SRRs, if a sample contained 3.5 %S (which approximates the average for the nine samples tested) and the average SRR was 500 mg SO_4/kg/wk it would take around 210 weeks (or approximately 4 years) to leach all of the sulfur.

Table 14 gives the reductions in sulfur contents of the column test samples over the 52 weeks of testing. The cumulative leaching of sulfur from HIT WR-8 equated to a reduction in the sulfur content of only 0.03 %S, and for HIT WR-4 the reduction was only 0.04 %S. For the other samples the cumulative leaching of sulfur was much greater, with the highest being a reduction of 1.77 %S in the sulfur content of the HIT WR-3 sample. The fractions remaining after 52 weeks ranged between 52 to 99% of the initial sulfur contents as indicated in Table 14.

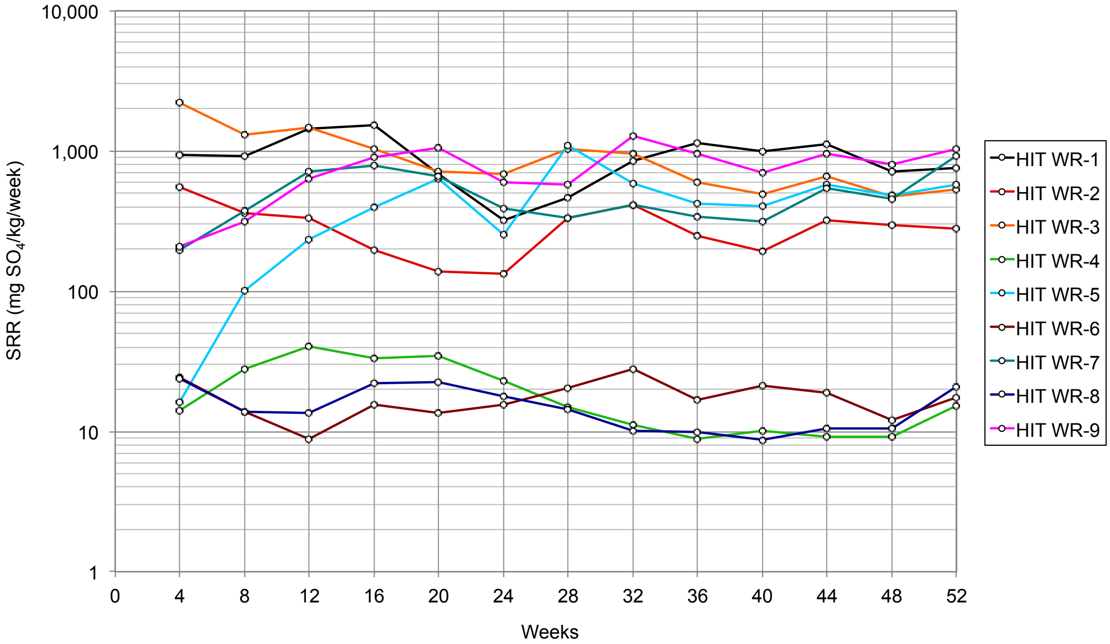

FIGURE 44: *Sulfate release rates for HIT waste rock columns*

TABLE 13: *Average and maximum sulfate release rates for HIT waste rock columns*

Column	Average SRR (mg SO_4/kg/wk)	Max SRR (mg SO_4/kg/wk)	Time of Max SRR
HIT WR-1	914	1536	week 16
HIT WR-2	292	551	week 4
HIT WR-3	936	2219	week 4
HIT WR-4	19	41	week 12
HIT WR-5	445	1106	week 28
HIT WR-6	17	28	week 32
HIT WR-7	496	927	week 52
HIT WR-8	15	24	week 4
HIT WR-9	771	1276	week 32

***TABLE 14:** Changes in sulfur contents of HIT waste rock columns*

Column	Sulfur Content (%S) at start of test	Reduction in Sulfur Content (%S) over 52 weeks	Percentage of Sulfur Remaining
HIT WR-1	6.19	1.67	73%
HIT WR-2	2.68	0.59	78%
HIT WR-3	3.66	1.77	52%
HIT WR-4	2.81	0.04	99%
HIT WR-5	3.38	0.77	77%
HIT WR-6	2.12	0.32	85%
HIT WR-7	2.72	0.87	68%
HIT WR-8	1.35	0.03	98%
HIT WR-9	5.41	1.35	75%

8.6 Intrinsic Oxidation Rates

Estimates of sulfide oxidation rate based on sulfate release can sometimes under-estimate the true oxidation rate in circumstances where there is significant retention of the sulfate within the column. This often occurs during the lag stage when carbonates are acting to buffer the acidity produced from sulfide oxidation. The primary mechanism of sulfate retention is precipitation of gypsum ($CaSO_4.2H_2O$). Conversely, if a sample already has an inherently high sulfate content then the rate of sulfate release under leach column conditions is likely to give an over-estimate the sulfide oxidation rate.

The SOC apparatus as described in Section 5.3 was used as an alternate method for quantifying the sulfide oxidation rates in the waste rock columns. The SOC method is based on measurement of the rate of oxygen consumption by a sample, and hence the method has the advantage of providing an oxidation rate independent of any secondary precipitation reactions that may be occurring within the test material.

The IORs for the nine waste rock samples based on the SOC measurements are summarised in Table 15. The SOC measurements of IOR were carried out on the waste rock samples between weeks 16 and 20 of column operation, at which point sulfide oxidation processes were occurring at relatively high rates in columns generating leachates of low pH. The IOR values ranged from a relatively slow rate of $4x10^{-8}$ kg $O_2/m^3/s$ for samples HIT WR-6 and WR-8 to a very high rate of $1x10^{-6}$ kg $O_2/m^3/s$ for HIT WR-9. The IORs for the remaining samples were moderate to high at between $2x10^{-7}$ to $7x10^{-7}$ kg $O_2/m^3/s$.

The IOR values were converted to sulfate generation rates (SGR) expressed in units of mg SO_4/kg/wk for comparison with the amounts of sulfate released from the columns in leachate collections made before and after the SOC measurements. The results of this comparison are included in Table 15 and are also illustrated graphically in Figure 45.

TABLE 15: Intrinsic oxidation rates for HIT waste rock determined by SOC apparatus and comparison with sulphate release rates from HIT waste rock columns

Leach Column Test	EGi Code	Description	ARD Class	SOC MEASUREMENT				LEACH COLUMN TEST						
				Date of SOC Reading	Column Duration at SOC Reading	IOR Based on SOC Reading	SGR Based on SOC Reading (#1)	SRR Based on Column Results (#2)	Average SRR for Column (#3)	Max SRR for Column	Time of Max SRR	Total S Content at Start	Total S Leached (#4)	Percentage of S Remaining
						(kg $O_2/m^3/s$)	(mg SO_4/kg/wk)					(%S)	(%S)	
HIT WR-1	39548	DVp / AR	PAF	5-Apr-10	Week 16 - 20	6E-07	491	690 - 1536	914	1536	week 16	6.19	1.67	73%
HIT WR-2	39549	DVp / SA	PAF	12-Apr-10	Week 16 - 20	4E-07	323	138 - 196	292	551	week 4	2.68	0.59	78%
HIT WR-3	39550	HMD / AR	PAF	12-Apr-10	Week 16 - 20	5E-07	425	716 - 1031	936	2219	week 4	3.66	1.77	52%
HIT WR-4	39551	HMD / PO	PAF	19-Apr-10	Week 16 - 20	2E-07	138	33 - 35	19	41	week 12	2.81	0.04	99%
HIT WR-5	39552	HMD / PH	PAF	12-Apr-10	Week 16 - 20	6E-07	508	398 - 633	445	1106	week 28	3.38	0.77	77%
HIT WR-6	39553	LW / PO	PAF	19-Apr-10	Week 16 - 20	4E-08	34	13 - 15	17	28	week 32	2.12	0.32	85%
HIT WR-7	39554	FDP / PR	PAF	19-Apr-10	Week 16 - 20	7E-07	649	661 - 784	496	927	week 52	2.72	0.87	68%
HIT WR-8	39555	FDP / PH	PAF	12-Apr-10	Week 16 - 20	4E-08	36	22	15	24	week 4	1.35	0.03	98%
HIT WR-9	39556	KDP / PH	PAF	19-Apr-10	Week 16 - 20	1E-06	949	905 - 1059	771	1276	week 32	5.41	1.35	75%

#1. Sulfate generation rates (SGRs) for waste rock calculated directly from IOR values

#2. Sulfate release rates (SRRs) for waste rock samples calculated from column leachate data for Weeks 16 and 20.

#3. Average SRR for waste rock columns based on results for 52 weeks.

#4. Total sulfur leached from sample expressed as %S, based on 52 weeks of testing.

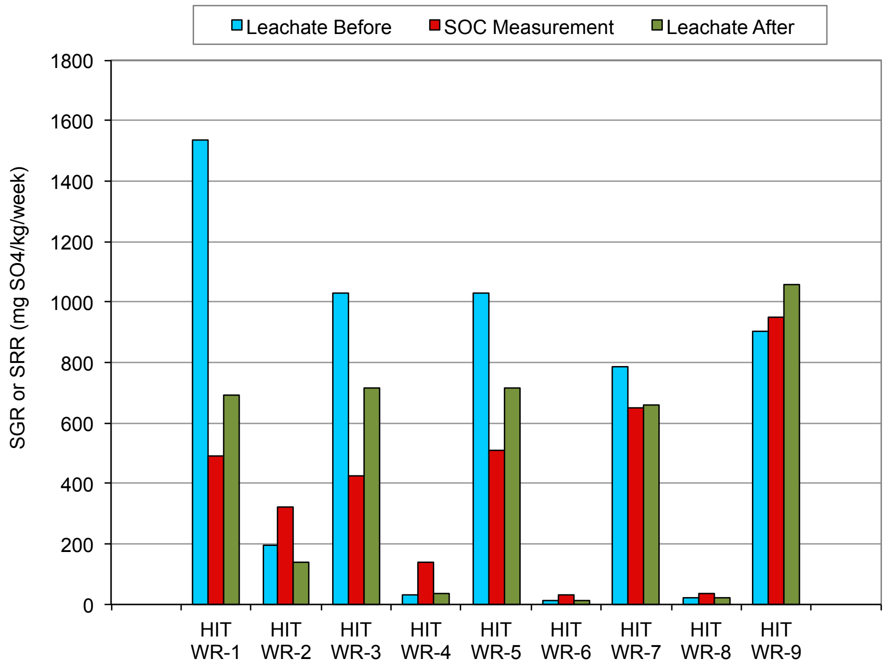

FIGURE 45: *Sulfate generation rates (SGRs) calculated from SOC measurements compared with sulfate release rates (SRRs) determined from column leachate data before and after the SOC measurements. (SOC measurements made between Weeks 16 and 20)*

The SGRs calculated from the SOC produced IOR values of similar magnitude to the corresponding SRRs calculated from the column leachate data. In the case of WR-6, WR-7, WR-8 and WR-9 the corresponding rates were essentially the same, which suggests that the sulfate generated from pyrite oxidation was being leached.

With WR-2 and WR-4 the SOC calculated SGRs were higher, suggesting some sulfate was being retained within these samples, whereas with WR-1, WR-3 and WR-5 the SOC calculated SGRs were lower. The differences, however, are generally within the expected range of uncertainty associated with experimental variations in column leaching on a month-to-month basis and/or the moisture status of the samples when the SOC measurements were made. In the latter case the moisture content affects the rate of oxygen diffusion into a sample and hence the rate at which sulfide oxidation can occur during the SOC measurement. Similarly, variations in the moisture content of the waste rock columns over each four-week leach cycle will affect the rate of sulfide oxidation, and the amount of sulfate release typically represents an integrated value for the four-week period.

Overall, the results of the SOC measurements suggest that the leaching of sulfate from the waste rock columns was likely to be a reasonable indicator of the magnitude of the sulfate generation rate (and hence pyrite oxidation rate) within the column over the four-week leach cycle.

9.0 Static Testing of Tailings

9.1 Sample Descriptions

Samples of HIT tailings were produced by G&TMS in Canada from locked cycle and large scale flotation tests involving ore types P1, P2, P3 and P4, as described in Table 16. In most cases, G&TMS provided individual samples of *cleaner* and *rougher* tailings from each test, then a *final* tailings was produced by EGi by combining sub-samples of cleaner and rougher tailings at a ratio determined by Xstrata personnel from the metallurgical results for the particular locked cycle or large flotation test. Overall, a total of 51 tailings samples were assessed for acid forming potential. The samples were distributed as follows:

Locked Cycle Tests

- P1 Rougher / Cleaner / Final (x2 grind sizes)
- P2a Rougher / Cleaner / Final (x2 grind sizes)
- P2b Rougher / Cleaner / Final l (x3 grind sizes)
- P2c Rougher / Cleaner / Final (x2 grind sizes)
- P3a Rougher / Cleaner / Final (x2 grind sizes)
- P4 Rougher / Cleaner / Final (x2 grind sizes)

Large Flotation Tests

- P1 Rougher / Cleaner / Final
- P2 Rougher / Cleaner / Final
- P3 Rougher / Cleaner / Final
- P1,P3 blend Rougher (*for column testing*)
- P1,P2,P3 blend Rougher (*for column testing*)
- P1,P2,P3 blend Final (*for column testing*)

In addition, blended rougher and final tailings samples from the large scale flotation tests were prepared by EGi for column leach testing, the results from which are presented and discussed in Section 10. The blends were prepared by combining equal amounts of the rougher or final tailings from ore types P1 and P3, or P1, P2 and P3.

The acid forming characteristics of the various tailings samples are summarised in Appendix C1-1 with samples sorted according to the G&TMS flotation test number. The same data are also presented in Appendix C1-2 with the samples sorted according to tailings type (*i.e.* final/rougher/cleaner) and ARD classification (*i.e.* PAF/NAF).

TABLE 16: *Descriptions of HIT ore types*

Ore Type	Source	Description
Ore Type P1	Drill Hole 102XC07M (23.09-45.05)	Supergene – Chalcocite bearing. Tends to be found in highly permeable areas which, in addition, are frequently clay-rich and brecciated.
Ore Type P2a	Drill Hole 105XC07M (31.85-51.08m)	Strong potassic altered diorite. Defined using alteration facies. It covers a range of grade from the < 0.5% Cu typical of magnetite - biotite alteration in Horse and Ivaal, to the strongly mineralized potassic from Trukai, which may run to 1.5% Cu and contain abundant quartz as well as up to 5% magnetite. All of the potassic end members, however, are characterised by magnetite rather than pyrite, and by a copper mineralogy which includes bornite as well as chalcopyrite.
Ore Type P2b	Drill Hole 105XC07M (95.45-110.8m)	Mineralised mudstone – mostly potassic. Softer and highly fractured compared to the diorite, but generally well mineralised, >1% Cu, and with a higher proportion of bornite. It is not clear what volume percentage of the total deposit P2b represents. All of the exposures are in Horse and apparently occur as roof pendants, however, the eastern contact of the system is little explored and may include a significant volume of mineralised mudstone in contact with the Horse Microdiorite.
Ore Type P2c	Drill Hole 105XC07M (276.6-301.2m)	Strong Potassic – Hornblende Monzonite. Volumetrically minor but could become more dominate.
Ore Type P3a	Drill Hole 104XC07M (63.9-80.0m)	Strong phyllic alteration – above gypsum-anhydrite transition. Characterised by abundant pyrite, quartz and sericite. Copper is present exclusively as chalcopyrite. The core is frequently highly fractured. A late event at Frieda is quartz – anhydrite – pyrite veining, which forms a closely spaced stockwork through much of the deposit. Weathering of the anhydrite to gypsum and then its dissolution mean that much of the rock is highly fragmented in situ.
Ore Type P4	Drill Hole 107XV07M (60.3-73.6m)	Chlorite – sericite diorite. Transitional between potassic and phyllic alteration, with chlorite dominant over biotite in the rock. It is typically low grade, <0.5% Cu, and not heavily fractured. Chalcopyrite and bornite may be present, as well as a combination of magnetite (disseminated) and pyrite (on fractures). This end member represents a significant fraction of the deposit.

9.2 Sulfur Content

The sulfur contents of the final, rougher and cleaner tailings are presented graphically in Figure 46. There was considerable variation in the total sulfur content of the final tailings samples, with values ranging from 0.27 to 2.27 %S and averaging at 1.02 %S. A sulfur content of 1.02 %S corresponds to a MPA of approximately 31 kg H_2SO_4/t, assuming that the sulfur occurs as reactive pyrite.

The majority of the sulfur within final tailings can be attributed to the cleaner tailings component, even though cleaner tailings represents a relatively small percentage (typically between 5 to 20%) of the solids mass of final tailings. Based on the assay data for the various tailings components, the cleaner tailings component accounts for an average of 88% of the sulfur reporting in final tailings. The sulfur grade of the cleaner tailings ranged from 2.53 to 11.05 %S, and the average was 7.2 %S.

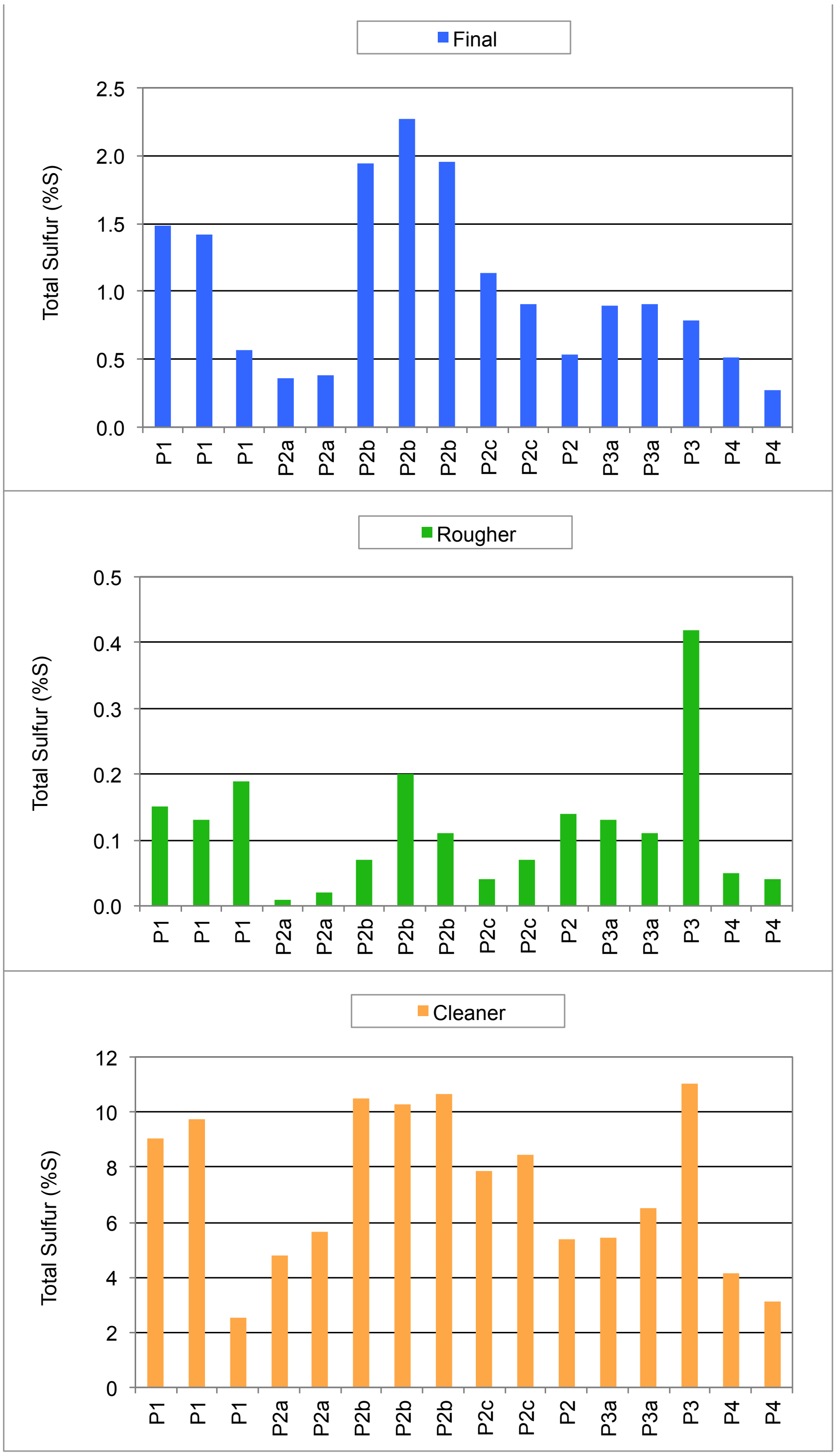

FIGURE 46: *Sulfur contents of HIT final, rougher and cleaner tailings samples*

The sulfur contents of the rougher tailings samples were relatively low at between 0.01 and 0.44 %S, with an average of 0.12 %S for the 18 samples assayed. A sulfur content of 0.12 %S corresponds to a MPA of less than 4 kg H_2SO_4/t.

9.3 Acid Neutralising Capacity

The ANCs of the various tailings samples are shown graphically in Figure 47. Overall, ANCs for all tailings types were low, with values ranging from 0 to 16 kg H_2SO_4/t. The rougher component tended to have a slightly higher ANC than the corresponding cleaner component, but unlike sulfur, the differences were relatively minor for any given flotation test. The average ANC for the 17 final tailings samples was 8 kg H_2SO_4/t, and the respective averages for rougher and cleaner tailings were 10 and 6 kg H_2SO_4/t, respectively.

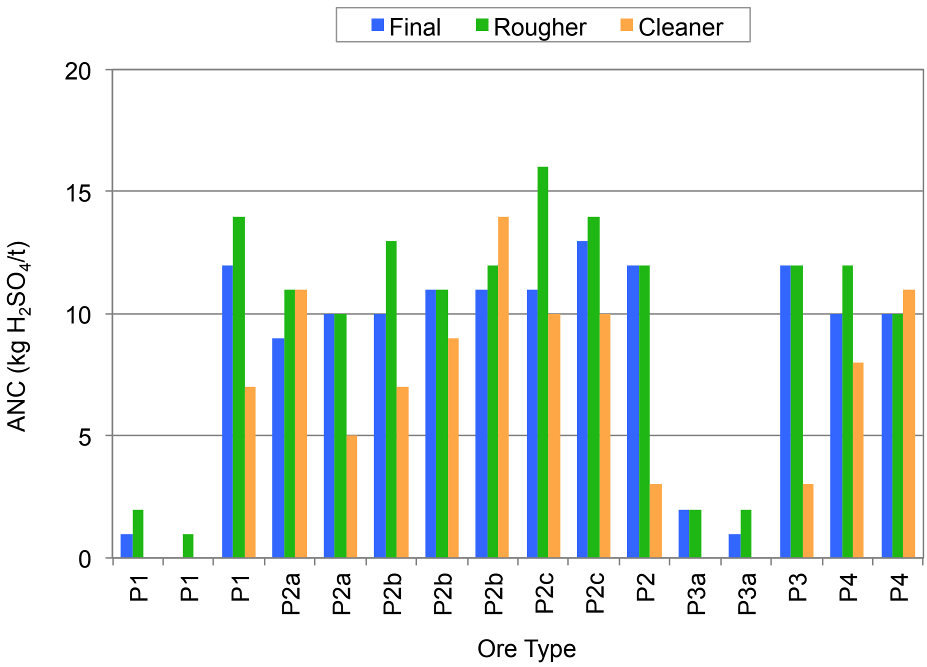

FIGURE 47: *Acid neutralising capacities of HIT final, rougher and cleaner tailings samples*

9.4 ARD Classifications

Acid-base account and ARD classification plots for the final tailings samples are shown in Figures 48 and 49, respectively. Corresponding acid-base account and ARD characterisation plots for the rougher tailings samples are shown in Figures 50 and 51, respectively, and plots for cleaner tailings samples are shown in Figures 52 and 53, respectively.

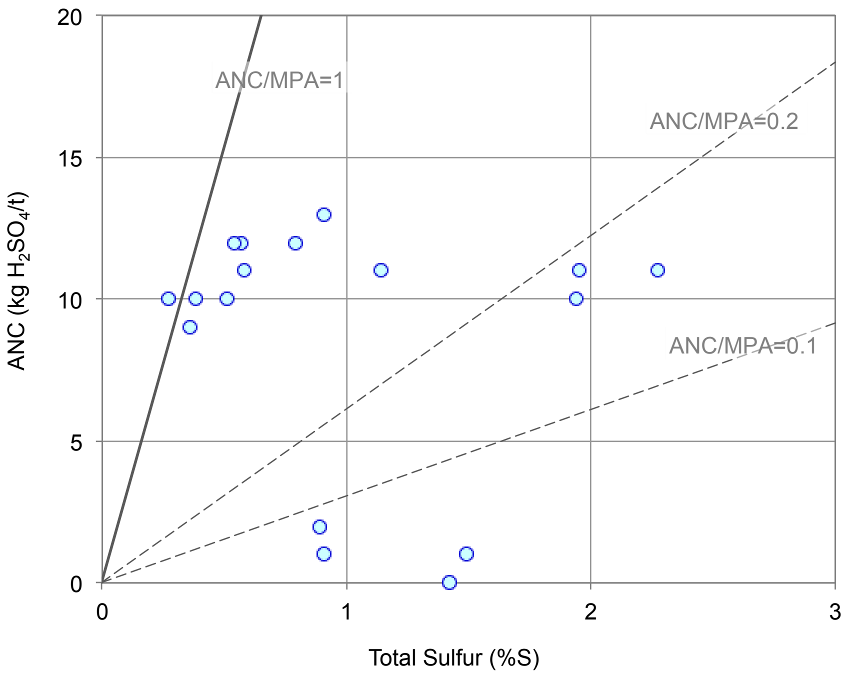

FIGURE 48: *Acid-base account plot for HIT final tailings samples*

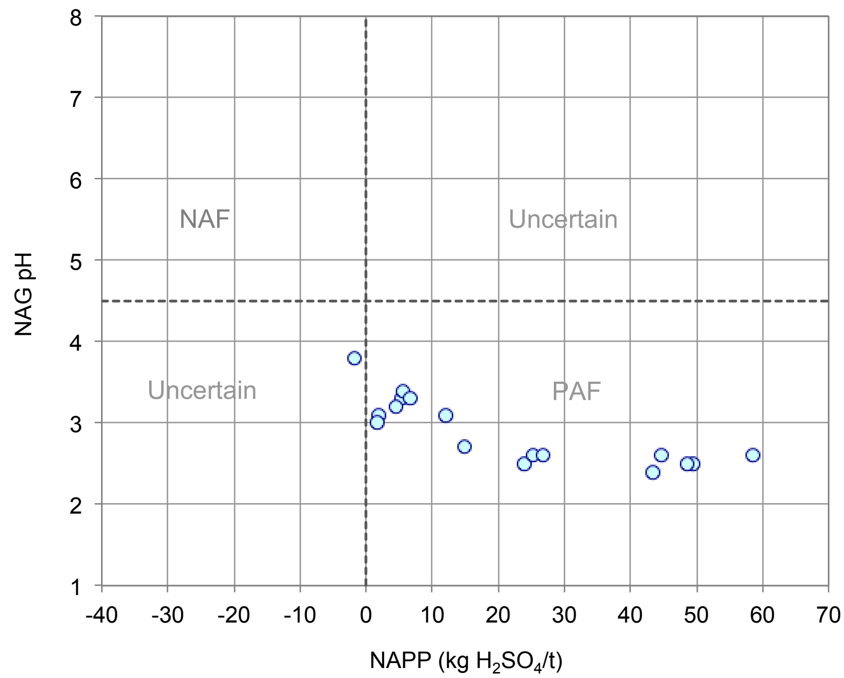

FIGURE 49: *ARD classification plot for HIT final tailings samples*

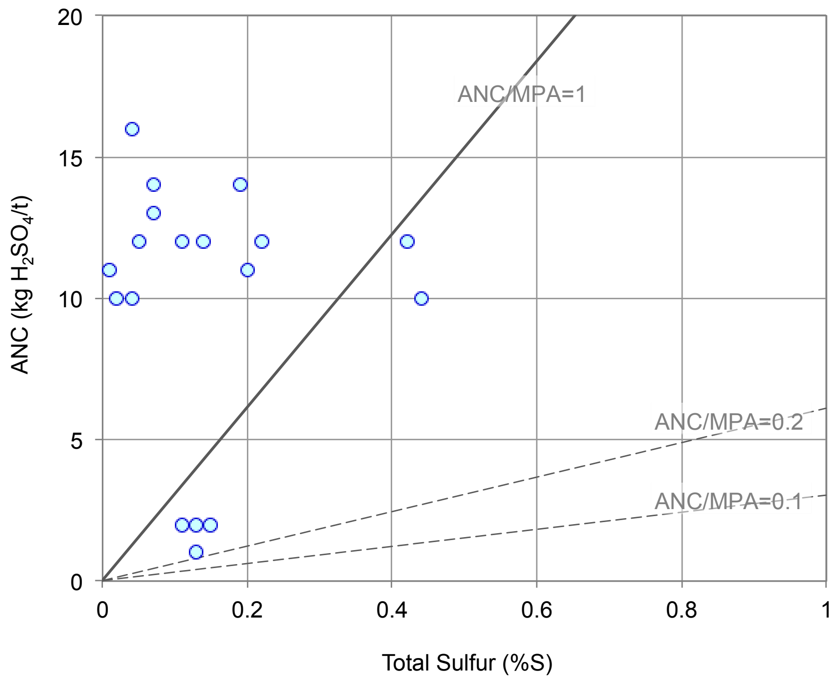

***FIGURE 50:** Acid-base account plot for HIT rougher tailings samples*

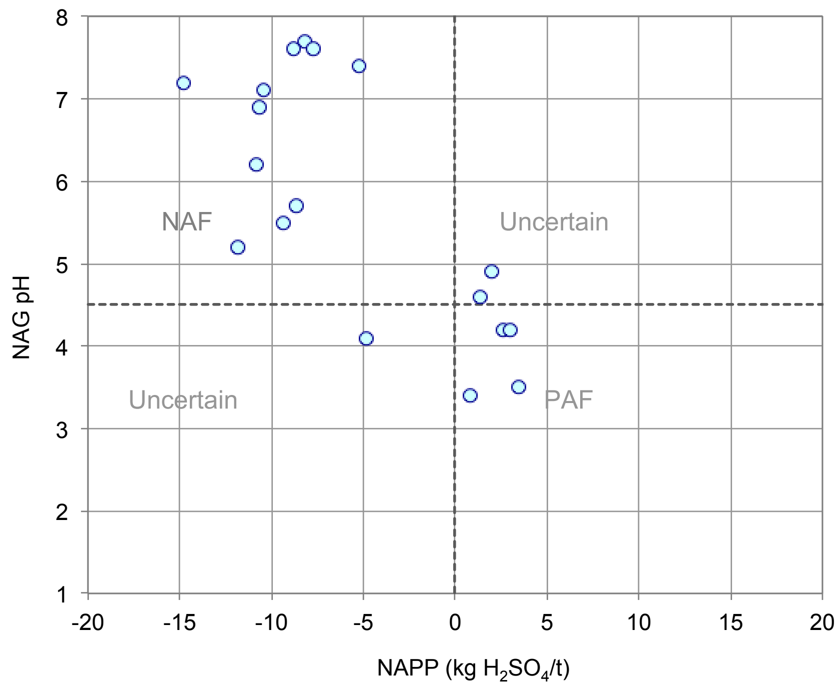

***FIGURE 51:** ARD classification plot for HIT rougher tailings samples*

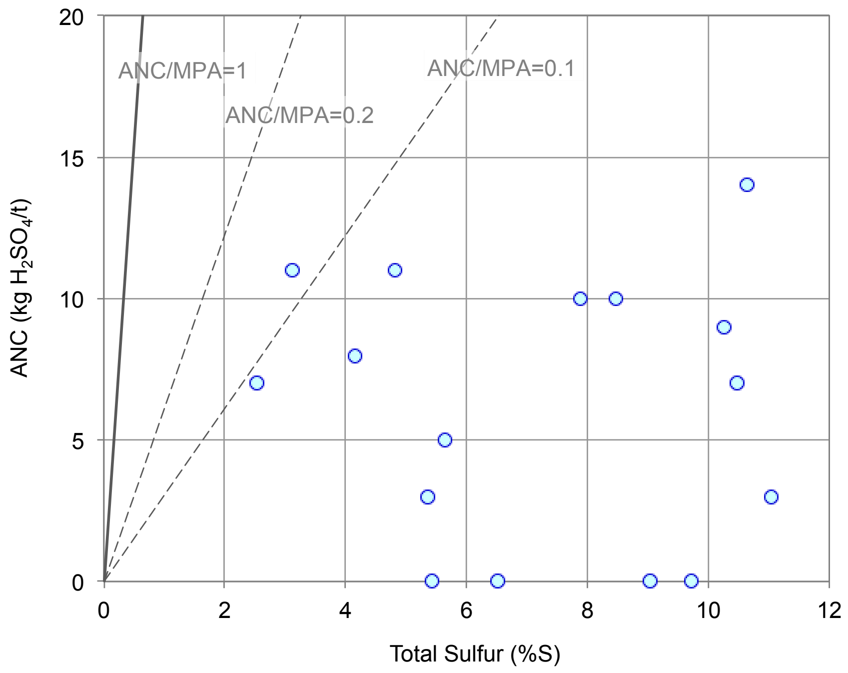

FIGURE 52: *Acid-base account plot for HIT cleaner tailings samples*

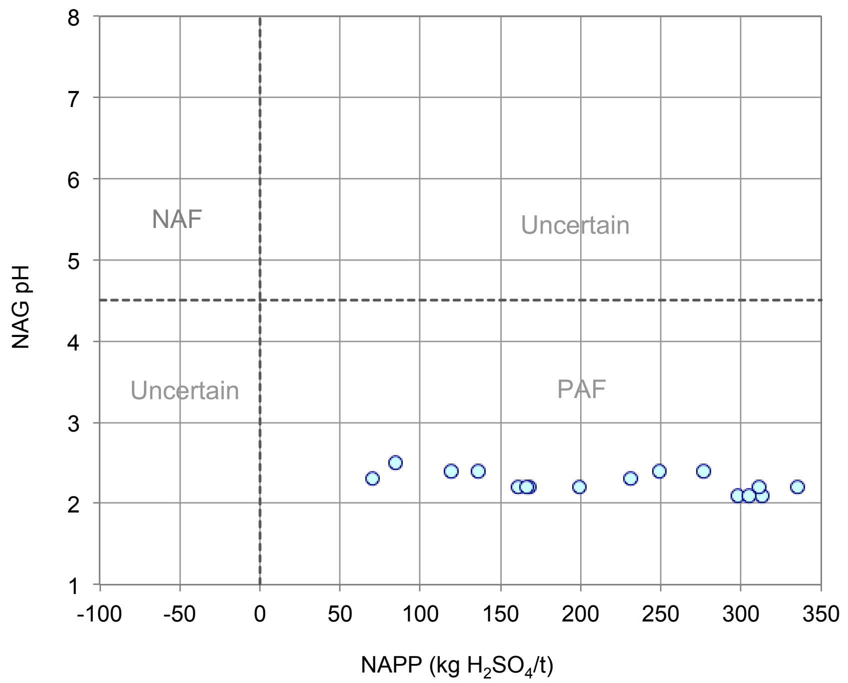

FIGURE 53: *ARD classification plot for HIT cleaner tailings samples*

The main points to note from these plots are as follows:

Final Tailings

- Sixteen of the 17 final tailings samples had positive NAPPs (2 to 58 kg H_2SO_4/t) and therefore plot below the ANC/MPA=1 line shown in Figure 48. The exception was sample #38291 (float test 134 involving Type P4 ore) that had a slightly negative NAPP of -2 kg H_2SO_4/t.
- All of the final tailings samples (including #38291) acidified to less than pH 4.5 when oxidised with peroxide in the NAG test, as illustrated in Figure 49. The NAG values for final tailings ranged from 4 to 41 g H_2SO_4/t.
- On the basis of the NAPP and NAG test results it is considered likely that all of the final tailings samples were PAF. However, eight of the 17 samples had relatively low capacities for acid generation (*i.e.* NAPP and NAG of less than 10 kg H_2SO_4/t) and hence were classified as PAF-lower capacity (or PAF-LC).

Rougher Tailings

- Only four of the 18 rougher tailings samples had both positive NAPPs (1 to 3 kg H_2SO_4/t) and acidified to less than pH 4.5 when oxidised with peroxide in the NAG test. A fifth sample with a small negative NAPP also acidified under NAG test conditions. The NAG values for these samples ranged from 2 to 6 kg H_2SO_4/t. As the NAG values were less than 10 kg H_2SO_4/t the five samples were classified, or considered likely to be PAF-LC.
- Eleven rougher tailings samples had negative NAPPs (-5 to -15 kg H_2SO_4/t) and did not acidify when oxidised in the NAG tests. These samples were classified as NAF.
- There were also three samples for which the classifications were uncertain. One sample (#38307) had small negative NAPP but acidified slightly under NAG test conditions. The other two (#38301 and 38309) had small positive NAPPs but they did not acidify under NAG test conditions.

Cleaner Tailings

- All 16 of the cleaner tailings samples had high positive NAPPs (70 to 335 kg H_2SO_4/t) and all acidified to less than pH 4.5 under NAG test conditions.
- The NAG values for the single-stage NAG tests were typically half to one-third of the NAPP values, ranging from 30 to 114 g H_2SO_4/t. Given the very high sulfur contents of Cleaner tailings it is likely that with most samples the difference in NAPP and NAG values was due to incomplete oxidation of sulfides in the single-stage NAG test. It is expected that higher NAG values would have been produced by sequential NAG testing.
- Based on the NAPP and NAG test results, the cleaner tailings were definitively PAF and had high to very high capacities for acid generation.

As sulfur is preferentially concentrated in the cleaner fraction, and the rougher fraction represents the bulk (approx. 85-95%) of tailings mass, the marked difference in acid potential between the rougher and cleaner components of tailings provides an opportunity for managing the potential for ARD from tailings through separate handling and placement of the two tailings streams.

9.5 Sulfide Reactivity in HIT Tailings

Eight tailings samples were selected for kinetic NAG testing to assess the reactivity of the sulfides within the tailings and to provide an indirect assessment of any lag time preceding the onset of acid conditions. The samples included five final tailings and three rougher tailings. The acid-base characteristics of the samples are given in Table 17, and the kinetic NAG reaction profiles exhibited by the eight tailings samples are given in Appendix C5.

TABLE 17: *Acid-base characteristics of tailings samples selected for kinetic NAG testing*

Tailings Type	Ore Type	Sample ID	Sulfur %S	ANC kg H_2SO_4/t	NAPP kg H_2SO_4/t	ARD Class
Final	P1	#38292	1.42	0	43	PAF
Final	P2b	#38286	1.94	10	49	PAF
Final	P2c	#38287	1.14	11	24	PAF
Final	P3a	#38296	0.91	1	27	PAF
Final	P1/P2/P3	#39759	0.58	11	7	PAF-LC*
Rougher	P1/P2/P3	#39758	0.22	12	-5	NAF
Rougher	P3	#39755	0.42	12	1	PAF-LC
Rougher	P1/P3	#40246	0.44	10	3	PAF-LC

* PAF-LC = PAF (low capacity)

Final Tailings - High Sulfur Content

Samples #38292 and #38286 which had the highest sulfur contents exhibited similar reactivities under NAG test conditions. The pH profiles for both samples were indicative of rapid and strong acidification (see Appendices C5-1 and C5-2). The starting pHs for the two samples were 5.0 and 5.8, respectively, and they acidified to around pH 4 within 10 and 24 minutes, respectively. There was some buffering of sample #38286 between pH 3 to 4 (as indicated by a small plateau in the pH curve) which was presumably associated with the small but measurable ANC of 10 kg H_2SO_4/t, but both samples acidified to less than pH 2 within approximately 1 hour of reaction. The two samples also exhibited strong temperature rises, with the NAG liquors effectively reaching boiling point at around the 70 minute mark due primarily to catalytic decomposition of the peroxide.

The acidification patterns exhibited by the two higher sulfur samples are consistent with relatively high rates of sulfide oxidation and short lag times. It is EGi's experience from laboratory and field test work for other mine sites that tailings with similar reaction profiles to those presented by these two samples are likely to exhibit a relatively short lag period if exposed to atmospheric conditions in the field (*i.e.* possibly acidification within months to a year rather than several years).

Final Tailings - Moderate Sulfur Content

Samples #38287 and #38296 had similar sulfur contents (*i.e.* 1.14 and 0.91 %S, respectively) and similar NAPPs (24 and 27 kg H_2SO_4/t, respectively) but they exhibited very different reaction profiles under NAG test conditions (see Appendices C5-3 and C5-4).

Tailings sample #38287 produced a well defined buffer plateau between pH 5 to 6 that extended for about 90 minutes. Again, this plateau can presumably be attributed to the tailings having some inherent neutralising capacity (albeit relatively small at 11 kg H_2SO_4/t). Once this neutralising capacity was exhausted, the pH of the NAG liquor gradually decreased over the next 90 minutes to a minimum of around 2, at which time there was a significant increase in temperature. The extent of the initial pH plateau for this sample suggests that a field lag time of at least a year, and probably several years could be expected if the tailings were exposed to atmospheric conditions.

In contrast, there was little, if any, plateau for tailings sample #38296, with the pH steadily decreasing to a minimum of around 2.6 after 150 minutes when a temperature rise occurred similar to that observed with sample #38287. The absence of any buffer plateau for sample #38296 is consistent with the fact that this sample was essentially devoid of ANC. Although the overall sulfide reactivity for this tailing type is likely to be slower than for the higher sulfur tailings discussed above, the absence of ANC and the reaction kinetics exhibited in the NAG test suggest that the lag period under field conditions would be relatively short (*i.e.* possibly less than a year).

Final Tailings - Low Sulfur Content

Sample #39759 (which was also included in the column leach test program discussed in Section 10) was a blend of final tailings from large flotation tests involving P1, P2 and P3 ore types. It had a sulfur content of 0.58 %S, which is at the lower end of the sulfur range recorded for final tailings in this study, but it had a small positive NAPP of 7 kg H_2SO_4/t and was classified as PAF-LC. The kinetic NAG profile for tailings sample #39759 is given in Appendix C5-5. The reaction profile included an initial, well-defined pH plateau between pH 5 to 6 extending for more than two hours. The pH then declined to around 3.5 where it stabilised for another two hours towards the end of which there was a significant increase in temperature of the NAG liquor. Once again, the appearance of a pH plateau corresponds with the tailings having some inherent neutralising capacity, in this case 11 kg H_2SO_4/t. Based on the results of the kinetic NAG test it is expected that tailings as represented by this sample would exhibit a relatively long lag period if exposed in the field to atmospheric conditions. A lag period extending for several years would be expected based on EGi's experience with the behaviour of tailings with similar ARD characteristics at other sites.

Rougher Tailings - Lower Sulfur Content

The kinetic NAG test reaction profiles for the three rougher tailings samples #39758, 39755 and 40246 are presented in Appendices C5-6, C5-7 and C5-8, respectively. These three samples were also included in the column leach test program. They all had low sulfur contents and their ANCs were essentially the same at between 10 to 12 kg H_2SO_4/t. All were border-line with respect to ARD potential.

Sample #39758 had the lowest sulfur content of 0.22 %S and was classified as NAF. The pH profile exhibited by this sample was consistent with this classification in that the pH remained above 6 for the duration of the kinetic NAG test. Also, there was no temperature increase during the test.

The other two samples had marginally higher sulfur contents (*i.e.* 0.42 and 0.44 %S, respectively) and both were classified as PAF-LC. The reaction profiles for the two samples were similar in that both produced initial plateaus of circum-neutral pH extending for about 12 hours before slowly decreasing in pH over the following 10 hours of testing to pHs just below the pH 4.5 criteria used to define a positive (*i.e.* PAF) response under NAG test conditions.

Implications for Field Behaviour

Overall, the results of the kinetic NAG tests suggest that final tailings with a sulfur content approaching 2 %S or higher will likely be highly reactive and acidify within a period of months to a year if exposed to atmospheric conditions within the ISF. Final tailings with a sulfur content around 1 %S would also be expected to acidify if exposed to atmospheric conditions, but a significant lag period may precede acidification if there is some inherent neutralising capacity within the tailings. The results of this study suggest that tailings from some ore types may have a small amount of ANC (*i.e.* possibly around 10 kg H_2SO_4/t) which could delay the onset of acid conditions beyond a year and possibly for several years.

The long initial lag periods and the very slow kinetics observed for rougher tailings under NAG test conditions suggest that rougher tailings containing around 0.4 %S could be exposed to atmospheric conditions in the field for a long period of time without significant acidification taking place. The results of column leach testing of three rougher tailings samples containing 0.2 to 0.4 %S are discussed in Section 10.

9.6 Elemental Composition of Tailings Solids

Multi-element scans were run on seven samples representing final tailings and another three representing rougher tailings. The tailings solids were assayed for the following elements: Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, S, Sb, Se, Sn, Sr, Th, U, and Zn. The elemental compositions of the tailings samples are given in Appendix C2, and the ratios of the concentrations in tailings relative to background soil are presented graphically in Figure 54.

In addition, GAIs were calculated for each sample and are given in Appendix C3. Virtually all of the final and rougher tailings samples were significantly (GAI≥3) enriched with copper and sulfur. There was also minor (GAI 1 or 2) enrichment of most samples with selenium, varying enrichment with molybdenum (minor in most samples), and minor enrichment of a few final tailings samples with magnesium and sodium.

The concentrations of copper in the seven final tailings samples ranged from 403 to 787 mg/kg, with an average of 658 mg/kg. The copper contents of the three rougher tailings samples were of similar magnitude, ranging from 622 to 1,075 mg/kg with an average of 791 mg/kg. These concentrations are considered to be fairly typical for copper flotation tailings but are more than twenty-times greater than concentrations typical reported for soils in non-mineralised areas.

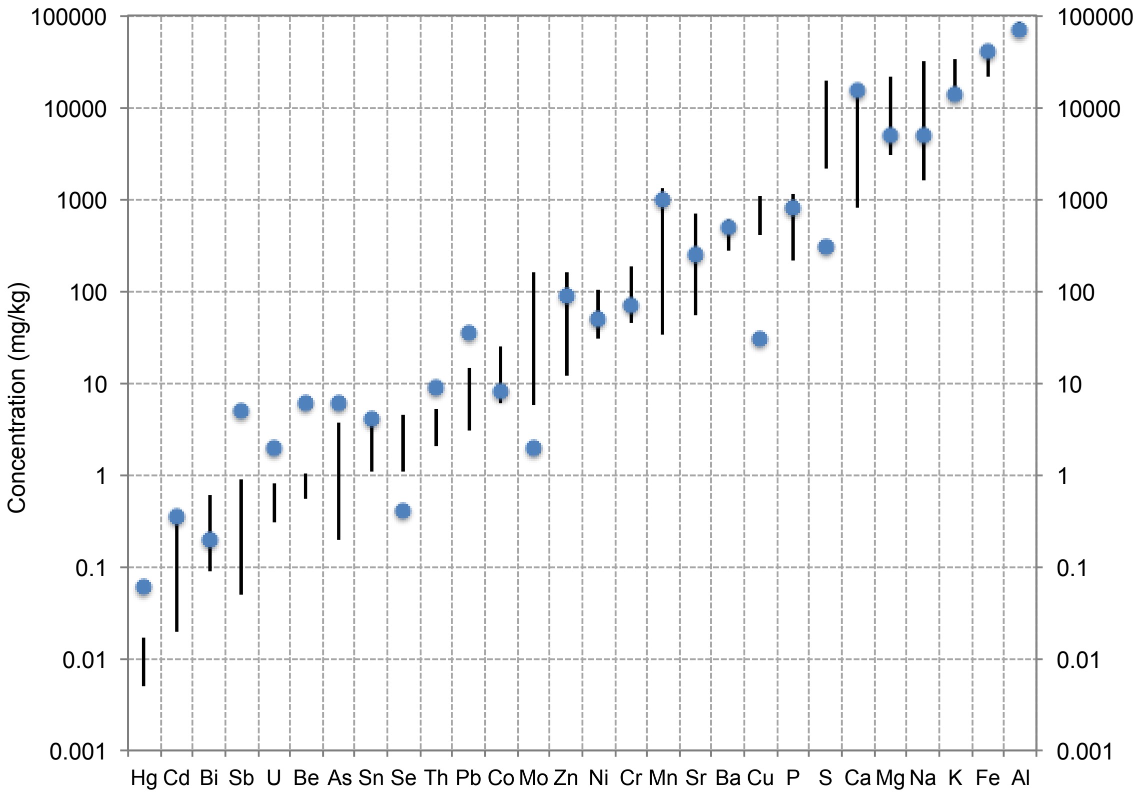

FIGURE 54: *Box plot showing element concentrations in HIT tailings compared to median soil contents*

(line = range for tailings, blue dot = median soil)

It is expected that the potential for copper release from tailings will be negligible if the discharge of tailings to the ISF is subaqueous and tailings solids remain permanently saturated (*i.e.* beneath a water cover). However, any beaching of tailings and exposure to atmospheric conditions would invariably allow sulfide oxidation (including chalcopyrite, bornite and chalcocite) to occur and this would increase the potential for mobilisation of copper.

Environmentally important metals that occurred in HIT tailings at concentrations comparable to those found in typical soils from non-mineralised areas included arsenic (average 1.4 mg/kg), cadmium (0.07 mg/kg), cobalt (13 mg/kg), chromium (101 mg/kg), lead (6 mg/kg), mercury (<0.005 mg/kg), nickel (62 mg/kg), tin (3 mg/kg) and zinc (40 mg/kg).

9.7 Metallurgical Test Results

The tailings samples provided for ARD assessment represented only a small number of the samples produced by G&TMS for the Frieda River Copper-Gold Project involving locked-cycle and large scale flotation testing of different ore types. Analyses carried out by G&TMS on the test head (or ore feed), cleaner tailings and rougher tailings included copper, gold, sulfur, iron and molybdenum. The test head assay also included carbon. The sulfur assays are relevant to ARD assessment in that they markedly extend the dataset in relation to the range of maximum potential acidities associated with different ore types and different processing options. The head assays for carbon are also of interest in that carbon can be used to calculate CNVs, assuming that carbon occurs exclusively as carbonate.

A summary of assay data for sulfur, carbon and copper for the metallurgical test program as of March 2010 is given in Appendix C4. Results for 121 tests[17] involving ore samples are provided, 98 of which involved primary (PRI) ore samples and 23 involved supergene (SPG) ore samples. Statistics for each ore type are given in Table 18.

TABLE 18: *Metallurgical results for locked cycle tests carried out by G&T Metallurgical Services Ltd*

Parameter	Ore Type	Ore Test Head			Rougher Tails		Cleaner Tails	
		%Cu	%S	%C	%Cu	%S	%Cu	%S
Count	PRI Only	98	98	98	98	98	97	97
Average	PRI Only	0.52	2.28	0.07	0.05	0.79	0.33	7.94
Median	PRI Only	0.44	1.91	0.02	0.06	0.20	0.29	5.35
Std Dev	PRI Only	0.35	1.59	0.10	0.14	1.17	0.38	7.17
Max	PRI Only	1.72	7.99	0.48	0.94	5.39	2.94	28.6
Min	PRI Only	0.01	0.13	0.00	0.003	0.006	0.04	0.19
Count	SPG Only	23	23	23	23	23	23	23
Average	SPG Only	1.09	2.64	0.04	0.28	0.73	0.67	7.79
Median	SPG Only	0.95	2.64	0.02	0.20	0.34	0.48	5.66
Std Dev	SPG Only	0.61	0.98	0.04	0.23	0.79	0.59	6.82
Max	SPG Only	2.35	4.36	0.16	0.94	2.64	2.94	23.0
Min	SPG Only	0.33	0.97	0.00	0.03	0.05	0.08	0.19

The main points to note are as follows:

- The carbon contents of the head samples were typically low for both primary and supergene ore types, confirming the low availability of inherent neutralising capacity within ores. The carbon contents ranged from less than detection (≤0.01 %C) up to 0.48 %C, but the median value for all tests was only 0.02 %C. This median corresponds to a CNV of less than 2 kg H_2SO_4/t. Furthermore, 84% of the head samples had carbon contents less than 0.12 %S, meaning CNVs less than 10 kg H_2SO_4/t. The low carbon contents and correspondingly low CNVs reported for head

17 A total of 126 Tests are listed in Appendix C4 but no assay data were available for Tests Nos 16, 17, 20, 23 and 29.

samples in the metallurgical program are consistent with the low ANCs that were measured on selected tailings samples provided to EGi for the ARD assessment program.

- The sulfur contents of the PRI rougher tailings ranged from 0.006 to 5.39 %S and the median was 0.20 %S. This median compares favourably with a median of 0.12 %S for the 18 rougher samples that were tested by EGi as part of this study. A sulfur content of 0.2 %S equates to a maximum potential acidity of only 6 kg H_2SO_4/t.
- The sulfur contents of the respective cleaner tailings fractions were markedly higher than for the rougher tailings from the same test. For PRI cleaner tailings the sulfur range was 0.19 to 28.6 %S and the median was 5.4 %S, which is about 270-times greater than the median for rougher tailings. The median sulfur content of cleaner tailings samples assessed for acid forming potential in this study was comparable at 7.1 %S.
- Assuming that the average rougher/cleaner mass split for final tailings will be about 90/10, and applying the median sulfur values for rougher and cleaner tailings, then approximately 75% of the sulfur in the final tailings is due to the cleaner fraction. As previously noted, the preferential distribution of sulfur in the cleaner fraction of tailings provides an opportunity to minimise the overall risk ARD from tailings by separate handling and placement of the two tailings streams.
- Figure 55 shows the relationship between the sulfur content of rougher tailings compared to the sulfur content of the ore sample from which the tailings were produced. Clearly, when the sulfur content of ore exceeds around 2 %S there is a strong tendency for the sulfur content of the rougher tailings to increase directly with ore %S.
- The copper head grades varied markedly, from 0.01 to 1.72 %Cu for PRI ore, and from 0.33 to 2.35 %Cu for SGR ore. Operational head grades for copper and sulfur will also vary through time, but presumably within a much narrower range than the individual samples that have undergone metallurgical testing.
- Figure 56 shows a plot of the sulfur content of ore versus the sulfur content of rougher tailings for primary ore samples containing more than 0.3 %Cu and less than 3 %S (i.e. excludes samples well beyond mainstream ore production). This sub-set includes 54 of the 98 metallurgical tests involving primary ore. With this sub-set there is no obvious relationship between the sulfur contents of ore and rougher tailings produced from those ore samples.
- Figure 57 shows a histogram of the sulfur contents of rougher tailings from ore samples containing more than 0.3 %Cu and less than 3 %S. There were only two rougher tailings that had sulfur contents exceeding 0.5 %S, and approximately 91% of the samples contained less than 0.3 %S. The median sulfur content of the rougher tailings was 0.13 %S (average 0.19 %S). Again, this compares favourably with a median of 0.12 %S (or average 0.14 %S) for the 18 rougher samples that were tested by EGi as part of this study.
- Whilst the data suggest that, on average, rougher tailings will have a low sulfur content, this might not always be the case if the sulfur grade of ore at any given time is especially high. The metallurgical testing program included 16 tests involving primary ore samples with sulfur head grades exceeding 3 %S. For these tests, the sulfur contents of the ore samples ranged from 3.14 to 7.32 %S (average 4.2 %S) and the sulfur contents of the rougher tailings ranged from 1.71 to 5.15 %S (average 2.7 %S). Rougher tailings with sulfur contents of this magnitude would almost certainly be PAF.

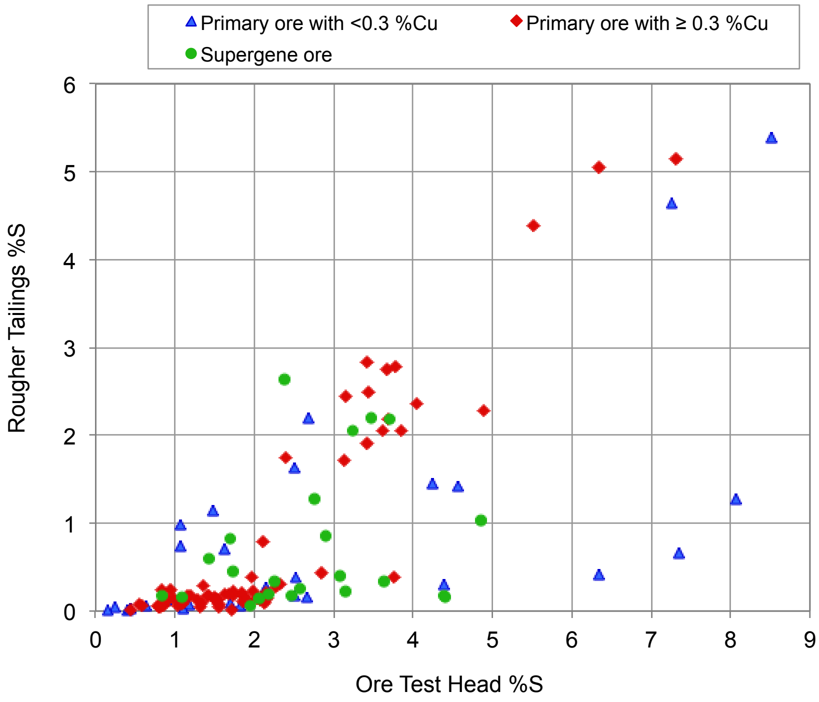

FIGURE 55: *Relationship between the sulfur contents of ore and rougher HIT tailings samples from the metallurgical testing program*

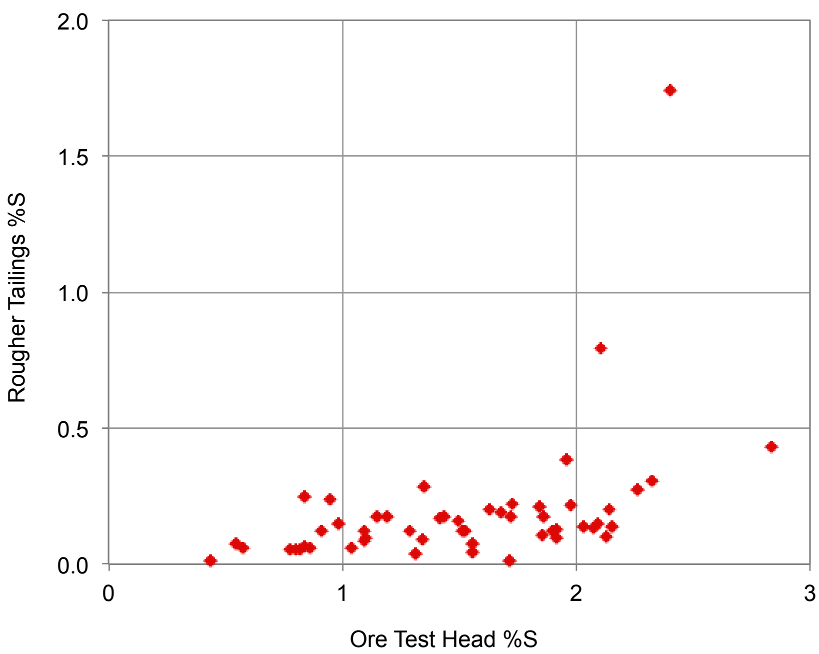

FIGURE 56: *Relationship between the sulfur contents of ore and rougher HIT tailings for primary ore samples containing ≥0.3 %Cu and <3 %S*

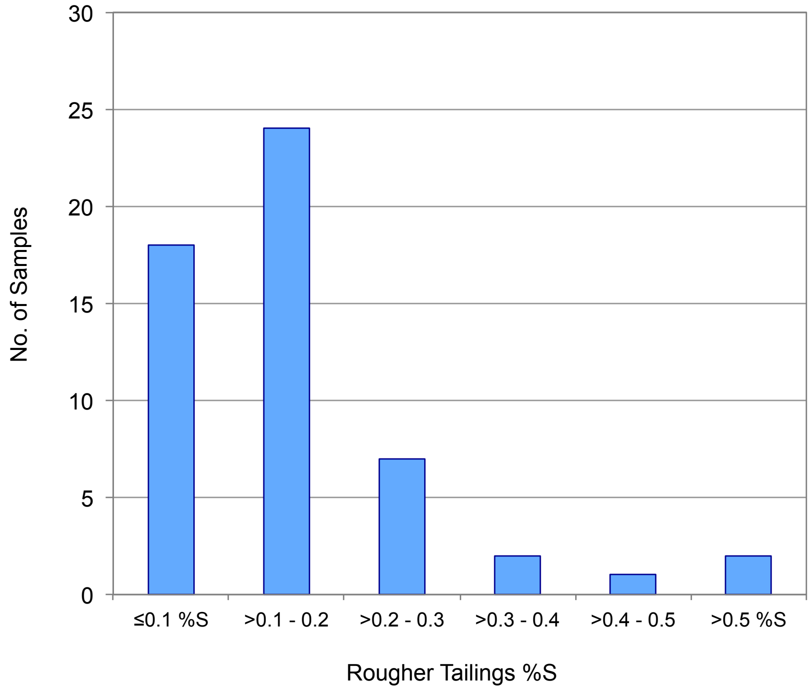

FIGURE 57: *Histogram of the sulfur contents of rougher HIT tailings from primary ore containing ≥0.3 %Cu and <3 %S*

10.0 Column Leach Testing of Tailings

10.1 Sample Descriptions

The column leach program involved three columns containing samples representing HIT rougher tailings and one column containing a sample representing final tailings.

The tailings samples were prepared by G&TMS in Kamloops, BC, Canada and were provided as slurries for geochemical assessment. The test samples represented rougher (CuRoT) and cleaner (Cu1ct) fractions from large scale flotation tests involving P1, P2 and P3 Ore Types.

The liquor fractions were initially decanted from the slurries provided by G&TMS, then the wet solids were slowly oven dried at around 55^{o}C. Samples representing final tailings were then prepared for each ore type by combining the rougher and cleaner tailings fractions as follows:

- P1 Final Tailing 84.5% CuRoT 15.5% Cu1ct
- P2 Final Tailing 91.5% CuRoT 8.5% Cu1ct
- P3 Final Tailing 95.5% CuRoT 4.5% Cu1ct

The following four samples were then produced for the column leach testing program:

- Column HIT T-1 (#39759) Final Tailings - Composite of Final P1 & P2 & P3
- Column HIT T-2 (#39758) Rougher Tailings - Composite Rougher P1 & P2 & P3
- Column HIT T-3 (#39755) Rougher Tailings - P3
- Column HIT T-4 (#40246) Rougher Tailings - Composite Rougher P1 & P3

Typically 3 to 4.5 kg of each sample for column testing was prepared. Approximately 2 kg was used in the column test and the remainder was retained for initial geochemical characterisation of the solids.

Acid Forming Characteristics

The geochemical characterisation of the tailings solids are given in Table 19, and acid-base account and ARD classification plots for the tailings are given in Figures 58 and 59, respectively. The main findings are summarised below.

- *HIT T-1 Final Tailings* - this sample was classified as PAF but it had a relatively low capacity for acid generation. It had a moderate sulfur content of 0.58 %S and a low ANC of 11 kg H_2SO_4/t. The NAPP and NAG values were both positive at 7 and 5 kg H_2SO_4/t, respectively.

- *HIT T-2 Rougher Tailings* - This sample contained only 0.22 %S and was classified as NAF. Although the ANC was relatively low at 12 kg H_2SO_4/t, the NAPP was slightly negative (-5 kg H_2SO_4/t) and there was no evidence of acid generation when the sample was oxidised under NAG test conditions.

- *HIT T-3 and T-4 Rougher Tailings* - Both samples were classified as PAF-lower capacity. Their sulfur contents (0.42 and 0.44 %S) were slightly higher than that of the HIT T-2 rougher tailings, but less than the 0.58 %S content of the HIT T-1 final tailings sample. The ANCs were essentially the same at 10 to 12 kg H_2SO_4/t, and both had small positive NAPPs. Also, both acidified slightly when oxidised in the NAG tests, with NAG values of 4 and 6 kg H_2SO_4/t, respectively.

TABLE 19: *Acid forming characteristics of HIT tailings used in column leach tests*

Column Code	Sample Code	Description	%S	MPA	ANC	NAPP	NAG	NAG pH	ARD Class
HIT T-1	39759	Final Tail (Blend P1, P2, P3)	0.58	18	11	7	5	3.3	PAF-LC
HIT T-2	39758	Rougher (Blend P1, P2, P3)	0.22	7	12	-5	0	7.4	NAF
HIT T-3	39755	Rougher (P3)	0.42	13	12	1	4	3.4	PAF-LC
HIT T-4	40246	Rougher (Blend P1, P3)	0.44	13	10	3	6	3.5	PAF-LC

<u>ARD Characteristics</u>
MPA = Maximum Potential Acidity (kg H_2SO_4/t)
ANC = Acid Neutralising Capacity (kg H_2SO_4/t)
NAPP = Net Acid Producing Potential (kg H_2SO_4/t)
NAG = Net Acid Generation capacity (kg H_2SO_4/t)
NAGpH = pH of NAG liquor

<u>ARD Classifications</u>
NAF = Non-Acid Forming
PAF-LC = Potentially Acid Forming- lower capacity

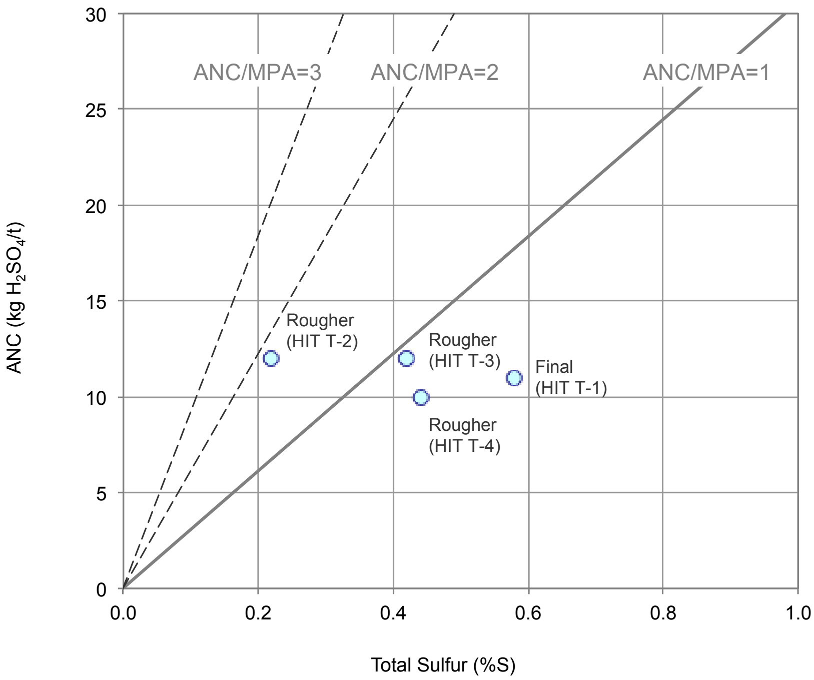

FIGURE 58: *Acid-base account plot for HIT tailings samples used in the column leach test program*

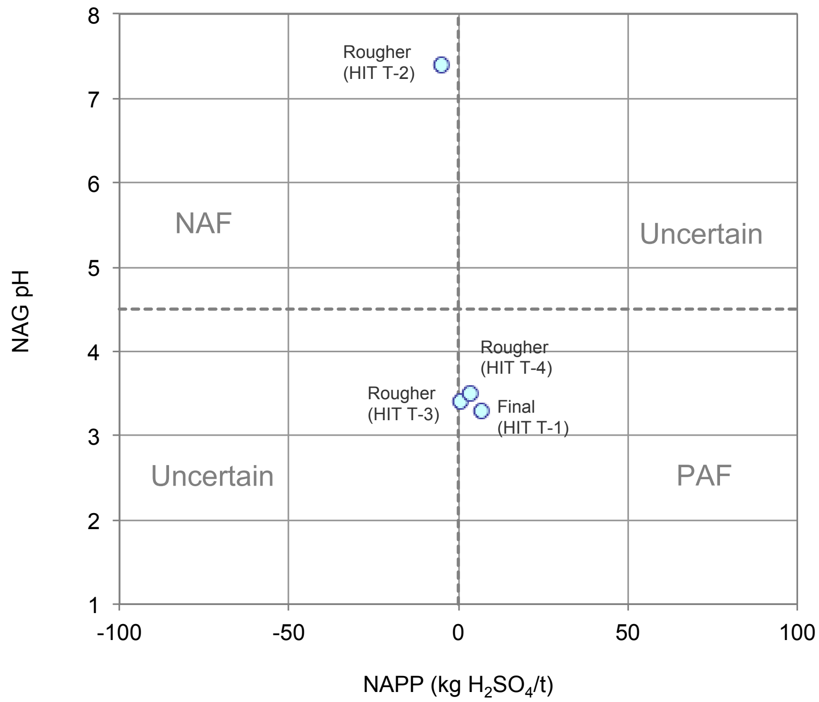

FIGURE 59: *ARD classification plot for HIT tailings samples used in the column leach test program*

Kinetic NAG Testing

HIT T-1 Final Tailings - Kinetic NAG test reaction profiles for the final tailings is given in Appendix C5-5. The profiles exhibited by the final tailings suggests that the tailings would likely exhibit a long lag period. There was a well-defined pH plateau at between pH 5 to 6 extending for more than 2 hours. The pH then slowly decreased over the next hour before stabilising at around pH 3.5. At this pH, iron becomes relatively soluble and the presence of iron in the NAG liquor would have initiated catalytic breakdown of the peroxide. This process is exothermic and is the primarily cause of heating of the NAG liquor, with the temperature peaking at 63 ^{o}C after 6 hours of reaction time. The results of the kinetic NAG test confirm that the HIT T-1 final tailings sample was PAF, but that such tailings will also be slow to acidify if exposed to atmospheric conditions in the field. Based on past experience, the duration of the lag period exhibited in the kinetic NAG test would typically extrapolate to a field lag of at least several years.

HIT T-2, T-3 and T-4 Rougher Tailings - The kinetic NAG test reaction profiles exhibited by the three rougher tailings samples are given in Appendices C5-6, C5-7 and C5-8, respectively. The pH of HIT T-2 remained above 6 for the 18 hour duration of the kinetic NAG test. With HIT T-3 and T-4 the pHs of the NAG liquors remained steady at around pH 6 for about 12 hours, then slowly decreased to around pH 4 over the following 10 hours when the tests were terminated. At no stage was there any evidence of significant temperature increase. After boiling the final pHs of the NAG liquors were 3.4 and 3.5, respectively. The reaction kinetics in the NAG test suggest a long lag (*i.e.* many years) if such tailings were exposed to atmospheric conditions in the field.

Elemental Composition

The multi-element analysis of tailings solids are given in Table 20 together with the corresponding geochemical abundance indices. The elemental data are also shown graphically in Figure 60. Apart from sulfur, the only significant enrichment (GAI≥3) in the tailings samples was copper, which ranged from 622 to 1,075 mg/kg. There was also minor enrichment (GAI=1 or 2) of the tailings samples with molybdenum (14 to 21 mg/kg) and selenium (3 to 4 mg/kg).

TABLE 20: *Elemental compositions and geochemical abundance indices for HIT tailings samples used in column leach tests*

Element	Unit	Elemental Composition				Median Soil Content #	Geochemical Abundance Indices *			
		HIT T-1 38759 Final Tailings	HIT T-2 39758 Rougher Tailings	HIT T-3 35755 Rougher Tailings	HIT T-4 40246 Rougher Tailings		HIT T-1 39759 Final Tailings	HIT T-2 39758 Rougher Tailings	HIT T-3 39755 Rougher Tailings	HIT T-4 40246 Rougher Tailings
S	%	0.64	0.27	0.42	0.44	0.03	**3**	2	**3**	**3**
Al	%	8.1	8.3	7.9	8.2	7.1	0	0	0	0
Ca	%	0.8	0.8	0.8	0.9	1.5	0	0	0	0
Fe	%	2.4	2.2	2.4	2.4	4	0	0	0	0
K	%	2.4	2.4	2.3	2.4	1.4	0	0	0	0
Mg	%	1.2	1.2	1.1	1.1	0.5	0	0	0	0
Na	%	1.1	1.2	1.2	1.3	0.5	0	0	0	0
As	mg/kg	1.8	1.7	1.4	2.3	6	0	0	0	0
Ba	mg/kg	440	450	410	420	500	0	0	0	0
Be	mg/kg	0.84	0.87	0.66	0.72	6	0	0	0	0
Bi	mg/kg	0.17	0.1	0.11	0.13	0.2	0	0	0	0
Cd	mg/kg	0.06	0.04	0.04	0.04	0.4	0	0	0	0
Co	mg/kg	10.1	6.1	7.3	6.6	8	0	0	0	0
Cr	mg/kg	190	150	144	112	70	0	0	0	0
Cu	mg/kg	682	622	675	1075	30	**3**	**3**	**3**	**4**
Ga	mg/kg	22	21	18	19	20	0	0	0	0
Hg	mg/kg	<0.005	<0.005	<0.005	<0.005	0.06	0	0	0	0
Mn	mg/kg	313	320	291	289	1000	0	0	0	0
Mo	mg/kg	21	16	14	15	2	2	2	2	2
Ni	mg/kg	102	79	71	55	50	0	0	0	0
P	mg/kg	820	830	750	770	800	0	0	0	0
Pb	mg/kg	5.5	5.4	3.8	3.8	35	0	0	0	0
Sb	mg/kg	0.15	0.15	0.12	0.11	5	0	0	0	0
Se	mg/kg	4	3	3	3	0.4	2	2	2	2
Sn	mg/kg	3.5	3.4	2.5	2.6	4	0	0	0	0
Sr	mg/kg	378	398	368	388	250	0	0	0	0
Th	mg/kg	5.2	5.1	4.3	4.2	9	0	0	0	0
U	mg/kg	0.8	0.8	0.6	0.6	2	0	0	0	0
Zn	mg/kg	29	28	20	20	90	0	0	0	0

* Underlined values indicate concentration below the analytical detection limit.

\# Median soil data from:
Bowen, H.J.M. (1979) Environmental Chemistry of the Elements. Academic Press, London.
Berkman, D.A. (1976) Field Geologists' Manual, The Australian Institute of Mining and Metallurgy, Vic.

* Geochemical Abundance Indices (GAI)
GAI=0 represents <3 times median soil content
GAI=1 represents 3 to 6 times
GAI=2 represents 6 to 12 times
GAI=3 represents 12 to 24 times
GAI=4 represents 24 to 48 times
GAI=5 represents 48 to 96 times
GAI=6 more than 96 times

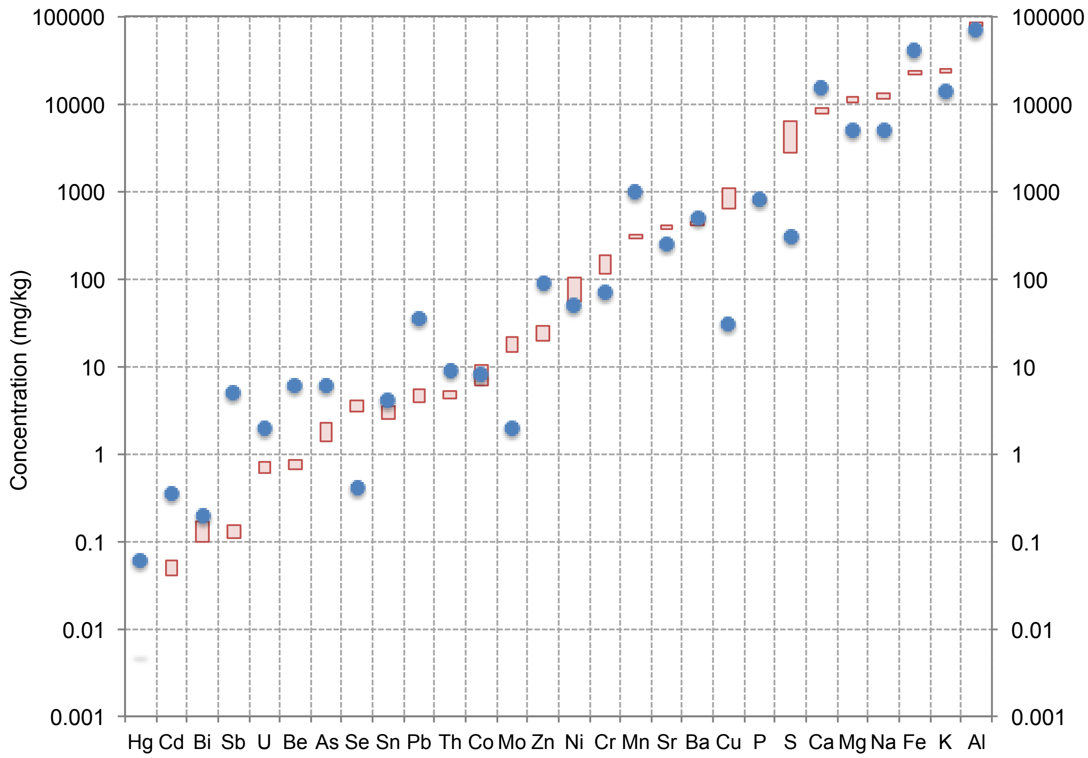

FIGURE 60: *Box plot showing element concentrations in HIT tailings used on column leach tests*
(red box = range for tailings, blue dot = median soil)

10.2 Column Test Results

The initial leachate collections from the HIT T-1 final tailings and the HIT T-2 rougher tailings were made on 15 February 2010. Testing of the HIT T-3 and T-4 rougher tailings commenced two months later on 12 April 2010. The column leach testing of the four samples extended for 52 weeks and involved 13, four-week leach cycles.

The leachate quality results for the four tailings columns are given in Appendix D1. The analytical suite included pH, alkalinity, EC, Ag, Al, As, B, Ba, Be, Ca, Cd, Cl, Co, Cr, Cu, F, Fe, Hg, K, Mg, Mn, Mo, Na, Ni, P, Pb, Sb, Se, Si, Sn, SO_4, Sr, Th, U and Zn.

pH and Alkalinity

All four tailings samples produced alkaline leachates during the 52 weeks of column leach testing. The starting pHs were essentially the same at between 5.7 to 6.3, then leachate pHs increased slightly during the first few months before stabilising at between 7.5 to 8.1 for the duration of testing as shown in Figure 61.

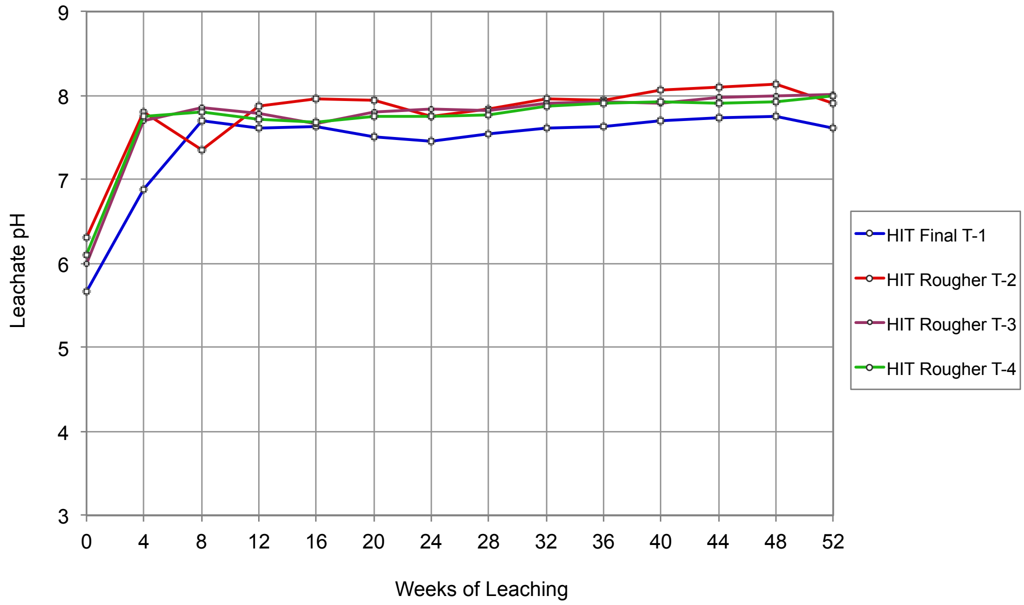

***FIGURE 61**: Plot of leachate pH versus time for HIT tailings column tests*

Leachate alkalinities typically fluctuated in the range 50 to 100 mg $CaCO_3$/L as shown in Figure 62. Such values indicate relatively good availability of neutralisation capacity as leachates passed through the columns and interacted with the tailings solids, even though the actual ANCs of the tailings solids were relatively low at between 10 to 12 kg H_2SO_4/t.

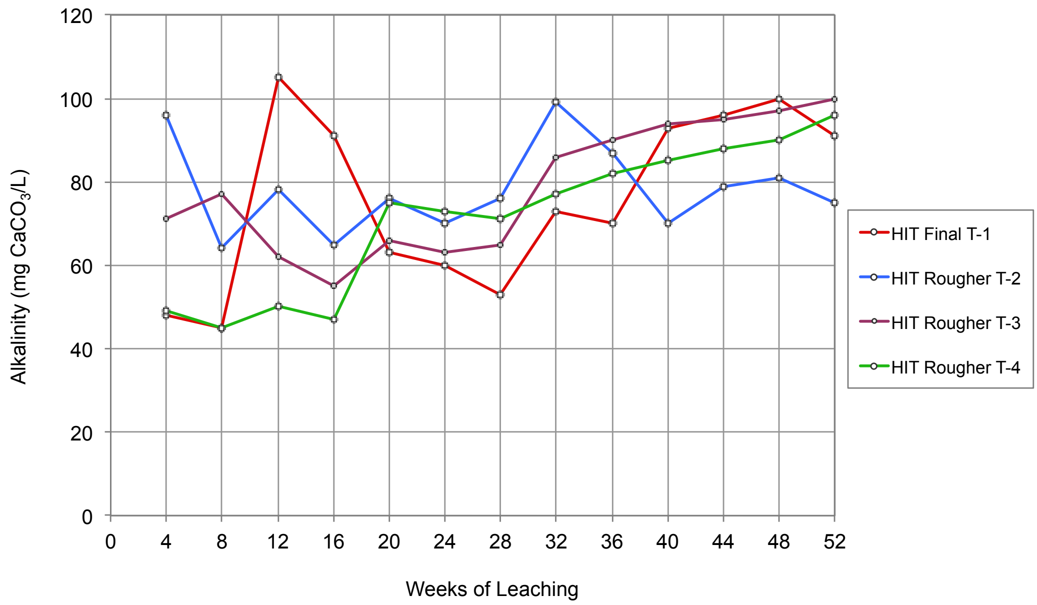

***FIGURE 62:** Plot of leachate alkalinity versus time for HIT tailings column tests*

Therefore, notwithstanding that the static testing indicated that the final tailings sample and two of the rougher tailings samples were likely to be PAF (albeit of low capacity), the results of the column leach tests confirm that acidification of such tailings is unlikely to occur within a year of exposure to atmospheric conditions. Furthermore, given that there was no evidence of diminution of leachate alkalinities during the year long test period it would seem likely that the lag period for the tailings could extend for at least a second year.

Solute Leaching

Time series plots for selected key elements are presented in the Appendix D2. The leachate chemistries for all tailings columns were dominated by sulfate (see Appendix D2-4), calcium (Appendix D2-5) and magnesium (Appendix D2-6). Overall, there was little difference in major ion leaching from the three rougher tailings columns, but the chemistry of leachate from the HIT T-1 final tailings did differ in a number of ways.

The concentration of sulfate in leachate from the HIT T-1 final tailings initially exceeded 2,000 mg/L, calcium concentration exceeded 500 mg/L, and magnesium was around 150 mg/L. The concentrations of sulfate and calcium were of such magnitude that it is likely that sulfate and calcium release from the tailings was controlled by the solubility of gypsum. As the leach test progressed there was a near-linear decrease in sulfate concentration. The concentrations of calcium and magnesium also decreased with time. By week 52 the sulfate concentration was around 400, calcium around 150, and magnesium around 5 mg/L, respectively.

The initial concentrations of major ions in leachate from the three rougher tailings samples were noticeably lower than for the final tailings sample (*i.e.* typically around half), but the trends with time were similar in that concentrations decreased in a near-linear manner for around 6 months before leveling out at around 150 to 100 mg/L for sulfate, 30 to 50 mg/L for calcium, and less than 5 mg/L for magnesium.

There was virtually no leaching of any iron (Appendix D2-7). The absence of iron release does not preclude the possibility of sulfide oxidation occurring within the columns, as iron is highly insoluble under alkaline conditions and it is expected that any iron released as a consequence of oxidation of pyrite would have immediately re-precipitated as a ferri-hydroxyoxide and been retained within the tailings column.

Similarly, there was virtually no leaching of aluminium from the rougher tailings, and only trace concentrations (*i.e.* 0.2 to 0.4 mg/L) for final tailings in the first 12 weeks (Appendix D2-8). The solubility of aluminium, like iron, is strongly pH-dependent. Provided tailings remain circum-neutral there is usually little potential for leaching of aluminium. As a general rule, aluminium solubility becomes significant only when the pH decreases below about pH 4.5.

There were slightly elevated concentrations of some trace elements in leachate from the final tailings but there was no evidence of any significant releases of environmentally important metals and metalloids from the rougher tailings during the 12-month test period. For a number of elements the concentrations were invariably close to, or less than analytical detection limits. They included: antimony (≤0.001 mg/L), cadmium (≤0.0003 mg/L), chromium (≤0.002 mg/L), cobalt (≤0.001 mg/L), mercury (≤0.0001 mg/L), nickel (≤0.002 mg/L), selenium (≤0.02 mg/L), tin (≤0.001 mg/L) and zinc (≤0.01 mg/L).

The few instances where slightly elevated concentrations of trace elements occurred were as follows:

- Copper (Appendix D2-9) - typically less than 0.05 mg/L leachates from rougher tailings but up to 0.45 mg/L in leachate from the sample of final tailings.
- Zinc (Appendix D2-10) - up to 0.12 mg/L in the initial leachate from the final tailings but thereafter less than or about 0.01 mg/L.
- Manganese (Appendix D2-11) - between 0.4 and 0.9 mg/L for final tailings but less than 0.1 mg/L for the rougher tailings samples.
- Arsenic (Appendix D2-12) - initially up to 0.02 mg/L in leachate from rougher tailings HIT T-4 but decreasing with time to around 0.005 mg/L. For all other tailings arsenic was below, or close to the detection limit of 0.001 mg/L.
- Nickel (Appendix D2-13) - between 0.004 and 0.018 mg/L for final tailings, and typically less than the detection limit of 0.001 mg/L for rougher tailings.
- Cobalt (Appendix D2-14) - between 0.003 and 0.014 mg/L for final tailings, and less than the detection limit of 0.001 mg/L for rougher tailings.
- Lead (Appendix D2-15) - approximately 1.1 mg/L in the initial leachate from rougher tailings HIT T-4 but thereafter around 0.1 to 0.2 mg/L. Less than 0.001 mg/L for other tailings samples.
- Selenium (Appendix D2-16) - up to 0.14 mg/L for final tailings after 4 weeks, but then decreasing to between 0.01 and 0.02 mg/L after 20 weeks. Selenium concentrations in the rougher tailings leachates were consistently less than the detection limit of 0.01 mg/L.

10.3 Sulfate Release and Intrinsic Oxidation Rates

As noted in the previous section, sulfate concentrations in leachate were greatest at the start of the tests then steadily decreased with time (Appendix D2-4). Based on the sulfate concentrations in leachates it was estimated that the equivalent of 0.11 %S (or 20% of the initial sulfur) was leached from the final tailings sample over the 12-month period. Assuming all of the sulfate in leachate derived from pyrite oxidation then the acid potential associated with the release of the sulfate equates to 3 kg H_2SO_4/t. This is well below the ANC of 11 kg H_2SO_4/t. Therefore, it seems likely that the lag period for such final tailings (if they are indeed PAF) would extend for several years.

With rougher tailings, the amounts of sulfate leached equated to only 0.04 to 0.05 %S, with between 79 to 91% of the initial sulfur still remaining within the columns. Even if all the sulfate in leachate derived entirely from pyrite oxidation then the acid generation would have been less than 2 kg H_2SO_4/t. As the ANCs of the rougher tailings were between 10 to 12 kg H_2SO_4/t, the lag times for the rougher tailings would be likely to extended for several more years.

The average SRR for the final tailings over the 12-month period was 57 mg SO_4/kg/week, which is relatively small in comparison to SRRs between 300 to 1000 mg SO_4/kg/week produced by most of the waste rock columns as discussed in Section 8. In the case of rougher tailings the average SRRs were even lower at between 18 to 23 mg SO_4/kg/week.

The IORs for the four tailings columns were independently measured using the SOC apparatus between weeks 36 and 40 of column operation. The SOC measurement results are summarised in Table 21. The IORs for the three rougher tailings samples were relatively slow at between 2.1 $x10^{-8}$ to $2.4x10^{-8}$ kg $O_2/m^3/s$. These IORS equate to SGRs of between 20 to 24 mg SO_4/kg/week, which compares closely with the SRRs of 18 to 23 mg SO_4/kg/week based on sulfate concentration in leachate. The IOR for the final tailings was slightly higher (but still low) at 2.9 $x10^{-8}$ kg $O_2/m^3/s$. This IOR equates to a SGR of 28 mg SO_4/kg/week, which is approximately half of the SRR based on sulfate leaching but still reasonably comparable given the uncertainties associated with the various measurements.

TABLE 21: *Intrinsic oxidation rates for HIT tailings determined by SOC apparatus and comparison with sulfate release rates from HIT tailings columns*

Parameter	Unit	HIT T-1	HIT T-2	HIT T-3	HIT T-4
		39759	39758	39755	40246
		HIT Final (P1, P2, P3)	HIT Rougher (P1, P2, P3)	HIT Rougher Tail (P3)	HIT Rougher (P1, P3)
		PAF-LC	NAF	PAF-LC	PAF-LC
SOC MEASUREMENT					
Date of SOC Reading		16 Nov 2010	16 Nov 2010	16 Nov 2010	16 Nov 2010
Column Duration at SOC Reading		Week 36-40	Week 36-40	Week 36-40	Week 36-40
IOR Based on SOC Reading	(kg $O_2/m^3/s$)	2.9E-08	2.1E-08	2.1E-08	2.5E-08
SGR Based on SOC Reading (#1)	(mg SO_4/kg/wk)	28	20	20	24
LEACH COLUMN TEST					
SRR Based on Column Results (#2)	(mg SO_4/kg/wk)	39 - 45	4	5 - 8	6 - 8
Average SRR for Column (#3)	(mg SO_4/kg/wk)	57	23	19	18
Max SRR for Column	(mg SO_4/kg/wk)	108	110	54	46
Time of Max SRR		week 4	week 4	week 4	week 8
Total %S Leached (#4)	(%S)	0.11	0.05	0.04	0.04
Total %S Content	(%S)	0.58	0.22	0.42	0.44
Percentage of S Remaining	(%)	80%	79%	90%	91%

#1. Sulfate generation rates (SGRs) for tailings samples calculated directly from IOR values

#2. Sulfate release rates (SRRs) for tailings samples calculated from column leachate data for Weeks 36 and 40.

#3. Average SRR for tailings columns based on results for 52 weeks.

#4. Total sulfur leached from sample expressed as %S, based on 52 weeks of testing.

Overall, the results of the column tests and the SOC measurements confirm that sulfide oxidation was occurring within the tailings columns, albeit at relatively slow rates in comparison to those observed with waste rock. However, there was no evidence of acidification of any of the tailings samples during the 12 months of column testing, and based on the sulfate release rates it is estimated that the lag period for tailings similar to those tested could extend for several years, if indeed they eventually prove to be acid generating.

It should be noted that the sulfur content of the final tailings sample included in the column leach program was at the lower end of the sulfur contents range for final tailings samples tested in this study. As reported in Section 9.2, the sulfur contents of the 17 finals tailings tested ranged from 0.27 to 2.27 %S, with an average of 1.02 %S. It is likely that final tailings with a sulfur content of 1 %S or higher would exhibit SRRs and IORs significantly higher than the final tailings sample included in the column leach test program.

APPENDIX A

RESULTS OF
STATIC TESTING OF WASTE ROCK

Appendix A1

Acid Forming Characteristics of HIT, Ekwai and Koki Drill Core Samples

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval From (m)	Interval To (m)	Lithology	Alteration	Weathering	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT MPA	AP	ANC	CNV	NAPP	NAG TEST NAG Value	NAG pH	ARD Class	Waste Type
														(kg H_2SO_4/t)								
HIT	001-IV95	250	252	HMD	PH	FR	-	36820	EGi (1996)	-	0.45	0.05	0.40	14	12	9	-	3	2	3.4	PAF	Green
HIT	002-IV95	16	18	HMD	PH	POX	-	36869	EGi (1996)	-	0.05	0.02	0.03	2	<1	1	-	0	0	5.7	NAF	Green
HIT	005-IV95	76	78	HMD	PH	FR	-	37085	EGi (1996)	-	0.74	0.07	0.67	23	21	7	-	14	3	3.3	PAF	Amber
HIT	008-IV96	406	408	HMD	PH	FR	-	37559	EGi (1996)	-	2.90	0.10	2.80	89	86	2	-	84	12	2.7	PAF	Red
HIT	008-IV96	22	22	HMD	PH	TOX	-	37366	EGi (1996)	-	0.37	0.05	0.32	11	10	0	-	10	2	3.3	PAF	Green
HIT	009-IV96	160	162	HMD	PO	FR	-	33079	EGi (1996)	-	0.32	0.04	0.28	10	9	11	-	-2	0	5.0	NAF	Green
HIT	010-IV96	12	14	HMD	PH	POX	-	33355	EGi (1996)	-	0.03	0.01	0.02	1	<1	0	-	0	0	4.9	NAF	Green
HIT	010-IV96	350	352	HMD	PR	FR	-	33526	EGi (1996)	-	5.20	1.30	3.90	159	119	11	-	108	6	3.1	PAF	High Red
HIT	011-IV96	218	220	HMD	QIP	FR	-	33658	EGi (1996)	-	5.00	0.10	4.90	153	150	14	-	136	35	2.4	PAF	High Red
HIT	011-IV96	74	76	HMD	AR	SEG	-	33586	EGi (1996)	-	5.40	0.15	5.25	165	161	0	-	161	19	2.6	PAF	High Red
HIT	001-TK97	42	44	FT	FR	POX	41831	39015	EGi (2009)	0.08	0.16	-	-	5	-	18	7	-13	0	7.1	NAF	Green
HIT	001-TK97	144	146	HMD	PH	SEG	41868	39016	EGi (2009)	0.05	4.57	-	-	140	-	0	4	140	39	2.3	PAF	High Red
HIT	002-TK97	40	42	DVp	SA	POX	41888	39017	EGi (2009)	0.01	7.31	-	-	224	-	0	1	224	68	2.1	PAF	High Red
HIT	002-TK97	84	88	DVp	SA	POX	41905	39018	EGi (2009)	0.01	4.19	-	-	128	-	0	1	128	80	2.2	PAF	High Red
HIT	002-TK97	130	132	HMD	AR	POX	41925	39019	EGi (2009)	0.02	2.34	-	-	72	-	1	2	71	38	2.3	PAF	Red
HIT	002-TK97	146	148	HMD	SA	FR	41933	39020	EGi (2009)	0.01	3.85	-	-	118	-	0	1	118	39	2.4	PAF	High Red
HIT	003NOR02	230	232	HMD	QIP	FR	283502	39021	EGi (2009)	0.01	3.59	-	-	110	-	0	1	110	42	2.3	PAF	High Red
HIT	003NOR02	266	268	HMD	QIP	FR	283522	39022	EGi (2009)	0.01	5.43	-	-	166	-	0	1	166	65	2.3	PAF	High Red
HIT	003NOR02	284	286	HMD	QIP	FR	283532	39023	EGi (2009)	0.02	5.15	-	-	158	-	0	2	158	77	2.4	PAF	High Red
HIT	003NOR02	330	332	HMD	QIP	FR	283558	39024	EGi (2009)	0.01	3.35	-	-	103	-	0	1	103	35	2.4	PAF	High Red
HIT	003NOR02	344	346	HMD	QIP	FR	283565	39025	EGi (2009)	0.03	2.48	-	-	76	-	0	2	76	21	2.4	PAF	Red
HIT	006ANOR02	52	54	HMD	QIP	FR	283922	39026	EGi (2009)	0.01	5.69	-	-	174	-	0	1	174	53	2.3	PAF	High Red
HIT	009NOR03	26	28	DVp	SA	POX	284413	39027	EGi (2009)	0.02	7.17	-	-	219	-	0	2	219	58	2.3	PAF	High Red
HIT	009NOR03	50	52	DVp	SA	POX	284427	39028	EGi (2009)	0.01	4.01	-	-	123	-	0	1	123	50	2.3	PAF	High Red
HIT	009NOR03	110	112	HMD	PH	FR	284453	39029	EGi (2009)	0.02	2.59	-	-	79	-	0	2	79	29	2.4	PAF	Red
HIT	010NOR03	46	48	DVp	QIP	POX	284550	39030	EGi (2009)	0.01	4.33	-	-	132	-	0	1	132	87	2.4	PAF	High Red
HIT	010NOR03	84	86	DVp	SIV	POX	284571	39031	EGi (2009)	0.02	9.32	-	-	285	-	0	2	285	104	2.4	PAF	High Red
HIT	010NOR03	160	162	DV	SA	FR	284613	39032	EGi (2009)	0.01	11.05	-	-	338	-	0	1	338	87	2.3	PAF	High Red
HIT	011NOR03	32	34	DV	AR	POX	284661	39033	EGi (2009)	0.03	4.79	-	-	147	-	0	2	147	36	2.4	PAF	High Red
HIT	011NOR03	88	90	HMD	SA	FR	284692	39034	EGi (2009)	0.07	8.21	-	-	251	-	0	6	251	56	2.2	PAF	High Red
HIT	011NOR03	154	156	HMD	SI	FR	284729	39035	EGi (2009)	0.02	12.30	-	-	376	-	0	2	376	90	2.3	PAF	High Red
HIT	011NOR03	214	216	HMD	PH	FR	284762	39036	EGi (2009)	0.01	15.45	-	-	473	-	0	1	473	106	2.3	PAF	High Red
HIT	023-IV97	180	182	HMD	QIP	FR	126268	39037	EGi (2009)	0.02	3.89	-	-	119	-	0	2	119	43	2.3	PAF	High Red
HIT	023-IV97	218	220	FDP	QIP	FR	126287	39038	EGi (2009)	0.01	4.68	-	-	143	-	0	1	143	54	2.4	PAF	High Red
HIT	026-IV97	92	94	HMD	PH	FR	126621	39039	EGi (2009)	0.02	2.48	-	-	76	-	0	2	76	18	2.5	PAF	Red
HIT	026-IV97	160	162	HMD	QIP	FR	126655	39040	EGi (2009)	0.02	4.44	-	-	136	-	0	2	136	30	2.4	PAF	High Red
HIT	026-IV97	224	226	DV	PH	FR	126687	39041	EGi (2009)	0.04	5.89	-	-	180	-	0	3	180	199	2.1	PAF	High Red
HIT	029-IV97	24	26	HMD	PH	POX	127127	39042	EGi (2009)	0.03	0.32	-	-	10	-	0	2	10	5	2.3	PAF	Green
HIT	029-IV97	108	110	HMD	PH	FR	127069	39043	EGi (2009)	0.02	1.52	-	-	47	-	5	2	42	14	2.6	PAF	Red
HIT	029-IV97	188	190	LW	PH	FR	127109	39044	EGi (2009)	0.01	11.05	-	-	338	-	0	1	338	50	2.4	PAF	High Red
HIT	053NOR05	40	42	DVp	SIV	SEG	260168	39045	EGi (2009)	0.01	6.31	-	-	193	-	0	1	193	54	2.3	PAF	High Red

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval		Lithology	Alteration	Weathering	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT					NAG TEST		ARD Class	Waste Type
		From (m)	To (m)											MPA	AP	ANC	CNV	NAPP	NAG Value	NAG pH		
														(kg H_2SO_4/t)								
HIT	053NOR05	82	84	DVp	SA	FR	260194	39046	EGi (2009)	0.01	13.40	-	-	410	-	0	1	410	64	2.4	PAF	High Red
HIT	053NOR05	98	100	DVp	SA	FR	260205	39047	EGi (2009)	0.01	11.80	-	-	361	-	0	1	361	57	2.2	PAF	High Red
HIT	053NOR05	206	208	DVp	AR	FR	260269	39048	EGi (2009)	0.03	1.72	-	-	53	-	0	2	53	31	2.5	PAF	Red
HIT	053NOR05	246	248	DVp	AR	FR	260292	39049	EGi (2009)	0.02	3.79	-	-	116	-	0	2	116	52	2.5	PAF	High Red
HIT	053NOR05	332	334	DVp	AR	FR	260342	39050	EGi (2009)	0.04	3.67	-	-	112	-	0	3	112	51	2.4	PAF	High Red
HIT	053NOR05	352	354	DVp	SA	FR	260354	39051	EGi (2009)	0.02	6.80	-	-	208	-	0	2	208	66	2.3	PAF	High Red
HIT	057NOR05	50	58	DVp	AR	FR	-	39548	EGi (2009)	0.03	6.19	-	-	189	-	0	2	189	171	1.9	PAF	High Red
HIT	057NOR05	72	74	DVp	SA	FR	260575	39052	EGi (2009)	0.02	2.80	-	-	86	-	0	2	86	39	2.4	PAF	Red
HIT	057NOR05	136	138	DVp	SA	FR	260440	39053	EGi (2009)	0.01	8.55	-	-	262	-	0	1	262	78	2.3	PAF	High Red
HIT	057NOR05	220	222	DVp	SA	FR	260489	39054	EGi (2009)	0.01	11.45	-	-	350	-	0	1	350	57	2.3	PAF	High Red
HIT	057NOR05	290	292	DVp	SA	FR	260529	39055	EGi (2009)	0.02	8.05	-	-	246	-	0	2	246	64	2.5	PAF	High Red
HIT	057NOR05	366	370	DVp	SA	FR	-	39549	EGi (2009)	0.05	2.68	-	-	82	-	0	4	82	76	2.1	PAF	Red
HIT	057NOR05	392	394	DVp	SA	FR	260589	39056	EGi (2009)	0.02	2.38	-	-	73	-	0	2	73	78	2.3	PAF	Red
HIT	057NOR05	428	430	DVp	SA	FR	260610	39057	EGi (2009)	0.02	1.10	-	-	34	-	0	2	34	29	2.4	PAF	Red
HIT	066NOR05	28	32	DVp	SA	FR	260666	39058	EGi (2009)	0.01	6.08	-	-	186	-	0	1	186	55	2.4	PAF	High Red
HIT	066NOR05	60	62	DVp	PR	FR	260684	39059	EGi (2009)	0.18	1.50	-	-	46	-	25	15	21	4	3.4	PAF	Red
HIT	066NOR05	98	100	DVp	PR	FR	260707	39060	EGi (2009)	0.26	1.78	-	-	54	-	29	21	25	13	3.3	PAF	Red
HIT	073NOR05	54	70	HMD	AR	FR	-	39550	EGi (2009)	0.03	3.66	-	-	112	-	0	2	112	105	2.0	PAF	High Red
HIT	076NOR05	30	32	FDP	PR	POX	219732	39061	EGi (2009)	1.86	0.73	-	-	22	-	126	152	-104	0	8.0	NAF	Amber
HIT	076NOR05	82	84	DVp	SA	FR	219763	39062	EGi (2009)	0.01	3.36	-	-	103	-	0	1	103	45	2.3	PAF	High Red
HIT	076NOR05	172	174	DVp	AR	FR	219817	39063	EGi (2009)	0.13	1.01	-	-	31	-	3	11	28	12	3.0	PAF	Red
HIT	109XC7	110	116	FDP	PR	FR	-	39554	EGi (2009)	0.03	2.72	-	-	83	-	10	2	73	63	2.2	PAF	Red
HIT	109XC7	170	176	FDP	PH	FR	-	39555	EGi (2009)	0.1	1.35	-	-	41	-	12	8	29	27	2.6	PAF	Red
HIT	123XC07	22	24	FDP	AR	POX	82877	39064	EGi (2009)	0.02	5.69	-	-	174	-	0	2	174	79	2.4	PAF	High Red
HIT	123XC07	46	48	FDP	QIP	FR	82891	39065	EGi (2009)	0.03	4.50	-	-	138	-	0	2	138	128	2.3	PAF	High Red
HIT	123XC07	90	92	DVp	PH	FR	82913	39066	EGi (2009)	0.02	4.78	-	-	146	-	0	2	146	70	2.3	PAF	High Red
HIT	123XC07	152	154	DVp	PH	FR	82947	39067	EGi (2009)	0.03	3.95	-	-	121	-	4	2	117	58	2.2	PAF	High Red
HIT	123XC07	234	236	KDP	PH	FR	82988	39068	EGi (2009)	0.22	5.46	-	-	167	-	25	18	142	62	2.4	PAF	High Red
HIT	123XC07	276	278	KDP	PO	FR	83512	39069	EGi (2009)	0.02	3.75	-	-	115	-	12	2	103	23	3.3	PAF	High Red
HIT	125XC07	50	52	FDP	PR	FR	84245	39070	EGi (2009)	0.02	0.78	-	-	24	-	6	2	18	12	2.9	PAF	Amber
HIT	125XC07	108	110	FDP	AR	FR	84277	39071	EGi (2009)	0.03	6.26	-	-	192	-	0	2	192	91	2.4	PAF	High Red
HIT	125XC07	154	156	HMD	AR	FR	84303	39072	EGi (2009)	0.01	5.30	-	-	162	-	0	1	162	102	2.3	PAF	High Red
HIT	125XC07	234	236	HMD	PO	FR	84347	39073	EGi (2009)	0.01	2.48	-	-	76	-	10	1	66	34	2.3	PAF	Red
HIT	129XC07	34	36	HMD	PH	FR	83923	39074	EGi (2009)	0.05	0.57	-	-	17	-	15	4	2	6	4.2	PAF	Amber
HIT	129XC07	192	194	HMD	PR	FR	84711	39075	EGi (2009)	0.40	3.85	-	-	118	-	39	33	79	6	3.3	PAF	High Red
HIT	129XC07	318	320	HMD	PO	FR	84781	39076	EGi (2009)	0.03	5.17	-	-	158	-	5	2	153	22	2.8	PAF	High Red
HIT	154XC08	30	32	FDP	PH	FR	703336	39077	EGi (2009)	0.02	3.30	-	-	101	-	0	2	101	38	2.4	PAF	High Red
HIT	154XC08	54	56	FDP	PO	FR	703349	39078	EGi (2009)	0.02	4.75	-	-	145	-	0	2	145	32	2.3	PAF	High Red
HIT	154XC08	66	68	FDP	PH	FR	703356	39079	EGi (2009)	0.11	4.01	-	-	123	-	7	9	116	39	2.4	PAF	High Red
HIT	154XC08	112	114	FDP	PH	FR	703382	39080	EGi (2009)	0.04	2.68	-	-	82	-	8	3	74	28	2.4	PAF	Red
HIT	154XC08	128	130	FDP	PH	FR	703391	39081	EGi (2009)	0.02	2.20	-	-	67	-	8	2	59	26	2.5	PAF	Red

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval From (m)	Interval To (m)	Lithology	Alteration	Weathering	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT MPA (kg H_2SO_4/t)	AP (kg H_2SO_4/t)	ANC (kg H_2SO_4/t)	CNV (kg H_2SO_4/t)	NAPP (kg H_2SO_4/t)	NAG TEST NAG Value	NAG pH	ARD Class	Waste Type
HIT	154XC08	162	164	FDP	QIP	FR	703409	39082	EGi (2009)	0.02	6.98	-	-	214	-	1	2	213	191	2.1	PAF	High Red
HIT	154XC08	228	230	FDP	QIP	FR	703446	39083	EGi (2009)	0.02	10.00	-	-	306	-	4	2	302	58	2.2	PAF	High Red
HIT	165XC08	28	30	HMD	NONE	TOX	703069	38811	EGi (2009)	0.03	0.01	-	-	0	-	3	2	-3	0	6.2	NAF	Green
HIT	165XC08	90	92	HMD	PO	FR	703104	38812	EGi (2009)	0.02	0.62	-	-	19	-	7	2	12	7	3.3	PAF	Amber
HIT	165XC08	152	154	LW	PO	FR	703138	38813	EGi (2009)	0.05	1.59	-	-	49	-	8	4	41	12	3.7	PAF	Red
HIT	166XC08	202	204	HMD	QIP	FR	706825	38814	EGi (2009)	0.02	2.49	-	-	76	-	0	2	76	40	2.3	PAF	Red
HIT	166XC08	242	244	HMD	PH	FR	706847	38815	EGi (2009)	0.03	4.62	-	-	141	-	0	2	141	92	2.2	PAF	High Red
HIT	172XC08	52	54	HMD	PH	FR	705812	38816	EGi (2009)	0.02	3.83	-	-	117	-	1	2	116	39	2.2	PAF	High Red
HIT	172XC08	124	126	HMD	PO	FR	705851	38817	EGi (2009)	0.03	2.34	-	-	72	-	14	2	58	10	3.1	PAF	Red
HIT	172XC08	284	286	LW	PO	FR	705939	38818	EGi (2009)	0.02	4.19	-	-	128	-	14	2	114	46	2.8	PAF	High Red
HIT	175XC08	66	68	LW	PO	FR	705315	38819	EGi (2009)	0.03	2.66	-	-	81	-	10	2	71	26	2.6	PAF	Red
HIT	175XC08B	106	108	HMD	PH	FR	735946	38833	EGi (2009)	0.03	2.52	-	-	77	-	12	2	65	15	3.3	PAF	Red
HIT	175XC08B	148	150	FT	FR	FR	735949	38832	EGi (2009)	0.21	0.56	-	-	17	-	34	17	-17	0	7.4	NAF	Amber
HIT	175XC08B	200	201	HMD	PO	FR	735953	38834	EGi (2009)	0.09	2.25	-	-	69	-	25	7	43	48	2.5	PAF	Red
HIT	180XC08	134	136	HMD	PH	FR	708266	38821	EGi (2009)	0.02	4.21	-	-	129	-	6	2	123	123	2.2	PAF	High Red
HIT	180XC08	304	306	HMD	PO	FR	708351	38820	EGi (2009)	0.01	2.57	-	-	79	-	16	1	63	14	3.0	PAF	Red
HIT	182XC08	74	76	HMD	PO	FR	708871	38822	EGi (2009)	0.50	1.32	-	-	40	-	46	41	-5	0	7.4	NAF	Red
HIT	184XC08	158	160	FT	FR	FR	708444	38823	EGi (2009)	0.12	1.25	-	-	38	-	23	10	15	15	3.1	PAF	Red
HIT	184XC08	282	284	HMD	PH	FR	708512	38824	EGi (2009)	0.06	2.34	-	-	72	-	17	5	54	29	2.8	PAF	Red
HIT	214XC09	272	274	DV	SA	FR	735537	38825	EGi (2009)	0.05	2.15	-	-	66	-	0	4	66	55	2.6	PAF	Red
HIT	214XC09	346	348	DV	PH	FR	735543	38826	EGi (2009)	0.03	2.28	-	-	70	-	0	2	69	22	3.2	PAF	Red
HIT	218XC09	110	114	LW	PO	FR	-	39553	EGi (2009)	0.04	2.12	-	-	65	-	9	3	56	39	2.7	PAF	Red
HIT	222XC09	62	64	DVp	AR	FR	735769	38827	EGi (2009)	0.03	2.22	-	-	68	-	0	2	68	27	2.6	PAF	Red
HIT	222XC09	140	142	DVp	PR	FR	735775	38828	EGi (2009)	0.03	3.01	-	-	92	-	3	2	89	89	2.3	PAF	High Red
HIT	228XC09	30	32	HMD	PO	POX	729418	38829	EGi (2009)	0.05	0.05	-	-	2	-	1	4	0	0	5.0	NAF	Green
HIT	228XC09	96	98	FT	FR	FR	735969	38831	EGi (2009)	0.03	2.32	-	-	71	-	13	2	58	38	2.3	PAF	Red
HIT	228XC09	120	122	LW	PH	FR	735972	38830	EGi (2009)	0.01	4.76	-	-	146	-	15	1	131	90	2.2	PAF	High Red
HIT	235XC09	58	62	LW	PO	FR	729613	38835	EGi (2009)	0.02	4.04	-	-	124	-	5	2	118	37	2.6	PAF	High Red
HIT	235XC09	104	106	HMD	PH	FR	729637	38836	EGi (2009)	0.29	1.94	-	-	59	-	50	24	9	16	3.0	PAF	Red
HIT	235XC09	200	202	FT	FR	FR	729689	38837	EGi (2009)	0.19	0.01	-	-	0	-	29	16	-28	0	7.2	NAF	Green
HIT	235XC09	232	234	FT	FR	FR	729707	38838	EGi (2009)	0.60	0.08	-	-	2	-	93	49	-91	0	7.5	NAF	Green
HIT	246XC09	14	16	KDP	PO	POX	729761	38839	EGi (2009)	0.03	0.04	-	-	1	-	6	2	-5	0	5.5	NAF	Green
HIT	246XC09	34	36	LW	PO	POX	729772	38840	EGi (2009)	0.04	0.02	-	-	1	-	3	3	-2	0	5.6	NAF	Green
HIT	246XC09	74	76	HMD	PO	POX	729794	38841	EGi (2009)	0.02	1.98	-	-	61	-	2	2	59	16	3.6	PAF	Red
HIT	246XC09	150	152	HMD	PO	FR	729836	38842	EGi (2009)	0.28	0.41	-	-	13	-	41	23	-28	0	7.2	NAF	Green
HIT	254XC09	70	72	KDP	PH	FR	721885	39375	EGi (2009)	0.01	6.09	-	-	186	-	1	1	185	86	2.1	PAF	High Red
HIT	254XC09	134	136	KDP	PH	FR	721919	39376	EGi (2009)	0.01	11.20	-	-	343	-	0	1	343	156	2.0	PAF	High Red
HIT	254XC09	210	216	KDP	PH	FR	-	39556	EGi (2009)	0.02	5.41	-	-	166	-	0	2	166	137	1.9	PAF	High Red
HIT	254XC09	250	252	KDP	PH	FR	721982	39377	EGi (2009)	0.01	7.65	-	-	234	-	9	1	225	40	2.4	PAF	High Red
HIT	262XC09	130	136	HMD	PH	FR	-	39552	EGi (2009)	0.01	3.38	-	-	103	-	1	1	102	83	2.1	PAF	High Red
HIT	265XC09	72	74	LW	PH	FR	722079	39378	EGi (2009)	0.01	4.73	-	-	145	-	10	1	135	34	2.5	PAF	High Red

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval		Lithology	Alteration	Weathering	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT					NAG TEST		ARD Class	Waste Type
		From (m)	To (m)											MPA	AP	ANC	CNV	NAPP	NAG Value	NAG pH		
														(kg H_2SO_4/t)								
HIT	265XC09	140	142	HMD	PH	FR	722116	39379	EGi (2009)	0.01	5.72	-	-	175	-	9	1	166	49	2.3	PAF	High Red
HIT	265XC09	226	228	HMD	PH	FR	722162	39380	EGi (2009)	0.07	6.36	-	-	195	-	13	6	182	31	2.5	PAF	High Red
HIT	267XC09	48	50	FDP	PH	POX	732855	39388	EGi (2009)	0.01	3.39	-	-	104	-	0	1	104	46	2.2	PAF	High Red
HIT	267XC09	120	122	FDP	PH	FR	732893	39389	EGi (2009)	0.04	7.53	-	-	230	-	3	3	227	121	2.0	PAF	High Red
HIT	267XC09	250	252	FDP	PO	FR	732965	39390	EGi (2009)	0.01	2.95	-	-	90	-	11	1	79	28	2.6	PAF	Red
HIT	267XC09	324	326	FDP	PH	FR	733005	39391	EGi (2009)	0.01	7.92	-	-	242	-	7	1	235	46	2.3	PAF	High Red
HIT	270XC09	138	140	HMD	PH	FR	722249	39381	EGi (2009)	0.13	3.44	-	-	105	-	5	11	100	41	2.5	PAF	High Red
HIT	270XC09	186	188	HMD	PH	FR	722276	39382	EGi (2009)	0.01	3.73	-	-	114	-	11	1	103	58	2.2	PAF	High Red
HIT	270XC09	242	246	HMD	PO	FR	-	39551	EGi (2009)	0.09	2.81	-	-	86	-	14	7	72	65	2.2	PAF	Red
HIT	270XC09	300	302	HMD	PH	FR	722337	39383	EGi (2009)	0.04	5.00	-	-	153	-	11	3	142	30	2.5	PAF	High Red
HIT	273XC09	30	32	FDP	AR	FR	718698	39372	EGi (2009)	0.01	6.85	-	-	210	-	6	1	204	100	2.1	PAF	High Red
HIT	273XC09	100	102	FDP	QIP	FR	718736	39373	EGi (2009)	0.01	5.49	-	-	168	-	2	1	166	53	2.2	PAF	High Red
HIT	273XC09	144	146	FDP	QIP	FR	718761	39374	EGi (2009)	0.01	3.63	-	-	111	-	12	1	99	32	2.4	PAF	High Red
HIT	278XC09	66	68	LW	PH	POX	724768	39384	EGi (2009)	1.01	5.02	-	-	154	-	15	82	139	23	3.6	PAF	High Red
HIT	278XC09	168	170	LW	PH	FR	724825	39385	EGi (2009)	0.27	3.57	-	-	109	-	36	22	73	23	2.7	PAF	High Red
HIT	278XC09	236	238	LW	PO	FR	724863	39386	EGi (2009)	0.01	17.85	-	-	546	-	3	1	543	105	2.1	PAF	High Red
HIT	278XC09	344	346	FDP	PH	FR	724923	39387	EGi (2009)	0.01	10.20	-	-	312	-	8	1	304	85	2.1	PAF	High Red
HIT	279XC09	46	48	DVp	SA	POX	733069	39392	EGi (2009)	0.01	5.69	-	-	174	-	0	1	174	40	2.2	PAF	High Red
HIT	279XC09	210	212	HMD	PH	FR	733161	39393	EGi (2009)	0.01	2.10	-	-	64	-	2	1	62	20	2.8	PAF	Red
HIT	279XC09	286	288	HMD	PH	FR	733203	39394	EGi (2009)	0.01	3.36	-	-	103	-	4	1	99	30	2.5	PAF	High Red
HIT	279XC09	416	418	HMD	PH	FR	733275	39395	EGi (2009)	0.01	5.06	-	-	155	-	5	1	150	50	2.3	PAF	High Red
HIT	C016-IV	42	44	DVa	SA	FR	129400	39084	EGi (2009)	0.02	2.03	-	-	62	-	0	2	62	47	2.2	PAF	Red
HIT	C016-IV	120	122	HMD	QIP	FR	129439	39085	EGi (2009)	0.02	4.75	-	-	145	-	0	2	145	39	2.3	PAF	High Red
HIT	C016-IV	182	184	HMD	QIP	FR	129472	39086	EGi (2009)	0.01	3.15	-	-	96	-	0	1	96	45	2.4	PAF	High Red
HIT	C019-ED	50	52	FDP	AR	POX	129507	39087	EGi (2009)	0.55	0.95	-	-	29	-	27	45	2	2	3.4	PAF	Amber
HIT	C019-ED	312	314	DV	SA	FR	129644	39088	EGi (2009)	0.01	6.56	-	-	201	-	0	1	201	81	2.2	PAF	High Red
HIT	C047-TT	18	20	AL	NONE	AL	97401	39089	EGi (2009)	0.03	2.53	-	-	77	-	0	2	77	44	2.3	PAF	Red
HIT	C047-TT	54	56	DVp	PR	POX	97420	39090	EGi (2009)	0.02	0.84	-	-	26	-	0	2	26	25	2.2	PAF	Amber
HIT	C047-TT	100	102	DVp	PH	FR	97444	39091	EGi (2009)	0.01	1.14	-	-	35	-	0	1	35	16	2.5	PAF	Red
HIT	C047-TT	154	156	FDP	PR	FR	97472	39092	EGi (2009)	0.03	5.34	-	-	163	-	0	2	163	49	2.2	PAF	High Red
HIT	C068-PR	100	102	DVp	SA	FR	161852	39093	EGi (2009)	0.02	3.78	-	-	116	-	0	2	116	34	2.5	PAF	High Red
HIT	C068-PR	148	150	DVp	SA	FR	161879	39094	EGi (2009)	0.01	2.61	-	-	80	-	0	1	80	41	2.4	PAF	Red
HIT	C068-PR	252	254	DVp	QIP	FR	161936	39095	EGi (2009)	0.02	4.26	-	-	130	-	0	2	130	100	2.3	PAF	High Red
HIT	C071-TK	44	46	HMD	PO	SEG	95131	39096	EGi (2009)	0.03	1.73	-	-	53	-	6	2	47	18	2.7	PAF	Red
HIT	C071-TK	92	94	HMD	AR	FR	95155	39097	EGi (2009)	0.02	1.29	-	-	39	-	1	2	38	17	2.5	PAF	Red
HIT	C071-TK	246	248	FDP	PR	FR	95238	39098	EGi (2009)	0.03	1.75	-	-	54	-	0	2	54	19	2.7	PAF	Red
HIT	DDH075D	114	117	HMD	PH	FR	737001	39099	EGi (2009)	0.01	3.40	-	-	104	-	4	1	100	95	2.3	PAF	High Red
HIT	DDH075D	144	147	DV	AR	FR	737002	39100	EGi (2009)	0.08	3.75	-	-	115	-	4	7	111	41	2.3	PAF	High Red
HIT	DDH081D	24	27	DVp	QIP	POX	737003	39101	EGi (2009)	0.06	1.77	-	-	54	-	0	5	54	25	2.5	PAF	Red
HIT	DDH081D	75	78	DVp	QIP	FR	737004	39102	EGi (2009)	0.11	1.11	-	-	34	-	0	9	34	14	3.1	PAF	Red
HIT	DDH081D	129	132	DVp	QIP	FR	737005	39103	EGi (2009)	0.06	2.96	-	-	91	-	0	5	91	66	2.2	PAF	Red

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval		Lithology	Alteration	Weathing	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT					NAG TEST		ARD Class	Waste Type
		From (m)	To (m)											MPA	AP	ANC	CNV	NAPP	NAG Value	NAG pH		
														(kg H_2SO_4/t)								
HIT	DDH085D	36	39	DVp	QIP	POX	737006	39104	EGi (2009)	0.08	2.12	-	-	65	-	0	7	65	39	2.2	PAF	Red
HIT	DDH085D	84	87	DVp	SA	POX	737007	39105	EGi (2009)	0.06	0.82	-	-	25	-	0	5	25	3	3.5	PAF	Amber
HIT	DDH085D	147	150	DVa	QIP	POX	737008	39106	EGi (2009)	0.06	3.64	-	-	111	-	0	5	111	85	2.3	PAF	High Red
HIT	DDH092D	54	57	HMD	QIP	FR	737009	39107	EGi (2009)	0.03	6.54	-	-	200	-	0	2	200	100	2.2	PAF	High Red
HIT	DDH092D	87	90	HMD	QIP	FR	737010	39108	EGi (2009)	0.02	3.87	-	-	118	-	0	2	118	63	2.2	PAF	High Red
HIT	DDH092D	108	111	HMD	AR	FR	737011	39109	EGi (2009)	0.03	3.79	-	-	116	-	0	2	116	61	2.2	PAF	High Red
HIT	DDH101D	45	48	HMD	PH	POX	737012	39110	EGi (2009)	0.03	3.45	-	-	106	-	0	2	106	45	2.2	PAF	High Red
HIT	DDH102D	51	54	DV	PR	SEG	737013	39111	EGi (2009)	0.02	1.15	-	-	35	-	6	2	29	12	3.4	PAF	Red
HIT	DDH102D	246	249	HMD	PO	FR	737014	39112	EGi (2009)	0.03	5.00	-	-	153	-	13	2	140	18	3.3	PAF	High Red
HIT	389XC10	32	32.4	HMD	PH	SEG	796001	-	SRK (2011)	-	0.06	0.06	0.01	2	0	16	-	-15	0	8.0	NAF	Green
HIT	389XC10	50	50.4	HMD	PH	SEG	796002	-	SRK (2011)	-	0.05	0.05	0.01	2	0	23	-	-23	0	7.8	NAF	Green
HIT	389XC10	85	85.4	HMD	PH	FR	796003	-	SRK (2011)	-	0.02	0.02	0.01	1	0	36	-	-36	0	8.9	NAF	Green
HIT	389XC10	138	138.8	HMD	PH	FR	796004	-	SRK (2011)	-	0.02	0.02	0.01	1	0	17	-	-16	0	7.3	NAF	Green
HIT	389XC10	208	208.8	HMD	PO	FR	796005	-	SRK (2011)	-	12.15	0.12	12.05	372	369	3	-	366	244	2.1	PAF	High Red
HIT	389XC10	214	214.8	HMD	PO	FR	796006	-	SRK (2011)	-	8.70	0.11	8.59	266	263	2	-	261	190	2.2	PAF	High Red
HIT	389XC10	219	219.8	HMD	PO	FR	796007	-	SRK (2011)	-	8.56	0.10	8.46	262	259	14	-	244	181	2.2	PAF	High Red
HIT	389XC10	273	274	HMD	PH	FR	796008	-	SRK (2011)	-	8.00	0.12	7.88	245	241	5	-	236	189	2.1	PAF	High Red
HIT	398XC10	25	25.4	HMD	PH	POX	796009	-	SRK (2011)	-	7.97	0.10	7.87	244	241	6	-	234	191	2.1	PAF	High Red
HIT	398XC10	140	140.4	HMD	PH	FR	796010	-	SRK (2011)	-	7.93	0.13	7.80	243	239	19	-	220	169	2.2	PAF	High Red
HIT	398XC10	168	168.8	HMD	PH	FR	796011	-	SRK (2011)	-	7.93	0.13	7.80	243	239	17	-	221	15	3.3	PAF	High Red
HIT	398XC10	197	197.8	HMD	PR	FR	796012	-	SRK (2011)	-	8.12	0.36	7.76	248	237	0.5	-	237	184	2.3	PAF	High Red
HIT	398XC10	204	204.8	HMD	PR	FR	796013	-	SRK (2011)	-	7.83	0.08	7.75	240	237	18	-	219	172	2.2	PAF	High Red
HIT	398XC10	218	218.8	HMD	PR	FR	796014	-	SRK (2011)	-	7.89	0.17	7.72	241	236	4	-	232	173	2.2	PAF	High Red
HIT	398XC10	262	262.8	HMD	PH	FR	796015	-	SRK (2011)	-	7.79	0.14	7.65	238	234	0.5	-	234	177	2.0	PAF	High Red
HIT	398XC10	372	373	HMD	PH	FR	796016	-	SRK (2011)	-	7.40	0.12	7.28	226	223	5	-	218	173	2.1	PAF	High Red
HIT	398XC10	454	455	HMD	PH	FR	796017	-	SRK (2011)	-	7.11	0.10	7.01	218	215	6	-	209	150	2.3	PAF	High Red
HIT	398XC10	502	503	HMD	PH	FR	796018	-	SRK (2011)	-	6.76	0.06	6.70	207	205	0.5	-	205	154	2.4	PAF	High Red
HIT	412XC10	42	42.4	FT	FR	SEG	796019	-	SRK (2011)	-	6.75	0.11	6.64	207	203	20	-	183	155	2.2	PAF	High Red
HIT	412XC10	52	52.4	FT	FR	FR	796020	-	SRK (2011)	-	6.58	0.11	6.47	201	198	7	-	191	152	2.2	PAF	High Red
HIT	415XC10	48	48.4	FT	FR	SEG	796021	-	SRK (2011)	-	6.59	0.12	6.47	202	198	4	-	194	116	2.4	PAF	High Red
HIT	415XC10	94	94.4	HMD	PO	FR	796022	-	SRK (2011)	-	6.53	0.12	6.41	200	196	20	-	176	137	2.2	PAF	High Red
HIT	415XC10	122	122.8	HMD	PO	FR	796023	-	SRK (2011)	-	6.41	0.07	6.34	196	194	12	-	182	157	2.1	PAF	High Red
HIT	415XC10	150	150.8	HMD	PO	FR	796024	-	SRK (2011)	-	6.43	0.15	6.28	197	192	0.5	-	192	88	2.5	PAF	High Red
HIT	415XC10	162	162.8	HMD	PO	FR	796025	-	SRK (2011)	-	6.42	0.18	6.24	196	191	0.5	-	190	121	2.4	PAF	High Red
HIT	415XC10	181	181.8	FT	FR	FR	796026	-	SRK (2011)	-	6.31	0.09	6.22	193	190	0.5	-	190	140	2.4	PAF	High Red
HIT	415XC10	190	190.8	FT	FR	FR	796027	-	SRK (2011)	-	6.29	0.15	6.14	192	188	0.5	-	187	166	2.2	PAF	High Red
HIT	415XC10	203	203.8	FT	FR	FR	796028	-	SRK (2011)	-	9.17	3.08	6.09	281	186	20	-	166	31	2.2	PAF	High Red
HIT	415XC10	266	266.8	FT	FR	FR	796029	-	SRK (2011)	-	10.65	4.63	6.02	326	184	5	-	179	138	2.3	PAF	High Red
HIT	415XC10	286	286.8	FT	FR	FR	796030	-	SRK (2011)	-	6.11	0.13	5.98	187	183	1	-	182	130	2.4	PAF	High Red
HIT	415XC10	304	304.8	FT	FR	FR	796031	-	SRK (2011)	-	5.99	0.10	5.89	183	180	1	-	180	148	2.4	PAF	High Red
HIT	415XC10	374	375	HMD	PO	FR	796032	-	SRK (2011)	-	5.95	0.07	5.88	182	180	0.5	-	179	154	2.2	PAF	High Red

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval From (m)	Interval To (m)	Lithology	Alteration	Weathing	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT (kg H_2SO_4/t) MPA	AP	ANC	CNV	NAPP	NAG TEST NAG Value	NAG pH	ARD Class	Waste Type
HIT	429XC10	26	26.4	HMD	PH	POX	796033	-	SRK (2011)	-	5.96	0.12	5.84	182	179	1	-	178	126	2.3	PAF	High Red
HIT	429XC10	66	66.4	HMD	PH	FR	796034	-	SRK (2011)	-	5.93	0.10	5.83	181	178	7	-	171	128	2.2	PAF	High Red
HIT	429XC10	106	106.4	HMD	PH	FR	796035	-	SRK (2011)	-	5.88	0.09	5.79	180	177	5	-	172	193	2.2	PAF	High Red
HIT	429XC10	148	148.4	HMD	PH	FR	796036	-	SRK (2011)	-	5.89	0.10	5.79	180	177	2	-	175	113	2.5	PAF	High Red
HIT	429XC10	162	162.4	HMD	PH	FR	796037	-	SRK (2011)	-	5.84	0.10	5.74	179	176	0.5	-	175	132	2.4	PAF	High Red
HIT	429XC10	222	222.8	HMD	PH	FR	796038	-	SRK (2011)	-	5.72	0.09	5.63	175	172	1	-	171	123	2.5	PAF	High Red
HIT	429XC10	248	248.8	HMD	PH	FR	796039	-	SRK (2011)	-	5.70	0.09	5.61	174	172	1	-	170	76	2.6	PAF	High Red
HIT	429XC10	272	272.8	HMD	PH	FR	796040	-	SRK (2011)	-	5.73	0.14	5.59	175	171	18	-	153	133	2.2	PAF	High Red
HIT	429XC10	280	280.8	HMD	PH	FR	796041	-	SRK (2011)	-	5.68	0.10	5.58	174	171	11	-	160	117	2.2	PAF	High Red
HIT	429XC10	300	300.8	HMD	PH	FR	796042	-	SRK (2011)	-	5.65	0.08	5.57	173	170	16	-	154	111	2.2	PAF	High Red
HIT	429XC10	324	324.8	HMD	PH	FR	796043	-	SRK (2011)	-	5.64	0.10	5.54	173	170	17	-	153	130	2.3	PAF	High Red
HIT	429XC10	356	356.8	HMD	PH	FR	796044	-	SRK (2011)	-	5.61	0.09	5.52	172	169	0.5	-	168	119	2.3	PAF	High Red
HIT	429XC10	402	402.8	HMD	PH	FR	796045	-	SRK (2011)	-	5.65	0.14	5.51	173	169	5	-	164	72	2.6	PAF	High Red
HIT	429XC10	424	424.8	FT	FR	FR	796046	-	SRK (2011)	-	5.58	0.08	5.50	171	168	9	-	159	121	2.4	PAF	High Red
HIT	429XC10	438	438.8	FT	FR	FR	796047	-	SRK (2011)	-	5.58	0.12	5.46	171	167	0.5	-	167	142	2.1	PAF	High Red
HIT	429XC10	450	450.8	FT	FR	FR	796048	-	SRK (2011)	-	5.46	0.09	5.37	167	164	0.5	-	164	125	2.3	PAF	High Red
HIT	429XC10	454	454.8	FT	FR	FR	796049	-	SRK (2011)	-	5.45	0.11	5.34	167	163	27	-	137	124	2.3	PAF	High Red
HIT	489XC10	19	19.4	FDP	PH	POX	796050	-	SRK (2011)	-	5.38	0.08	5.30	165	162	29	-	133	107	2.3	PAF	High Red
HIT	489XC10	54	54.4	FDP	PH	POX	796051	-	SRK (2011)	-	5.39	0.13	5.26	165	161	8	-	153	131	2.3	PAF	High Red
HIT	489XC10	62	62.4	FDP	PH	FR	796052	-	SRK (2011)	-	5.30	0.09	5.21	162	159	0.5	-	159	132	2.3	PAF	High Red
HIT	489XC10	94	94.4	FDP	PH	FR	796053	-	SRK (2011)	-	10.35	5.35	5.00	317	153	10	-	143	120	2.3	PAF	High Red
HIT	489XC10	118	118.4	FDP	PH	FR	796054	-	SRK (2011)	-	5.06	0.07	4.99	155	153	16	-	136	124	2.2	PAF	High Red
HIT	489XC10	133	133.4	FT	FR	FR	796055	-	SRK (2011)	-	6.28	1.34	4.94	192	151	33	-	118	79	2.3	PAF	High Red
HIT	489XC10	145	145.4	FT	FR	FR	796056	-	SRK (2011)	-	5.00	0.07	4.93	153	151	7	-	144	123	2.2	PAF	High Red
HIT	489XC10	174	174.8	FDP	PH	FR	796057	-	SRK (2011)	-	4.98	0.11	4.87	152	149	0.5	-	149	124	2.3	PAF	High Red
HIT	489XC10	190	190.8	FDP	PH	FR	796058	-	SRK (2011)	-	4.93	0.08	4.85	151	148	17	-	131	99	2.4	PAF	High Red
HIT	489XC10	212	212.8	FDP	PH	FR	796059	-	SRK (2011)	-	4.96	0.11	4.85	152	148	16	-	133	104	2.4	PAF	High Red
HIT	492XC10	18	18.4	HMD	PH	FR	796060	-	SRK (2011)	-	4.88	0.05	4.83	149	148	0.5	-	147	122	2.4	PAF	High Red
HIT	492XC10	23	23.4	HMD	PH	FR	796061	-	SRK (2011)	-	4.87	0.07	4.80	149	147	30	-	117	143	2.3	PAF	High Red
HIT	492XC10	27	27.4	HMD	PH	FR	796062	-	SRK (2011)	-	4.84	0.06	4.78	148	146	7	-	139	124	2.3	PAF	High Red
HIT	492XC10	43	43.4	HMD	PH	FR	796063	-	SRK (2011)	-	5.04	0.30	4.74	154	145	3	-	142	73	2.4	PAF	High Red
HIT	492XC10	47	47.4	HMD	PH	FR	796064	-	SRK (2011)	-	4.86	0.12	4.74	149	145	5	-	140	88	2.6	PAF	High Red
HIT	492XC10	51	51.4	HMD	PH	FR	796065	-	SRK (2011)	-	4.76	0.07	4.69	146	144	0.5	-	143	108	2.2	PAF	High Red
HIT	492XC10	56	56.4	HMD	PH	FR	796066	-	SRK (2011)	-	4.92	0.25	4.67	151	143	0.5	-	142	58	2.7	PAF	High Red
HIT	492XC10	73	73.4	HMD	PH	FR	796067	-	SRK (2011)	-	7.37	2.70	4.67	226	143	30	-	113	62	2.7	PAF	High Red
HIT	492XC10	82	82.4	HMD	PH	FR	796068	-	SRK (2011)	-	4.53	0.06	4.47	139	137	17	-	119	93	2.3	PAF	High Red
HIT	492XC10	88	88.4	HMD	PH	FR	796069	-	SRK (2011)	-	4.57	0.12	4.45	140	136	0.5	-	136	72	2.6	PAF	High Red
HIT	492XC10	93	93.4	FDP	PH	FR	796070	-	SRK (2011)	-	4.51	0.09	4.42	138	135	16	-	120	106	2.4	PAF	High Red
HIT	492XC10	96	96.4	FDP	PH	FR	796071	-	SRK (2011)	-	4.44	0.08	4.36	136	133	36	-	98	95	2.4	PAF	High Red
HIT	492XC10	104	104.4	FDP	PH	FR	796072	-	SRK (2011)	-	4.49	0.14	4.35	137	133	4	-	129	94	2.7	PAF	High Red
HIT	492XC10	110	110.4	FDP	PH	FR	796073	-	SRK (2011)	-	4.33	0.09	4.24	132	130	17	-	113	62	2.8	PAF	High Red

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval		Lithology	Alteration	Weathering	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT					NAG TEST		ARD Class	Waste Type
		From (m)	To (m)											MPA (kg H_2SO_4/t)	AP (kg H_2SO_4/t)	ANC (kg H_2SO_4/t)	CNV (kg H_2SO_4/t)	NAPP (kg H_2SO_4/t)	NAG Value	NAG pH		
HIT	492XC10	116	116.4	FDP	PH	FR	796074	-	SRK (2011)	-	4.30	0.07	4.23	132	129	32	-	98	88	2.5	PAF	High Red
HIT	492XC10	194	194.8	HMD	PH	FR	796075	-	SRK (2011)	-	4.31	0.12	4.19	132	128	3	-	125	72	2.4	PAF	High Red
HIT	492XC10	284	284.8	HMD	PH	FR	796076	-	SRK (2011)	-	4.25	0.06	4.19	130	128	0.5	-	128	114	2.3	PAF	High Red
HIT	505XC10	8	8.4	FDP	PH	POX	796077	-	SRK (2011)	-	4.24	0.05	4.19	130	128	18	-	110	99	2.3	PAF	High Red
HIT	505XC10	19	19.4	FDP	PH	POX	796078	-	SRK (2011)	-	4.51	0.33	4.18	138	128	3	-	125	71	2.5	PAF	High Red
HIT	505XC10	24	24.4	FDP	PH	POX	796079	-	SRK (2011)	-	4.21	0.15	4.06	129	124	13	-	111	65	3.3	PAF	High Red
HIT	505XC10	28	28.4	FDP	PH	POX	796080	-	SRK (2011)	-	4.17	0.13	4.04	128	124	12	-	112	64	2.8	PAF	High Red
HIT	505XC10	36	36.4	FDP	PH	POX	796081	-	SRK (2011)	-	7.42	3.42	4.00	227	122	24	-	98	70	2.4	PAF	High Red
HIT	505XC10	62	62.4	FDP	PH	POX	796082	-	SRK (2011)	-	4.10	0.12	3.98	125	122	8	-	114	94	2.4	PAF	High Red
HIT	505XC10	84	84.4	FDP	PH	POX	796083	-	SRK (2011)	-	3.99	0.08	3.91	122	120	14	-	106	50	3.0	PAF	High Red
HIT	505XC10	87	87.4	FDP	PH	POX	796084	-	SRK (2011)	-	3.97	0.08	3.89	121	119	1	-	118	102	2.1	PAF	High Red
HIT	505XC10	94	94.4	FDP	PH	POX	796085	-	SRK (2011)	-	3.94	0.07	3.87	121	118	15	-	103	55	2.8	PAF	High Red
HIT	505XC10	99	99.4	FDP	PH	POX	796086	-	SRK (2011)	-	3.97	0.10	3.87	121	118	15	-	103	96	2.5	PAF	High Red
HIT	505XC10	102	102.4	FDP	PH	POX	796087	-	SRK (2011)	-	3.91	0.10	3.81	120	117	6	-	111	61	2.7	PAF	High Red
HIT	505XC10	106	106.4	FDP	PH	POX	796088	-	SRK (2011)	-	3.87	0.07	3.80	118	116	19	-	97	82	2.5	PAF	High Red
HIT	505XC10	112	112.4	FDP	PH	POX	796089	-	SRK (2011)	-	3.75	0.04	3.71	115	114	32	-	82	71	2.5	PAF	High Red
HIT	505XC10	119	119.4	FDP	PH	POX	796090	-	SRK (2011)	-	3.80	0.10	3.70	116	113	5	-	108	87	2.7	PAF	High Red
HIT	505XC10	122	122.4	FDP	PH	POX	796091	-	SRK (2011)	-	3.79	0.11	3.68	116	113	24	-	89	17	3.2	PAF	High Red
HIT	505XC10	127	127.4	FDP	PH	POX	796092	-	SRK (2011)	-	3.64	0.04	3.60	111	110	18	-	93	82	2.4	PAF	High Red
HIT	505XC10	136	136.4	FDP	PH	POX	796093	-	SRK (2011)	-	3.70	0.11	3.59	113	110	24	-	85	68	2.6	PAF	High Red
HIT	505XC10	138.6	139	FDP	PH	POX	796094	-	SRK (2011)	-	3.64	0.05	3.59	111	110	2	-	108	93	2.2	PAF	High Red
HIT	505XC10	143	143.4	FDP	PH	FR	796095	-	SRK (2011)	-	3.59	0.10	3.49	110	107	19	-	88	54	3.0	PAF	High Red
HIT	505XC10	151	151.4	FDP	PH	FR	796096	-	SRK (2011)	-	3.53	0.08	3.45	108	106	35	-	71	17	3.7	PAF	High Red
HIT	505XC10	156	156.4	FDP	PH	FR	796097	-	SRK (2011)	-	3.46	0.06	3.40	106	104	21	-	83	77	2.5	PAF	High Red
HIT	506XC10	8	8.4	AL	NONE	AL	796098	-	SRK (2011)	-	3.45	0.10	3.35	106	103	31	-	72	53	3.0	PAF	High Red
HIT	506XC10	12	12.4	AL	NONE	AL	796099	-	SRK (2011)	-	3.38	0.06	3.32	103	102	29	-	72	78	2.5	PAF	High Red
HIT	506XC10	18	18.4	DVp	PH	POX	796100	-	SRK (2011)	-	8.18	4.89	3.29	250	101	18	-	83	46	2.8	PAF	High Red
HIT	506XC10	24	24.4	DVp	PH	POX	796101	-	SRK (2011)	-	3.33	0.08	3.25	102	99	2	-	97	89	2.4	PAF	High Red
HIT	506XC10	64	64.4	DVp	PH	FR	796102	-	SRK (2011)	-	4.34	1.12	3.22	133	99	31	-	68	52	2.7	PAF	High Red
HIT	506XC10	70	70.4	DVp	PH	FR	796103	-	SRK (2011)	-	7.37	4.16	3.21	226	98	28	-	70	63	2.5	PAF	High Red
HIT	506XC10	127	127.4	DVp	PH	FR	796104	-	SRK (2011)	-	3.29	0.09	3.20	101	98	24	-	74	23	2.7	PAF	High Red
HIT	506XC10	136	136.4	DVp	PH	FR	796105	-	SRK (2011)	-	3.21	0.06	3.15	98	96	25	-	72	77	2.5	PAF	High Red
HIT	506XC10	144	144.4	DVp	PH	FR	796106	-	SRK (2011)	-	3.18	0.06	3.12	97	95	0.5	-	95	72	2.5	PAF	High Red
HIT	506XC10	166	166.8	DVp	PH	FR	796107	-	SRK (2011)	-	3.17	0.05	3.12	97	95	39	-	56	61	2.6	PAF	High Red
HIT	506XC10	172	172.8	DVp	PH	FR	796108	-	SRK (2011)	-	3.14	0.05	3.09	96	95	28	-	66	64	2.6	PAF	High Red
HIT	506XC10	190	190.8	DVp	PH	FR	796109	-	SRK (2011)	-	3.16	0.07	3.09	97	95	13	-	82	53	2.9	PAF	High Red
HIT	506XC10	202	202.8	FDP	PR	FR	796110	-	SRK (2011)	-	3.09	0.04	3.05	95	93	47	-	47	62	2.6	PAF	High Red
HIT	506XC10	216	216.8	FDP	PR	FR	796111	-	SRK (2011)	-	6.02	3.01	3.01	184	92	38	-	55	10	3.6	PAF	High Red
HIT	506XC10	217	217.8	FDP	PR	FR	796112	-	SRK (2011)	-	3.07	0.06	3.01	94	92	31	-	61	56	2.7	PAF	High Red
HIT	506XC10	224	224.8	FDP	PR	FR	796113	-	SRK (2011)	-	7.04	4.09	2.95	215	90	20	-	70	55	2.8	PAF	High Red
HIT	506XC10	227	227.8	FDP	PR	FR	796114	-	SRK (2011)	-	3.03	0.10	2.93	93	90	17	-	72	68	3.0	PAF	High Red

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval		Lithology	Alteration	Weathing	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT (kg H_2SO_4/t)					NAG TEST		ARD Class	Waste Type
		From (m)	To (m)											MPA	AP	ANC	CNV	NAPP	NAG Value	NAG pH		
HIT	506XC10	234	234.8	FDP	PR	FR	796115	-	SRK (2011)	-	2.98	0.06	2.92	91	89	19	-	70	60	3.0	PAF	Red
HIT	506XC10	247	247.8	FDP	PR	FR	796116	-	SRK (2011)	-	2.94	0.04	2.90	90	89	27	-	62	54	2.6	PAF	Red
HIT	506XC10	260	260.8	FDP	PR	FR	796117	-	SRK (2011)	-	2.90	0.04	2.86	89	88	37	-	51	54	2.7	PAF	Red
HIT	515XC10	20	20.4	DVa	PH	POX	796118	-	SRK (2011)	-	2.85	0.05	2.80	87	86	20	-	66	62	2.6	PAF	Red
HIT	515XC10	26	26.4	DVa	PH	POX	796119	-	SRK (2011)	-	2.89	0.11	2.78	88	85	13	-	72	23	2.8	PAF	Red
HIT	515XC10	34	34.4	DVa	PH	POX	796120	-	SRK (2011)	-	7.05	4.37	2.68	216	82	19	-	63	62	2.7	PAF	High Red
HIT	515XC10	45	45.4	DVa	PH	FR	796121	-	SRK (2011)	-	2.78	0.10	2.68	85	82	13	-	69	54	3.0	PAF	Red
HIT	515XC10	58	58.4	DVa	PH	FR	796122	-	SRK (2011)	-	2.73	0.07	2.66	84	81	32	-	50	58	2.8	PAF	Red
HIT	515XC10	64	64.4	FDP	PH	FR	796123	-	SRK (2011)	-	2.70	0.05	2.65	83	81	28	-	53	62	2.6	PAF	Red
HIT	515XC10	76	76.4	FDP	PH	FR	796124	-	SRK (2011)	-	2.70	0.11	2.59	83	79	0.5	-	79	151	2.3	PAF	Red
HIT	515XC10	88	88.4	FDP	PH	FR	796125	-	SRK (2011)	-	4.90	2.40	2.50	150	77	37	-	40	0	8.7	UC(paf)	High Red
HIT	515XC10	94	94.4	FDP	PH	FR	796126	-	SRK (2011)	-	2.65	0.18	2.47	81	76	40	-	35	8	4.5	PAF	Red
HIT	515XC10	96	96.4	FDP	PH	FR	796127	-	SRK (2011)	-	2.54	0.08	2.46	78	75	33	-	42	43	3.0	PAF	Red
HIT	515XC10	100	100.4	FDP	PH	FR	796128	-	SRK (2011)	-	2.69	0.24	2.45	82	75	6	-	69	22	3.2	PAF	Red
HIT	515XC10	102	102.4	FDP	PH	FR	796129	-	SRK (2011)	-	2.51	0.06	2.45	77	75	29	-	46	13	3.4	PAF	Red
HIT	515XC10	108	108.4	FDP	PH	FR	796130	-	SRK (2011)	-	2.51	0.07	2.44	77	75	5	-	70	56	2.7	PAF	Red
HIT	515XC10	114	114.8	FDP	PH	FR	796131	-	SRK (2011)	-	2.42	0.08	2.34	74	72	20	-	51	17	3.0	PAF	Red
HIT	515XC10	118	118.8	FDP	PH	FR	796132	-	SRK (2011)	-	2.41	0.09	2.32	74	71	5	-	66	45	2.9	PAF	Red
HIT	515XC10	126	126.8	FDP	PH	FR	796133	-	SRK (2011)	-	2.33	0.07	2.26	71	69	41	-	28	43	2.9	PAF	Red
HIT	515XC10	130	130.8	FDP	PH	FR	796134	-	SRK (2011)	-	2.26	0.03	2.23	69	68	37	-	32	42	2.9	PAF	Red
HIT	515XC10	136	136.8	FDP	PH	FR	796135	-	SRK (2011)	-	2.23	0.05	2.18	68	67	39	-	28	40	2.8	PAF	Red
HIT	515XC10	138	138.8	FDP	PH	FR	796136	-	SRK (2011)	-	2.44	0.27	2.17	75	66	0.5	-	66	4	4.0	PAF	Red
HIT	515XC10	144	144.8	FDP	PR	FR	796137	-	SRK (2011)	-	2.31	0.17	2.14	71	65	2	-	63	17	3.5	PAF	Red
HIT	515XC10	149	149.8	FDP	PR	FR	796138	-	SRK (2011)	-	2.13	0.04	2.09	65	64	39	-	25	41	2.8	PAF	Red
HIT	515XC10	152	152.8	FDP	PR	FR	796139	-	SRK (2011)	-	2.19	0.10	2.09	67	64	8	-	56	21	2.8	PAF	Red
HIT	515XC10	160	160.8	FDP	PR	FR	796140	-	SRK (2011)	-	2.24	0.17	2.07	69	63	4	-	60	49	3.6	PAF	Red
HIT	515XC10	165	165.8	FDP	PR	FR	796141	-	SRK (2011)	-	4.89	2.84	2.05	150	63	24	-	39	6	4.4	PAF	High Red
HIT	515XC10	169	169.8	FDP	PR	FR	796142	-	SRK (2011)	-	2.11	0.06	2.05	65	63	2	-	61	43	2.6	PAF	Red
HIT	515XC10	174	174.8	FDP	PR	FR	796143	-	SRK (2011)	-	2.10	0.10	2.00	64	61	1	-	60	0	4.8	UC(paf)	Red
HIT	515XC10	180	180.8	FDP	PR	FR	796144	-	SRK (2011)	-	2.21	0.23	1.98	68	61	16	-	45	16	3.7	PAF	Red
HIT	515XC10	185	185.8	FDP	PR	FR	796145	-	SRK (2011)	-	3.78	1.82	1.96	116	60	28	-	32	6	4.5	PAF	High Red
HIT	515XC10	190	190.8	FDP	PR	FR	796146	-	SRK (2011)	-	1.99	0.05	1.94	61	59	11	-	48	14	3.7	PAF	Red
HIT	515XC10	198	198.8	FDP	PR	FR	796147	-	SRK (2011)	-	1.98	0.05	1.93	61	59	12	-	47	16	3.4	PAF	Red
HIT	515XC10	204	204.8	FDP	PR	FR	796148	-	SRK (2011)	-	4.69	2.83	1.86	144	57	31	-	26	21	3.2	PAF	High Red
HIT	515XC10	206	206.8	FDP	PR	FR	796149	-	SRK (2011)	-	4.98	3.15	1.83	152	56	23	-	33	7	4.2	PAF	High Red
HIT	515XC10	208	208.8	FDP	PR	FR	796150	-	SRK (2011)	-	2.08	0.36	1.72	64	53	0.5	-	52	50	3.0	PAF	Red
HIT	515XC10	214	214.8	FDP	PR	FR	796151	-	SRK (2011)	-	5.64	3.99	1.65	173	50	32	-	19	4	4.1	PAF	High Red
HIT	515XC10	218	218.8	FDP	PR	FR	796152	-	SRK (2011)	-	1.77	0.13	1.64	54	50	15	-	35	11	3.8	PAF	Red
HIT	515XC10	222	222.8	FDP	PR	FR	796153	-	SRK (2011)	-	1.68	0.11	1.57	51	48	26	-	22	0	4.7	UC(paf)	Red
HIT	515XC10	226	226.8	FDP	PR	FR	796154	-	SRK (2011)	-	4.83	3.26	1.57	148	48	34	-	14	0	5.2	UC(paf)	High Red
HIT	515XC10	229	229.8	FDP	PR	FR	796155	-	SRK (2011)	-	1.65	0.08	1.57	50	48	6	-	42	37	3.2	PAF	Red

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval From (m)	Interval To (m)	Lithology	Alteration	Weathering	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT MPA (kg H_2SO_4/t)	AP	ANC	CNV	NAPP	NAG TEST NAG Value	NAG pH	ARD Class	Waste Type
HIT	515XC10	232	232.8	FDP	PR	FR	796156	-	SRK (2011)	-	1.58	0.03	1.55	48	47	18	-	30	20	2.7	PAF	Red
HIT	515XC10	240	240.8	FDP	PH	FR	796157	-	SRK (2011)	-	1.60	0.06	1.54	49	47	37	-	11	3	4.5	PAF	Red
HIT	515XC10	243	243.8	FDP	PH	FR	796158	-	SRK (2011)	-	1.62	0.09	1.53	50	47	22	-	24	7	3.7	PAF	Red
HIT	515XC10	248	248.8	FDP	PH	FR	796159	-	SRK (2011)	-	1.51	0.03	1.48	46	45	34	-	11	23	3.0	PAF	Red
HIT	515XC10	256	256.8	FDP	PH	FR	796160	-	SRK (2011)	-	1.51	0.04	1.47	46	45	39	-	6	19	3.4	PAF	Red
HIT	515XC10	262	262.8	FDP	PH	FR	796161	-	SRK (2011)	-	1.40	0.04	1.36	43	42	45	-	-4	8	4.0	UC(paf)	Red
HIT	515XC10	270	270.8	FDP	PH	FR	796162	-	SRK (2011)	-	1.44	0.09	1.35	44	41	18	-	23	16	4.1	PAF	Red
HIT	515XC10	284	284.8	FDP	SA	FR	796163	-	SRK (2011)	-	1.25	0.05	1.20	38	37	44	-	-7	0	8.2	NAF	Red
HIT	516XC10	5	5.4	AL	NONE	AL	796164	-	SRK (2011)	-	1.22	0.04	1.18	37	36	3	-	34	13	3.3	PAF	Red
HIT	516XC10	17	17.4	DVp	PH	TOX	796165	-	SRK (2011)	-	1.54	0.37	1.17	47	36	59	-	-23	0	8.8	NAF	Red
HIT	516XC10	28	28.4	DVp	PH	POX	796166	-	SRK (2011)	-	1.34	0.20	1.14	41	35	1	-	34	0	4.8	UC(paf)	Red
HIT	516XC10	35	35.4	DVp	PH	POX	796167	-	SRK (2011)	-	1.30	0.16	1.14	40	35	7	-	28	1	4.0	PAF	Red
HIT	516XC10	41	41.4	DVp	PH	POX	796168	-	SRK (2011)	-	1.21	0.09	1.12	37	34	0.5	-	34	151	2.3	PAF	Red
HIT	516XC10	45	45.4	DVp	PH	POX	796169	-	SRK (2011)	-	1.14	0.03	1.11	35	34	19	-	15	0	4.6	UC(paf)	Red
HIT	516XC10	50	50.4	DVp	PH	POX	796170	-	SRK (2011)	-	1.81	0.70	1.11	55	34	8	-	26	13	3.2	PAF	Red
HIT	516XC10	54	54.4	DVp	PH	POX	796171	-	SRK (2011)	-	1.10	0.03	1.07	34	33	32	-	1	14	3.0	PAF	Red
HIT	516XC10	58	58.4	DVp	PH	POX	796172	-	SRK (2011)	-	1.06	0.03	1.03	32	32	38	-	-7	12	3.5	UC(paf)	Red
HIT	516XC10	62	62.4	DVp	PH	POX	796173	-	SRK (2011)	-	1.85	0.88	0.97	57	30	47	-	-17	0	8.2	NAF	Red
HIT	516XC10	66	66.4	DVp	PH	POX	796174	-	SRK (2011)	-	0.99	0.03	0.96	30	29	56	-	-26	0	9.6	NAF	Amber
HIT	516XC10	72	72.4	DVp	PH	POX	796175	-	SRK (2011)	-	0.99	0.04	0.95	30	29	34	-	-5	9	3.8	UC(paf)	Amber
HIT	516XC10	76	76.4	DVp	PH	POX	796176	-	SRK (2011)	-	0.98	0.03	0.95	30	29	32	-	-3	8	3.8	UC(paf)	Amber
HIT	516XC10	78	78.4	DVp	PH	POX	796177	-	SRK (2011)	-	0.97	0.05	0.92	30	28	8	-	20	12	3.9	PAF	Amber
HIT	516XC10	83	83.4	DVp	PH	POX	796178	-	SRK (2011)	-	1.75	0.90	0.85	54	26	34	-	-8	6	3.9	UC(paf)	Red
HIT	516XC10	88	88.4	DVp	PH	POX	796179	-	SRK (2011)	-	1.20	0.35	0.85	37	26	0.5	-	26	5	3.9	PAF	Red
HIT	516XC10	166	166.4	DVp	QIP	FR	796180	-	SRK (2011)	-	0.85	0.04	0.81	26	25	19	-	6	3	4.4	PAF	Amber
HIT	516XC10	206	206.8	DVp	QIP	FR	796181	-	SRK (2011)	-	0.82	0.03	0.79	25	24	11	-	13	6	3.7	PAF	Amber
HIT	516XC10	214	214.8	DVp	QIP	FR	796182	-	SRK (2011)	-	0.84	0.06	0.78	26	24	14	-	9	4	4.2	PAF	Amber
HIT	516XC10	224	224.8	DVp	PH	FR	796183	-	SRK (2011)	-	1.49	0.71	0.78	46	24	56	-	-32	0	10.5	NAF	Red
HIT	516XC10	232	232.8	DVp	PH	FR	796184	-	SRK (2011)	-	0.81	0.03	0.78	25	24	29	-	-5	8	3.8	UC(paf)	Amber
HIT	516XC10	236	236.8	DVp	PH	FR	796185	-	SRK (2011)	-	0.81	0.07	0.74	25	23	43	-	-21	0	8.2	NAF	Amber
HIT	516XC10	240	240.8	DVp	PH	FR	796186	-	SRK (2011)	-	0.75	0.07	0.68	23	21	7	-	14	9	4.0	PAF	Amber
HIT	516XC10	244	244.8	DVp	PH	FR	796187	-	SRK (2011)	-	1.33	0.66	0.67	41	21	57	-	-37	0	10.4	NAF	Red
HIT	516XC10	251	251.8	DVp	PH	FR	796188	-	SRK (2011)	-	0.69	0.03	0.66	21	20	16	-	4	7	4.0	PAF	Amber
HIT	516XC10	254	254.8	DVp	PH	FR	796189	-	SRK (2011)	-	0.64	0.03	0.61	20	19	19	-	0	7	3.5	PAF	Amber
HIT	516XC10	257	257.8	DVp	PH	FR	796190	-	SRK (2011)	-	1.24	0.64	0.60	38	18	38	-	-19	0	8.0	NAF	Red
HIT	516XC10	260	260.8	DVp	PH	FR	796191	-	SRK (2011)	-	0.63	0.03	0.60	19	18	32	-	-13	5	3.8	UC(paf)	Amber
HIT	516XC10	263	263.8	DVp	PH	FR	796192	-	SRK (2011)	-	0.62	0.02	0.60	19	18	39	-	-21	0	4.5	NAF	Amber
HIT	516XC10	266	266.8	DVp	PH	FR	796193	-	SRK (2011)	-	1.47	0.92	0.55	45	17	39	-	-22	0	8.6	NAF	Red
HIT	516XC10	268	268.8	DVp	PH	FR	796194	-	SRK (2011)	-	0.65	0.10	0.55	20	17	31	-	-15	60	2.8	UC(paf)	Amber
HIT	516XC10	272	272.8	DVp	PH	FR	796195	-	SRK (2011)	-	0.56	0.02	0.54	17	17	38	-	-22	0	6.2	NAF	Amber
HIT	516XC10	275	275.8	DVp	PH	FR	796196	-	SRK (2011)	-	0.54	0.02	0.52	17	16	39	-	-23	0	5.0	NAF	Amber

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval From (m)	Interval To (m)	Lithology	Alteration	Weathering	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT MPA (kg H_2SO_4/t)	AP	ANC	CNV	NAPP	NAG TEST NAG Value	NAG pH	ARD Class	Waste Type
HIT	516XC10	278	278.8	DVp	PH	FR	796197	-	SRK (2011)	-	0.51	0.02	0.49	16	15	41	-	-26	0	6.1	NAF	Amber
HIT	516XC10	283	283.8	DVp	PH	FR	796198	-	SRK (2011)	-	0.48	0.04	0.44	15	13	19	-	-6	0	4.8	NAF	Green
HIT	516XC10	286	286.8	DVp	PH	FR	796199	-	SRK (2011)	-	0.42	0.04	0.38	13	12	14	-	-2	0	5.2	NAF	Green
HIT	516XC10	289	289.8	DVp	PH	FR	796200	-	SRK (2011)	-	0.35	0.02	0.33	11	10	21	-	-10	0	5.9	NAF	Green
HIT	516XC10	292	292.8	DVp	PH	FR	796201	-	SRK (2011)	-	0.34	0.03	0.31	10	9	59	-	-50	0	9.7	NAF	Green
HIT	516XC10	296	296.8	DVp	PH	FR	796202	-	SRK (2011)	-	0.33	0.02	0.31	10	9	13	-	-3	3	4.3	UC(paf)	Green
HIT	516XC10	302	302.8	DVp	PH	FR	796203	-	SRK (2011)	-	0.59	0.31	0.28	18	9	37	-	-28	0	9.9	NAF	Amber
HIT	516XC10	333	333.8	DVp	PH	FR	796204	-	SRK (2011)	-	0.33	0.05	0.28	10	9	0.5	-	8	4	4.0	PAF	Green
HIT	516XC10	362	362.8	FDP	PH	FR	796205	-	SRK (2011)	-	0.28	0.03	0.25	9	8	0.5	-	7	0	5.1	UC(naf)	Green
HIT	516XC10	382	382.8	FDP	PH	FR	796206	-	SRK (2011)	-	0.22	0.03	0.19	7	6	12	-	-6	0	7.0	NAF	Green
HIT	516XC10	426	427	FDP	PH	FR	796207	-	SRK (2011)	-	0.19	0.04	0.15	6	5	8	-	-3	0	6.0	NAF	Green
HIT	516XC10	462	463	FDP	PH	FR	796208	-	SRK (2011)	-	0.22	0.08	0.14	7	4	0.5	-	4	0	4.5	UC(naf)	Green
HIT	516XC10	484	485	FDP	PH	FR	796209	-	SRK (2011)	-	0.16	0.04	0.12	5	4	8	-	-5	0	6.6	NAF	Green
HIT	516XC10	516	517	FDP	PH	FR	796210	-	SRK (2011)	-	0.14	0.02	0.12	4	4	10	-	-7	0	7.4	NAF	Green
HIT	522XC10	3	3.4	AL	NONE	AL	796211	-	SRK (2011)	-	0.08	0.02	0.06	2	2	52	-	-50	0	9.6	NAF	Green
HIT	522XC10	15	15.4	AL	NONE	AL	796212	-	SRK (2011)	-	0.08	0.02	0.06	2	2	12	-	-11	0	6.5	NAF	Green
HIT	522XC10	26	26.4	FDP	PH	POX	796213	-	SRK (2011)	-	0.09	0.03	0.06	3	2	4	-	-2	0	6.8	NAF	Green
HIT	522XC10	38	38.4	FDP	PH	FR	796214	-	SRK (2011)	-	0.07	0.03	0.04	2	1	14	-	-12	0	6.8	NAF	Green
HIT	522XC10	60	60.4	DVp	SI	FR	796215	-	SRK (2011)	-	0.62	0.58	0.04	19	1	63	-	-62	0	9.4	NAF	Amber
HIT	522XC10	108	108.4	FDP	PH	FR	796216	-	SRK (2011)	-	0.05	0.01	0.04	2	1	16	-	-14	0	7.0	NAF	Green
HIT	522XC10	128	128.4	FDP	PH	FR	796217	-	SRK (2011)	-	0.37	0.34	0.03	11	1	40	-	-39	0	9.4	NAF	Green
HIT	522XC10	134	134.4	FDP	PH	FR	796218	-	SRK (2011)	-	0.17	0.14	0.03	5	1	14	-	-13	0	6.8	NAF	Green
HIT	522XC10	140	140.4	FDP	PH	FR	796219	-	SRK (2011)	-	0.04	0.01	0.03	1	1	11	-	-10	0	6.9	NAF	Green
HIT	522XC10	146	146.4	FDP	PH	FR	796220	-	SRK (2011)	-	0.08	0.06	0.02	2	1	37	-	-36	0	7.4	NAF	Green
HIT	522XC10	154	154.4	FDP	PH	FR	796221	-	SRK (2011)	-	0.02	0.01	0.01	1	0	18	-	-17	0	7.3	NAF	Green
HIT	265XC09	12	14	HMD	PH	TOX	722047	10494	EGi (2016)	0.07	0.03	-	-	1	-	1	6	0	0	5.0	NAF	Green
HIT	265XC09	14	16	HMD	PH	TOX	722048	10495	EGi (2016)	0.10	0.02	-	-	1	-	0	8	0	0	4.6	NAF	Green
HIT	265XC09	26	28	HMD	PH	TOX	722055	10496	EGi (2016)	0.05	0.01	-	-	0	-	3	4	-2	0	5.1	NAF	Green
HIT	256XC09	0	2	HMD	NONE	TOX	723967	10497	EGi (2016)	0.08	0.79	-	-	24	-	0	7	24	13	3.2	PAF	Amber
HIT	326XC10	2	4	HMD	NONE	TOX	728297	10498	EGi (2016)	0.16	0.05	-	-	2	-	7	13	-6	0	4.5	NAF	Green
HIT	326XC10	10	12	HMD	NONE	TOX	728302	10499	EGi (2016)	0.06	0.03	-	-	1	-	2	5	-1	0	4.6	NAF	Green
HIT	235XC09	8	10	LW	NONE	TOX	729586	10500	EGi (2016)	0.05	0.05	-	-	2	-	4	4	-2	0	4.7	NAF	Green
HIT	241XC09	4	6	FT	NONE	TOX	732287	10501	EGi (2016)	0.11	0.04	-	-	1	-	4	9	-3	0	5.3	NAF	Green
HIT	267XC09	6	8	FDP	PH	TOX	732833	10502	EGi (2016)	0.15	0.03	-	-	1	-	1	12	0	0	4.6	NAF	Green
HIT	439XC10	8	12	FT	FR	TOX	745945	10503	EGi (2016)	0.06	0.01	-	-	0	-	4	5	-3	0	5.3	NAF	Green
HIT	439XC10	12	14	FT	FR	TOX	745946	10504	EGi (2016)	0.04	0.01	-	-	0	-	4	3	-4	0	7.2	NAF	Green
HIT	360XC10	12	14	HMD	NONE	TOX	746686	10505	EGi (2016)	0.12	0.03	-	-	1	-	3	10	-2	0	5.2	NAF	Green
HIT	370XC10	2	4	HMD	NONE	TOX	747349	10506	EGi (2016)	0.21	0.03	-	-	1	-	1	17	0	0	4.8	NAF	Green
HIT	388XC10	58	60	HMD	NONE	TOX	747778	10507	EGi (2016)	0.04	0.02	-	-	1	-	2	3	-2	0	4.9	NAF	Green
HIT	394XC10	12	14	HMD	NONE	TOX	747946	10508	EGi (2016)	0.04	0.01	-	-	0	-	1	3	-1	0	5.2	NAF	Green
HIT	373XC10	10	12	HMD	NONE	TOX	750118	10509	EGi (2016)	0.14	0.04	-	-	1	-	2	11	0	0	4.6	NAF	Green

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval		Lithology	Alteration	Weathing	Client Sample ID	EGi Sample ID	Study Year	Total Carbon	Total Sulfur	Sulphate Sulphur	Sulphide Sulphur	ACID-BASE ACCOUNT					NAG TEST		ARD Class	Waste Type
		From (m)	To (m)							(%C)	(%S)	(%S)	(%S)	MPA	AP	ANC	CNV	NAPP	NAG Value	NAG pH		
														(kg H_2SO_4/t)								
HIT	380XC10	16	18	HMD	NONE	TOX	750217	10510	EGi (2016)	0.06	0.02	-	-	1	-	1	5	-1	0	4.7	NAF	Green
HIT	510XC10	18	20	HMD	NONE	TOX	752111	10511	EGi (2016)	0.05	0.05	-	-	2	-	1	4	0	0	4.5	NAF	Green
HIT	466XC10	0	2	LW	NONE	TOX	755965	10512	EGi (2016)	0.58	0.05	-	-	2	-	1	47	0	7	3.9	UC(naf)	Green
HIT	479XC10	6	8	HMD	NONE	TOX	756125	10513	EGi (2016)	0.07	0.02	-	-	1	-	3	6	-2	0	5.0	NAF	Green
HIT	479XC10	14	16	HMD	NONE	TOX	756129	10514	EGi (2016)	0.04	0.02	-	-	1	-	2	3	-1	0	5.0	NAF	Green
HIT	479XC10	18	20	HMD	NONE	TOX	756132	10515	EGi (2016)	0.06	0.02	-	-	1	-	2	5	-1	0	4.9	NAF	Green
HIT	479XC10	20	22	HMD	NONE	TOX	756133	10516	EGi (2016)	0.05	0.02	-	-	1	-	1	4	-1	0	4.7	NAF	Green
HIT	479XC10	44	46	HMD	NONE	TOX	756146	10517	EGi (2016)	0.03	0.02	-	-	1	-	1	2	-1	0	4.6	NAF	Green
HIT	494XC10	28	30	HMD	NONE	TOX	756342	10518	EGi (2016)	0.03	0.02	-	-	1	-	3	2	-2	0	5.5	NAF	Green
HIT	494XC10	36	38	HMD	NONE	TOX	756346	10519	EGi (2016)	0.04	0.02	-	-	1	-	2	3	-1	0	5.1	NAF	Green
HIT	494XC10	44	46	HMD	NONE	TOX	756351	10520	EGi (2016)	0.05	0.04	-	-	1	-	2	4	-1	0	4.9	NAF	Green
HIT	436XC10	16	20	HMD	NONE	TOX	759801	10521	EGi (2016)	0.18	0.01	-	-	0	-	3	15	-3	0	5.3	NAF	Green
HIT	437XC10	4	6	HMD	NONE	TOX	759843	10522	EGi (2016)	0.06	0.03	-	-	1	-	1	5	0	0	4.8	NAF	Green
HIT	437XC10	8	10	HMD	NONE	TOX	759845	10523	EGi (2016)	0.17	0.03	-	-	1	-	3	14	-2	0	4.5	NAF	Green
HIT	437XC10	42	46	LW	NONE	TOX	759863	10524	EGi (2016)	0.03	0.12	-	-	4	-	4	2	0	3	4.2	UC(naf)	Green
HIT	450XC10	18	22	HMD	NONE	TOX	760011	10525	EGi (2016)	0.04	0.01	-	-	0	-	5	3	-4	0	5.5	NAF	Green
HIT	450XC10	24	26	HMD	NONE	TOX	760013	10526	EGi (2016)	0.05	0.01	-	-	0	-	4	4	-4	0	5.5	NAF	Green
HIT	450XC10	28	32	HMD	NONE	TOX	760015	10527	EGi (2016)	0.05	0.01	-	-	0	-	4	4	-4	0	5.3	NAF	Green
HIT	456XC10	0	4	FDP	NONE	TOX	760052	10528	EGi (2016)	0.20	0.03	-	-	1	-	4	16	-3	0	5.2	NAF	Green
HIT	467XC10	0	2	HMD	PO	TOX	760099	10529	EGi (2016)	0.17	0.04	-	-	1	-	1	14	0	0	4.5	NAF	Green
HIT	489XC10	4	6	FDP	NONE	TOX	760336	10530	EGi (2016)	0.06	0.06	-	-	2	-	3	5	-1	0	4.7	NAF	Green
HIT	483XC10	12	14	HMD	PO	TOX	763878	10531	EGi (2016)	0.07	0.01	-	-	0	-	3	6	-3	0	4.9	NAF	Green
HIT	483XC10	18	20	HMD	PO	TOX	763882	10532	EGi (2016)	0.04	0.01	-	-	0	-	4	3	-4	0	5.2	NAF	Green
HIT	483XC10	30	32	HMD	PO	TOX	763888	10533	EGi (2016)	0.04	0.06	-	-	2	-	2	3	0	0	4.5	NAF	Green
HIT	579XC11	18	20	HMD	NONE	TOX	764545	10534	EGi (2016)	0.04	0.01	-	-	0	-	2	3	-2	0	4.9	NAF	Green
HIT	579XC11	24	26	HMD	NONE	TOX	764548	10535	EGi (2016)	0.04	0.20	-	-	6	-	2	3	4	4	4.1	PAF	Green
HIT	579XC11	26	28	HMD	NONE	TOX	764549	10536	EGi (2016)	0.04	0.84	-	-	26	-	3	3	22	6	3.9	PAF	Amber
HIT	597XC11	2	4	HMD	NONE	TOX	764689	10537	EGi (2016)	0.10	0.03	-	-	1	-	1	8	0	0	4.5	NAF	Green
HIT	597XC11	14	16	HMD	NONE	TOX	764695	10538	EGi (2016)	0.02	0.01	-	-	0	-	3	2	-2	0	4.9	NAF	Green
HIT	597XC11	16	18	HMD	NONE	TOX	764696	10539	EGi (2016)	0.02	0.01	-	-	0	-	3	2	-3	0	5.2	NAF	Green
HIT	618XC11	12	14	HMD	NONE	TOX	764897	10540	EGi (2016)	0.08	0.05	-	-	2	-	0	7	2	6	4.2	UC(naf)	Green
HIT	482XC10	16	18	HMD	PH	TOX	768692	10541	EGi (2016)	0.01	1.85	-	-	57	-	0	1	57	45	2.3	PAF	Red
HIT	482XC10	28	30	HMD	PH	TOX	768698	10542	EGi (2016)	0.01	0.16	-	-	5	-	3	1	2	5	3.9	PAF	Green
HIT	571XC11	2	4	HBM	NONE	TOX	769699	10543	EGi (2016)	0.01	0.88	-	-	27	-	1	1	26	21	2.6	PAF	Amber
HIT	571XC11	4	6	HBM	NONE	TOX	769701	10544	EGi (2016)	0.03	0.38	-	-	12	-	2	2	10	4	4.4	PAF	Green
HIT	591XC11	0.8	2	HMD	NONE	TOX	769879	10545	EGi (2016)	0.30	0.03	-	-	1	-	1	25	-1	0	4.7	NAF	Green
HIT	591XC11	4	6	HMD	NONE	TOX	769882	10546	EGi (2016)	0.10	0.04	-	-	1	-	2	8	0	0	4.6	NAF	Green
HIT	591XC11	8	10	HMD	NONE	TOX	769884	10547	EGi (2016)	0.14	0.03	-	-	1	-	3	11	-2	0	4.5	NAF	Green
HIT	591XC11	18	20	HMD	NONE	TOX	769889	10548	EGi (2016)	0.02	0.04	-	-	1	-	2	2	-1	0	4.6	NAF	Green
HIT	497XC10	12	14	HMD	PH	TOX	774194	10549	EGi (2016)	0.03	0.02	-	-	1	-	2	2	-2	0	4.8	NAF	Green
HIT	497XC10	18	20	HMD	PH	TOX	774197	10550	EGi (2016)	0.03	0.01	-	-	0	-	3	2	-3	0	4.9	NAF	Green

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval		Lithology	Alteration	Weathering	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT ($kg\ H_2SO_4/t$)					NAG TEST		ARD Class	Waste Type
		From (m)	To (m)											MPA	AP	ANC	CNV	NAPP	NAG Value	NAG pH		
HIT	582XC11	6	8	HMD	NONE	TOX	775192	10551	EGi (2016)	0.11	0.05	-	-	2	-	0	9	2	0	4.6	UC(naf)	Green
HIT	449XC10	24	26	HMD	NONE	TOX	777873	10552	EGi (2016)	0.03	0.05	-	-	2	-	1	2	0	5	4.2	UC(naf)	Green
HIT	478XC10	16	18	HMD	NONE	TOX	778112	10553	EGi (2016)	0.02	1.09	-	-	33	-	0	2	34	21	2.5	PAF	Red
HIT	478XC10	18	20	HMD	NONE	TOX	778113	10554	EGi (2016)	0.01	0.08	-	-	2	-	1	1	1	6	3.8	UC(naf)	Green
HIT	478XC10	20	22	HMD	NONE	TOX	778114	10555	EGi (2016)	0.03	0.65	-	-	20	-	0	2	19	8	3.1	PAF	Amber
HIT	478XC10	24	26	HMD	NONE	TOX	778116	10556	EGi (2016)	0.03	0.16	-	-	5	-	0	2	5	5	3.2	PAF	Green
HIT	478XC10	30	32	HMD	NONE	TOX	778119	10557	EGi (2016)	0.02	0.11	-	-	3	-	1	2	2	3	3.7	UC(naf)	Green
HIT	484XC10	16.7	18	HMD	NONE	TOX	778192	10558	EGi (2016)	0.04	0.04	-	-	1	-	2	3	-1	0	4.6	NAF	Green
HIT	484XC10	20	22	HMD	NONE	TOX	778194	10559	EGi (2016)	0.04	0.04	-	-	1	-	2	3	-1	0	4.7	NAF	Green
HIT	558XC11	18	20	HMD	NONE	TOX	778633	10560	EGi (2016)	0.03	0.05	-	-	2	-	1	2	0	0	4.6	NAF	Green
Ekwai	660FC15	2	6	HMD	AR	TOX	800385	10629	EGi (2016)	0.32	0.07	-	-	2	-	2	26	0	0	4.6	NAF	Green
Ekwai	660FC15	14	16	LW	PO	POX	800391	10630	EGi (2016)	0.34	0.08	-	-	2	-	2	28	0	0	4.7	NAF	Green
Ekwai	660FC15	20	22	LW	PO	POX	800394	10631	EGi (2016)	0.02	0.04	-	-	1	-	3	2	-1	0	4.9	NAF	Green
Ekwai	660FC15	44	46	HMD	SCC	POX	800407	10632	EGi (2016)	0.01	0.67	-	-	21	-	17	1	3	4	3.9	PAF	Amber
Ekwai	660FC15	46	48	HMD	SCC	POX	800408	10633	EGi (2016)	0.01	0.36	-	-	11	-	17	1	-6	4	4.4	UC(paf)	Green
Ekwai	660FC15	48	50	HMD	SCC	POX	800409	10634	EGi (2016)	0.02	0.45	-	-	14	-	14	2	0	7	3.9	UC(paf)	Green
Ekwai	660FC15	52	54	HMD	SCC	POX	800412	10635	EGi (2016)	0.01	1.05	-	-	32	-	14	1	18	10	4.4	PAF	Red
Ekwai	660FC15	64	66	HMD	PR	SEG	800418	10636	EGi (2016)	0.02	0.84	-	-	26	-	20	2	6	7	4.2	PAF	Amber
Ekwai	660FC15	66	68	HMD	PR	SEG	800419	10637	EGi (2016)	0.02	0.4	-	-	12	-	21	2	-9	0	4.5	NAF	Green
Ekwai	660FC15	82	84	HMD	PR	SEG	800428	10638	EGi (2016)	0.03	0.73	-	-	22	-	20	2	3	6	4.0	PAF	Amber
Ekwai	660FC15	104	106	HMD	PR	SEG	800439	10639	EGi (2016)	0.28	0.36	-	-	11	-	40	23	-29	0	7.3	NAF	Green
Ekwai	660FC15	106	108	HMD	PR	SEG	800441	10640	EGi (2016)	0.53	0.37	-	-	11	-	52	43	-41	0	7.9	NAF	Green
Ekwai	660FC15	122	124	HMD	PR	FR	800449	10641	EGi (2016)	0.42	2.98	-	-	91	-	51	34	40	40	2.7	PAF	Red
Ekwai	660FC15	136	138	HMD	PR	FR	800457	10643	EGi (2016)	0.31	0.27	-	-	8	-	37	25	-29	0	7.5	NAF	Green
Ekwai	660FC15	150	152	HMD	PR	FR	800465	10644	EGi (2016)	0.06	0.57	-	-	17	-	18	5	-1	5	4.4	UC(paf)	Amber
Ekwai	661FC15	0	2	SC		TOX	800546	10645	EGi (2016)	0.8	0.91	-	-	28	-	1	65	27	0	4.6	UC(naf)	Amber
Ekwai	661FC15	2	4	SC		POX	800547	10646	EGi (2016)	0.03	8.95	-	-	274	-	0	2	274	79	2.2	PAF	High Red
Ekwai	661FC15	8	10	HMD		POX	800551	10647	EGi (2016)	0.02	0.03	-	-	1	-	1	2	0	0	4.9	NAF	Green
Ekwai	661FC15	42	44	HMD		POX	800569	10648	EGi (2016)	0.02	0.02	-	-	1	-	6	2	-5	0	5.6	NAF	Green
Ekwai	661FC15	54	56	HMD		POX	800576	10649	EGi (2016)	0.01	0.13	-	-	4	-	4	1	0	0	4.6	NAF	Green
Ekwai	661FC15	72	74	LW		FR	800586	10650	EGi (2016)	0.01	0.53	-	-	16	-	12	1	5	10	4.0	PAF	Amber
Ekwai	661FC15	78	80	LW		FR	800589	10651	EGi (2016)	0.04	0.34	-	-	10	-	23	3	-12	0	4.9	NAF	Green
Ekwai	661FC15	82	84	LW		FR	800592	10652	EGi (2016)	0.01	0.36	-	-	11	-	26	1	-15	0	4.5	NAF	Green
Ekwai	661FC15	94	96	LW		FR	800598	10653	EGi (2016)	0.03	0.56	-	-	17	-	19	2	-2	0	4.5	NAF	Amber
Ekwai	661FC15	112	114	OAP		FR	800608	10654	EGi (2016)	0.09	1.73	-	-	53	-	30	7	23	34	2.7	PAF	Red
Ekwai	661FC15	134	136	FT		FR	800621	10655	EGi (2016)	0.46	0.02	-	-	1	-	52	38	-51	0	7.3	NAF	Green
Koki	663FC16	2	4	LW	AR	TOX	800685	10657	EGi (2016)	0.12	0.03	-	-	1	-	1	10	0	0	4.5	NAF	Green
Koki	663FC16	14	16	HMD	AR	TOX	800692	10658	EGi (2016)	0.03	0.03	-	-	1	-	1	2	0	0	4.7	NAF	Green
Koki	663FC16	30	32	KDP	AR	TOX	800701	10659	EGi (2016)	0.02	0.02	-	-	1	-	2	2	-2	0	5.3	NAF	Green
Koki	663FC16	82	84	HMD	PR	FR	800729	10660	EGi (2016)	0.01	1.94	-	-	59	-	5	1	54	45	2.6	PAF	Red
Koki	663FC16	108	110	KDP	PO	FR	800744	10661	EGi (2016)	0.01	0.9	-	-	28	-	17	1	11	8	3.8	PAF	Amber

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval		Lithology	Alteration	Weathering	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT					NAG TEST		ARD Class	Waste Type
		From (m)	To (m)											MPA	AP	ANC	CNV	NAPP	NAG Value	NAG pH		
														(kg H_2SO_4/t)								
Koki	663FC16	118	120	KDP	PO	FR	800749	10662	EGi (2016)	0.01	1.15	-	-	35	-	16	1	19	10	3.7	PAF	Red
Koki	663FC16	122	124	HMD	PO	FR	800752	10663	EGi (2016)	0.01	1.9	-	-	58	-	15	1	43	45	2.4	PAF	Red
Koki	663FC16	172	174	HMD	PO	FR	800779	10664	EGi (2016)	0.01	2.26	-	-	69	-	12	1	57	57	2.4	PAF	Red
Koki	664FC16	2	4	HMD	WT	TOX	800877	10665	EGi (2016)	0.16	0.03	-	-	1	-	5	13	-4	0	5.5	NAF	Green
Koki	664FC16	8	10	HMD	WT	TOX	800881	10666	EGi (2016)	0.03	0.03	-	-	1	-	1	2	0	0	4.8	NAF	Green
Koki	664FC16	18	20	LW	WT	TOX	800886	10667	EGi (2016)	0.03	0.04	-	-	1	-	1	2	0	0	4.5	NAF	Green
Koki	664FC16	28	30	KDP	WT	TOX	800892	10668	EGi (2016)	0.02	0.04	-	-	1	-	1	2	0	0	4.6	NAF	Green
Koki	664FC16	38	40	KDP	PO	POX	800897	10669	EGi (2016)	0.02	0.03	-	-	1	-	1	2	-1	0	5.0	NAF	Green
Koki	664FC16	48	50	KDP	PO	POX	800903	10671	EGi (2016)	0.01	0.42	-	-	13	-	1	1	12	0	4.6	UC(naf)	Green
Koki	664FC16	60	62	HMD	PO	FR	800909	10672	EGi (2016)	0.01	0.39	-	-	12	-	9	1	3	5	4.0	PAF	Green
Koki	664FC16	96	98	HMD	PH	FR	800929	10673	EGi (2016)	0.03	2.02	-	-	62	-	9	2	53	55	2.5	PAF	Red
Koki	665FC16	2	4	SC	SC	TOX	801052	10674	EGi (2016)	0.2	0.04	-	-	1	-	2	16	0	0	4.7	NAF	Green
Koki	665FC16	12	14	HMD	PH	POX	801057	10675	EGi (2016)	0.03	0.01	-	-	0	-	8	2	-8	0	6.9	NAF	Green
Koki	665FC16	26	28	HMD	PO	POX	801065	10676	EGi (2016)	0.21	0.08	-	-	2	-	24	17	-22	0	7.2	NAF	Green
Koki	665FC16	44	46	HMD	PO	FR	801075	10677	EGi (2016)	0.06	0.04	-	-	1	-	22	5	-21	0	7.1	NAF	Green
Koki	665FC16	60	62	HMD	PO	FR	801084	10678	EGi (2016)	1.56	0.6	-	-	18	-	127	127	-109	0	7.7	NAF	Amber
Koki	665FC16	66	68	HMD	PO	FR	801087	10679	EGi (2016)	1.65	0.62	-	-	19	-	111	135	-92	0	7.5	NAF	Amber
Koki	665FC16	82	84	KDP	PO	FR	801096	10680	EGi (2016)	0.98	0.57	-	-	17	-	78	80	-61	0	7.9	NAF	Amber
Koki	665FC16	102	104	KDP	PO	FR	801107	10681	EGi (2016)	0.07	0.03	-	-	1	-	17	6	-16	0	7.2	NAF	Green
Koki	665FC16	114	116	KDP	PO	FR	801114	10682	EGi (2016)	0.32	0.15	-	-	5	-	40	26	-35	0	8.0	NAF	Green
Koki	666FC16	2	4	HMD	AR	TOX	801225	10683	EGi (2016)	0.12	0.35	-	-	11	-	0	10	11	10	4.3	PAF	Green
Koki	666FC16	16	18	HMD	PH	TOX	801233	10684	EGi (2016)	0.03	0.01	-	-	0	-	0	2	0	0	5.1	NAF	Green
Koki	666FC16	60	62	KDP	PO	POX	801257	10686	EGi (2016)	0.02	0.01	-	-	0	-	6	2	-6	0	6.9	NAF	Green
Koki	666FC16	86	88	KDP	PO	FR	801272	10687	EGi (2016)	0.02	1.28	-	-	39	-	8	2	31	19	3.9	PAF	Red
Koki	666FC16	218	220	KDP	PO	FR	801345	10688	EGi (2016)	0.04	0.97	-	-	30	-	9	3	21	7	3.8	PAF	Amber
Koki	666FC16	254	256	HMD	PO	FR	801365	10689	EGi (2016)	0.56	2.34	-	-	72	-	57	46	14	24	2.7	PAF	Red
Koki	666FC16	268	270	HMD	PH	FR	801373	10690	EGi (2016)	0.07	3.73	-	-	114	-	12	6	102	102	2.2	PAF	High Red
Koki	666FC16	280	282	HMD	PH	FR	801379	10691	EGi (2016)	0.21	11.45	-	-	350	-	21	17	330	28	2.7	PAF	High Red
Koki	666FC16	284	286	HMD	PH	FR	801382	10692	EGi (2016)	0.23	6.04	-	-	185	-	25	19	160	88	2.2	PAF	High Red
Koki	666FC16	288	290	HMD	PH	FR	801384	10693	EGi (2016)	0.1	6.94	-	-	212	-	15	8	198	140	2.1	PAF	High Red
Koki	667FC16	2	4	SC	SC	TOX	801387	10694	EGi (2016)	1.65	0.1	-	-	3	-	4	135	-1	0	4.7	NAF	Green
Koki	667FC16	8	10	HMD	PO	POX	801391	10695	EGi (2016)	0.02	0.39	-	-	12	-	2	2	10	11	3.8	PAF	Green
Koki	667FC16	22	24	HMD	AAA	FR	801398	10696	EGi (2016)	0.85	0.98	-	-	30	-	72	69	-42	0	7.5	NAF	Amber
Koki	667FC16	30	32	HMD	AAA	FR	801403	10697	EGi (2016)	0.93	1.65	-	-	50	-	99	76	-48	0	7.5	NAF	Red
Koki	667FC16	50	52	HMD	PO	FR	801414	10698	EGi (2016)	0.01	0.49	-	-	15	-	14	1	1	4	4.4	PAF	Green
Koki	667FC16	56	58	HMD	PO	FR	801417	10700	EGi (2016)	0.03	0.05	-	-	2	-	17	2	-15	0	6.9	NAF	Green
Koki	667FC16	58	60	HMD	PH	FR	801418	10701	EGi (2016)	0.01	0.47	-	-	14	-	14	1	0	0	4.6	NAF	Green
Koki	667FC16	100	102	HMD	PO	FR	801442	10702	EGi (2016)	0.08	0.29	-	-	9	-	22	7	-13	0	7.1	NAF	Green
Koki	668FC16	2	4	HMD	AR	TOX	801555	10703	EGi (2016)	0.15	0.03	-	-	1	-	1	12	0	0	4.8	NAF	Green
Koki	668FC16	12	14	HMD	AR	TOX	801561	10704	EGi (2016)	0.03	0.01	-	-	0	-	1	2	-1	0	5.6	NAF	Green
Koki	668FC16	22	24	HMD	AR	POX	801566	10705	EGi (2016)	0.01	0.01	-	-	0	-	2	1	-2	0	5.9	NAF	Green

APPENDIX A1: Acid forming characteristics of HIT, Ekwai and Koki drill core samples

Deposit	Hole ID	Interval		Lithology	Alteration	Weathing	Client Sample ID	EGi Sample ID	Study Year	Total Carbon (%C)	Total Sulfur (%S)	Sulphate Sulphur (%S)	Sulphide Sulphur (%S)	ACID-BASE ACCOUNT					NAG TEST		ARD Class	Waste Type
		From (m)	To (m)											MPA	AP	ANC	CNV	NAPP	NAG Value	NAG pH		
														(kg H_2SO_4/t)								
Koki	668FC16	48	50	HMD	PO	FR	801578	10706	EGi (2016)	0.01	0.46	-	-	14	-	10	1	4	6	4.1	PAF	Green
Koki	668FC16	102	104	HMD	PO	FR	801608	10707	EGi (2016)	0.01	0.05	-	-	2	-	16	1	-15	0	6.9	NAF	Green
Koki	668FC16	128	130	FT	PR	FR	801623	10708	EGi (2016)	0.02	0.1	-	-	3	-	15	2	-12	0	7.1	NAF	Green
Koki	668FC16	152	154	FT	PR	FR	801636	10709	EGi (2016)	0.11	0.02	-	-	1	-	24	9	-24	0	7.2	NAF	Green
Koki	668FC16	168	170	HMD	PO	FR	801645	10710	EGi (2016)	0.83	0.46	-	-	14	-	69	68	-55	0	8.0	NAF	Green
Koki	668FC16	172	174	HMD	PO	FR	801647	10711	EGi (2016)	0.29	0.19	-	-	6	-	32	24	-26	0	7.3	NAF	Green
Koki	668FC16	174	176	HMD	PO	FR	801648	10712	EGi (2016)	0.34	0.64	-	-	20	-	33	28	-14	0	7.9	NAF	Amber
Koki	668FC16	194	196	HMD	PO	FR	801659	10713	EGi (2016)	0.37	0.18	-	-	6	-	42	30	-36	0	7.4	NAF	Green

Lithology

AL	Alluvium
DV	Debom Volcanics
DVa	Debom Volcanics - Andesite
DVp	Debom Volcanics - Pyroclastics
FDP	Frieda Diorite Porphyry
FT	Flimtem Trachyandesite
HBM	Hornblende Monzonite
HMD	Horse Microdiorite
KDP	Koki Diorite Porphyry
LW	Lower Wagamush Sediment
OAP	April Ophiolites
SC	Scree

Alteration

AAA	Advanced Argillic Aleration
AR	Argillic
FR	Fresh (or unaltered)
PH	Phyllic
PO	Potassic
PR	Propylitic
QIP	Quartz-Illite-Pyrite
SA	Silica-Alunite
SC	Scree
SCC	Silica-Clay-Chlorite
SI	Silica Flooding
SIV	Vuggy Silica
WT	Weathered/Oxidised

Weathering

AL	Alluvium
FR	Fresh
POX	Partially Oxidised
SEG	Supergene Enriched
TOX	Totally Oxidised

ARD Characteristics

MPA	Maximum Potential Acidity (kg H_2SO_4/t)
AP	Acid Potential (kg H_2SO_4/t)
CNV	Carbon neutralising value(kg H_2SO_4/t)
ANC	Acid Neutralising Capacity (kg H_2SO_4/t)
NAPP	Net Acid Producing Potential (kg H_2SO_4/t)
NAG	Net Acid Generation capacity (kg H_2SO_4/t)
NAGpH	pH of NAG liquor
NAF	Non-Acid Forming
PAF	Potentially Acid Forming
UC(naf)	Uncertain but probably NAF
UC(paf)	Uncertain but probably PAF

Appendix A2

Results of Sequential NAG Tests Carried Out On Selected HIT, Ekwai and Koki Drill Core Samples

APPENDIX A2: Results of sequential NAG tests carried out on selected HIT, Ekwai and Koki drill core samples

EGI	Sulfur	ANC	NAPP	Stage 1		Stage 2		Stage 3		Stage 4		Stage 5		Stage 6		Stage 7		Total	NAG/NAPP
Code	(%S)	(kg H_2SO_4/t)		NAGpH	NAG*	NAGpH	NAG	NAGpH	NAG	NAGpH	NAG	NAGpH	NAG	NAGpH	NAG	NAGpH	NAG	NAG	Ratio
39087	0.95	27	2	**7.2**	-	3.4	1	3.8	1	5.5	-	6.9	-					2	1.0
39555	1.35	12	29	2.7	14	2.6	12	4.1	1	4.5	-	5.0	-					27	0.9
39059	1.50	25	21	**7.2**	-	3.4	2	4.0	2	4.7	-	5.3	-					4	**0.2**
39060	1.78	29	25	4.1	8	3.3	3	4.2	2	4.5	-	5.0	-					13	**0.5**
38836	1.94	50	9	**7.4**	-	3.0	11	3.2	4	4.1	1	4.9	-					16	1.8
39553	2.12	9	56	3.1	14	2.8	10	2.7	10	3.1	4	4.0	1					39	0.7
38825	2.15	0	66	3.6	11	3.0	10	2.6	15	2.6	14	2.9	5	4.5	-			55	0.8
38834	2.25	25	44	3.2	22	2.5	17	2.8	7	3.8	2	4.8	-					48	1.1
38817	2.34	14	58	3.1	9	3.8	1	5.3	-	5.4	-	5.6	-					10	**0.2**
39056	2.38	0	73	2.4	32	2.3	28	2.6	10	2.9	5	3.3	2	3.9	1	4.6	-	78	1.1
39549	2.68	0	82	2.4	27	2.1	30	2.4	9	3.1	9	3.7	1					76	0.9
39554	2.72	10	73	2.3	32	2.2	26	3.2	3	3.8	1	4.4	1					63	0.9
39551	2.81	14	72	2.3	23	2.2	28	2.6	7	3.5	6	4.1	1					65	0.9
38828	3.01	3	89	2.5	23	2.3	33	2.3	26	2.8	5	3.7	1	4.1	1			89	1.0
39552	3.38	1	102	2.6	18	2.2	24	2.1	31	2.5	9	3.5	1					83	0.8
39099	3.40	4	100	2.6	27	2.3	41	2.5	20	3.0	4	3.5	2	3.8	1	4.5	-	95	1.0
39550	3.66	0	112	2.1	53	2.0	38	2.6	7	3.1	6	3.6	1					105	0.9
39093	3.78	0	116	2.5	16	2.7	10	3.4	3	4.1	5	4.5	-					34	**0.3**
39075	3.85	39	79	**7.6**	-	**6.2**	-	3.3	5	4.0	1	4.8	-					6	**0.1**
38818	4.19	14	114	3.4	18	2.9	16	2.8	10	3.9	2	4.7	-					46	**0.4**
38821	4.21	6	123	2.4	28	2.2	44	2.2	40	2.6	8	3.6	2	4.3	1			123	1.0
39065	4.50	0	138	2.5	50	2.3	53	2.4	16	3.0	8	3.8	1	4.5	-	5.1	-	128	0.9
39112	5.00	13	140	3.8	12	3.3	4	3.6	2	4.5	-	5.4	-					18	**0.1**
39556	5.41	0	166	2.1	53	1.9	56	2.2	25	3.2	2	3.9	1					137	0.8
39041	5.89	0	180	2.5	24	2.3	35	2.2	46	2.1	52	2.3	34	2.8	7	4.2	1	199	1.1
39548	6.19	0	189	2.0	65	1.9	57	2.1	28	2.5	18	3.2	3					171	0.9
39082	6.98	1	213	2.2	63	2.1	72	2.2	44	2.6	8	3.3	3	3.7	1	4.5	-	191	0.9
10641	2.98	51	40	7.7	-	3.0	15	2.7	16	3.1	6	4.0	3					40	1.0
10654	1.73	30	23	3.6	13	2.7	14	3.2	5	4.0	2	4.6	-					34	1.5
10660	1.94	5	54	3.4	14	2.6	17	2.7	12	3.5	2	4.7	-					45	0.8
10663	1.90	15	43	3.3	11	2.4	24	2.8	9	3.9	1	4.6	-					45	1.0
10664	2.26	12	57	3.0	13	2.4	28	2.6	14	3.7	2	4.7	-					57	1.0
10673	2.02	9	53	3.2	15	2.5	18	2.6	16	3.1	5	3.9	1					55	1.0
10689	2.34	57	14	7.5	-	2.7	14	2.8	8	3.8	2	4.7	-					24	1.7
10690	3.73	12	102	2.7	22	2.2	44	2.4	30	3.2	4	4.2	2					102	1.0
10692	6.04	25	160	2.6	28	2.2	38	2.5	19	3.4	2	4.3	1					88	0.6
10693	6.94	15	198	2.5	32	2.1	58	2.2	41	2.9	7	3.8	2					140	0.7

NAG values are expressed in units of kg H_2SO_4/t

Appendix A3

Elemental Compositions of HIT, Ekwai and Koki Drill Core Solids

APPENDIX A3: Elemental composition of HIT, Ekawi and Koki drill core solids

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	001-IV95	002-IV95	005-IV95	008-IV96	008-IV96	009-IV96	010-IV96	010-IV96	011-IV96	011-IV96	001-TK97	001-TK97	002-TK97	002-TK97	002-TK97	002-TK97	003NOR02
	From	250	16	76	406	22	160	12	350	218	74	42	144	40	84	130	146	230
	To	252	18	78	408	22	162	14	352	220	76	44	146	42	88	132	148	232
	Lith	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	FT	HMD	DVp	DVp	HMD	HMD	HMD
	Alt	PH	PH	PH	PH	PH	PO	PH	PR	QIP	AR	FR	PH	SA	SA	AR	SA	QIP
	Weath	FR	POX	FR	FR	TOX	FR	POX	FR	FR	SEG	POX	SEG	POX	POX	POX	FR	FR
	Sample ID	-	-	-	-	-	-	-	-	-	-	41831	41868	41888	41905	41925	41933	283502
	Sample ID	36820	36869	37085	37559	37366	33079	33355	33526	33658	33586	39015	39016	39017	39018	39019	39020	39021
	ARD Class	PAF	NAF	PAF	PAF	PAF	NAF	NAF	PAF	PAF	PAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	Green	Green	Amber	Red	Green	Green	Green	High Red	High Red	High Red	Green	High Red	High Red	High Red	Red	High Red	High Red
Al	%													5.1				8.0
Ca	%													0.08				0.09
Fe	%													3.5				3.5
K	%													1.0				2.2
Mg	%													0.01				0.17
Na	%													0.45				0.11
S	%	0.45	0.05	0.74	2.90	0.37	0.32	0.03	5.20	5.00	5.40	0.16	4.57	7.31	4.19	2.34	3.85	3.59
As	mg/kg													4.0				3.4
Ba	mg/kg													60				380
Be	mg/kg													0.1				0.3
Bi	mg/kg													1.0				0.3
Cd	mg/kg													0.02				0.02
Co	mg/kg													15				26
Cr	mg/kg													160				189
Cu	mg/kg													180.5				908
Hg	mg/kg													0.038				0.018
Mn	mg/kg													25				15
Mo	mg/kg													6.5				22
Ni	mg/kg													17				44
P	mg/kg													700				1120
Pb	mg/kg													147				13
Sb	mg/kg													1				0.29
Se	mg/kg													6				13
Sn	mg/kg													2.7				10.2
Sr	mg/kg													736				618
Th	mg/kg													3.1				3.3
U	mg/kg													0.4				0.6
Zn	mg/kg													2				2

* Underlined values indicate concentration below the analytical detection limit.

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	003NOR02	003NOR02	003NOR02	003NOR02	2	009NOR03	009NOR03	009NOR03	010NOR03	010NOR03	010NOR03	011NOR03	011NOR03	011NOR03	011NOR03	023-IV97	023-IV97
	From	266	284	330	344	52	26	50	110	46	84	160	32	88	154	214	180	218
	To	268	286	332	346	54	28	52	112	48	86	162	34	90	156	216	182	220
	Lith	HMD	HMD	HMD	HMD	HMD	DVp	DVp	HMD	DVp	DVp	DV	DV	HMD	HMD	HMD	HMD	FDP
	Alt	QIP	QIP	QIP	QIP	QIP	SA	SA	PH	QIP	SIV	SA	AR	SA	SI	PH	QIP	QIP
	Weath	FR	FR	FR	FR	FR	POX	POX	FR	POX	POX	FR	POX	FR	FR	FR	FR	FR
	Sample ID	283522	283532	283558	283565	283922	284413	284427	284453	284550	284571	284613	284661	284692	284729	284762	126268	126287
	Sample ID	39022	39023	39024	39025	39026	39027	39028	39029	39030	39031	39032	39033	39034	39035	39036	39037	39038
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	High Red	High Red	Red	High Red	High Red	High Red	Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	%												6.0	7.8				
Ca	%												0.12	0.08				
Fe	%												3.6	4.6				
K	%												1.0	1.2				
Mg	%												0.01	0.01				
Na	%												0.2	0.23				
S	%	5.43	5.15	3.35	2.48	5.69	7.17	4.01	2.59	4.33	9.32	11.05	4.79	8.21	12.30	15.45	3.89	4.68
As	mg/kg												18	19				
Ba	mg/kg												150	70				
Be	mg/kg												0.1	0.1				
Bi	mg/kg												0.7	1.1				
Cd	mg/kg												0.02	0.02				
Co	mg/kg												13	26				
Cr	mg/kg												106	109				
Cu	mg/kg												944	1720				
Hg	mg/kg												0.152	0.07				
Mn	mg/kg												19	20				
Mo	mg/kg												21	9.9				
Ni	mg/kg												35	46				
P	mg/kg												1060	1020				
Pb	mg/kg												154	122				
Sb	mg/kg												1.48	1.22				
Se	mg/kg												16	10				
Sn	mg/kg												6	2.9				
Sr	mg/kg												706	1000				
Th	mg/kg												4.4	3.6				
U	mg/kg												0.5	0.6				
Zn	mg/kg												12	2				

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	026-IV97	026-IV97	026-IV97	029-IV97	029-IV97	029-IV97	053NOR05	053NOR05	053NOR05	053NOR05	053NOR05	053NOR05	053NOR05	057NOR05	057NOR05	057NOR05	057NOR05
	From	92	160	224	24	108	188	40	82	98	206	246	332	352	50	72	136	220
	To	94	162	226	26	110	190	42	84	100	208	248	334	354	58	74	138	222
	Lith	HMD	HMD	DV	HMD	HMD	LW	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp
	Alt	PH	QIP	PH	PH	PH	PH	SIV	SA	SA	AR	AR	AR	SA	AR	SA	SA	SA
	Weath	FR	FR	FR	POX	FR	FR	SEG	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	126621	126655	126687	127127	127069	127109	260168	260194	260205	260269	260292	260342	260354	-	260575	260440	260489
	Sample ID	39039	39040	39041	39042	39043	39044	39045	39046	39047	39048	39049	39050	39051	39548	39052	39053	39054
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	Red	High Red	High Red	Green	Red	High Red	High Red	High Red	High Red	Red	High Red	High Red	High Red	High Red	Red	High Red	High Red
Al	%						6.4								8.3			7.1
Ca	%						3.1								0.1			0.1
Fe	%						8.4								5.3			4.8
K	%						2.6								1.5			2.5
Mg	%						1.2								0.2			0.02
Na	%						0.11								0.1			0.2
S	%	2.48	4.44	5.89	0.32	1.52	11.05	6.31	13.40	11.80	1.72	3.79	3.67	6.80	6.19	2.80	8.55	11.45
As	mg/kg						0.8								11			18
Ba	mg/kg						40								410			40
Be	mg/kg						0.8								0.5			0.2
Bi	mg/kg						0.4								1.0			2.6
Cd	mg/kg						1								0.9			0.06
Co	mg/kg						31								25			16
Cr	mg/kg						75								71			41
Cu	mg/kg						1530								459			893
Hg	mg/kg						0.018								0.12			0.32
Mn	mg/kg						462								26			32
Mo	mg/kg						23								16			3.5
Ni	mg/kg						62								60			22
P	mg/kg						510								1400			1000
Pb	mg/kg						5.9								151			223
Sb	mg/kg						0.12								0.6			0.8
Se	mg/kg						19								12			11
Sn	mg/kg						2								3.7			3
Sr	mg/kg						214								1175			851
Th	mg/kg						4.1								3.5			3.2
U	mg/kg						0.8								0.9			1
Zn	mg/kg						287								75			10

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	057NOR05	057NOR05	057NOR05	057NOR05	066NOR05	066NOR05	066NOR05	073NOR05	076NOR05	076NOR05	076NOR05	109XC7	109XC7	123XC07	123XC07	123XC07	123XC07
	From	290	366	392	428	28	60	98	54	30	82	172	110	170	22	46	90	152
	To	292	370	394	430	32	62	100	70	32	84	174	116	176	24	48	92	154
	Lith	DVp	DVp	DVp	DVp	DVp	DVp	DVp	HMD	FDP	DVp	DVp	FDP	FDP	FDP	FDP	DVp	DVp
	Alt	SA	SA	SA	SA	SA	PR	PR	AR	PR	SA	AR	PR	PH	AR	QIP	PH	PH
	Weath	FR	FR	FR	FR	FR	FR	FR	FR	POX	FR	FR	FR	FR	POX	FR	FR	FR
	Sample ID	260529	-	260589	260610	260666	260684	260707	-	219732	219763	219817	-	-	82877	82891	82913	82947
	Sample ID	39055	39549	39056	39057	39058	39059	39060	39550	39061	39062	39063	39554	39555	39064	39065	39066	39067
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	Red	Red	Red	High Red	Red	Red	High Red	Amber	High Red	Red	Red	Red	High Red	High Red	High Red	High Red
Al	%		9.1				8.2	7.3	8.1	7.2			7.3	7.6		8.2		
Ca	%		0.09				1.3	1.0	0.1	3.0			1.2	1.4		0.09		
Fe	%		3.0				4.0	4.3	4.0	4.4			4.7	4.5		5.1		
K	%		2.2				2.1	2.0	1.6	2.1			2.4	1.8		2.7		
Mg	%		0.2				1.7	2.2	0.1	1.6			2.3	2.2		1.7		
Na	%		0.09				0.9	0.1	0.06	0.5			1.1	2.3		0.2		
S	%	8.05	2.68	2.38	1.10	6.08	1.50	1.78	3.66	0.73	3.36	1.01	2.72	1.35	5.69	4.50	4.78	3.95
As	mg/kg		33				1.9	2.3	9.1	1.2			36	15		1.3		
Ba	mg/kg		510				280	240	440	330			430	420		320		
Be	mg/kg		0.5				1.1	0.9	0.4	0.9			1.1	1.0		1.1		
Bi	mg/kg		1.7				0.2	0.6	2.1	0.2			0.8	0.3		0.3		
Cd	mg/kg		0.1				0.16	0.26	0.4	0.84			13	2.2		0.1		
Co	mg/kg		32				13	19	18	18			20	19		42		
Cr	mg/kg		46				25	122	88	115			63	58		45		
Cu	mg/kg		2030				642	1670	619	1850			438	384		501		
Hg	mg/kg		0.019				0.008	0.026	0.027	0.005			0.15	0.078		0.005		
Mn	mg/kg		12				721	984	14	1460			2220	1640		397		
Mo	mg/kg		7.2				3.9	3.2	28	5.0			4.2	8.2		3.8		
Ni	mg/kg		31				12	52	32	48			38	31		26		
P	mg/kg		1400				1110	1100	1230	1140			1810	1580		730		
Pb	mg/kg		357				19	25	107	19			261	134		3		
Sb	mg/kg		0.5				0.1	0.09	0.4	0.07			1.5	0.6		0.5		
Se	mg/kg		8				4	6	10	4			6	4		10		
Sn	mg/kg		6.6				2.3	2.5	8.5	1.7			1.5	1.8		3.3		
Sr	mg/kg		1610				218	96	956	178			237	373		546		
Th	mg/kg		3.9				4.9	4.4	4.3	4.2			2.8	3.5		4.6		
U	mg/kg		0.7				1.1	1	1.0	0.8			0.7	0.7		1.5		
Zn	mg/kg		40				191	364	113	358			3370	670		50		

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	123XC07	123XC07	125XC07	125XC07	125XC07	125XC07	129XC07	129XC07	129XC07	154XC08	154XC08	154XC08	154XC08	154XC08	154XC08	154XC08	165XC08
	From	234	276	50	108	154	234	34	192	318	30	54	66	112	128	162	228	28
	To	236	278	52	110	156	236	36	194	320	32	56	68	114	130	164	230	30
	Lith	KDP	KDP	FDP	FDP	HMD	HMD	HMD	HMD	HMD	FDP	FDP	FDP	FDP	FDP	FDP	FDP	HMD
	Alt	PH	PO	PR	AR	AR	PO	PH	PR	PO	PH	PO	PH	PH	PH	QIP	QIP	NONE
	Weath	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	TOX
	Sample ID	82988	83512	84245	84277	84303	84347	83923	84711	84781	703336	703349	703356	703382	703391	703409	703446	703069
	Sample ID	39068	39069	39070	39071	39072	39073	39074	39075	39076	39077	39078	39079	39080	39081	39082	39083	38811
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	NAF
	Waste Type	High Red	High Red	Amber	High Red	High Red	Red	Amber	High Red	High Red	High Red	High Red	High Red	Red	Red	High Red	High Red	Green
Al	%	7.9		8.5	8.5	8.5			6.8									
Ca	%	0.8		0.8	0.05	0.02			4.4									
Fe	%	6.2		5.4	5.3	4.7			3.9									
K	%	3.2		1.1	3.2	3.4			1.8									
Mg	%	1.6		1.9	0.2	0.09			1.5									
Na	%	0.2		1.9	0.1	0.09			1.3									
S	%	5.46	3.75	0.78	6.26	5.30	2.48	0.57	3.85	5.17	3.30	4.75	4.01	2.68	2.20	6.98	10.00	0.01
As	mg/kg	2.7		2.7	8.3	3.9			1.5									
Ba	mg/kg	400		150	320	170			300									
Be	mg/kg	1.3		1.6	0.7	0.4			1.0									
Bi	mg/kg	0.7		1.3	1.1	0.5			0.5									
Cd	mg/kg	0.07		0.11	0.17	0.02			0.15									
Co	mg/kg	19		14	20	15			14									
Cr	mg/kg	7		38	53	39			32									
Cu	mg/kg	697		451	249	67.7			1680									
Hg	mg/kg	0.01		0.024	0.041	0.029			0.009									
Mn	mg/kg	694		1300	27	20			523									
Mo	mg/kg	27		0.5	4.2	4.3			7.5									
Ni	mg/kg	4.8		21	23	18			19									
P	mg/kg	1420		930	570	420			790									
Pb	mg/kg	11		11	9.5	4.3			14									
Sb	mg/kg	0.21		0.9	0.6	0.5			0.11									
Se	mg/kg	10		3	14	10			5									
Sn	mg/kg	2.2		1.3	2.6	4.7			1.4									
Sr	mg/kg	48		266	134	57			773									
Th	mg/kg	3.1		3.9	2.3	2.6			3.8									
U	mg/kg	1		1.1	0.6	0.6			0.8									
Zn	mg/kg	45		117	3	2			85									

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	165XC08	165XC08	166XC08	166XC08	172XC08	172XC08	172XC08	175XC08	175XC08B	175XC08B	175XC08B	180XC08	180XC08	182XC08	184XC08	184XC08	214XC09
	From	90	152	202	242	52	124	284	66	106	148	200	134	304	74	158	282	272
	To	92	154	204	244	54	126	286	68	108	150	201	136	306	76	160	284	274
	Lith	HMD	LW	HMD	HMD	HMD	HMD	LW	LW	HMD	FT	HMD	HMD	HMD	HMD	FT	HMD	DV
	Alt	PO	PO	QIP	PH	PH	PO	PO	PO	PH	FR	PO	PH	PO	PO	FR	PH	SA
	Weath	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	703104	703138	706825	706847	705812	705851	705939	705315	735946	735949	735953	708266	708351	708871	708444	708512	735537
	Sample ID	38812	38813	38814	38815	38816	38817	38818	38819	38833	38832	38834	38821	38820	38822	38823	38824	38825
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	NAF	PAF	PAF	PAF	NAF	PAF	PAF	PAF
	Waste Type	Amber	Red	Red	High Red	High Red	Red	High Red	Red	Red	Amber	Red	High Red	Red	Red	Red	Red	Red
Al	%		7.4					6.5	8.1		7.9	8.2				7.8	8.0	
Ca	%		0.4					2.8	0.9		2.0	1.2				1.7	1.0	
Fe	%		4.6					4.5	5.5		3.5	4.6				3.7	4.6	
K	%		2.0					1.8	1.8		1.6	2.0				2.1	2.0	
Mg	%		2.4					1.9	2.2		1.7	1.7				1.4	1.5	
Na	%		2.0					1.9	1.5		2.8	1.9				2.2	1.3	
S	%	0.62	1.59	2.49	4.62	3.83	2.34	4.19	2.66	2.52	0.56	2.25	4.21	2.57	1.32	1.25	2.34	2.15
As	mg/kg		1.4					0.2	0.6		1.0	0.4				1.0	0.3	
Ba	mg/kg		280					280	290		410	660				560	270	
Be	mg/kg		1.1					0.8	1.6		1.0	1.1				1.0	1.2	
Bi	mg/kg		0.5					0.05	0.1		0.07	0.08				0.6	0.1	
Cd	mg/kg		0.3					0.03	0.02		0.05	0.02				0.15	0.02	
Co	mg/kg		18					20	30		13	18				12	9.7	
Cr	mg/kg		131					113	117		26	30				19	40	
Cu	mg/kg		5760					5980	882		715	2840				133.5	329	
Hg	mg/kg		0.008					0.005	0.005		0.005	0.005				0.005	0.005	
Mn	mg/kg		1120					162	357		741	325				1260	281	
Mo	mg/kg		40					35	12		13	29				0.51	3.14	
Ni	mg/kg		82					62	82		16	23				9.9	15	
P	mg/kg		470					520	940		1060	1070				960	1200	
Pb	mg/kg		21					1.2	1.3		4.8	2.4				13	1.3	
Sb	mg/kg		0.16					0.05	0.07		0.12	0.07				0.14	0.05	
Se	mg/kg		7					8	6		2	5				1	4	
Sn	mg/kg		2.3					1.8	2.1		1.2	1.6				1.3	2.4	
Sr	mg/kg		132					240	207		653	292				528	257	
Th	mg/kg		3.6					3.9	4.2		3.9	4.2				3.8	3	
U	mg/kg		0.4					0.4	0.7		1.0	0.7				1.0	0.7	
Zn	mg/kg		139					10	21		51	17				104	7	

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Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	214XC09	218XC09	222XC09	222XC09	228XC09	228XC09	228XC09	235XC09	235XC09	235XC09	235XC09	246XC09	246XC09	246XC09	246XC09	254XC09	254XC09
	From	346	110	62	140	30	96	120	58	104	200	232	14	34	74	150	70	134
	To	348	114	64	142	32	98	122	62	106	202	234	16	36	76	152	72	136
	Lith	DV	LW	DVp	DVp	HMD	FT	LW	LW	HMD	FT	FT	KDP	LW	HMD	HMD	KDP	KDP
	Alt	PH	PO	AR	PR	PO	FR	PH	PO	PH	FR	FR	PO	PO	PO	PO	PH	PH
	Weath	FR	FR	FR	FR	POX	FR	FR	FR	FR	FR	FR	POX	POX	POX	FR	FR	FR
	Sample ID	735543	-	735769	735775	729418	735969	735972	729613	729637	729689	729707	729761	729772	729794	729836	721885	721919
	Sample ID	38826	39553	38827	38828	38829	38831	38830	38835	38836	38837	38838	38839	38840	38841	38842	39375	39376
	ARD Class	PAF	PAF	PAF	PAF	NAF	PAF	PAF	PAF	PAF	NAF	NAF	NAF	NAF	PAF	NAF	PAF	PAF
	Waste Type	Red	Red	Red	High Red	Green	Red	High Red	High Red	Red	Green	Green	Green	Green	Red	Green	High Red	High Red
Al	%		7.2			8.6			7.9									
Ca	%		0.7			0.02			0.05									
Fe	%		5.3			10.4			5.1									
K	%		2.0			2.9			2.4									
Mg	%		2.3			0.6			2.1									
Na	%		2.7			0.08			0.23									
S	%	2.28	2.12	2.22	3.01	0.05	2.32	4.76	4.04	1.94	0.01	0.08	0.04	0.02	1.98	0.41	6.09	11.20
As	mg/kg		0.3			2.3			1.1									
Ba	mg/kg		350			380			350									
Be	mg/kg		1.3			0.9			1.5									
Bi	mg/kg		0.3			0.4			0.2									
Cd	mg/kg		0.05			0.02			0.32									
Co	mg/kg		21			2			29									
Cr	mg/kg		117			78			101									
Cu	mg/kg		8420			248			1290									
Hg	mg/kg		0.008			0.005			0.005									
Mn	mg/kg		263			69			252									
Mo	mg/kg		22			19			19									
Ni	mg/kg		89			7.8			76									
P	mg/kg		570			1160			240									
Pb	mg/kg		5.8			15			2.2									
Sb	mg/kg		0.07			0.1			0.07									
Se	mg/kg		9			19			10									
Sn	mg/kg		2			2.6			2.6									
Sr	mg/kg		170			32			56									
Th	mg/kg		4.8			4			4.1									
U	mg/kg		0.4			0.9			0.8									
Zn	mg/kg		32			13			53									

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Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	254XC09	254XC09	262XC09	265XC09	265XC09	265XC09	267XC09	267XC09	267XC09	267XC09	270XC09	270XC09	270XC09	270XC09	273XC09	273XC09	273XC09
	From	210	250	130	72	140	226	48	120	250	324	138	186	242	300	30	100	144
	To	216	252	136	74	142	228	50	122	252	326	140	188	246	302	32	102	146
	Lith	KDP	KDP	HMD	LW	HMD	HMD	FDP	FDP	FDP	FDP	HMD	HMD	HMD	HMD	FDP	FDP	FDP
	Alt	PH	PH	PH	PH	PH	PH	PH	PH	PO	PH	PH	PH	PO	PH	AR	QIP	QIP
	Weath	FR	FR	FR	FR	FR	FR	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	-	721982	-	722079	722116	722162	732855	732893	732965	733005	722249	722276	-	722337	718698	718736	718761
	Sample ID	39556	39377	39552	39378	39379	39380	39388	39389	39390	39391	39381	39382	39551	39383	39372	39373	39374
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	Red	High Red	High Red	High Red	Red	High Red	High Red	High Red	High Red
Al	%	7.9		7.7										7.6				
Ca	%	0.1		0.05										1.7				
Fe	%	5.0		4.1										4.4				
K	%	3.5		2.7										1.1				
Mg	%	1.4		0.7										1.7				
Na	%	0.2		0.2										2.6				
S	%	5.41	7.65	3.38	4.73	5.72	6.36	3.39	7.53	2.95	7.92	3.44	3.73	2.81	5.00	6.85	5.49	3.63
As	mg/kg	2.4		1.6										0.4				
Ba	mg/kg	470		410										150				
Be	mg/kg	1.3		0.6										1.2				
Bi	mg/kg	0.3		0.5										0.2				
Cd	mg/kg	0.08		0.04										0.05				
Co	mg/kg	25		13										15				
Cr	mg/kg	13		48										45				
Cu	mg/kg	163		4340										353				
Hg	mg/kg	0.022		0.010										0.005				
Mn	mg/kg	75		39										261				
Mo	mg/kg	14		34										1.2				
Ni	mg/kg	10		23										27				
P	mg/kg	1570		320										1090				
Pb	mg/kg	7.0		7										6.7				
Sb	mg/kg	0.3		0.1										0.1				
Se	mg/kg	11		12										3				
Sn	mg/kg	3		3.6										1.3				
Sr	mg/kg	1330		287										535				
Th	mg/kg	3.4		3.4										3.3				
U	mg/kg	1.1		0.8										0.7				
Zn	mg/kg	33		14										27				

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Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	278XC09	278XC09	278XC09	278XC09	279XC09	279XC09	279XC09	279XC09	C016-IV	C016-IV	C016-IV	C019-ED	C019-ED	C047-TT	C047-TT	C047-TT	C047-TT
	From	66	168	236	344	46	210	286	416	42	120	182	50	312	18	54	100	154
	To	68	170	238	346	48	212	288	418	44	122	184	52	314	20	56	102	156
	Lith	LW	LW	LW	FDP	DVp	HMD	HMD	HMD	DVa	HMD	HMD	FDP	DV	AL	DVp	DVp	FDP
	Alt	PH	PH	PO	PH	SA	PH	PH	PH	SA	QIP	QIP	AR	SA	NONE	PR	PH	PR
	Weath	POX	FR	FR	FR	POX	FR	FR	FR	FR	FR	FR	POX	FR	AL	POX	FR	FR
	Sample ID	724768	724825	724863	724923	733069	733161	733203	733275	129400	129439	129472	129507	129644	97401	97420	97444	97472
	Sample ID	39384	39385	39386	39387	39392	39393	39394	39395	39084	39085	39086	39087	39088	39089	39090	39091	39092
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	High Red	High Red	High Red	High Red	Red	High Red	High Red	Red	High Red	High Red	Amber	High Red	Red	Amber	Red	High Red
Al	%													7.1				
Ca	%													0.08				
Fe	%													4.6				
K	%													0.7				
Mg	%													0.02				
Na	%													0.05				
S	%	5.02	3.57	17.85	10.20	5.69	2.10	3.36	5.06	2.03	4.75	3.15	0.95	6.56	2.53	0.84	1.14	5.34
As	mg/kg													12.4				
Ba	mg/kg													190				
Be	mg/kg													0.1				
Bi	mg/kg													1.3				
Cd	mg/kg													3.66				
Co	mg/kg													15				
Cr	mg/kg													89				
Cu	mg/kg													2160				
Hg	mg/kg													0.088				
Mn	mg/kg													29				
Mo	mg/kg													32				
Ni	mg/kg													23				
P	mg/kg													940				
Pb	mg/kg													185				
Sb	mg/kg													0.5				
Se	mg/kg													10				
Sn	mg/kg													22				
Sr	mg/kg													770				
Th	mg/kg													4.4				
U	mg/kg													1.3				
Zn	mg/kg													379				

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Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	C068-PR	C068-PR	C068-PR	C071-TK	C071-TK	C071-TK	DDH075D	DDH075D	DDH081D	DDH081D	DDH081D	DDH085D	DDH085D	DDH085D	DDH092D	DDH092D	DDH092D
	From	100	148	252	44	92	246	114	144	24	75	129	36	84	147	54	87	108
	To	102	150	254	46	94	248	117	147	27	78	132	39	87	150	57	90	111
	Lith	DVp	DVp	DVp	HMD	HMD	FDP	HMD	DV	DVp	DVp	DVp	DVp	DVp	DVa	HMD	HMD	HMD
	Alt	SA	SA	QIP	PO	AR	PR	PH	AR	QIP	QIP	QIP	QIP	SA	QIP	QIP	QIP	AR
	Weath	FR	FR	FR	SEG	FR	FR	FR	FR	POX	FR	FR	POX	POX	POX	FR	FR	FR
	Sample ID	161852	161879	161936	95131	95155	95238	737001	737002	737003	737004	737005	737006	737007	737008	737009	737010	737011
	Sample ID	39093	39094	39095	39096	39097	39098	39099	39100	39101	39102	39103	39104	39105	39106	39107	39108	39109
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	Red	High Red	Red	Red	Red	High Red	High Red	Red	Red	Red	Red	Amber	High Red	High Red	High Red	High Red
Al	%		8.6					8.0			8.7	8.6	8.3					8.9
Ca	%		0.09					0.3			0.04	0.07	0.06					0.1
Fe	%		1.4					4.9			4.2	3.0	3.1					4.6
K	%		0.6					2.5			1.0	0.7	2.7					3.3
Mg	%		0.01					1.4			1.3	0.03	0.2					0.3
Na	%		0.04					0.9			0.2	0.07	0.3					0.2
S	%	3.78	2.61	4.26	1.73	1.29	1.75	3.40	3.75	1.77	1.11	2.96	2.12	0.82	3.64	6.54	3.87	3.79
As	mg/kg		6.5					1.1			7.1	3.5	2.5					1.4
Ba	mg/kg		510					580			230	240	350					330
Be	mg/kg		0.1					0.9			1.0	0.2	0.8					0.6
Bi	mg/kg		1.0					0.1			1.4	0.2	0.3					0.1
Cd	mg/kg		0.04					0.02			0.02	0.02	0.02					0.02
Co	mg/kg		7.4					24			2.4	7.9	3.7					17
Cr	mg/kg		36					29			45	30	26					29
Cu	mg/kg		999					1710			130.5	44	43					216
Hg	mg/kg		0.079					0.005			0.019	0.009	0.038					0.014
Mn	mg/kg		20					100			814	22	85					34
Mo	mg/kg		69					25			2.9	4.8	3.8					46
Ni	mg/kg		12					15			17	6.3	5.1					11
P	mg/kg		1180					940			450	1280	710					1020
Pb	mg/kg		86					3.3			32	21	9.9					2.2
Sb	mg/kg		0.7					0.08			0.44	0.5	0.9					0.1
Se	mg/kg		3					9			8	6	3					9
Sn	mg/kg		18					2.2			1.7	3.6	1.2					4.8
Sr	mg/kg		816					180			249	1790	571					441
Th	mg/kg		4.6					4.2			2.5	2.9	2.6					4.9
U	mg/kg		1.6					0.7			0.8	0.5	0.7					0.6
Zn	mg/kg		5					46			139	2	12					2

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Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	DDH101D	DDH102D	DDH102D	389XC10	389XC10	389XC10	389XC10	389XC10	389XC10	389XC10	389XC10	398XC10	398XC10	398XC10	398XC10	398XC10	398XC10
	From	45	51	246	32	50	85	138	208	214	219	273	25	140	168	197	204	218
	To	48	54	249	32.4	50.4	85.4	138.8	208.8	214.8	219.8	274	25.4	140.4	168.8	197.8	204.8	218.8
	Lith	HMD	DV	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD
	Alt	PH	PR	PO	PH	PH	PH	PH	PO	PO	PO	PH	PH	PH	PH	PR	PR	PR
	Weath	POX	SEG	FR	SEG	SEG	FR	FR	FR	FR	FR	FR	POX	FR	FR	FR	FR	FR
	Sample ID	737012	737013	737014	796001	796002	796003	796004	796005	796006	796007	796008	796009	796010	796011	796012	796013	796014
	Sample ID	39110	39111	39112	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	PAF	NAF	NAF	NAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	Red	High Red	Green	Green	Green	Green	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	%	8.7			4.0	1.6	1.5	3.7	1.5	0.8	1.3	1.6	1.2	2.9	1.9	1.8	2.7	2.1
Ca	%	0.09			0.13	0.67	0.93	0.04	0.05	0.19	0.31	0.03	0.02	0.03	0.06	0.02	0.03	0.05
Fe	%	4.0			3.4	2.7	2.6	2.9	11.6	7.5	7.6	6.3	6.7	7.2	7.2	7.3	7.3	7.0
K	%	2.8			0.46	0.13	0.14	0.51	0.5	0.33	0.55	0.53	0.41	0.83	0.28	0.3	0.59	0.65
Mg	%	0.3			1.7	1.0	0.97	1.22	0.43	0.07	0.11	0.04	0.02	0.99	0.04	0.01	1.11	0.05
Na	%	0.2			0.01	0.16	0.2	0.04	0.03	0.04	0.02	0.01	0.02	0.06	0.03	0.03	0.06	0.06
S	%	3.45	1.15	5.00	0.06	0.05	0.02	0.02	12.15	8.70	8.56	8.00	7.97	7.93	7.93	8.12	7.83	7.89
As	mg/kg	1.4			2.1	0.7	0.7	0.8	25	11	3	11	16	4	2	4	3	2.7
Ba	mg/kg	540			170	70	40	140	10	40	30	50	30	20	20	10	30	20
Be	mg/kg	0.5			0.9	0.22	0.18	0.76	0.55	0.2	0.53	0.19	0.07	0.37	0.17	0.06	0.42	0.21
Bi	mg/kg	0.1			1.5	0.07	0.04	0.05	9.9	2.0	2.2	0.8	0.6	0.3	0.2	0.36	0.7	0.31
Cd	mg/kg	0.02			0.27	0.03	0.02	0.02	0.23	0.04	0.1	0.75	0.1	0.13	0.01	0.01	0.09	0.01
Co	mg/kg	21.4			12	11	6	8	22	19	15	22	16	50	18	17	27	5
Cr	mg/kg	33			21	19	30	14	9	3	4	19	15	21	8	9	19	17
Cu	mg/kg	566			1845	129	95	680	418	243	315	106	101	373	575	334	332	445
Hg	mg/kg	0.005			0.03	0.01	0.01	0.02	0.05	0.13	0.02	0.01	0.1	0.01	0.01	0.02	0.01	0.01
Mn	mg/kg	22			1940	569	735	206	215	97	121	27	27	42	20	31	54	34
Mo	mg/kg	4.3			2	2	1.3	39	6	3	3	6	8	17	7	11	9	2.55
Ni	mg/kg	12			9	8	16	15	19	19	9	35	37	56	18	17	75	15
P	mg/kg	1320			240	800	770	1870	70	630	1040	770	720	90	100	180	80	140
Pb	mg/kg	6.7			9	1	2	3	27	12	13	11	8	3	6	7	6	3
Sb	mg/kg	0.06			0.09	0.06	0.05	0.06	0.84	0.41	0.33	0.36	0.2	0.07	0.05	0.1	0.05	0.05
Se	mg/kg	8			0.3	0.2	0.2	1.3	63	21	32	14	21	21	17	19	14	19
Sn	mg/kg	5.4			0.2	0.4	0.3	0.4	0.8	0.6	0.6	0.5	0.5	0.7	0.5	1.1	0.3	0.5
Sr	mg/kg	806			52	89	67	59	17	52	11	54	35	10	29	64	8	42
Th	mg/kg	3.6			1.5	1.3	1.5	5.7	0.5	0.4	0.6	1	1.2	2	0.7	0.2	2.1	1
U	mg/kg	1.0			0.26	0.22	0.34	0.42	0.5	0.2	0.2	0.2	0.1	0.3	0.1	0.05	0.3	0.05
Zn	mg/kg	2			100	40	44	34	81	14	23	13	9	11	3	2	16	2

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	398XC10	398XC10	398XC10	398XC10	412XC10	412XC10	415XC10	415XC10	415XC10	415XC10	415XC10	415XC10	415XC10	415XC10	415XC10	415XC10	415XC10
	From	262	372	454	502	42	52	48	94	122	150	162	181	190	203	266	286	304
	To	262.8	373	455	503	42.4	52.4	48.4	94.4	122.8	150.8	162.8	181.8	190.8	203.8	266.8	286.8	304.8
	Lith	HMD	HMD	HMD	HMD	FT	FT	FT	HMD	HMD	HMD	HMD	FT	FT	FT	FT	FT	FT
	Alt	PH	PH	PH	PH	FR	FR	FR	PO	PO	PO	PO	FR	FR	FR	FR	FR	FR
	Weath	FR	FR	FR	FR	SEG	FR	SEG	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	796015	796016	796017	796018	796019	796020	796021	796022	796023	796024	796025	796026	796027	796028	796029	796030	796031
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	%	0.4	1.4	2.3	1.1	3.1	2.2	2.1	2.6	1.8	1.5	1.9	1.6	1.8	1.7	0.6	0.9	1.9
Ca	%	0.03	0.03	0.09	0.02	0.05	0.03	0.11	0.04	0.03	0.12	0.13	0.02	0.02	4.2	5.51	0.03	0.09
Fe	%	7.3	6.5	6.7	5.6	6.2	5.5	5.9	6.2	6.0	5.8	5.7	5.2	5.4	5.9	5.3	5.6	5.6
K	%	0.01	0.45	0.47	0.08	0.58	0.68	0.43	0.57	0.46	0.41	0.32	0.6	0.59	0.57	0.1	0.29	0.32
Mg	%	0.01	0.08	0.33	0.01	1.3	0.15	0.2	1.3	0.99	0.1	0.04	0.09	0.06	0.64	0.02	0.01	0.02
Na	%	0.01	0.03	0.06	0.01	0.08	0.03	0.04	0.07	0.06	0.03	0.04	0.08	0.06	0.05	0.03	0.02	0.03
S	%	7.79	7.40	7.11	6.76	6.75	6.58	6.59	6.53	6.41	6.43	6.42	6.31	6.29	9.17	10.65	6.11	5.99
As	mg/kg	2.8	5	6	1.8	21	8.8	2	10	6	1.4	5	2	11.2	1.5	1.5	2	3
Ba	mg/kg	10	40	50	10	30	40	30	50	50	40	30	40	70	50	30	40	30
Be	mg/kg	0.05	0.13	0.13	0.05	1.39	0.16	0.15	0.77	0.43	0.14	0.26	0.15	0.23	0.27	0.06	0.07	0.11
Bi	mg/kg	0.16	0.8	0.7	0.51	0.3	0.79	1.0	0.3	0.2	0.4	0.7	0.84	2.83	0.46	0.34	0.61	0.4
Cd	mg/kg	0.03	0.01	0.02	0.01	0.12	0.12	0.01	0.11	0.05	0.01	0.01	0.02	0.17	0.07	0.01	0.01	0.01
Co	mg/kg	70	27	14	20	25	25	11	27	20	22	13	12	20	25	15	19	13
Cr	mg/kg	14	18	12	8	37	57	13	33	14	5	10	5	4	14	6	5	12
Cu	mg/kg	416	71	553	230	182	296	1020	420	75	2610	814	378	76	111	164	1340	145
Hg	mg/kg	0.01	0.03	0.01	0.02	0.01	0.02	0.03	0.01	0.01	0.02	0.01	0.01	0.08	0.03	0.01	0.01	0.01
Mn	mg/kg	60	20	41	13	107	24	22	139	49	24	26	26	49	156	20	31	25
Mo	mg/kg	59	5	7	22	20	1	37	13	3	11	25	3	1	15	16	5	13
Ni	mg/kg	85	46	19	18	64	98	25	53	59	13	21	11	13	23	17	18	26
P	mg/kg	90	130	260	80	110	190	160	60	60	90	240	90	240	970	70	60	210
Pb	mg/kg	1	5	11	2	13	6	11	8	4	2	8	16	10	6	5	4	3
Sb	mg/kg	0.16	0.14	0.19	0.16	0.14	0.31	0.06	0.1	0.08	0.05	0.05	0.07	0.59	0.13	0.18	0.05	0.1
Se	mg/kg	23	15	16	9	26	11	14	22	18	18	13	15	11	8.5	13.8	15	12
Sn	mg/kg	0.3	0.5	3.2	0.4	0.4	1.1	0.7	0.5	0.4	0.7	0.5	0.8	0.3	0.4	0.7	0.6	1.2
Sr	mg/kg	115	29	45	84	50	15	34	23	8	28	24	68	126	527	639	26	37
Th	mg/kg	0.3	1.6	0.5	0.2	2.7	1.6	0.8	3.3	3.6	0.9	0.9	0.5	0.5	1.3	0.3	0.3	0.5
U	mg/kg	0.1	0.1	0.09	0.1	0.3	0.1	0.2	0.3	0.3	0.1	0.2	0.08	0.1	0.22	0.1	0.05	0.09
Zn	mg/kg	2	9	10	2	32	12	12	40	14	3	3	5	10	21	2	2	3

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	415XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10	429XC10
	From	374	26	66	106	148	162	222	248	272	280	300	324	356	402	424	438	450
	To	375	26.4	66.4	106.4	148.4	162.4	222.8	248.8	272.8	280.8	300.8	324.8	356.8	402.8	424.8	438.8	450.8
	Lith	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	FT	FT	FT
	Alt	PO	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	FR	FR	FR
	Weath	FR	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	796032	796033	796034	796035	796036	796037	796038	796039	796040	796041	796042	796043	796044	796045	796046	796047	796048
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	%	0.4	1.1	1.8	1.7	2.3	1.2	1.8	1.2	2.6	1.8	2.4	2.4	0.9	1.7	2.0	0.4	1.1
Ca	%	0.03	0.05	0.02	0.03	0.05	0.03	0.04	0.03	0.02	0.04	0.04	0.1	0.04	0.18	0.07	0.02	0.04
Fe	%	5.2	5.4	4.9	4.9	5.5	5.6	4.8	5.3	5.4	5.7	5.4	5.3	4.9	5.1	4.8	5.4	5.1
K	%	0.04	0.21	0.69	0.51	0.39	0.41	0.71	0.29	0.45	0.43	0.42	0.58	0.32	0.36	0.46	0.07	0.3
Mg	%	0.01	0.01	0.07	0.02	0.03	0.01	0.04	0.02	1.5	1.1	1.4	1.0	0.01	0.3	0.02	0.01	0.01
Na	%	0.01	0.02	0.02	0.02	0.03	0.03	0.05	0.02	0.03	0.05	0.1	0.05	0.01	0.03	0.03	0.02	0.02
S	%	5.95	5.96	5.93	5.88	5.89	5.84	5.72	5.70	5.73	5.68	5.65	5.64	5.61	5.65	5.58	5.58	5.46
As	mg/kg	5	3	4.8	4	2	27.6	6	3	8	3	6	5	3	1.4	1.1	3.6	3
Ba	mg/kg	10	30	60	50	40	50	50	30	50	60	50	50	30	50	50	30	30
Be	mg/kg	0.05	0.05	0.11	0.13	0.16	0.09	0.12	0.07	0.26	0.45	0.38	0.46	0.05	0.23	0.13	0.05	0.06
Bi	mg/kg	0.4	0.38	0.44	0.6	0.42	1.08	0.68	0.58	0.7	0.1	0.2	0.3	0.36	0.4	0.4	0.25	0.24
Cd	mg/kg	0.02	0.01	0.08	0.13	0.01	0.02	0.02	0.01	0.04	0.04	0.05	0.13	0.03	0.01	0.01	0.04	0.02
Co	mg/kg	14	15	13	14	14	23	14	21	22	50	23	19	20	18	19	18	23
Cr	mg/kg	3	9	4	20	9	16	6	6	78	9	4	4	7	10	6	4	8
Cu	mg/kg	37	808	422	58	1860	484	526	6340	116	306	527	177	717	3380	360	38	554
Hg	mg/kg	0.02	0.03	0.03	0.03	0.01	0.01	0.02	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.04	0.19	0.01
Mn	mg/kg	25	52	16	22	21	39	27	29	101	85	73	86	33	19	19	45	29
Mo	mg/kg	9	12	2	5	3	5	2	6	3	12	34	6	12	10	15	3	10
Ni	mg/kg	16	15	9	29	14	43	12	19	57	25	9	8	19	22	14	10	20
P	mg/kg	40	80	130	1710	80	130	40	60	260	60	110	330	60	190	60	130	70
Pb	mg/kg	6	5	5	5	3	20	7	4	7	3	5	8	15	4	3	6	12
Sb	mg/kg	0.34	0.22	0.12	0.21	0.07	0.07	0.15	0.06	0.14	0.11	0.05	0.13	0.06	0.05	0.15	0.23	0.05
Se	mg/kg	11	11	11	8	22	15	10	16	12	16	11	10	19	13	14	7.9	12
Sn	mg/kg	1.5	0.7	0.5	0.7	0.5	1.3	0.3	0.7	0.4	0.3	0.2	0.4	0.4	0.6	0.4	0.2	0.3
Sr	mg/kg	36	68	38	49	49	30	12	36	28	12	24	24	34	31	30	84	38
Th	mg/kg	0.2	0.4	1.8	1.2	0.5	0.4	0.4	0.4	1.4	1.8	1.6	1.5	0.4	1.5	0.7	0.2	0.4
U	mg/kg	0.1	0.06	0.2	0.1	0.08	0.1	0.06	0.06	0.2	0.2	0.3	0.2	0.07	0.2	0.07	0.05	0.07
Zn	mg/kg	7	18	12	19	2	5	6	3	39	15	13	42	5	5	4	4	4

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	429XC10	489XC10	489XC10	489XC10	489XC10	489XC10	489XC10	489XC10	489XC10	489XC10	489XC10	492XC10	492XC10	492XC10	492XC10	492XC10	492XC10
	From	454	19	54	62	94	118	133	145	174	190	212	18	23	27	43	47	51
	To	454.8	19.4	54.4	62.4	94.4	118.4	133.4	145.4	174.8	190.8	212.8	18.4	23.4	27.4	43.4	47.4	51.4
	Lith	FT	FDP	FDP	FDP	FDP	FDP	FT	FT	FDP	FDP	FDP	HMD	HMD	HMD	HMD	HMD	HMD
	Alt	FR	PH	PH	PH	PH	PH	FR	FR	PH	PH	PH	PH	PH	PH	PH	PH	PH
	Weath	FR	POX	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	796049	796050	796051	796052	796053	796054	796055	796056	796057	796058	796059	796060	796061	796062	796063	796064	796065
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	%	2.2	2.6	3.2	2.3	1.0	2.1	2.6	1.6	1.5	2.8	2.6	0.5	2.3	1.9	1.2	1.6	0.4
Ca	%	0.3	0.32	0.07	0.03	5.55	0.03	2.52	0.02	0.08	0.04	0.06	0.04	0.25	0.04	0.04	0.12	0.04
Fe	%	5.2	5.3	4.7	4.8	4.4	4.8	5.2	4.6	4.5	5.1	4.8	4.1	4.8	4.6	2.8	4.6	4.3
K	%	0.49	0.6	0.37	0.67	0.45	0.69	0.45	0.6	0.37	0.55	0.64	0.03	0.55	0.51	0.16	0.38	0.03
Mg	%	0.98	1.38	1.67	0.18	0.14	0.8	1.76	0.4	0.0	1.1	0.8	0.01	1.34	0.9	0.1	0.5	0.01
Na	%	0.1	0.08	0.07	0.03	0.06	0.06	0.05	0.04	0.03	0.04	0.07	0.01	0.06	0.03	0.03	0.03	0.02
S	%	5.45	5.38	5.39	5.30	10.35	5.06	6.28	5.00	4.98	4.93	4.96	4.88	4.87	4.84	5.04	4.86	4.76
As	mg/kg	1.3	3.8	7.4	28.1	13	2.5	0.3	5.7	1.8	2.8	3.1	1.6	2	3.9	2.9	1.6	6
Ba	mg/kg	50	50	60	30	30	50	30	60	40	50	60	10	70	80	50	50	10
Be	mg/kg	0.44	0.5	0.59	0.17	0.12	0.4	0.39	0.18	0.15	0.39	0.29	0.05	0.48	0.35	0.07	0.19	0.05
Bi	mg/kg	0.18	0.21	0.88	0.71	0.39	0.2	0.2	0.2	0.3	0.9	0.7	0.41	0.16	0.8	0.8	0.6	1.42
Cd	mg/kg	0.01	0.01	0.26	0.07	0.02	0.02	0.08	0.06	0.01	0.06	0.88	0.01	0.01	0.02	0.03	0.01	0.01
Co	mg/kg	16	13	15	15	14	22	34	18	12	18	20	13	16	16	12	11	42
Cr	mg/kg	12	12	6	7	8	16	41	13	8	11	22	3	10	10	10	13	4
Cu	mg/kg	84	334	213	493	191	94	1295	168	118	529	474	109	183	37	254	1840	509
Hg	mg/kg	0.01	0.01	0.03	0.13	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.03	0.02	0.08	0.02	0.04
Mn	mg/kg	94	100	1190	44	24	39	380	28	26	203	93	10	103	251	39	49	29
Mo	mg/kg	3	3	2	1	10	6	9	8	22	2	9	334	3	1	11	56	119
Ni	mg/kg	11	11	9	8	25	52	32	33	18	14	30	37	11	14	13	23	33
P	mg/kg	1020	1320	1010	320	600	50	1050	50	360	420	340	20	1030	210	130	170	70
Pb	mg/kg	2	2	25	10	11	2.1	4	4.2	18.7	8.9	32.5	1	2	4.7	13	7	1
Sb	mg/kg	0.05	0.05	0.72	14.7	0.32	0.05	0.09	0.05	0.1	0.1	0.27	0.14	0.05	0.17	0.29	0.05	0.16
Se	mg/kg	9	12	6.6	10	14	11	6.8	11	11	7	10	5.9	9	7	7	12	15
Sn	mg/kg	0.5	0.6	0.4	0.3	0.4	0.5	0.2	0.7	2.1	0.5	0.6	0.2	0.5	0.2	0.3	0.6	0.4
Sr	mg/kg	33	19	41	196	419	8	214	7	48	80	131	19	19	38	76	38	63
Th	mg/kg	1.2	1.7	0.8	0.5	0.7	2.9	1.9	2.6	0.5	1	1.2	0.4	1.9	0.8	0.7	1.8	0.4
U	mg/kg	0.2	0.2	0.11	0.1	0.1	0.3	0.25	0.3	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.4	0.2
Zn	mg/kg	11	10	110	24	5	7	36	17	4	39	35	2	13	42	11	3	3

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	492XC10	492XC10	492XC10	492XC10	492XC10	492XC10	492XC10	492XC10	492XC10	492XC10	492XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10
	From	56	73	82	88	93	96	104	110	116	194	284	8	19	24	28	36	62
	To	56.4	73.4	82.4	88.4	93.4	96.4	104.4	110.4	116.4	194.8	284.8	8.4	19.4	24.4	28.4	36.4	62.4
	Lith	HMD	HMD	HMD	HMD	FDP	FDP	FDP	FDP	FDP	HMD	HMD	FDP	FDP	FDP	FDP	FDP	FDP
	Alt	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH
	Weath	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	POX	POX	POX	POX	POX	POX
	Sample ID	796066	796067	796068	796069	796070	796071	796072	796073	796074	796075	796076	796077	796078	796079	796080	796081	796082
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	%	1.6	2.7	2.0	1.3	2.3	3.3	2.9	3.0	2.8	1.6	1.3	2.4	1.2	3.9	2.4	1.6	2.1
Ca	%	0.01	3.54	0.03	0.13	0.22	0.25	0.03	0.23	0.29	0.02	0.05	0.3	0.05	0.09	0.21	4.54	0.04
Fe	%	2.5	4.7	4.5	3.9	4.5	4.3	3.9	4.6	4.5	3.6	3.8	4.1	3.7	3.7	4.1	4.0	3.9
K	%	0.12	0.44	0.5	0.21	0.53	0.86	0.63	0.53	0.56	0.45	0.56	0.36	0.23	1.34	0.54	0.42	0.57
Mg	%	0.0	2.53	1.2	0.0	1.5	1.17	0.11	1.6	1.34	0.17	0.07	2.13	0.2	0.19	0.7	0.87	0.12
Na	%	0.02	0.05	0.06	0.03	0.03	0.16	0.02	0.04	0.1	0.01	0.03	0.02	0.04	0.07	0.05	0.06	0.03
S	%	4.92	7.37	4.53	4.57	4.51	4.44	4.49	4.33	4.30	4.31	4.25	4.24	4.51	4.21	4.17	7.42	4.10
As	mg/kg	3.9	0.1	1.8	1.5	18.8	1.3	3	1.2	1	4.3	8.1	1	8.9	3	1	1.1	5
Ba	mg/kg	70	60	60	60	60	70	40	70	70	60	80	50	50	70	100	60	60
Be	mg/kg	0.05	0.25	0.44	0.17	0.63	0.51	0.25	0.25	0.56	0.14	0.26	0.49	0.12	0.22	0.18	0.39	0.21
Bi	mg/kg	0.3	0.29	0.2	0.5	1.6	0.08	0.57	0.5	0.15	0.44	0.4	1.4	0.8	0.95	0.5	0.44	0.48
Cd	mg/kg	0.01	0.01	0.04	0.01	0.24	0.01	0.01	0.01	0.01	0.12	0.03	0.04	0.07	0.01	0.02	0.01	0.07
Co	mg/kg	9	10	19	14	15	15	16	15	18	11	16	13	9	14	12	32	13
Cr	mg/kg	13	11	16	5	25	8	15	26	10	4	6	7	15	12	15	22	12
Cu	mg/kg	86.1	1420	512	1580	149	310	1200	2160	201	1595	21	187	205	1820	2070	1190	586
Hg	mg/kg	0.49	0.01	0.01	0.01	0.05	0.02	0.01	0.01	0.01	0.11	0.01	0.01	0.21	0.01	0.01	0.01	0.05
Mn	mg/kg	52	77	54	15	906	49	20	41	106	17	58	624	125	36	30	237	39
Mo	mg/kg	5	51	11	11	0	7	7	20	5	1	0.5	2	8	17	16	25	2
Ni	mg/kg	9	14	54	12	21	10	13	22	10	7	15	7	11	12	21	23	15
P	mg/kg	170	1110	90	110	880	950	90	590	1120	90	390	1180	310	80	470	720	130
Pb	mg/kg	7	2	3.1	6.7	14.5	1	4	5	1	4	13	5	26	5	8	2	4
Sb	mg/kg	1.27	0.05	0.05	0.05	5.1	0.05	0.06	0.05	0.05	0.15	0.32	0.08	1.13	0.09	0.05	0.13	0.16
Se	mg/kg	5	10	18	11	13	11	9	7	7	6.2	2.9	7	7	5	8	9.2	6.1
Sn	mg/kg	0.6	0.7	0.6	0.4	0.3	1	0.8	0.6	0.6	0.3	0.2	0.2	0.6	1.7	0.6	0.3	0.4
Sr	mg/kg	164	562	12	28	28	32	32	30	29	20	18	17	72	30	26	519	15
Th	mg/kg	0.5	1.8	4.1	1	0.6	1.7	0.4	1.6	1.8	1.3	0.5	0.6	0.8	0.7	1.5	1	0.6
U	mg/kg	0.1	0.5	0.3	0.1	0.2	0.2	0.09	0.3	0.2	0.2	0.12	0.1	0.1	0.1	0.4	0.2	0.2
Zn	mg/kg	5	12	15	2	174	5	7	14	16	35	19	58	27	11	8	18	8

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	505XC10	506XC10	506XC10
	From	84	87	94	99	102	106	112	119	122	127	136	138.6	143	151	156	8	12
	To	84.4	87.4	94.4	99.4	102.4	106.4	112.4	119.4	122.4	127.4	136.4	139	143.4	151.4	156.4	8.4	12.4
	Lith	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	AL	AL
	Alt	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	NONE	NONE
	Weath	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	FR	FR	FR	AL	AL
	Sample ID	796083	796084	796085	796086	796087	796088	796089	796090	796091	796092	796093	796094	796095	796096	796097	796098	796099
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	%	1.8	0.5	2.3	2.5	1.3	2.8	3.1	2.4	2.2	2.3	2.9	0.9	3.1	4.4	2.7	3.8	2.5
Ca	%	0.07	0.03	0.05	0.2	0.16	0.24	0.21	0.02	0.27	0.24	0.08	0.09	0.16	0.22	0.03	0.24	0.71
Fe	%	4.0	3.7	3.8	4.5	3.6	4.4	4.4	5.6	4.3	4.0	4.1	3.2	4.5	4.8	3.9	4.5	3.8
K	%	0.49	0.08	0.75	0.48	0.24	0.43	0.51	0.89	0.4	0.52	0.63	0.21	0.67	0.43	0.7	0.46	0.56
Mg	%	0.5	0.01	0.6	0.97	0.3	2.7	2.7	0.09	1.68	1.5	1.5	0.06	1.1	2.86	1.4	2.4	1.2
Na	%	0.03	0.01	0.07	0.05	0.03	0.04	0.04	0.05	0.08	0.04	0.06	0.02	0.06	0.11	0.07	0.03	0.11
S	%	3.99	3.97	3.94	3.97	3.91	3.87	3.75	3.80	3.79	3.64	3.70	3.64	3.59	3.53	3.46	3.45	3.38
As	mg/kg	0.9	2.5	1.2	8.6	2.2	7	28	6	2	10	3.8	1.6	3	2.3	0.7	1.8	1.5
Ba	mg/kg	50	50	80	80	70	70	100	80	50	80	80	30	80	90	80	90	90
Be	mg/kg	0.12	0.05	0.54	0.66	0.17	0.7	0.4	0.18	0.2	0.6	0.76	0.1	0.2	1.43	0.6	0.28	0.73
Bi	mg/kg	0.24	0.2	0.1	0.76	0.8	1.2	1.7	1.0	0.27	0.6	0.5	0.42	0.6	0.52	0.1	0.43	0.24
Cd	mg/kg	0.01	0.01	0.01	0.82	0.02	0.25	4.57	0.03	0.13	5.43	0.02	0.01	0.01	0.06	0.03	0.01	0.65
Co	mg/kg	12	32	18	16	18	14	15	10	26	15	18	27	13	22	16	12	12
Cr	mg/kg	9	18	4	17	8	28	19	11	28	15	14	7	18	44	22	17	6
Cu	mg/kg	2860	154	2120	52.1	2250	463	314	1010	3430	239	1235	189	1720	1670	139	1380	79
Hg	mg/kg	0.01	0.06	0.04	0.14	0.01	0.01	0.2	0.02	0.01	0.04	0.02	0.02	0.01	0.01	0.01	0.02	0.01
Mn	mg/kg	24	34	51	1210	38	1710	3160	41	84	1400	73	28	38	170	76	71	1160
Mo	mg/kg	9	282	282	4	40	0.5	0.3	4	13	0.6	38	111	7	49	8	47	2
Ni	mg/kg	10	102	11	15	20	19	13	13	24	14	18	36	19	26	28	14	6
P	mg/kg	80	70	150	850	360	970	870	40	1110	940	1000	60	350	1770	100	620	1200
Pb	mg/kg	2	2	1.8	196	15	9	8	8	3	5	2	2	5	3	2	5	24
Sb	mg/kg	0.05	0.12	0.07	0.35	0.05	0.2	4.93	0.18	0.06	0.12	0.07	0.11	0.05	0.06	0.06	0.05	0.21
Se	mg/kg	11.5	9.2	17	3.7	7	13	7	7	7	7	4.8	9.3	17	8.5	7	7.6	3.8
Sn	mg/kg	0.5	0.4	0.8	0.3	0.5	0.3	0.2	0.7	0.3	0.2	0.6	0.3	0.9	0.6	0.3	1.3	0.2
Sr	mg/kg	26	67	24	42	38	13	13	24	19	10	483	51	28	734	23	32	36
Th	mg/kg	0.7	0.4	1.9	1.4	1.6	0.7	1	0.4	2.3	1	2.6	0.4	1.4	2.3	2.2	2	1
U	mg/kg	0.09	0.2	0.3	0.3	0.3	0.1	0.17	0.1	0.5	0.09	0.4	0.2	0.28	0.3	0.32	0.3	0.27
Zn	mg/kg	6	4	8	303	5	225	1530	6	34	1620	29	11	14	50	70	17	198

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10	506XC10
	From	18	24	64	70	127	136	144	166	172	190	202	216	217	224	227	234	247
	To	18.4	24.4	64.4	70.4	127.4	136.4	144.4	166.8	172.8	190.8	202.8	216.8	217.8	224.8	227.8	234.8	247.8
	Lith	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	FDP	FDP	FDP	FDP	FDP	FDP	FDP
	Alt	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PR	PR	PR	PR	PR	PR	PR
	Weath	POX	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	796100	796101	796102	796103	796104	796105	796106	796107	796108	796109	796110	796111	796112	796113	796114	796115	796116
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	Red	Red
Al	%	1.6	1.0	2.7	2.1	3.3	2.1	1.3	2.9	2.6	1.7	3.0	2.3	4.7	2.0	4.9	4.6	2.9
Ca	%	5.12	0.08	1.83	4.96	0.32	0.45	0.03	0.31	0.29	0.09	0.25	3.86	0.04	4.76	0.11	0.09	0.36
Fe	%	2.7	3.1	4.6	3.5	4.4	3.6	2.6	4.3	3.9	3.3	4.0	3.7	5.5	3.5	3.9	4.7	4.0
K	%	0.53	0.26	0.52	0.54	0.47	0.61	0.05	0.26	0.63	0.53	0.39	0.56	0.25	0.43	0.6	0.57	0.43
Mg	%	0.59	0.05	1.9	1.53	2.0	1.0	0.01	2.8	1.2	0.4	2.9	1.1	4.04	0.97	1.0	1.5	2.5
Na	%	0.08	0.04	0.09	0.05	0.04	0.04	0.02	0.08	0.04	0.03	0.04	0.08	0.02	0.12	0.06	0.02	0.02
S	%	8.18	3.33	4.34	7.37	3.29	3.21	3.18	3.17	3.14	3.16	3.09	6.02	3.07	7.04	3.03	2.98	2.94
As	mg/kg	0.7	15	0.7	1.1	1.0	5.9	6.2	6	0.7	0.7	16	1.2	1.5	0.8	1.2	1.4	1.1
Ba	mg/kg	50	50	90	60	60	90	50	40	70	40	60	70	30	50	140	120	80
Be	mg/kg	0.18	0.05	0.22	0.56	0.2	0.79	0.05	0.7	0.6	0.1	0.7	0.3	0.28	0.38	0.8	0.8	1.01
Bi	mg/kg	0.22	0.23	0.3	0.11	0.4	0.31	0.27	0.8	1	0.3	1.2	0.1	0.46	0.57	0.5	1.3	0.59
Cd	mg/kg	0.01	0.03	0.07	0.01	0.01	0.18	0.03	0.18	0.13	0.01	0.14	0.06	0.03	0.01	0.27	0.02	0.13
Co	mg/kg	16	5	14	62	8	13	17	17	15	8	14	30	26	12	24	20	12
Cr	mg/kg	5	5	47	48	26	5	8	34	21	5	23	24	168	6	14	17	8
Cu	mg/kg	327	108	810	483	1920	49	530	78	497	1310	109	2340	256	816	667	233	600
Hg	mg/kg	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Mn	mg/kg	27	82	356	120	52	979	8	2300	709	24	2730	163	262	74	151	632	2400
Mo	mg/kg	4	11	5	90	28	12	37	0.3	2	10	0.8	64	2	3	2	1.4	1
Ni	mg/kg	10	7	25	83	26	6	16	18	16	12	14	24	128	7	22	17	7
P	mg/kg	930	50	850	550	940	1200	60	1020	940	160	990	790	210	760	1790	1210	1310
Pb	mg/kg	1	11	2	1	3	6	2	22	7	2	13	2	2	2	3	5	8
Sb	mg/kg	0.08	0.66	0.05	0.05	0.05	0.17	0.7	0.28	0.05	0.05	0.24	0.06	0.1	0.05	0.1	0.07	0.08
Se	mg/kg	8.9	3	4	12.3	6	1.9	5.6	4	4	7	5	9	5.2	5.7	5	3	3.2
Sn	mg/kg	0.7	2	0.3	0.3	0.6	0.2	0.9	0.4	0.9	0.9	0.3	0.4	0.3	0.5	0.3	0.3	0.2
Sr	mg/kg	715	51	168	516	22	13	77	14	21	26	9	417	30	555	625	162	11
Th	mg/kg	0.5	0.4	2.5	1.7	1.8	1	0.4	1.5	1.2	1	1.2	1.6	1.6	0.9	1.6	2.3	1.4
U	mg/kg	0.1	0.05	0.3	0.1	0.48	0.2	0.2	0.22	0.22	0.11	0.18	0.2	0.1	0.1	0.25	0.23	0.22
Zn	mg/kg	3	7	59	10	15	135	5	196	72	5	192	29	48	8	153	96	223

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	506XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10
	From	260	20	26	34	45	58	64	76	88	94	96	100	102	108	114	118	126
	To	260.8	20.4	26.4	34.4	45.4	58.4	64.4	76.4	88.4	94.4	96.4	100.4	102.4	108.4	114.8	118.8	126.8
	Lith	FDP	DVa	DVa	DVa	DVa	DVa	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP
	Alt	PR	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH
	Weath	FR	POX	POX	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	796117	796118	796119	796120	796121	796122	796123	796124	796125	796126	796127	796128	796129	796130	796131	796132	796133
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	UC(paf)	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	Red	Red	Red	High Red	Red	Red	Red	Red	High Red	Red	Red	Red	Red	Red	Red	Red	Red
Al	%	2.7	3.8	2.1	1.7	3.0	3.0	2.8	3.3	2.2	3.3	3.4	2.5	2.6	2.1	3.6	1.4	2.3
Ca	%	0.27	0.26	0.24	4.56	0.09	0.38	0.48	0.15	3.92	0.35	0.02	0.03	0.28	0.02	0.18	0.1	0.48
Fe	%	3.8	4.0	3.0	2.3	5.5	3.7	4.2	4.7	3.3	5.3	4.4	2.9	3.5	2.4	5.0	2.6	3.3
K	%	0.3	0.25	0.6	0.46	0.36	0.66	0.45	0.49	0.37	0.77	0.75	0.57	0.76	0.41	0.37	0.45	0.15
Mg	%	2.5	3.81	0.8	0.86	0.8	1.9	2.2	1.8	1.3	1.79	1.9	0.6	1.51	0.2	2.3	0.03	2.0
Na	%	0.08	0.01	0.04	0.09	0.04	0.04	0.03	0.03	0.07	0.06	0.06	0.03	0.04	0.01	0.03	0.03	0.13
S	%	2.90	2.85	2.89	7.05	2.78	2.73	2.70	2.70	4.90	2.65	2.54	2.69	2.51	2.51	2.42	2.41	2.33
As	mg/kg	5.1	2	0.6	0.1	9	2	9.6	0.9	0.5	3.2	0.8	2	2.1	4.7	0.6	3.2	4.4
Ba	mg/kg	40	30	120	50	50	130	90	50	40	110	100	80	120	70	130	100	30
Be	mg/kg	0.5	0.67	0.2	0.24	0.28	0.7	1.08	0.38	0.31	0.41	1.27	0.28	0.36	0.11	0.4	0.09	0.37
Bi	mg/kg	0.3	1.0	0.5	0.13	1.8	0.9	0.13	0.25	0.2	1.72	0.08	0.4	0.29	0.78	0.24	0.36	0.19
Cd	mg/kg	1.04	0.07	0.01	0.01	0.18	0.04	0.02	0.01	0.04	0.59	0.07	0.07	0.07	0.08	0.01	0.06	0.08
Co	mg/kg	14	15	9	7	5	17	14	14	14	10	22	18	26	13	20	15	12
Cr	mg/kg	17	25	13	5	54	19	6	12	30	25	64	10	9	14	24	10	24
Cu	mg/kg	94	226	2720	44.5	415	80	74	2260	1760	7620	358	1170	1945	1035	1720	1590	22
Hg	mg/kg	0.01	0.02	0.01	0.01	0.08	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.01	0.02	0.01	0.01	0.01
Mn	mg/kg	2210	388	45	31	539	1260	1690	43	376	1460	204	91	307	35	55	10	1420
Mo	mg/kg	0.6	2	32	17	2	0.4	7	7	14	8	12	26	47	3	20	43	1.1
Ni	mg/kg	10	16	16	10	26	15	7	12	19	12	72	20	10	16	22	13	12
P	mg/kg	960	920	580	770	670	1020	1260	140	920	700	210	160	1070	90	400	40	940
Pb	mg/kg	8	2	8	1	34	7	8	2	2	21	1.9	4	5	4	2.6	2	11.7
Sb	mg/kg	0.15	0.14	0.05	0.05	2.95	0.13	0.21	0.05	0.07	0.08	0.05	0.16	0.09	0.42	0.05	0.46	0.26
Se	mg/kg	5	3	5	6.7	15	7	1.9	6.3	5	7.1	7	8	7.2	7.4	7	3.6	4
Sn	mg/kg	0.5	0.3	0.9	0.5	1.2	0.3	0.3	0.6	0.2	0.8	0.6	0.3	0.4	0.5	0.8	0.6	0.4
Sr	mg/kg	12	42	38	611	29	19	12	21	328	34	52	121	15	59	21	45	30
Th	mg/kg	1.8	1	2.4	1	1.4	0.9	0.9	1.2	2.2	4.8	3.9	3.2	2.5	0.8	1.3	0.5	1.7
U	mg/kg	0.29	0.2	0.54	0.1	0.2	0.22	0.27	0.66	0.3	0.7	0.3	0.5	0.3	0.16	0.4	0.11	0.4
Zn	mg/kg	417	81	7	5	130	126	136	10	29	225	21	12	72	10	10	3	183

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10
	From	130	136	138	144	149	152	160	165	169	174	180	185	190	198	204	206	208
	To	130.8	136.8	138.8	144.8	149.8	152.8	160.8	165.8	169.8	174.8	180.8	185.8	190.8	198.8	204.8	206.8	208.8
	Lith	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP
	Alt	PH	PH	PH	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR	PR
	Weath	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	796134	796135	796136	796137	796138	796139	796140	796141	796142	796143	796144	796145	796146	796147	796148	796149	796150
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	UC(paf)	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Waste Type	Red	Red	Red	Red	Red	Red	Red	High Red	Red	Red	Red	High Red	Red	Red	High Red	High Red	Red
Al	%	3.9	1.7	0.6	2.4	2.5	1.9	6.9	2.1	0.9	3.2	2.4	2.2	5.0	2.4	2.4	2.0	2.4
Ca	%	0.21	0.64	0.01	0.03	0.33	0.14	0.01	3.64	0.02	0.05	0.33	2.48	0.01	0.16	3.71	4.11	0.04
Fe	%	4.3	3.2	11.2	2.3	3.9	3.4	2.1	2.6	2.6	2.8	2.9	2.8	5.2	3.9	2.2	2.7	3.1
K	%	0.31	0.14	0.05	0.73	0.11	0.44	0.86	0.66	0.27	0.74	1.11	0.6	0.42	0.41	0.71	0.71	0.78
Mg	%	3.9	1.7	0.01	0.14	2.5	0.7	0.11	0.93	0.06	0.88	0.17	1.33	1.07	1.11	1.05	0.85	0.05
Na	%	0.02	0.12	0.04	0.06	0.08	0.03	0.04	0.04	0.01	0.06	0.05	0.06	0.01	0.02	0.06	0.03	0.13
S	%	2.26	2.23	2.44	2.31	2.13	2.19	2.24	4.89	2.11	2.10	2.21	3.78	1.99	1.98	4.69	4.98	2.08
As	mg/kg	3.4	2.2	15.9	19.1	4.3	5.7	3	1.1	7.6	7.2	1	1.7	1.1	0.7	1.2	0.6	6
Ba	mg/kg	80	50	330	130	30	110	150	80	50	130	120	80	90	60	80	90	60
Be	mg/kg	0.63	0.36	0.05	0.22	0.32	0.52	0.59	0.48	0.05	0.28	0.43	0.52	0.64	0.25	0.47	0.44	0.33
Bi	mg/kg	0.72	0.26	0.51	0.39	0.42	0.6	1.78	0.04	0.51	0.14	0.06	0.04	0.15	0.61	0.03	0.61	1.55
Cd	mg/kg	9.45	2.2	0.03	0.07	6.31	0.29	0.01	0.02	0.02	0.02	0.03	0.06	1.04	0.01	0.19	0.14	0.02
Co	mg/kg	13	13	0	18	16	12	18	18	21	14	43	24	12	14	14	16	19
Cr	mg/kg	26	19	8	13	32	23	29	8	11	13	18	16	15	19	11	7	10
Cu	mg/kg	96	103	217	5160	308	2290	1280	2260	1545	4830	5880	4860	1905	3430	1065	5830	1400
Hg	mg/kg	0.11	0.02	0.29	0.02	0.02	0.14	0.01	0.02	0.01	0.03	0.03	0.02	0.01	0.01	0.02	0.02	0.01
Mn	mg/kg	3480	1990	23	31	1940	145	47	159	25	115	151	134	489	348	154	384	48
Mo	mg/kg	0.3	0.6	3	27	1.2	10	3	97	4	27	147	84	27	6	26	37	3
Ni	mg/kg	15	12	0.4	8	16	17	12	10	19	16	22	14	11	29	8	16	13
P	mg/kg	840	940	280	100	970	360	80	740	70	560	1390	980	350	600	900	920	70
Pb	mg/kg	5.6	75.1	15	1	8.2	14	6	2	2	2	2	2	2	1	6	39	10
Sb	mg/kg	0.12	0.17	0.36	0.05	0.15	0.8	0.25	0.07	0.22	0.2	0.13	0.06	0.05	0.07	0.11	0.14	0.13
Se	mg/kg	2	3	8.3	10.7	5	8	7	6.7	6.4	6.1	12.4	9.9	7.2	2.3	4.8	8	6
Sn	mg/kg	0.2	0.3	0.5	0.7	0.6	0.6	0.5	0.4	0.5	0.3	0.6	0.4	0.5	0.5	0.4	0.4	0.5
Sr	mg/kg	11	42	87	24	28	85	14	408	40	363	26	240	30	237	321	507	50
Th	mg/kg	1	0.9	0.2	2.6	1.2	2	1.5	2.9	0.5	4	3.4	2.4	3.8	1.4	2.9	2.2	1.4
U	mg/kg	0.2	0.3	0.05	0.4	0.3	0.3	0.2	0.4	0.1	0.4	0.3	0.4	0.6	0.9	0.3	0.3	0.2
Zn	mg/kg	2880	596	8	9	1730	84	12	12	6	16	6	11	299	45	31	47	7

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	515XC10	516XC10	516XC10	516XC10	516XC10
	From	214	218	222	226	229	232	240	243	248	256	262	270	284	5	17	28	35
	To	214.8	218.8	222.8	226.8	229.8	232.8	240.8	243.8	248.8	256.8	262.8	270.8	284.8	5.4	17.4	28.4	35.4
	Lith	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	AL	DVp	DVp	DVp
	Alt	PR	PR	PR	PR	PR	PR	PH	PH	PH	PH	PH	PH	SA	NONE	PH	PH	PH
	Weath	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	AL	TOX	POX	POX
	Sample ID	796151	796152	796153	796154	796155	796156	796157	796158	796159	796160	796161	796162	796163	796164	796165	796166	796167
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	PAF	UC(paf)	UC(paf)	PAF	PAF	PAF	PAF	PAF	PAF	UC(paf)	PAF	NAF	PAF	NAF	UC(paf)	PAF
	Waste Type	High Red	Red	Red	High Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Al	%	3.2	2.1	3.1	2.2	4.9	3.0	1.6	3.5	3.7	3.2	2.7	4.1	2.3	0.9	2.5	2.8	2.4
Ca	%	4.79	0.25	0.26	4.42	0.12	0.29	0.53	0.29	0.26	0.64	0.42	0.1	0.79	0.08	1.97	0.13	0.05
Fe	%	3.5	1.9	4.4	3.1	2.8	4.5	3.5	4.3	3.8	3.4	3.7	2.1	3.5	1.2	3.9	1.1	1.4
K	%	0.28	0.97	0.99	0.73	0.28	0.43	0.37	0.46	0.36	0.4	0.17	1.05	0.48	0.28	0.46	0.47	0.65
Mg	%	2.9	0.21	1.6	0.9	0.8	1.6	1.1	2.2	3.4	2.4	1.9	0.42	1.4	0.01	1.44	0.17	0.18
Na	%	0.11	0.03	0.07	0.05	0.02	0.02	0.15	0.07	0.02	0.05	0.15	0.04	0.13	0.04	0.07	0.04	0.02
S	%	5.64	1.77	1.68	4.83	1.65	1.58	1.60	1.62	1.51	1.51	1.40	1.44	1.25	1.22	1.54	1.34	1.30
As	mg/kg	0.1	0.5	1.3	3.2	0.5	1.5	0.7	0.8	9.6	2.6	0.6	1.6	0.7	2.9	0.5	3.5	2.4
Ba	mg/kg	80	100	110	90	130	70	80	110	50	90	40	180	60	90	30	120	150
Be	mg/kg	0.3	0.44	0.46	0.42	1	0.77	0.18	0.33	0.74	0.91	0.67	0.47	0.26	0.07	0.4	0.28	0.28
Bi	mg/kg	0.18	0.04	0.18	0.19	0.55	0.43	0.46	0.36	0.59	0.49	0.22	0.34	0.94	0.42	1.21	0.09	0.12
Cd	mg/kg	0.02	0.5	0.04	0.03	0.09	0.02	0.01	0.01	0.43	0.55	0.03	0.16	0.36	0.02	0.42	0.04	0.03
Co	mg/kg	14	20	27	19	15	21	9	12	14	16	11	8	9	8	9	13	9
Cr	mg/kg	43	19	90	4	14	29	26	33	23	8	29	25	27	7	32	29	12
Cu	mg/kg	1470	4780	5500	3630	393	921	2800	2060	265	93	502	12700	2070	2180	668	13150	5740
Hg	mg/kg	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.04	0.02	0.03	0.02	0.03	0.03
Mn	mg/kg	179	147	108	259	233	275	246	63	2770	2600	1580	133	1130	24	1470	47	15
Mo	mg/kg	58	41	122	43	2	10	1	10	1.0	1	1	143	1.0	42	0.9	19	45
Ni	mg/kg	25	18	70	8	28	31	12	27	14	6	17	14	14	8	18	12	8
P	mg/kg	690	1000	660	980	1880	810	650	750	1000	1270	1070	1720	690	110	760	170	80
Pb	mg/kg	3	5	2	1	4.5	2	1	2.7	13.5	23	2	21	12	2	17	3	1
Sb	mg/kg	0.05	0.22	0.05	0.06	0.09	0.09	0.05	0.05	0.28	0.12	0.05	0.28	0.05	0.24	0.06	0.1	0.08
Se	mg/kg	5.6	8.1	9.6	8.5	2	7.7	4.7	5	2	1.3	0.6	12	3.6	2.8	0.7	8.7	9
Sn	mg/kg	0.5	0.3	0.8	0.4	0.2	0.3	0.5	0.7	0.3	0.3	0.4	0.7	0.3	0.4	0.6	0.3	0.6
Sr	mg/kg	628	28	23	499	499	25	49	25	10	22	59	146	44	102	101	57	32
Th	mg/kg	1.2	3.2	4	1	1.9	2	5.5	1.4	1.4	0.9	1.1	2.8	5.9	14.7	1.1	5.8	0.9
U	mg/kg	0.5	0.2	0.4	0.2	0.2	0.18	0.4	0.4	0.3	0.22	0.21	0.3	0.4	0.21	0.16	0.4	0.3
Zn	mg/kg	28	136	19	28	44	46	19	13	301	344	128	47	143	3	187	30	7

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10
	From	41	45	50	54	58	62	66	72	76	78	83	88	166	206	214	224	232
	To	41.4	45.4	50.4	54.4	58.4	62.4	66.4	72.4	76.4	78.4	83.4	88.4	166.4	206.8	214.8	224.8	232.8
	Lith	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp
	Alt	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	QIP	QIP	QIP	PH	PH
	Weath	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	FR	FR	FR	FR	FR
	Sample ID	796168	796169	796170	796171	796172	796173	796174	796175	796176	796177	796178	796179	796180	796181	796182	796183	796184
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	PAF	UC(paf)	PAF	PAF	UC(paf)	NAF	NAF	UC(paf)	UC(paf)	PAF	UC(paf)	PAF	PAF	PAF	PAF	NAF	UC(paf)
	Waste Type	Red	Red	Red	Red	Red	Red	Amber	Amber	Amber	Amber	Red	Red	Amber	Amber	Amber	Red	Amber
Al	%	0.4	3.7	1.4	2.1	2.3	1.8	3.0	2.0	2.3	2.4	1.8	0.8	3.3	1.7	3.1	1.7	2.3
Ca	%	0.02	0.32	1.08	0.54	0.7	2.0	1.51	0.71	0.8	0.31	1.8	0.03	0.23	0.34	0.15	2.4	0.7
Fe	%	5.6	5.6	1.8	3.0	2.7	3.2	4.6	2.4	2.7	4.5	3.1	17.2	4.2	2.3	2.6	2.9	2.7
K	%	0.06	0.55	0.39	0.18	0.33	0.18	0.34	0.09	0.25	0.51	0.24	0.09	0.55	0.37	0.41	0.22	0.25
Mg	%	0.03	2.2	0.17	1.7	1.5	1.5	2.14	1.9	1.6	0.34	1.16	0.03	1.93	0.51	1.5	1.2	1.6
Na	%	0.02	0.02	0.05	0.07	0.06	0.15	0.03	0.11	0.08	0.03	0.14	0.05	0.03	0.02	0.01	0.12	0.07
S	%	1.21	1.14	1.81	1.10	1.06	1.85	0.99	0.99	0.98	0.97	1.75	1.20	0.85	0.82	0.84	1.49	0.81
As	mg/kg	2.8	2.8	0.6	1.6	2.3	0.4	3.3	4.8	1.4	2.1	1.2	15.6	0.9	0.5	1.2	0.7	0.9
Ba	mg/kg	10	70	60	40	60	30	30	40	80	150	30	310	80	70	90	30	80
Be	mg/kg	0.05	0.87	0.3	0.47	0.43	0.17	0.4	0.28	0.39	0.32	0.25	0.05	0.37	0.46	0.52	0.21	0.45
Bi	mg/kg	0.36	0.81	0.24	0.22	0.11	0.75	0.74	0.11	0.12	0.43	0.83	1.04	0.31	0.27	0.2	0.29	0.11
Cd	mg/kg	0.08	0.37	0.07	0.13	0.03	0.03	0.42	1.39	0.23	0.01	0.01	0.01	0.03	0.02	0.2	0.02	0.11
Co	mg/kg	15	13	11	10	11	11	12	12	12	15	7	1	10	15	11	9	12
Cr	mg/kg	6	35	8	17	8	39	47	29	9	22	33	12	40	16	19	31	9
Cu	mg/kg	58	1620	7050	106	24	389	241	32	77.1	6260	175	84	1780	2860	1680	31.1	54.7
Hg	mg/kg	0.02	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.01	0.04	0.01	3.35	0.01	0.01	0.03	0.01	0.01
Mn	mg/kg	80	1950	113	1570	1340	345	3770	1450	1390	238	451	41	1120	144	308	615	1490
Mo	mg/kg	15	5	14	0.7	0.7	0.5	1.4	0.4	1.1	299	0.9	14	19	54	37	2.1	0.8
Ni	mg/kg	12	39	50	9	6	18	27	14	7	28	18	0.9	39	32	19	14	6
P	mg/kg	80	1570	550	1020	1160	810	840	890	1170	1000	780	630	910	910	630	850	1170
Pb	mg/kg	5	8	3	13.4	3	2	37	28.9	10	2	2	48	4	2	9	1	6
Sb	mg/kg	0.25	0.14	0.09	0.33	0.15	0.08	0.06	0.18	0.13	0.11	0.08	1.12	0.1	0.07	0.37	0.06	0.13
Se	mg/kg	6.7	1.3	12.7	1.3	1.8	1.8	0.3	4	1.8	8.9	1.1	14.8	2	3.9	4	0.8	1.4
Sn	mg/kg	1.3	0.4	0.3	0.4	0.3	0.7	0.4	0.3	0.3	0.5	1.1	0.6	0.4	0.3	0.3	0.4	0.3
Sr	mg/kg	60	329	59	40	30	150	44	47	39	51	124	553	176	35	150	166	35
Th	mg/kg	0.2	2.5	3.5	1.9	0.8	0.9	0.9	0.9	0.9	2.6	1.4	1.2	2.5	2.8	4.6	1.4	0.8
U	mg/kg	0.07	0.3	0.23	0.4	0.22	0.32	0.23	0.3	0.23	0.6	0.25	0.11	0.5	0.28	0.7	0.26	0.23
Zn	mg/kg	14	392	13	166	126	25	287	371	184	33	34	5	201	20	28	19	166

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10
	From	236	240	244	251	254	257	260	263	266	268	272	275	278	283	286	289	292
	To	236.8	240.8	244.8	251.8	254.8	257.8	260.8	263.8	266.8	268.8	272.8	275.8	278.8	283.8	286.8	289.8	292.8
	Lith	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp
	Alt	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH
	Weath	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	Sample ID	796185	796186	796187	796188	796189	796190	796191	796192	796193	796194	796195	796196	796197	796198	796199	796200	796201
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	NAF	PAF	NAF	PAF	PAF	NAF	UC(paf)	NAF	NAF	UC(paf)	NAF	NAF	NAF	NAF	NAF	NAF	NAF
	Waste Type	Amber	Amber	Red	Amber	Amber	Red	Amber	Amber	Red	Amber	Amber	Amber	Amber	Green	Green	Green	Green
Al	%	2.6	2.8	2.0	3.8	2.9	1.6	2.0	3.4	1.8	3.3	2.6	3.1	2.4	4.6	3.5	4.2	2.5
Ca	%	0.81	0.08	2.4	0.11	0.34	1.7	0.59	0.6	1.7	0.19	0.7	0.7	0.6	0.31	0.29	0.32	1.62
Fe	%	3.5	1.0	2.9	4.2	3.3	2.8	2.8	3.0	3.4	3.9	3.2	2.8	2.8	2.6	5.1	5.2	4.8
K	%	0.54	0.81	0.35	0.43	0.52	0.19	0.11	0.26	0.37	0.76	0.2	0.4	0.11	0.54	0.4	0.52	0.22
Mg	%	1.4	0.19	1.2	2.8	1.41	1.1	1.6	2.8	1.03	1.6	2.4	2.3	2.1	1.6	2.5	2.3	1.94
Na	%	0.12	0.05	0.14	0.02	0.02	0.17	0.09	0.05	0.14	0.14	0.1	0.03	0.1	0.01	0.02	0.02	0.07
S	%	0.81	0.75	1.33	0.69	0.64	1.24	0.63	0.62	1.47	0.65	0.56	0.54	0.51	0.48	0.42	0.35	0.34
As	mg/kg	0.8	3.9	0.7	2.2	1.1	0.5	2.2	0.6	0.5	1.3	1.5	2.1	3.3	1.9	1.1	1.2	0.3
Ba	mg/kg	70	230	40	70	70	30	20	50	50	110	30	90	30	110	140	110	20
Be	mg/kg	0.32	0.34	0.22	0.47	0.52	0.18	0.36	0.85	0.2	0.75	0.46	0.69	0.25	0.99	0.56	0.82	0.23
Bi	mg/kg	0.77	0.06	0.33	0.46	0.33	0.37	0.12	0.31	0.32	0.11	0.13	0.12	0.04	0.1	0.81	0.34	1.02
Cd	mg/kg	0.28	0.1	0.11	0.27	0.01	0.02	0.05	0.15	0.16	0.03	0.89	0.07	0.11	0.13	18.2	0.57	0.08
Co	mg/kg	9	4	9	29	11	10	16	10	7	18	13	8	14	11	13	10	7
Cr	mg/kg	29	11	27	35	22	28	19	8	27	25	31	8	29	30	37	40	68
Cu	mg/kg	5700	5530	60.7	526	1340	198.5	25	75.7	3240	333	69	145	149	633	2000	755	634
Hg	mg/kg	0.01	0.04	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.08	0.01	0.01
Mn	mg/kg	1020	22	949	2020	477	378	1620	3170	642	112	2000	2230	1620	356	3200	1980	1340
Mo	mg/kg	1.2	39	1.3	8	18	2.1	0.9	0.4	1.1	6	1.6	0.4	2	13	3	5	1.2
Ni	mg/kg	14	6	13	33	29	12	10	6	14	21	15	6	14	22	35	43	36
P	mg/kg	660	280	860	540	1030	830	930	1310	350	720	1000	1290	960	1010	1190	1200	810
Pb	mg/kg	11	1	2	4	2	1	5.1	9	5	1.7	7.6	8	6	6	12	26	2
Sb	mg/kg	0.1	0.05	0.07	0.09	0.06	0.06	0.4	0.1	0.06	0.12	0.24	0.11	0.12	0.18	0.06	0.16	0.05
Se	mg/kg	7.7	8	0.7	0.9	3.3	0.4	0.9	1.1	3.1	7	0.6	1.1	0.6	1	1.6	1.1	0.3
Sn	mg/kg	0.6	0.4	0.6	0.3	0.2	0.6	0.6	0.3	0.4	0.5	0.4	0.3	0.4	0.3	0.4	0.5	0.6
Sr	mg/kg	46	117	137	255	27	128	59	23	96	28	56	25	51	486	117	49	50
Th	mg/kg	5.1	3.5	1.5	1.7	3.5	1.2	2	1.1	5.1	2.8	1.5	0.9	1.1	4.5	2.6	2.9	0.9
U	mg/kg	0.4	0.5	0.35	0.3	0.24	0.3	0.4	0.2	0.2	0.4	0.4	0.18	0.28	0.5	0.3	0.3	0.24
Zn	mg/kg	121	9	82	337	64	19	134	288	68	13	408	247	170	41	2580	457	104

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	516XC10	522XC10	522XC10	522XC10	522XC10	522XC10	522XC10	522XC10	522XC10
	From	296	302	333	362	382	426	462	484	516	3	15	26	38	60	108	128	134
	To	296.8	302.8	333.8	362.8	382.8	427	463	485	517	3.4	15.4	26.4	38.4	60.4	108.4	128.4	134.4
	Lith	DVp	DVp	DVp	FDP	FDP	FDP	FDP	FDP	FDP	AL	AL	FDP	FDP	DVp	FDP	FDP	FDP
	Alt	PH	PH	PH	PH	PH	PH	PH	PH	PH	NONE	NONE	PH	PH	SI	PH	PH	PH
	Weath	FR	FR	FR	FR	FR	FR	FR	FR	FR	AL	AL	POX	FR	FR	FR	FR	FR
	Sample ID	796202	796203	796204	796205	796206	796207	796208	796209	796210	796211	796212	796213	796214	796215	796216	796217	796218
	Sample ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	ARD Class	UC(paf)	NAF	PAF	UC(naf)	NAF	NAF	UC(naf)	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF
	Waste Type	Green	Amber	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Amber	Green	Green	Green
Al	%	1.8	1.8	0.7	3.4	3.5	1.7	0.3	2.0	3.5	1.8	6.8	2.3	5.1	2.7	5.9	1.7	2.1
Ca	%	0.38	1.5	0.06	0.29	0.32	0.04	0.02	0.02	0.16	1.37	0.02	0.01	0.04	2.8	0.02	1.2	0.07
Fe	%	1.9	2.7	2.3	4.6	3.9	3.3	4.7	5.3	4.2	2.9	4.0	14.5	3.6	3.0	3.9	2.7	2.4
K	%	0.55	0.27	0.02	0.38	0.64	0.62	0.02	0.63	0.46	0.17	0.21	0.79	0.53	0.42	0.2	0.2	0.87
Mg	%	0.43	1.0	0.01	2.6	1.27	0.05	0.04	0.31	2.6	1.24	0.8	0.04	1.6	1.6	0.7	1.2	0.07
Na	%	0.02	0.12	0.02	0.02	0.02	0.06	0.03	0.04	0.02	0.16	0.02	0.04	0.03	0.06	0.02	0.16	0.05
S	%	0.33	0.59	0.33	0.28	0.22	0.19	0.22	0.16	0.14	0.08	0.08	0.09	0.07	0.62	0.05	0.37	0.17
As	mg/kg	0.6	1.4	35	1.3	0.9	1.6	19.4	3.4	0.3	0.4	1.9	12	0.6	1.0	1.7	1.2	2
Ba	mg/kg	160	50	10	210	170	120	20	120	60	40	190	120	230	160	290	40	370
Be	mg/kg	0.4	0.24	0.05	0.28	0.61	0.14	0.05	0.35	0.41	0.13	1.48	0.14	0.98	0.45	1.81	0.21	0.19
Bi	mg/kg	0.11	0.02	0.42	0.21	0.42	0.04	0.37	0.24	0.21	0.09	0.04	0.99	0.04	0.03	0.03	0.01	0.08
Cd	mg/kg	0.01	0.73	0.01	1.21	0.1	0.01	0.01	0.06	3.49	0.03	0.09	0.01	0.11	0.12	0.07	0.05	0.01
Co	mg/kg	4	13	0	9	11	0.8	3	3	8	9	16	0	13	10	18	9	0
Cr	mg/kg	21	28	4	36	27	15	9	7	38	29	27	7	36	33	29	28	14
Cu	mg/kg	1530	872	97	502	1530	50	54	988	395	138	28.7	128	1165	107	30	122	126
Hg	mg/kg	0.01	0.03	0.05	0.02	0.02	0.01	0.23	0.01	0.04	0.01	0.01	0.08	0.02	0.01	0.01	0.02	0.01
Mn	mg/kg	172	703	6	3520	1560	12	73	74	3780	1280	1110	15	202	1360	1180	623	14
Mo	mg/kg	56	20.8	15	2	26	1.5	4	47	2	1.4	0.9	2	12	1.5	1	2.7	2
Ni	mg/kg	19	14	1.0	38	26	0.9	3	3	35	16	20	2	18	15	19	12	0.4
P	mg/kg	1180	880	160	1190	2970	340	100	1540	790	810	470	40	1700	830	190	800	1290
Pb	mg/kg	2	4	3	244	5	1	4	4	11	3	7	3	6	6	5	2	1
Sb	mg/kg	0.05	0.14	1.71	0.09	0.14	0.05	0.7	0.08	0.07	0.05	0.1	0.12	0.18	0.09	0.09	0.06	0.05
Se	mg/kg	3.2	1.6	14.9	0.4	1.3	17.2	11.5	6.6	0.6	0.4	0.2	3	0.6	0.2	0.2	0.3	6.5
Sn	mg/kg	0.3	0.4	1	0.2	0.3	0.4	0.9	0.4	0.3	0.3	0.5	0.5	0.6	0.2	0.6	0.3	0.5
Sr	mg/kg	35	72	54	83	1125	53	77	30	180	67	54	8	285	157	27	107	53
Th	mg/kg	3	1.2	0.2	3.9	3.9	2.2	0.2	2.5	2.1	1.3	1.7	1.1	5.2	2.2	1.7	1	1.6
U	mg/kg	0.25	0.26	0.05	0.3	0.6	0.1	0.1	0.6	0.2	0.25	0.5	0.2	0.4	0.25	0.72	0.21	0.19
Zn	mg/kg	20	86	2	554	308	2	9	9	1150	69	82	9	41	72	82	39	

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	522XC10	522XC10	522XC10	265XC09	265XC09	265XC09	256XC09	326XC10	326XC10	235XC09	241XC09	267XC09	439XC10	439XC10	360XC10	370XC10	388XC10
	From	140	146	154	12	14	26	0	2	10	8	4	6	8	12	12	2	58
	To	140.4	146.4	154.4	14	16	28	2	4	12	10	6	8	12	14	14	4	60
	Lith	FDP	FDP	FDP	HMD	HMD	HMD	HMD	HMD	HMD	LW	FT	FDP	FT	FT	HMD	HMD	HMD
	Alt	PH	PH	PH	PH	PH	PH	NONE	NONE	NONE	NONE	NONE	PH	FR	FR	NONE	NONE	NONE
	Weath	FR	FR	FR	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX
	Sample ID	796219	796220	796221	722047	722048	722055	723967	728297	728302	729586	732287	732833	745945	745946	746686	747349	747778
	Sample ID	-	-	-	10494	10495	10496	10497	10498	10499	10500	10501	10502	10503	10504	10505	10506	10507
	ARD Class	NAF	NAF	NAF	NAF	NAF	NAF	PAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF
	Waste Type	Green	Green	Green	Green	Green	Green	Amber	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Al	%	4.8	1.8	5.6	0.7	0.79	1.12	0.63	4.39	8.95	5.17	2.3	0.55	1.87	1.92	6.14	2.23	1.48
Ca	%	0.01	0.64	0.05	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.1	0.01	0.07	0.1	0.01	0.02	0.01
Fe	%	3.5	2.8	3.9	2.36	1.03	4.41	1.97	3.96	4.42	7.19	5.58	6.52	2.5	2.5	8.47	2.73	2.75
K	%	0.19	0.15	0.23	0.19	0.22	0.18	0.19	0.09	0.4	0.42	0.1	0.13	0.04	0.04	0.33	0.29	0.3
Mg	%	0.6	0.87	0.8														
Na	%	0.01	0.11	0.04														
S	%	0.04	0.08	0.02	0.03	0.02	0.01	0.79	0.05	0.03	0.05	0.04	0.03	0.01	0.01	0.03	0.03	0.02
As	mg/kg	1.0	1	0.8	1	1	9	5	1	2	2	3	2	1	2	1	1	2
Ba	mg/kg	280	40	300	20	10	140	30	20	60	220	60	20	120	80	50	60	60
Be	mg/kg	1.32	0.3	1.93														
Bi	mg/kg	0.02	0.01	0.04	2	1	1	1	1	1	1	2	1	1	1	1	1	1
Cd	mg/kg	0.09	0.08	0.04	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Co	mg/kg	15	11	17	1	1	12	4	1	9	2	7	0.5	11	10	8	23	2
Cr	mg/kg	24	26	32	9	16	14	7	24	45	98	31	13	20	21	96	22	10
Cu	mg/kg	20.7	102	43	190	70	440	4950	590	1840	1090	870	160	3970	6570	2170	420	490
Hg	mg/kg	0.01	0.01	0.01														
Mn	mg/kg	706	551	984	10	10	970	12	19	89	122	359	12	541	541	189	254	101
Mo	mg/kg	0.3	2	2	8	1	2	48	16	17	8	11	7	0.5	0.5	35	53	43
Ni	mg/kg	18	15	18	1	1	3	3	10	46	30	16	0.5	10	12	45	5	3
P	mg/kg	160	960	190	160	110	600	50	770	1180	1250	650	180	110	150	450	470	40
Pb	mg/kg	4	3	3	4	5	4	1	2	3	2	1	1	4	3	5	3	1
Sb	mg/kg	0.07	0.11	0.1	1	1	3	1	1	1	1	1	1	1	1	1	1	1
Se	mg/kg	0.2	0.3	0.2														
Sn	mg/kg	0.5	0.4	0.6														
Sr	mg/kg	27	121	49														
Th	mg/kg	1.4	1.2	1.4														
U	mg/kg	0.38	0.46	0.6	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Zn	mg/kg	56	42	40	2	4	25	2	13	107	34	31	1	83	96	41	7	5

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	394XC10	373XC10	380XC10	510XC10	466XC10	479XC10	479XC10	479XC10	479XC10	479XC10	494XC10	494XC10	494XC10	436XC10	437XC10	437XC10	437XC10
	From	12	10	16	18	0	6	14	18	20	44	28	36	44	16	4	8	42
	To	14	12	18	20	2	8	16	20	22	46	30	38	46	20	6	10	46
	Lith	HMD	HMD	HMD	HMD	LW	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	LW
	Alt	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
	Weath	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX
	Sample ID	747946	750118	750217	752111	755965	756125	756129	756132	756133	756146	756342	756346	756351	759801	759843	759845	759863
	Sample ID	10508	10509	10510	10511	10512	10513	10514	10515	10516	10517	10518	10519	10520	10521	10522	10523	10524
	ARD Class	NAF	NAF	NAF	NAF	UC(naf)	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	UC(naf)
	Waste Type	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Al	%	2.45	1.29	0.62	0.44	2.42	2.26	1.24	1.48	1.4	1.51	2.59	2.66	1.7	4.47	2.42	2.26	2.66
Ca	%	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.06	0.01
Fe	%	2.77	4.08	3.36	6.41	7.38	4.05	4.57	4.66	3.92	3.22	5.91	5.67	6.01	5.14	3.48	3.22	6.12
K	%	0.04	0.28	0.23	0.21	0.15	0.28	0.2	0.26	0.15	0.18	0.3	0.24	0.23	0.75	0.01	0.01	0.33
Mg	%																	
Na	%																	
S	%	0.01	0.04	0.02	0.05	0.05	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.01	0.03	0.03	0.12
As	mg/kg	1	1	303	2	4	1	1	2	1	1	1	1	1	8	1	1	1
Ba	mg/kg	30	70	40	20	80	50	30	40	50	90	60	80	60	100	50	70	70
Be	mg/kg																	
Bi	mg/kg	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cd	mg/kg	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Co	mg/kg	7	0.5	7	0.5	4	12	8	15	4	2	2	7	1	10	21	16	7
Cr	mg/kg	25	36	12	22	67	47	80	43	37	15	36	43	28	108	24	20	69
Cu	mg/kg	1620	420	620	170	680	530	1110	1120	830	710	410	480	310	3440	10	20	1210
Hg	mg/kg																	
Mn	mg/kg	369	14	11	5	202	210	127	230	83	89	145	225	14	75	1210	803	347
Mo	mg/kg	0.5	31	56	15	30	91	66	56	67	27	6	14	14	16	0.5	0.5	17
Ni	mg/kg	11	4	4	0.5	12	11	3	3	2	3	7	11	1	64	10	7	22
P	mg/kg	130	190	160	390	890	490	60	130	80	90	650	470	130	660	80	100	40
Pb	mg/kg	2	1	143	1	1	1	1	1	1	2	3	2	2	2	8	7	2
Sb	mg/kg	2	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1
Se	mg/kg																	
Sn	mg/kg																	
Sr	mg/kg																	
Th	mg/kg																	
U	mg/kg	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Zn	mg/kg	40	3	16	1	22	10	2	3	2	5	23	33	2	22	36	27	20

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	450XC10	450XC10	450XC10	456XC10	467XC10	489XC10	483XC10	483XC10	483XC10	579XC11	579XC11	579XC11	597XC11	597XC11	597XC11	618XC11	482XC10
	From	18	24	28	0	0	4	12	18	30	18	24	26	2	14	16	12	16
	To	22	26	32	4	2	6	14	20	32	20	26	28	4	16	18	14	18
	Lith	HMD	HMD	HMD	FDP	HMD	FDP	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD
	Alt	NONE	NONE	NONE	NONE	PO	NONE	PO	PO	PO	NONE	NONE	NONE	NONE	NONE	NONE	NONE	PH
	Weath	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX
	Sample ID	760011	760013	760015	760052	760099	760336	763878	763882	763888	764545	764548	764549	764689	764695	764696	764897	768692
	Sample ID	10525	10526	10527	10528	10529	10530	10531	10532	10533	10534	10535	10536	10537	10538	10539	10540	10541
	ARD Class	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	PAF	PAF	NAF	NAF	NAF	UC(naf)	PAF
	Waste Type	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Amber	Green	Green	Green	Green	Red
Al	%	4.66	3.7	3.65	0.78	3.05	0.51	4.13	3.24	1.57	4.09	3.49	2.86	2.39	2.05	1.64	0.84	0.62
Ca	%	0.02	0.02	0.01	0.01	0.02	0.02	0.04	0.04	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Fe	%	5.43	5.06	5.38	5.79	6.16	0.86	3.98	3.49	3.35	3.61	3.07	3.11	3.09	2.14	2.03	4.81	7.14
K	%	0.42	0.1	0.12	0.24	0.05	0.27	0.21	0.21	0.14	0.48	0.55	0.43	0.16	0.26	0.33	0.17	0.29
Mg	%																	
Na	%																	
S	%	0.01	0.01	0.01	0.03	0.04	0.06	0.01	0.01	0.06	0.01	0.20	0.84	0.03	0.01	0.01	0.05	1.85
As	mg/kg	1	1	1	1	1	3	2	1	1	2	1	2	1	1	2	17	5
Ba	mg/kg	100	100	50	40	20	30	130	110	40	100	90	70	40	50	70	50	30
Be	mg/kg																	
Bi	mg/kg	1	1	1	1	1	1	2	1	2	1	1	1	1	1	2	6	1
Cd	mg/kg	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Co	mg/kg	15	20	9	0.5	9	1	8	6	3	5	6	6	3	8	2	0.5	2
Cr	mg/kg	77	45	44	5	42	6	33	27	18	36	38	27	29	28	13	11	5
Cu	mg/kg	5520	2950	1410	180	530	20	560	690	310	2260	2990	3520	390	550	550	400	490
Hg	mg/kg																	
Mn	mg/kg	774	704	580	12	247	7	321	216	93	68	75	51	163	201	113	45	18
Mo	mg/kg	1	0.5	1	5	36	1	0.5	0.5	2	70	8	10	48	355	177	8	13
Ni	mg/kg	49	26	24	0.5	10	1	12	11	2	29	29	27	7	17	9	1	1
P	mg/kg	340	320	380	250	120	70	730	630	240	1300	1170	1030	270	160	210	670	240
Pb	mg/kg	5	6	7	3	2	2	2	1	3	1	2	3	16	3	4	91	2
Sb	mg/kg	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1
Se	mg/kg																	
Sn	mg/kg																	
Sr	mg/kg																	
Th	mg/kg																	
U	mg/kg	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Zn	mg/kg	271	195	113	2	9	3	57	42	19	56	47	35	6	12	11	16	1

APPENDIX A3:

Element	Deposit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	Hole ID	482XC10	571XC11	571XC11	591XC11	591XC11	591XC11	591XC11	497XC10	497XC10	582XC11	449XC10	478XC10	478XC10	478XC10	478XC10	478XC10	484XC10
	From	28	2	4	0.8	4	8	18	12	18	6	24	16	18	20	24	30	16.7
	To	30	4	6	2	6	10	20	14	20	8	26	18	20	22	26	32	18
	Lith	HMD	HBM	HBM	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD
	Alt	PH	NONE	NONE	NONE	NONE	NONE	NONE	PH	PH	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE
	Weath	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX
	Sample ID	768698	769699	769701	769879	769882	769884	769889	774194	774197	775192	777873	778112	778113	778114	778116	778119	778192
	Sample ID	10542	10543	10544	10545	10546	10547	10548	10549	10550	10551	10552	10553	10554	10555	10556	10557	10558
	ARD Class	PAF	PAF	PAF	NAF	NAF	NAF	NAF	NAF	NAF	UC(naf)	UC(naf)	PAF	UC(naf)	PAF	PAF	UC(naf)	NAF
	Waste Type	Green	Amber	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Green	Amber	Green	Green	Green
Al	%	0.79	3.83	2.35	3.82	2.59	2.89	3.63	0.87	1.49	3.34	0.9	0.29	0.28	0.26	0.25	0.28	1.39
Ca	%	0.03	0.01	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03
Fe	%	3.81	4.21	3.99	3.38	6.6	2.19	2.96	3.66	2.28	6.1	2.19	4.12	2.09	2.62	2.13	1.27	9.28
K	%	0.3	0.05	0.09	0.21	0.27	0.34	0.27	0.25	0.25	0.17	0.32	0.18	0.14	0.14	0.11	0.14	0.23
Mg	%																	
Na	%																	
S	%	0.16	0.88	0.38	0.03	0.04	0.03	0.04	0.02	0.01	0.05	0.05	1.09	0.08	0.65	0.16	0.11	0.04
As	mg/kg	14	1	1	7	5	1	1	1	2	4	4	32	537	229	54	37	2
Ba	mg/kg	40	10	10	80	40	60	50	30	60	30	50	30	30	30	30	30	150
Be	mg/kg																	
Bi	mg/kg	1	2	1	1	1	1	1	1	1	2	1	2	1	1	1	1	1
Cd	mg/kg	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Co	mg/kg	1	15	38	2	1	0.5	1	1	4	4	0.5	7	1	4	1	0.5	1
Cr	mg/kg	7	32	35	20	19	22	16	10	10	45	13	5	4	3	3	4	14
Cu	mg/kg	580	260	320	330	490	260	410	520	440	520	200	640	220	2040	250	500	480
Hg	mg/kg																	
Mn	mg/kg	14	463	844	71	96	67	66	64	137	131	20	7	5	5	5	7	87
Mo	mg/kg	7	1	2	38	65	67	68	59	94	22	58	65	73	59	64	60	36
Ni	mg/kg	1	6	4	5	5	7	6	2	7	11	2	2	0.5	2	0.5	0.5	3
P	mg/kg	180	350	350	220	750	830	910	50	220	520	100	100	120	100	120	80	2480
Pb	mg/kg	1	2	2	4	7	2	1	2	3	15	1	2	1	2	1	1	8
Sb	mg/kg	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Se	mg/kg																	
Sn	mg/kg																	
Sr	mg/kg																	
Th	mg/kg																	
U	mg/kg	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Zn	mg/kg	1	13	9	8	12	10	10	9	17	24	3	1	1	1	1	1	17

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Element	Deposit	HIT	HIT	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai
	Hole ID	484XC10	558XC11	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15	660FC15
	From	20	18	2	14	20	44	46	48	52	64	66	82	104	106	122	136	150
	To	22	20	6	16	22	46	48	50	54	66	68	84	106	108	124	138	152
	Lith	HMD	HMD	HMD	LW	LW	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD
	Alt	NONE	NONE	AR	PO	PO	SCC	SCC	SCC	SCC	PR	PR	PR	PR	PR	PR	PR	PR
	Weath	TOX	TOX	TOX	POX	POX	POX	POX	POX	POX	SEG	SEG	SEG	SEG	SEG	FR	FR	FR
	Sample ID	778194	778633	800385	800391	800394	800407	800408	800409	800412	800418	800419	800428	800439	800441	800449	800457	800465
	Sample ID	10559	10560	10629	10630	10631	10632	10633	10634	10635	10636	10637	10638	10639	10640	10641	10643	10644
	ARD Class	NAF	NAF	UC(naf)	UC(naf)	NAF	PAF	UC(paf)	UC(paf)	PAF	PAF	NAF	PAF	NAF	NAF	NAF	NAF	UC(paf)
	Waste Type	Green	Green	Green	Green	Green	Amber	Green	Green	Red	Amber	Green	Amber	Green	Green	Red	Green	Amber
Al	%	1.11	0.43	7.71	10.35	6.25	4.01	3.34	3.47	4.08	3.66	3.2	2.21	1.91	1.97	2.01	1.86	2.07
Ca	%	0.01	0.01	0.01	0.005	0.01	0.33	0.4	0.37	0.21	0.38	0.53	0.47	1.1	1.91	1.5	1.29	0.45
Fe	%	5.94	1.7	11.7	4.96	7.26	6.04	5.02	5.02	6.27	5.77	5.56	3.93	3.46	3.96	5.64	2.61	4.68
K	%	0.19	0.17	0.15	1.72	0.87	0.64	0.71	0.63	1.43	1.12	0.65	0.9	0.67	0.38	0.52	0.91	0.53
Mg	%																	
Na	%																	
S	%	0.04	0.05	0.07	0.08	0.04	0.67	0.36	0.45	1.05	0.84	0.4	0.73	0.36	0.37	2.98	0.27	0.57
As	mg/kg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	1	1
Ba	mg/kg	80	40	40	140	90	180	180	140	310	210	100	170	100	70	80	110	90
Be	mg/kg																	
Bi	mg/kg	1	1	1	1	2	1	1	1	3	1	1	1	1	1	1	1	1
Cd	mg/kg	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Co	mg/kg	1	0.5	3	14	14	25	18	15	20	17	15	10	7	8	11	7	6
Cr	mg/kg	12	3	37	229	162	104	100	99	56	81	102	29	30	29	27	36	29
Cu	mg/kg	380	150	980	2730	1610	2370	2030	990	9390	3770	2890	3350	3010	2910	5880	3720	2040
Hg	mg/kg																	
Mn	mg/kg	113	5	51	228	1440	806	600	930	608	805	872	666	522	1190	936	430	863
Mo	mg/kg	30	63	36	53	30	10	12	9	17	57	5	77	8	9	12	5	5
Ni	mg/kg	1	0.5	10	151	140	56	41	38	31	33	38	13	13	12	15	14	13
P	mg/kg	780	130	2640	4480	4010	910	1220	1190	950	1300	1560	1560	1040	1200	1070	960	1150
Pb	mg/kg	1	2	2	3	5	3	2	3	3	2	3	2	2	3	4	3	5
Sb	mg/kg	1	1	2	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Se	mg/kg																	
Sn	mg/kg			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	mg/kg																	
Th	mg/kg																	
U	mg/kg	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Zn	mg/kg	5	1	16	35	188	68	48	71	69	52	45	38	31	59	43	29	54

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Element	Deposit	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Koki	Koki	Koki	Koki	Koki	Koki
	Hole ID	661FC15	661FC15	661FC15	661FC15	661FC15	661FC15	661FC15	661FC15	661FC15	661FC15	661FC15	663FC16	663FC16	663FC16	663FC16	663FC16	663FC16
	From	0	2	8	42	54	72	78	82	94	112	134	2	14	30	82	108	118
	To	2	4	10	44	56	74	80	84	96	114	136	4	16	32	84	110	120
	Lith	SC	SC	HMD	HMD	HMD	LW	LW	LW	LW	OAP	FT	LW	HMD	KDP	HMD	KDP	KDP
	Alt	-	-	-	-	-	-	-	-	-	-	-	AR	AR	AR	PR	PO	PO
	Weath	TOX	POX	POX	POX	POX	FR	FR	FR	FR	FR	FR	TOX	TOX	TOX	FR	FR	FR
	Sample ID	800546	800547	800551	800569	800576	800586	800589	800592	800598	800608	800621	800685	800692	800701	800729	800744	800749
	Sample ID	10645	10646	10647	10648	10649	10650	10651	10652	10653	10654	10655	10657	10658	10659	10660	10661	10662
	ARD Class	UC(naf)	PAF	NAF	NAF	NAF	PAF	NAF	NAF	NAF	PAF	NAF	NAF	NAF	NAF	PAF	PAF	PAF
	Waste Type	Amber	High Red	Green	Green	Green	Amber	Green	Green	Amber	Red	Green	Green	Green	Green	Red	Amber	Red
Al	%	7.23	0.37	1.83	2.92	1.54	3.14	3.62	3.94	3.3	2.77	1.86	1.59	1.81	2.91	2.12	2.5	2.29
Ca	%	0.01	0.01	0.01	0.12	0.05	0.27	0.74	0.95	0.58	1.09	1.75	0.005	0.005	0.005	0.02	0.37	0.4
Fe	%	7.99	4.19	8.28	4.35	2.11	5.56	6.04	5.91	5.75	5.89	3.77	4.96	2.66	3.37	3.24	3.39	3.63
K	%	0.27	0.07	0.27	0.21	0.15	1.81	1.54	1.74	1.76	0.6	0.13	0.14	0.16	0.65	0.76	1.05	0.91
Mg	%																	
Na	%																	
S	%	0.91	8.95	0.03	0.02	0.13	0.53	0.34	0.36	0.56	1.73	0.02	0.03	0.03	0.02	1.94	0.9	1.15
As	mg/kg	7	4	5	1	1	1	1	1	1	1	1	2	1	1	1	1	1
Ba	mg/kg	70	5	50	240	50	200	210	270	200	150	10	30	20	50	110	100	70
Be	mg/kg																	
Bi	mg/kg	3	1	2	1	2	3	2	2	2	3	1	1	1	3	5	3	2
Cd	mg/kg	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Co	mg/kg	8	11	9	14	7	16	16	16	18	24	11	9	7	4	28	19	17
Cr	mg/kg	45	9	20	21	19	163	179	196	178	16	22	68	6	17	11	16	15
Cu	mg/kg	1720	140	3450	3300	2920	5250	3080	3280	4820	4990	50	1340	1250	4120	7930	3540	4410
Hg	mg/kg																	
Mn	mg/kg	421	81	618	541	498	742	964	869	829	795	1525	80	52	70	138	181	306
Mo	mg/kg	93	4	106	5	8	11	17	10	24	24	0.5	149	79	131	67	193	48
Ni	mg/kg	11	14	8	13	14	111	119	132	119	10	13	6	7	20	11	9	7
P	mg/kg	1340	40	1670	340	260	610	650	800	660	1320	860	240	130	150	40	1110	1340
Pb	mg/kg	5	5	1	3	3	1	2	1	1	2	1	2	4	3	1	1	2.5
Sb	mg/kg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Se	mg/kg																	
Sn	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	mg/kg																	
Th	mg/kg																	
U	mg/kg	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Zn	mg/kg	28	4	37	48	50	69	63	52	53	69	122	5	9	20	41	41	28

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Element	Deposit	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki
	Hole ID	663FC16	663FC16	664FC16	664FC16	664FC16	664FC16	664FC16	664FC16	664FC16	664FC16	665FC16	665FC16	665FC16	665FC16	665FC16	665FC16	665FC16
	From	122	172	2	8	18	28	38	48	60	96	2	12	26	44	60	66	82
	To	124	174	4	10	20	30	40	50	62	98	4	14	28	46	62	68	84
	Lith	HMD	HMD	HMD	HMD	LW	KDP	KDP	KDP	HMD	HMD	SC	HMD	HMD	HMD	HMD	HMD	KDP
	Alt	PO	PO	WT	WT	WT	WT	PO	PO	PO	PH	SC	PH	PO	PO	PO	PO	PO
	Weath	FR	FR	TOX	TOX	TOX	TOX	POX	POX	FR	FR	TOX	POX	POX	FR	FR	FR	FR
	Sample ID	800752	800779	800877	800881	800886	800892	800897	800903	800909	800929	801052	801057	801065	801075	801084	801087	801096
	Sample ID	10663	10664	10665	10666	10667	10668	10669	10671	10672	10673	10674	10675	10676	10677	10678	10679	10680
	ARD Class	PAF	PAF	NAF	NAF	NAF	NAF	NAF	UC(naf)	PAF	PAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF
	Waste Type	Red	Red	Green	Green	Green	Green	Green	Green	Green	Red	Green	Green	Green	Green	Amber	Amber	Amber
Al	%	1.87	2.01	2.95	1.5	0.62	0.63	2.11	1.1	1.92	1.68	7.01	1.94	1.02	1.07	0.76	0.97	2.44
Ca	%	0.38	0.69	0.14	0.01	0.01	0.01	0.01	0.02	0.23	0.29	0.05	0.23	0.93	0.55	5.2	5.45	3.31
Fe	%	3.61	3.96	1.96	1.46	3.52	1.21	2.13	3.25	4.08	3.54	4.81	2.87	2.57	3.23	1.92	1.86	4.23
K	%	0.59	0.52	0.32	0.19	0.25	0.31	0.27	0.21	0.29	0.31	0.1	0.18	0.3	0.53	0.2	0.25	0.3
Mg	%																	
Na	%																	
S	%	1.9	2.26	0.03	0.03	0.04	0.04	0.03	0.42	0.39	2.02	0.04	0.01	0.08	0.04	0.6	0.62	0.57
As	mg/kg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1
Ba	mg/kg	50	40	170	30	20	30	80	30	40	30	60	230	70	110	40	30	30
Be	mg/kg																	
Bi	mg/kg	1	1	1	1	1	1	1	5	1	5	1	1	1	1	2	1	1
Cd	mg/kg	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.6
Co	mg/kg	22	22	4	1	0.5	1	8	10	12	20	11	9	8	8	5	5	14
Cr	mg/kg	9	9	9	4	2	3	9	4	34	26	39	28	28	30	12	11	49
Cu	mg/kg	3780	2870	1000	320	510	280	450	10250	2150	8030	1090	2500	590	810	3420	4100	1170
Hg	mg/kg																	
Mn	mg/kg	363	220	171	124	7	17	740	189	506	691	563	3250	746	254	1910	2010	5470
Mo	mg/kg	62	51	179	271	164	224	104	83	19	95	12	4	1	1	34	557	2
Ni	mg/kg	6	5	8	2	1	3	8	9	19	21	13	12	10	12	7	7	27
P	mg/kg	1390	1430	2800	270	100	50	290	860	950	1260	790	540	900	950	680	1160	1020
Pb	mg/kg	3	4	11	6	5	8	22	10	3.5	5	23	2	1	3	211	24	84
Sb	mg/kg	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1
Se	mg/kg																	
Sn	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	mg/kg																	
Th	mg/kg																	
U	mg/kg	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Zn	mg/kg	29	38	40	14	2	11	43	36	49	44	220	128	33	24	34	59	323

APPENDIX A3:

Element	Deposit	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki
	Hole ID	665FC16	665FC16	666FC16	666FC16	666FC16	666FC16	666FC16	666FC16	666FC16	666FC16	666FC16	666FC16	667FC16	667FC16	667FC16	667FC16	667FC16
	From	102	114	2	16	60	86	218	254	268	280	284	288	2	8	22	30	50
	To	104	116	4	18	62	88	220	256	270	282	286	290	4	10	24	32	52
	Lith	KDP	KDP	HMD	HMD	KDP	KDP	KDP	HMD	HMD	HMD	HMD	HMD	SC	HMD	HMD	HMD	HMD
	Alt	PO	PO	AR	PH	PO	PO	PO	PO	PH	PH	PH	PH	SC	PO	AAA	AAA	PO
	Weath	FR	FR	TOX	TOX	POX	FR	FR	FR	FR	FR	FR	FR	TOX	POX	FR	FR	FR
	Sample ID	801107	801114	801225	801233	801257	801272	801345	801365	801373	801379	801382	801384	801387	801391	801398	801403	801414
	Sample ID	10681	10682	10683	10684	10686	10687	10688	10689	10690	10691	10692	10693	10694	10695	10696	10697	10698
	ARD Class	NAF	NAF	PAF	NAF	NAF	PAF	PAF	UC	PAF	PAF	PAF	PAF	NAF	PAF	NAF	NAF	PAF
	Waste Type	Green	Green	Green	Green	Green	Red	Amber	Red	High Red	High Red	High Red	High Red	Green	Green	Amber	Red	Green
Al	%	0.96	1.4	1.08	1.09	4.2	1.83	2.11	2.04	1.76	0.83	1.37	1.24	6.11	2.1	1.32	1.51	1.46
Ca	%	0.61	1.2	0.005	0.005	0.02	0.31	0.53	1.99	0.68	8.7	3.77	3.52	0.1	0.14	2.88	3.2	0.59
Fe	%	2.85	3.56	2.45	3.07	2.11	2.27	3.5	4.67	4.75	5.06	4.43	5.13	5.61	6.94	2.78	3.7	3.99
K	%	0.41	0.47	0.09	0.12	0.56	0.65	1.06	0.5	0.58	0.32	0.39	0.5	0.86	0.25	0.25	0.36	0.63
Mg	%																	
Na	%																	
S	%	0.03	0.15	0.35	0.01	0.01	1.28	0.97	2.34	3.73	11.45	6.04	6.94	0.1	0.39	0.98	1.65	0.49
As	mg/kg	1	1	7	7	1	1	1	1	1	2	1	1	3	1	8	13	1
Ba	mg/kg	50	50	30	40	110	50	60	30	50	40	30	40	110	80	170	230	110
Be	mg/kg																	
Bi	mg/kg	1	1	1	2	3	1	1	1	1	1	1	2	3	2	2	10	3
Cd	mg/kg	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Co	mg/kg	9	10	1	25	8	7	14	20	21	42	23	29	18	19	10	14	11
Cr	mg/kg	48	46	39	12	11	10	18	58	44	10	32	20	98	17	8	6	23
Cu	mg/kg	330	1000	200	640	8680	16500	2680	1090	1960	1740	2040	1760	840	2220	5660	12800	1960
Hg	mg/kg																	
Mn	mg/kg	207	991	14	513	145	109	256	967	265	281	419	252	701	310	598	491	256
Mo	mg/kg	1	1	1	18	3	8	38	8	37	36	34	27	30	24	8	125	7
Ni	mg/kg	19	22	3	2	13	10	7	27	22	17	22	18	68	12	9	5	10
P	mg/kg	860	880	120	710	370	1120	1320	970	1080	820	1040	1000	940	1580	1210	1220	1060
Pb	mg/kg	2	1	15	113	7	2	2	7	3	10	2	7	10	5	119	28	1
Sb	mg/kg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1
Se	mg/kg																	
Sn	mg/kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	mg/kg																	
Th	mg/kg																	
U	mg/kg	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Zn	mg/kg	31	29	17	7	53	28	19	51	17	68	18	25	200	47	36	29	22

Appendix A4

Geochemical Abundance Indices for HIT, Ekwai and Koki Drill Core Samples

APPENDIX A4: Geochemical abundance indices for HIT, Ekawi and Koki drill core samples

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	-	-	-	-	-	-	-	-	-	-	41831	41868	41888	41905	41925	41933	283502	283522	283532	283558	283565	283922	284413	284427
	36820	36869	37085	37559	37366	33079	33355	33526	33658	33586	39015	39016	39017	39018	39019	39020	39021	39022	39023	39024	39025	39026	39027	39028
	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	FT	HMD	DVp	DVp	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	DVp	DVp
	PH	PH	PH	PH	PH	PO	PH	PR	QIP	AR	FR	PH	SA	SA	AR	SA	QIP	QIP	QIP	QIP	QIP	QIP	SA	SA
	FR	POX	FR	FR	TOX	FR	POX	FR	FR	SEG	POX	SEG	POX	POX	POX	FR	FR	FR	FR	FR	FR	FR	POX	POX
	PAF	NAF	PAF	PAF	PAF	NAF	NAF	PAF	PAF	PAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Green	Green	Amber	Red	Green	Green	Green	High Red	High Red	High Red	Green	High Red	High Red	High Red	Red	High Red	High Red	High Red	High Red	High Red	Red	High Red	High Red	High Red
Al													0				0							
Ca													0				0							
Fe													0				0							
K													0				0							
Mg													0				0							
Na													0				0							
S	3	0	4	6	3	2	0	6	6	6	1	6	6	6	5	6	6	6	6	6	5	6	6	6
As													0				0							
Ba													0				0							
Be													0				0							
Bi													1				0							
Cd													0				0							
Co													0				1							
Cr													0				0							
Cu													2				4							
Hg													0				0							
Mn													0				0							
Mo													1				2							
Ni													0				0							
P													0				0							
Pb													1				0							
Sb													0				0							
Se													3				4							
Sn													0				0							
Sr													0				0							
Th													0				0							
U													0				0							
Zn													0				0							

* Geochemical Abundance Indices (GAI)

GAI=0 represents <3 times median soil content
GAI=1 represents 3 to 6 times
GAI=2 represents 6 to 12 times
GAI=3 represents 12 to 24 times
GAI=4 represents 24 to 48 times
GAI=5 represents 48 to 96 times
GAI=6 represents more than 96 times

Median soil data from:

Bowen, H.J.M. (1979) Environmental Chemistry of the Elements. Academic Press, London.
Berkman, D.A. (1976) Field Geologists' Manual, The Australian Institute of Mining and Metallurgy, Vic.

Al	Ca	Fe	K	Mg	Na	S	As	Ba	Be	Bi	Cd	Co	Cr
7.1 %	1.5 %	4 %	1.4 %	0.5 %	0.5 %	0.03 %	6 ppm	500 ppm	6 ppm	0.2 ppm	0.4 ppm	8 ppm	70 ppm
Cu	**Hg**	**Mn**	**Mo**	**Ni**	**P**	**Pb**	**Sb**	**Se**	**Sn**	**Sr**	**Th**	**U**	**Zn**
30 ppm	0.06 ppm	1000 ppm	2 ppm	50 ppm	800 ppm	35 ppm	5 ppm	0.4 ppm	4 ppm	250 ppm	9 ppm	2 ppm	90 ppm

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	284453	284550	284571	284613	284661	284692	284729	284762	126268	126287	126621	126655	126687	127127	127069	127109	260168	260194	260205	260269	260292	260342	260354	-
	39029	39030	39031	39032	39033	39034	39035	39036	39037	39038	39039	39040	39041	39042	39043	39044	39045	39046	39047	39048	39049	39050	39051	39548
	HMD	DVp	DVp	DV	DV	HMD	HMD	HMD	HMD	FDP	HMD	HMD	DV	HMD	HMD	LW	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp
	PH	QIP	SIV	SA	AR	SA	SI	PH	QIP	QIP	PH	QIP	PH	PH	PH	PH	SIV	SA	SA	AR	AR	AR	SA	AR
	FR	POX	POX	FR	POX	FR	FR	FR	FR	FR	FR	FR	FR	POX	FR	FR	SEG	FR	FR	FR	FR	FR	FR	FR
	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	Red	High Red	High Red	Green	Red	High Red	High Red	High Red	High Red	Red	High Red	High Red	High Red	High Red
Al					0	0										0								0
Ca					0	0										0								0
Fe					0	0										0								0
K					0	0										0								0
Mg					0	0										0								0
Na					0	0										0								0
S	5	6	6	6	6	6	6	6	6	6	5	6	6	2	5	6	6	6	6	5	6	6	6	6
As					0	1										0								0
Ba					0	0										0								0
Be					0	0										0								0
Bi					1	1										0								1
Cd					0	0										0								0
Co					0	1										1								1
Cr					0	0										0								0
Cu					4	5										5								3
Hg					0	0										0								0
Mn					0	0										0								0
Mo					2	1										2								2
Ni					0	0										0								0
P					0	0										0								0
Pb					1	1										0								1
Sb					0	0										0								0
Se					4	4										4								4
Sn					0	0										0								0
Sr					0	1										0								1
Th					0	0										0								0
U					0	0										0								0
Zn					0	0										1								0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	260575	260440	260489	260529	-	260589	260610	260666	260684	260707	-	219732	219763	219817	-	-	82877	82891	82913	82947	82988	83512	84245	84277
	39052	39053	39054	39055	39549	39056	39057	39058	39059	39060	39550	39061	39062	39063	39554	39555	39064	39065	39066	39067	39068	39069	39070	39071
	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	HMD	FDP	DVp	DVp	FDP	FDP	FDP	FDP	DVp	DVp	KDP	KDP	FDP	FDP
	SA	SA	SA	SA	SA	SA	SA	SA	PR	PR	AR	PR	SA	AR	PR	PH	AR	QIP	PH	PH	PH	PO	PR	AR
	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	POX	FR	FR	FR	FR	POX	FR	FR	FR	FR	FR	FR	FR
	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Red	High Red	High Red	High Red	Red	Red	Red	High Red	Red	Red	High Red	Amber	High Red	Red	Red	Red	High Red	High Red	High Red	High Red	High Red	High Red	Amber	High Red
Al			0		0				0	0	0	0			0	0		0			0		0	0
Ca			0		0				0	0	0	0			0	0		0			0		0	0
Fe			0		0				0	0	0	0			0	0		0			0		0	0
K			0		0				0	0	0	0			0	0		0			0		0	0
Mg			0		0				1	1	0	1			1	1		1			1		1	0
Na			0		0				0	0	0	0			0	1		0			0		1	0
S	5	6	6	6	5	5	4	6	5	5	6	4	6	4	5	4	6	6	6	6	6	6	4	6
As			1		1				0	0	0	0			2	0		0			0		0	0
Ba			0		0				0	0	0	0			0	0		0			0		0	0
Be			0		0				0	0	0	0			0	0		0			0		0	0
Bi			3		2				0	1	2	0			1	0		0			1		2	1
Cd			0		0				0	0	0	0			4	2		0			0		0	0
Co			0		1				0	0	0	0			0	0		1			0		0	0
Cr			0		0				0	0	0	0			0	0		0			0		0	0
Cu			4		5				3	5	3	5			3	3		3			3		3	2
Hg			1		0				0	0	0	0			0	0		0			0		0	0
Mn			0		0				0	0	0	0			0	0		0			0		0	0
Mo			0		1				0	0	3	0			0	1		0			3		0	0
Ni			0		0				0	0	0	0			0	0		0			0		0	0
P			0		0				0	0	0	0			0	0		0			0		0	0
Pb			2		2				0	0	1	0			2	1		0			0		0	0
Sb			0		0				0	0	0	0			0	0		0			0		0	0
Se			4		3				2	3	4	2			3	2		4			4		2	4
Sn			0		0				0	0	0	0			0	0		0			0		0	0
Sr			1		2				0	0	1	0			0	0		0			0		0	0
Th			0		0				0	0	0	0			0	0		0			0		0	0
U			0		0				0	0	0	0			0	0		0			0		0	0
Zn			0		0				0	1	0	1			4	2		0			0		0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	84303	84347	83923	84711	84781	703336	703349	703356	703382	703391	703409	703446	703069	703104	703138	706825	706847	705812	705851	705939	705315	735946	735949	735953
	39072	39073	39074	39075	39076	39077	39078	39079	39080	39081	39082	39083	38811	38812	38813	38814	38815	38816	38817	38818	38819	38833	38832	38834
	HMD	HMD	HMD	HMD	HMD	FDP	FDP	FDP	FDP	FDP	FDP	FDP	HMD	HMD	LW	HMD	HMD	HMD	HMD	LW	LW	HMD	FT	HMD
	AR	PO	PH	PR	PO	PH	PO	PH	PH	PH	QIP	QIP	NONE	PO	PO	QIP	PH	PH	PO	PO	PO	PH	FR	PO
	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	TOX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	NAF	PAF
	High Red	Red	Amber	High Red	High Red	High Red	High Red	High Red	Red	Red	High Red	High Red	Green	Amber	Red	Red	High Red	High Red	Red	High Red	Red	Red	Amber	Red
Al	0			0											0					0	0		0	0
Ca	0			0											0					0	0		0	0
Fe	0			0											0					0	0		0	0
K	0			0											0					0	0		0	0
Mg	0			1											1					1	1		1	1
Na	0			0											1					1	0		1	1
S	6	5	3	6	6	6	6	6	5	5	6	6	0	3	5	5	6	6	5	6	5	5	3	5
As	0			0											0					0	0		0	0
Ba	0			0											0					0	0		0	0
Be	0			0											0					0	0		0	0
Bi	0			0											0					0	0		0	0
Cd	0			0											0					0	0		0	0
Co	0			0											0					0	1		0	0
Cr	0			0											0					0	0		0	0
Cu	0			5											6					6	4		3	5
Hg	0			0											0					0	0		0	0
Mn	0			0											0					0	0		0	0
Mo	0			1											3					3	2		2	3
Ni	0			0											0					0	0		0	0
P	0			0											0					0	0		0	0
Pb	0			0											0					0	0		0	0
Sb	0			0											0					0	0		0	0
Se	4			3											3					3	3		1	3
Sn	0			0											0					0	0		0	0
Sr	0			1											0					0	0		0	0
Th	0			0											0					0	0		0	0
U	0			0											0					0	0		0	0
Zn	0			0											0					0	0		0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	708266	708351	708871	708444	708512	735537	735543	-	735769	735775	729418	735969	735972	729613	729637	729689	729707	729761	729772	729794	729836	721885	721919	-
	38821	38820	38822	38823	38824	38825	38826	39553	38827	38828	38829	38831	38830	38835	38836	38837	38838	38839	38840	38841	38842	39375	39376	39556
	HMD	HMD	HMD	FT	HMD	DV	DV	LW	DVp	DVp	HMD	FT	LW	LW	HMD	FT	FT	KDP	LW	HMD	HMD	KDP	KDP	KDP
	PH	PO	PO	FR	PH	SA	PH	PO	AR	PR	PO	FR	PH	PO	PH	FR	FR	PO	PO	PO	PO	PH	PH	PH
	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	POX	FR	FR	FR	FR	FR	FR	POX	POX	POX	FR	FR	FR	FR
	PAF	PAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	NAF	PAF	PAF	PAF	PAF	NAF	NAF	NAF	NAF	PAF	NAF	PAF	PAF	PAF
	High Red	Red	Red	Red	Red	Red	Red	Red	Red	High Red	Green	Red	High Red	High Red	Red	Green	Green	Green	Green	Red	Green	High Red	High Red	High Red
Al				0	0			0			0			0										0
Ca				0	0			0			0			0										0
Fe				0	0			0			0			0										0
K				0	0			0			0			0										0
Mg				0	1			1			0			1										0
Na				1	0			1			0			0										0
S	6	5	4	4	5	5	5	5	5	6	0	5	6	6	5	0	0	0	0	5	3	6	6	6
As				0	0			0			0			0										0
Ba				0	0			0			0			0										0
Be				0	0			0			0			0										0
Bi				1	0			0			0			0										0
Cd				0	0			0			0			0										0
Co				0	0			0			0			1										1
Cr				0	0			0			0			0										0
Cu				1	2			6			2			4										1
Hg				0	0			0			0			0										0
Mn				0	0			0			0			0										0
Mo				0	0			2			2			2										2
Ni				0	0			0			0			0										0
P				0	0			0			0			0										0
Pb				0	0			0			0			0										0
Sb				0	0			0			0			0										0
Se				0	2			3			4			4										4
Sn				0	0			0			0			0										0
Sr				0	0			0			0			0										1
Th				0	0			0			0			0										0
U				0	0			0			0			0										0
Zn				0	0			0			0			0										0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	721982	-	722079	722116	722162	732855	732893	732965	733005	722249	722276	-	722337	718698	718736	718761	724768	724825	724863	724923	733069	733161	733203	733275
	39377	39552	39378	39379	39380	39388	39389	39390	39391	39381	39382	39551	39383	39372	39373	39374	39384	39385	39386	39387	39392	39393	39394	39395
	KDP	HMD	LW	HMD	HMD	FDP	FDP	FDP	FDP	HMD	HMD	HMD	HMD	FDP	FDP	FDP	LW	LW	LW	FDP	DVp	HMD	HMD	HMD
	PH	PH	PH	PH	PH	PH	PH	PO	PH	PH	PH	PO	PH	AR	QIP	QIP	PH	PH	PO	PH	SA	PH	PH	PH
	FR	FR	FR	FR	FR	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	POX	FR	FR	FR	POX	FR	FR	FR
	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	High Red	High Red	High Red	High Red	High Red	High Red	High Red	Red	High Red	High Red	High Red	Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	Red	High Red	High Red
Al		0										0												
Ca		0										0												
Fe		0										0												
K		0										0												
Mg		0										1												
Na		0										1												
S	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6	6	6	6	6	6	6	5	6	6
As		0										0												
Ba		0										0												
Be		0										0												
Bi		0										0												
Cd		0										0												
Co		0										0												
Cr		0										0												
Cu		6										2												
Hg		0										0												
Mn		0										0												
Mo		3										0												
Ni		0										0												
P		0										0												
Pb		0										0												
Sb		0										0												
Se		4										2												
Sn		0										0												
Sr		0										0												
Th		0										0												
U		0										0												
Zn		0										0												

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	129400	129439	129472	129507	129644	97401	97420	97444	97472	161852	161879	161936	95131	95155	95238	737001	737002	737003	737004	737005	737006	737007	737008	737009
	39084	39085	39086	39087	39088	39089	39090	39091	39092	39093	39094	39095	39096	39097	39098	39099	39100	39101	39102	39103	39104	39105	39106	39107
	DVa	HMD	HMD	FDP	DV	AL	DVp	DVp	FDP	DVp	DVp	DVp	HMD	HMD	FDP	HMD	DV	DVp	DVp	DVp	DVp	DVp	DVa	HMD
	SA	QIP	QIP	AR	SA	NONE	PR	PH	PR	SA	SA	QIP	PO	AR	PR	PH	AR	QIP	QIP	QIP	QIP	SA	QIP	QIP
	FR	FR	FR	POX	FR	AL	POX	FR	FR	FR	FR	FR	SEG	FR	FR	FR	FR	POX	FR	FR	POX	POX	POX	FR
	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Red	High Red	High Red	Amber	High Red	Red	Amber	Red	High Red	High Red	Red	High Red	Red	Red	Red	High Red	High Red	Red	Red	Red	Red	Amber	High Red	High Red
Al					0						0					0			0	0	0			
Ca					0						0					0			0	0	0			
Fe					0						0					0			0	0	0			
K					0						0					0			0	0	0			
Mg					0						0					0			0	0	0			
Na					0						0					0			0	0	0			
S	5	6	6	4	6	5	4	4	6	6	5	6	5	4	5	6	6	5	4	6	5	4	6	6
As					0						0					0			0	0	0			
Ba					0						0					0			0	0	0			
Be					0						0					0			0	0	0			
Bi					2						1					0			2	0	0			
Cd					2						0					0			0	0	0			
Co					0						0					1			0	0	0			
Cr					0						0					0			0	0	0			
Cu					5						4					5			1	0	0			
Hg					0						0					0			0	0	0			
Mn					0						0					0			0	0	0			
Mo					3						4					3			0	0	0			
Ni					0						0					0			0	0	0			
P					0						0					0			0	0	0			
Pb					1						0					0			0	0	0			
Sb					0						0					0			0	0	0			
Se					4						2					3			3	3	2			
Sn					1						1					0			0	0	0			
Sr					1						1					0			0	2	0			
Th					0						0					0			0	0	0			
U					0						0					0			0	0	0			
Zn					1						0					0			0	0	0			

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	737010	737011	737012	737013	737014	796001	796002	796003	796004	796005	796006	796007	796008	796009	796010	796011	796012	796013	796014	796015	796016	796017	796018	796019
	39108	39109	39110	39111	39112	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HMD	HMD	HMD	DV	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	FT
	QIP	AR	PH	PR	PO	PH	PH	PH	PH	PO	PO	PO	PH	PH	PH	PH	PR	PR	PR	PH	PH	PH	PH	FR
	FR	FR	POX	SEG	FR	SEG	SEG	FR	FR	FR	FR	FR	FR	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	SEG
	PAF	PAF	PAF	PAF	PAF	NAF	NAF	NAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	High Red	High Red	High Red	Red	High Red	Green	Green	Green	Green	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg		0	0			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Na		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	6	6	6	4	6	0	0	0	0	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
As		0	0			0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Ba		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bi		0	0			2	0	0	0	5	2	2	1	0	0	0	0	1	0	0	1	1	0	0
Cd		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co		0	0			0	0	0	0	0	0	0	0	0	2	0	0	1	0	2	1	0	0	1
Cr		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu		2	3			5	1	1	3	3	2	2	1	1	3	3	2	2	3	3	0	3	2	2
Hg		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mn		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo		3	0			0	0	0	3	1	0	0	0	1	2	1	1	1	0	4	0	1	2	2
Ni		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se		3	3			0	0	0	1	6	5	5	4	5	5	4	5	4	5	5	4	4	3	5
Sn		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr		0	1			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn		0	0			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	796020	796021	796022	796023	796024	796025	796026	796027	796028	796029	796030	796031	796032	796033	796034	796035	796036	796037	796038	796039	796040	796041	796042	796043
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	FT	FT	HMD	HMD	HMD	HMD	FT	FT	FT	FT	FT	FT	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD
	FR	FR	PO	PO	PO	PO	FR	FR	FR	FR	FR	FR	PO	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH
	FR	SEG	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Na	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bi	1	1	0	0	0	1	1	3	0	0	1	0	0	0	0	0	0	1	1	0	1	0	0	0
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	2	4	3	0	5	4	3	0	1	1	4	1	0	4	3	0	5	3	3	6	1	2	3	1
Hg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	0	3	2	0	1	3	0	0	2	2	0	2	1	1	0	0	0	0	0	0	0	2	3	1
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	4	4	5	4	4	4	4	4	3	4	4	4	4	4	4	3	5	4	4	4	4	4	4	4
Sn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	796044	796045	796046	796047	796048	796049	796050	796051	796052	796053	796054	796055	796056	796057	796058	796059	796060	796061	796062	796063	796064	796065	796066	796067
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HMD	HMD	FT	FT	FT	FT	FDP	FDP	FDP	FDP	FDP	FT	FT	FDP	FDP	FDP	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD
	PH	PH	FR	FR	FR	FR	PH	PH	PH	PH	PH	FR	FR	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH
	FR	FR	FR	FR	FR	FR	POX	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Na	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
As	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bi	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	1	1	0	2	0	0
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	3	6	3	0	3	0	2	2	3	2	1	4	1	1	3	3	1	2	0	2	5	3	0	4
Hg	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	2	1	2	0	1	0	0	0	0	1	0	1	1	2	0	1	6	0	0	1	4	5	0	4
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	4	4	4	3	4	3	4	3	4	4	4	3	4	4	3	4	3	3	3	3	4	4	3	4
Sn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	796068	796069	796070	796071	796072	796073	796074	796075	796076	796077	796078	796079	796080	796081	796082	796083	796084	796085	796086	796087	796088	796089	796090	796091
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	HMD	HMD	FDP	FDP	FDP	FDP	FDP	HMD	HMD	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP
	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH
	FR	FR	FR	FR	FR	FR	FR	FR	FR	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX
	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red	High Red
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	1
Na	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
As	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bi	0	0	2	0	0	0	0	0	0	2	1	1	0	0	0	0	0	0	1	1	2	2	1	0
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0
Co	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	1
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	3	5	1	2	4	5	2	5	0	2	2	5	5	4	3	5	1	5	0	5	3	2	4	6
Hg	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Mo	1	1	0	1	1	2	0	0	0	0	1	2	2	3	0	1	6	6	0	3	0	0	0	2
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	4	4	4	4	3	3	3	3	2	3	3	3	3	3	3	4	3	4	2	3	4	3	3	3
Sn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	3	0	0

APPENDIX A4:

Element	HIT 796092 - FDP PH POX PAF High Red	HIT 796093 - FDP PH POX PAF High Red	HIT 796094 - FDP PH POX PAF High Red	HIT 796095 - FDP PH FR PAF High Red	HIT 796096 - FDP PH FR PAF High Red	HIT 796097 - FDP PH FR PAF High Red	HIT 796098 - AL NONE AL PAF High Red	HIT 796099 - AL NONE AL PAF High Red	HIT 796100 - DVp PH POX PAF High Red	HIT 796101 - DVp PH POX PAF High Red	HIT 796102 - DVp PH FR PAF High Red	HIT 796103 - DVp PH FR PAF High Red	HIT 796104 - DVp PH FR PAF High Red	HIT 796105 - DVp PH FR PAF High Red	HIT 796106 - DVp PH FR PAF High Red	HIT 796107 - DVp PH FR PAF High Red	HIT 796108 - DVp PH FR PAF High Red	HIT 796109 - DVp PH FR PAF High Red	HIT 796110 - FDP PR FR PAF High Red	HIT 796111 - FDP PR FR PAF High Red	HIT 796112 - FDP PR FR PAF High Red	HIT 796113 - FDP PR FR PAF High Red	HIT 796114 - FDP PR FR PAF High Red	HIT 796115 - FDP PR FR PAF Red
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg	0	1	0	0	1	0	1	0	0	0	1	1	1	0	0	1	0	0	1	0	2	0	0	1
Na	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	2
Cd	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	1	0	1	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	2	4	2	5	5	1	4	0	2	1	4	3	5	0	3	0	3	4	1	5	2	4	3	2
Hg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	0	3	5	1	4	1	3	0	0	1	0	4	3	2	3	0	0	1	0	4	0	0	0	0
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	3	3	3	4	3	3	3	2	3	2	2	4	3	1	3	2	2	3	3	3	3	3	2	2
Sn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	HIT 796116	HIT 796117	HIT 796118	HIT 796119	HIT 796120	HIT 796121	HIT 796122	HIT 796123	HIT 796124	HIT 796125	HIT 796126	HIT 796127	HIT 796128	HIT 796129	HIT 796130	HIT 796131	HIT 796132	HIT 796133	HIT 796134	HIT 796135	HIT 796136	HIT 796137	HIT 796138	HIT 796139
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	FDP	FDP	DVa	DVa	DVa	DVa	DVa	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP	FDP
	PR	PR	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PR	PR	PR
	FR	FR	POX	POX	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	UC(paf)	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
	Red	Red	Red	Red	High Red	Red	Red	Red	Red	High Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg	1	1	2	0	0	0	1	1	1	0	1	1	0	1	0	1	0	1	2	1	0	0	1	0
Na	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	6	6	5	6	6	5	5	5	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5	5
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bi	0	0	1	0	0	2	1	0	0	0	2	0	0	0	1	0	0	0	1	0	0	0	0	0
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	3	0
Co	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	3	1	2	5	0	3	0	0	5	5	6	2	4	5	4	5	5	0	1	1	2	6	2	5
Hg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Mo	0	0	0	3	2	0	0	1	1	2	1	1	3	3	0	2	3	0	0	0	0	3	0	1
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	2	3	2	3	3	4	3	1	3	3	3	3	3	3	3	3	2	2	2	2	3	4	3	3
Sn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	0	3	0

APPENDIX A4:

Element	HIT 796140 - FDP PR FR PAF Red	HIT 796141 - FDP PR FR PAF High Red	HIT 796142 - FDP PR FR PAF Red	HIT 796143 - FDP PR FR UC(paf) Red	HIT 796144 - FDP PR FR PAF Red	HIT 796145 - FDP PR FR PAF High Red	HIT 796146 - FDP PR FR PAF Red	HIT 796147 - FDP PR FR PAF Red	HIT 796148 - FDP PR FR PAF High Red	HIT 796149 - FDP PR FR PAF High Red	HIT 796150 - FDP PR FR PAF Red	HIT 796151 - FDP PR FR PAF High Red	HIT 796152 - FDP PR FR PAF Red	HIT 796153 - FDP PR FR UC(paf) Red	HIT 796154 - FDP PR FR UC(paf) High Red	HIT 796155 - FDP PR FR PAF Red	HIT 796156 - FDP PR FR PAF Red	HIT 796157 - FDP PH FR PAF Red	HIT 796158 - FDP PH FR PAF Red	HIT 796159 - FDP PH FR PAF Red	HIT 796160 - FDP PH FR PAF Red	HIT 796161 - FDP PH FR UC(paf) Red	HIT 796162 - FDP PH FR PAF Red	HIT 796163 - FDP SA FR NAF Red
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	1	0	1	2	1	1	0	0
Na	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	5	6	5	5	5	6	5	5	6	6	5	6	5	5	6	5	5	5	5	5	5	4	5	4
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bi	2	0	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	4	5	5	6	6	6	5	6	4	6	4	5	6	6	6	3	4	5	5	2	1	3	6	5
Hg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	0	5	0	3	5	4	3	1	3	3	0	4	3	5	3	0	1	0	1	0	0	0	5	0
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	3	3	3	3	4	4	3	1	3	3	3	3	3	4	3	2	3	2	2	1	1	0	4	2
Sn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	796164	796165	796166	796167	796168	796169	796170	796171	796172	796173	796174	796175	796176	796177	796178	796179	796180	796181	796182	796183	796184	796185	796186	796187
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	AL	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp
	NONE	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	QIP	QIP	QIP	PH	PH	PH	PH	PH
	AL	TOX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	POX	FR	FR	FR	FR	FR	FR	FR	FR
	PAF	NAF	UC(paf)	PAF	PAF	UC(paf)	PAF	PAF	UC(paf)	NAF	NAF	UC(paf)	UC(paf)	PAF	UC(paf)	PAF	PAF	PAF	PAF	NAF	UC(paf)	NAF	PAF	NAF
	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red	Amber	Amber	Amber	Amber	Red	Red	Amber	Amber	Amber	Red	Amber	Amber	Amber	Red
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	1	0	0	0	1	0	0	0
Na	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	4	5	4	4	4	4	5	4	4	5	4	4	4	4	5	4	4	4	4	5	4	4	4	4
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bi	0	2	0	0	0	1	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0	1	0	0
Cd	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	5	3	6	6	0	5	6	1	0	3	2	0	0	6	1	0	5	5	5	0	0	6	6	0
Hg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0
Mn	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	3	0	2	3	2	0	2	0	0	0	0	0	0	6	0	2	2	4	3	0	0	0	3	0
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	2	0	3	3	3	1	4	1	1	1	0	2	1	3	0	4	1	2	2	0	1	3	3	0
Sn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	796188	796189	796190	796191	796192	796193	796194	796195	796196	796197	796198	796199	796200	796201	796202	796203	796204	796205	796206	796207	796208	796209	796210	796211
	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	DVp	FDP	FDP	FDP	FDP	FDP	FDP	AL
	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	PH	NONE
	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	AL
	PAF	PAF	NAF	UC(paf)	NAF	NAF	UC(paf)	NAF	NAF	NAF	NAF	NAF	NAF	NAF	UC(paf)	NAF	PAF	UC(naf)	NAF	NAF	UC(naf)	NAF	NAF	NAF
	Amber	Amber	Red	Amber	Amber	Red	Amber	Amber	Amber	Amber	Green	Green	Green	Green	Green	Amber	Green	Green	Green	Green	Green	Green	Green	Green
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg	1	0	0	1	1	0	1	1	1	1	1	1	1	1	0	0	0	1	0	0	0	0	1	0
Na	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S	3	3	4	3	3	5	3	3	3	3	3	3	2	2	2	3	2	2	2	2	2	1	1	0
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bi	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Cd	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	1	0	0	0	0	2	0
Co	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	3	4	2	0	0	6	2	0	1	1	3	5	4	3	5	4	1	3	5	0	0	4	3	1
Hg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Mn	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	1	0
Mo	1	2	0	0	0	0	1	0	0	0	2	0	0	0	4	2	2	0	3	0	0	3	0	0
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	0	2	0	0	0	2	3	0	0	0	1	1	0	0	2	1	4	0	1	4	4	3	0	0
Sn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Th	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	1	0	0	0	1	0	0	1	0	0	0	4	1	0	0	0	0	2	1	0	0	0	3	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	796212	796213	796214	796215	796216	796217	796218	796219	796220	796221	722047	722048	722055	723967	728297	728302	729586	732287	732833	745945	745946	746686	747349	747778
	-	-	-	-	-	-	-	-	-	-	10494	10495	10496	10497	10498	10499	10500	10501	10502	10503	10504	10505	10506	10507
	AL	FDP	FDP	DVp	FDP	FDP	FDP	FDP	FDP	FDP	HMD	HMD	HMD	HMD	HMD	HMD	LW	FT	FDP	FT	FT	HMD	HMD	HMD
	NONE	PH	PH	SI	PH	PH	PH	PH	PH	PH	PH	PH	PH	NONE	NONE	NONE	NONE	NONE	PH	FR	FR	NONE	NONE	NONE
	AL	POX	FR	FR	FR	FR	FR	FR	FR	FR	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX
	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	PAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF
	Green	Green	Green	Amber	Green	Green	Green	Green	Green	Green	Green	Green	Green	Amber	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg	0	0	1	1	0	0	0	0	0	0														
Na	0	0	0	0	0	0	0	0	0	0														
S	0	1	0	3	0	3	1	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be	0	0	0	0	0	0	0	0	0	0														
Bi	0	1	0	0	0	0	0	0	0	0	2	1	1	1	1	1	1	2	1	1	1	1	1	1
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	0	1	4	1	0	1	1	0	1	0	2	0	3	6	3	5	4	4	1	6	6	5	3	3
Hg	0	0	0	0	0	0	0	0	0	0														
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	0	0	2	0	0	0	0	0	0	0	1	0	0	4	2	2	1	1	1	0	0	3	4	3
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se	0	2	0	0	0	0	3	0	0	0														
Sn	0	0	0	0	0	0	0	0	0	0														
Sr	0	0	0	0	0	0	0	0	0	0														
Th	0	0	0	0	0	0	0	0	0	0														
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	747946	750118	750217	752111	755965	756125	756129	756132	756133	756146	756342	756346	756351	759801	759843	759845	759863	760011	760013	760015	760052	760099	760336	763878
	10508	10509	10510	10511	10512	10513	10514	10515	10516	10517	10518	10519	10520	10521	10522	10523	10524	10525	10526	10527	10528	10529	10530	10531
	HMD	HMD	HMD	HMD	LW	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	LW	HMD	HMD	HMD	FDP	HMD	FDP	HMD
	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	PO	NONE	PO
	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX
	NAF	NAF	NAF	NAF	UC(naf)	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF	UC(naf)	NAF	NAF	NAF	NAF	NAF	NAF	NAF
	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg																								
Na																								
S	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
As	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be																								
Bi	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	5	3	3	1	3	3	4	4	4	3	3	3	2	6	0	0	4	6	6	4	2	3	0	3
Hg																								
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	0	3	4	2	3	4	4	4	4	3	1	2	2	2	0	0	2	0	0	0	0	3	0	0
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se																								
Sn																								
Sr																								
Th																								
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
	763882	763888	764545	764548	764549	764689	764695	764696	764897	768692	768698	769699	769701	769879	769882	769884	769889	774194	774197	775192	777873	778112	778113	778114
	10532	10533	10534	10535	10536	10537	10538	10539	10540	10541	10542	10543	10544	10545	10546	10547	10548	10549	10550	10551	10552	10553	10554	10555
	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HBM	HBM	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD
	PO	PO	NONE	NONE	NONE	NONE	NONE	NONE	NONE	PH	PH	NONE	NONE	NONE	NONE	NONE	NONE	PH	PH	NONE	NONE	NONE	NONE	NONE
	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX	TOX
	NAF	NAF	NAF	PAF	PAF	NAF	NAF	NAF	UC(naf)	PAF	PAF	PAF	PAF	NAF	NAF	NAF	NAF	NAF	NAF	UC(naf)	UC(naf)	PAF	UC(naf)	PAF
	Green	Green	Green	Green	Amber	Green	Green	Green	Green	Red	Green	Amber	Green	Green	Green	Green	Green	Green	Green	Green	Green	Red	Green	Amber
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg																								
Na																								
S	0	0	0	2	4	0	0	0	0	5	1	4	3	0	0	0	0	0	0	0	0	4	0	3
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	4
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be																								
Bi	1	2	1	1	1	1	1	2	4	1	1	2	1	1	1	1	1	1	1	2	1	2	1	1
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	3	2	5	6	6	3	3	3	3	3	3	2	2	2	3	2	3	3	3	3	2	3	2	5
Hg																								
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	0	0	4	1	1	4	6	5	1	2	1	0	0	3	4	4	4	4	4	2	4	4	4	4
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se																								
Sn																								
Sr																								
Th																								
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	HIT	HIT	HIT	HIT	HIT	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai
	778116	778119	778192	778194	778633	800385	800391	800394	800407	800408	800409	800412	800418	800419	800428	800439	800441	800449	800457	800465	800546	800547	800551	800569
	10556	10557	10558	10559	10560	10629	10630	10631	10632	10633	10634	10635	10636	10637	10638	10639	10640	10641	10643	10644	10645	10646	10647	10648
	HMD	HMD	HMD	HMD	HMD	HMD	LW	LW	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	HMD	SC	SC	HMD	HMD
	NONE	NONE	NONE	NONE	NONE	AR	PO	PO	SCC	SCC	SCC	SCC	PR	PR	PR	PR	PR	PR	PR	PR	-	-	-	-
	TOX	TOX	TOX	TOX	TOX	TOX	POX	POX	POX	POX	POX	POX	SEG	SEG	SEG	SEG	SEG	FR	FR	FR	TOX	POX	POX	POX
	PAF	UC(naf)	NAF	NAF	NAF	UC(naf)	UC(naf)	NAF	PAF	UC(paf)	UC(paf)	PAF	PAF	NAF	PAF	NAF	NAF	NAF	NAF	UC(paf)	UC(naf)	PAF	NAF	NAF
	Green	Green	Green	Green	Green	Green	Green	Green	Amber	Green	Green	Red	Amber	Green	Amber	Green	Green	Red	Green	Amber	Amber	High Red	Green	Green
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg																								
Na																								
S	1	1	0	0	0	0	0	0	3	3	3	4	4	3	4	3	3	6	2	3	4	6	0	0
As	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be																								
Bi	1	1	1	1	1	1	1	2	1	1	1	3	1	1	1	1	1	1	1	1	3	1	2	1
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	2	3	3	3	1	4	5	5	5	5	4	6	6	6	6	6	6	6	6	5	5	1	6	6
Hg																								
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	4	4	3	3	4	3	4	3	1	2	1	2	4	0	4	1	1	2	0	0	4	0	5	0
Ni	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se																								
Sn																								
Sr																								
Th																								
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Ekwai	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki
	800576	800586	800589	800592	800598	800608	800621	800685	800692	800701	800729	800744	800749	800752	800779	800877	800881	800886	800892	800897	800903	800909	800929	801052
	10649	10650	10651	10652	10653	10654	10655	10657	10658	10659	10660	10661	10662	10663	10664	10665	10666	10667	10668	10669	10671	10672	10673	10674
	HMD	LW	LW	LW	LW	OAP	FT	LW	HMD	KDP	HMD	KDP	KDP	HMD	HMD	HMD	HMD	LW	KDP	KDP	KDP	HMD	HMD	SC
	-	-	-	-	-	-	-	AR	AR	AR	PR	PO	PO	PO	PO	WT	WT	WT	WT	PO	PO	PO	PH	SC
	POX	FR	FR	FR	FR	FR	FR	TOX	TOX	TOX	FR	FR	FR	FR	FR	TOX	TOX	TOX	TOX	POX	POX	FR	FR	TOX
	NAF	PAF	NAF	NAF	NAF	PAF	NAF	NAF	NAF	NAF	PAF	PAF	PAF	PAF	PAF	NAF	NAF	NAF	NAF	NAF	UC(naf)	PAF	PAF	NAF
	Green	Amber	Green	Green	Amber	Red	Green	Green	Green	Green	Red	Amber	Red	Red	Red	Green	Green	Green	Green	Green	Green	Green	Red	Green
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg																								
Na																								
S	1	3	2	3	3	5	0	0	0	0	5	4	4	5	5	0	0	0	0	0	3	3	5	0
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be																								
Bi	2	3	2	2	2	3	1	1	1	3	4	3	2	1	1	1	1	1	1	1	4	1	4	1
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	6	6	6	6	6	6	0	4	4	6	6	6	6	6	5	4	2	3	2	3	6	5	6	4
Hg																								
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	1	1	2	1	3	3	0	5	4	5	4	6	4	4	4	5	6	5	6	5	4	2	4	2
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se																								
Sn																								
Sr																								
Th																								
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	Koki 801057 10675 HMD PH POX NAF Green	Koki 801065 10676 HMD PO POX NAF Green	Koki 801075 10677 HMD PO FR NAF Green	Koki 801084 10678 HMD PO FR NAF Amber	Koki 801087 10679 HMD PO FR NAF Amber	Koki 801096 10680 KDP PO FR NAF Amber	Koki 801107 10681 KDP PO FR NAF Green	Koki 801114 10682 KDP PO FR NAF Green	Koki 801225 10683 HMD AR TOX PAF Green	Koki 801233 10684 HMD PH TOX NAF Green	Koki 801257 10686 KDP PO POX NAF Green	Koki 801272 10687 KDP PO FR PAF Red	Koki 801345 10688 KDP PO FR PAF Amber	Koki 801365 10689 HMD PO FR UC Red	Koki 801373 10690 HMD PH FR PAF High Red	Koki 801379 10691 HMD PH FR PAF High Red	Koki 801382 10692 HMD PH FR PAF High Red	Koki 801384 10693 HMD PH FR PAF High Red	Koki 801387 10694 SC SC TOX NAF Green	Koki 801391 10695 HMD PO POX PAF Green	Koki 801398 10696 HMD AAA FR NAF Amber	Koki 801403 10697 HMD AAA FR NAF Red	Koki 801414 10698 HMD PO FR PAF Green	Koki 801417 10700 HMD PO FR NAF Green
Al	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg																								
Na																								
S	0	0	0	3	3	3	0	1	2	0	0	4	4	5	6	6	6	6	1	3	4	5	3	0
As	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Be																								
Bi	1	1	1	2	1	1	1	1	1	2	3	1	1	1	1	1	1	2	3	2	2	5	3	1
Cd	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Co	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	5	3	4	6	6	4	2	4	2	3	6	6	5	4	5	5	5	5	4	5	6	6	5	4
Hg																								
Mn	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	0	0	0	3	6	0	0	0	0	2	0	1	3	1	3	3	3	3	3	3	1	5	1	0
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Se																								
Sn																								
Sr																								
Th																								
U	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX A4:

Element	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki	Koki
	801418	801442	801555	801561	801566	801578	801608	801623	801636	801645	801647	801648	801659
	10701	10702	10703	10704	10705	10706	10707	10708	10709	10710	10711	10712	10713
	HMD	HMD	HMD	HMD	HMD	HMD	HMD	FT	FT	HMD	HMD	HMD	HMD
	PH	PO	AR	AR	AR	PO	PO	PR	PR	PO	PO	PO	PO
	FR	FR	TOX	TOX	POX	FR	FR	FR	FR	FR	FR	FR	FR
	NAF	NAF	NAF	NAF	NAF	PAF	NAF	NAF	NAF	NAF	NAF	NAF	NAF
	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Amber	Green
Al	0	0	0	0	0	0	0	0	0	0	0	0	0
Ca	0	0	0	0	0	0	0	0	0	0	0	0	0
Fe	0	0	0	0	0	0	0	0	0	0	0	0	0
K	0	0	0	0	0	0	0	0	0	0	0	0	0
Mg													
Na													
S	3	2	0	0	0	3	0	1	0	3	2	3	2
As	0	0	0	0	0	0	0	0	0	0	0	0	0
Ba	0	0	0	0	0	0	0	0	0	0	0	0	0
Be													
Bi	3	3	1	1	1	1	1	1	1	3	2	2	2
Cd	0	0	0	0	0	3	0	0	0	0	0	0	0
Co	0	0	0	0	0	0	0	0	0	0	0	0	0
Cr	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	6	6	5	5	6	4	4	4	1	5	5	6	5
Hg													
Mn	0	0	0	0	0	0	0	0	0	0	0	0	0
Mo	3	4	0	0	0	0	0	0	0	2	0	1	5
Ni	0	0	0	0	0	0	0	0	0	0	0	0	0
P	0	0	0	0	0	0	0	0	0	0	0	0	0
Pb	0	0	0	0	0	0	0	0	0	0	0	0	0
Sb	0	0	0	0	0	0	0	0	0	0	0	0	0
Se													
Sn													
Sr													
Th													
U	0	0	0	0	0	0	0	0	0	0	0	0	0
Zn	0	0	0	0	0	3	0	0	0	0	0	0	0

Appendix A5

Water Extractable Elements in HIT Drill Core Samples

APPENDIX A5: Water extractable elements in HIT drill core samples

Element	Unit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
		228XC09	076NOR05	184XC08	184XC08	175XC08B	003NOR02	129XC07	123XC07	125XC07	011NOR03	DDH081D	066NOR05	066NOR05
		30	30	282	282	200	230	192	46	154	88	75	60	98
		32	32	284	284	201	232	194	48	156	90	78	62	100
		HMD	FDP	HMD	HMD	HMD	HMD	HMD	FDP	HMD	HMD	DVp	DVp	DVp
		PO	PR	PH	PH	PO	QIP	PR	QIP	AR	SA	QIP	PR	PR
		POX	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
		729418	219732	708512	708512	735953	283502	84711	82891	84303	284692	737004	260684	260707
		38829	39061	38824	38824	38834	39021	39075	39065	39072	39034	39102	39059	39060
		NAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
		Green	Amber	Red	Red	Red	High Red	High Red	High Red	High Red	High Red	Red	Red	Red
Ag	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Al	mg/L	0.07	0.16	0.06	0.88	0.35	65.9	0.38	0.35	35.8	49	9.08	0.12	0.09
As	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
B	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Ba	mg/L	0.004	0.031	0.051	0.007	0.04	0.003	0.038	0.001	0.002	0.002	0.01	0.035	0.022
Be	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Ca	mg/L	1	33	20	15	10	11	604	14	9	7	4	281	227
Cd	mg/L	0.0001	0.0001	0.0016	0.0001	0.0001	0.0009	0.0001	0.0022	0.0011	0.0003	0.0005	0.0002	0.0003
Cl	mg/L	13	13	60	16	14	12	15	13	14	13	13	18	15
Co	mg/L	0.001	0.001	0.004	0.001	0.001	0.404	0.002	0.068	0.179	0.102	0.036	0.002	0.003
Cr	mg/L	0.001	0.001	0.001	0.001	0.001	0.159	0.001	0.001	0.016	0.016	0.002	0.001	0.001
Cu	mg/L	0.004	0.016	0.355	0.002	0.146	58.2	0.012	0.154	0.597	65	0.361	0.161	0.036
F	mg/L	0.1	1.6	0.2	1.4	1.2	0.9	1	0.2	0.8	0.9	0.9	1.6	1.1
Fe	mg/L	0.05	0.14	0.05	0.41	0.07	5.12	0.05	0.12	3.58	19.1	8.13	0.05	0.05
Hg	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
K	mg/L	23	11	70	34	29	1	46	4	1	1	4	38	29
Mg	mg/L	1	9	82	2	1	11	17	47	4	1	64	49	112
Mn	mg/L	0.017	1.27	2.92	0.013	0.143	0.966	0.198	1.16	0.88	1.63	5.01	1.24	3.45
Mo	mg/L	0.001	0.019	0.004	0.008	0.011	0.001	0.024	0.001	0.001	0.001	0.001	0.008	0.004
Na	mg/L	14	16	32	31	18	14	68	20	14	14	14	22	14
Ni	mg/L	0.001	0.001	0.007	0.001	0.001	0.793	0.001	0.043	0.24	0.226	0.083	0.001	0.002
P	mg/L	1	1	1	1	1	1	1	1	1	1	1	1	1
Pb	mg/L	0.001	0.001	0.001	0.001	0.001	0.004	0.001	0.002	0.009	0.004	0.004	0.001	0.001
Sb	mg/L	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Se	mg/L	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.04
Si	mg/L	6.24	3.5	4.67	2.88	5.01	3.89	2.43	5.5	3.56	5.28	10.7	4.08	4.52
Sn	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
SO4	mg/L	40	109	490	89	40	605	1740	251	305	544	347	914	1030
Sr	mg/L	0.004	0.11	0.349	0.064	0.087	0.021	6.89	0.014	0.04	0.036	0.066	0.689	0.347
Th	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
U	mg/L	0.001	0.001	0.001	0.001	0.001	0.004	0.001	0.001	0.004	0.001	0.001	0.001	0.001
Zn	mg/L	0.006	0.005	0.096	0.005	0.005	0.254	0.006	0.153	0.079	0.539	0.768	0.012	0.011
pH	-	5.4	5.8	6.3	8.4	5.7	6.7	5.4	5.7	5.2	6.7	4.4	6.6	7.4
EC	dS/m	0.912	0.867	0.276	0.729	0.476	0.912	0.529	0.616	0.416	0.315	0.716	0.715	0.556

APPENDIX A5: *Continued*

Element	Unit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
		DDH085D	C068-PR	DDH081D	011NOR03	C019-ED	057NOR05	125XC07	DDH075D	DDH101D	DDH092D	125XC07	002-TK97	175XC08
		36	148	129	32	312	220	50	114	45	108	108	40	66
		39	150	132	34	314	222	52	117	48	111	110	42	68
		DVp	DVp	DVp	DV	DV	DVp	FDP	HMD	HMD	HMD	FDP	DVp	LW
		QIP	SA	QIP	AR	SA	SA	PR	PH	PH	AR	AR	SA	PO
		POX	FR	FR	POX	FR	FR	FR	FR	POX	FR	FR	POX	FR
		737006	161879	737005	284661	129644	260489	84245	737001	737012	737011	84277	41888	705315
		39104	39094	39103	39033	39088	39054	39070	39099	39110	39109	39071	39017	38819
		PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
		Red	Red	Red	High Red	High Red	High Red	Amber	High Red	High Red	High Red	High Red	High Red	Red
Ag	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Al	mg/L	64.3	46.6	160	11.7	370	6.26	0.21	2.47	20.2	34.7	27.7	145	0.07
As	mg/L	0.001	0.001	0.001	0.001	0.31	0.001	0.001	0.002	0.001	0.001	0.002	0.006	0.001
B	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Ba	mg/L	0.006	0.019	0.003	0.015	0.008	0.001	0.004	0.009	0.007	0.002	0.007	0.007	0.035
Be	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Ca	mg/L	5	4	5	16	7	19	2	66	26	94	24	8	28
Cd	mg/L	0.0004	0.0026	0.0002	0.0003	0.376	0.0026	0.0001	0.0028	0.001	0.0006	0.0085	0.0012	0.0001
Cl	mg/L	13	14	13	14	14	12	13	15	15	15	12	12	12
Co	mg/L	0.121	0.068	0.196	0.078	0.404	0.107	0.001	0.06	0.284	0.301	0.141	0.343	0.002
Cr	mg/L	0.025	0.004	0.037	0.007	1.94	0.001	0.001	0.009	0.004	0.009	0.009	5.41	0.001
Cu	mg/L	0.645	25.7	0.852	16.7	189	21.5	0.012	1.84	1.74	1.29	1.43	21	0.084
F	mg/L	0.5	0.9	0.1	1.2	0.1	1	1.1	0.7	1.1	1.3	1	0.1	0.3
Fe	mg/L	65.4	13.8	233	4.46	1510	19	0.15	11.5	56.8	72.2	2.7	435	0.05
Hg	mg/L	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001
K	mg/L	1	1	1	1	1	1	10	33	2	1	2	1	28
Mg	mg/L	31	1	4	1	3	4	4	61	34	42	6	2	42
Mn	mg/L	2.21	1.14	1.63	1.16	1.53	1.65	0.085	1.43	1.68	2.43	0.696	5.54	0.363
Mo	mg/L	0.001	0.001	0.001	0.001	0.014	0.001	0.001	0.001	0.001	0.001	0.001	0.007	0.004
Na	mg/L	14	14	14	14	14	14	18	34	15	14	14	13	32
Ni	mg/L	0.136	0.187	0.182	0.135	1.04	0.149	0.001	0.041	0.223	0.211	0.212	0.664	0.003
P	mg/L	1	1	1	1	1	1	1	1	1	1	1	1	1
Pb	mg/L	0.009	0.001	0.003	0.006	0.033	0.003	0.001	0.004	0.005	0.005	0.006	0.008	0.001
Sb	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Se	mg/L	0.01	0.01	0.01	0.03	0.08	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
Si	mg/L	7.15	6.17	8.59	4.29	2.39	2.7	3.9	6.94	10.7	11.5	5.27	1.81	3.66
Sn	mg/L	0.001	0.001	0.001	0.001	0.004	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
SO4	mg/L	655	490	1360	366	6620	192	40	515	432	734	274	2050	314
Sr	mg/L	1.54	0.066	0.314	0.107	0.15	0.023	0.025	0.165	0.374	0.529	0.119	0.057	0.267
Th	mg/L	0.001	0.001	0.001	0.001	0.016	0.001	0.001	0.001	0.001	0.001	0.001	0.008	0.001
U	mg/L	0.001	0.006	0.001	0.001	0.03	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001
Zn	mg/L	0.422	0.39	0.076	1.37	29.9	0.352	0.005	0.603	0.171	0.375	0.132	0.131	0.007
pH	-	5.1	7.2	5.2	7.3	2.5	7.4	7.2	7.5	5.5	5.8	5.7	2.8	7.2
EC	dS/m	0.239	0.818	0.976	0.896	4.32	0.829	0.671	0.919	0.329	0.415	0.912	2.13	0.529

APPENDIX A5: *Continued*

Element	Unit	HIT	HIT	HIT	HIT	HIT	HIT	SUMMARY HIT SAMPLES				
		235XC09	172XC08	029-IV97	175XC08B	184XC08	123XC07	Detection Limit	Minimum Conc.	Maximum Conc.	Median Conc.	Average Conc.
		58	284	188	148	158	234					
		62	286	190	150	160	236					
		LW	LW	LW	FT	FT	KDP					
		PO	PO	PH	FR	FR	PH					
		FR	FR	FR	FR	FR	FR					
		729613	705939	127109	735949	708444	82988					
		38835	38818	39044	38832	38823	39068					
		PAF	PAF	PAF	NAF	PAF	PAF					
		High Red	High Red	High Red	Amber	Red	High Red					
Ag	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Al	mg/L	0.09	0.06	13.6	1	8.7	0.09	0.01	0.06	370	4.4	34
As	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.31	0.001	0.011
B	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Ba	mg/L	0.024	0.065	0.011	0.007	0.03	0.029	0.001	0.001	0.065	0.009	0.017
Be	mg/L	0.001	0.001	0.006	0.001	0.001	0.001	0.001	0.001	0.006	0.001	0.001
Ca	mg/L	4	723	610	8	96	122	1	1	723	16	97
Cd	mg/L	0.0007	0.0003	0.07	0.0001	0.0035	0.0001	0.0001	0.0001	0.38	0.0005	0.015
Cl	mg/L	18	20	13	14	14	15	1	12	60	14	16
Co	mg/L	0.001	0.003	0.285	0.001	0.03	0.001	0.001	0.001	0.404	0.048	0.10
Cr	mg/L	0.001	0.001	0.007	0.001	0.003	0.001	0.001	0.001	5.4	0.0015	0.24
Cu	mg/L	0.01	0.158	65.5	0.007	8.07	0.012	0.001	0.002	189	0.48	15
F	mg/L	0.1	0.4	0.3	1.7	1.2	1.4	0.1	0.1	1.7	0.9	0.8
Fe	mg/L	0.05	0.05	1.03	0.61	3.97	0.05	0.05	0.05	1510	1.9	77
Hg	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0001
K	mg/L	35	115	1	6	28	63	1	1	115	5	19
Mg	mg/L	20	89	113	2	23	52	1	1	113	14	29
Mn	mg/L	0.14	0.911	11.1	0.023	1.01	0.444	0.001	0.013	11.1	1.2	1.7
Mo	mg/L	0.005	0.01	0.001	0.002	0.003	0.078	0.001	0.001	0.078	0.001	0.007
Na	mg/L	19	45	14	17	25	20	1	13	68	15	20
Ni	mg/L	0.001	0.009	0.637	0.001	0.064	0.001	0.001	0.001	1.0	0.054	0.17
P	mg/L	1	1	1	1	1	1	1	1	1	1	1
Pb	mg/L	0.001	0.001	0.004	0.001	0.003	0.001	0.001	0.001	0.033	0.003	0.004
Sb	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
Se	mg/L	0.01	0.01	0.03	0.01	0.01	0.01	0.01	0.01	0.08	0.01	0.02
Si	mg/L	4.78	3.57	2.96	7.82	4.65	2.38	0.05	1.8	12	4.6	5.1
Sn	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.004	0.001	0.001
SO4	mg/L	157	2420	2190	6	532	580	1	6	6620	490	826
Sr	mg/L	0.068	5.36	2.82	0.034	0.59	0.208	0.001	0.004	6.9	0.11	0.67
Th	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.016	0.001	0.002
U	mg/L	0.001	0.001	0.02	0.001	0.001	0.001	0.001	0.001	0.03	0.001	0.003
Zn	mg/L	0.006	0.008	23.9	0.005	1.08	0.006	0.005	0.005	30	0.11	1.9
pH	-	5.9	5.9	5.6	5.5	8.1	6.5	0.1	2.5	8.4	5.85	6.0
EC	dS/m	0.529	0.316	0.229	0.998	0.818	0.439	0.001	0.23	4.32	0.69	0.79

Appendix A6

Peroxide Extractable Elements in HIT, Ekwai and Koki Drill Core Samples

APPENDIX A6: Peroxide extractable elements in HIT, Ekwai and Koki drill core samples

Element	Unit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
		228XC09	076NOR05	184XC08	184XC08	175XC08B	003NOR02	129XC07	123XC07	125XC07	011NOR03	DDH081D	066NOR05	066NOR05
		30	30	282	282	200	230	192	46	154	88	75	60	98
		32	32	284	284	201	232	194	48	156	90	78	62	100
		HMD	FDP	HMD	HMD	HMD	HMD	HMD	FDP	HMD	HMD	DVp	DVp	DVp
		PO	PR	PH	PH	PO	QIP	PR	QIP	AR	SA	QIP	PR	PR
		POX	POX	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR	FR
		729418	219732	708512	708512	735953	283502	84711	82891	84303	284692	737004	260684	260707
		38829	39061	38824	38824	38834	39021	39075	39065	39072	39034	39102	39059	39060
		NAF	NAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
		Green	Amber	Red	Red	Red	High Red	High Red	High Red	High Red	High Red	Red	Red	Red
Ag	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Al	mg/L	1.5	1.2	17.5	66.4	12.5	11.2	1.5	17.6	11.7	17.0	16.2	9.6	6.6
As	mg/L	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001
B	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Ba	mg/L	0.016	0.018	0.242	0.328	0.004	0.004	0.081	0.006	0.004	0.35	0.02	0.216	0.124
Be	mg/L	0.001	0.001	0.002	0.006	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.003	0.004
Ca	mg/L	1	24	4	46	2	2	514	4	2	34	1	154	120
Cd	mg/L	0.0001	0.0001	0.0036	0.0004	0.0001	0.0001	0.0002	0.0011	0.0003	0.0004	0.0002	0.0029	0.0031
Cl	mg/L	1	9	8	10	10	9	10	9	9	9	4	9	10
Co	mg/L	0.003	0.002	0.06	0.158	0.084	0.126	0.003	0.223	0.122	0.104	0.022	0.135	0.112
Cr	mg/L	0.061	0.028	0.015	0.017	0.02	0.036	0.006	0.008	0.008	0.008	0.026	0.002	0.004
Cu	mg/L	0.103	0.274	65.6	6.66	17.2	8.3	0.037	4.73	0.426	26.4	0.881	7.6	17.3
F	mg/L	0.1	1	0.9	0.5	0.9	0.7	1.2	0.6	0.9	0.7	0.8	1.1	1.1
Fe	mg/L	1.04	0.85	3.9	34.1	67.8	27.8	4.02	54.1	178	9.27	0.93	5.86	1.63
Hg	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
K	mg/L	6	8	26	29	1	1	16	4	1	18	3	17	13
Mg	mg/L	1	1	18	32	1	1	1	12	1	12	12	18	57
Mn	mg/L	0.04	0.17	1.15	1.76	0.28	0.14	0.03	0.39	0.22	1.08	0.99	4.24	8.67
Mo	mg/L	0.018	0.042	0.006	0.001	0.001	0.002	0.063	0.001	0.001	0.004	0.008	0.001	0.001
Na	mg/L	6	10	11	16	8	8	16	10	9	12	11	11	10
Ni	mg/L	0.002	0.004	0.104	0.142	0.174	0.212	0.005	0.115	0.153	0.073	0.036	0.072	0.193
P	mg/L	1	1	1	1	1	1	1	1	1	1	1	1	1
Pb	mg/L	0.001	0.001	0.08	0.015	0.003	0.002	0.007	0.003	0.003	0.011	0.002	0.017	0.003
Sb	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Se	mg/L	0.02	0.01	0.05	0.05	0.03	0.03	0.02	0.04	0.06	0.03	0.03	0.04	0.05
Si	mg/L	7.35	10.1	21.5	62.9	20.1	2.41	4.51	16.5	4.47	4.92	13	21	21.3
Sn	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
SO4	mg/L	26	60	370	1070	401	495	1180	727	1180	646	200	639	674
Sr	mg/L	0.006	0.064	0.085	0.273	0.036	0.01	3.62	0.021	0.017	0.106	0.028	0.382	0.156
Th	mg/L	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
U	mg/L	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001
Zn	mg/L	0.005	0.024	0.864	0.087	0.087	0.034	0.022	0.168	0.051	0.07	0.247	0.156	0.866
NAGpH		4.9	8.2	3.6	2.8	3.6	2.3	7.6	2.5	2.3	2.2	3.1	7.5	4.7

APPENDIX A6: *Continued*

Element	Unit	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT	HIT
		DDH085D	C068-PR	DDH081D	011NOR03	C019-ED	057NOR05	125XC07	DDH075D	DDH101D	DDH092D	125XC07	002-TK97	175XC08
		36	148	129	32	312	220	50	114	45	108	108	40	66
		39	150	132	34	314	222	52	117	48	111	110	42	68
		DVp	DVp	DVp	DV	DV	DVp	FDP	HMD	HMD	HMD	FDP	DVp	LW
		QIP	SA	QIP	AR	SA	SA	PR	PH	PH	AR	AR	SA	PO
		POX	FR	FR	POX	FR	FR	FR	FR	POX	FR	FR	POX	FR
		737006	161879	737005	284661	129644	260489	84245	737001	737012	737011	84277	41888	705315
		39104	39094	39103	39033	39088	39054	39070	39099	39110	39109	39071	39017	38819
		PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF	PAF
		Red	Red	Red	High Red	High Red	High Red	Amber	High Red	High Red	High Red	High Red	High Red	Red
Ag	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Al	mg/L	26.5	39.6	36.4	6.6	58.0	10.3	18.7	36.6	31.8	33.1	18.8	15.2	20.5
As	mg/L	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
B	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Ba	mg/L	0.006	0.039	0.009	0.017	0.036	0.004	0.104	0.02	0.008	0.006	0.01	0.023	0.157
Be	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.006	0.002	0.001	0.001	0.001	0.001	0.003
Ca	mg/L	2	2	2	3	21	12	7	19	4	17	4	3	12
Cd	mg/L	0.0003	0.0026	0.0004	0.0002	0.0698	0.0013	0.0012	0.0008	0.0003	0.0002	0.0026	0.0003	0.0009
Cl	mg/L	8	9	8	8	9	9	10	9	9	8	9	9	8
Co	mg/L	0.058	0.07	0.099	0.076	0.084	0.078	0.181	0.14	0.146	0.155	0.123	0.105	0.148
Cr	mg/L	0.012	0.027	0.02	0.016	0.327	0.022	0.007	0.008	0.014	0.016	0.012	0.496	0.016
Cu	mg/L	0.663	16.4	0.519	8.3	33.1	14.6	7.1	27.3	7.64	3.25	2.83	2.72	11.7
F	mg/L	0.6	0.5	0.5	0.8	0.4	0.7	0.8	0.8	0.7	0.7	0.6	0.6	0.8
Fe	mg/L	32.8	30	107	32	148	98.8	9.49	22.9	39.7	95.2	156	90.2	9.7
Hg	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
K	mg/L	1	1	1	1	1	1	14	12	3	2	2	1	16
Mg	mg/L	7	1	1	1	1	1	14	16	5	7	1	1	15
Mn	mg/L	0.59	0.32	0.34	0.27	3.30	0.44	1.04	0.71	0.28	0.45	0.19	0.60	0.39
Mo	mg/L	0.001	0.02	0.001	0.002	0.004	0.001	0.002	0.003	0.001	0.016	0.001	0.001	0.002
Na	mg/L	8	9	7	8	9	9	11	13	10	8	9	9	11
Ni	mg/L	0.063	0.142	0.08	0.201	0.213	0.114	0.059	0.077	0.083	0.102	0.156	0.14	0.178
P	mg/L	1	1	1	1	1	1	1	1	1	1	1	1	1
Pb	mg/L	0.01	0.007	0.039	0.002	0.062	0.005	0.014	0.006	0.008	0.002	0.033	0.008	0.004
Sb	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Se	mg/L	0.02	0.02	0.05	0.05	0.04	0.04	0.03	0.05	0.04	0.06	0.06	0.03	0.03
Si	mg/L	9.04	17.8	8.51	4.32	3.55	2.91	24.5	26.2	16.6	16.6	8.06	2.43	20.4
Sn	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
SO4	mg/L	650	527	1010	488	1410	795	413	563	608	944	1100	857	418
Sr	mg/L	0.41	0.084	0.088	0.055	0.123	0.048	0.09	0.097	0.141	0.19	0.036	0.051	0.122
Th	mg/L	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
U	mg/L	0.001	0.002	0.001	0.001	0.006	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001
Zn	mg/L	0.143	0.228	0.059	0.197	4.96	0.201	0.167	0.625	0.061	0.104	0.096	0.055	0.056
NAGpH		2.3	2.4	2.3	2.4	2.3	2.3	2.8	2.5	2.2	2.2	2.5	2.2	2.5

APPENDIX A6: *Continued*

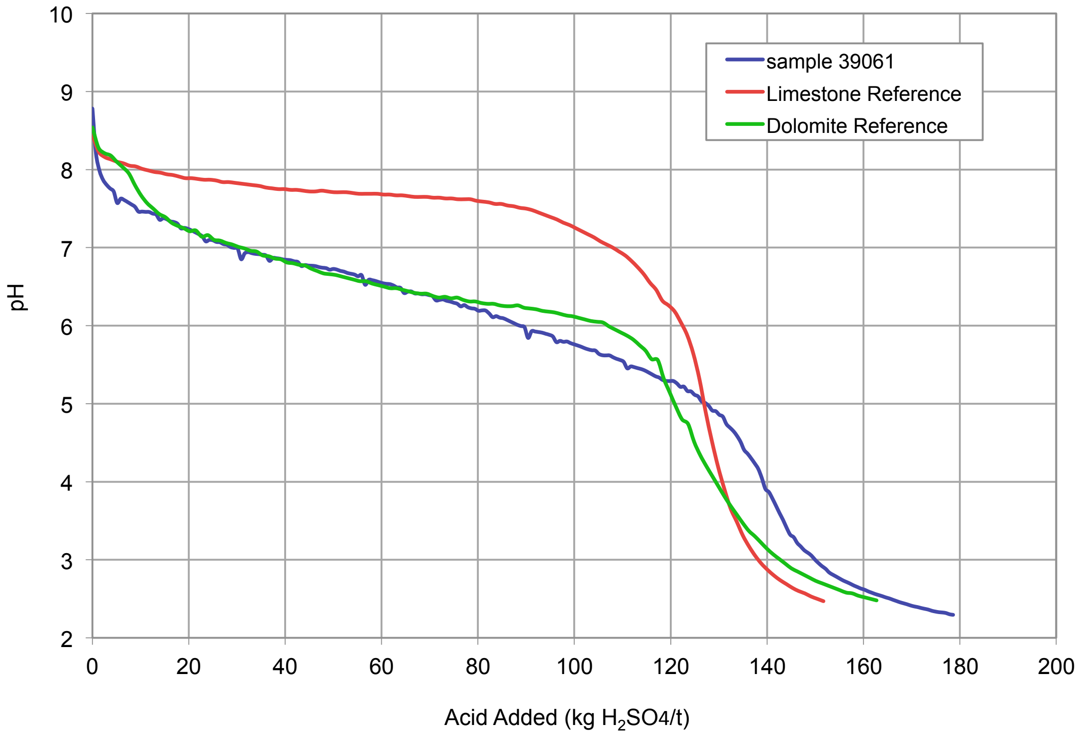
Element	Unit	HIT	HIT	HIT	HIT	HIT	HIT	SUMMARY HIT SAMPLES				
		235XC09	172XC08	029-IV97	175XC08B	184XC08	123XC07					
		58	284	188	148	158	234	Detection Limit	Minimum Conc.	Maximum Conc.	Median Conc.	Average Conc.
		62	286	190	150	160	236					
		LW	LW	LW	FT	FT	KDP					
		PO	PO	PH	FR	FR	PH					
		FR	FR	FR	FR	FR	FR					
		729613	705939	127109	735949	708444	82988					
		38835	38818	39044	38832	38823	39068					
		PAF	PAF	PAF	NAF	PAF	PAF					
		High Red	High Red	High Red	Amber	Red	High Red					
Ag	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Al	mg/L	36.3	17.4	12.2	1.4	24.2	42.7	0.01	1.2	66	17	21
As	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
B	mg/L	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Ba	mg/L	0.123	0.215	0.042	0.007	0.237	0.245	0.001	0.004	0.35	0.02	0.09
Be	mg/L	0.002	0.001	0.002	0.001	0.002	0.004	0.001	0.001	0.006	0.001	0.002
Ca	mg/L	2	411	411	40	59	72	1	1	514	9.5	63
Cd	mg/L	0.0055	0.0007	0.0146	0.0001	0.0026	0.0011	0.0001	0.0001	0.07	0.0006	0.004
Cl	mg/L	8	13	9	8	8	10	1	1	13	9	9
Co	mg/L	0.117	0.072	0.111	0.001	0.094	0.12	0.001	0.001	0.22	0.10	0.10
Cr	mg/L	0.017	0.022	0.006	0.009	0.007	0.006	0.001	0.002	0.50	0.02	0.04
Cu	mg/L	18.6	77.8	16.3	0.009	1.98	7.44	0.001	0.009	78	7.5	13
F	mg/L	0.5	0.5	0.6	1	0.9	0.6	0.1	0.1	1.2	0.7	0.7
Fe	mg/L	15.1	3.36	45.6	0.21	6.59	54	0.05	0.2	178	29	43
Hg	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
K	mg/L	18	42	1	10	14	30	1	1	42	5	9.8
Mg	mg/L	13	29	20	1	15	45	1	1	57	7	11
Mn	mg/L	0.29	0.48	1.96	0.01	4.82	5.01	0.001	0.01	8.67	0.44	1.27
Mo	mg/L	0.003	0.019	0.003	0.222	0.001	0.002	0.001	0.001	0.22	0.002	0.014
Na	mg/L	10	14	9	13	13	12	1	6	16	10	10
Ni	mg/L	0.195	0.124	0.216	0.001	0.044	0.035	0.001	0.001	0.22	0.11	0.11
P	mg/L	1	1	1	1	1	1	1	1	1	1	1
Pb	mg/L	0.067	0.005	0.002	0.001	0.039	0.045	0.001	0.001	0.08	0.007	0.016
Sb	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Se	mg/L	0.04	0.07	0.05	0.01	0.01	0.05	0.01	0.01	0.07	0.04	0.038
Si	mg/L	26.9	30.6	3.91	7.94	29.5	37.9	0.05	2.4	63	15	16
Sn	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
SO4	mg/L	499	1480	1540	106	534	1110	1	26	1540	643	710
Sr	mg/L	0.043	1.98	1.95	0.122	0.228	0.116	0.001	0.006	3.6	0.09	0.34
Th	mg/L	0.002	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
U	mg/L	0.002	0.001	0.004	0.001	0.001	0.001	0.001	0.001	0.006	0.001	0.001
Zn	mg/L	0.352	0.056	3.8	0.005	0.63	0.36	0.005	0.005	5.0	0.12	0.5
NAGpH		2.5	3.7	2.3	7.3	3.1	2.4	0.1	2.2	8.2	2.5	3.4

APPENDIX A6: *Continued*

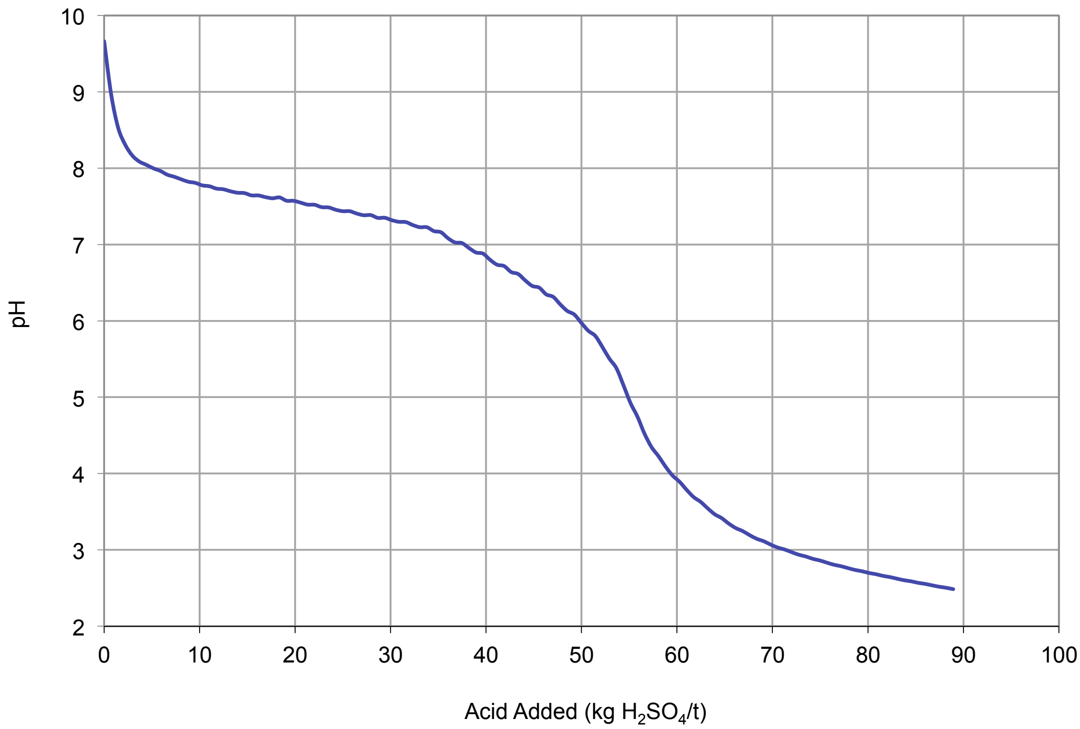
Element	Unit	Ekwai	Ekwai	Ekwai	Ekwai	Koki	Koki	Koki	Koki	Koki	Koki	SUMMARY EKWAI AND KOKI SAMPLES				
		660FC15	660FC15	660FC15	661FC15	663FC16	663FC16	664FC16	665FC16	666FC16	667FC16	Detection Limit	Minimum Conc.	Maximum Conc.	Median Conc.	Average Conc.
		44	82	122	112	108	122	96	66	268	30					
		46	84	124	114	110	124	98	68	270	32					
		HMD	HMD	HMD	OAP	KDP	HMD	HMD	HMD	HMD	HMD					
		SCC	PR	PR	-	PO	PO	PH	PO	PH	AAA					
		POX	SEG	FR	FR	FR	FR	FR	FR	FR	FR					
		800407	800428	800449	800608	800744	800752	800929	801087	801373	801403					
		10632	10638	10641	10654	10661	10663	10673	10679	10690	10697					
		PAF	PAF	NAF	PAF	PAF	PAF	PAF	NAF	PAF	NAF					
		Amber	Amber	Red	Red	Amber	Red	Red	Amber	High Red	Red					
Ag	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Al	mg/L	2	2	4	6	7	11	5	1	17	0.5	0.01	0.5	17	5	6
As	mg/L	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
B	mg/L	0.2	0.2	0.3	0.4	0.3	0.3	0.3	0.07	0.3	0.06	0.05	0.06	0.4	0.3	0.26
Ba	mg/L	0.02	0.02	0.05	0.05	0.02	0.03	0.02	0.5	0.04	0.12	0.001	0.02	0.5	0.03	0.08
Be	mg/L	0.001	0.001	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001
Ca	mg/L	5	15	165	36	5	14	8	25	35	44	1	5	165	20	35
Cd	mg/L	0.0003	0.0003	0.0004	0.0004	0.0003	0.0003	0.0006	0.0016	0.0004	0.0003	0.0001	0.0003	0.00	0.0004	0.000
Cl	mg/L	4	3	4	4	4	4	3	3	3	4	1	3	4	4	4
Co	mg/L	0.11	0.04	0.06	0.09	0.08	0.11	0.05	0.001	0.07	0.001	0.001	0.001	0.11	0.07	0.06
Cr	mg/L	0.002	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.008	0.001	0.001	0.001	0.01	0.002	0.002
Cu	mg/L	20	31	74	44	37	47	64	0.02	18	0.007	0.001	0.007	74	33.9	33
F	mg/L	0.3	0.9	0.4	0.3	0.4	0.7	0.5	0.2	0.6	0.2	0.1	0.2	0.9	0.4	0.5
Fe	mg/L	0.05	1.3	4	3	2	9	8	0.05	22	0.05	0.05	0.1	22	3	5
Hg	mg/L	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
K	mg/L	30	20	25	23	21	19	10	4	22	9	1	4	30	21	18
Mg	mg/L	9	5	8	7	8	10	4	1	8	1	1	1	10	8	6
Mn	mg/L	0.3	1.0	4	0.9	0.1	0.4	3	0.001	0.6	0.008	0.001	0.001	4	0.5	1.1
Mo	mg/L	0.001	0.01	0.001	0.001	0.01	0.002	0.001	4	0.05	1	0.001	0.001	4	0.007	0.5
Na	mg/L	7	9	9	9	10	10	7	6	9	6	1	6	10	9	8
Ni	mg/L	0.08	0.02	0.03	0.03	0.02	0.02	0.02	0.001	0.07	0.001	0.001	0.001	0.08	0.02	0.03
P	mg/L	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Pb	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Sb	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.002	0.001	0.001	0.002	0.001	0.001
Se	mg/L	0.01	0.02	0.04	0.02	0.02	0.04	0.03	0.01	0.02	0.02	0.01	0.01	0.04	0.02	0.023
Si	mg/L	11	9	15	16	15	19	11	4	18	2	0.05	2	19	13	12
Sn	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
SO4	mg/L	152	171	604	316	208	342	272	52	522	127	1	52	604	240	277
Sr	mg/L	0.09	0.07	0.20	0.11	0.07	0.11	0.05	0.07	0.10	0.08	0.001	0.05	0.2	0.09	0.09
Th	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
U	mg/L	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Zn	mg/L	0.7	0.6	0.8	0.6	0.7	0.8	0.6	0.005	0.6	0.005	0.005	0.005	0.8	0.6	0.6
NAGpH		3.6	3.9	7.7	3.6	3.5	3.0	3.1	7.6	2.6	7.4	0.1	2.6	7.7	3.6	4.6

Appendix A7

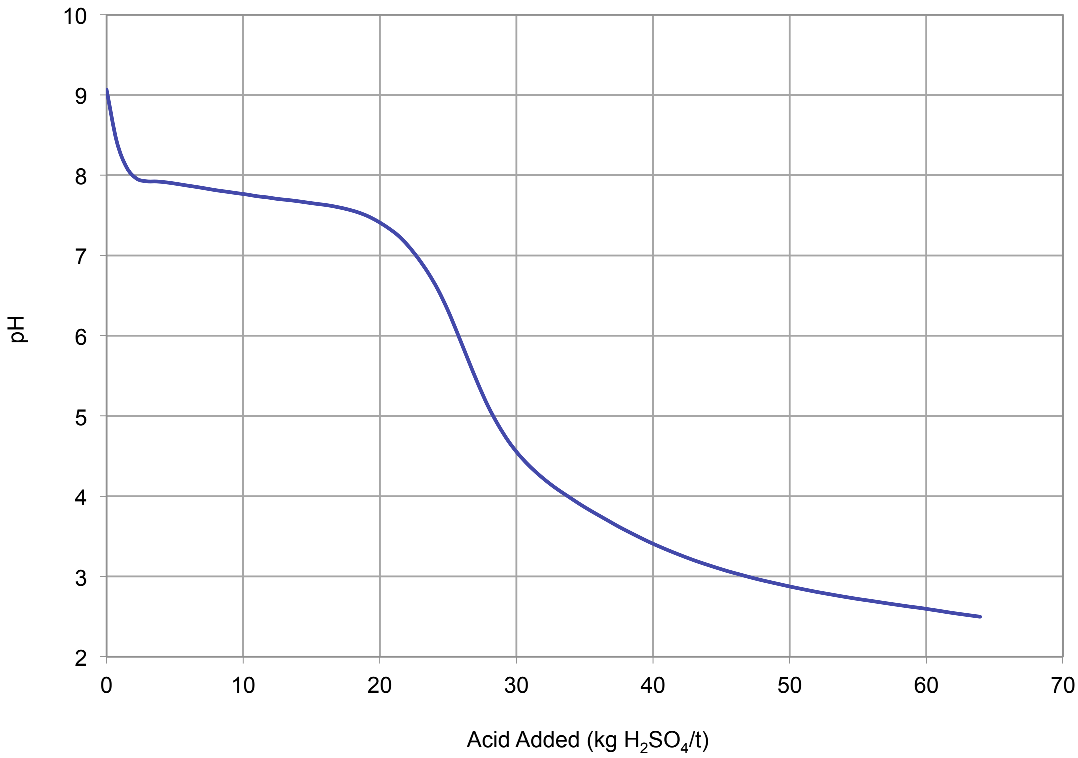
Acid Buffer Characteristic Curves for HIT, Ekwai and Koki Drill Core Samples



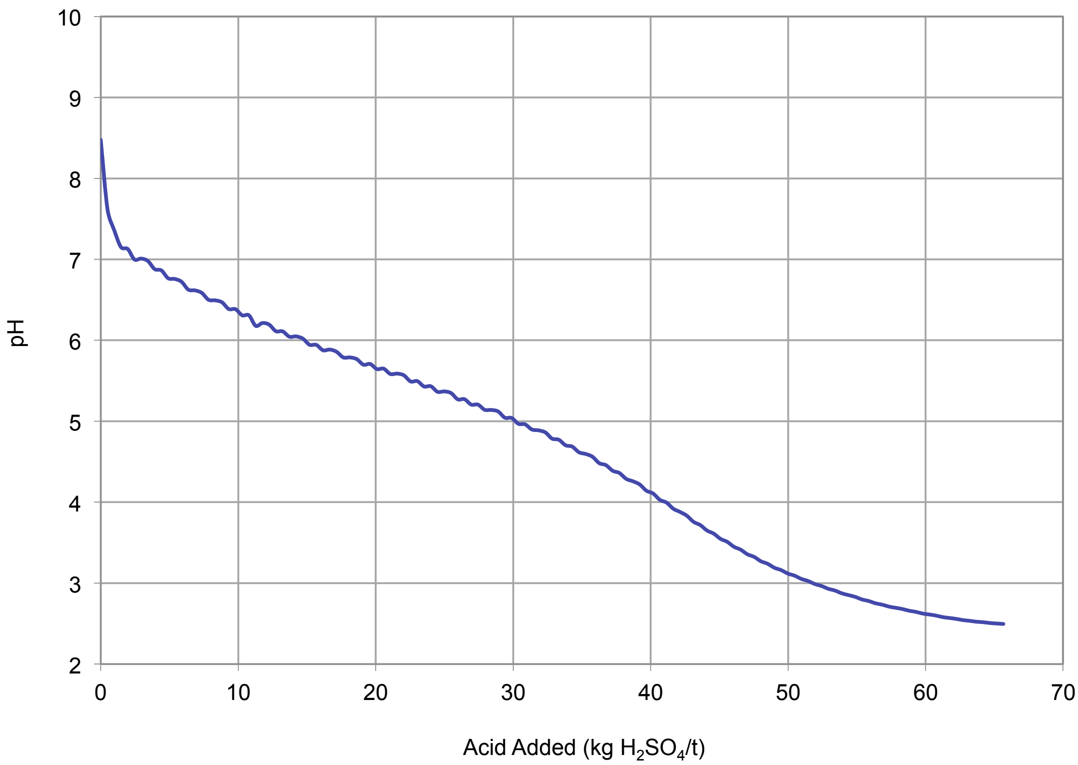
APPENDIX A7-1: Acid buffer characteristic curve for HIT drill core sample # 39061
Drill Hole = 076NOR05 (30-32m), Lithology = FDP, Alteration = PR, ANC = 126 kg H_2SO_4/t
(Note: buffer curves for limestone and dolomite assume ANC of 130 kg H_2SO_4/t)



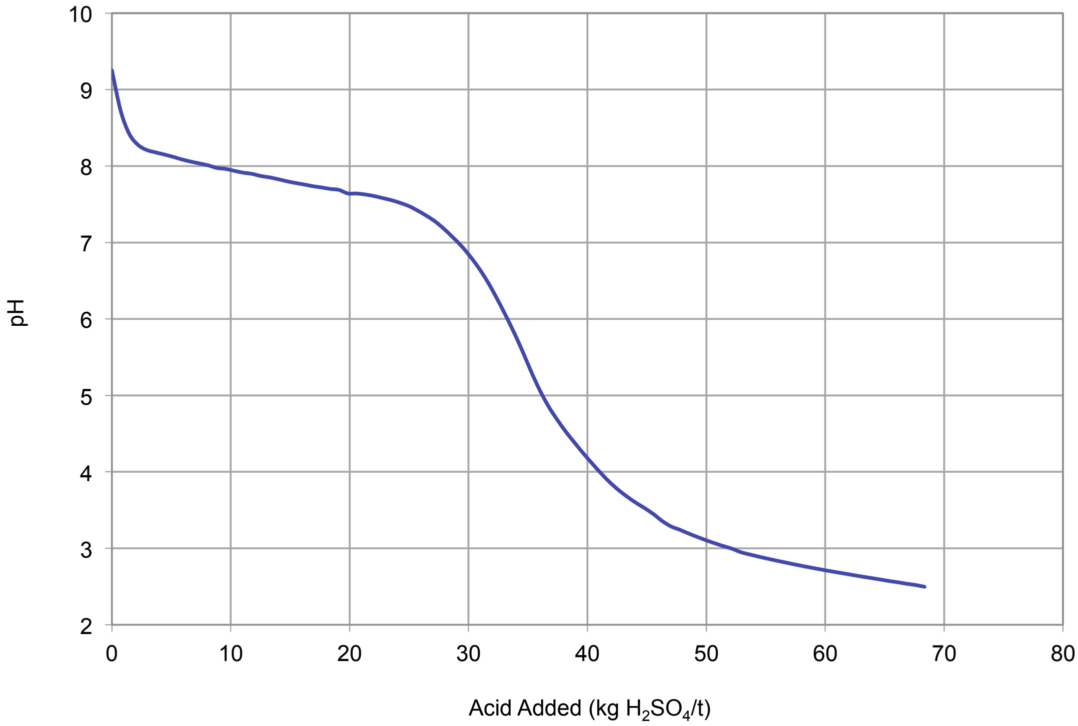
APPENDIX A7-2: Acid buffer characteristic curve for HIT drill core sample # 38838
Drill Hole = 235XC09 (232-234m), Lithology = FT, Alteration = FR, ANC = 93 kg H_2SO_4/t



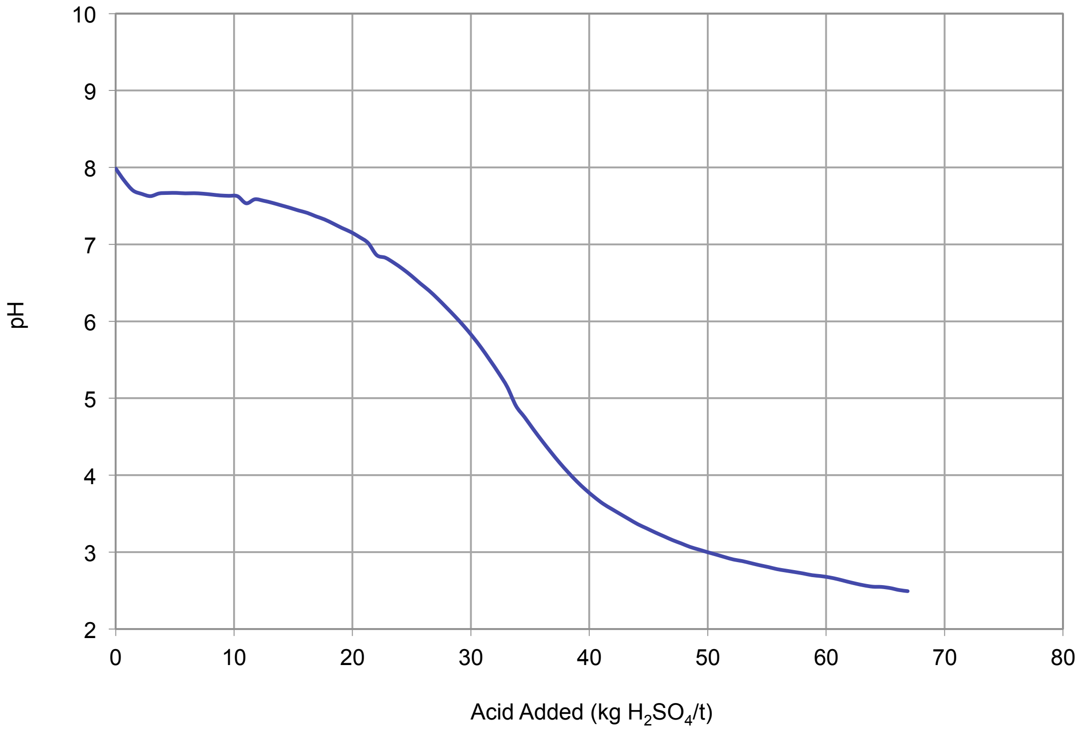
APPENDIX 7-3: Acid buffer characteristic curve for HIT drill core sample # 38836
Drill Hole = 235XC09 (104-106m), Lithology = HMD, Alteration = PH, ANC = 50 kg H_2SO_4/t



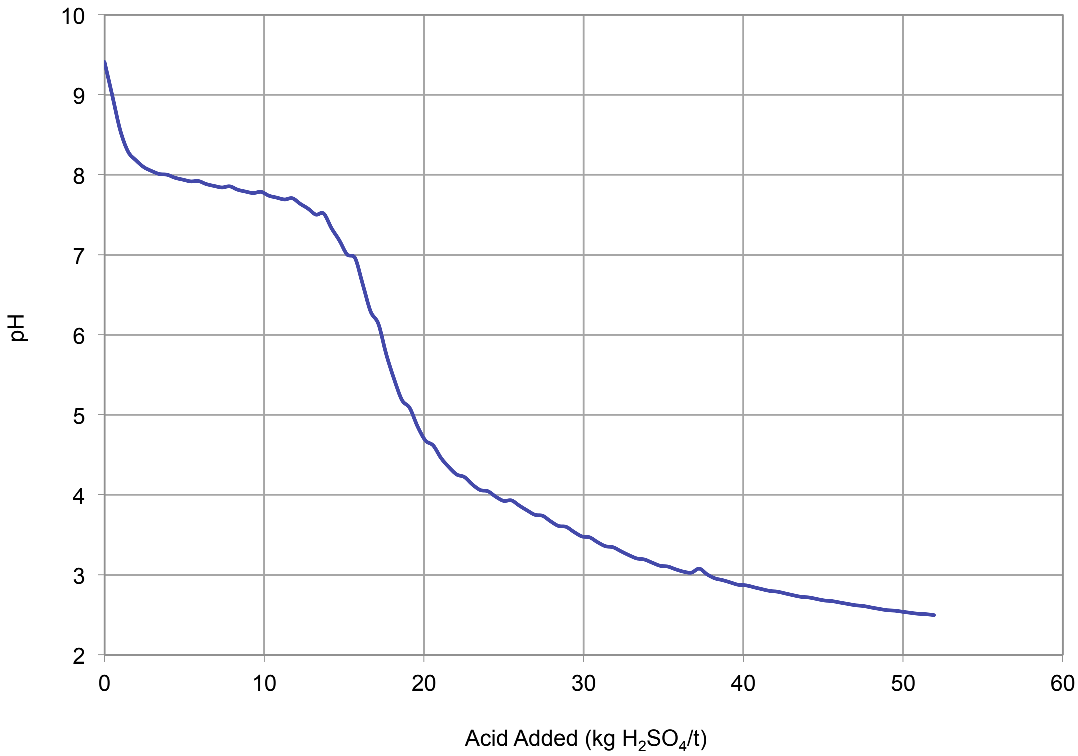
APPENDIX A7-4: Acid buffer characteristic curve for HIT drill core sample # 38822
Drill Hole = 182XC08 (74-76m), Lithology = HMD, Alteration = PO, ANC = 46 kg H_2SO_4/t



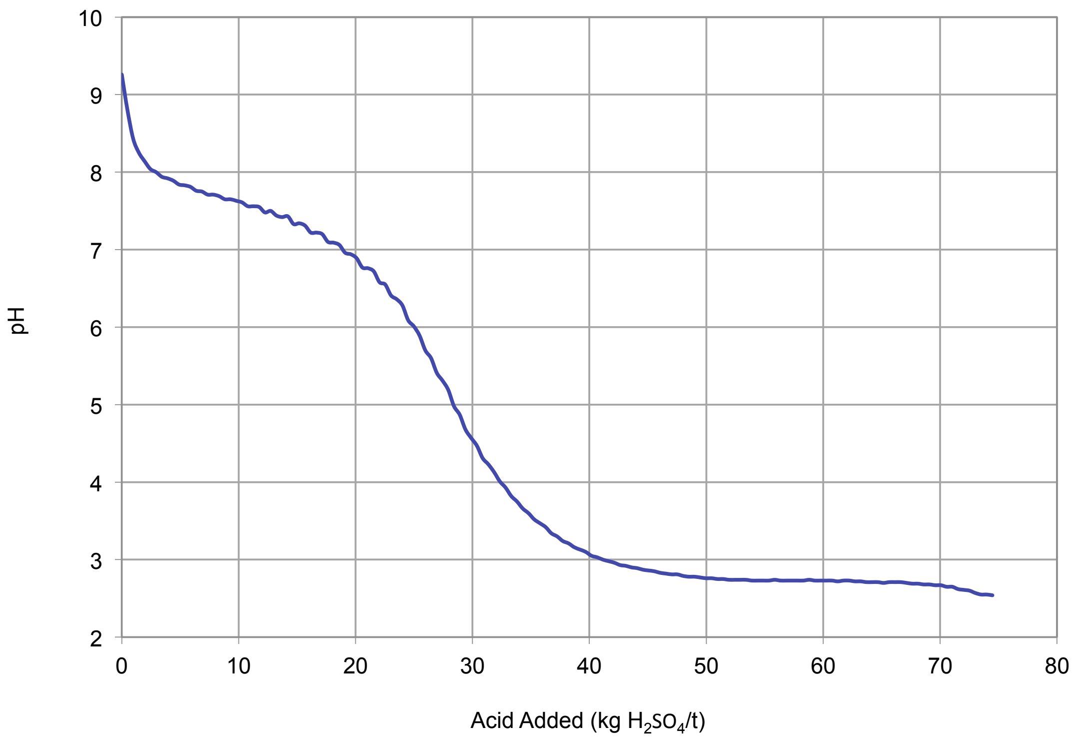
APPENDIX A7-5: Acid buffer characteristic curve for HIT drill core sample # 38842
Drill Hole = 246XC09 (150-152m), Lithology = HMD, Alteration = PO, ANC = 41 kg H_2SO_4/t



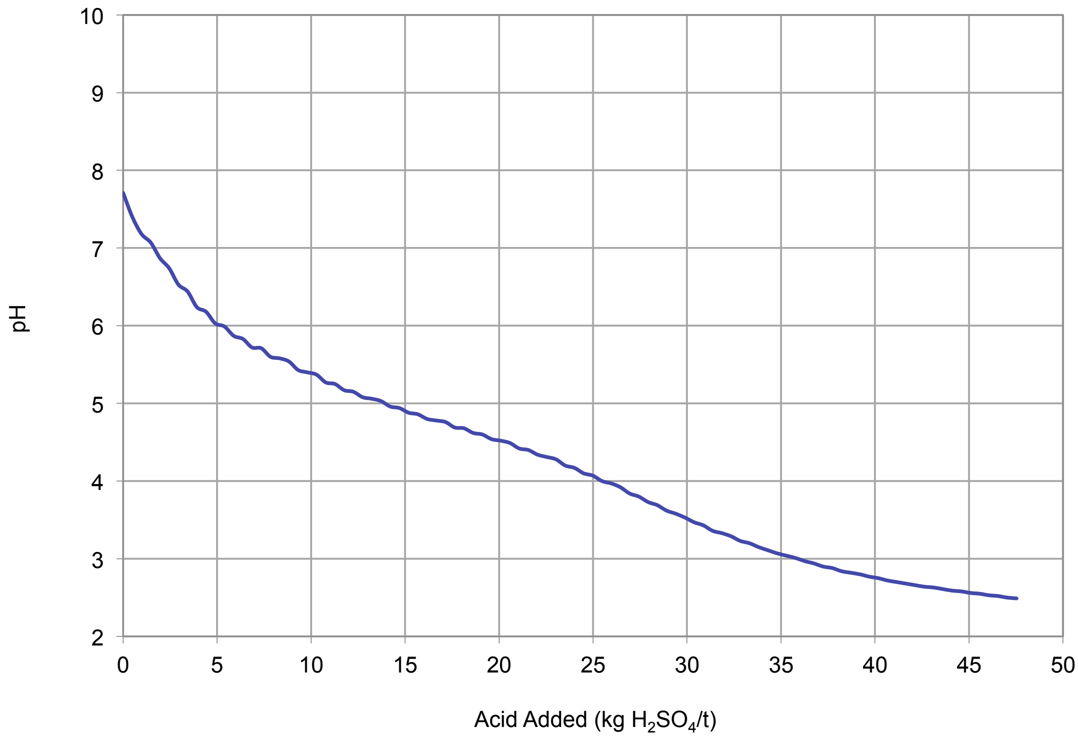
APPENDIX A7-6: Acid buffer characteristic curve for HIT drill core sample # 39075
Drill Hole = 129XC07 (192-194m), Lithology = HMD, Alteration = PR, ANC = 39 kg H_2SO_4/t



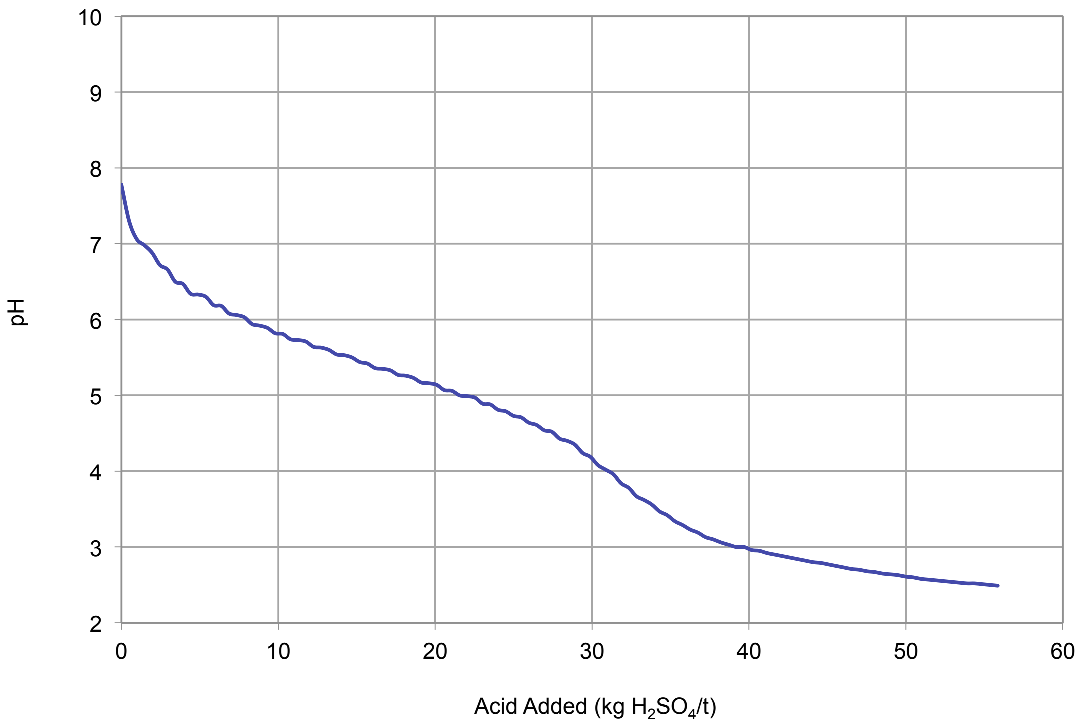
APPENDIX A7-7: Acid buffer characteristic curve for HIT drill core sample # 38832
Drill Hole = 175XC08B (148-150m), Lithology = FT, Alteration = FR, ANC = 34 kg H_2SO_4/t



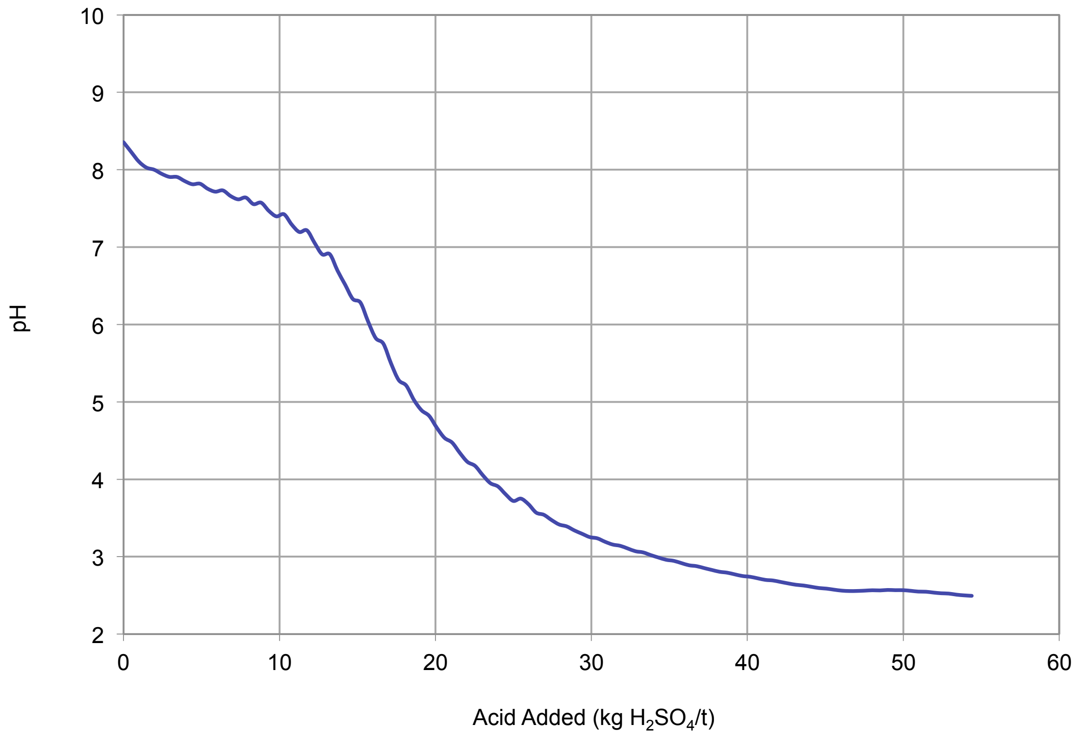
APPENDIX A7-8: Acid buffer characteristic curve for HIT drill core sample # 38837
Drill Hole = 235XC09 (200-202m), Lithology = FT, Alteration = FR, ANC = 29 kg H_2SO_4/t



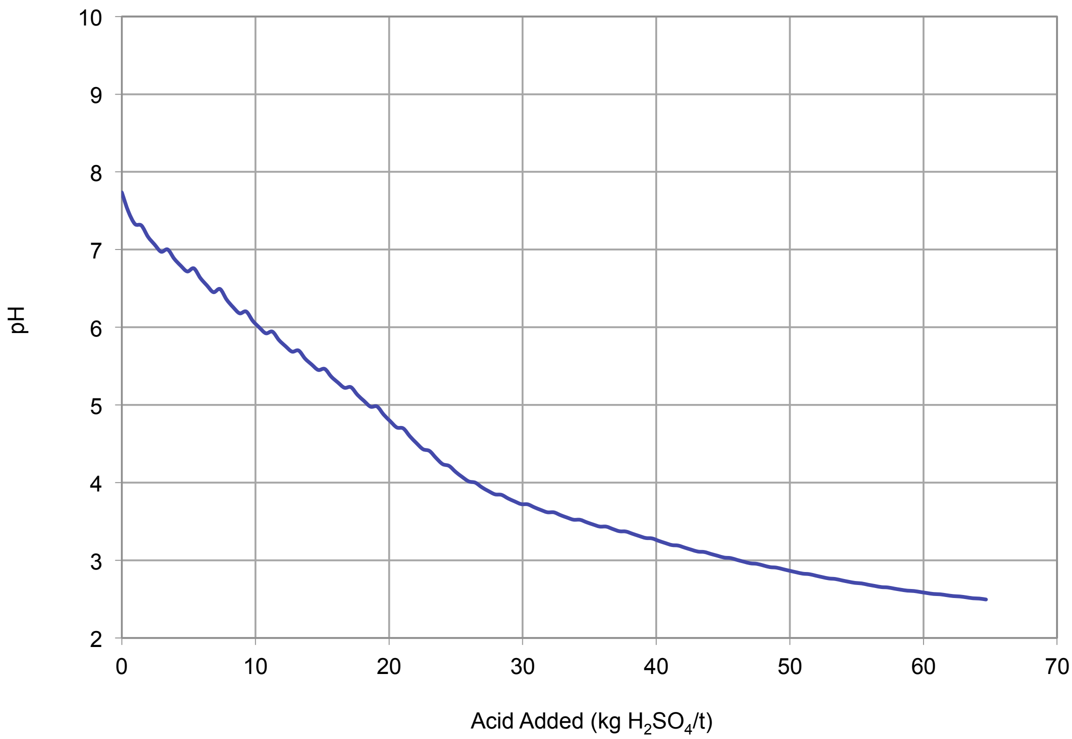
APPENDIX A7-9: Acid buffer characteristic curve for HIT drill core sample # 39060
Drill Hole = 066NOR05 (98-100m), Lithology = DVp, Alteration = PR, ANC = 29 kg H_2SO_4/t



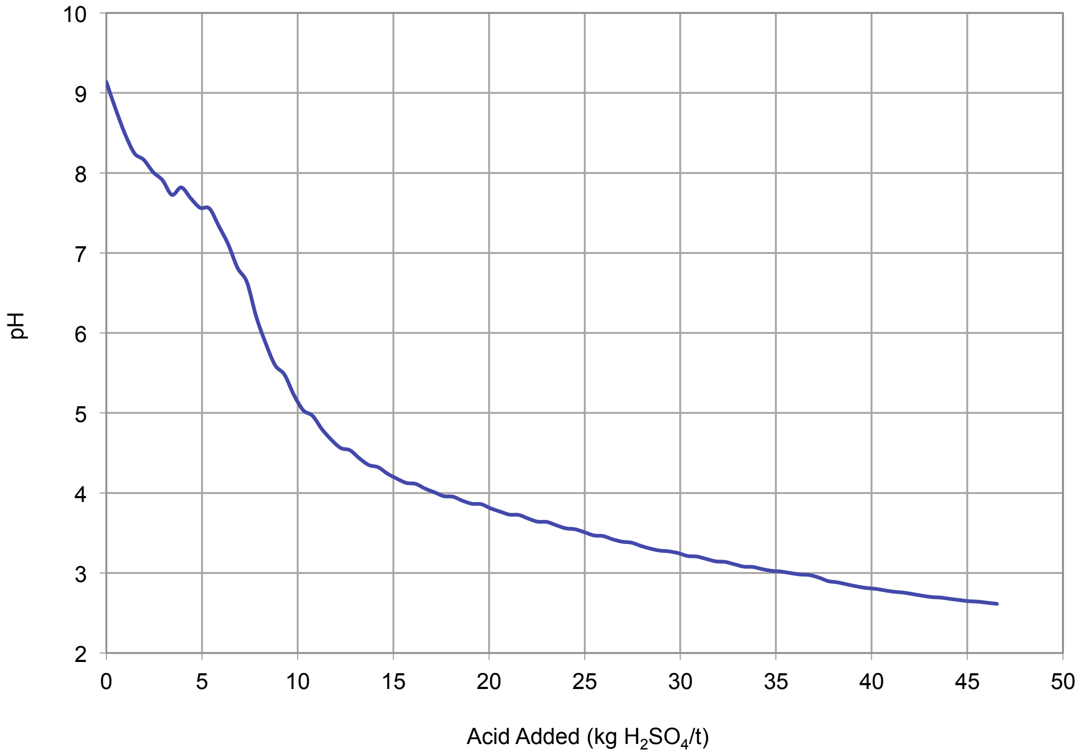
APPENDIX A7-10: Acid buffer characteristic curve for HIT drill core sample # 39087
Drill Hole = C019-ED (50-52m), Lithology = FDP, Alteration = AR, ANC = 27 kg H_2SO_4/t



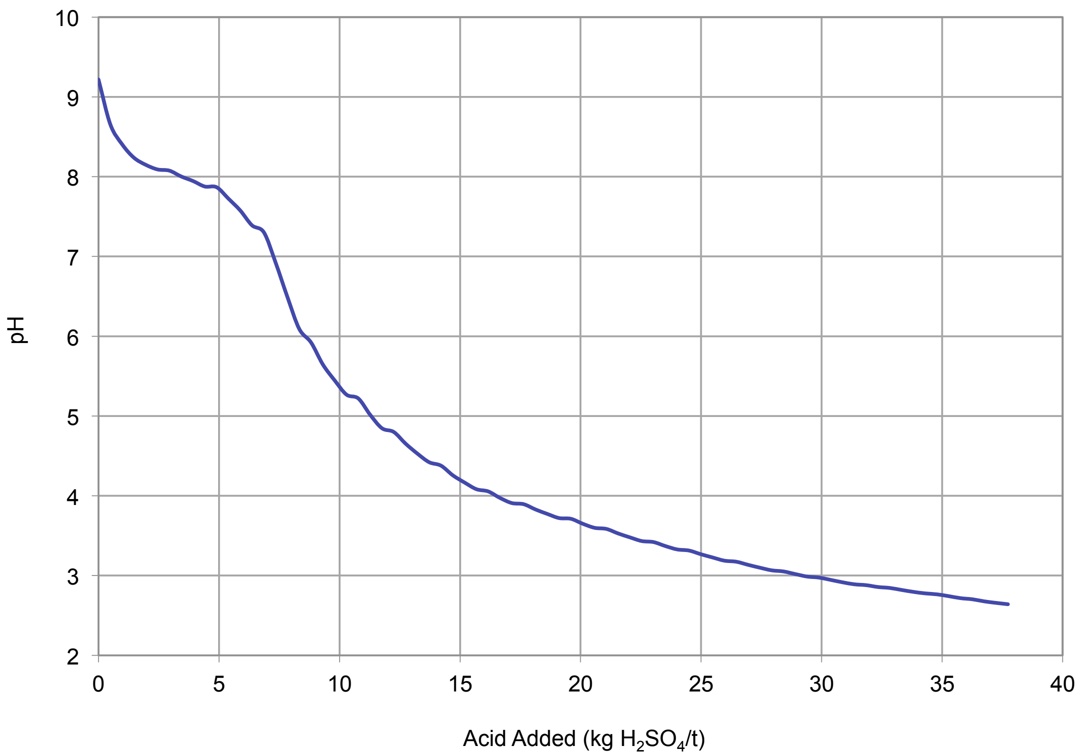
APPENDIX A7-11: Acid buffer characteristic curve for HIT drill core sample # 39059
Drill Hole = 066NOR05 (60-62m), Lithology = DVp, Alteration = PR, ANC = 25 kg H_2SO_4/t



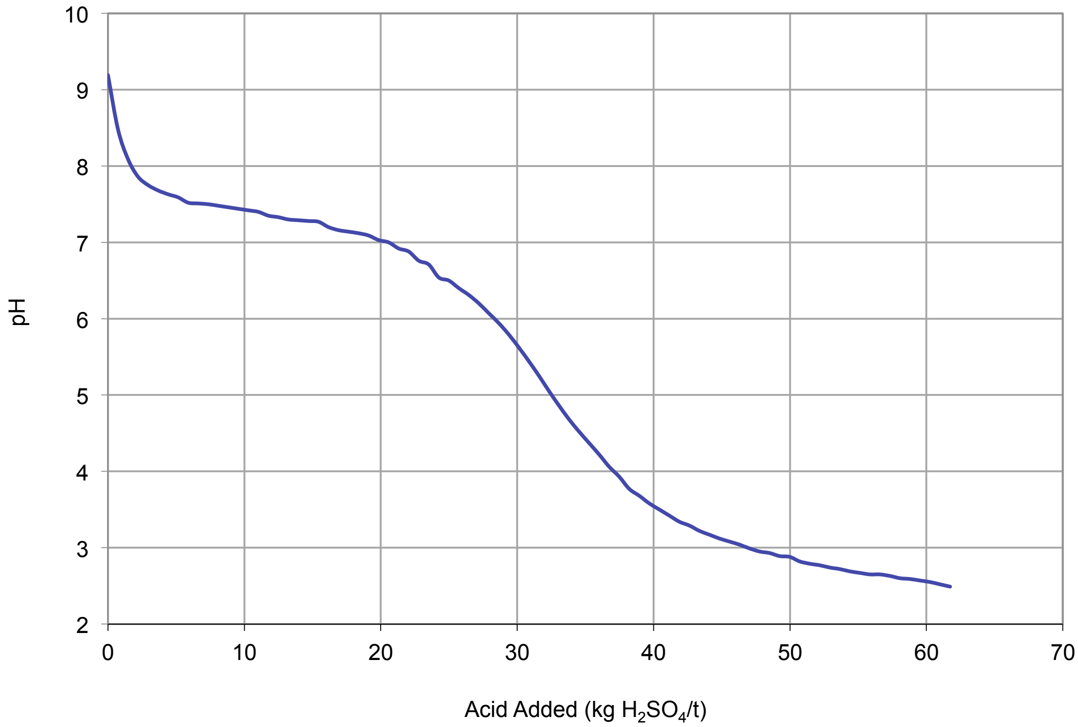
APPENDIX A7-12: Acid buffer characteristic curve for HIT drill core sample # 39068
Drill Hole = 123XC07 (234-236m), Lithology = KDP, Alteration = PH, ANC = 25 kg H_2SO_4/t



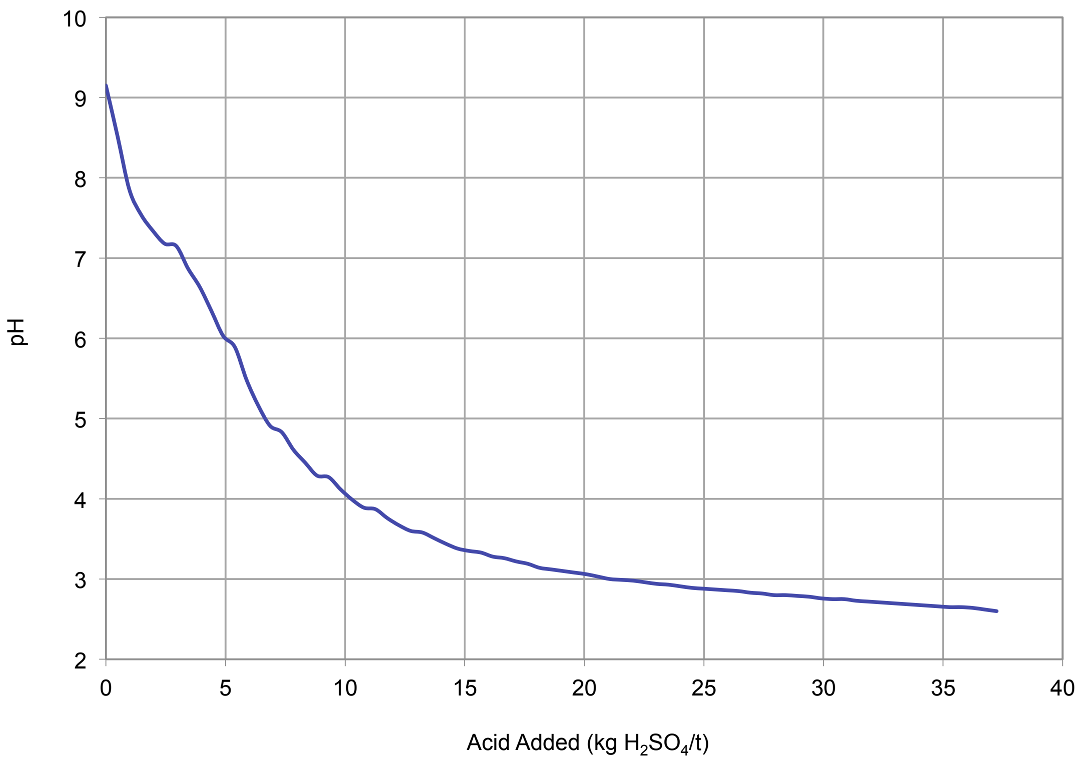
APPENDIX A7-13: Acid buffer characteristic curve for HIT drill core sample # 38834
Drill Hole = 175XC08B (200-201m), Lithology = HMD, Alteration = PO, ANC = 25 kg H_2SO_4/t



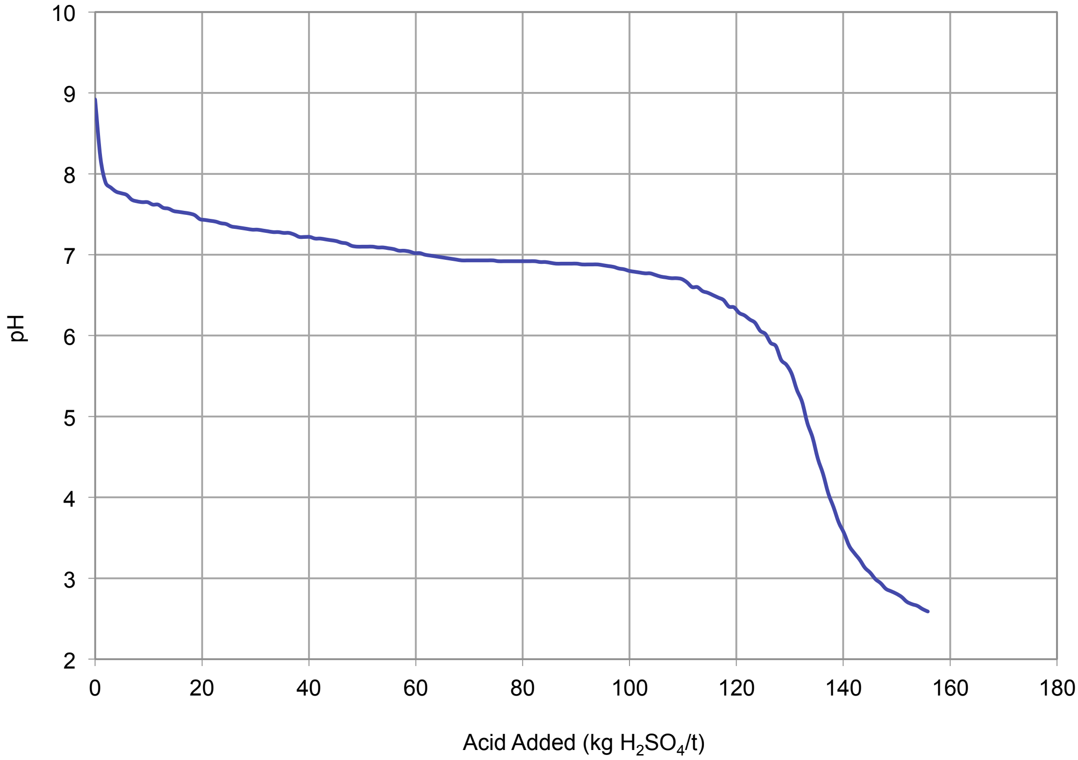
APPENDIX A7-14: Acid buffer characteristic curve for HIT drill core sample # 38823
Drill Hole = 184XC08 (158-160m), Lithology = FT, Alteration = FR, ANC = 23 kg H_2SO_4/t



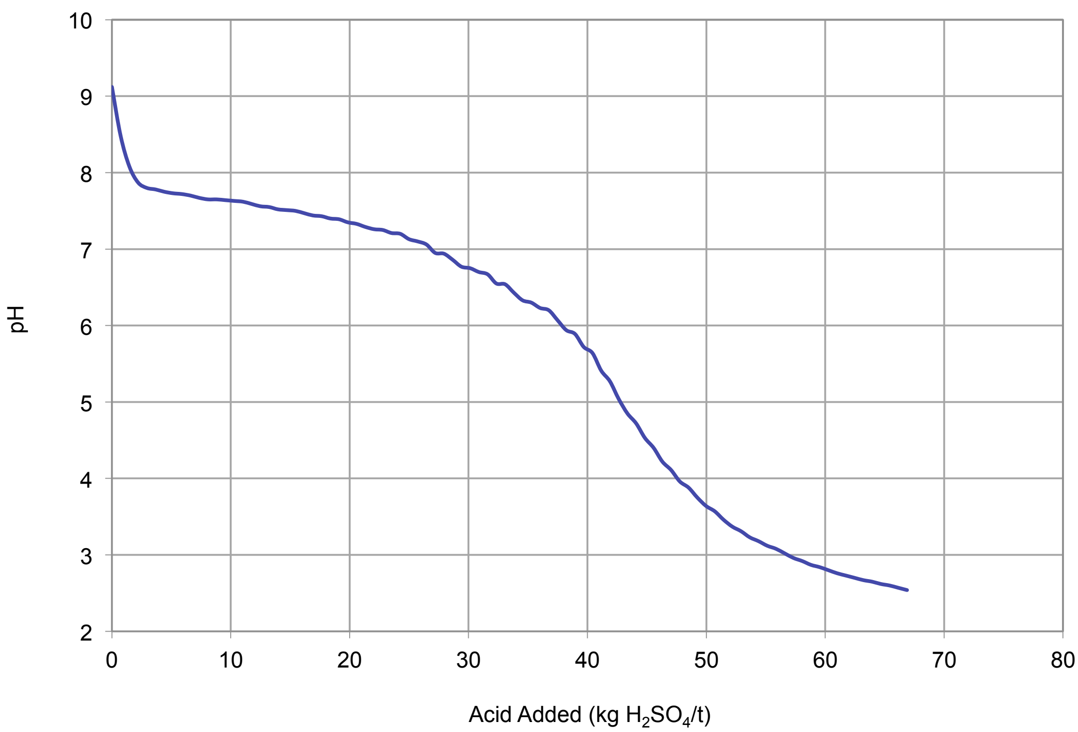
APPENDIX A7-15: Acid buffer characteristic curve for Ekwai drill core sample # 10641
Drill Hole = 660FC15 (122-124m), Lithology = HMD, Alteration = PR, ANC = 51 kg H_2SO_4/t



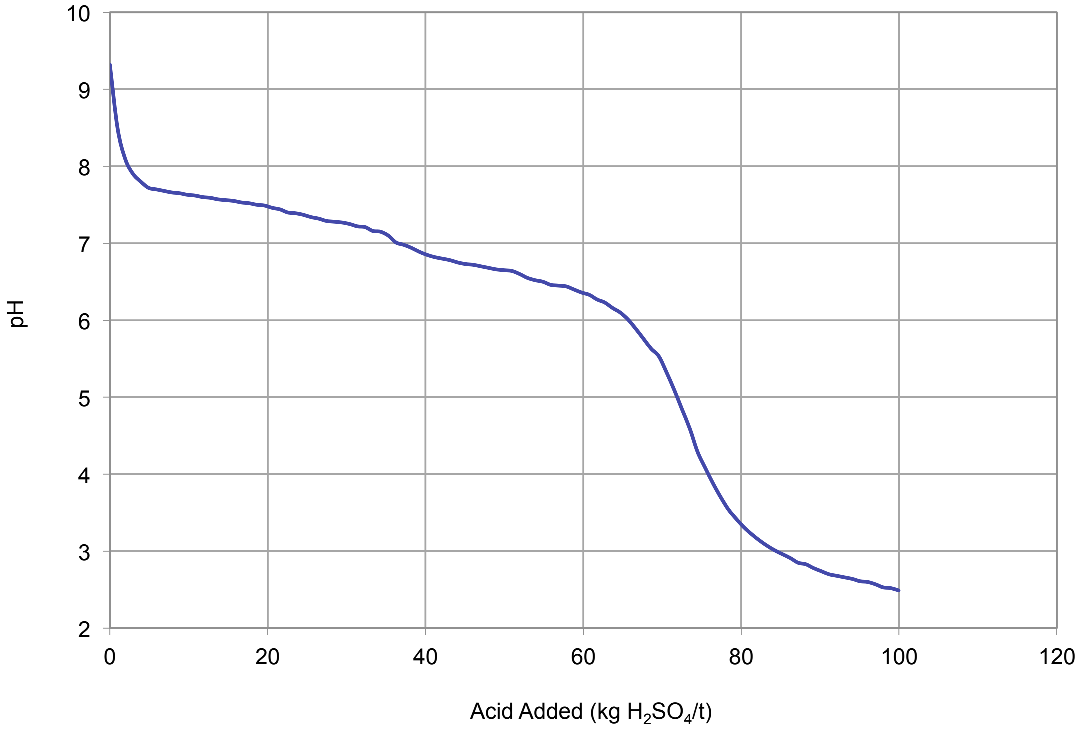
APPENDIX A7-16: Acid buffer characteristic curve for Ekwai drill core sample # 10654
Drill Hole = 661FC15 (112-114m), Lithology = OAP, Alteration = NONE, ANC = 30 kg H_2SO_4/t



APPENDIX A7-17: Acid buffer characteristic curve for Koki drill core sample # 10679
Drill Hole = 665FC16 (66-68m), Lithology = HMD, Alteration = PO, ANC = 111 kg H_2SO_4/t



APPENDIX A7-18: Acid buffer characteristic curve for Koki drill core sample # 10689
Drill Hole = 666FC16 (254-256m), Lithology = HMD, Alteration = PO, ANC = 57 kg H_2SO_4/t

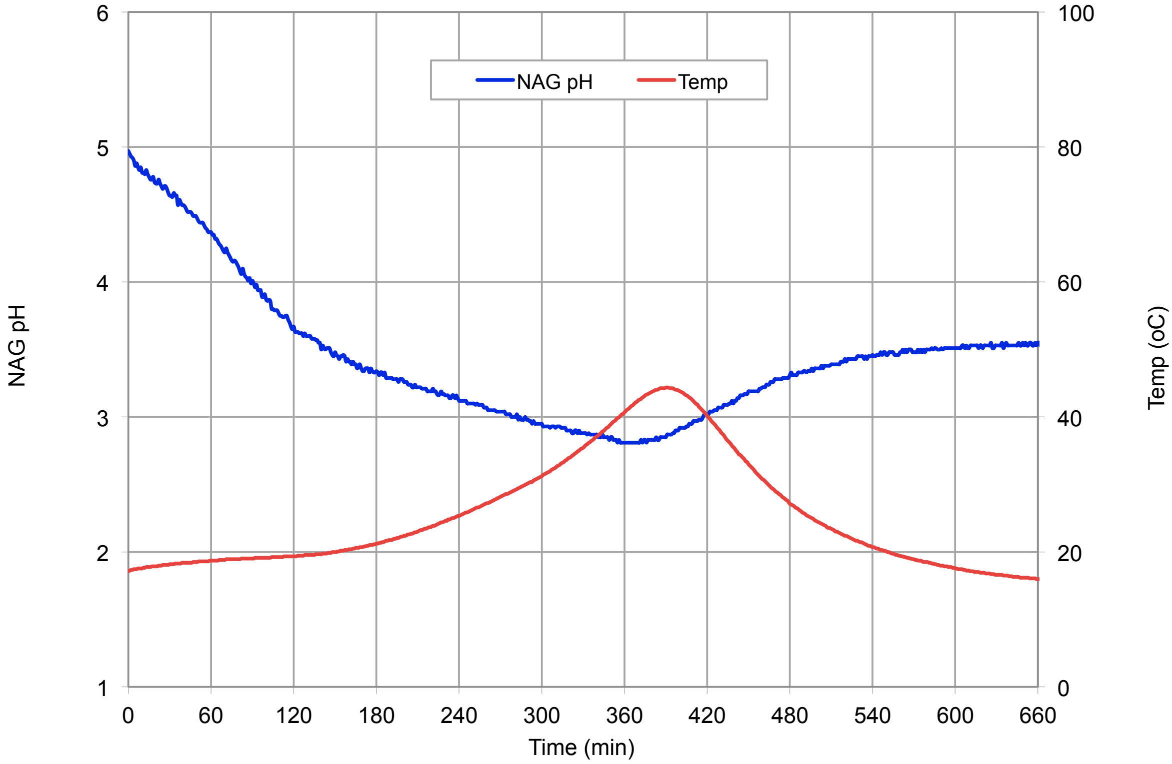


APPENDIX A7-19: Acid buffer characteristic curve for Koki drill core sample # 10697

Drill Hole = 667FC16 (30-32m), Lithology = HMD, Alteration = AAA, ANC = 99 kg H_2SO_4/t

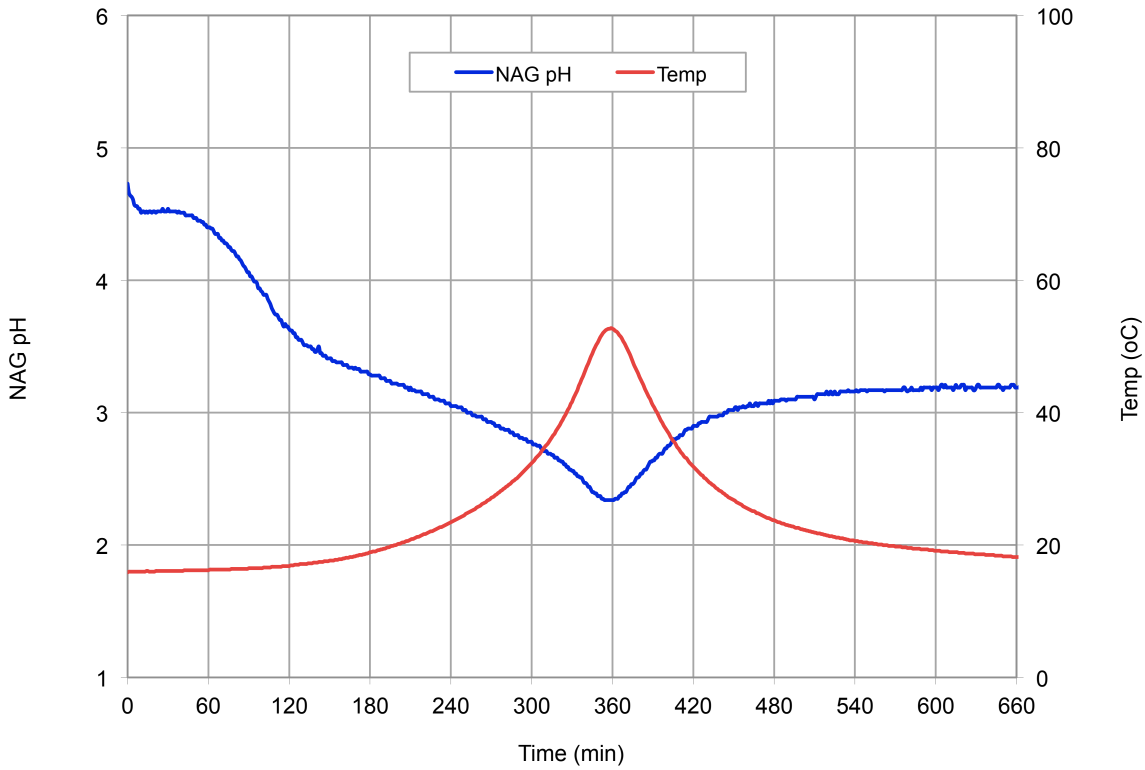
Appendix A8

Kinetic NAG Test Profiles for HIT, Ekwai and Koki Drill Core Samples



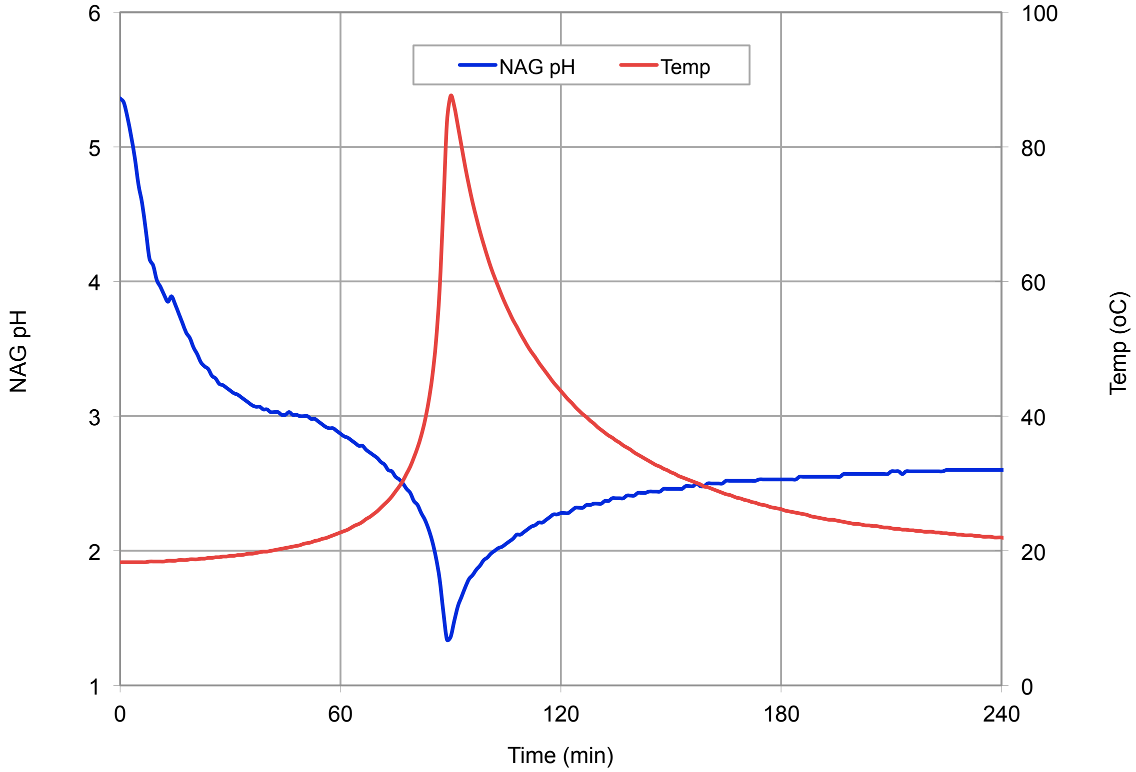
APPENDIX A8-1: Kinetic NAG test profiles for HIT drill core sample # 38813

Drill Hole = 165XC08 (152-154m) / Lithology = LW / Alteration = PO
1.59%S, ANC = 46 kg H_2SO_4/t, NAPP = 41 kg H_2SO_4/t, NAGpH = 3.7



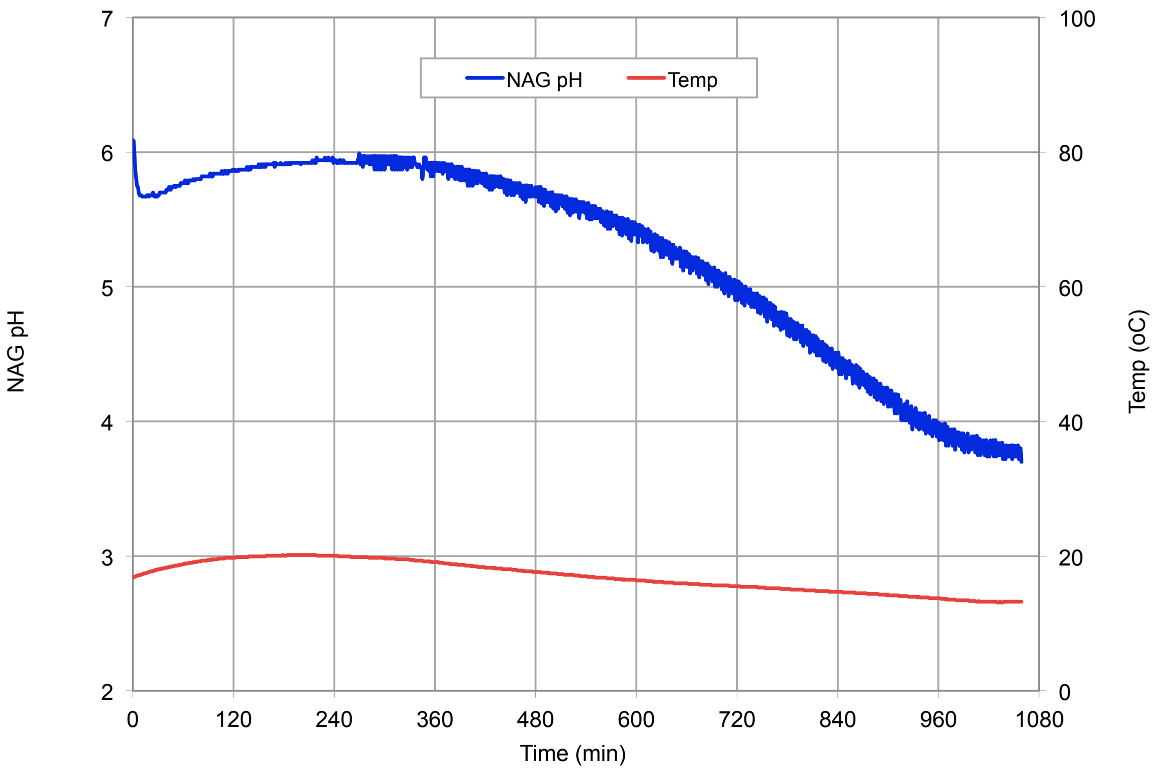
APPENDIX A8-2: Kinetic NAG test profile for HIT drill core sample # 38818

Drill Hole = 172XC08 (284-286m) / Lithology = LW / Alteration = PO
4.19%S, ANC = 14 kg H_2SO_4/t, NAPP = 114 kg H_2SO_4/t, NAGpH = 2.8



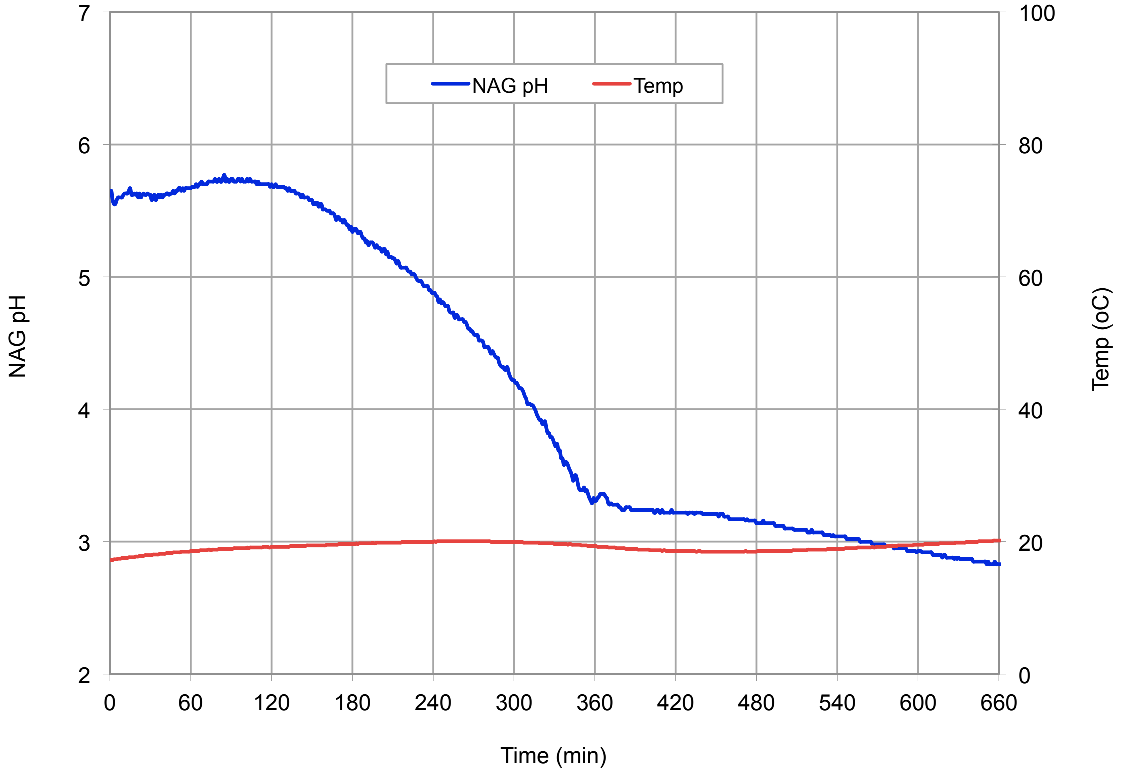
APPENDIX A8-3: Kinetic NAG test profiles for HIT drill core sample # 38819

Drill Hole = 175XC08 (66-68m) / Lithology = LW / Alteration = PO
2.66%S, ANC = 10 kg H_2SO_4/t, NAPP = 71 kg H_2SO_4/t, NAGpH = 2.6



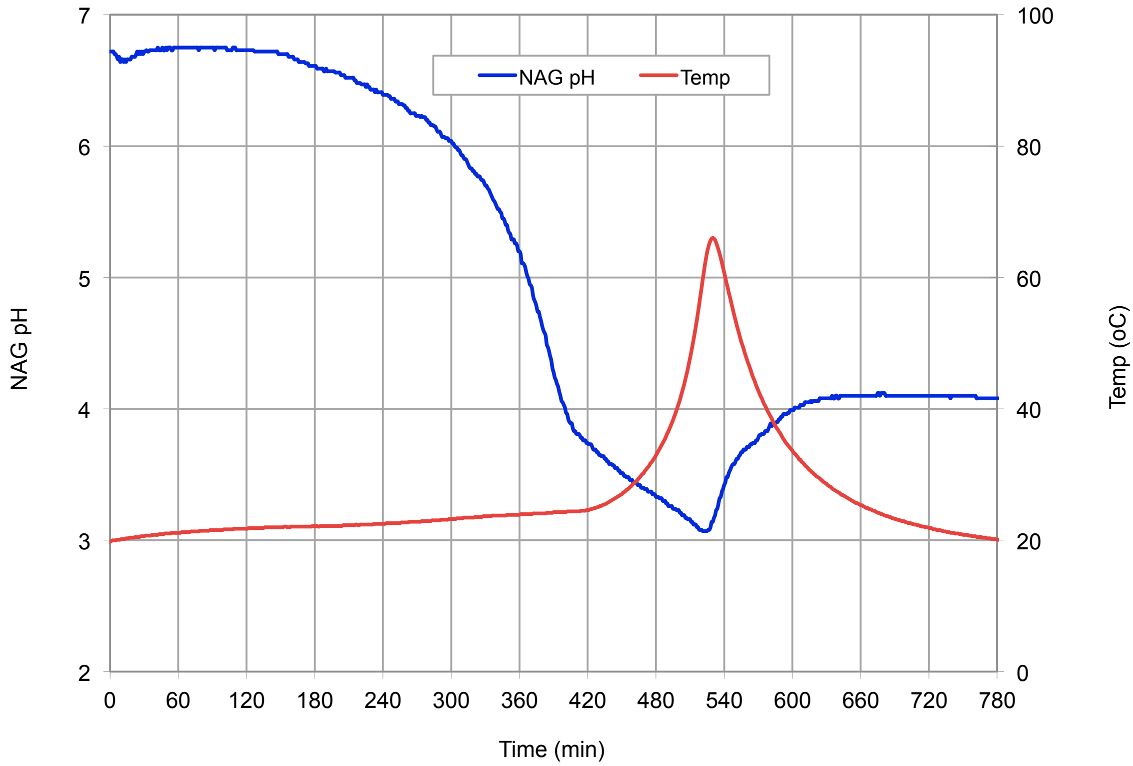
APPENDIX A8-4: Kinetic NAG test profiles for HIT drill core sample # 38823

Drill Hole = 184XC08 (158-160m) / Lithology = FR / Alteration = PR
1.25%S, ANC = 23 kg H_2SO_4/t, NAPP = 15 kg H_2SO_4/t, NAGpH = 3.1



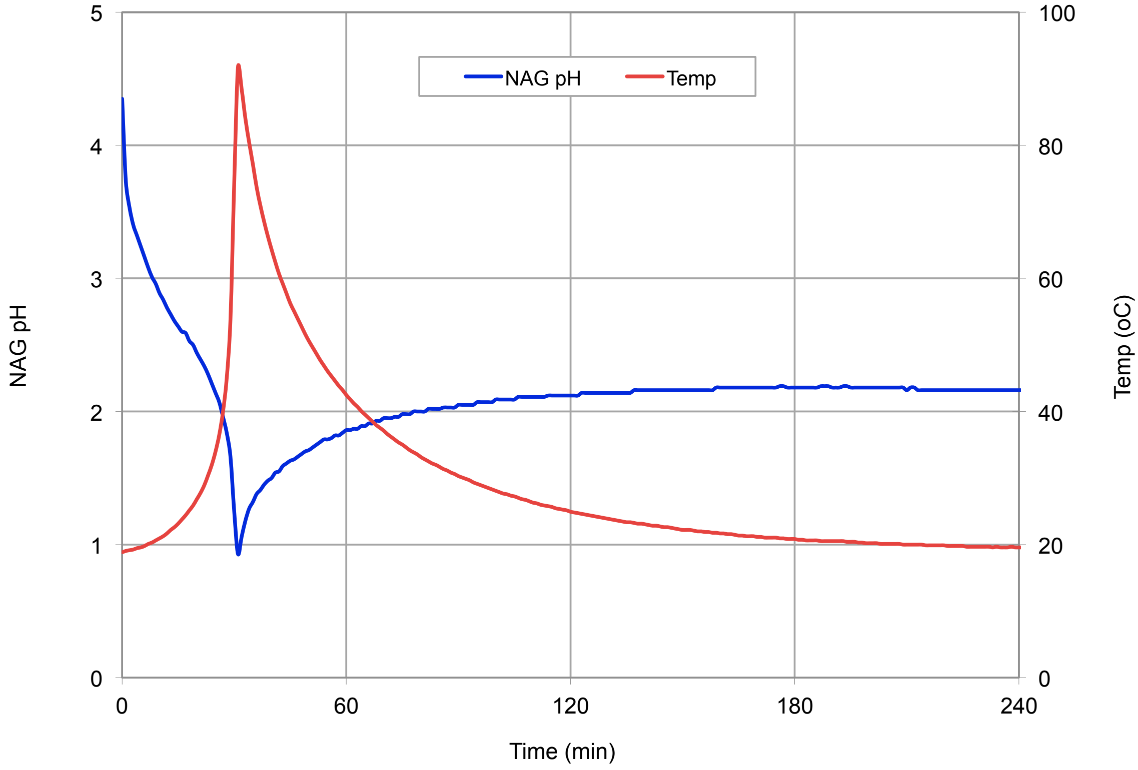
APPENDIX A8-5: Kinetic NAG test profiles for HIT drill core sample # 38824

Drill Hole = 184XC08 (282-284m) / Lithology = HMD / Alteration = PH
2.34%S, ANC = 17 kg H_2SO_4/t, NAPP = 54 kg H_2SO_4/t, NAGpH = 2.8



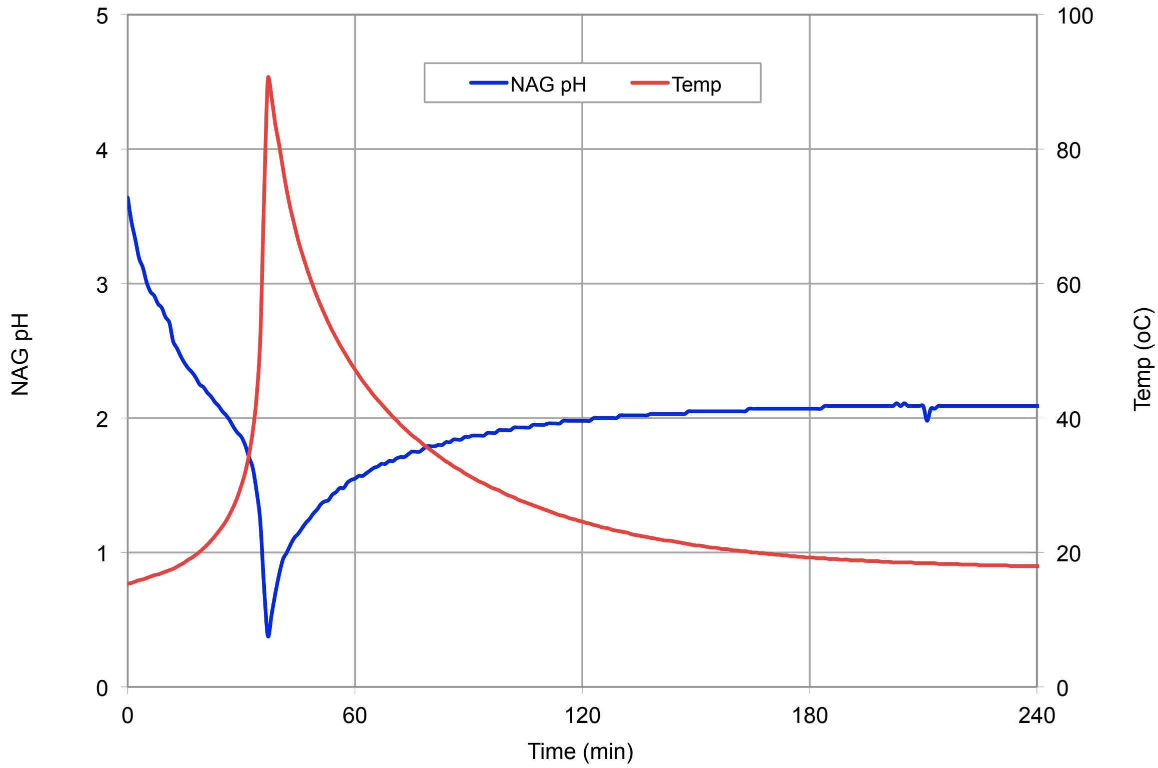
APPENDIX A8-6: Kinetic NAG profiles for HIT drill core sample #38834

Drill Hole = 175XC08 (200-201m) / Lithology = HMD / Alteration = PO
2.25%S, ANC = 25 kg H_2SO_4/t, NAPP = 43 kg H_2SO_4/t, NAGpH = 2.5



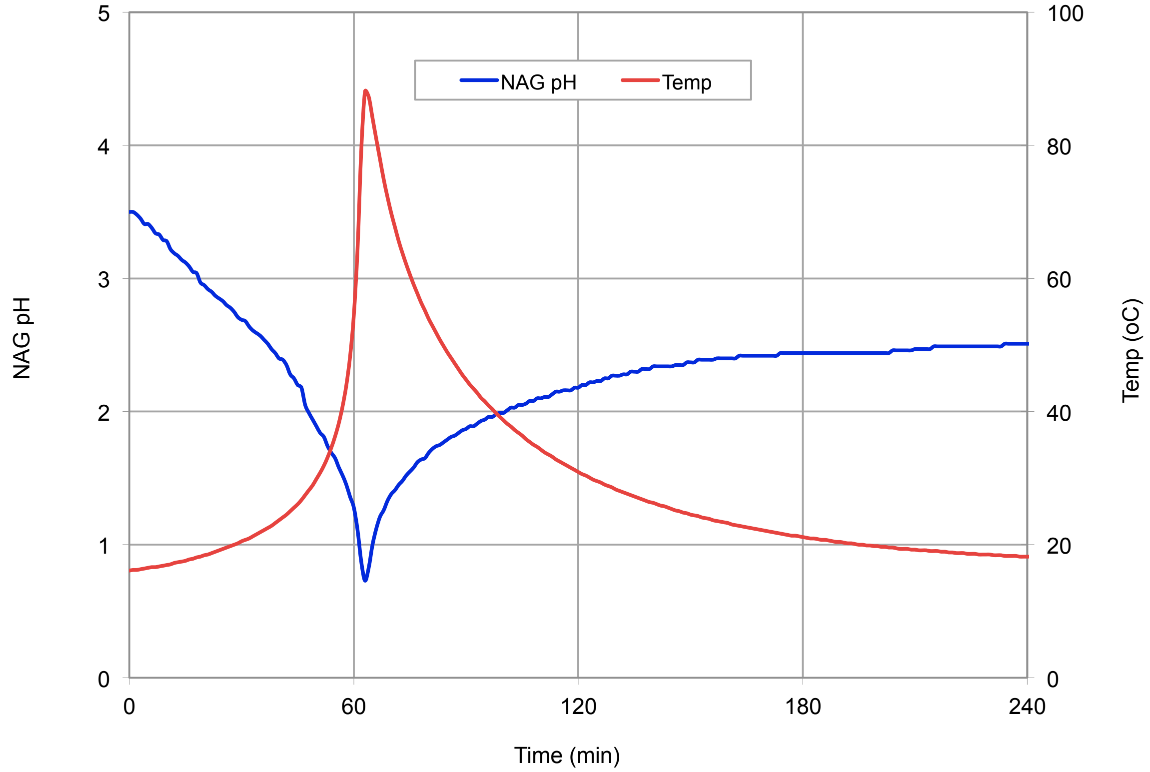
APPENDIX A8-7: Kinetic NAG test profiles for HIT drill core sample # 39021

Drill Hole = 003NOR02 (230-232m) / Lithology = HMD / Alteration = QIP
3.59%S, ANC = 0 kg H_2SO_4/t, NAPP = 110 kg H_2SO_4/t, NAGpH = 2.3



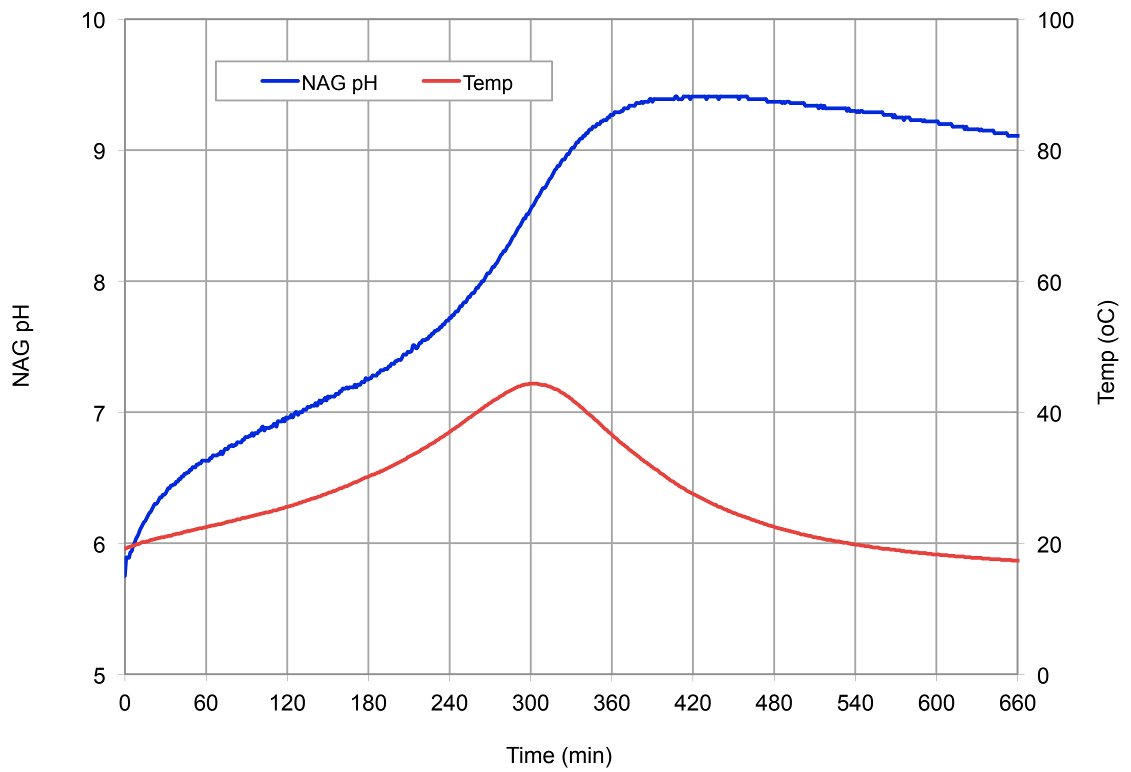
APPENDIX A8-8: Kinetic NAG test profiles for HIT drill core sample # 39033

Drill Hole = 011NOR02 (32-34m), Lithology = DV, Alteration = AR
4.79%S, ANC = 0 kg H_2SO_4/t, NAPP = 147 kg H_2SO_4/t, NAGpH = 2.4



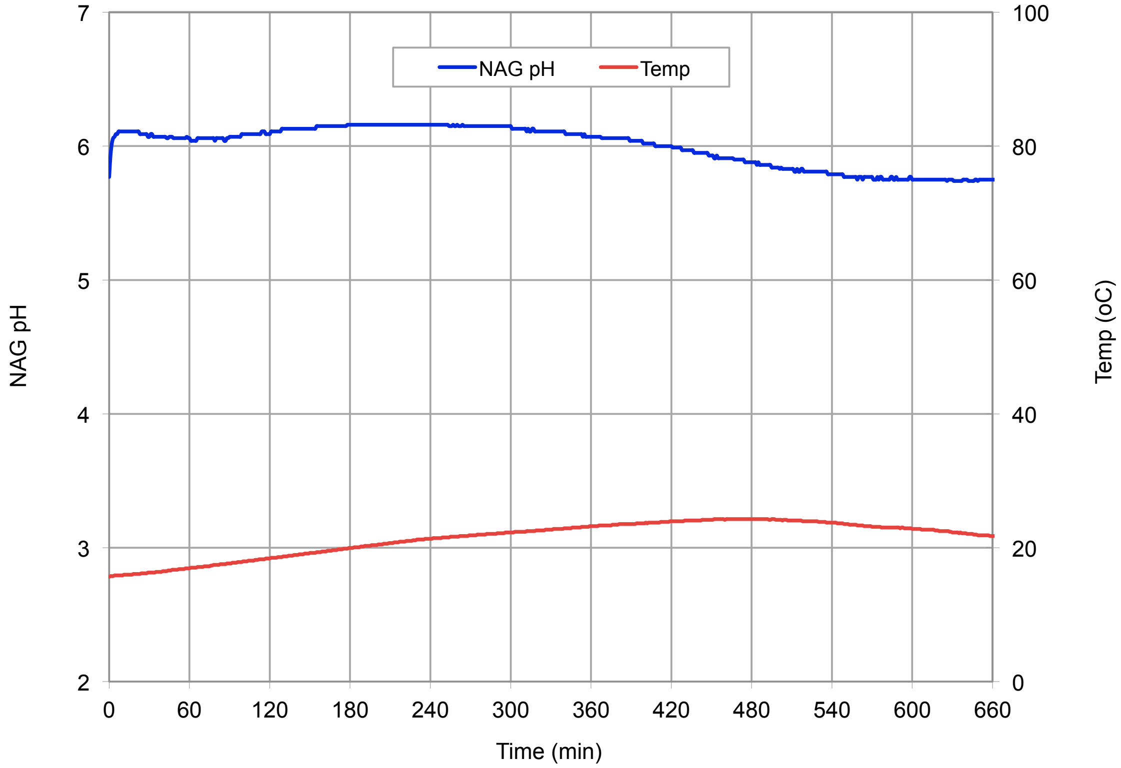
APPENDIX A8-9: Kinetic NAG test profiles for HIT drill core sample # 39056

Drill Hole = 057NOR05 (392-394m) / Lithology = DVp / Alteration = SA
2.38%S, ANC = 0 kg H_2SO_4/t, NAPP = 73 kg H_2SO_4/t, NAGpH = 2.3



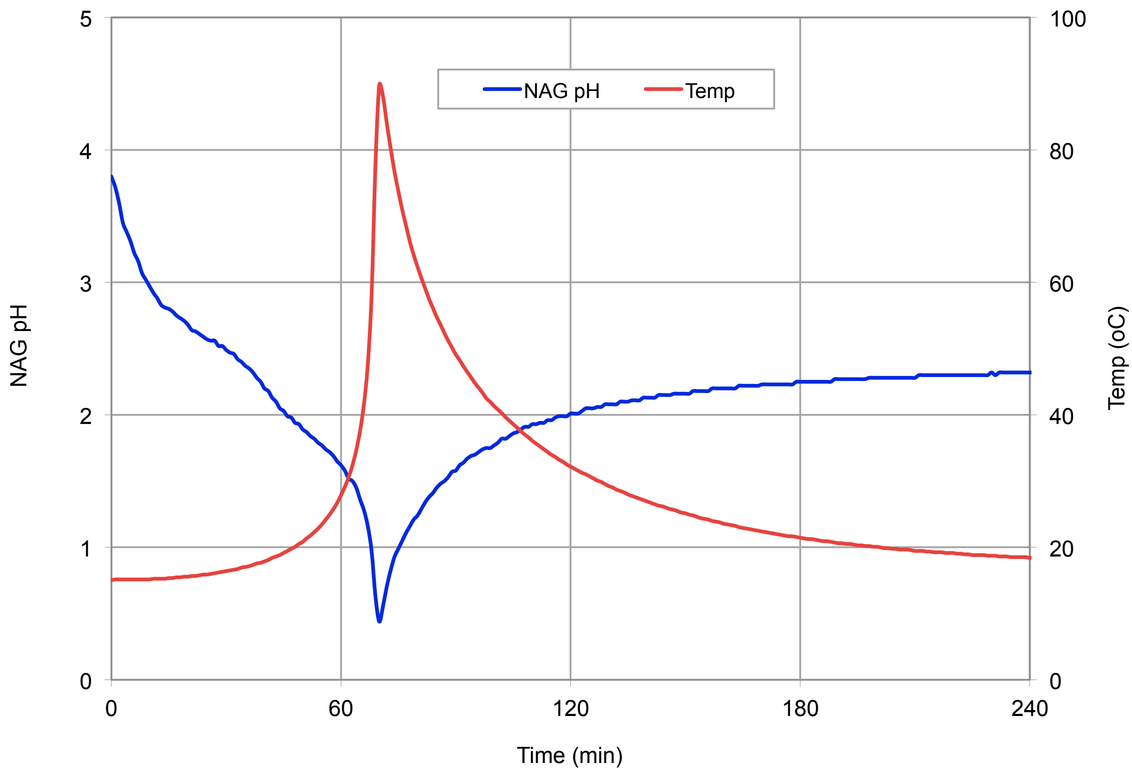
APPENDIX A8-10: Kinetic NAG test profiles for HIT drill core sample # 39059

Drill Hole = 066NOR05 (60-62m) / Lithology = DVp / Alteration = PR
1.50%S, ANC = 25 kg H_2SO_4/t, NAPP = 21 kg H_2SO_4/t, NAGpH = 3.4



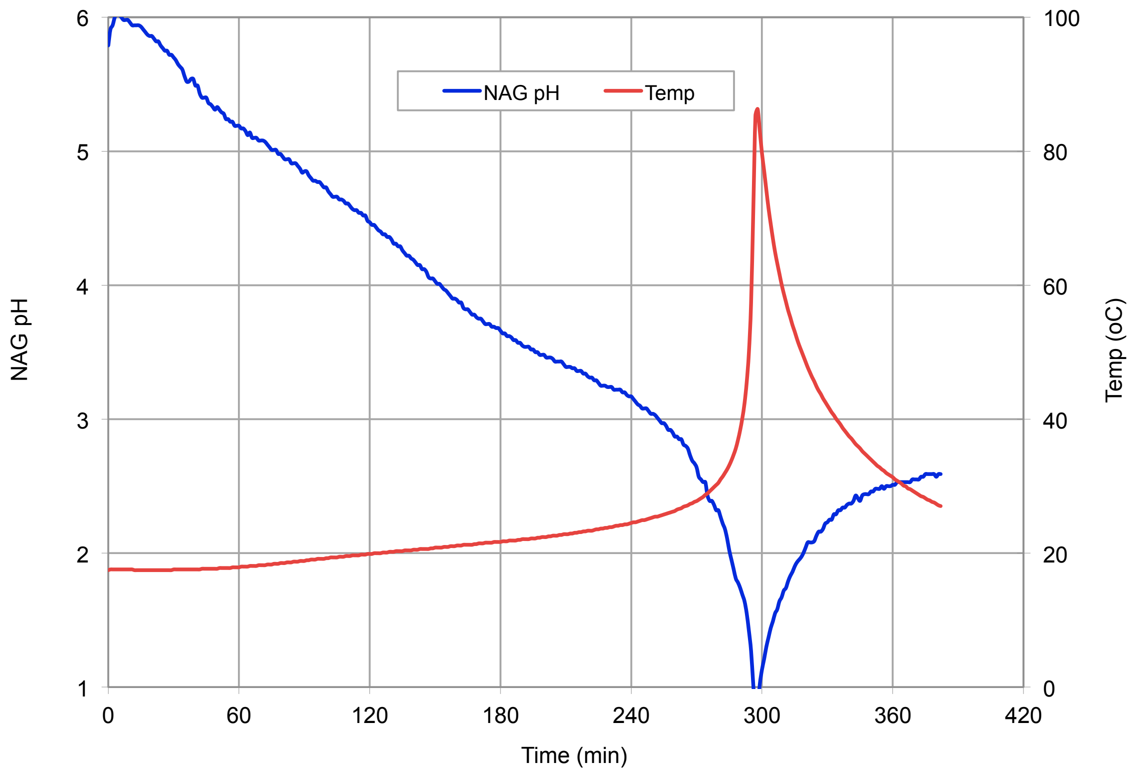
APPENDIX A8-11: Kinetic NAG test profiles for HIT drill core sample # 39060

Drill Hole = 066NOR05 (98-100m) / Lithology = DVp / Alteration = PR
1.78%S, ANC = 29 kg H_2SO_4/t, NAPP = 25 kg H_2SO_4/t, NAGpH = 3.3



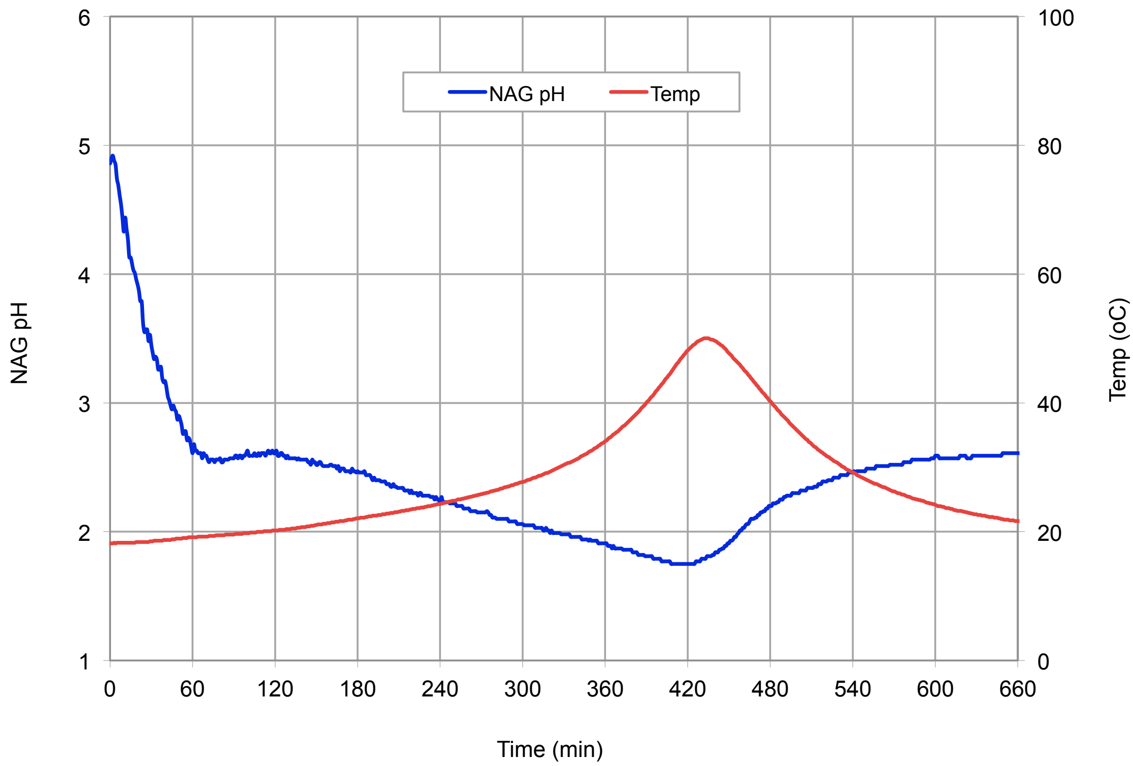
APPENDIX A8-12: Kinetic NAG test profiles for HIT drill core sample # 39065

Drill Hole = 123XC07 (46-48m) / Lithology = FDP / Alteration = QIP
4.50%S, ANC = 0 kg H_2SO_4/t, NAPP = 138 kg H_2SO_4/t, NAGpH = 2.3



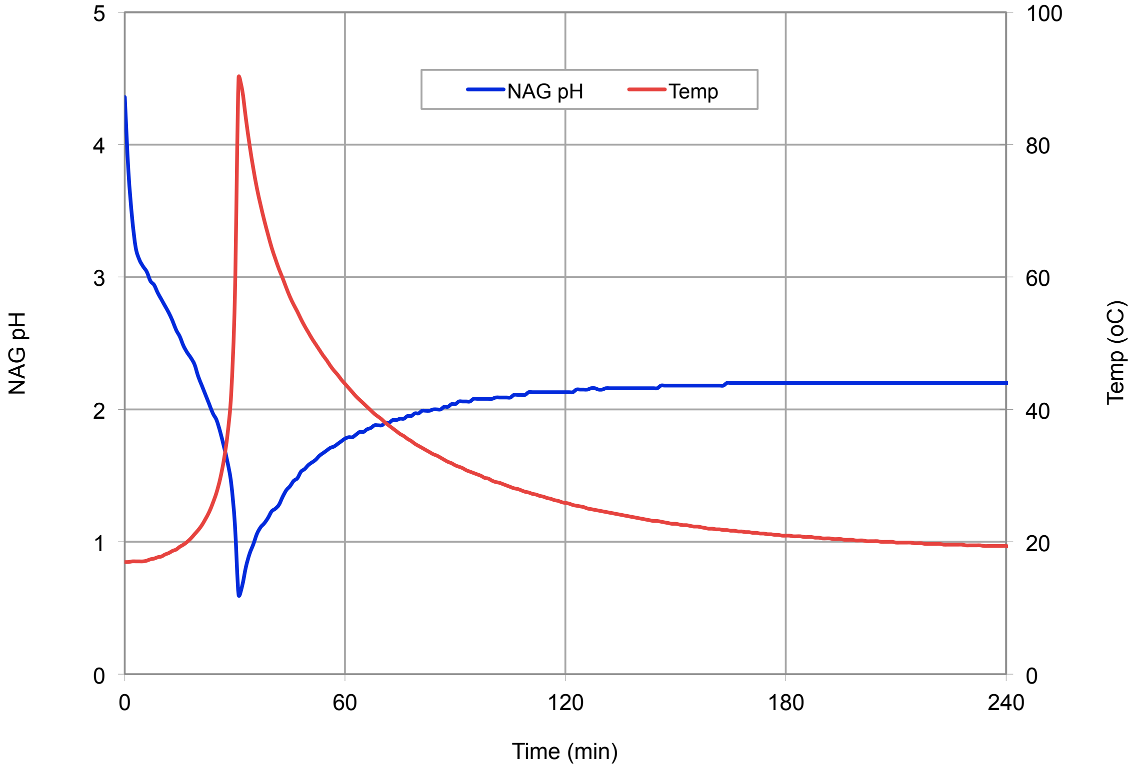
APPENDIX A8-13: Kinetic NAG test profiles for HIT drill core sample # 39068

Drill Hole = 123XC07 (234-236m), Lithology = KDP, Alteration = PH
5.46%S, ANC = 25 kg H_2SO_4/t, NAPP = 142 kg H_2SO_4/t, NAGpH = 2.4



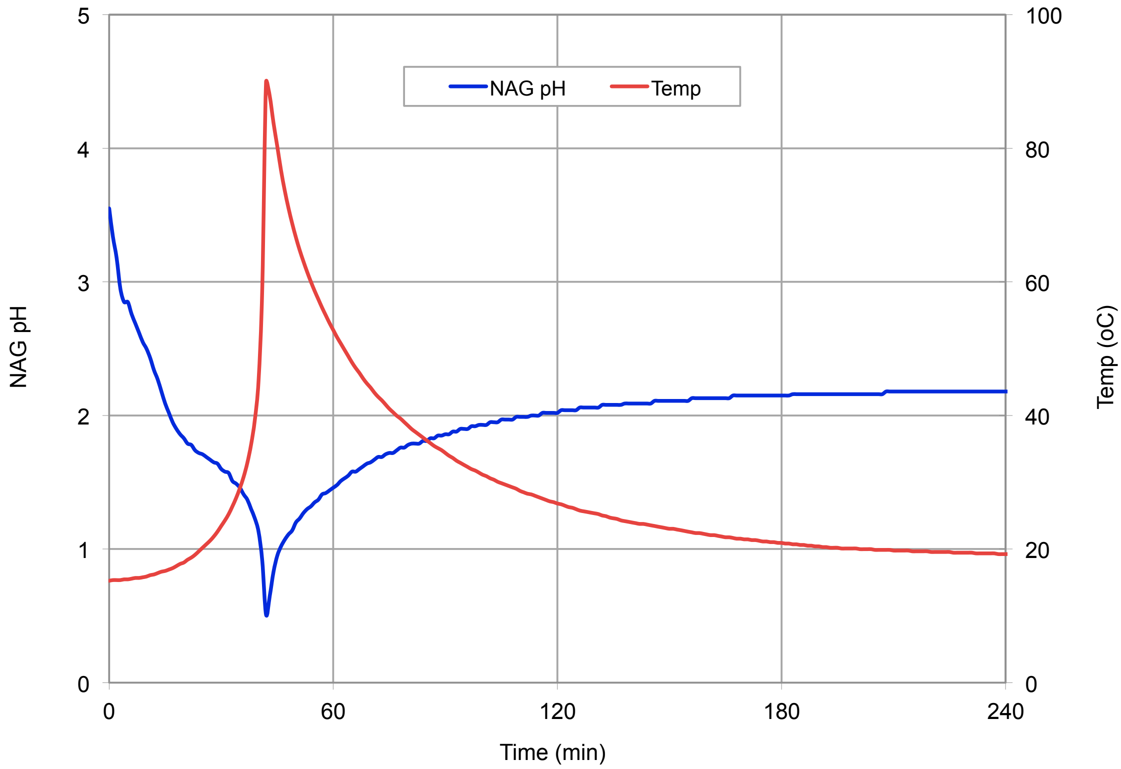
APPENDIX A8-14: Kinetic NAG test profiles for HIT drill core sample # 39070

Drill Hole = 125XC07 (50-52m), Lithology = FDP, Alteration = PR
0.78%S, ANC = 6 kg H_2SO_4/t, NAPP = 18 kg H_2SO_4/t, NAGpH = 2.9



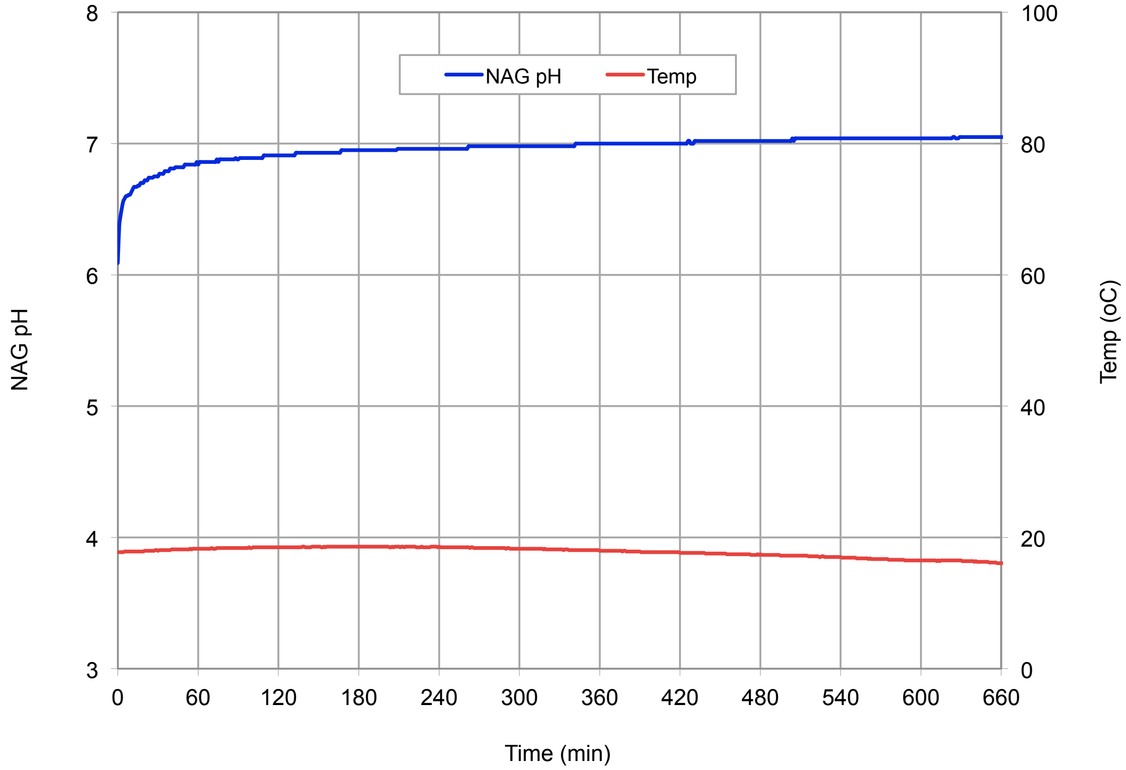
APPENDIX A8-15: Kinetic NAG test profiles for HIT drill core sample # 39071

Drill Hole = 125XC07 (108-110m) / Lithology = FDP / Alteration = AR
6.26%S, ANC = 6 kg H_2SO_4/t, NAPP = 192 kg H_2SO_4/t, NAGpH = 2.4



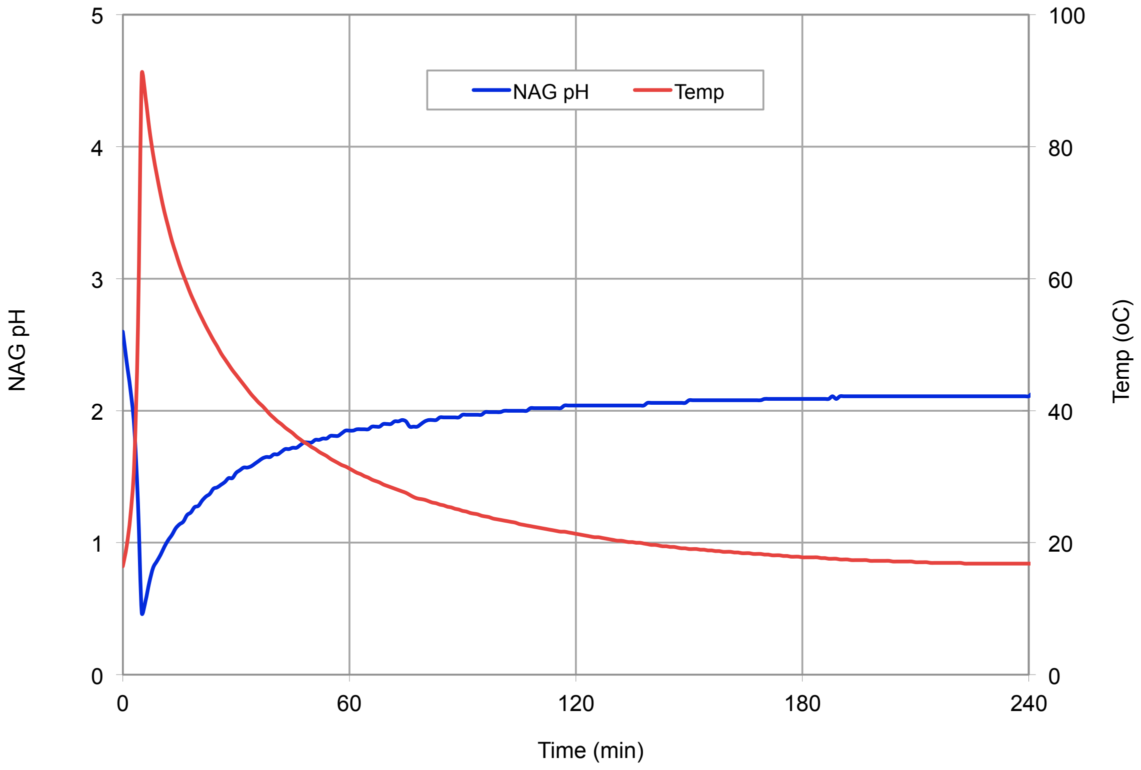
APPENDIX A8-16: Kinetic NAG test profiles for HIT drill core sample # 39072

Drill Hole = 125XC07 (154-156m) / Lithology = HMD / Alteration = AR
5.30%S, ANC = 0 kg H_2SO_4/t, NAPP = 162 kg H_2SO_4/t, NAGpH = 2.3



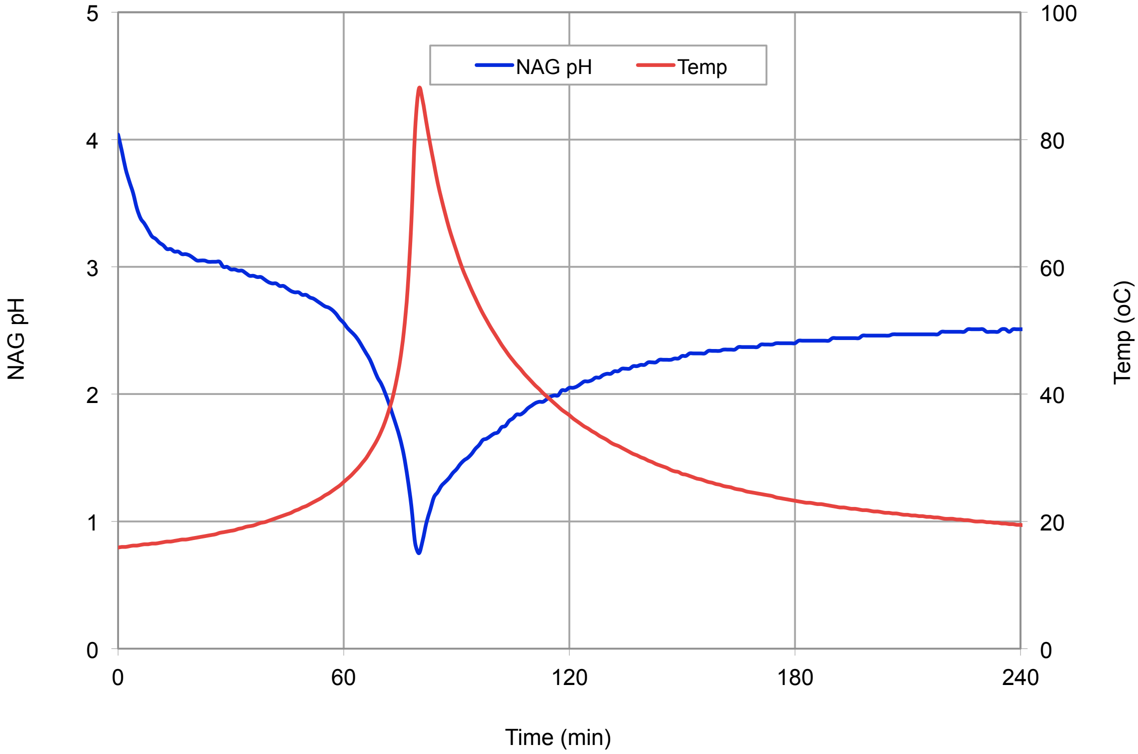
APPENDIX A8-17: Kinetic NAG test profiles for HIT drill core sample # 39075

Drill Hole = 129XC07 (192-194m) / Lithology = HMD / Alteration = PR
3.85%S, ANC = 39 kg H_2SO_4/t, NAPP = 79 kg H_2SO_4/t, NAGpH = 3.3



APPENDIX A8-18: Kinetic NAG test profiles for HIT drill core sample # 39088

Drill Hole = C019-ED (312-314m) / Lithology = DV / Alteration = SA
6.56%S, ANC = 0 kg H_2SO_4/t, NAPP = 201 kg H_2SO_4/t, NAGpH = 2.2



APPENDIX A8-19: Kinetic NAG test profiles for HIT drill core sample # 39099

Drill Hole = DDH075D (114-117m) / Lithology = HMD / Alteration = PH
3.40%S, ANC = 4 kg H_2SO_4/t, NAPP = 100 kg H_2SO_4/t, NAGpH = 2.3

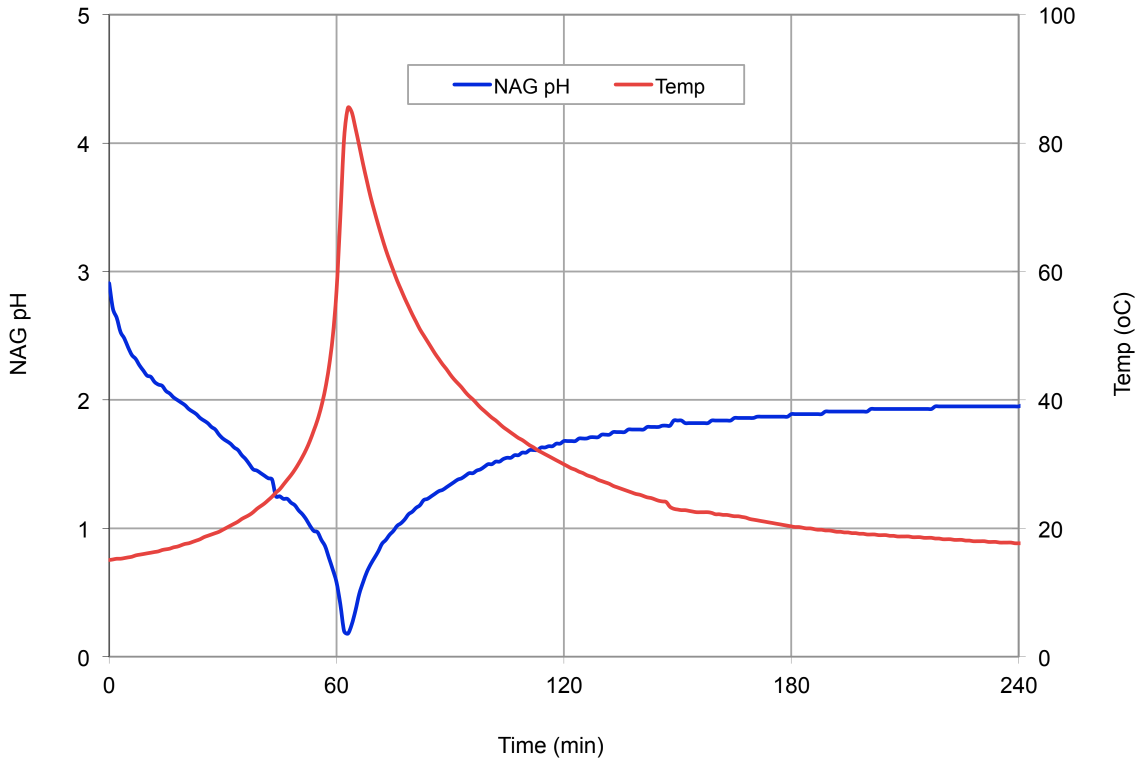
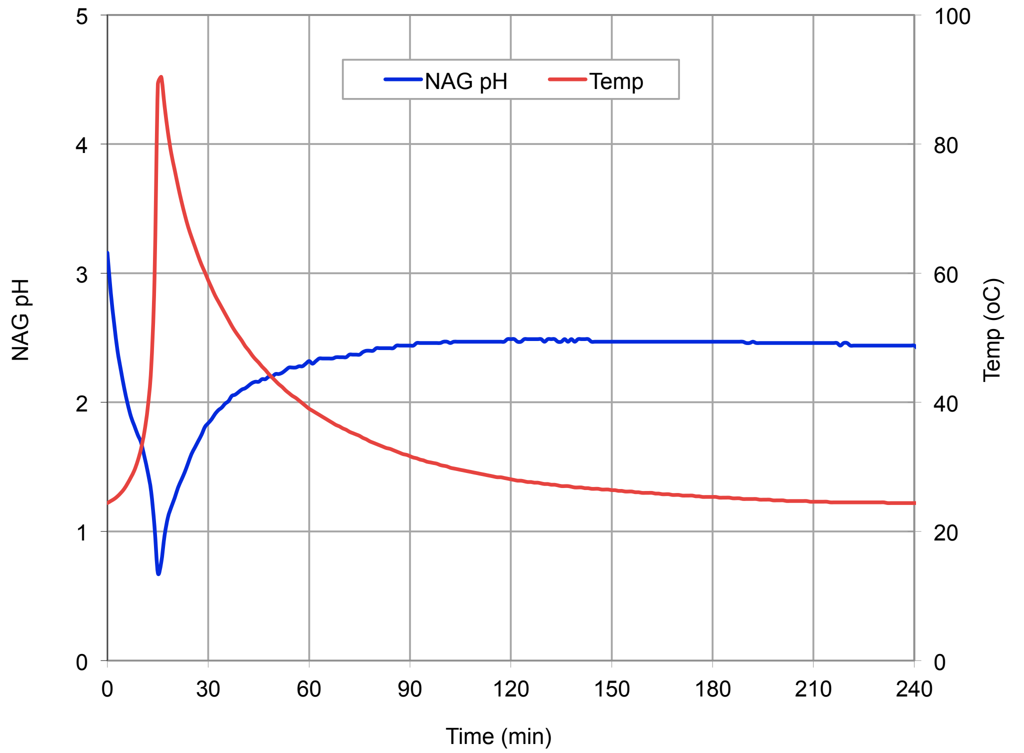


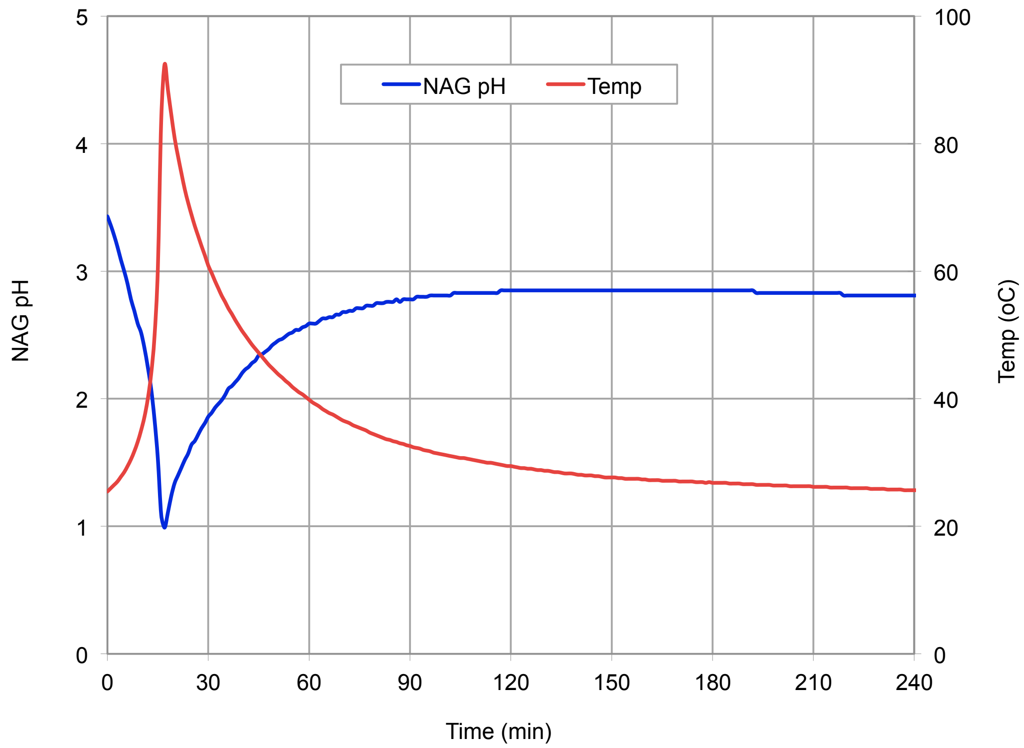
FIGURE A8-20: Kinetic NAG test profiles for HIT drill core sample # 39103

Drill Hole = DDH081D (129-132m) / Lithology = DVp / Alteration = QIP
2.96%S, ANC = 0 kg H_2SO_4/t, NAPP = 91 kg H_2SO_4/t, NAGpH = 2.2



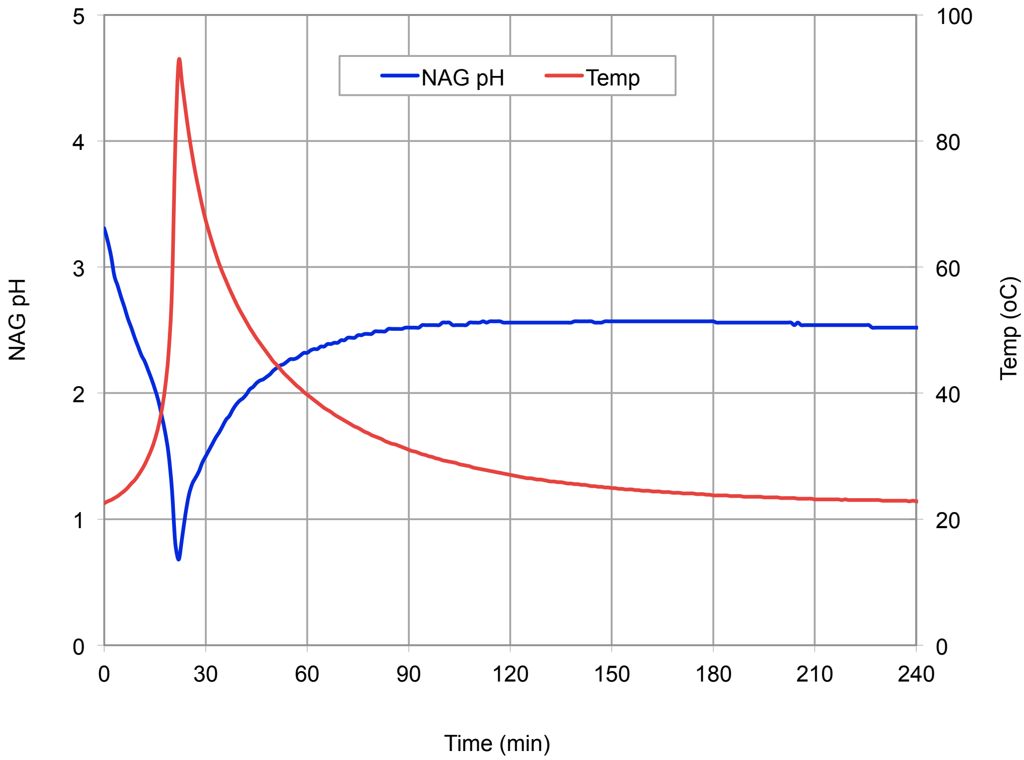
APPENDIX A8-21: Kinetic NAG profiles for HIT drill core sample #39548 (Column Test HIT WR-1)

Drill Hole = 057NOR05 (50-58m), Lithology = DVp, Alteration = AR
6.2 %S, ANC = 0 kg H_2SO_4/t, NAPP = 189 kg H_2SO_4/t, NAGpH = 1.9



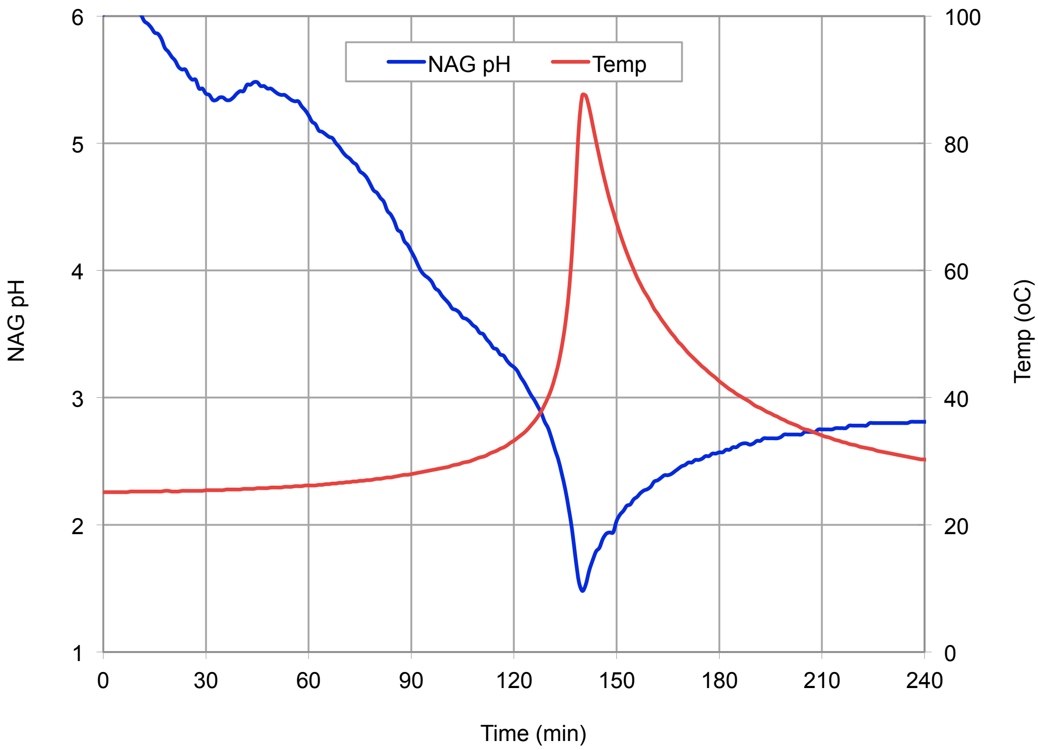
APPENDIX A8-22: Kinetic NAG profiles for HIT drill core sample #39549 (Column Test HIT WR-2)

Drill Hole = 057NOR05 (366-370m), Lithology = DVp, Alteration = SA
2.7 %S, ANC = 0 kg H_2SO_4/t, NAPP = 82 kg H_2SO_4/t, NAGpH = 2.1



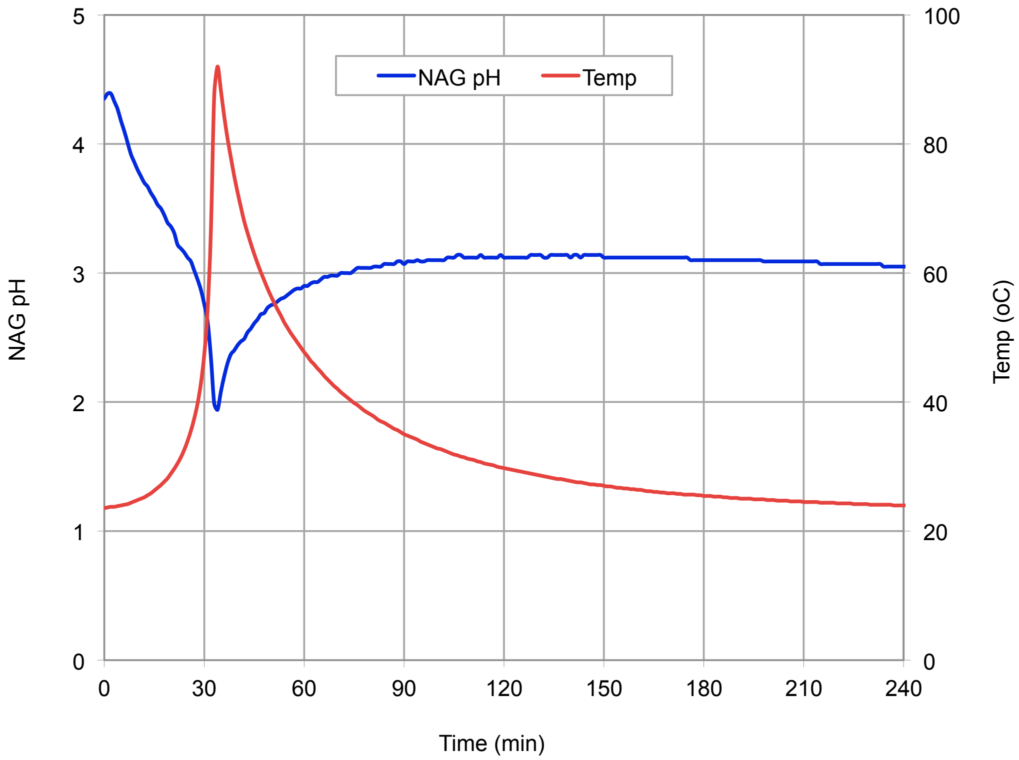
APPENDIX A8-23: Kinetic NAG profiles for HIT drill core sample #39550 (Column Test HIT WR-3)

Drill Hole = 073NOR05 (54-70m), Lithology = HMD, Alteration = AR
3.7 %S, ANC = 0 kg H_2SO_4/t, NAPP = 112 kg H_2SO_4/t, NAGpH = 2.0



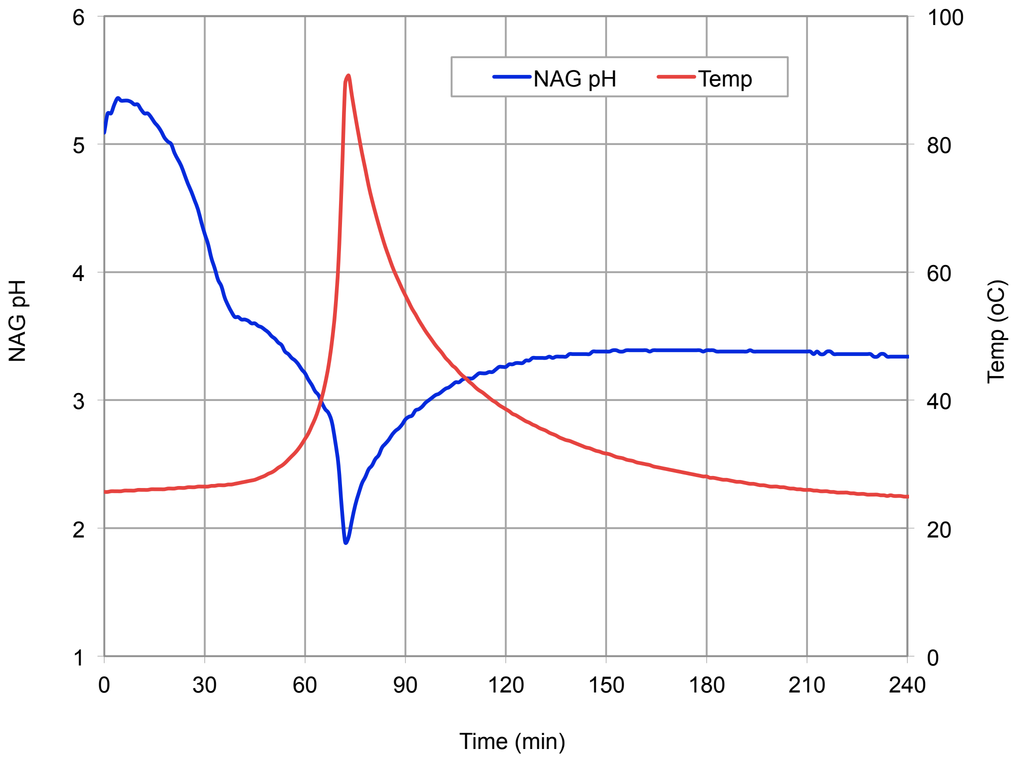
APPENDIX A8-24: Kinetic NAG profiles for HIT drill core sample #39551 (Column Test HIT WR-4)

Drill Hole = 270XC09 (242-246m), Lithology = HMD, Alteration = PO
2.8 %S, ANC = 14 kg H_2SO_4/t, NAPP = 72 kg H_2SO_4/t, NAGpH = 2.2



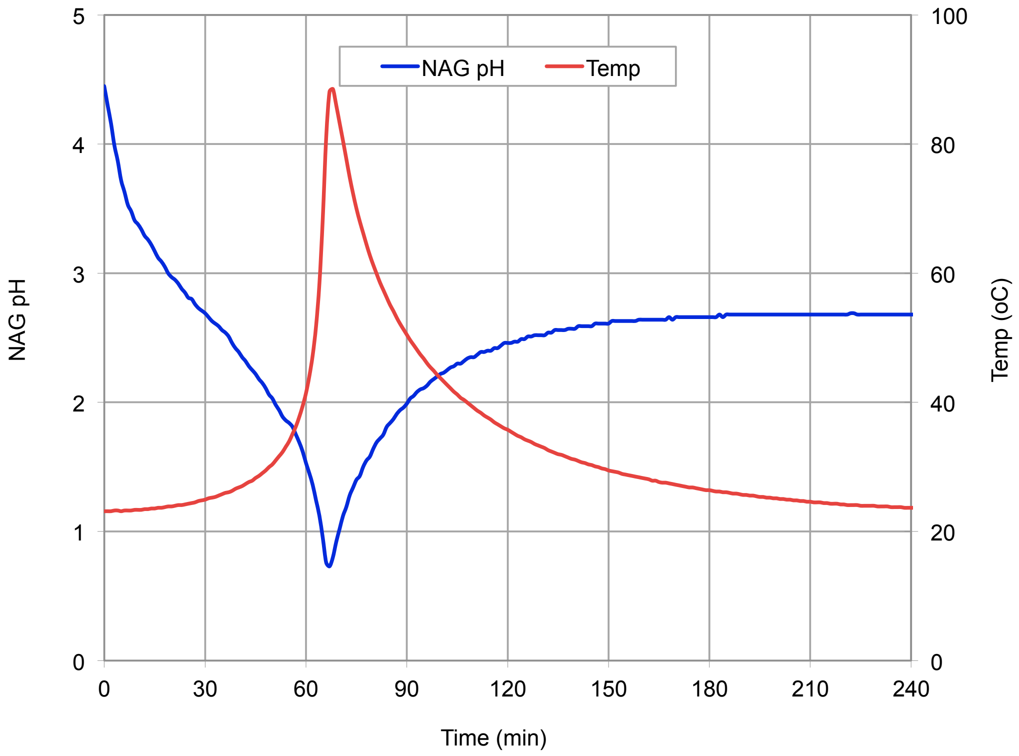
APPENDIX A8-25: Kinetic NAG profiles for HIT drill core sample #39552 (Column Test HIT WR-5)

Drill Hole = 262XC09 (130-136m), Lithology = HMD, Alteration = PH
3.4 %S, ANC = 1 kg H_2SO_4/t, NAPP = 102 kg H_2SO_4/t, NAGpH = 2.1



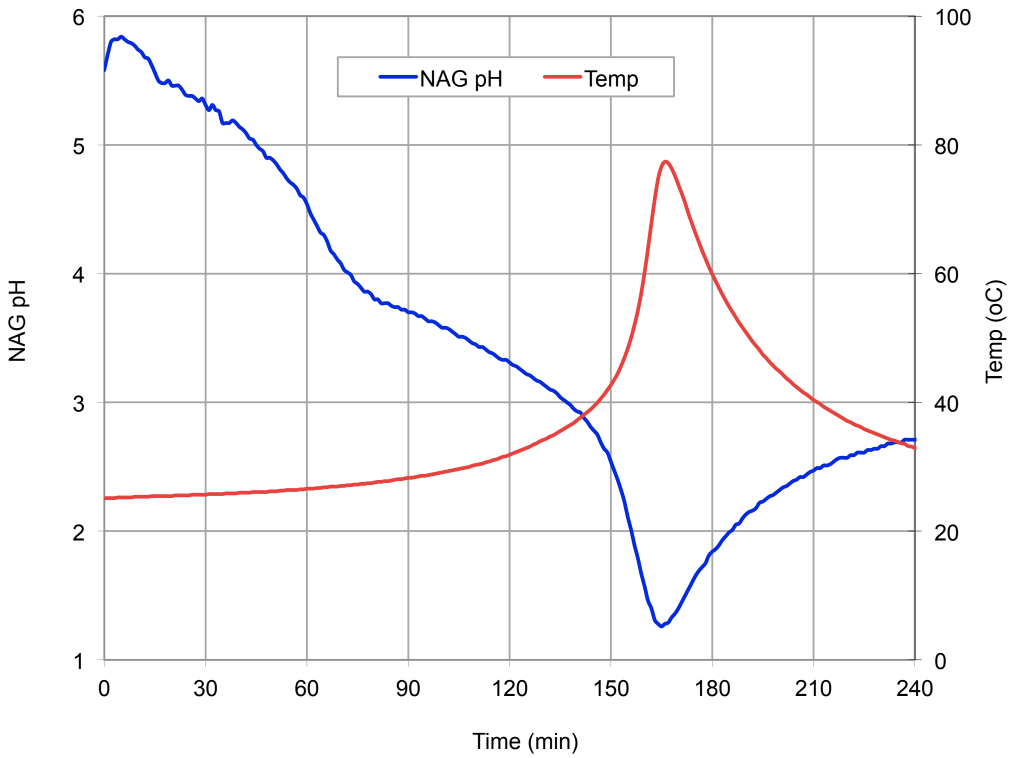
APPENDIX A8-26: Kinetic NAG profiles for HIT drill core sample #39553 (Column Test HIT WR-6)

Drill Hole = 218XC09 (110-114m), Lithology = LW, Alteration = PO
2.1 %S, ANC = 9 kg H_2SO_4/t, NAPP = 56 kg H_2SO_4/t, NAGpH = 2.7



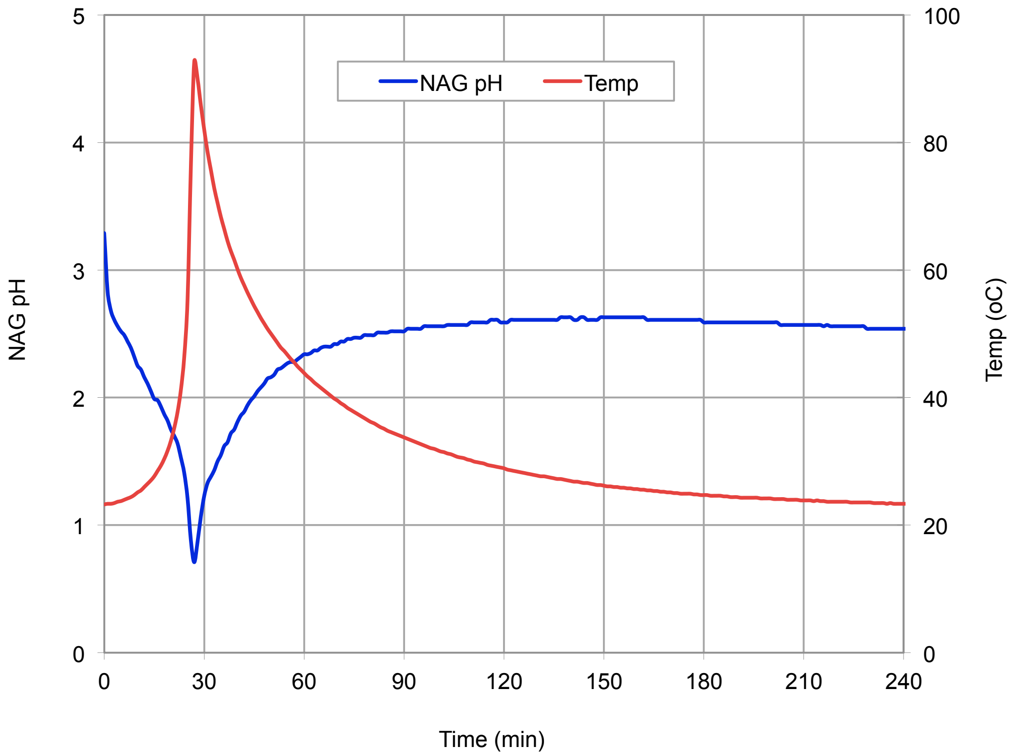
APPENDIX A8-27: Kinetic NAG profiles for HIT drill core sample #39554 (Column Test HIT WR-7)

Drill Hole = 109XC07 (110-116m), Lithology = FDP, Alteration = PR
2.7 %S, ANC = 10 kg H_2SO_4/t, NAPP = 73 kg H_2SO_4/t, NAGpH = 2.2



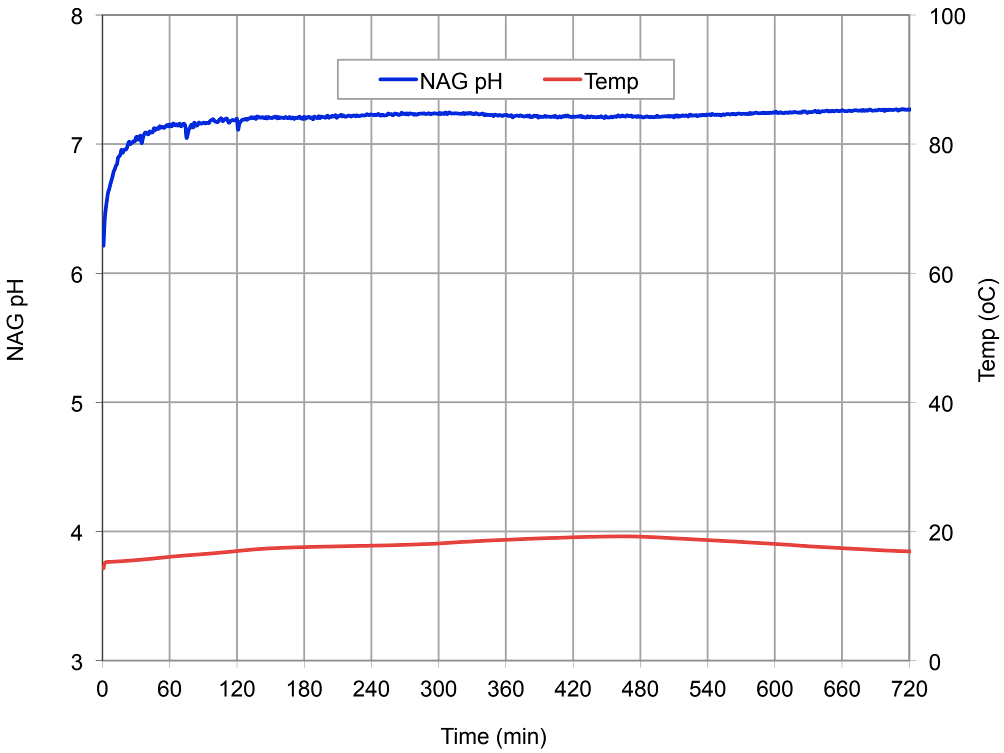
APPENDIX A8-28: Kinetic NAG profiles for HIT drill core sample #39555 (Column Test HIT WR-8)

Drill Hole = 109XC07 (170-176m), Lithology = FDP, Alteration = PH
1.4 %S, ANC = 12 kg H_2SO_4/t, NAPP = 29 kg H_2SO_4/t, NAGpH = 2.6



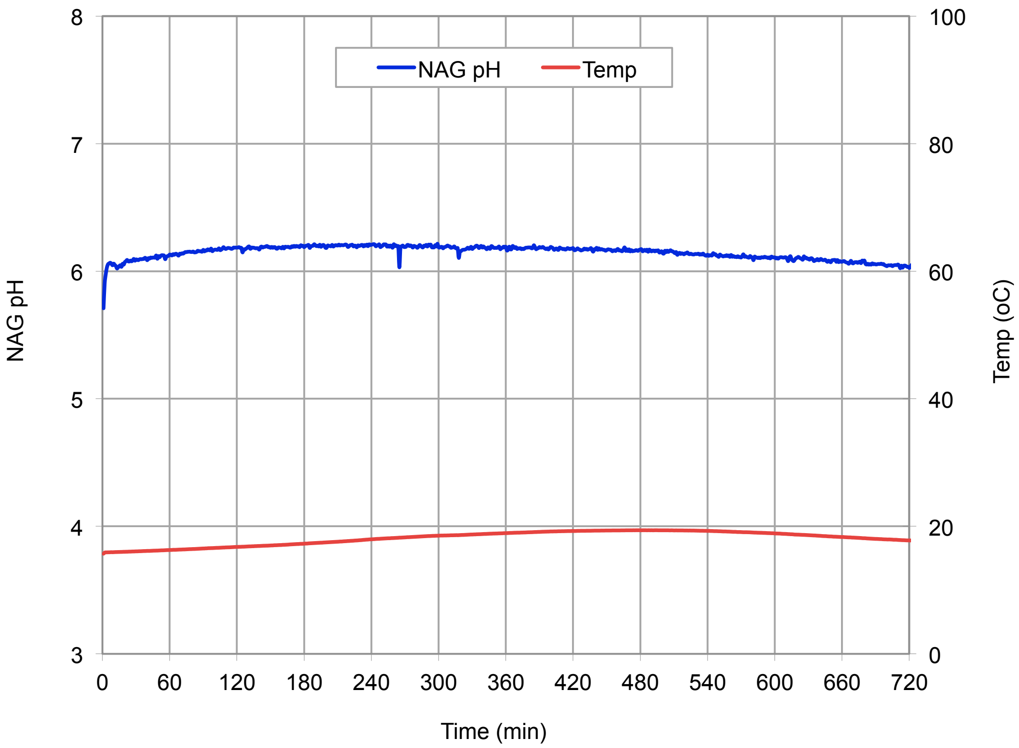
APPENDIX A8-29: Kinetic NAG profiles for HIT drill core sample #39556 (Column Test HIT WR-9)

Drill Hole = 254XC09 (210-216m), Lithology = KDP, Alteration = PH
5.4 %S, ANC = 0 kg H_2SO_4/t, NAPP = 166 kg H_2SO_4/t, NAGpH = 1.9



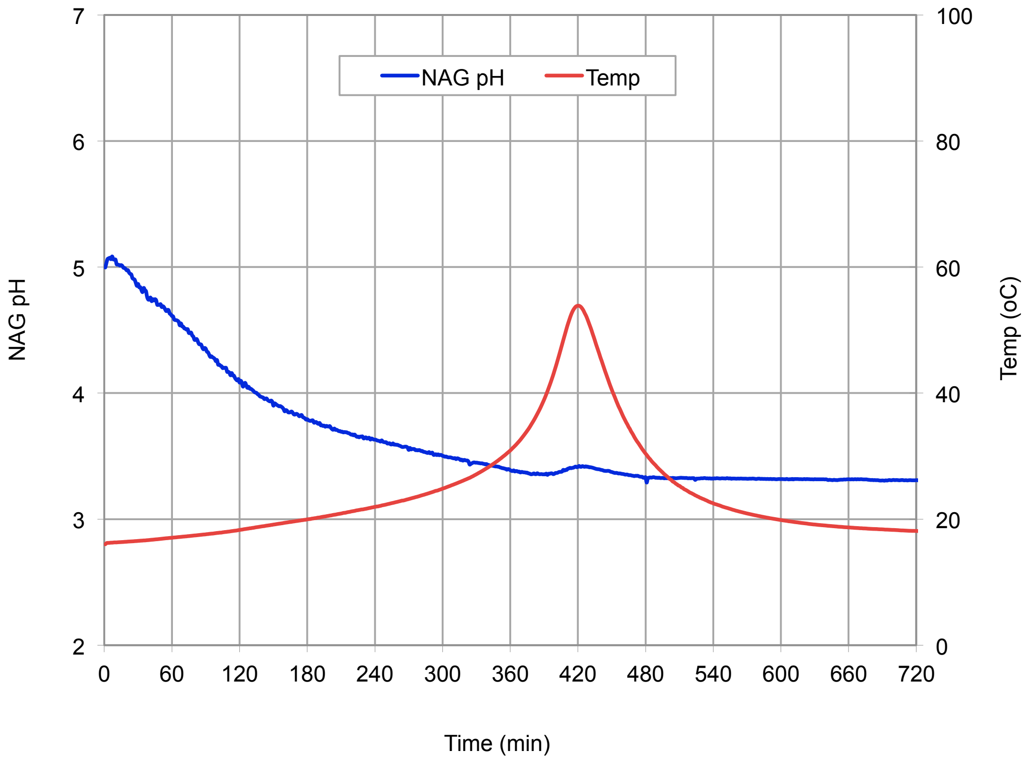
APPENDIX A8-30: Kinetic NAG profiles for Ekwai drill core sample #10641

Drill Hole = 660FC15 (122-124m), Lithology = HMD, Alteration = PR
2.98 %S, ANC = 51 kg H_2SO_4/t, NAPP = 40 kg H_2SO_4/t, NAGpH = 7.7, seq NAGpH =2.7



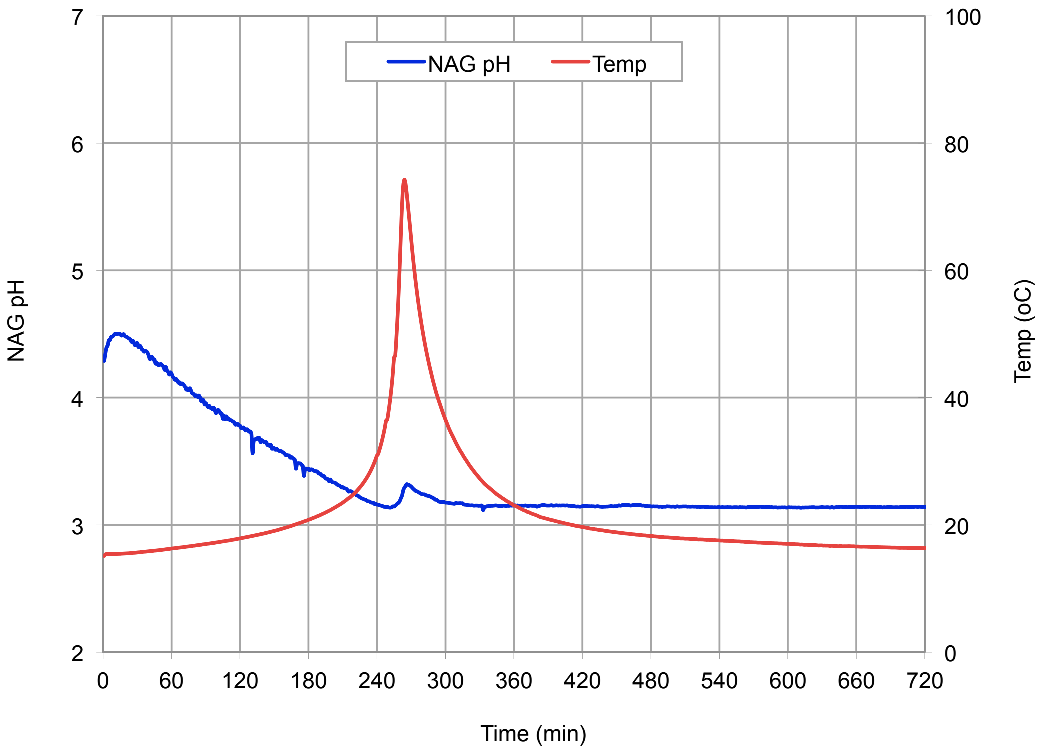
APPENDIX A8-31: Kinetic NAG profiles for Ekwai drill core sample #10654

Drill Hole = 661FC15 (112-114m), Lithology = OAP, Alteration = None
1.73 %S, ANC = 30 kg H_2SO_4/t, NAPP = 23 kg H_2SO_4/t, NAGpH = 3.9, seq NAGpH = 2.7



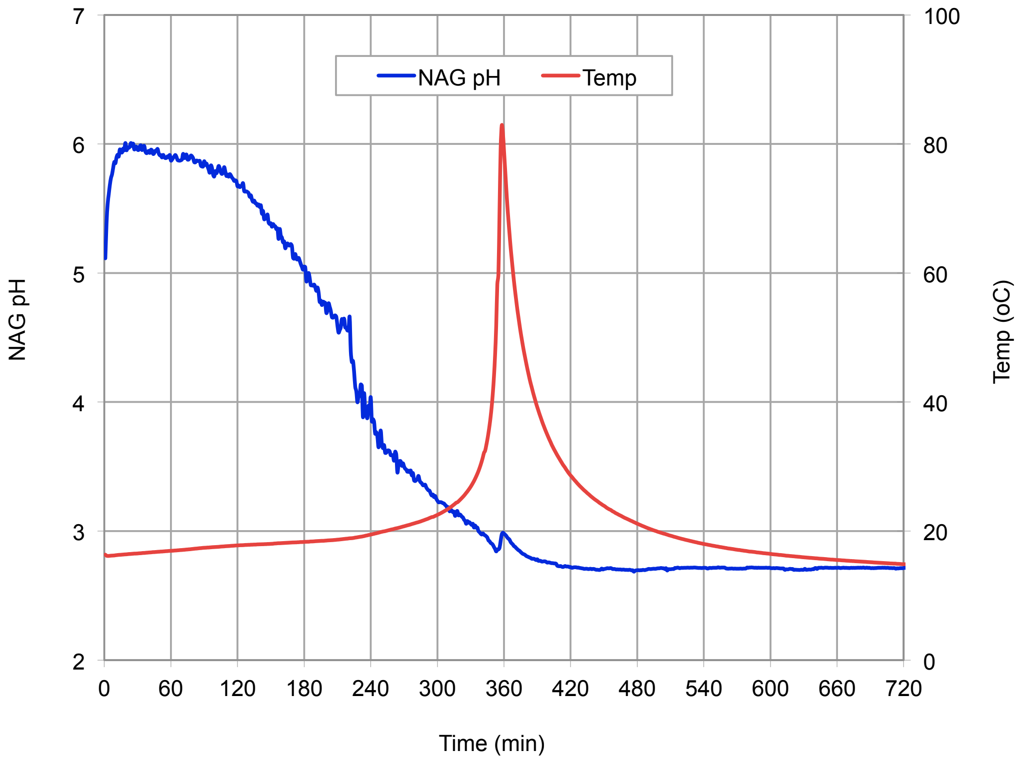
APPENDIX A8-32: Kinetic NAG profiles for Koki drill core sample #10663

Drill Hole = 663FC16 (122-124m), Lithology = HMD, Alteration = PO
1.9 %S, ANC = 15 kg H_2SO_4/t, NAPP = 43 kg H_2SO_4/t, NAGpH = 3.3, seq NAGpH = 2.4



APPENDIX A8-24: Kinetic NAG profiles for Koki drill core sample #10673

Drill Hole = 664FC16 (96-98m), Lithology = HMD, Alteration = PH
2.02 %S, ANC = 9 kg H_2SO_4/t, NAPP = 53 kg H_2SO_4/t, NAGpH = 3.2, seq NAGpH = 2.5



APPENDIX A8-25: Kinetic NAG profiles for Koki drill core sample #10690

Drill Hole = 666FC16 (268-270m), Lithology = HMD, Alteration = PH
3.73 %S, ANC = 12 kg H_2SO_4/t, NAPP = 102 kg H_2SO_4/t, NAGpH = 2.6, seq NAGpH = 2.2

APPENDIX B

RESULTS OF
COLUMN LEACH TESTING OF WASTE ROCK

Appendix B1

Results of Column Leach Tests on HIT Drill Core Samples

APPENDIX B1-1: Results of column leach test : HIT WR-1 (DVp/AR Waste Rock)

Parameters		Four Week Leach Cycle													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	1327	2117	2122	2176	2194	2242	2216	2266	2270	2278	2252	2276	2284	2379
pH	-	2.1	2.1	2.0	1.8	1.8	1.8	1.9	1.9	1.9	1.7	1.7	1.7	1.7	1.7
EC	dS/m	6.69	6.44	9.33	14.91	15.21	10.81	7.99	7.93	9.21	11.26	14.11	13.91	13.45	11.25
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acidity	mg/L	9785	9135	9826	13718	13991	15,596	10681	6216	7276	7778	10646	10973	10796	8291
Ag	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.010	<0.001
Al	mg/L	814	497	521	346	351	93	83	75	160	218	182	158	106	91
As	mg/L	0.73	0.266	0.449	0.804	0.88	0.36	0.19	0.20	0.34	0.52	0.34	0.34	0.24	0.22
B	mg/L	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.10	<0.05
Ba	mg/L	0.010	0.007	0.008	0.02	0.016	0.010	0.020	0.016	0.025	0.028	0.017	0.019	0.014	0.013
Be	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Ca	mg/L	22	17	12	10	7	3	2	2	3	4	3	4	2	1
Cd	mg/L	0.42	0.43	0.22	0.18	0.13	0.04	0.02	0.01	0.02	0.03	0.02	0.02	0.01	0.01
Cl	mg/L	2.0	5	3	2	2	2	3	<1	2	2	2	<1	23	2
Co	mg/L	5.3	4.0	3.2	2.9	2.9	1	0.5	0.6	0.9	1.1	1.1	1.1	1.0	0.8
Cr	mg/L	0.30	0.71	0.17	0.52	0.3	0.16	0.11	0.13	0.20	0.34	0.25	0.25	0.17	0.14
Cu	mg/L	102	68	52	45	37	13	7	7	11	12	12	11	10	8
F	mg/L	<0.1	<0.1	<0.1	0.4	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe	mg/L	1870	1240	217	3190	3900	1,770	940	1110	2100	2760	2870	2520	1980	1890
Hg	mg/L	<0.0001	<0.0001	0.0001	<0.0001	0.00160	<0.0001	<0.0001	0.00040	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00050
K	mg/L	1.0	<1	3	3	4	3	4	8	9	11	13	15	7	6
Mg	mg/L	10	9	6	5	5	2	2	2	4	6	5	5	3	3
Mn	mg/L	0.19	0.44	0.08	0.20	0.14	0.09	0.07	0.09	0.16	0.29	0.45	0.35	0.19	0.16
Mo	mg/L	0.015	0.011	0.026	0.061	0.071	0.028	0.016	0.018	0.033	0.054	0.041	0.046	0.031	0.038
Na	mg/L	2.0	1	<1	<1	1	2	1	1	2	3	2	3	1	<1
Ni	mg/L	4.7	3.4	2.8	4.0	4	2	1	1	2	2	2	3	2	2
P	mg/L	4	2	2	2	2.0	<1	<1	<1	<1	1.0	<1	<1	<1	<1
Pb	mg/L	<0.001	0.008	0.01	0.055	0.081	0.038	0.0480	0.045	0.096	0.110	0.070	0.068	0.052	0.040
Sb	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Se	mg/L	0.13	0.07	0.17	0.31	0.40	0.17	0.060	0.080	0.120	0.230	0.190	0.200	0.160	0.190
Si	mg/L	2.9	5.37	10.3	14.4	11	9	2	2	2	6	8	9	9	8
Sn	mg/L	0.002	<0.001	<0.001	<0.010	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
SO4	mg/L	11500	10700	10500	16000	16800	7,390	3470	4890	8910	11900	10500	11800	7540	7700
Sr	mg/L	0.17	0.23	0.14	0.27	0.34	0.15	0.10	0.13	0.24	0.36	0.32	0.36	0.22	0.18
Th	mg/L	<0.001	0.061	0.034	0.037	0.03	0.01	0.01	0.01	0.014	0.02	0.02	0.02	<0.010	0.01
U	mg/L	0.07	0.06	0.031	0.026	0.02	0.01	0.00	0.00	0.005	0.01	0.01	0.01	<0.010	0.00
Zn	mg/L	27.9	11.2	6.6	6.7	4.9	1.7	0.8	0.7	1.0	1.5	1.0	0.9	0.6	0.5

Note: < indicate that the concentration is less than the limit of detection

APPENDIX B1-2: Results of column leach test : HIT WR-2 (DVp/SA Waste Rock)

Parameters		Four Week Leach Cycle													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	1095	727	797	812	816	822	790	812	816	896	912	903	910	1110
pH	-	2.5	2.7	2.6	2.5	2.5	2.4	2.2	2.0	1.9	1.9	2.0	1.9	1.9	1.8
EC	dS/m	4.79	4.82	5.52	4.91	4.99	3.46	3.55	5.11	6.39	7.31	5.62	6.41	6.21	5.99
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acidity	mg/L	6389	8375	6266	5023	5110	5,229	3210	5124	5853	5816	4266	4531	4639	4115
Ag	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.010	<0.001
Al	mg/L	582	628	716	430	288	186	137	233	216	91	62	85	119	70
As	mg/L	0.42	0.063	0.074	0.088	0.06	0.08	0.42	1.15	1.17	0.49	0.40	0.89	0.76	0.37
B	mg/L	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10	<0.10	<0.05
Ba	mg/L	0.005	0.001	<0.001	<0.010	<0.001	0.001	0.003	<0.001	0.003	0.001	0.001	0.001	<0.010	<0.001
Be	mg/L	<0.001	<0.001	<0.001	<0.010	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Ca	mg/L	23	30	30	18	10	7	3	5	3	1	<1	3	1	<1
Cd	mg/L	0.027	0.035	0.028	0.024	0.015	0.010	0.004	0.006	0.004	0.002	0.001	0.002	0.001	0.001
Cl	mg/L	4.0	7.0	2.0	2.0	2	6	11	4	13	8	9	15	4	4
Co	mg/L	5.6	6.6	6.3	4.2	2.9	2	1.0	2.2	2.4	1.5	1.0	1.5	1.8	1.2
Cr	mg/L	0.29	0.61	0.14	0.48	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.2	0.1
Cu	mg/L	1090	1340	1250	786	489	317	87	108	61	21	14	15	18	10
F	mg/L	<0.1	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe	mg/L	497	312	89.7	359	180	159	375	983	1410	714	716	932	1070	779
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.00050	<0.0001	<0.0001	0.00020	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00030
K	mg/L	2.0	1	<1	<1	<1	<1	4	<1	<1	<1	<1	1	<1	<1
Mg	mg/L	9.0	15	12	9	6	5	2	5	4	2	2	4	4	3
Mn	mg/L	0.21	0.56	0.12	0.33	0.17	0.14	0.09	0.11	0.12	0.10	0.12	0.13	0.13	0.07
Mo	mg/L	0.003	0.001	0.001	<0.010	<0.001	<0.001	0.002	0.007	0.010	0.007	0.008	0.010	0.011	0.012
Na	mg/L	2.0	<1	<1	<1	<1	2	1	<1	<1	<1	<1	3	<1	<1
Ni	mg/L	1.81	1.94	1.70	1.78	1.08	0.80	0.58	1.28	1.21	0.85	0.73	1.04	1.24	0.88
P	mg/L	2.0	2	<1	<1	<1	<1	1.0	3.0	3.0	1.0	<1	2	1	<1
Pb	mg/L	0.003	<0.001	<0.001	<0.010	<0.001	<0.001	0.0020	<0.001	0.010	0.002	<0.001	0.002	<0.010	<0.001
Sb	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Se	mg/L	0.16	0.12	0.11	<0.10	0.06	0.06	0.04	0.120	0.140	0.080	0.080	0.190	0.150	0.090
Si	mg/L	3.4	6.1	10.4	14.1	11	13	8	16	14	16	9	7	12	11
Sn	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
SO4	mg/L	7800	10800	6490	5860	3420	2,400	2400	5810	7180	3940	3020	5060	4660	3610
Sr	mg/L	0.01	0.008	0.005	<0.010	0.01	0.01	0.01	0.02	0.03	0.02	0.02	0.03	0.03	0.02
Th	mg/L	<0.001	0.033	0.02	0.014	0.007	0.004	0.006	0.011	0.008	0.004	0.003	0.006	<0.010	0.004
U	mg/L	0.007	0.012	0.008	<0.010	0.004	0.002	0.001	0.002	0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Zn	mg/L	2.7	2.6	2.2	1.8	1.0	0.7	0.4	0.6	0.3	0.2	0.1	0.2	0.2	0.2

Note: < indicate that the concentration is less than the limit of detection

APPENDIX B1-3: Results of column leach test : HIT WR-3 (HMD/AR Waste Rock)

Parameters		Four Week Leach Cycle													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	1643	2879	2881	2873	2877	2892	2931	2946	2955	2967	2929	2934	2931	2907
pH	-	1.9	2.1	1.9	1.8	1.8	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8
EC	dS/m	9.04	8.76	8.92	12.52	12.79	10.31	8.66	9.32	10.55	8.64	6.99	7.71	7.81	7.11
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acidity	mg/L	20915	na	10387	10875	11379	11,210	8781	7689	7080	6896	4799	4648	4666	4574
Ag	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.010	<0.001
Al	mg/L	966	487	361	240	170	85	132	199	156	86	66	65	64	66
As	mg/L	2.3	0.56	0.37	0.56	0.31	0.19	0.26	0.29	0.18	0.11	0.07	0.06	0.06	0.07
B	mg/L	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.10	<0.05
Ba	mg/L	0.006	0.011	0.005	0.026	0.014	0.009	0.028	0.024	0.016	0.011	0.010	0.010	<0.010	0.005
Be	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Ca	mg/L	68	79	46	28	15	9	14	18	14	8	5	5	2	1
Cd	mg/L	0.35	0.25	0.11	0.08	0.04	0.02	0.02	0.02	0.01	0.01	0.004	0.004	0.003	0.003
Cl	mg/L	4.0	14	3	1	2	2	3	1	2	1	2	<1	<1	<1
Co	mg/L	7.0	4.3	2.6	2.3	1.5	1	1.0	1.4	1.1	0.7	0.6	0.7	0.7	0.7
Cr	mg/L	0.38	0.99	0.20	0.46	0.2	0.2	0.2	0.3	0.2	0.2	0.1	0.2	0.1	0.1
Cu	mg/L	310	196	102	66.7	36	19	20	22	16	8	8	8	9	8
F	mg/L	<0.1	<0.1	<0.1	1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe	mg/L	5490	2850	2370	2510	1800	1,340	1320	1720	1910	1020	1020	945	896	988
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.00100	<0.0001	<0.0001	0.00030	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00030
K	mg/L	<1	<1	<1	2	2	1	5	6	3	2	2	4	1	<1
Mg	mg/L	60	53	20	13	9	5	6	8	7	4	3	4	3	2
Mn	mg/L	0.59	1.5	0.34	0.50	0.25	0.16	0.23	0.27	0.25	0.21	0.24	0.21	0.17	0.18
Mo	mg/L	0.54	0.28	0.20	0.28	0.195	0.114	0.115	0.148	0.122	0.085	0.066	0.085	0.102	0.191
Na	mg/L	1.0	<1	<1	<1	<1	1	2	2	<1	<1	<1	2	<1	<1
Ni	mg/L	10	5.4	4.1	3.6	2	1	2	2	1	1	1	1	1	1
P	mg/L	4	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pb	mg/L	0.007	0.006	0.002	0.015	0.019	0.011	0.0260	0.023	0.026	0.012	0.008	0.006	<0.010	0.003
Sb	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Se	mg/L	0.58	0.21	0.22	0.24	0.18	0.13	0.120	0.160	0.150	0.120	0.090	0.090	<0.10	0.120
Si	mg/L	4.7	9.1	14	16	8	8	6	7	7	5	4	6	7	7
Sn	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
SO4	mg/L	16600	18500	10800	12300	8600	5,940	5670	8390	7760	4870	4000	5390	3870	4400
Sr	mg/L	0.24	0.21	0.11	0.17	0.14	0.10	0.14	0.19	0.14	0.10	0.07	0.09	0.06	0.05
Th	mg/L	<0.001	0.068	0.025	0.02	0.01	0.01	0.01	0.01	0.007	0.01	0.00	0.00	<0.010	0.00
U	mg/L	0.078	0.059	0.021	0.014	0.01	0.004	0.004	0.004	0.003	0.002	0.002	0.002	<0.010	0.001
Zn	mg/L	92	48	30	21	10.4	5.6	5.0	6.1	3.5	2.4	1.5	1.4	1.0	0.9

Note: < indicate that the concentration is less than the limit of detection

APPENDIX B1-4: Results of column leach test : HIT WR-4 (HMD/PO Waste Rock)

Parameters		Four Week Leach Cycle													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	2084	3100	2930	2896	2892	2891	2876	2891	2896	2916	2876	2881	2889	3110
pH	-	5.9	6.0	4.3	3.8	3.6	4.0	4.3	3.6	4.2	3.5	3.7	3.9	3.9	3.3
EC	dS/m	0.46	0.59	0.49	0.67	0.71	0.56	0.42	0.40	0.21	0.22	0.18	0.18	0.19	0.25
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acidity	mg/L	6.0	8	35	70	78	63	42	78	35	55	29	25	30	66
Ag	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Al	mg/L	0.09	0.03	0.85	0.69	<0.01	0.29	0.05	0.49	0.07	0.21	0.17	0.12	1.12	0.32
As	mg/L	<0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
B	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	<0.05
Ba	mg/L	0.022	0.008	0.013	0.017	0.013	0.014	0.010	0.004	0.004	0.003	0.004	0.004	0.025	0.004
Be	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L	54	40	85	129	92	104	71	34	26	26	25	34	22	29
Cd	mg/L	0.0004	<0.0001	0.0004	0.0004	0.0003	0.0003	0.0003	0.0002	0.0001	<0.0001	0.0001	0.0001	0.0074	0.0003
Cl	mg/L	<1	1	<1	<1	<1	2	2	<1	<1	<1	1	<1	<1	<1
Co	mg/L	0.01	<0.001	0.009	0.007	0.001	0.004	0.002	0.006	0.004	0.006	0.008	0.006	0.032	0.011
Cr	mg/L	<0.001	0.001	0.002	0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	mg/L	0.055	0.011	0.42	0.19	0.01	0.05	0.02	0.13	0.03	0.05	0.08	0.04	0.76	0.09
F	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1
Fe	mg/L	0.44	0.09	8.4	7.0	<0.05	3	0.16	4.54	0.60	2.12	1.73	<0.05	0.08	2.18
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
K	mg/L	3	2	2	2	1	2	2	1	<1	<1	<1	<1	<1	<1
Mg	mg/L	2	1	2	2	2	2	2	1	1	<1	<1	1	5	2
Mn	mg/L	0.57	0.072	0.084	0.27	0.39	0.47	0.66	0.47	0.41	0.36	0.41	0.45	3.80	0.64
Mo	mg/L	<0.001	<0.001	0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Na	mg/L	3	1	1	1	1	2	2	<1	<1	<1	<1	1	1	<1
Ni	mg/L	0.007	<0.001	0.014	0.011	0.002	0.006	0.004	0.007	0.002	0.004	0.004	0.003	0.015	0.007
P	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pb	mg/L	0.001	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.090	0.002
Sb	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Si	mg/L	1.7	1.1	1.8	1.8	2	2	1	0.4	0.3	0.2	0.3	0.5	0.3	0.3
Sn	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO4	mg/L	160	108	227	336	275	287	191	125	93	73	85	77	76	117
Sr	mg/L	0.23	0.17	0.26	0.36	0.24	0.25	0.17	0.08	0.06	0.05	0.05	0.05	0.09	0.06
Th	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
U	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn	mg/L	0.093	0.011	0.11	0.069	0.04	0.1	0.1	0.044	0.019	0.017	0.028	0.028	1.780	0.056

Note: < indicate that the concentration is less than the limit of detection

APPENDIX B1-5: Results of column leach test : HIT WR-5 (HMD/PH Waste Rock)

Parameters		Four Week Leach Cycle													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	1882	2604	2616	2630	2631	2676	2655	2675	2711	2746	2755	2796	2791	2996
pH	-	4.1	3.8	2.8	2.4	2.4	2.3	2.4	2.3	2.2	2.2	2.2	2.1	2.1	2.0
EC	dS/m	0.36	0.47	0.98	1.96	2.11	5.11	4.07	6.65	5.21	4.66	4.11	4.41	4.61	4.91
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acidity	mg/L	51	86	125	2117	2216	3,786	2312	5210	4439	4638	3551	3935	3879	4116
Ag	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.010	<0.001
Al	mg/L	2.8	5.5	36	98	184	247	120	553	237	120	136	126	152	162
As	mg/L	<0.001	<0.001	0.004	0.019	0.05	0.07	0.03	0.16	0.05	0.03	0.03	0.02	0.02	0.02
B	mg/L	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.10	<0.05
Ba	mg/L	0.038	0.016	0.006	<0.010	0.003	0.003	0.006	0.005	0.005	0.004	0.004	0.005	<0.010	0.004
Be	mg/L	<0.001	<0.001	0.002	<0.010	0.003	0.002	0.002	0.007	0.003	0.002	0.002	0.002	<0.010	0.002
Ca	mg/L	10	11	11	10	13	12	6	25	12	5	3	3	2	2
Cd	mg/L	0.002	0.002	0.0057	0.0054	0.01	0.01	0.003	0.013	0.004	0.002	0.001	0.001	<0.0010	0.001
Cl	mg/L	<1	<1	<1	<1	2	2	3	12	2	1	2	<1	<1	2
Co	mg/L	0.22	0.205	0.406	0.526	0.7	1	0.4	1.8	0.7	0.5	0.4	0.5	0.6	0.6
Cr	mg/L	0.001	0.002	0.026	0.102	0.1	0.2	0.1	0.3	0.2	0.2	0.1	0.1	0.2	0.2
Cu	mg/L	11	16	107	108	144	162	59	255	105	48	54	52	63	70
F	mg/L	0.6	0.6	0.5	0.7	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe	mg/L	4	3	109	397	749	1,350	418	1850	1100	588	820	759	880	933
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.00070	<0.0001	<0.0001	0.00030	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.00020
K	mg/L	6	3	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Mg	mg/L	6	8	14	25	55	81	43	190	97	60	64	77	82	91
Mn	mg/L	0.27	0.22	0.28	0.41	0.50	0.62	0.37	1.17	0.65	0.52	0.55	0.58	0.65	0.64
Mo	mg/L	<0.001	<0.001	<0.001	<0.010	0.004	0.007	0.003	0.015	0.005	0.004	0.005	0.009	0.012	0.021
Na	mg/L	2	1	<1	<1	<1	1	1	<1	<1	<1	<1	<1	<1	<1
Ni	mg/L	0.12	0.11	0.31	0.44	0.65	0.79	0.40	1.58	0.64	0.44	0.45	0.49	0.54	0.59
P	mg/L	<1	<1	<1	<1	1.0	1.0	<1	2.0	<1	<1	<1	<1	<1	<1
Pb	mg/L	0.002	<0.001	<0.001	<0.010	<0.001	<0.001	0.0080	<0.001	0.008	<0.001	<0.001	0.002	<0.010	0.001
Sb	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Se	mg/L	<0.01	<0.01	0.02	<0.10	0.07	0.11	0.07	0.31	0.13	0.09	0.10	0.11	0.10	0.11
Si	mg/L	2.2	1.5	8.6	13.1	12	17	7	7	9	12	9	12	19	19
Sn	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
SO4	mg/L	118	149	923	2160	3630	5,680	2280	9920	5210	3670	3510	4940	4120	4650
Sr	mg/L	0.06	0.05	0.034	0.019	0.03	0.04	0.01	0.03	0.02	0.02	0.02	0.02	0.02	0.02
Th	mg/L	<0.001	<0.001	0.019	0.044	0.07	0.08	0.03	0.15	0.056	0.03	0.03	0.03	0.03	0.04
U	mg/L	0.005	0.008	0.03	0.027	0.04	0.03	0.02	0.07	0.022	0.01	0.01	0.01	<0.010	0.01
Zn	mg/L	0.64	0.36	1.0	1.3	1.5	1.3	0.6	2.5	0.7	0.4	0.3	0.2	0.2	0.3

Note: < indicate that the concentration is less than the limit of detection

APPENDIX B1-6: Results of column leach test : HIT WR-6 (LW/PO Waste Rock)

Parameters		Four Week Leach Cycle													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	1698	2768	2770	2791	2791	2779	2762	2766	2739	2811	2796	2794	2810	2929
pH	-	5.9	5.9	5.2	4.5	4.4	5.8	5.2	5.6	6.1	5.7	4.9	5.4	5.3	4.9
EC	dS/m	0.53	0.61	0.47	0.29	0.34	0.28	0.27	0.31	0.33	0.33	0.32	0.32	0.42	0.34
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acidity	mg/L	7	4	10	14	18	12	26	35	20	38	23	22	25	42
Ag	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Al	mg/L	0.06	<0.01	0.17	0.36	0.02	0.09	0.32	0.16	0.08	0.06	0.26	0.07	<0.01	0.28
As	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010
B	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10	<0.05	<0.05
Ba	mg/L	0.060	0.038	0.035	0.033	0.034	0.028	0.032	0.032	0.045	0.044	0.050	0.044	0.042	0.040
Be	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L	61	77	42	26	40	36	42	59	82	60	57	70	41	42
Cd	mg/L	0.0006	<0.0001	0.0001	<0.0001	0.0002	0.0003	0.0002	0.0002	0.0002	0.0002	0.0003	0.0003	0.0003	0.0003
Cl	mg/L	<1	1	<1	<1	<1	1	2	<1	<1	<1	1	<1	<1	<1
Co	mg/L	0.05	0.006	0.004	0.004	0.007	0.007	0.005	0.004	0.005	0.005	0.008	0.007	0.007	0.009
Cr	mg/L	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0	<0.001	<0.001
Cu	mg/L	1.5	0.144	0.421	0.568	0.615	0.738	0.421	0.407	0.223	0.241	0.593	0.585	0.671	1.020
F	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	0.2	0.2	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	<0.1
Fe	mg/L	0.17	0.18	0.46	1.31	<0.05	0.15	1.15	0.13	0.26	0.28	1.50	0.37	<0.05	1.93
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
K	mg/L	5	4	2	2	2	2	2	2	4	3	3	3	3	3
Mg	mg/L	6	6	4	2	6	4	4	3	5	3	5	3	3	3
Mn	mg/L	0.88	0.52	0.37	0.21	0.54	0.47	0.47	0.46	0.72	0.48	0.76	0.69	0.66	0.63
Mo	mg/L	<0.001	<0.001	0.004	0.005	0.003	0.002	0.002	0.003	0.002	0.002	0.002	0.003	0.003	0.005
Na	mg/L	4	3	2	<1	2	2	3	1	2	1	1	1	1	<1
Ni	mg/L	0.039	0.005	0.003	0.003	0.005	0.006	0.004	0.003	0.003	0.004	0.006	0.006	0.006	0.008
P	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pb	mg/L	0.003	0.002	<0.001	0.001	0.002	0.002	0.002	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sb	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.10
Si	mg/L	2.0	1.26	1.64	1.6	1.6	1.6	1.0	0.8	0.9	0.8	0.8	1.0	0.9	1.1
Sn	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO4	mg/L	211	209	119	76	133	116	134	178	244	142	182	162	103	144
Sr	mg/L	0.14	0.166	0.084	0.055	0.09	0.07	0.08	0.10	0.13	0.10	0.10	0.08	0.07	0.07
Th	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
U	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn	mg/L	0.41	0.026	0.021	0.025	0.042	0.053	0.038	0.030	0.033	0.035	0.056	0.059	0.061	0.066

Note: < indicate that the concentration is less than the limit of detection

APPENDIX B1-7: Results of column leach test : HIT WR-7 (FDP/PR Waste Rock)

Parameters		Four Week Leach Cycle													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	1936	3214	3211	2998	2992	2916	2889	2818	2829	2834	2829	2935	2988	3079
pH	-	3.4	2.8	2.6	2.4	2.4	2.5	2.4	2.5	2.5	2.5	2.5	2.5	2.5	2.4
EC	dS/m	1.69	1.98	2.24	3.36	3.46	5.11	4.22	3.71	3.69	3.58	3.11	3.61	3.66	4.46
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acidity	mg/L	545	971	2902	5270	5389	5,278	3010	2627	2649	2635	2225	3534	3321	5119
Ag	mg/L	<0.001	<0.001	0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.010	<0.010
Al	mg/L	28	43	79	198	188	200	143	107	105	88	86	142	144	256
As	mg/L	0.002	0.021	0.317	1.48	1.60	1.76	0.97	0.89	0.86	0.86	0.79	1.35	1.30	2.01
B	mg/L	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.10	<0.10	<0.10
Ba	mg/L	0.026	0.021	0.004	<0.010	0.002	0.002	0.006	<0.001	<0.001	<0.001	<0.001	0.002	<0.010	<0.010
Be	mg/L	0.016	0.023	0.031	0.049	0.029	0.025	0.024	0.020	0.013	0.012	0.009	0.016	0.011	0.022
Ca	mg/L	144	112	106	100	94	112	115	87	84	69	57	111	79	162
Cd	mg/L	0.10	0.15	0.43	0.83	0.78	0.77	0.47	0.38	0.39	0.36	0.28	0.42	0.37	0.62
Cl	mg/L	<1	1	2	2	3	3	3	<1	2	<1	2	<1	<1	2
Co	mg/L	0.7	0.781	0.944	1.14	1.0	1	0.7	0.6	0.5	0.5	0.4	0.6	0.7	1.1
Cr	mg/L	0.013	0.028	0.094	0.314	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.5
Cu	mg/L	7.3	6.1	13	15	13	11	9	7	7	5	5	6	8	13
F	mg/L	3.5	5.3	<0.1	12	0.3	0.2	0.2	<0.1	0.2	0.2	0.2	0.2	0.1	0.2
Fe	mg/L	104	85	636	1410	1210	1,370	672	531	658	445	488	697	733	1040
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	0.00080	<0.0001	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
K	mg/L	2	<1	<1	8	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Mg	mg/L	83	116	129	223	239	240	154	139	154	130	106	199	174	308
Mn	mg/L	17	25	26	34	30	26	21	17	17	14	12	18	20	34
Mo	mg/L	<0.001	0.001	0.005	<0.010	0.007	0.006	0.004	0.004	0.003	0.004	0.005	0.008	<0.010	0.017
Na	mg/L	4	3	1	<1	<1	1	1	<1	<1	<1	<1	<1	<1	<1
Ni	mg/L	0.35	0.56	0.78	1.3	1.17	1.18	0.81	0.70	0.66	0.62	0.56	0.84	0.91	1.47
P	mg/L	<1	4	47	123	94	78	42	34	32	32	20	45	29	47
Pb	mg/L	0.130	0.03	0.022	0.017	0.007	0.004	0.025	0.004	0.002	0.002	<0.001	0.001	<0.010	<0.010
Sb	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.010
Se	mg/L	0.02	0.02	0.07	0.13	0.16	0.15	0.10	0.09	0.08	0.09	0.08	0.12	0.11	0.19
Si	mg/L	1.6	5.5	14	16	12	15	9	7	6	7	5	8	11	16
Sn	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.010
SO4	mg/L	1150	1460	2820	5680	6290	5,440	3260	2840	3500	2890	2640	4460	3640	7230
Sr	mg/L	0.39	0.38	0.23	0.11	0.08	0.08	0.06	0.04	0.03	0.03	0.02	0.03	0.03	0.06
Th	mg/L	<0.001	0.009	0.033	0.071	0.06	0.06	0.03	0.03	0.029	0.03	0.02	0.04	0.04	0.05
U	mg/L	0.01	0.017	0.021	0.026	0.02	0.02	0.01	0.01	0.009	0.01	0.01	0.01	<0.010	0.01
Zn	mg/L	42	58	117	203	192	226	119	103	102	75	62	79	77	132

Note: < indicate that the concentration is less than the limit of detection

APPENDIX B1-8: Results of column leach test : HIT WR-8 (FDP/PH Waste Rock)

Parameters		Four Week Leach Cycle													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	2000	2985	2982	2910	2916	2946	2930	2897	2866	2894	2831	2946	2979	3129
pH	-	5.4	5.4	4.4	4.0	4.0	4.2	4.1	4.3	4.3	3.9	3.9	4.1	4.1	3.5
EC	dS/m	0.77	0.92	0.42	0.31	0.35	0.37	0.32	0.28	0.21	0.18	0.12	0.19	0.20	0.21
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acidity	mg/L	17	9	23	56	64	60	53	86	66	72	51	68	60	62
Ag	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Al	mg/L	0.30	0.06	0.41	0.72	0.64	1.18	1.24	0.59	0.47	0.79	0.72	0.86	0.12	1.96
As	mg/L	<0.001	<0.001	0.001	0.003	<0.001	<0.001	0.002	<0.001	<0.001	0.002	0.002	<0.001	<0.001	0.003
B	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.11	<0.05	<0.05
Ba	mg/L	0.039	0.043	0.042	0.041	0.043	0.036	0.027	0.031	0.021	0.026	0.024	0.024	0.005	0.021
Be	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L	102	51	32	27	45	46	37	29	20	21	17	26	28	27
Cd	mg/L	0.01	0.0032	0.0048	0.0055	0.0057	0.0061	0.0051	0.0032	0.0026	0.0036	0.0038	0.0050	0.0002	0.0127
Cl	mg/L	<1	1	<1	<1	2	1	<1	<1	<1	<1	1	<1	<1	<1
Co	mg/L	0.10	0.045	0.037	0.035	0.052	0.050	0.038	0.030	0.023	0.023	0.021	0.024	0.007	0.038
Cr	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.0
Cu	mg/L	0.20	0.07	0.183	0.243	0.375	0.448	0.372	0.233	0.188	0.264	0.305	0.442	0.055	1.160
F	mg/L	0.5	0.4	0.4	0.7	0.7	1.0	0.9	<0.1	0.5	0.5	0.6	0.6	1.0	<0.1
Fe	mg/L	0.29	0.15	2.3	3.3	0.2	0.4	1.3	0.3	0.6	1.3	1.1	0.2	0.2	1.8
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
K	mg/L	3	2	2	2	1	1	1	1	<1	<1	<1	<1	<1	1
Mg	mg/L	13	9	6	6	9	8	6	6	5	4	3	4	2	5
Mn	mg/L	9.9	7.6	6.1	4.3	8.3	6.8	6.0	4.7	4.0	2.7	2.8	2.9	0.5	4.2
Mo	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Na	mg/L	5	3	2	1	2	2	2	2	1	<1	<1	1	<1	<1
Ni	mg/L	0.03	0.014	0.014	0.014	0.019	0.020	0.016	0.012	0.009	0.010	0.010	0.010	0.004	0.020
P	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pb	mg/L	0.013	0.023	0.063	0.141	0.299	0.252	0.0900	0.045	0.030	0.058	0.060	0.069	0.005	0.088
Sb	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Si	mg/L	2.1	2.3	3.5	3.7	3.4	3.8	1.7	0.9	0.7	1.0	1.0	1.4	1.4	1.8
Sn	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO4	mg/L	348	190	112	111	183	183	145	118	84	82	74	85	85	161
Sr	mg/L	0.29	0.22	0.15	0.13	0.21	0.19	0.15	0.11	0.08	0.08	0.07	0.07	0.05	0.10
Th	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
U	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn	mg/L	3.1	0.95	1.4	1.5	1.5	1.6	1.3	0.9	0.7	1.0	1.0	1.2	0.0	2.9

Note: < indicate that the concentration is less than the limit of detection

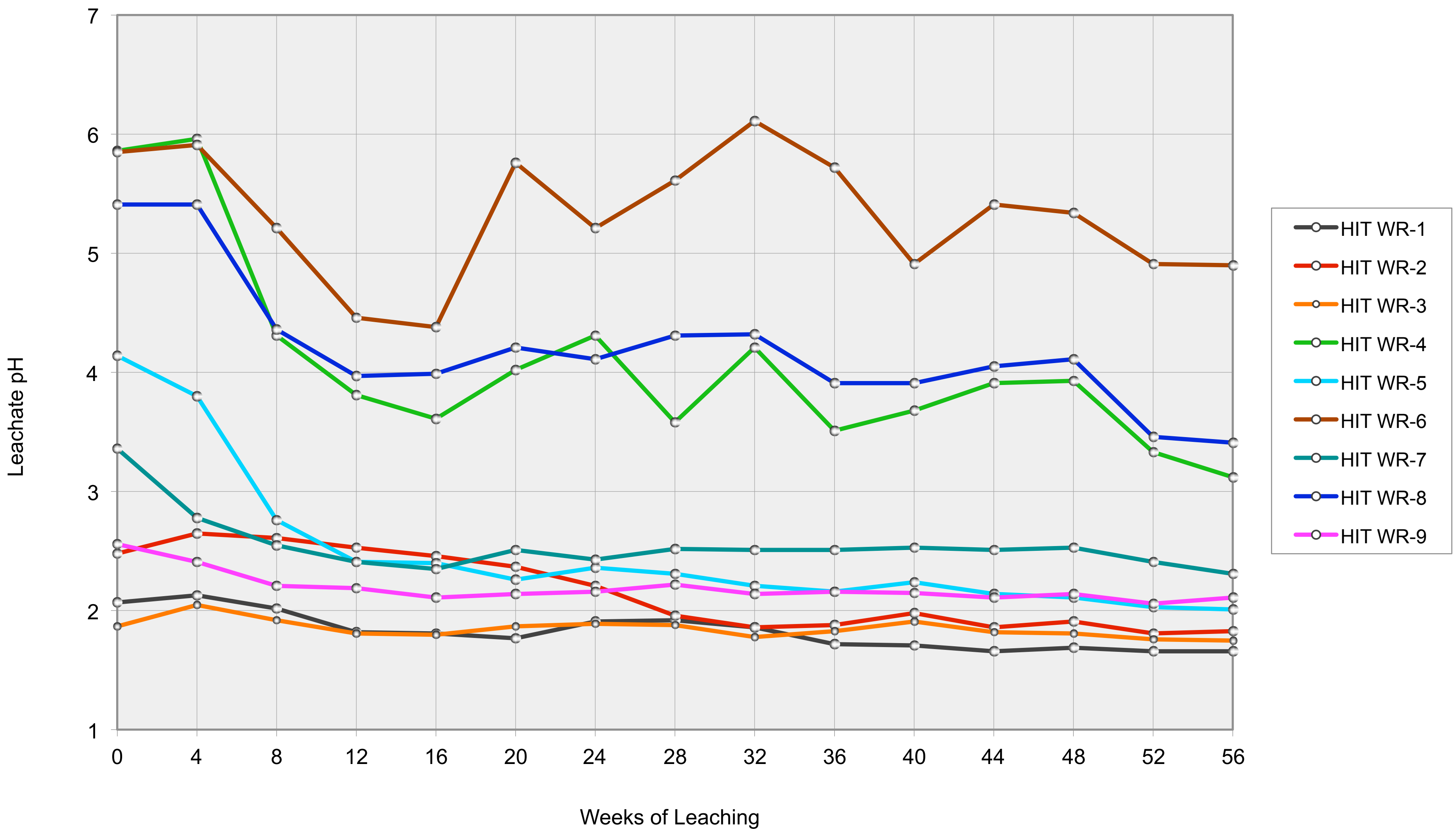
APPENDIX B1-9: Results of column leach test : HIT WR-9 (KDP/PH Waste Rock)

Parameters		Four Week Leach Cycle													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	1928	2662	2662	2697	2689	2681	2667	2696	2710	2755	2776	2881	2984	3145
pH	-	2.6	2.4	2.2	2.2	2.1	2.1	2.2	2.2	2.1	2.2	2.2	2.1	2.1	2.1
EC	dS/m	1.72	1.96	3.46	4.42	4.68	7.46	6.17	5.42	7.21	6.89	5.72	5.55	5.63	6.21
Alkalinity	mg/L	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Acidity	mg/L	497	1742	3184	5017	5127	7,321	5335	4764	7091	7110	6066	6060	5935	6272
Ag	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.010	<0.001
Al	mg/L	19	57	57	120	227	243	173	153	309	179	153	136	144	175
As	mg/L	0.002	0.009	0.032	0.055	0.09	0.10	0.08	0.07	0.11	0.08	0.07	0.07	0.08	0.09
B	mg/L	<0.05	<0.05	<0.05	<0.10	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	<0.10	<0.05
Ba	mg/L	0.003	<0.001	0.002	<0.010	0.001	0.006	0.002	<0.001	0.002	0.001	<0.001	<0.001	<0.010	0.001
Be	mg/L	0.014	0.025	0.026	0.044	0.053	0.046	0.039	0.032	0.035	0.026	0.017	0.017	0.012	0.015
Ca	mg/L	135	72	31	26	27	26	30	24	28	28	19	25	11	11
Cd	mg/L	0.01	0.015	0.013	0.010	0.01	0.01	0.01	0.01	0.01	0.01	0.003	0.002	0.002	0.002
Cl	mg/L	<1	2	1	1	3	4	2	10	3	2	3	<1	1	<1
Co	mg/L	0.43	0.66	0.50	0.75	1.2	1.1	0.8	0.7	1.1	0.7	0.7	0.7	0.9	0.9
Cr	mg/L	0.02	0.038	0.032	0.048	0.090	0.106	0.063	0.060	0.117	0.090	0.060	0.067	0.054	0.080
Cu	mg/L	2.3	4.7	4.6	4.7	6	5	4	3	5	3	2	2	3	3
F	mg/L	0.4	<0.1	<0.1	0.6	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fe	mg/L	76.3	374	774	1340	2130	2,700	1330	1220	2780	1600	1660	1410	1620	1850
Hg	mg/L	<0.0001	<0.0001	0.0002	<0.0001	0.00090	<0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0003
K	mg/L	1.0	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Mg	mg/L	14	39	46	144	218	276	173	151	286	229	183	214	187	221
Mn	mg/L	1.8	2.4	1.5	1.8	3.1	2.9	2.0	1.7	3.3	1.9	1.4	1.4	1.3	1.3
Mo	mg/L	<0.001	<0.001	0.004	0.012	0.041	0.081	0.054	0.069	0.119	0.110	0.112	0.122	0.142	0.169
Na	mg/L	4.0	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1
Ni	mg/L	0.36	0.55	0.36	0.39	0.57	0.53	0.38	0.31	0.47	0.33	0.25	0.25	0.28	0.30
P	mg/L	<1	1	3	6	6	6	4	4	6	5	3	4	2	3
Pb	mg/L	0.002	<0.001	<0.001	<0.010	<0.001	0.004	0.0050	<0.001	0.001	<0.001	<0.001	0.003	<0.010	<0.001
Sb	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
Se	mg/L	<0.01	0.01	0.04	0.1	0.18	0.23	0.190	0.140	0.230	0.230	0.200	0.210	0.230	0.280
Si	mg/L	5.0	7.3	17.2	28.8	21	26	12	8	9	13	9	10	18	16
Sn	mg/L	<0.001	<0.001	<0.001	<0.010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.010	<0.001
SO4	mg/L	866	1880	2840	5640	8080	9,480	5430	5150	11300	8280	6060	7910	6460	7950
Sr	mg/L	0.28	0.17	0.13	0.19	0.31	0.39	0.25	0.29	0.52	0.37	0.37	0.39	0.32	0.35
Th	mg/L	0.054	0.11	0.10	0.10	0.13	0.10	0.07	0.06	0.090	0.05	0.03	0.03	0.03	0.03
U	mg/L	0.011	0.014	0.011	0.012	0.02	0.01	0.01	0.01	0.012	0.01	0.00	0.00	<0.010	0.00
Zn	mg/L	3.6	5.2	3.9	4.1	5.0	4.0	2.7	2.3	2.9	1.9	1.0	0.8	0.8	0.7

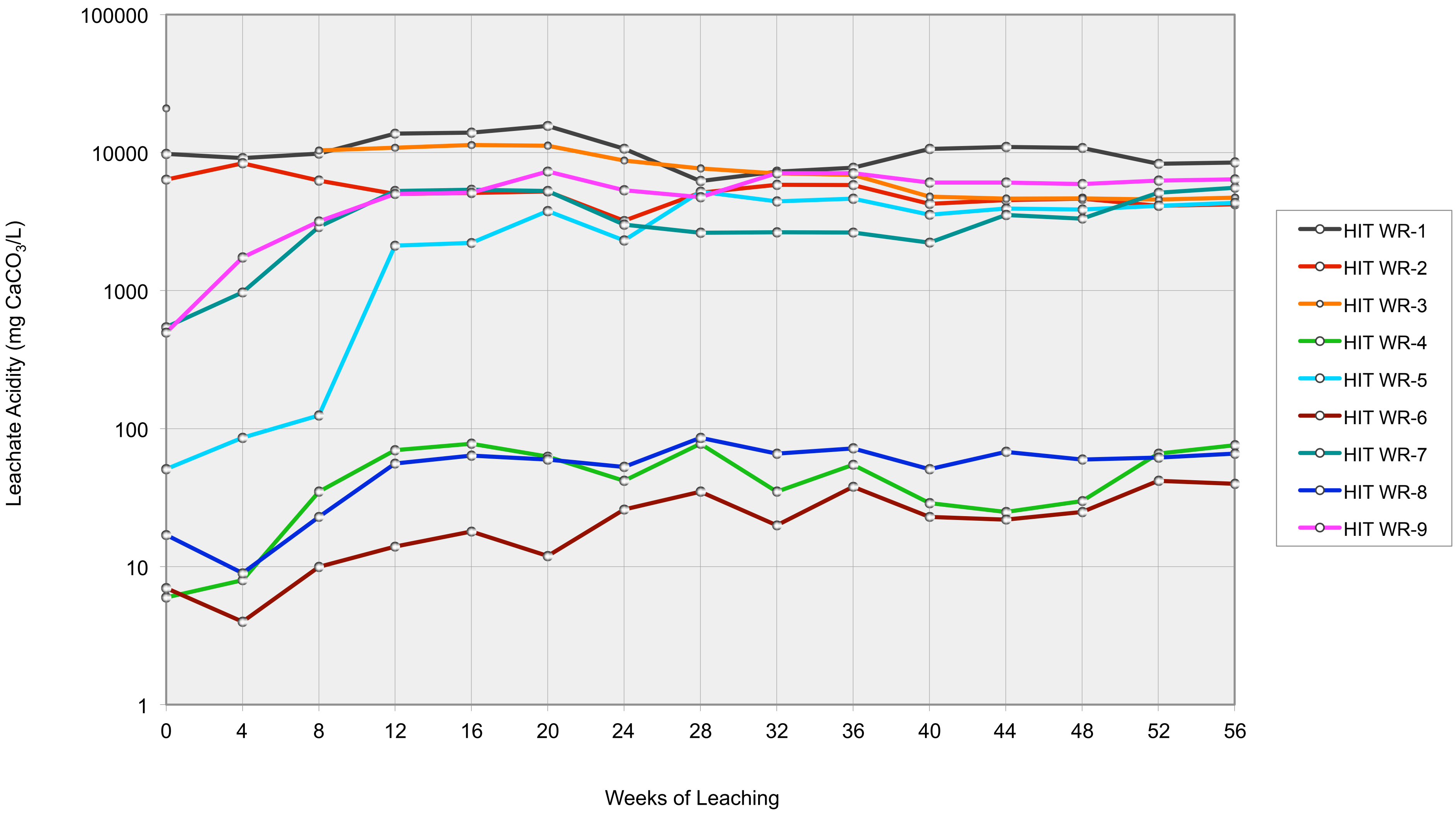
Note: < indicate that the concentration is less than the limit of detection

Appendix B2

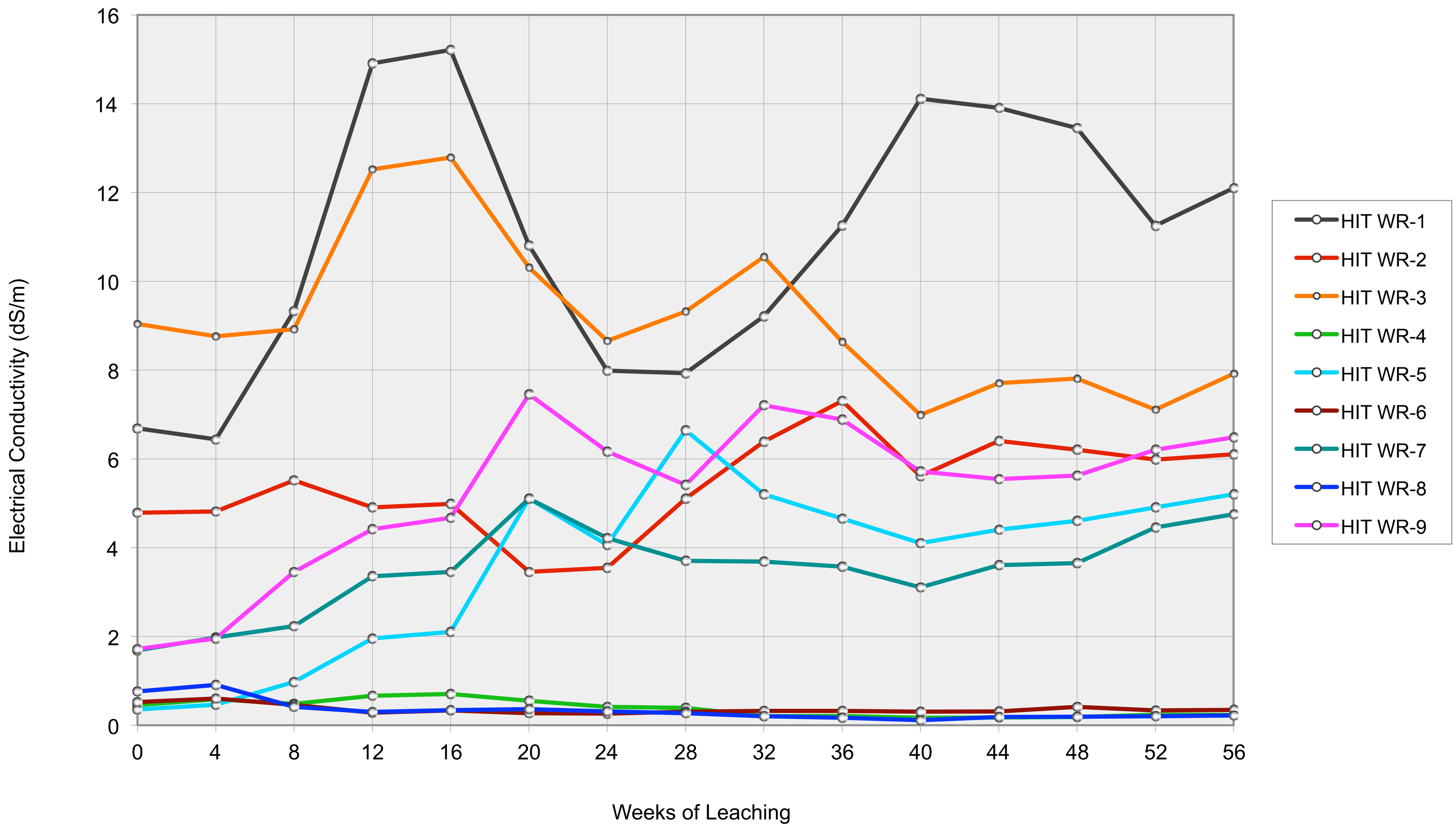
Plots of Leachate Composition Versus Time
for Column Leach Tests Involving HIT Drill Core Samples



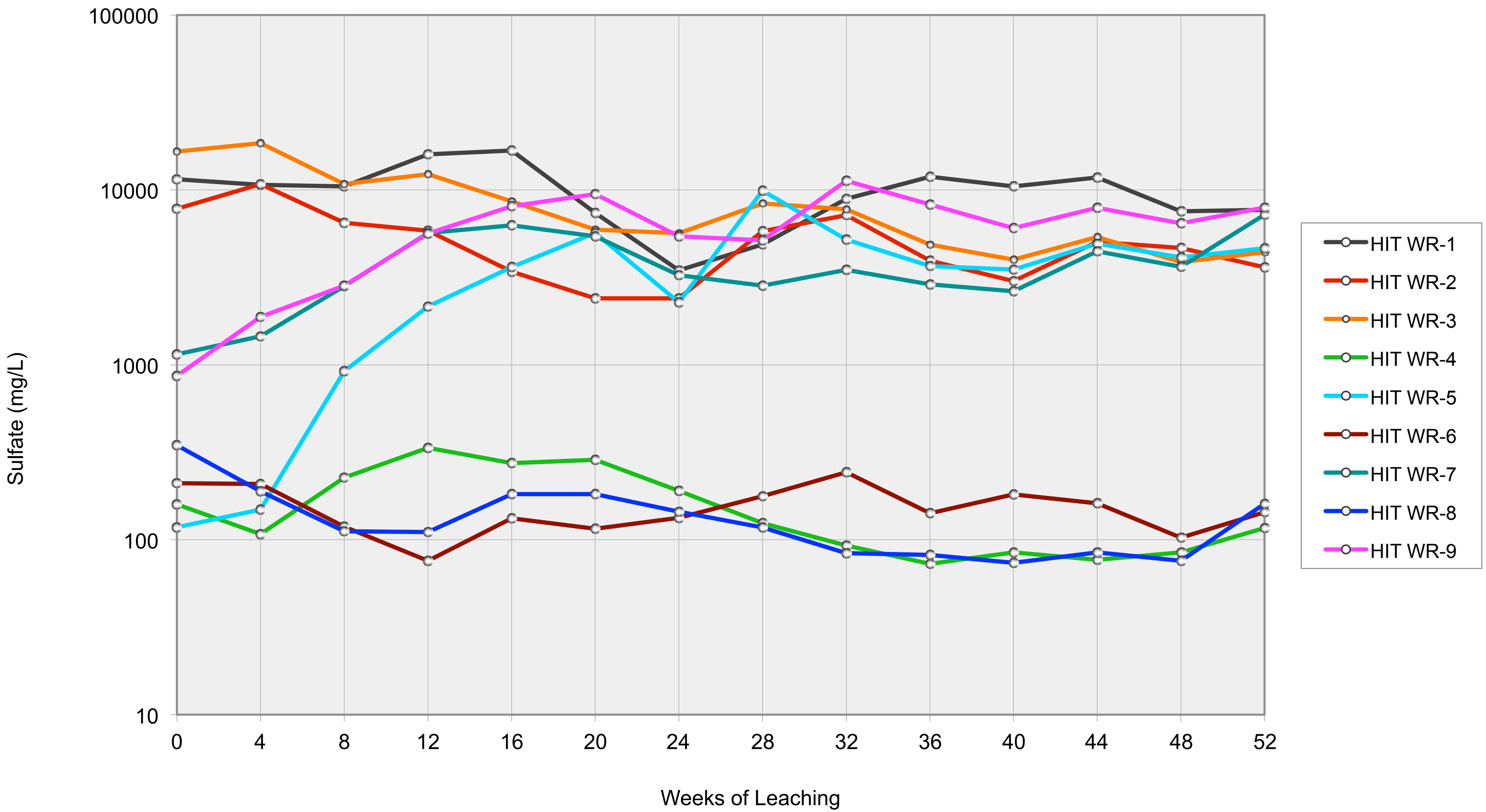
APPENDIX B2-1: Plot of leachate pH versus time for HIT waste rock column tests



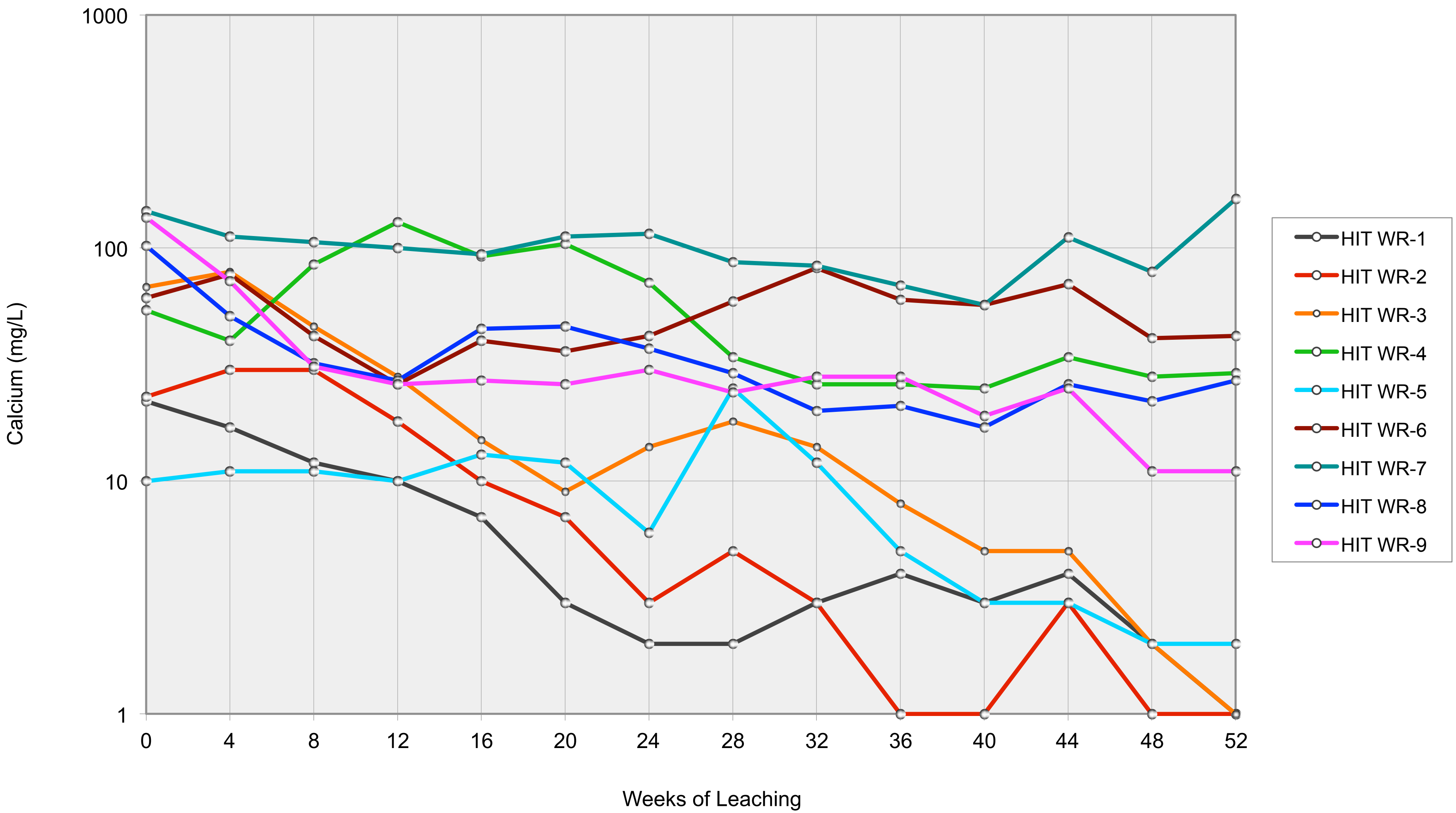
APPENDIX B2-2: Plot of leachate acidity versus time for HIT waste rock column tests



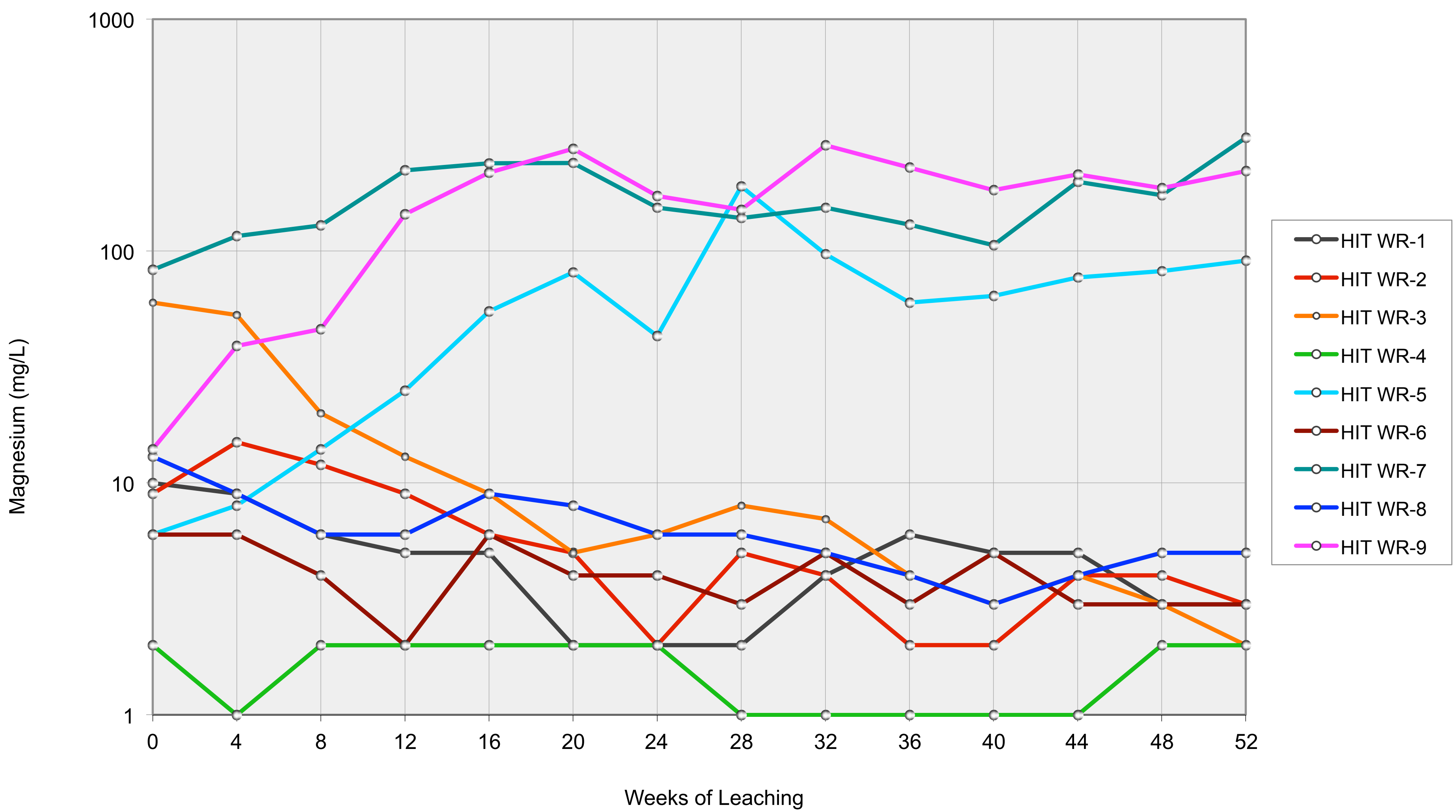
APPENDIX B2-3: Plot of leachate conductivity versus time for HIT waste rock column tests



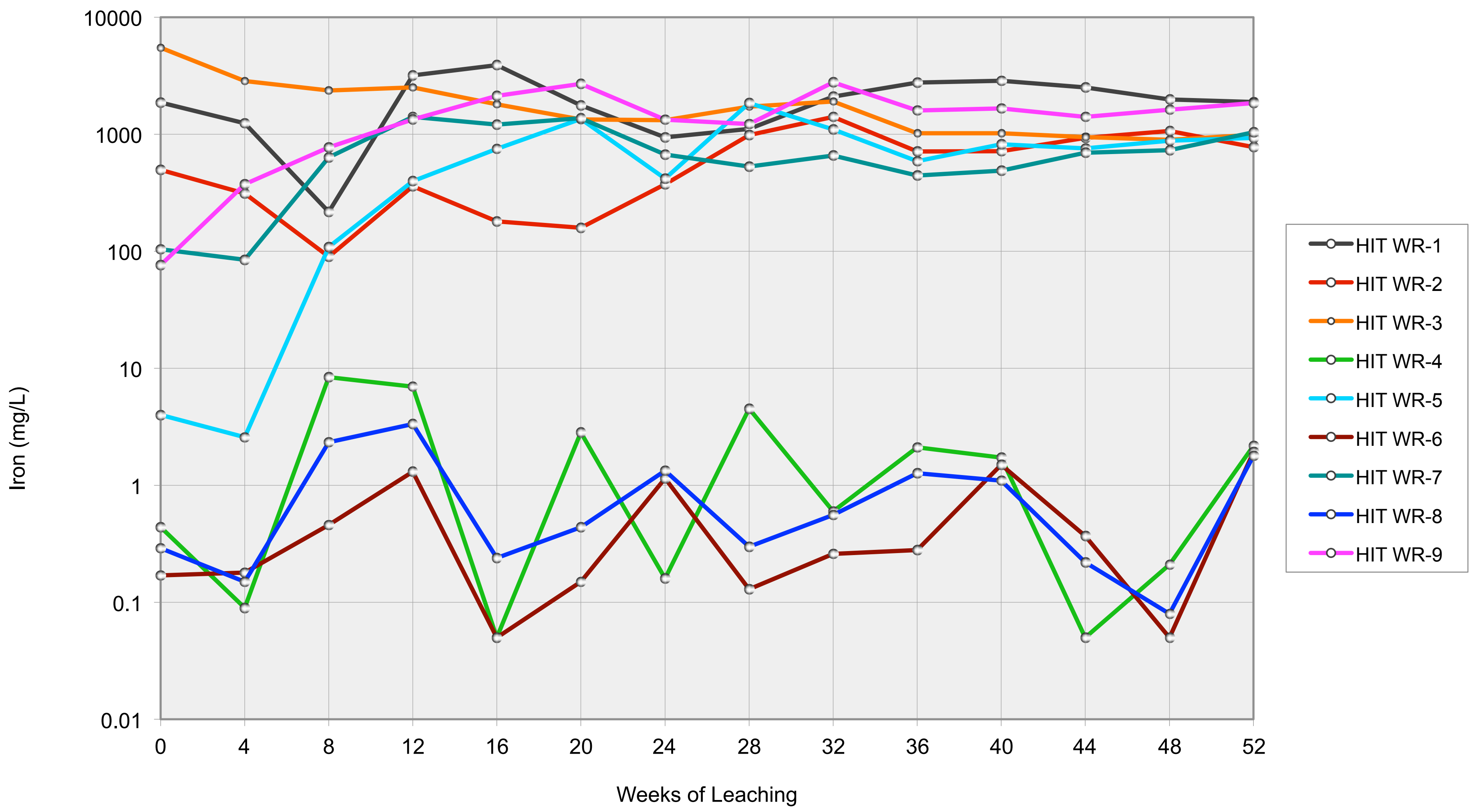
APPENDIX B2-4: Plot of sulfate concentration versus time for HIT waste rock column tests



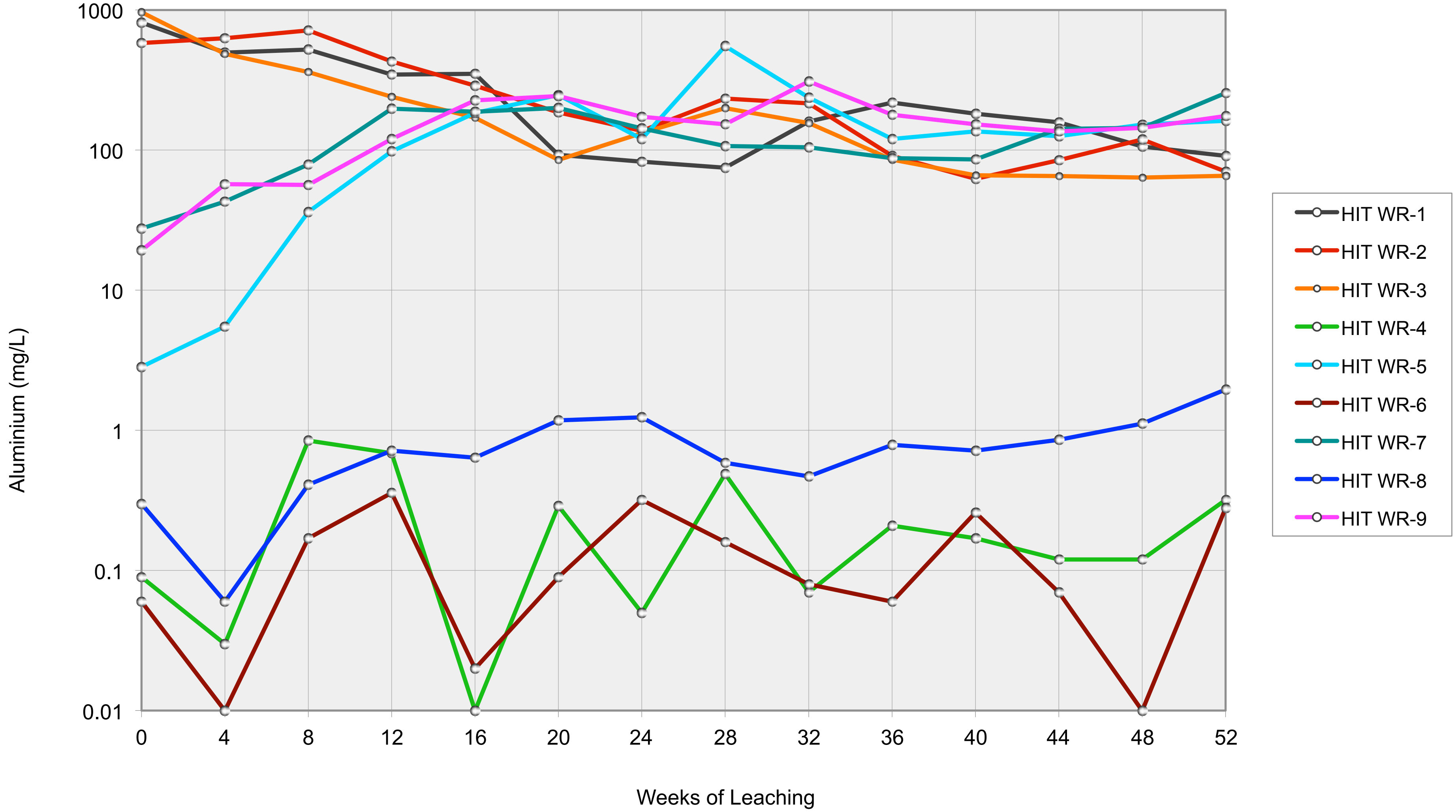
APPENDIX B2-5: Plot of calcium concentration versus time for HIT waste rock column tests



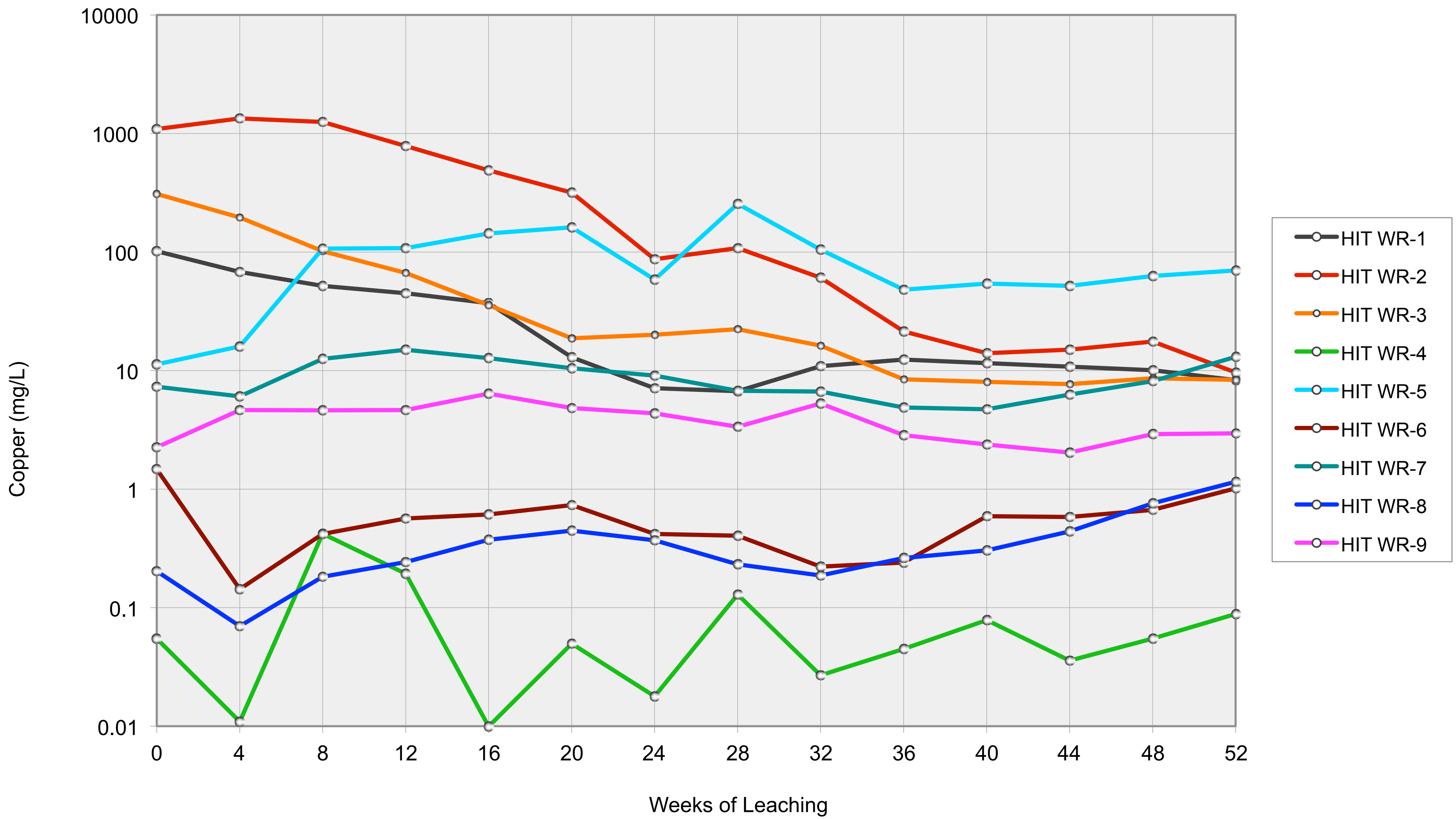
APPENDIX B2-6: Plot of magnesium concentration versus time for HIT waste rock column tests



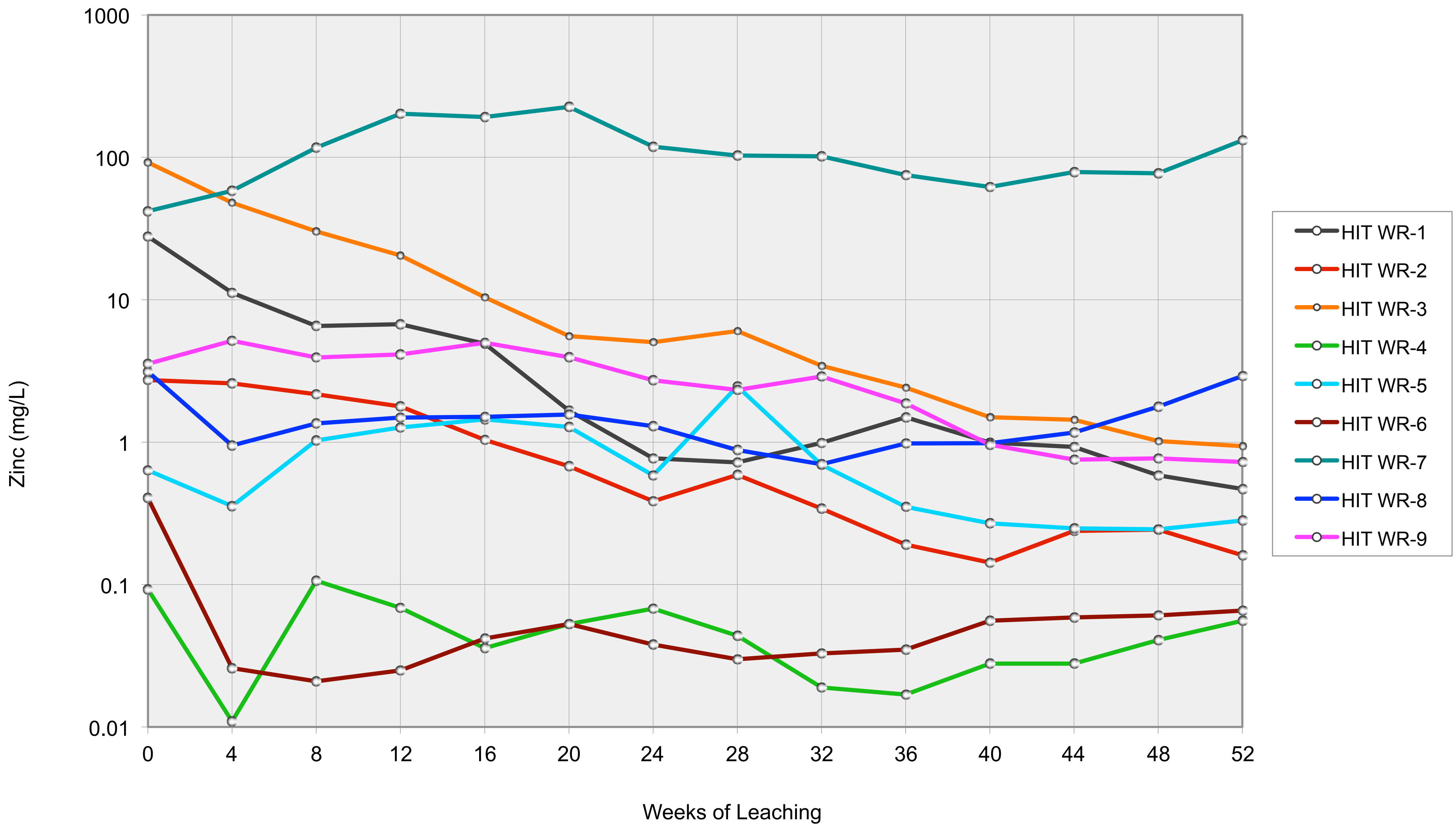
APPENDIX B2-7: Plot of iron concentration versus time for HIT waste rock column tests



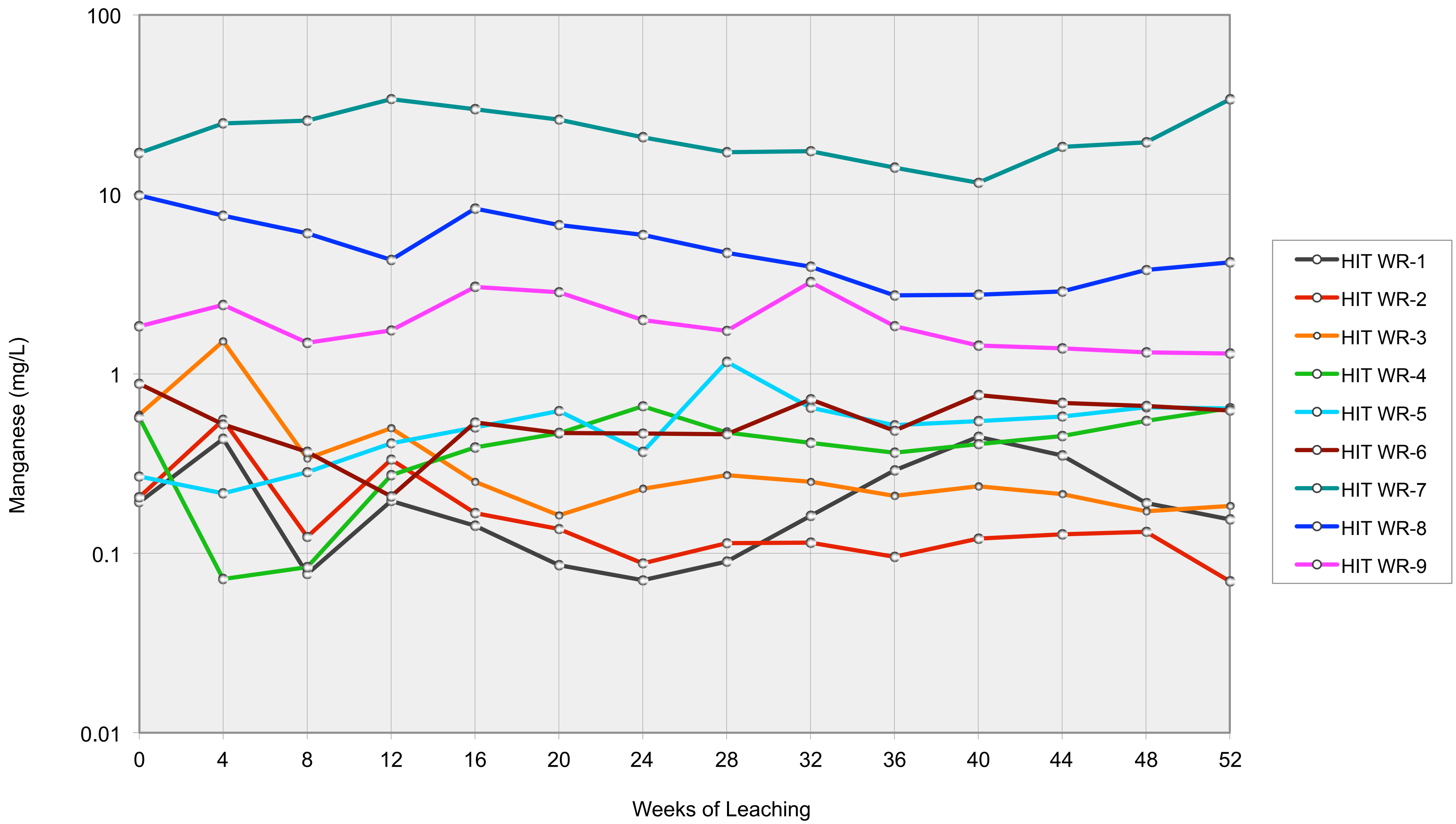
APPENDIX B2-8: Plot of aluminium concentration versus time for HIT waste rock column tests



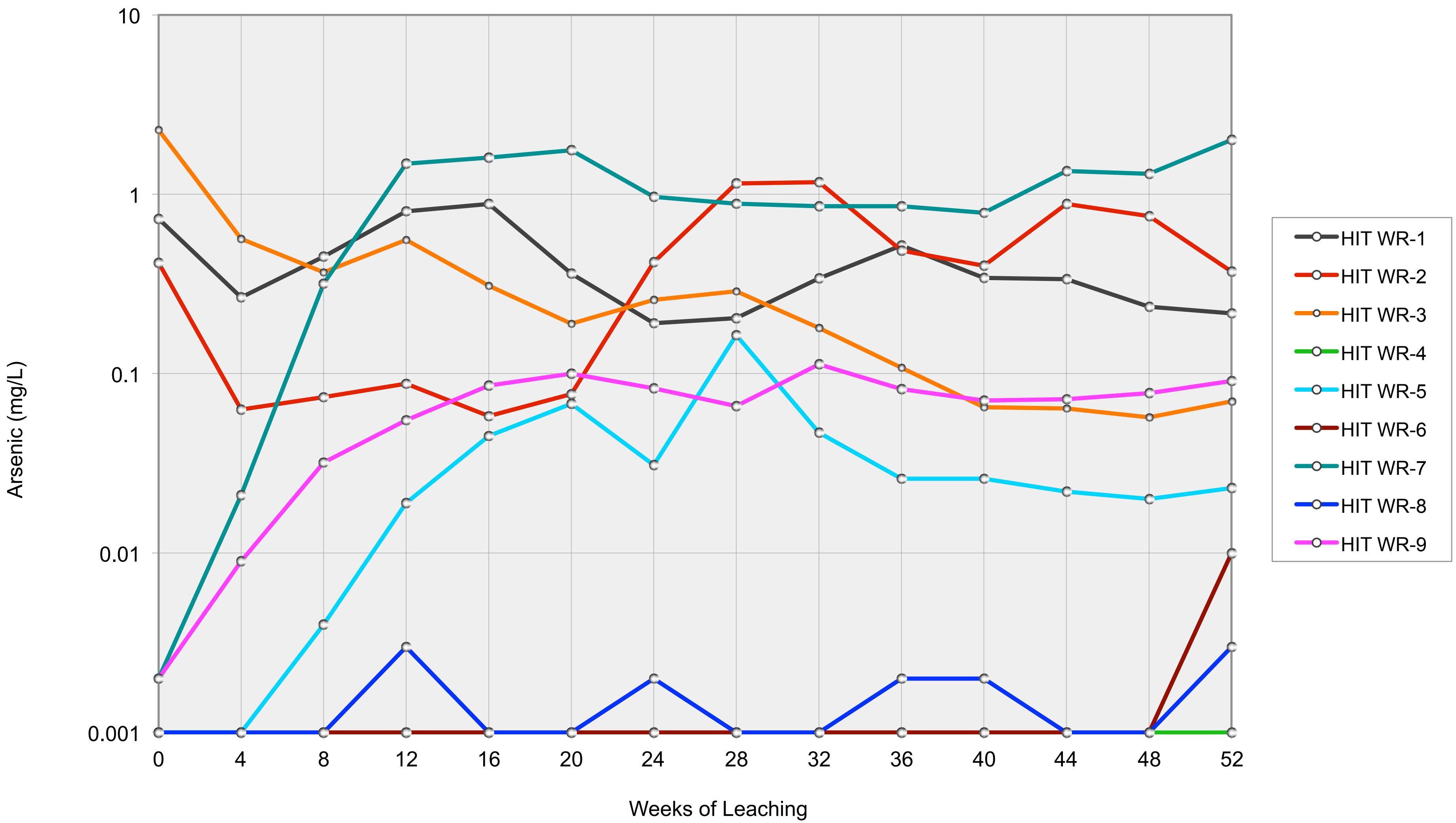
APPENDIX B2-9: Plot of copper concentration versus time for HIT waste rock column tests



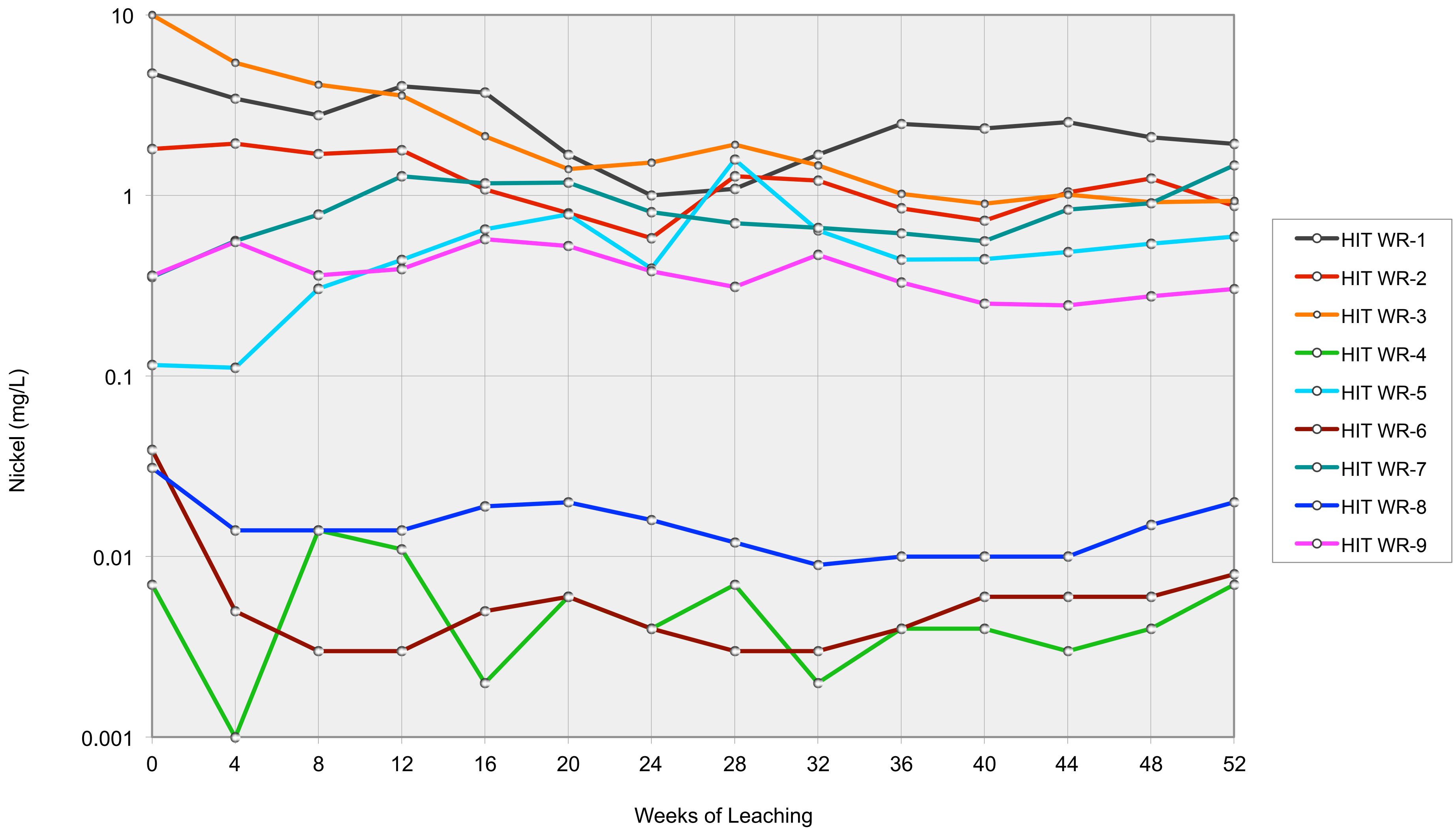
APPENDIX B2-10: Plot of zinc concentration versus time for HIT waste rock column tests



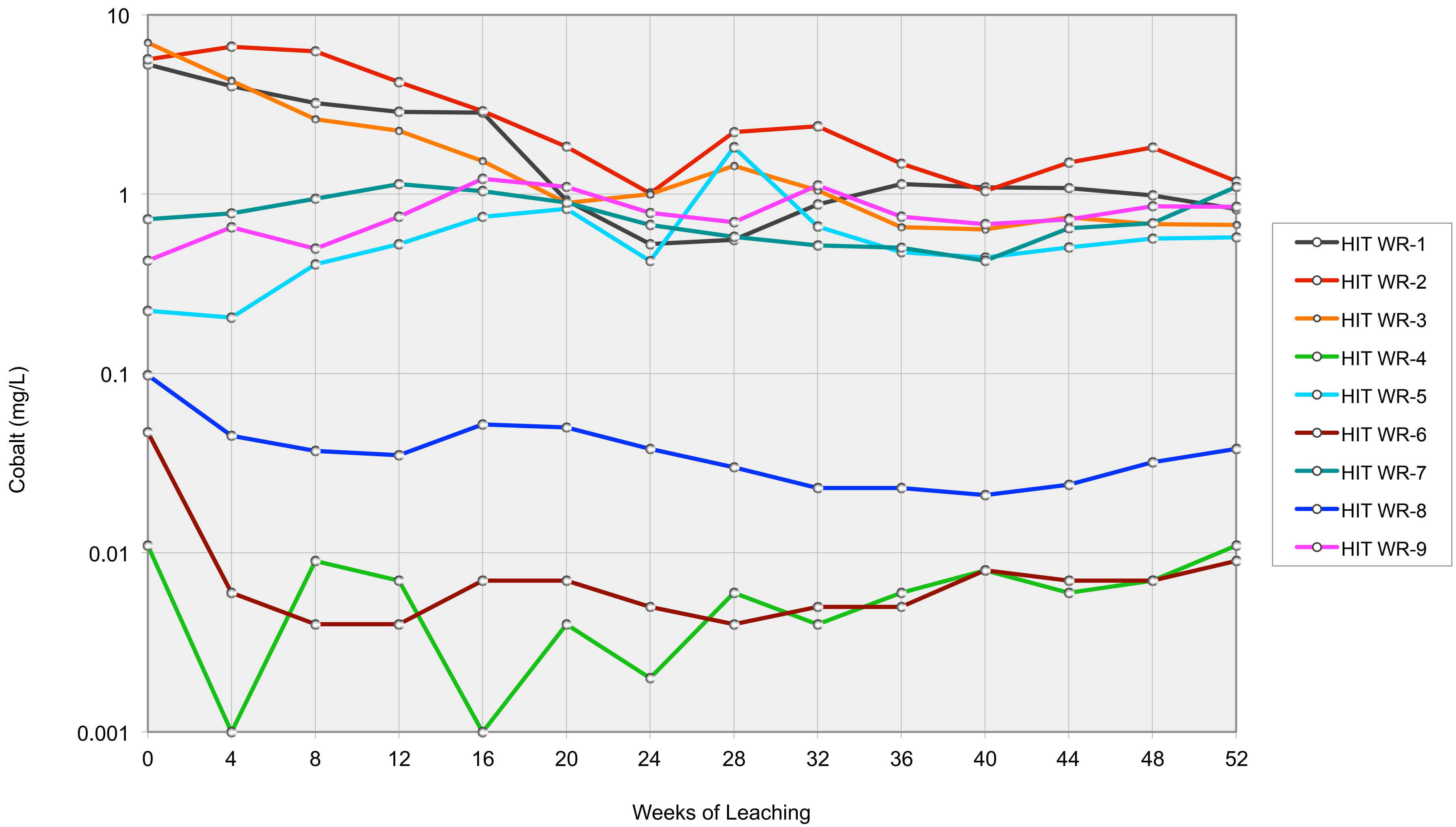
APPENDIX B2-11: Plot of manganese concentration versus time for HIT waste rock column tests



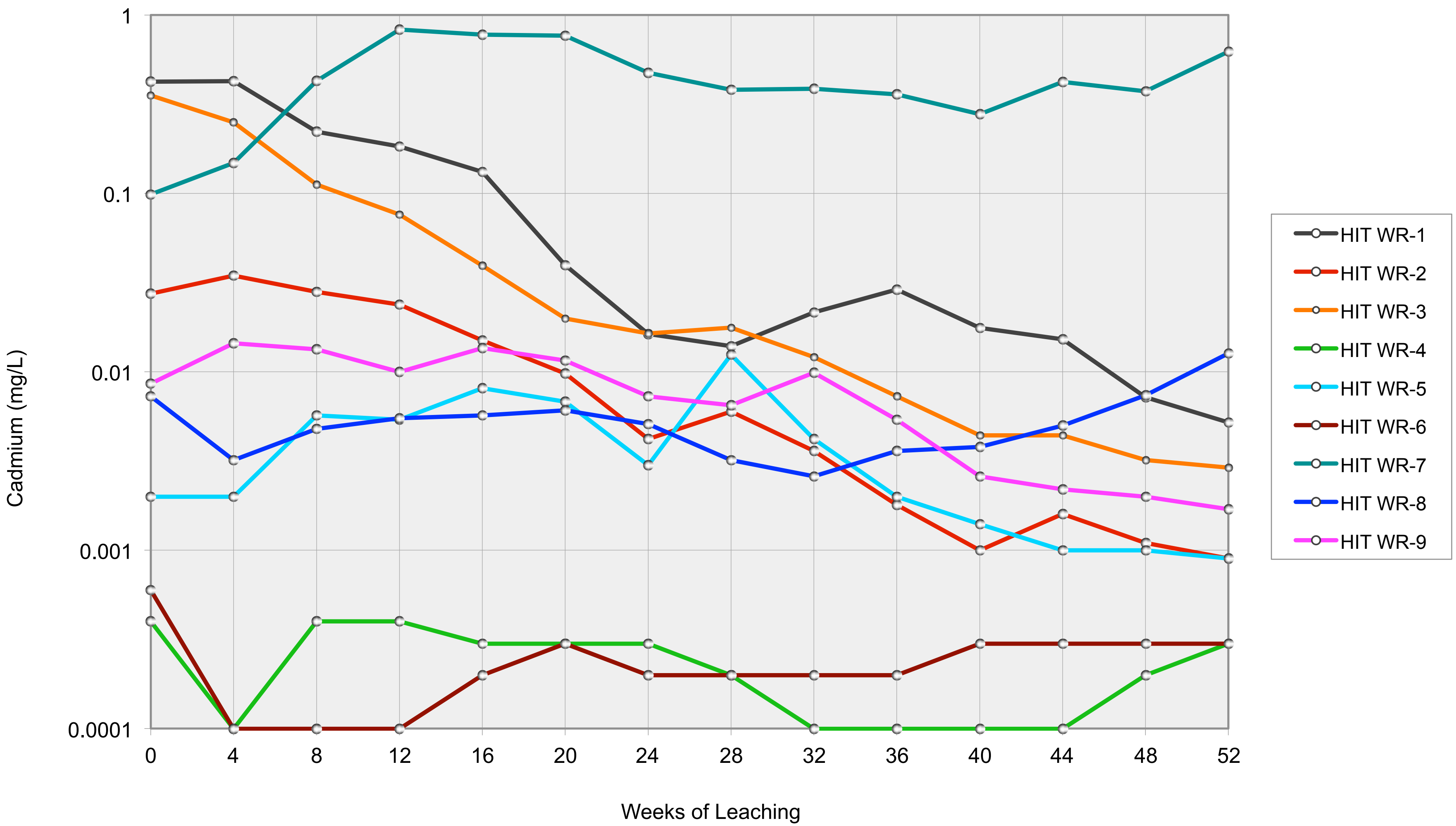
APPENDIX B2-12: Plot of arsenic concentration versus time for HIT waste rock column tests



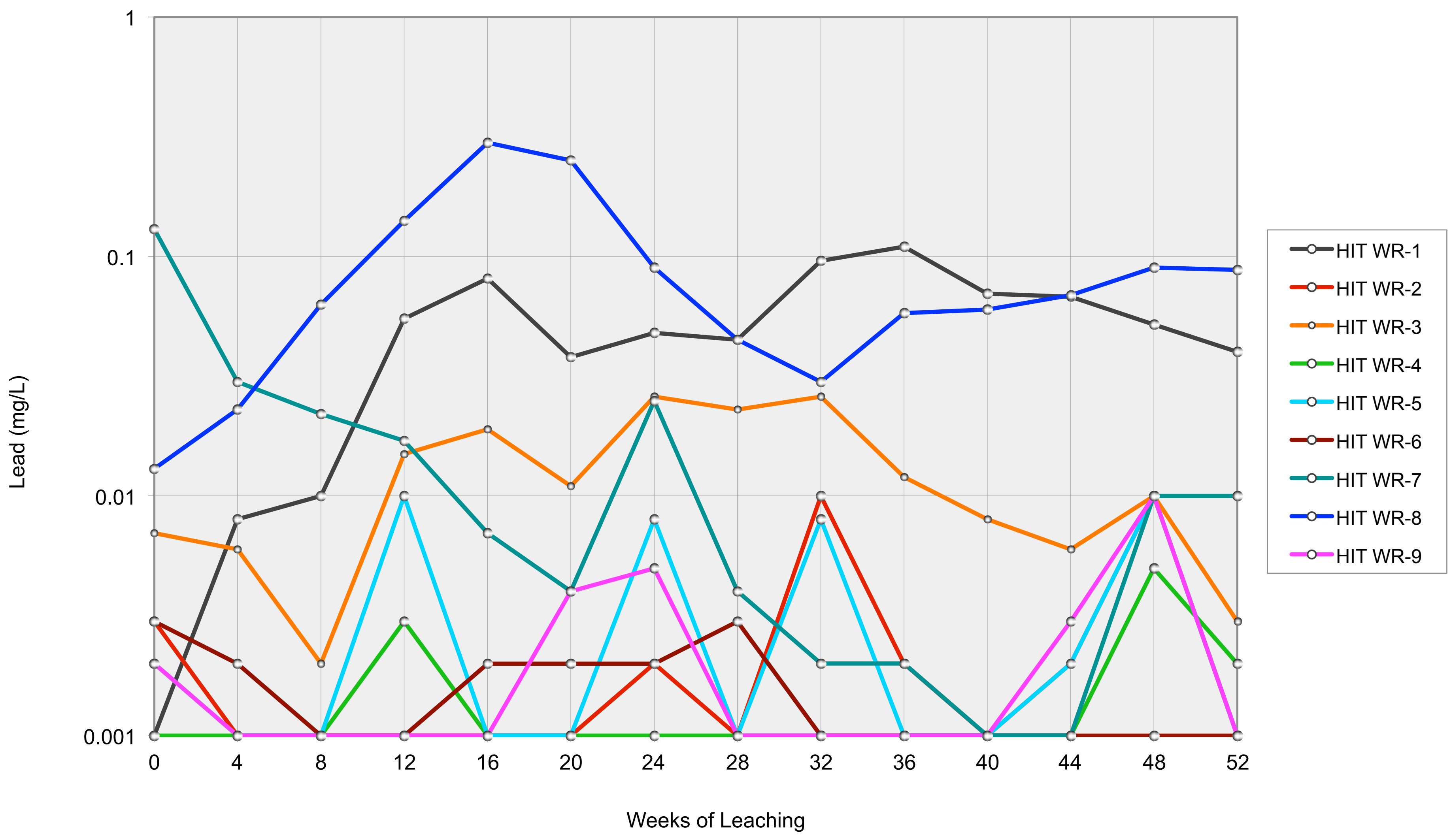
APPENDIX B2-13: Plot of nickel concentration versus time for HIT waste rock column tests



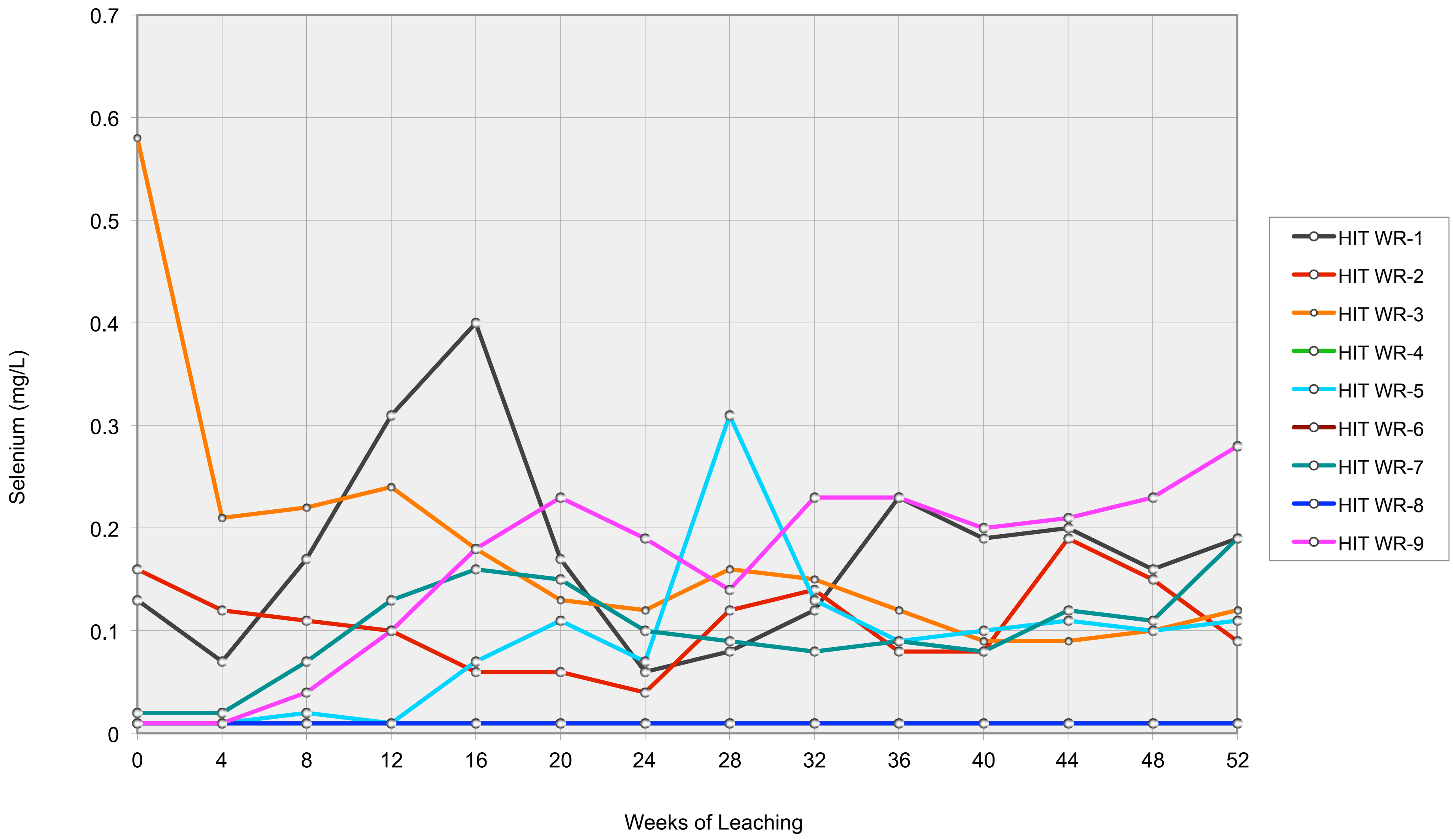
APPENDIX B2-14: Plot of cobalt concentration versus time for HIT waste rock column tests



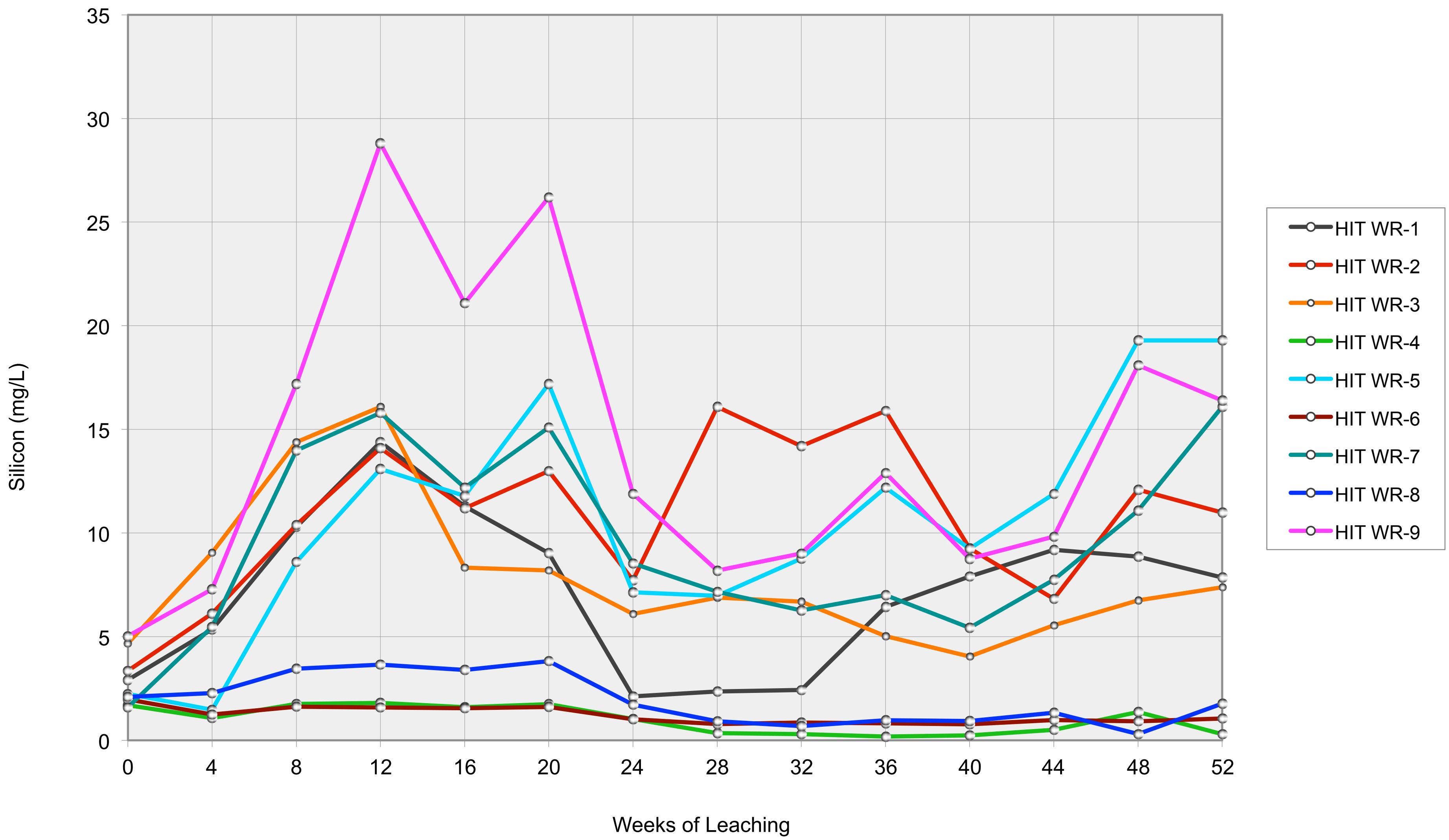
APPENDIX B2-15: Plot of cadmium concentration versus time for HIT waste rock column tests



APPENDIX B2-16: Plot of lead concentration versus time for HIT waste rock column tests



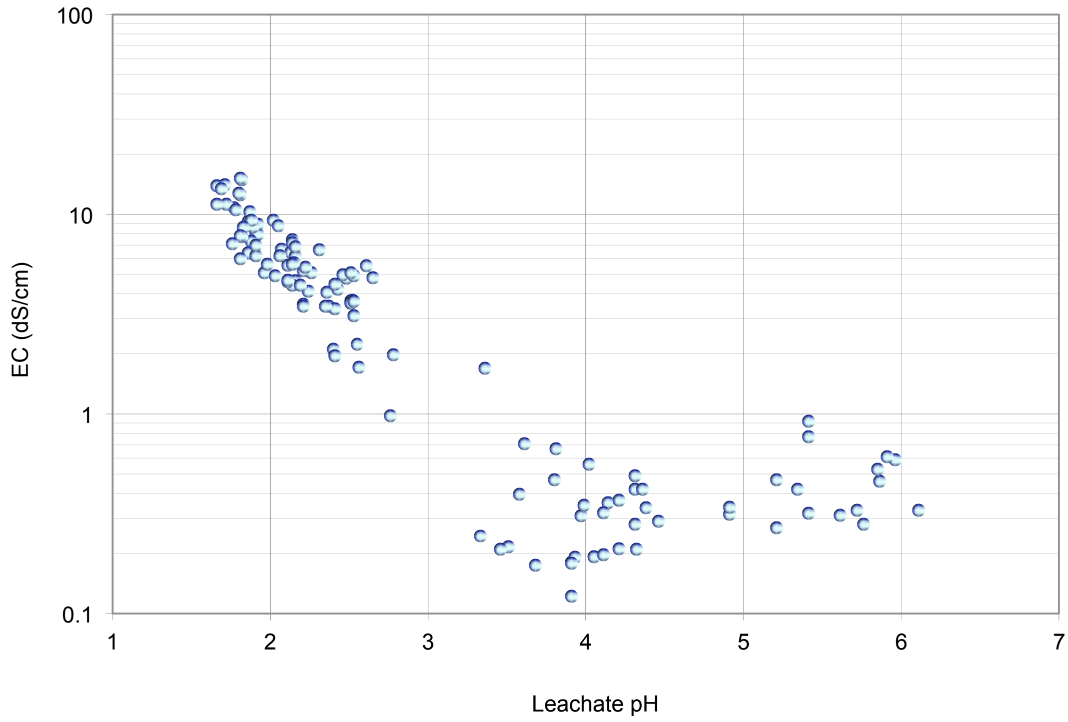
APPENDIX B2-17: Plot of selenium concentration versus time for HIT waste rock column tests



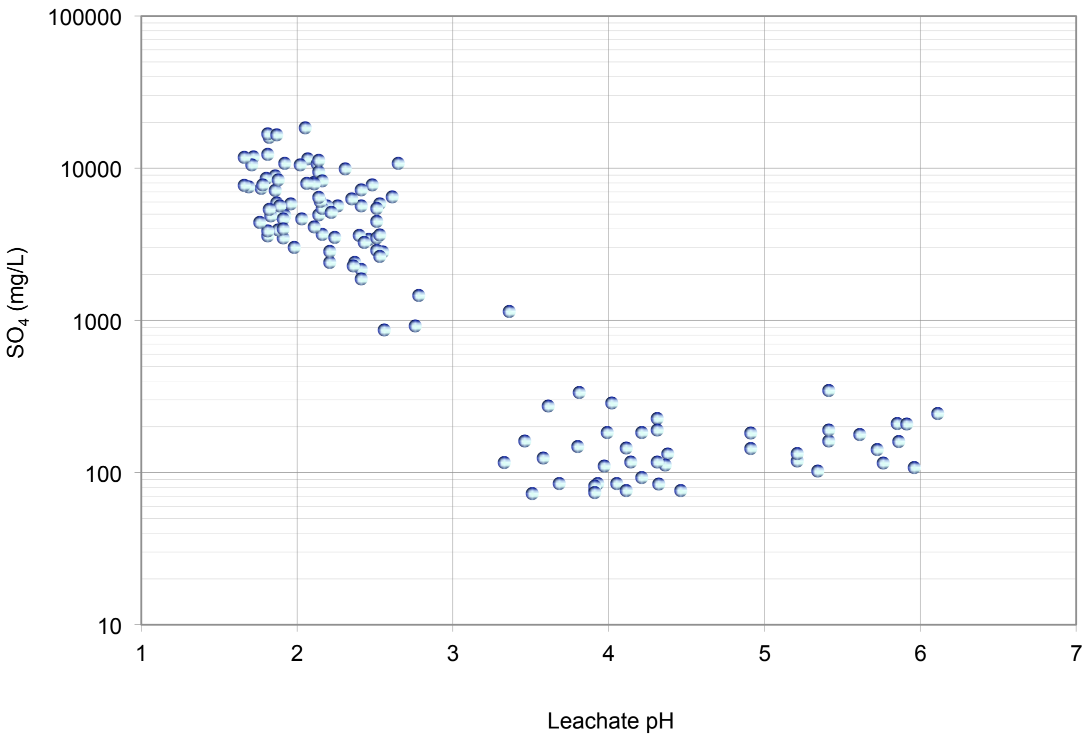
APPENDIX B2-18: Plot of silicon concentration versus time for HIT waste rock column tests

Appendix B3

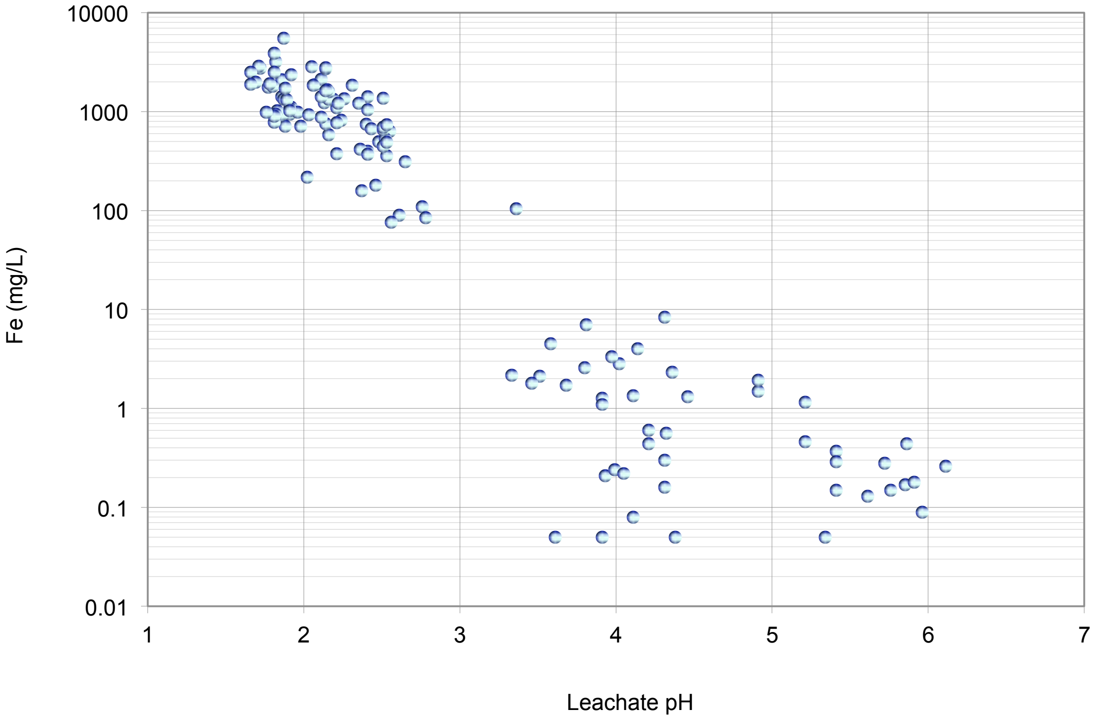
Plots of Leachate Composition Versus pH for Column Leach Tests Involving HIT Drill Core Samples



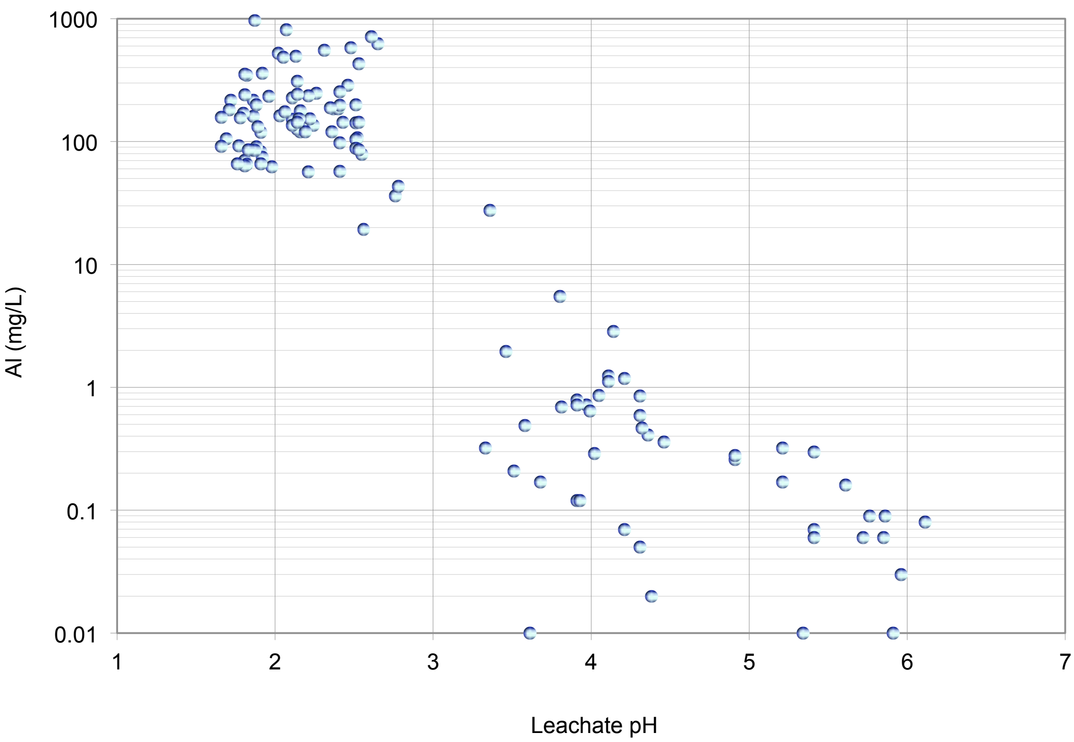
APPENDIX B3-1: Relationship between pH and electrical conductivity of waste rock leachate



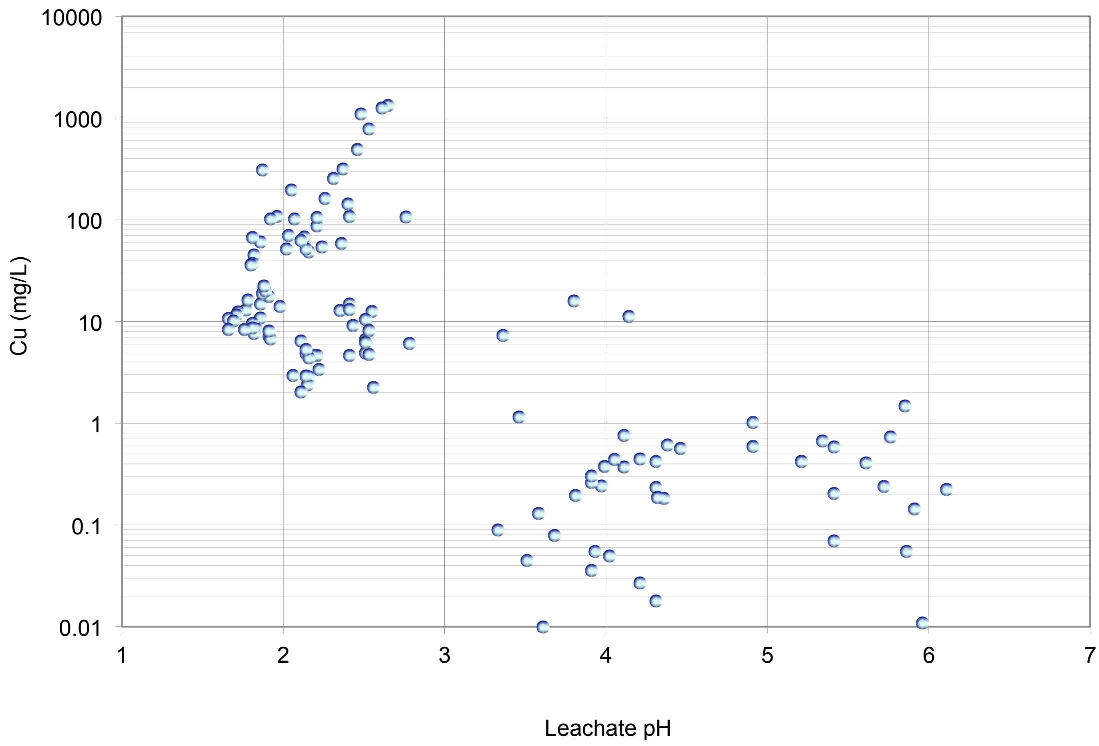
APPENDIX B3-2: Relationship between pH and sulfate concentration in waste rock leachate



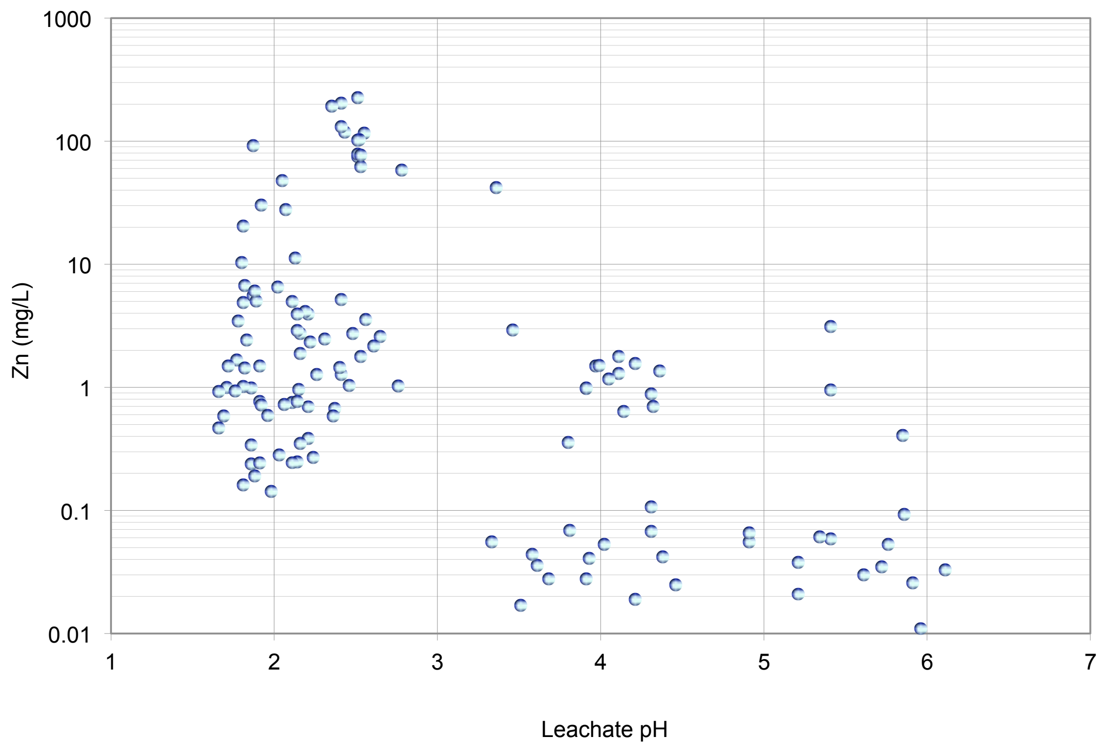
APPENDIX B3-3: Relationship between pH and iron concentration in waste rock leachate



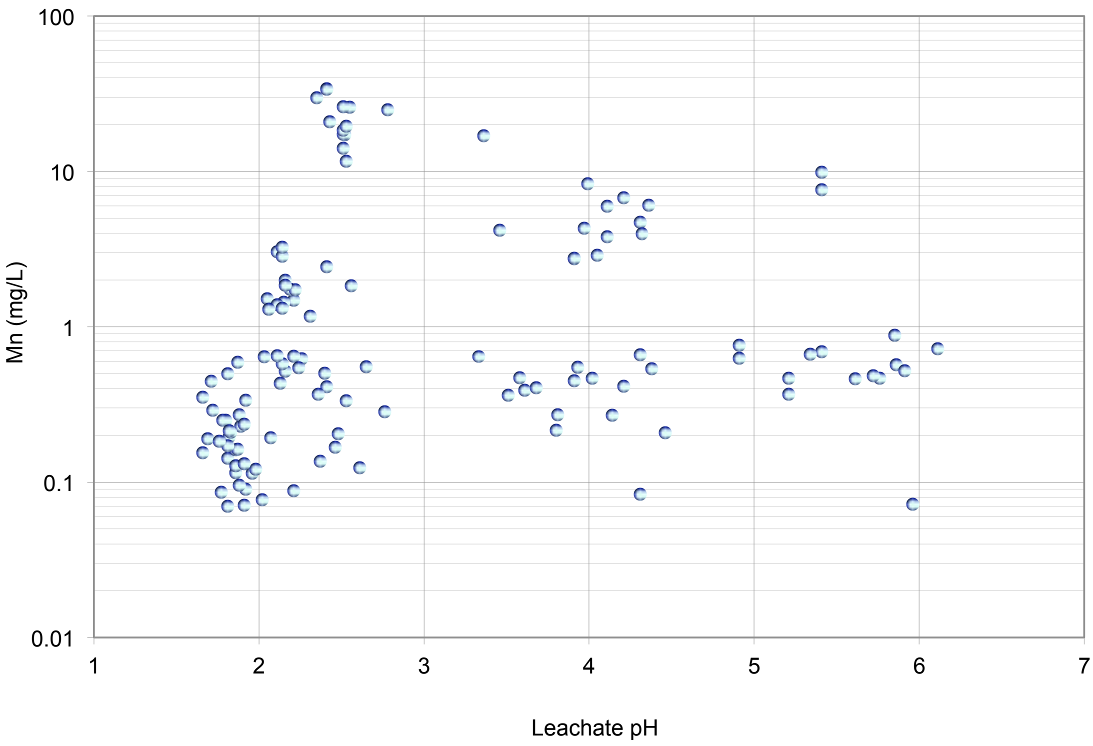
APPENDIX B3-4: Relationship between pH and aluminium concentration in waste rock leachate



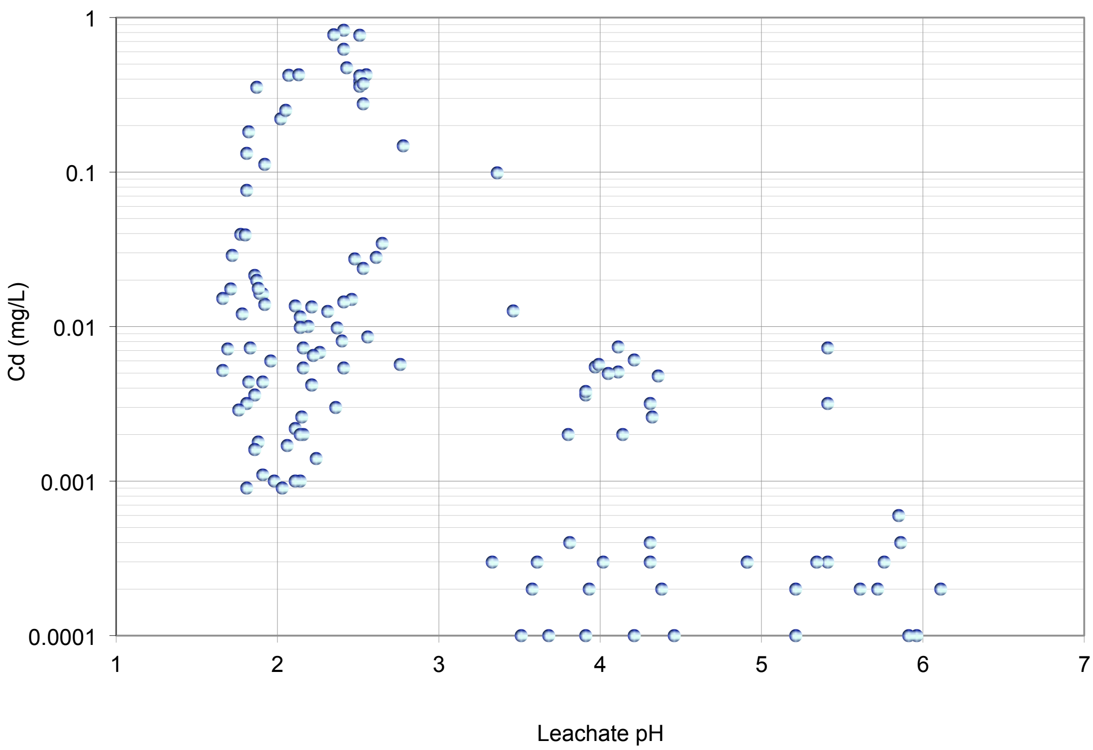
APPENDIX B3-5: Relationship between pH and copper concentration in waste rock leachate



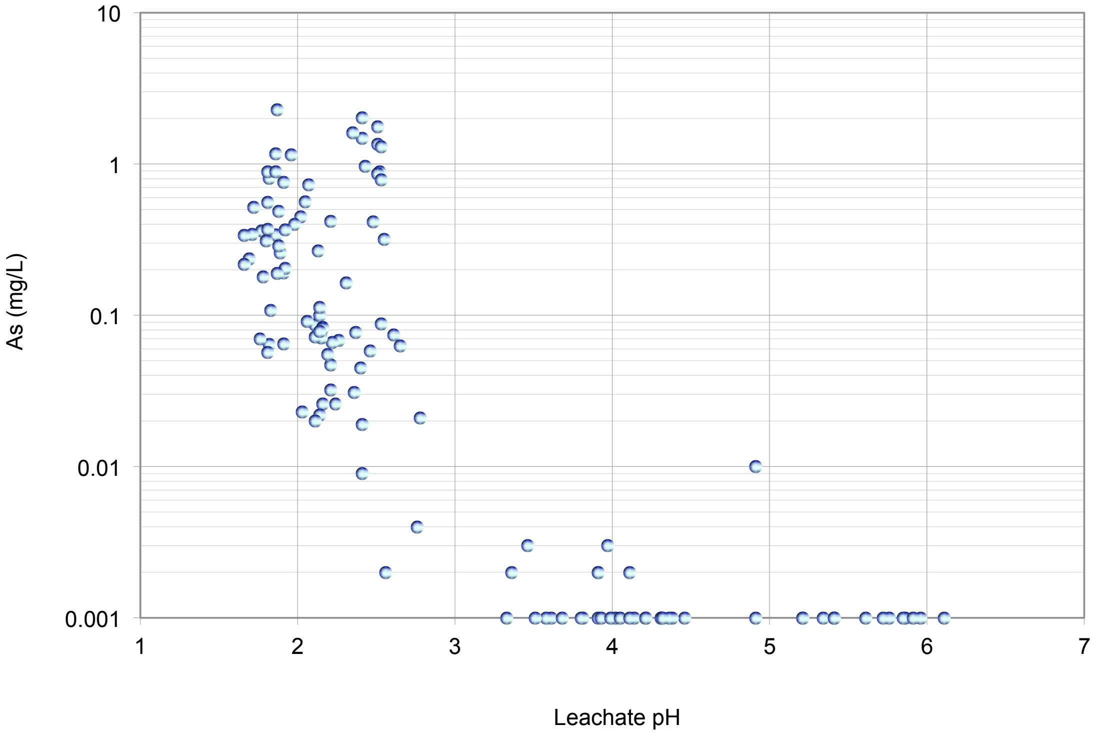
APPENDIX B3-6: Relationship between pH and zinc concentration in waste rock leachate



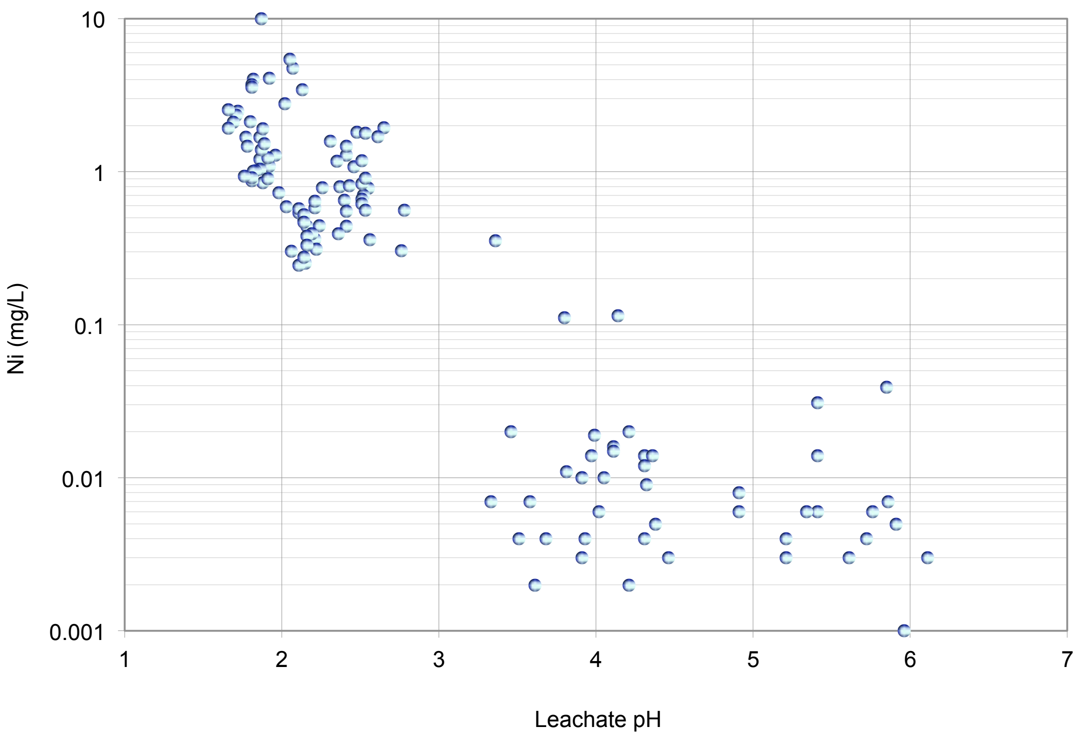
APPENDIX B3-7: Relationship between pH and manganese concentration in waste rock leachate



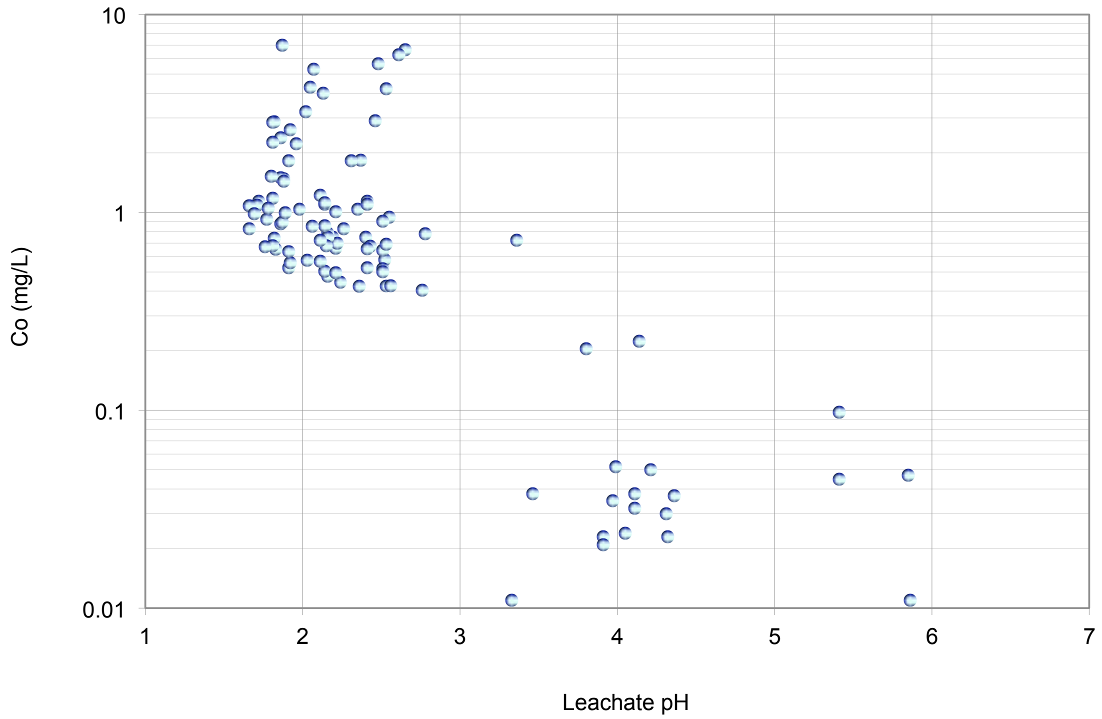
APPENDIX B3-8: Relationship between pH and cadmium concentration in waste rock leachate



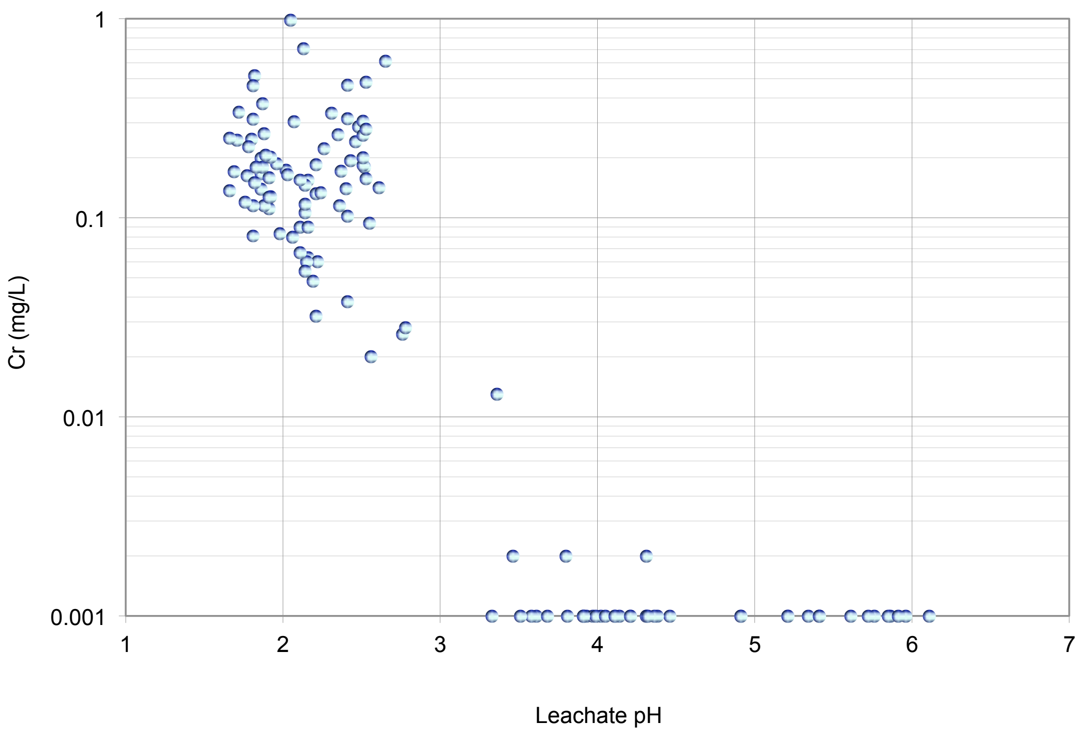
APPENDIX B3-9: Relationship between pH and arsenic concentration in waste rock leachate



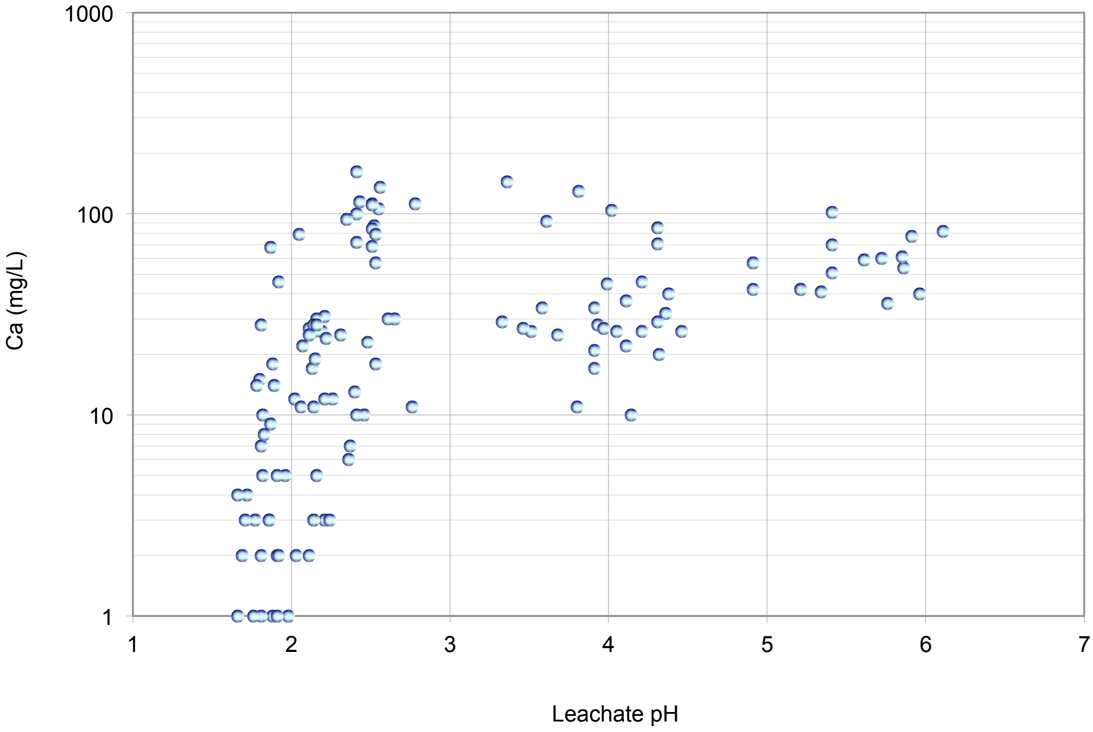
APPENDIX B3-10: Relationship between pH and nickel concentration in waste rock leachate



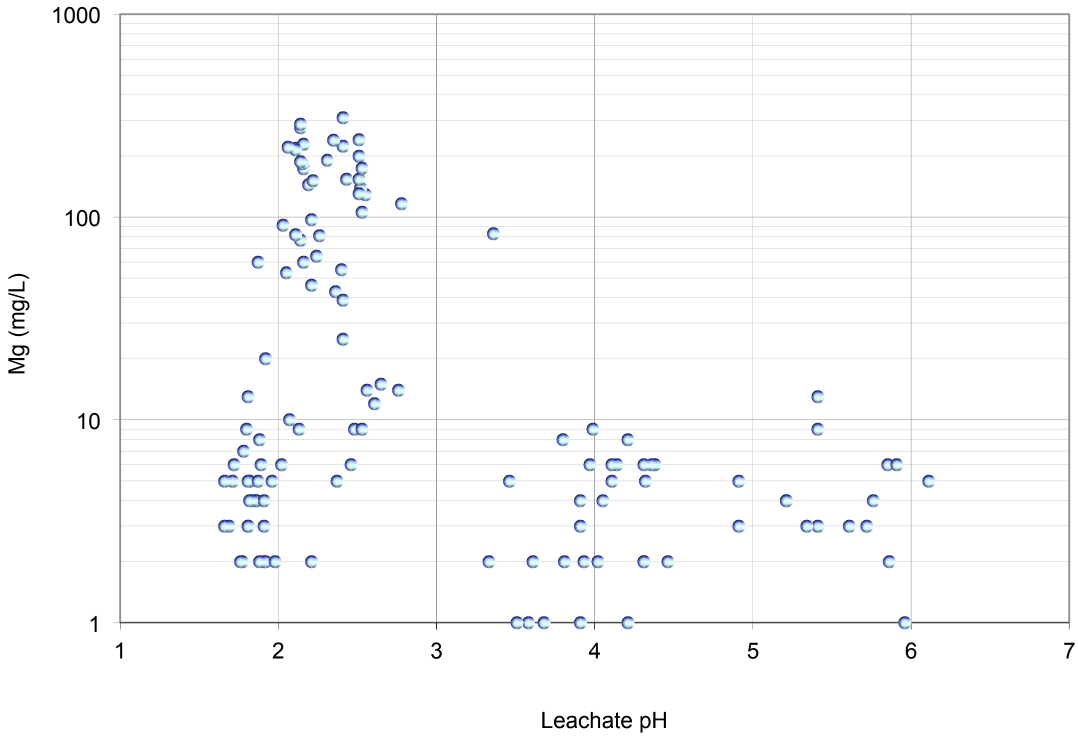
APPENDIX B3-11: Relationship between pH and cobalt concentration in waste rock leachate



APPENDIX B3-12: Relationship between pH and chromium concentration in waste rock leachate



APPENDIX B3-13: Relationship between pH and calcium concentration in waste rock leachate



APPENDIX B3-14: Relationship between pH and magnesium concentration in waste rock leachate

APPENDIX C

RESULTS OF STATIC TESTING OF TAILINGS

Appendix C1

Acid Forming Characteristics of HIT Tailings

APPENDIX C1-1: Acid forming characteristics of HIT tailings - Samples arranged by Flotation Test

EGi Code	Deposit	Flotation Test	Ore Type	Grind/ Regrind (μm)	Tailings Type	ACID-BASE ANALYSIS					NAG TEST		ARD Class
						Sulfur %S	MPA kg H_2SO_4/t	ANC kg H_2SO_4/t	ANC/MPA Ratio	NAPP kg H_2SO_4/t	NAG kg H_2SO_4/t	NAGpH	
38297	HIT	123	P1	189 / 14	Rougher	0.15	5	2	0.4	3	2	4.2	PAF-LC
38310	HIT	123	P1	189 / 14	Cleaner	9.04	277	0	0.0	277	92	2.4	PAF
38284	HIT	123	P1	189 / 14	Final	1.49	46	1	0.0	45	36	2.6	PAF
38305	HIT	135	P1	140 / 16	Rougher	0.13	4	1	0.3	3	2	4.2	PAF-LC
38318	HIT	135	P1	140 / 16	Cleaner	9.73	298	0	0.0	298	114	2.1	PAF
38292	HIT	135	P1	140 / 16	Final	1.42	43	0	0.0	43	36	2.4	PAF
38298	HIT	124	P2a	155 / 22	Rougher	0.01	0	11	35.9	-11	0	6.9	NAF
38311	HIT	124	P2a	155 / 22	Cleaner	4.81	147	11	0.1	136	54	2.4	PAF
38285	HIT	124	P2a	155 / 22	Final	0.36	11	9	0.8	2	7	3.1	PAF-LC
38306	HIT	136	P2a	198 / 20	Rougher	0.02	1	10	16.3	-9	0	5.5	NAF
38319	HIT	136	P2a	198 / 20	Cleaner	5.65	173	5	0.0	168	67	2.2	PAF
38293	HIT	136	P2a	198 / 20	Final	0.38	12	10	0.9	2	7	3.0	PAF-LC
38299	HIT	125	P2b	178 / 17	Rougher	0.07	2	13	6.1	-11	0	6.2	NAF
38312	HIT	125	P2b	178 / 17	Cleaner	10.47	320	7	0.0	313	91	2.1	PAF
38286	HIT	125	P2b	178 / 17	Final	1.94	59	10	0.2	49	41	2.5	PAF
38307	HIT	137	P2b	236 / 19	Rougher	0.20	6	11	1.8	-5	3	4.1	UC (PAF-LC)
38320	HIT	137	P2b	236 / 19	Cleaner	10.27	314	9	0.0	305	112	2.1	PAF
38294	HIT	137	P2b	236 / 19	Final	2.27	69	11	0.2	58	35	2.6	PAF
38303	HIT	131	P2b	157 / 27	Rougher	0.11	3	12	3.6	-9	0	5.7	NAF
38316	HIT	131	P2b	157 / 27	Cleaner	10.63	325	14	0.0	311	83	2.2	PAF
38290	HIT	131	P2b	157 / 27	Final	1.95	60	11	0.2	49	39	2.5	PAF
38300	HIT	126	P2c	158 / 24	Rougher	0.04	1	16	13.1	-15	0	7.2	NAF
38313	HIT	126	P2c	158 / 24	Cleaner	7.87	241	10	0.0	231	67	2.3	PAF
38287	HIT	126	P2c	158 / 24	Final	1.14	35	11	0.3	24	26	2.5	PAF
38308	HIT	138	P2c	233 / 27	Rougher	0.07	2	14	6.5	-12	0	5.2	NAF
38321	HIT	138	P2c	233 / 27	Cleaner	8.47	259	10	0.0	249	60	2.4	PAF
38295	HIT	138	P2c	233 / 27	Final	0.91	28	13	0.5	15	22	2.7	PAF
38301	HIT	128	P3a	195 / 19	Rougher	0.13	4	2	0.5	2	0	4.9	UC (NAF)
38314	HIT	128	P3a	195 / 19	Cleaner	5.44	166	0	0.0	166	66	2.2	PAF
38288	HIT	128	P3a	195 / 19	Final	0.89	27	2	0.1	25	19	2.6	PAF

TABLE C1-1: *Continued*

EGi Code	Deposit	Flotation Test	Ore Type	Grind/ Regrind (µm)	Tailings Type	ACID-BASE ANALYSIS					NAG TEST		ARD Class
						Sulfur %S	MPA kg H_2SO_4/t	ANC kg H_2SO_4/t	ANC/MPA Ratio	NAPP kg H_2SO_4/t	NAG kg H_2SO_4/t	NAGpH	
38309	HIT	139	P3a	144 / 18	Rougher	0.11	3	2	0.6	1	0	4.6	UC (NAF)
38322	HIT	139	P3a	144 / 18	Cleaner	6.51	199	0	0.0	199	70	2.2	PAF
38296	HIT	139	P3a	144 / 18	Final	0.91	28	1	0.0	27	20	2.6	PAF
38302	HIT	129	P4	185 / 26	Rougher	0.05	2	12	7.8	-10	0	7.1	NAF
38315	HIT	129	P4	185 / 26	Cleaner	4.16	127	8	0.1	119	41	2.4	PAF
38289	HIT	129	P4	185 / 26	Final	0.51	16	10	0.6	6	6	3.4	PAF-LC
38304	HIT	134	P4	151 / 25	Rougher	0.04	1	10	8.2	-9	0	7.6	NAF
38317	HIT	134	P4	151 / 25	Cleaner	3.12	95	11	0.1	84	30	2.5	PAF
38291	HIT	134	P4	151 / 25	Final	0.27	8	10	1.2	-2	4	3.8	UC (PAF-LC)
39749	HIT	Large	P1		Rougher	0.19	6	14	2.4	-8	0	7.7	NAF
39750	HIT	Flotation	P1		Cleaner	2.53	77	7	0.1	70	47	2.3	PAF
39751	HIT	Tests	P1		Final	0.57	17	12	0.7	5	5	3.3	PAF-LC
39752	HIT	Large	P2		Rougher	0.14	4	12	2.8	-8	0	7.6	NAF
39753	HIT	Flotation	P2		Cleaner	5.37	164	3	0.0	161	76	2.2	PAF
39754	HIT	Tests	P2		Final	0.54	17	12	0.7	5	5	3.2	PAF-LC
39755	HIT	Large	P3		Rougher	0.42	13	12	0.9	1	4	3.4	PAF-LC
39756	HIT	Flotation	P3		Cleaner	11.05	338	3	0.0	335	80	2.2	PAF
39757	HIT	Tests	P3		Final	0.79	24	12	0.5	12	7	3.1	PAF-LC
39759	HIT	Large	P1,P2,P3		Final	0.58	18	11	0.6	7	5	3.3	PAF-LC
39758	HIT	Flotation	P1,P2,P3		Rougher	0.22	7	12	1.8	-5	0	7.4	NAF
40246	HIT	Tests	P1,P3		Rougher	0.44	13	10	0.7	3	6	3.5	PAF-LC

Abbreviations

MPA Maximum Potential Acidity (kgH_2SO_4/t)
ANC Acid Neutralising Capacity (kgH_2SO_4/t)
NAPP Net Acid Producing Potential (kgH_2SO_4/t)

NAG Net Acid Generation capacity (kgH_2SO_4/t)
NAGpH pH of NAG liquor

PAF Potentially Acid Forming
PAF-LC PAF Lower capacity
NAF Non-Acid Forming
UC Uncertain (likely classification in brackets)

APPENDIX C1-2: Acid forming characteristics of HIT tailings - Samples arranged by tailings type

EGi Code	Deposit	Flotation Test	Ore Type	Grind/ Regrind (µm)	Tailings Type	ACID-BASE ANALYSIS					NAG TEST		ARD Class
						Sulfur %S	MPA kg H_2SO_4/t	ANC kg H_2SO_4/t	ANC/MPA Ratio	NAPP kg H_2SO_4/t	NAG kg H_2SO_4/t	NAGpH	
38294	HIT	137	P2b	236 / 19	Final	2.27	69	11	0.2	58	35	2.6	PAF
38290	HIT	131	P2b	157 / 27	Final	1.95	60	11	0.2	49	39	2.5	PAF
38286	HIT	125	P2b	178 / 17	Final	1.94	59	10	0.2	49	41	2.5	PAF
38284	HIT	123	P1	189 / 14	Final	1.49	46	1	0.0	45	36	2.6	PAF
38292	HIT	135	P1	140 / 16	Final	1.42	43	0	0.0	43	36	2.4	PAF
38296	HIT	139	P3a	144 / 18	Final	0.91	28	1	0.0	27	20	2.6	PAF
38288	HIT	128	P3a	195 / 19	Final	0.89	27	2	0.1	25	19	2.6	PAF
38287	HIT	126	P2c	158 / 24	Final	1.14	35	11	0.3	24	26	2.5	PAF
38295	HIT	138	P2c	233 / 27	Final	0.91	28	13	0.5	15	22	2.7	PAF
39757	HIT	Large Float	P3		Final	0.79	24	12	0.5	12	7	3.1	PAF-LC
39759	HIT	Large Float	P1,P2,P3		Final	0.58	18	11	0.6	7	5	3.3	PAF-LC
38289	HIT	129	P4	185 / 26	Final	0.51	16	10	0.6	6	6	3.4	PAF-LC
39751	HIT	Large Float	P1		Final	0.57	17	12	0.7	5	5	3.3	PAF-LC
39754	HIT	Large Float	P2		Final	0.54	17	12	0.7	5	5	3.2	PAF-LC
38293	HIT	136	P2a	198 / 20	Final	0.38	12	10	0.9	2	7	3.0	PAF-LC
38285	HIT	124	P2a	155 / 22	Final	0.36	11	9	0.8	2	7	3.1	PAF-LC
38291	HIT	134	P4	151 / 25	Final	0.27	8	10	1.2	-2	4	3.8	UC (PAF-LC)
40246	HIT	Tests	P1,P3		Rougher	0.44	13	10	0.7	3	6	3.5	PAF-LC
38305	HIT	135	P1	140 / 16	Rougher	0.13	4	1	0.3	3	2	4.2	PAF-LC
38297	HIT	123	P1	189 / 14	Rougher	0.15	5	2	0.4	3	2	4.2	PAF-LC
39755	HIT	Large Float	P3		Rougher	0.42	13	12	0.9	1	4	3.4	PAF-LC
38307	HIT	137	P2b	236 / 19	Rougher	0.20	6	11	1.8	-5	3	4.1	UC (PAF-LC)
38301	HIT	128	P3a	195 / 19	Rougher	0.13	4	2	0.5	2	0	4.9	UC (NAF)
38309	HIT	139	P3a	144 / 18	Rougher	0.11	3	2	0.6	1	0	4.6	UC (NAF)
39758	HIT	Large Float	P1,P2,P3		Rougher	0.22	7	12	1.8	-5	0	7.4	NAF
39752	HIT	Large Float	P2		Rougher	0.14	4	12	2.8	-8	0	7.6	NAF
39749	HIT	Large Float	P1		Rougher	0.19	6	14	2.4	-8	0	7.7	NAF
38303	HIT	131	P2b	157 / 27	Rougher	0.11	3	12	3.6	-9	0	5.7	NAF
38304	HIT	134	P4	151 / 25	Rougher	0.04	1	10	8.2	-9	0	7.6	NAF
38306	HIT	136	P2a	198 / 20	Rougher	0.02	1	10	16.3	-9	0	5.5	NAF
38302	HIT	129	P4	185 / 26	Rougher	0.05	2	12	7.8	-10	0	7.1	NAF
38298	HIT	124	P2a	155 / 22	Rougher	0.01	0	11	35.9	-11	0	6.9	NAF
38299	HIT	125	P2b	178 / 17	Rougher	0.07	2	13	6.1	-11	0	6.2	NAF
38308	HIT	138	P2c	233 / 27	Rougher	0.07	2	14	6.5	-12	0	5.2	NAF
38300	HIT	126	P2c	158 / 24	Rougher	0.04	1	16	13.1	-15	0	7.2	NAF

TABLE C1-2: *Continued*

EGi Code	Deposit	Flotation Test	Ore Type	Grind/ Regrind (µm)	Tailings Type	ACID-BASE ANALYSIS					NAG TEST		ARD Class
						Sulfur %S	MPA kg H_2SO_4/t	ANC kg H_2SO_4/t	ANC/MPA Ratio	NAPP kg H_2SO_4/t	NAG kg H_2SO_4/t	NAGpH	
39756	HIT	Large Float	P3		Cleaner	11.05	338	3	0.0	335	80	2.2	PAF
38312	HIT	125	P2b	178 / 17	Cleaner	10.47	320	7	0.0	313	91	2.1	PAF
38316	HIT	131	P2b	157 / 27	Cleaner	10.63	325	14	0.0	311	83	2.2	PAF
38320	HIT	137	P2b	236 / 19	Cleaner	10.27	314	9	0.0	305	112	2.1	PAF
38318	HIT	135	P1	140 / 16	Cleaner	9.73	298	0	0.0	298	114	2.1	PAF
38310	HIT	123	P1	189 / 14	Cleaner	9.04	277	0	0.0	277	92	2.4	PAF
38321	HIT	138	P2c	233 / 27	Cleaner	8.47	259	10	0.0	249	60	2.4	PAF
38313	HIT	126	P2c	158 / 24	Cleaner	7.87	241	10	0.0	231	67	2.3	PAF
38322	HIT	139	P3a	144 / 18	Cleaner	6.51	199	0	0.0	199	70	2.2	PAF
38319	HIT	136	P2a	198 / 20	Cleaner	5.65	173	5	0.0	168	67	2.2	PAF
38314	HIT	128	P3a	195 / 19	Cleaner	5.44	166	0	0.0	166	66	2.2	PAF
39753	HIT	Large Float	P2		Cleaner	5.37	164	3	0.0	161	76	2.2	PAF
38311	HIT	124	P2a	155 / 22	Cleaner	4.81	147	11	0.1	136	54	2.4	PAF
38315	HIT	129	P4	185 / 26	Cleaner	4.16	127	8	0.1	119	41	2.4	PAF
38317	HIT	134	P4	151 / 25	Cleaner	3.12	95	11	0.1	84	30	2.5	PAF
39750	HIT	Large Float	P1		Cleaner	2.53	77	7	0.1	70	47	2.3	PAF

Abbreviations

MPA	Maximum Potential Acidity (kgH_2SO_4/t)	NAG	Net Acid Generation capacity (kgH_2SO_4/t)	PAF	Potentially Acid Forming
ANC	Acid Neutralising Capacity (kgH_2SO_4/t)	NAGpH	pH of NAG liquor	PAF-LC	PAF Lower capacity
NAPP	Net Acid Producing Potential (kgH_2SO_4/t)			NAF	Non-Acid Forming
				UC	Uncertain (likely classification in brackets)

Appendix C2

Elemental Composition of HIT Tailings Solids

APPENDIX C2: Elemental composition of HIT tailings solids

PARAMETER		38285	38286	38287	38291	38292	38296	39759 (Column)	39758 (Column)	35755 (Column)	40246 (Column)
Tail Type		Final	Final	Final	Final	Final	Final	Final	Rougher	Rougher	Rougher
Ore Type		P2a	P2b	P2c	P4	P1	P3a	P1,P2,P3	P1,P2,P3	P3	P1,P3
Float Test		124	125	126	134	135	139				
Grind Size		155 / 22	178 / 17	158 / 24	151 / 25	140 / 16	144 / 18				
ANC (kg H_2SO_4/t)		9	10	11	10	0	1	11	12	10	10
NAPP (kg H_2SO_4/t)		2	49	24	-2	43	27	7	-5	1	3
NAGpH		3.1	2.5	2.5	3.8	2.4	2.6	3.3	7.4	3.4	3.5
ARD Class		PAF-LC	PAF	PAF	PAF-LC	PAF	PAF	PAF-LC	NAF	PAF-LC	PAF-LC
S	%	0.36	1.94	1.14	0.27	1.42	0.91	0.58	0.22	0.42	0.44
Al	%	7.3	7.1	7.9	7.8	7.9	7.8	8.1	8.3	7.9	8.2
Ca	%	1.4	1.0	1.8	1.0	0.12	0.08	0.8	0.8	0.8	0.9
Fe	%	2.4	4.0	3.6	2.8	2.1	2.7	2.4	2.2	2.4	2.4
K	%	1.2	2.1	2.0	1.7	3.3	3.3	2.4	2.4	2.3	2.4
Mg	%	1.4	2.0	2.2	1.7	0.3	1.3	1.2	1.2	1.1	1.1
Na	%	3.2	2.2	2.8	2.4	0.2	0.2	1.1	1.2	1.2	1.3
As	mg/kg	0.2	1.1	0.3	0.8	3.7	1.1	1.8	1.7	1.4	2.3
Ba	mg/kg	270	280	300	330	480	590	440	450	410	420
Be	mg/kg	0.7	1.0	1.0	1.0	0.6	0.9	0.8	0.9	0.7	0.7
Bi	mg/kg	0.13	0.61	0.09	0.3	0.14	0.13	0.17	0.1	0.11	0.13
Cd	mg/kg	0.02	0.08	0.02	0.32	0.04	0.04	0.06	0.04	0.04	0.04
Co	mg/kg	9	17	21	10	20	25	10.1	6.1	7.3	6.6
Cr	mg/kg	55	130	50	46	84	47	190	150	144	112
Cu	mg/kg	403	663	547	757	787	768	682	622	675	1075
Hg	mg/kg	0.005	0.005	0.005	0.006	0.017	0.006	0.005	0.005	0.005	0.005
Mn	mg/kg	160	367	270	1340	34	98	313	320	291	289
Mo	mg/kg	6	20	9	8	164	29	21	16	14	15
Ni	mg/kg	44	105	45	31	55	36	102	79	71	55
P	mg/kg	750	1120	1110	930	790	220	820	830	750	770
Pb	mg/kg	7	8	3	15	4	8	6	5	4	4
Sb	mg/kg	0.05	0.15	0.08	0.5	0.9	0.6	0.15	0.15	0.12	0.11
Se	mg/kg	1	3	3	2	5	4	4	3	3	3
Sn	mg/kg	1	2	2	1	4	3	4	3	3	3
Sr	mg/kg	537	200	374	368	691	55	378	398	368	388
Th	mg/kg	5	4	2	5	4	5	5	5	4	4
U	mg/kg	0.3	0.5	0.4	0.4	0.6	0.7	0.8	0.8	0.6	0.6
Zn	mg/kg	28	59	30	159	12	15	29	28	20	20

* Underlined values indicate concentration below the analytical detection limit.

Appendix C3

Geochemical Abundance Indices for HIT Tailings Solids

APPENDIX C3: Geochemical abundance indices for HIT tailings solids

Parameter	Median Soil Content		Geochemical Abundance Indices									
			38285	38286	38287	38291	38292	38296	39759	39758	35755	40246
			Final	Final	Final	Final	Final	Final	Final	Rougher	Rougher	Rougher
S	0.03	%	**3**	**5**	**4**	2	**4**	**4**	**3**	2	**3**	**3**
Al	7.1	%	0	0	0	0	0	0	0	0	0	0
Ca	1.5	%	0	0	0	0	0	0	0	0	0	0
Fe	4	%	0	0	0	0	0	0	0	0	0	0
K	1.4	%	0	0	0	0	0	0	0	0	0	0
Mg	0.5	%	0	1	1	1	0	0	0	0	0	0
Na	0.5	%	2	1	1	1	0	0	0	0	0	0
As	6	mg/kg	0	0	0	0	0	0	0	0	0	0
Ba	500	mg/kg	0	0	0	0	0	0	0	0	0	0
Be	6	mg/kg	0	0	0	0	0	0	0	0	0	0
Bi	0.2	mg/kg	0	1	0	0	0	0	0	0	0	0
Cd	0.4	mg/kg	0	0	0	0	0	0	0	0	0	0
Co	8	mg/kg	0	0	0	0	0	1	0	0	0	0
Cr	70	mg/kg	0	0	0	0	0	0	0	0	0	0
Cu	30	mg/kg	**3**	**3**	**3**	**4**	**4**	**4**	**3**	**3**	**3**	**4**
Hg	0.06	mg/kg	0	0	0	0	0	0	0	0	0	0
Mn	1000	mg/kg	0	0	0	0	0	0	0	0	0	0
Mo	2	mg/kg	0	2	1	1	**5**	**3**	2	2	2	2
Ni	50	mg/kg	0	0	0	0	0	0	0	0	0	0
P	800	mg/kg	0	0	0	0	0	0	0	0	0	0
Pb	35	mg/kg	0	0	0	0	0	0	0	0	0	0
Sb	5	mg/kg	0	0	0	0	0	0	0	0	0	0
Se	0.4	mg/kg	0	2	2	1	2	2	2	2	2	2
Sn	4	mg/kg	0	0	0	0	0	0	0	0	0	0
Sr	250	mg/kg	0	0	0	0	0	0	0	0	0	0
Th	9	mg/kg	0	0	0	0	0	0	0	0	0	0
U	2	mg/kg	0	0	0	0	0	0	0	0	0	0
Zn	90	mg/kg	0	0	0	0	0	0	0	0	0	0

Median soil data from:
Bowen, H.J.M. (1979). Environmental Chemistry of the Elements. Academic Press, London.
Berkman, D.A. (1976). Field Geologists' Manual, The Australian Institute of Mining and Metallurgy, Vic.

* Geochemical Abundance Indices (GAI)
GAI=0 represents <3 times median soil content
GAI=1 represents 3 to 6 times
GAI=2 represents 6 to 12 times
GAI=3 represents 12 to 24 times
GAI=4 represents 24 to 48 times
GAI=5 represents 48 to 96 times
GAI=6 represents more than 96 times

Appendix C4

Metallurgical Results for Locked Cycle Tests Carried Out by G&T Metallurgical Services Ltd

APPENDIX C4: Metallurgical results for locked cycle tests carried out by G&T Metallurgical Services Ltd

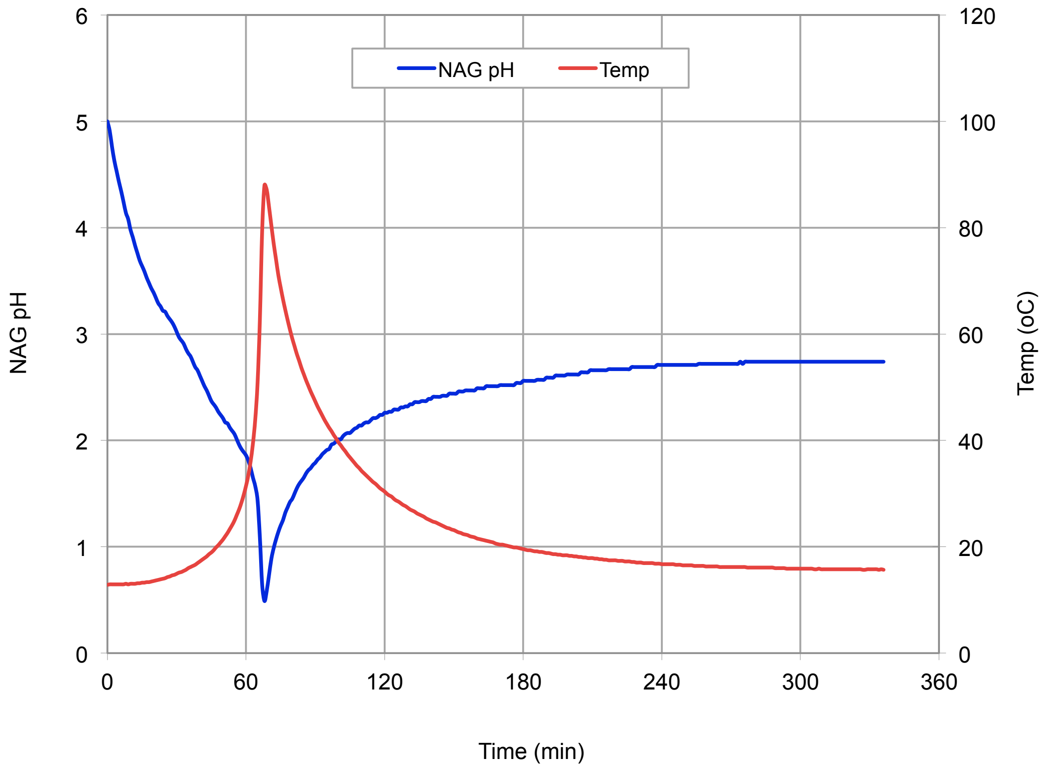
Test	Met ID	Hole ID	Interval		End Member	Ore Type	Ore Test Head			Rougher Tails		Cleaner Tails	
No.	No.	No.	From	To	SS 2008	PFS 2009	%Cu	%S	%C	%Cu	%S	%Cu	%S
1	Comp 1	101XC07M	23.3	24.8	p1	SG	0.97	4.36	0.08	0.30	2.19	0.46	5.19
2	Comp 2	101XC07M	38.25	41	p1	SG	0.92	2.66	0.07	0.16	0.18	0.42	6.68
3	Comp 3	101XC07M	50.1	51.9	p1	SG	1.21	3.98	0.06	0.42	2.20	0.50	7.54
4	Comp 4	101XC07M	61.9	63.7	p1	SG	0.79	2.86	0.03	0.27	1.28	0.38	4.14
5	Comp 5	102XC07M	14.4	16.3	p1	SG	2.30	2.20	0.01	0.22	0.33	0.47	3.89
6	Comp 6	102XC07M	20.9	23.09	p1	SG	2.26	3.21	0.02	0.20	0.40	0.29	1.32
7	Comp 7	102XC07M	53.5	55.2	p1	SG	0.59	1.57	0.01	0.14	0.60	0.08	0.38
8	Comp 8	102XC07M	78.65	80.1	p4	PRI	1.16	1.53	0.00	0.05	0.12	0.45	1.73
9	Comp 9	102XC07M	94.7	96.3	p4	PRI	0.73	0.95	0.02	0.16	0.24	0.25	0.44
10	Comp 10	102XC07M	126.3	131.2	p3a	PRI	1.09	2.32	0.01	0.08	0.31	0.22	1.99
11	Comp 11	102XC07M	162.6	165.9	p3a	PRI	0.44	1.42	0.01	0.06	0.17	0.21	5.49
12	Comp 12	103XC07M	43.9	46.6	p2a	PRI	0.96	2.84	0.01	0.14	0.43	0.25	0.46
13	Comp 13	103XC07M	80.2	82.7	p2a	PRI	0.95	1.97	0.00	0.07	0.22	0.20	2.25
14	Comp 14	102XC07M	110.45	111.95	p3a	PRI	0.82	1.19	0.01	0.10	0.17	0.21	0.68
15	Comp 15	103XC07M	60.6	63.45	p2a	PRI	0.66	4.90	0.01	0.21	2.28	0.07	0.79
16	Comp 16	NA											
17	Comp 17	NA											
18	Comp 18	105XC07M	229.7	232	p4	PRI	0.14	1.86	0.23	0.01	0.06	0.06	10.60
19	Comp 19	107XC07M	146.6	150	p4	PRI	0.60	2.13	0.00	0.04	0.10	0.31	13.80
20	Comp 20	NA											
21	Comp 21	103XC07M	213.2	216	p3a	PRI	1.17	1.68	0.00	0.12	0.19	0.32	0.69
22	Comp 22	103XC07M	231.4	234	p3a	PRI	0.89	2.26	0.00	0.11	0.28	0.29	0.93
23	Comp 23	NA											
24	Comp 24	104XC07M	28.1	29.9	p1	SG	0.95	1.69	0.01	0.11	0.14	0.48	3.45
25	Comp 25	104XC07M	47.5	51.4	p1	SG	0.33	4.34	0.02	0.03	1.03	0.44	18.70
26	Comp 26	105XC07M	24.1	27.8	p2a	PRI	0.45	0.58	0.00	0.03	0.06	1.04	2.21
27	Comp 27	105XC07M	90.1	93.1	p2b	PRI	0.42	0.54	0.01	0.02	0.07	0.28	0.80
28	Comp 28	105XC07M	130.8	136.7	p4	PRI	0.34	1.91	0.01	0.03	0.10	0.15	12.70
29	Comp 29	NA											
30	Comp 30	105XC07M	250	252.8	p4	PRI	0.47	1.85	0.34	0.04	0.11	0.16	4.65
31	Comp 31	106XC07M	64.75	66.1	p4	PRI	0.43	1.73	0.00	0.03	0.22	0.48	12.80
32	Comp 32	106XC07M	123	126.7	p4	PRI	0.80	0.98	0.00	0.08	0.15	0.29	0.49
33	Comp 33	106XC07M	139.8	143.4	p4	PRI	1.02	1.50	0.01	0.08	0.16	0.23	1.44
34	Comp 34	107XC07M	84.85	88	p4	PRI	0.22	0.30	0.01	0.01	0.04	0.22	1.15
35	Comp 35	107XC07M	109.8	114.4	p4	PRI	0.64	0.78	0.02	0.03	0.06	0.21	0.35
36	Comp 36	108XC07M	37.9	39.5	p2b	PRI	0.54	0.82	0.01	0.05	0.05	0.22	1.74
37	C-01	215XC09	52	58	P2b	PRI	0.36	0.44	0.10	0.01	0.01	2.04	5.06
38	C-02	213XC09	158	162	P2b	PRI	0.73	1.71	0.39	0.04	0.01	0.34	5.71
39	C-03	217XC09	22	26	P1	SG	1.22	2.00	0.005	0.48	0.20	1.04	2.09
40	C-04	217XC09	54	58	P1	SG	1.59	1.82	0.01	0.29	0.05	0.89	6.01
41	C-05	217XC09	174	182	P3a	PRI	0.93	1.63	0.02	0.08	0.20	0.51	5.42
42	C-06	217XC09	364	384	P2a	PRI	0.44	1.43	0.08	0.03	0.18	0.65	7.22
43	C-07	225XC09	126	132	P3a	PRI	0.32	2.09	0.07	0.03	0.15	0.27	16.40
44	C-08	212XC09	286	290	P4	PRI	0.42	0.91	0.01	0.05	0.13	0.13	3.09
45	C-09	232XC09	152	160	P3a	PRI	0.18	7.07	0.01	0.04	0.66	0.13	21.90
46	C-10	233XC09	80	86	P3a	PRI	0.23	1.13	0.03	0.04	0.13	0.10	3.26
47	C-11	242XC09	240	246	P3a	PRI	1.31	2.16	0.03	0.09	0.14	0.58	4.02
48	C-12	242XC09	288	294	P2a	PRI	1.12	1.51	0.08	0.08	0.12	0.19	1.88
49	C-13	242XC09	354	360	P2a	PRI	0.09	0.59	0.37	0.01	0.05	0.36	11.10
50	C-14	250XC09	72	76	P3a	PRI	0.88	1.91	0.004	0.06	0.13	0.19	1.88
51	C-15	250XC09	168	174	P4	PRI	0.36	1.09	0.01	0.04	0.12	0.10	2.85
52	C-16	203XC09	36	42	P1	SG	0.62	1.73	0.01	0.16	0.45	0.48	7.62
53	C-17	203XC09	50	56	P1	SG	0.73	1.15	0.01	0.11	0.16	0.44	4.04
54	C-18	220XC09	4	8	P1	SG	1.23	2.17	0.16	0.22	0.25	0.64	4.68
55	C-19	220XC09	148	156	P3a	PRI	0.77	1.90	0.01	0.02	0.12	0.70	11.50
56	C-20	220XC09	308	320	P3b	PRI	0.80	6.35	0.04	0.07	5.05	0.20	9.79
57	C-21	175XC08B	226	232	P2a	PRI	0.10	0.32	0.05	0.00	0.01	0.74	12.20
58	C-22	230XC09	288	294	P2b	PRI	0.16	3.65	0.04	0.02	1.46	0.18	27.10
59	C-23	249XC09	50	54	P2a	PRI	0.27	1.09	0.01	0.01	0.03	0.37	11.70
60	C-24	249XC09	304	316	P2c	PRI	0.71	3.15	0.03	0.03	2.44	0.62	4.09
61	C-25	215XC09	106	112	P2a	PRI	0.19	0.13	0.01	0.01	0.01	0.71	0.71
62	C-26	215XC09	366	372	P2a	PRI	0.16	0.97	0.41	0.01	0.75	0.25	2.72
63	C-27	226XC09	50	54	P2b	PRI	0.11	1.49	0.003	0.01	0.71	0.49	26.70
64	C-28	247XC09	244	252	P3a	PRI	0.61	3.75	0.01	0.07	0.39	0.29	12.20
65	C-29	247XC09	306	318	P4	PRI	0.74	1.84	0.01	0.06	0.21	0.43	3.36
66	C-30	214XC09	26	30	P1	SG	1.69	1.83	0.01	0.78	0.82	1.64	3.69
67	C-31	214XC09	72	76	P4	PRI	0.41	0.84	0.01	0.07	0.25	0.25	3.07
68	C-32	214XC09	180	184	P4	PRI	0.95	1.56	0.01	0.06	0.08	0.32	4.57
69	C-33	214XC09	268	272	P3b	PRI	1.70	1.52	0.01	0.13	0.12	1.27	3.78

APPENDIX C4: *Continued*

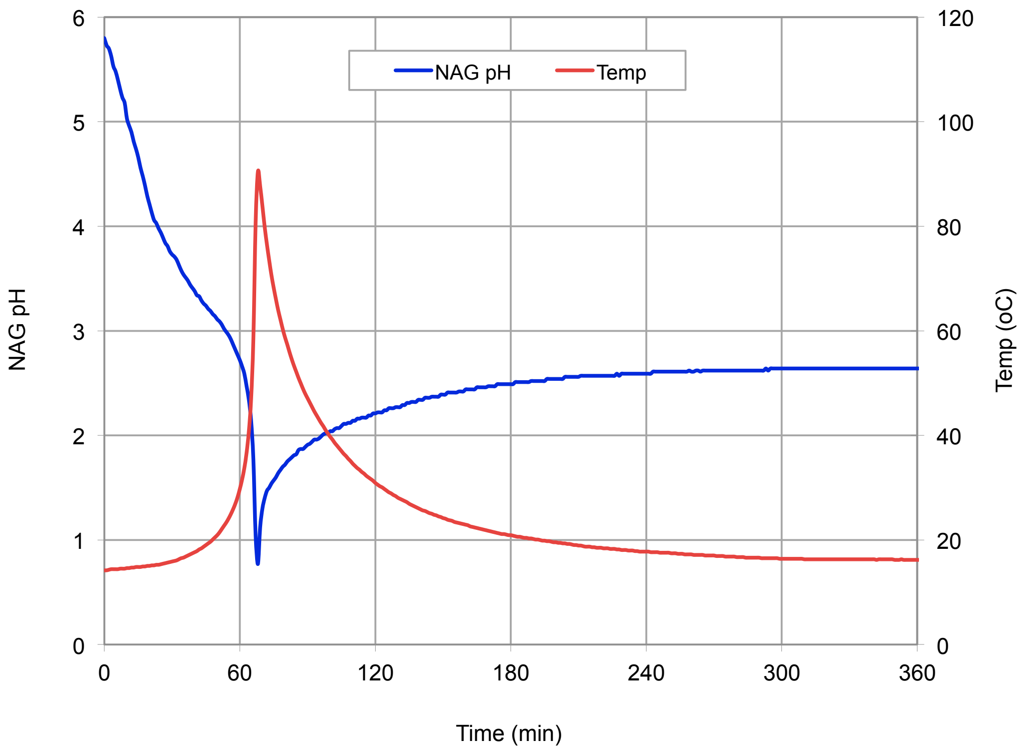
Test	Met ID	Hole ID	Interval		End Member	Ore Type	Ore Test Head			Rougher Tails		Cleaner Tails	
No.	No.	No.	From	To	SS 2008	PFS 2009	%Cu	%S	%C	%Cu	%S	%Cu	%S
70	C-34	219XC09	24	30	P1	SG	2.35	3.19	0.01	0.94	0.85	2.94	9.74
71	C-35	219XC09	60	64	P4	PRI	0.82	1.34	0.004	0.07	0.09	0.31	1.06
72	C-36	224XC09	172	178	P4	PRI	0.18	2.00	0.003	0.03	0.28	0.16	15.90
73	C-37	224XC09	250	256	P3a	PRI	0.18	2.52	0.004	0.03	0.38	0.15	17.30
74	C-38	248XC09	218	224	P3a	PRI	0.67	1.10	0.48	0.04	0.10	0.45	4.38
75	C-39	248XC09	240	246	P3a	PRI	0.54	1.09	0.46	0.03	0.09	0.35	5.24
76	C-40	248XC09	272	278	P2a	PRI	0.41	0.80	0.06	0.03	0.05	0.30	4.18
77	C-41	248XC09	292	298	P2a	PRI	0.37	1.04	0.20	0.02	0.06	0.32	10.60
78	C-42	221XC09	248	254	P2a	PRI	0.11	1.63	0.01	0.01	1.14	0.41	14.90
79	C-43	235XC09	36	40	P2b	PRI	0.39	3.69	0.04	0.32	2.19	0.61	5.28
80	C-44	235XC09	92	96	P3a	PRI	0.22	1.50	0.003	0.02	0.09	0.18	13.50
81	C-45	235XC09	178	184	P2a	PRI	0.13	1.16	0.09	0.02	0.08	0.24	14.00
82	C-46	235XC09	240	246	P3b	PRI	0.22	2.34	0.15	0.03	0.16	0.17	19.20
83	C-47	246XC09	138	142	P2a	PRI	0.48	2.03	0.22	0.04	0.14	0.55	16.80
84	C-48	246XC09	232	238	P2b	PRI	0.63	0.84	0.22	0.03	0.06	0.29	1.71
85	C-49	246XC09	248	254	P2a	PRI	0.07	1.17	0.03	0.00	0.98		
86	C-50	246XC09	268	276	P2c	PRI	0.59	3.67	0.02	0.04	2.75	0.88	9.54
87	C-51	246XC09	310	318	P2c	PRI	0.76	3.61	0.11	0.04	2.06	0.47	11.70
88	C-52	246XC09	338	344	P2b	PRI	0.39	3.42	0.001	0.04	1.91	0.17	15.00
89	C-53	225XC09	186	194	P3a	PRI	0.42	0.86	0.36	0.02	0.06	0.60	8.50
90	C-54	225XC09	508	522	P2a	PRI	0.18	2.63	0.06	0.01	2.20	0.42	10.60
91	C-55	241XC09	98	104	P2b	PRI	0.26	2.32	0.11	0.05	0.18	0.33	17.50
92	C-56	241XC09	270	276	P2b	PRI	0.11	3.87	0.17	0.03	1.43	0.14	27.50
93	C-57	241XC09	294	300	P2b	PRI	0.04	2.45	0.04	0.00	1.64	0.20	17.50
94	C-58	252XC09	38	50		FOX	0.96	0.97	0.03	0.18	0.17	0.24	0.19
95	C-59	252XC09	216	234		PRI	0.31	2.10	0.03	0.16	0.79	0.17	7.13
96	C-60	252XC09	280	296		PRI	0.10	4.17	0.07	0.01	0.30	0.10	7.79
97	C-61	257XC09	82	92		PRI	1.72	2.07	0.04	0.09	0.14	0.30	0.41
98	C-62	257XC09	232	244		PRI	0.58	1.35	0.10	0.12	0.28	0.28	0.75
99	C-63	257XC09	302	312		PRI	0.67	3.42	0.04	0.07	2.83	0.17	3.84
100	C-64	258XC09	28	38		SG	0.64	2.64	0.09	0.64	2.64	1.11	8.13
101	C-65	258XC09	124	134		PRI	0.55	1.96	0.20	0.19	0.38	0.46	1.13
102	C-66	258XC09	230	242		PRI	0.59	7.32	0.06	0.06	5.15	0.20	16.20
103	C-67	291XC09	266	278		PRI	0.03	5.63	0.02	0.01	0.41	0.05	28.60
104	C-68	256XC09	12	24		SG	1.51	3.81	0.04	0.16	0.16	0.56	19.60
105	C-69	256XC09	120	130		SG/PRI	0.38	3.23	0.03	0.09	0.34	0.42	23.00
106	C-70	262XC09	24	44		SG	0.87	3.48	0.04	0.12	0.18	0.39	10.50
107	C-71	262XC09	120	130		PRI	0.41	1.86	0.02	0.05	0.18	0.10	0.94
108	C-72	262XC09	154	164		PRI/SG	0.43	3.37	0.02	0.23	2.05	0.55	23.00
109	C-73	268XC09	120	132		PRI	0.72	1.29	0.04	0.06	0.13	0.26	0.73
110	C-74	268XC09	200	208		PRI	0.43	2.40	0.01	0.03	1.74	0.23	4.74
111	C-75	268XC09	380	396		PRI	0.70	4.05	0.03	0.06	2.36	0.13	7.18
112	C-76	268XC09	420	426		PRI	0.37	3.84	0.06	0.08	2.05	0.23	3.99
113	C-77	268XC09	32	60		SG	0.61	2.49	0.10	0.18	0.22	0.57	5.66
114	C-78	277XC09	144	152		PRI	0.30	1.56	0.01	0.01	0.04	0.25	17.60
115	C-79	277XC09	52	58		PRI	0.47	1.32	0.01	0.02	0.04	0.19	8.41
116	C-80	277XC09	280	296		PRI	0.67	1.72	0.01	0.06	0.18	0.15	1.03
117	C-81	277XC09	326	332		PRI	0.65	2.14	0.01	0.06	0.20	0.20	3.13
118	C-82	282XC09	286	296		PRI	0.01	7.09	0.02	0.00	1.28	0.04	5.84
119	C-83	282XC09	44	50		PRI	0.13	0.48	0.11	0.02	0.03	0.10	0.75
120	C-84	260XC09	240	248		PRI	0.18	7.99	0.22	0.09	5.39	0.12	23.90
121	C-85	260XC09	354	364		PRI	0.21	7.31	0.04	0.09	4.64	0.10	24.30
122	C-86	280XC09	108	122		PRI	0.39	1.15	0.03	0.09	0.17	0.36	6.76
123	C-87	280XC09	330	338		PRI	0.64	5.51	0.01	0.09	4.38	0.24	7.56
124	C-88	280XC09	364	372		PRI	0.57	3.78	0.04	0.05	2.78	0.41	7.86
125	C-89	280XC09	470	484		PRI	0.96	3.43	0.12	0.07	2.50	0.43	3.12
126	C-90	280XC09	812	826		PRI	0.40	3.14	0.13	0.02	1.71	0.46	13.40
					Count	(PRI Only)	98	98	98	98	98	97	97
					Average	(PRI Only)	0.52	2.28	0.07	0.05	0.79	0.33	7.94
					Median	(PRI Only)	0.44	1.91	0.02	0.06	0.20	0.29	5.35
					StDEV	(PRI Only)	0.35	1.59	0.10	0.14	1.17	0.38	7.17
					Max	(PRI Only)	1.72	7.99	0.48	0.94	5.39	2.94	28.60
					Min	(PRI Only)	0.01	0.13	0.00	0.003	0.006	0.04	0.19
					Count	(SPG Only)	23	23	23	23	23	23	23
					Average	(SPG Only)	1.09	2.64	0.04	0.28	0.73	0.67	7.79
					Median	(SPG Only)	0.95	2.64	0.02	0.20	0.34	0.48	5.66
					StDEV	(SPG Only)	0.61	0.98	0.04	0.23	0.79	0.59	6.82
					Max	(SPG Only)	2.35	4.36	0.16	0.94	2.64	2.94	23.00
					Min	(SPG Only)	0.33	0.97	0.00	0.03	0.05	0.08	0.19

Appendix C5

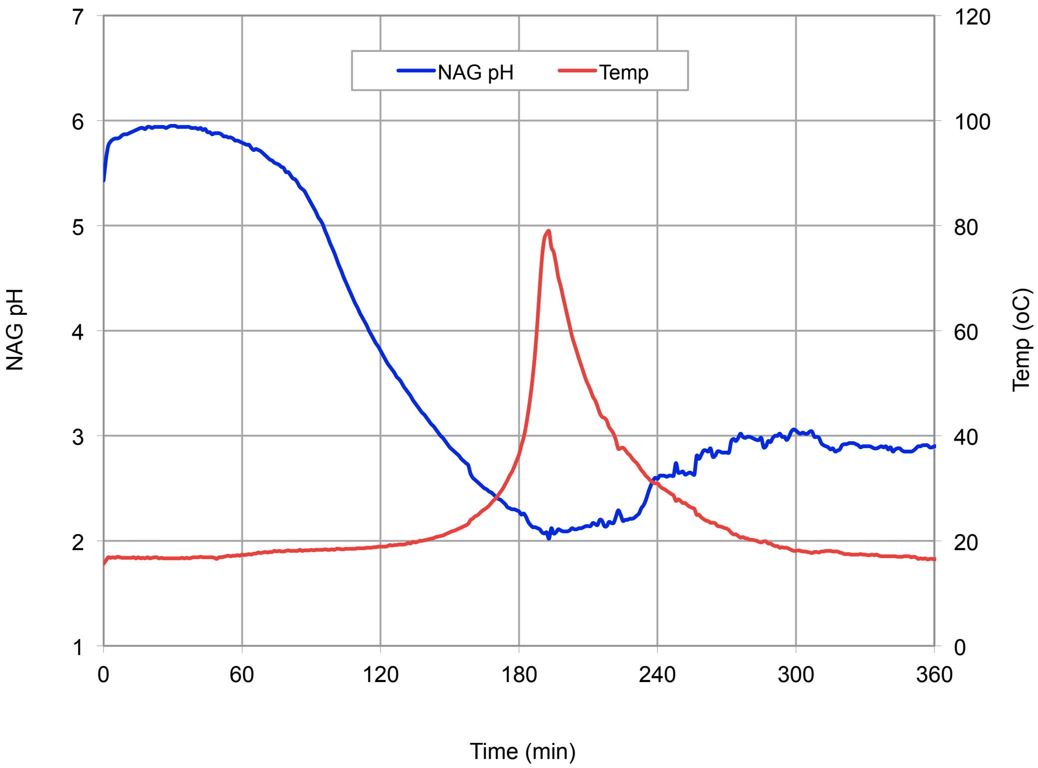
Kinetic NAG Test Profiles for HIT Rougher and Final Tailings



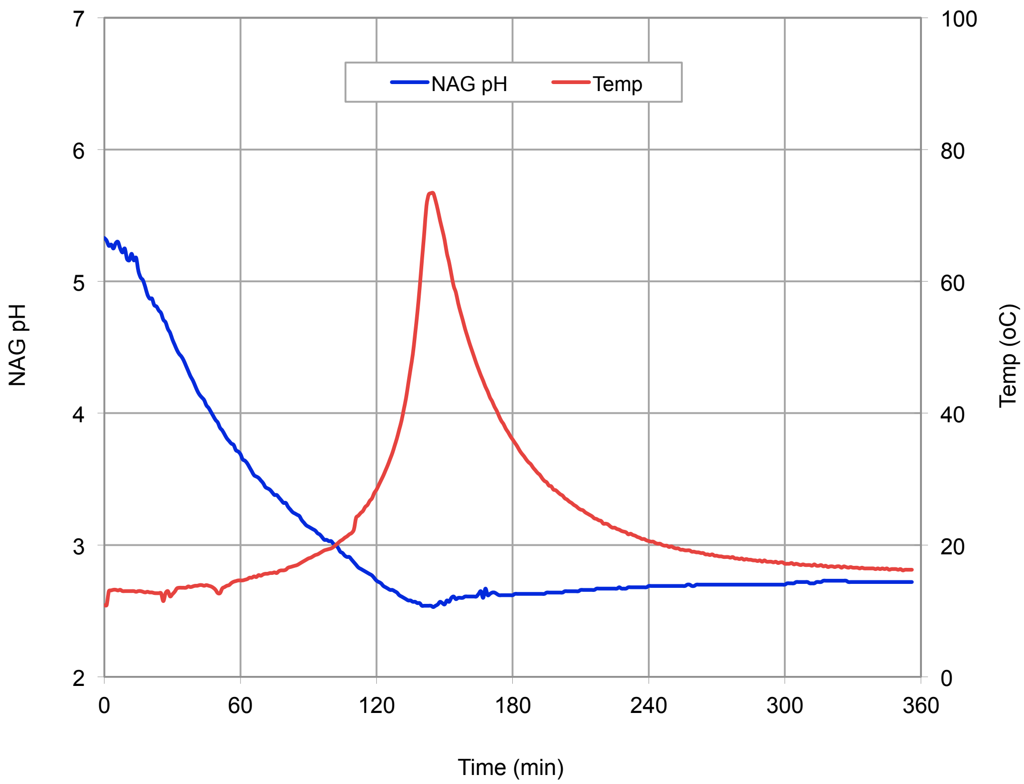
APPENDIX C5-1: Kinetic NAG profiles for HIT final tailings sample #38292 - Ore Type P1



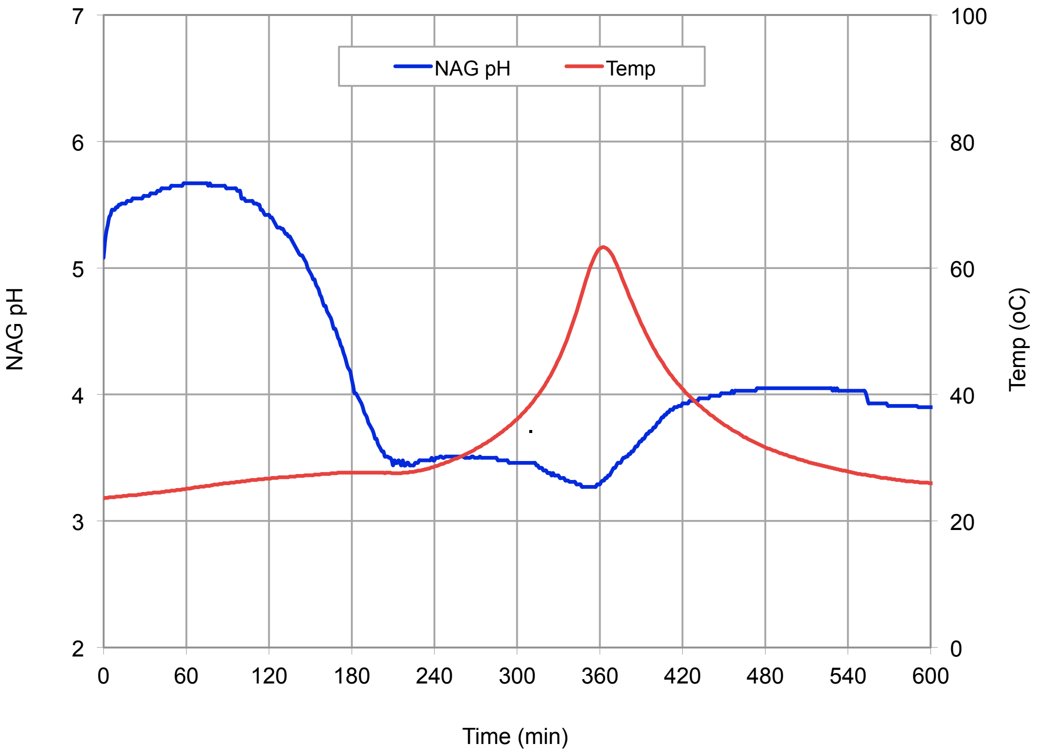
APPENDIX C5-2: Kinetic NAG profiles for HIT final tailings sample #38286 - Ore Type P2b



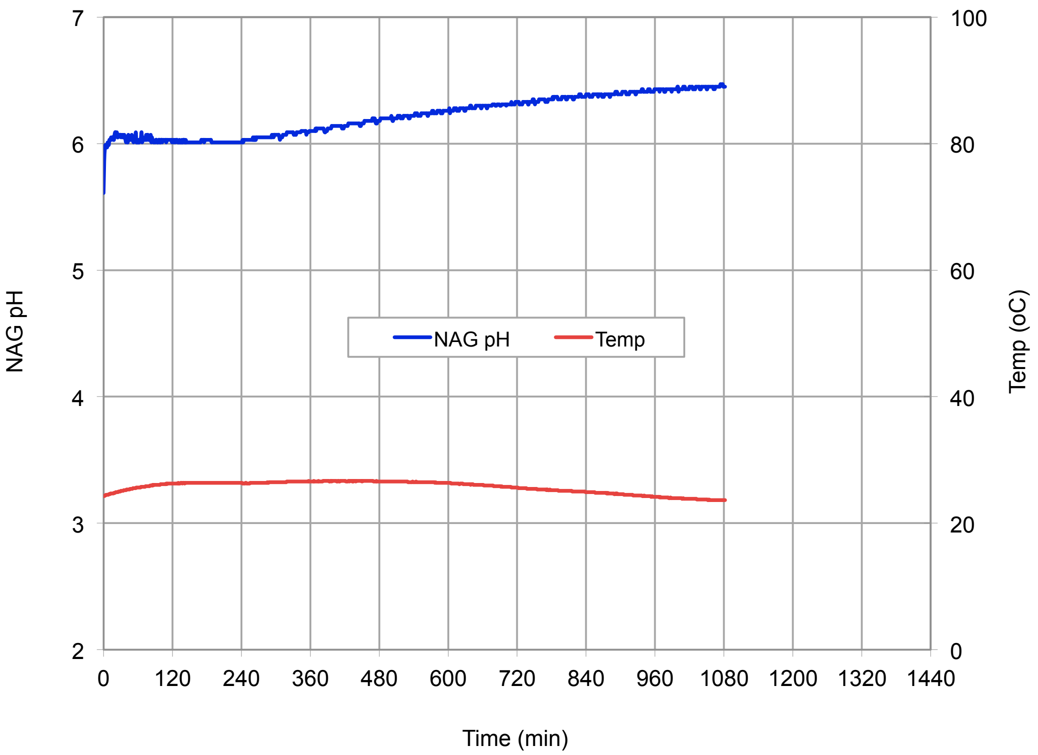
APPENDIX C5-3: Kinetic NAG profiles for HIT final tailings sample #38287 - Ore Type P2c



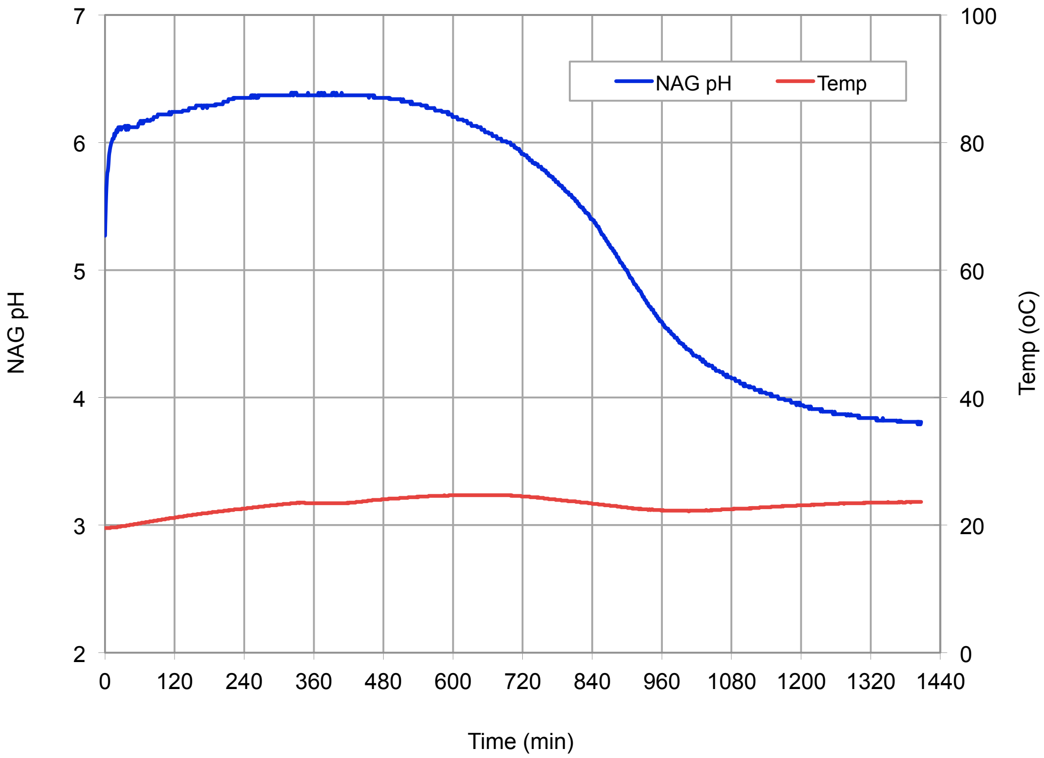
APPENDIX C5-4: Kinetic NAG profiles for HIT final tailings sample #38296 - Ore Type P3a



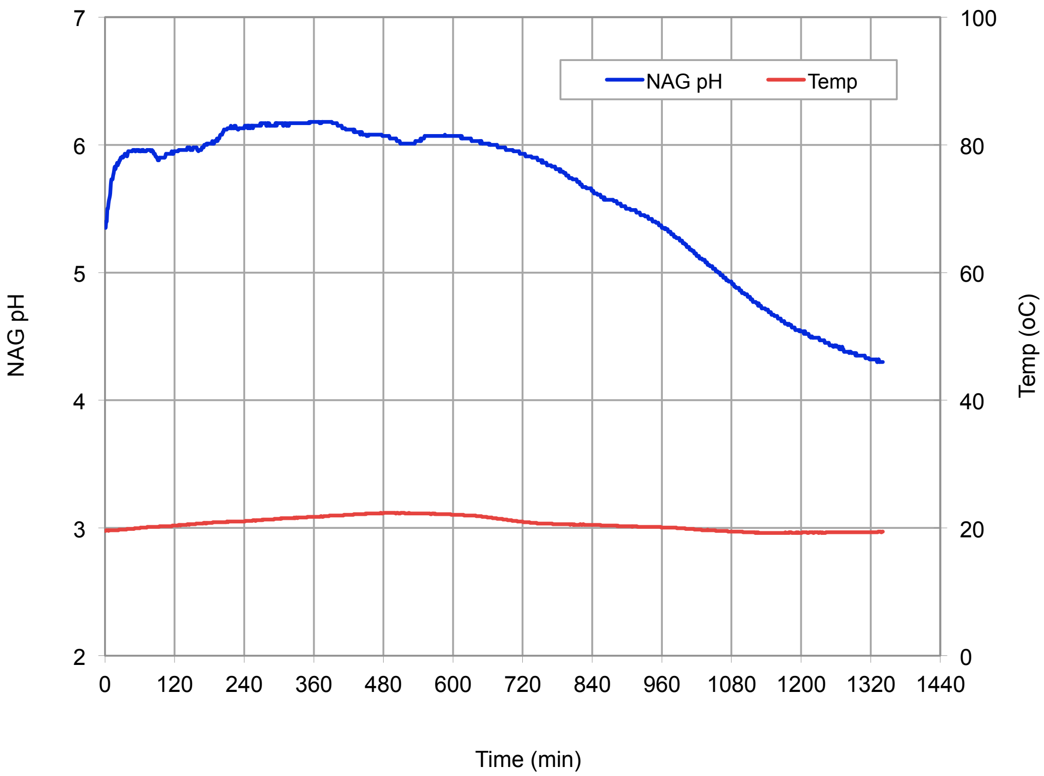
APPENDIX C5-5: Kinetic NAG profiles for HIT final tailings sample #39759
Blend of Ore Types P1, P2 & P3 (Column Test HIT T-1)



APPENDIX C5-6: Kinetic NAG profiles for HIT rougher tailings sample #39758
Blend of Ore Types P1, P2 & P3 (Column Test HIT T-2)



APPENDIX C5-7: Kinetic NAG profiles for HIT rougher tailings sample #39755
Ore Type P3 (Column Test HIT T-3)



APPENDIX C5-8: Kinetic NAG profiles for HIT rougher tailings sample #40246
Blend of Ore Types P1 & P3 (Column Test HIT T-4)

APPENDIX D

RESULTS OF
COLUMN LEACH TESTING OF TAILINGS

Appendix D1

Results of Column Leach Tests Involving HIT Tailings

APPENDIX D1-1: Results of column leach test: HIT T-1 (Final Tailings P1, P2 & P3)

Parameters		Weeks (based on four-week leach cycle)													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	351	416	410	412	399	391	393	387	399	394	392	395	396	399
pH	-	5.7	6.9	7.7	7.6	7.6	7.5	7.5	7.6	7.6	7.6	7.7	7.7	7.8	7.6
EC	dS/m	2.86	3.11	2.66	2.52	2.46	2.33	2.12	1.86	1.61	1.55	1.42	1.48	1.43	0.92
Alkalinity	mg/L	-	48	45	105	91	63	60	53	73	70	93	96	100	91
Acidity	mg/L	8	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Al	mg/L	0.29	0.18	0.26	0.42	0.02	<0.01	<0.01	0.02	0.02	0.02	<0.01	<0.01	<0.01	0.02
As	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
B	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.08	0.05	0.06	0.12
Ba	mg/L	0.062	0.057	0.038	0.024	0.018	0.014	0.016	0.016	0.020	0.018	0.017	0.024	0.025	0.022
Be	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L	545	546	525	502	652	544	498	441	449	344	296	200	184	154
Cd	mg/L	0.0002	0.0002	0.0002	0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0005	0.0001	0.0004	<0.0001	0.0002
Cl	mg/L	491	6	4	4	1	<1	<1	<1	<1	<1	<1	<1	<1	3
Co	mg/L	0.004	0.008	0.007	0.005	0.004	0.004	0.004	0.003	0.004	0.005	0.003	0.005	0.006	0.014
Cr	mg/L	0.002	0.001	0.002	0.001	<0.001	<0.001	<0.001	<0.001	0.002	0.002	0.001	0.001	<0.001	<0.001
Cu	mg/L	0.259	0.10	0.12	0.07	0.03	0.02	0.04	0.03	0.05	0.05	0.05	0.12	0.14	0.43
F	mg/L	0.2	0.1	0.1	0.2	0.2	0.4	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.4
Fe	mg/L	<0.05	0.12	0.31	0.21	<0.05	<0.50	<0.05	<0.50	<0.50	0.33	0.29	<0.05	<0.05	0.07
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
K	mg/L	52	46	39	32	39	29	30	26	26	24	23	22	12	18
Mg	mg/L	137	162	96	61	59	34	23	15	11	9	8	5	5	5
Mn	mg/L	0.53	0.89	0.737	0.780	0.737	0.681	0.574	0.621	0.493	0.494	0.480	0.308	0.260	0.369
Mo	mg/L	0.023	0.018	0.014	0.009	0.008	0.009	0.012	0.016	0.020	0.025	0.026	0.042	0.033	0.030
Na	mg/L	34	29	12	10	7	4	3	2	3	4	3	3	1	4
Ni	mg/L	0.004	0.009	0.006	<0.005	0.004	<0.005	0.005	<0.005	<0.005	0.008	0.007	0.006	0.008	0.018
P	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pb	mg/L	0.004	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001
Sb	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	mg/L	0.04	0.14	0.11	0.080	0.040	0.020	0.020	0.010	0.020	0.020	0.010	0.010	0.020	0.020
Si	mg/L	2.7	3.0	3.3	3.9	2.6	2.4	2.5	2.7	2.8	2.9	3.4	3.01	3.35	3.65
Sn	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO4	mg/L	2520	2070	1710	1610	1650	1540	1240	1260	1130	912	799	490	448	408
Sr	mg/L	2.6	2.7	2.29	2.15	1.91	1.62	1.30	1.25	0.95	0.96	0.82	0.64	0.47	0.54
Th	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
U	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn	mg/L	0.058	0.01	0.01	0.01	<0.005	<0.005	<0.005	0.01	<0.005	0.01	<0.005	0.01	0.01	0.01

Note: < indicate that the concentration is less than the limit of detection

APPENDIX D1-2: Results of column leach test: HIT T-2 (Rougher Tailings P1, P2 & P3)

Parameters		Weeks (based on four-week leach cycle)													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	347	412	396	395	397	395	394	391	396	394	390	393	392	394
pH	-	6.3	7.8	7.4	7.9	8.0	8.0	7.8	7.9	8.0	8.0	8.1	8.1	8.1	7.9
EC	dS/m	1.72	1.65	1.54	1.19	1.02	0.72	0.52	0.32	0.33	0.33	0.28	0.27	0.26	0.25
Alkalinity	mg/L	-	96	64	78	65	76	70	76	99	87	70	79	81	75
Acidity	mg/L	6	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Al	mg/L	0.04	0.05	0.03	0.04	0.02	0.02	0.02	0.04	0.03	0.04	0.03	0.03	0.02	0.04
As	mg/L	0.002	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.002	0.002
B	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	0.06	0.08	0.06	0.06	0.13
Ba	mg/L	0.05	0.080	0.030	0.022	0.021	0.017	0.019	0.021	0.031	0.040	0.042	0.049	0.054	0.068
Be	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L	322	296	269	193	202	100	68	52	59	39	36	36	30	30
Cd	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	<0.0001	<0.0001
Cl	mg/L	21	6	4	4	<1	<1	<1	<1	<1	<1	<1	<1	<1	3
Co	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001
Cu	mg/L	0.037	0.029	0.023	0.019	0.012	0.012	0.012	0.009	0.011	0.011	0.008	0.007	0.006	0.010
F	mg/L	0.2	0.1	<0.1	0.10	0.20	0.30	0.20	0.20	0.30	0.20	0.30	0.30	0.40	0.40
Fe	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.080	0.13	<0.05	0.06	<0.05	<0.05	<0.05	0.19
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
K	mg/L	43	26	26	20	24	16	15	13	13	12	12	14	7	11
Mg	mg/L	44	50	48	35	32	18	11	8	8	6	6	5	4	4
Mn	mg/L	0.041	0.0	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Mo	mg/L	0.069	0.079	0.067	0.07	0.052	0.040	0.036	0.04	0.04	0.04	0.04	0.034	0.029	0.029
Na	mg/L	28	15	10	10	6	2	2	1	2	3	2	3	1	2
Ni	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
P	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pb	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sb	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	mg/L	0.02	0.02	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Si	mg/L	2.4	2.4	2.9	2.7	2.5	2.3	2.6	2.3	2.6	2.7	2.8	2.5	2.6	2.66
Sn	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO4	mg/L	1020	919	836	621	516	292	170	130	111	78	72	61	52	56
Sr	mg/L	1.9	1.82	1.76	1.49	1.14	0.71	0.46	0.43	0.39	0.34	0.32	0.29	0.24	0.26
Th	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
U	mg/L	<0.001	0.00	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn	mg/L	0.01	0.01	0.006	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005	<0.005	<0.005

Note: < indicate that the concentration is less than the limit of detection

APPENDIX D1-3: Results of column leach test: HIT T-3 (Rougher Tailings P3)

Parameters		Weeks (based on four-week leach cycle)													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	340	347	352	355	359	361	380	381	383	391	393	385	389	392
pH	-	6.0	7.7	7.9	7.8	7.7	7.8	7.8	7.8	7.9	7.9	7.9	8.0	8.0	8.0
EC	dS/m	2.17	1.75	1.47	1.32	1.21	0.92	0.71	0.71	0.52	0.51	0.52	0.32	0.31	0.23
Alkalinity	mg/L	-	71	77	62	55	66	63	65	86	90	94	95	97	100
Acidity	mg/L	10	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Al	mg/L	0.04	0.03	0.05	<0.01	0.02	0.01	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.02
As	mg/L	0.002	<0.001	0.002	0.001	<0.001	0.001	0.002	0.001	0.001	0.002	0.001	0.001	0.002	0.001
B	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.06	0.06	0.07	0.05	0.06	0.15	0.14	0.09
Ba	mg/L	0.035	0.026	0.024	0.017	0.019	0.020	0.026	0.027	0.028	0.039	0.044	0.050	0.060	0.063
Be	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L	383	315	310	192	194	144	143	84	60	46	39	35	37	33
Cd	mg/L	0.0001	<0.0001	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0001	0.0003	<0.0001	<0.0001	<0.0001	<0.0001
Cl	mg/L	28	6	<1	1	<1	<1	<1	<1	<1	<1	<1	3	2	<1
Co	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	mg/L	0.055	0.03	0.03	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01
F	mg/L	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.6	0.6
Fe	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
K	mg/L	33	25	29	24	22	18	18	15	13	15	8	11	11	11
Mg	mg/L	66	49	41	32	21	14	10	8	6	4	3	3	3	3
Mn	mg/L	0.07	0.06	0.071	0.057	0.050	0.032	0.023	0.016	0.012	0.007	0.005	0.006	0.005	0.008
Mo	mg/L	0.076	0.067	0.080	0.065	0.063	0.070	0.066	0.073	0.065	0.062	0.046	0.044	0.047	0.034
Na	mg/L	26	16	8	4	3	2	3	4	3	2	1	2	4	4
Ni	mg/L	<0.001	<0.001	0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
P	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pb	mg/L	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sb	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	mg/L	0.03	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Si	mg/L	2.9	2.9	2.8	2.7	2.7	2.7	2.6	2.6	2.8	2.5	2.5	2.52	2.52	2.34
Sn	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO4	mg/L	1280	1030	838	754	551	437	324	209	160	95	72	69	72	55
Sr	mg/L	2.4	2.2	1.74	1.61	1.24	1.00	0.68	0.61	0.44	0.38	0.27	0.28	0.31	0.27
Th	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
U	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn	mg/L	0.026	<0.005	0.01	0.01	<0.005	0.01	0.01	0.01	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Note: < indicate that the concentration is less than the limit of detection

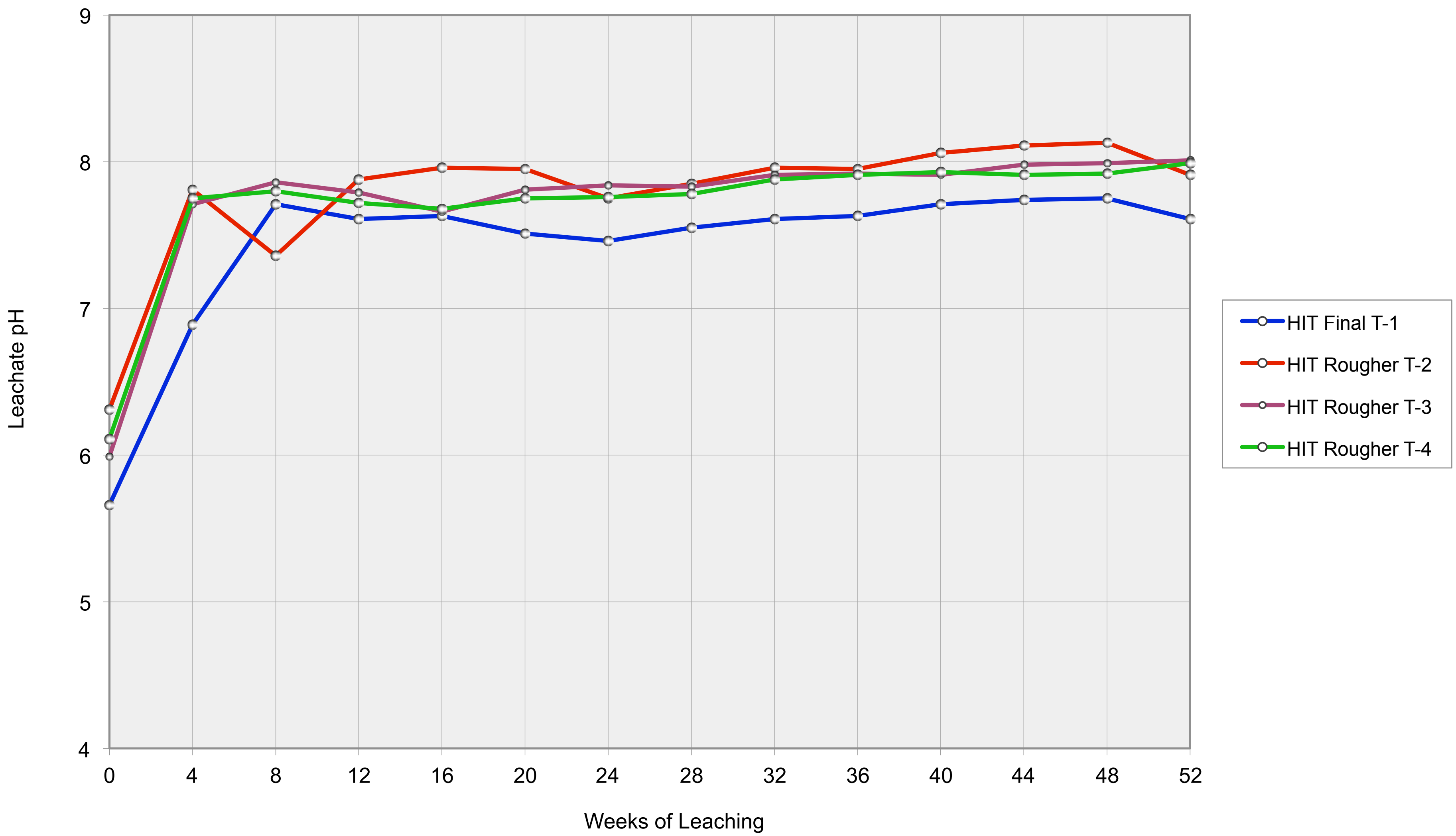
APPENDIX D1-4: Results of column leach test: HIT T-4 (Rougher Tailings P1 & P3)

Parameters		Weeks (based on four-week leach cycle)													
		0	4	8	12	16	20	24	28	32	36	40	44	48	52
Volume	ml	341	364	380	381	376	363	388	389	391	390	392	391	393	391
pH	-	6.1	7.8	7.8	7.7	7.7	7.8	7.8	7.8	7.9	7.9	7.9	7.9	7.9	8.0
EC	dS/m	2.11	1.56	1.62	1.39	1.17	0.95	0.87	0.86	0.61	0.61	0.59	0.42	0.41	0.33
Alkalinity	mg/L	-	49	45	50	47	75	73	71	77	82	85	88	90	96
Acidity	mg/L	9	-	-	-	-	-	-	-	-	-	-	-	-	-
Ag	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Al	mg/L	0.03	0.06	0.03	0.02	0.03	0.03	0.04	0.03	0.03	0.04	0.04	0.04	0.04	0.02
As	mg/L	0.021	0.018	0.011	0.007	0.006	0.006	0.006	0.006	0.004	0.005	0.005	0.004	0.003	0.003
B	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	0.06	0.07	<0.05	0.08	0.17	0.11	0.06
Ba	mg/L	0.035	0.023	0.022	0.017	0.019	0.017	0.016	0.018	0.021	0.023	0.028	0.031	0.035	0.034
Be	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Ca	mg/L	414	300	378	270	205	195	219	113	98	67	57	50	43	35
Cd	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	0.0002	<0.0001	0.0001	<0.0001
Cl	mg/L	17	4	1	<1	<1	<1	<1	<1	<1	<1	<1	3	2	<1
Co	mg/L	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Cr	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
Cu	mg/L	0.334	0.05	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
F	mg/L	0.2	0.2	0.2	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.7	0.6
Fe	mg/L	<0.05	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	0.10	0.08	<0.05	0.10	<0.05	0.10	<0.05
Hg	mg/L	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
K	mg/L	36	23	28	23	21	19	19	16	15	15	8	11	11	10
Mg	mg/L	46	29	32	23	15	12	10	6	5	3	3	2	2	2
Mn	mg/L	0.07	0.04	0.048	0.044	0.036	0.031	0.025	0.016	0.015	0.009	0.006	0.006	0.006	0.005
Mo	mg/L	0.057	0.057	0.056	0.041	0.034	0.040	0.040	0.042	0.047	0.042	0.040	0.034	0.037	0.030
Na	mg/L	25	12	9	3	2	2	3	3	2	2	<1	3	4	2
Ni	mg/L	<0.001	<0.001	0.001	<0.001	0.002	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
P	mg/L	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Pb	mg/L	1.16	0.145	0.093	0.077	0.100	0.115	0.135	0.150	0.102	0.176	0.183	0.214	0.233	0.148
Sb	mg/L	0.002	0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Se	mg/L	0.03	0.02	0.010	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Si	mg/L	2.9	2.5	2.4	2.2	2.3	2.2	2.3	2.2	2.7	2.2	2.2	2.15	2.11	1.89
Sn	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
SO4	mg/L	1230	893	970	797	533	548	478	282	304	159	124	104	91	59
Sr	mg/L	2.4	2.1	2.12	1.86	1.32	1.33	1.00	0.82	0.69	0.48	0.38	0.35	0.36	0.27
Th	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
U	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Zn	mg/L	0.121	0.01	0.01	0.01	<0.005	0.01	0.01	<0.005	<0.005	<0.005	<0.005	0.01	<0.005	<0.005

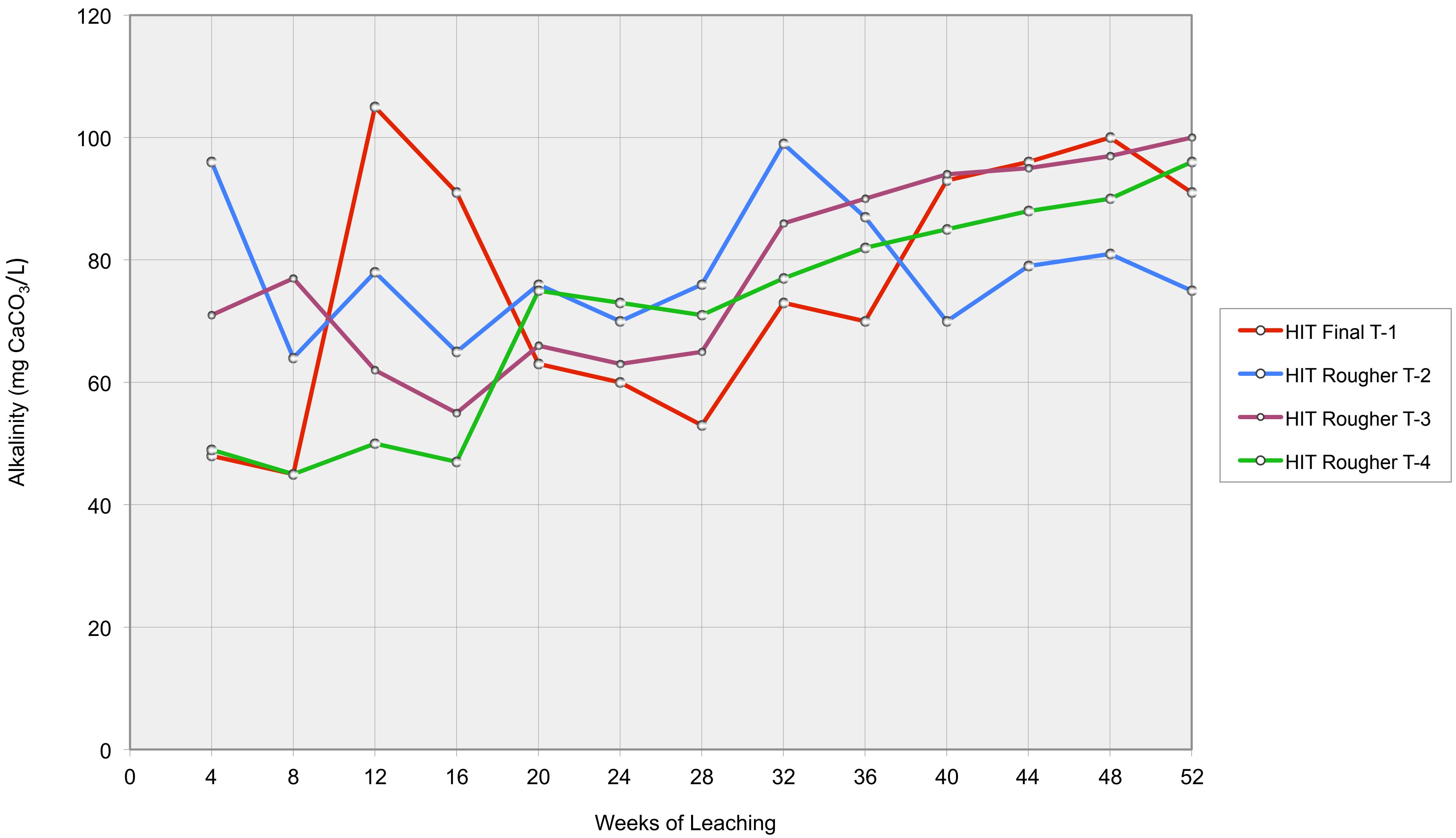
Note: < indicate that the concentration is less than the limit of detection

Appendix D2

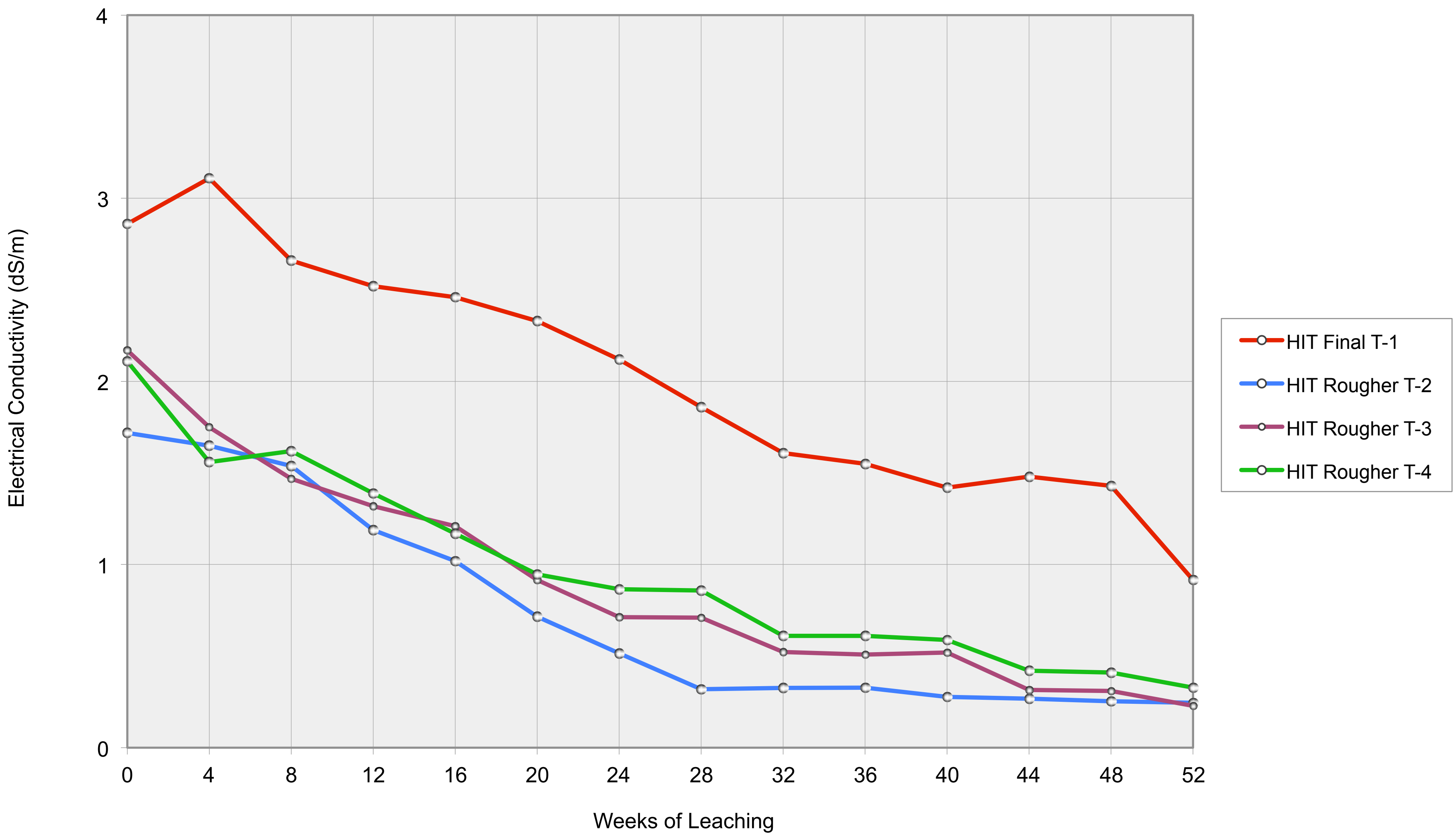
Plots of Leachate Composition Versus Time for Column Leach Tests Involving HIT Tailings



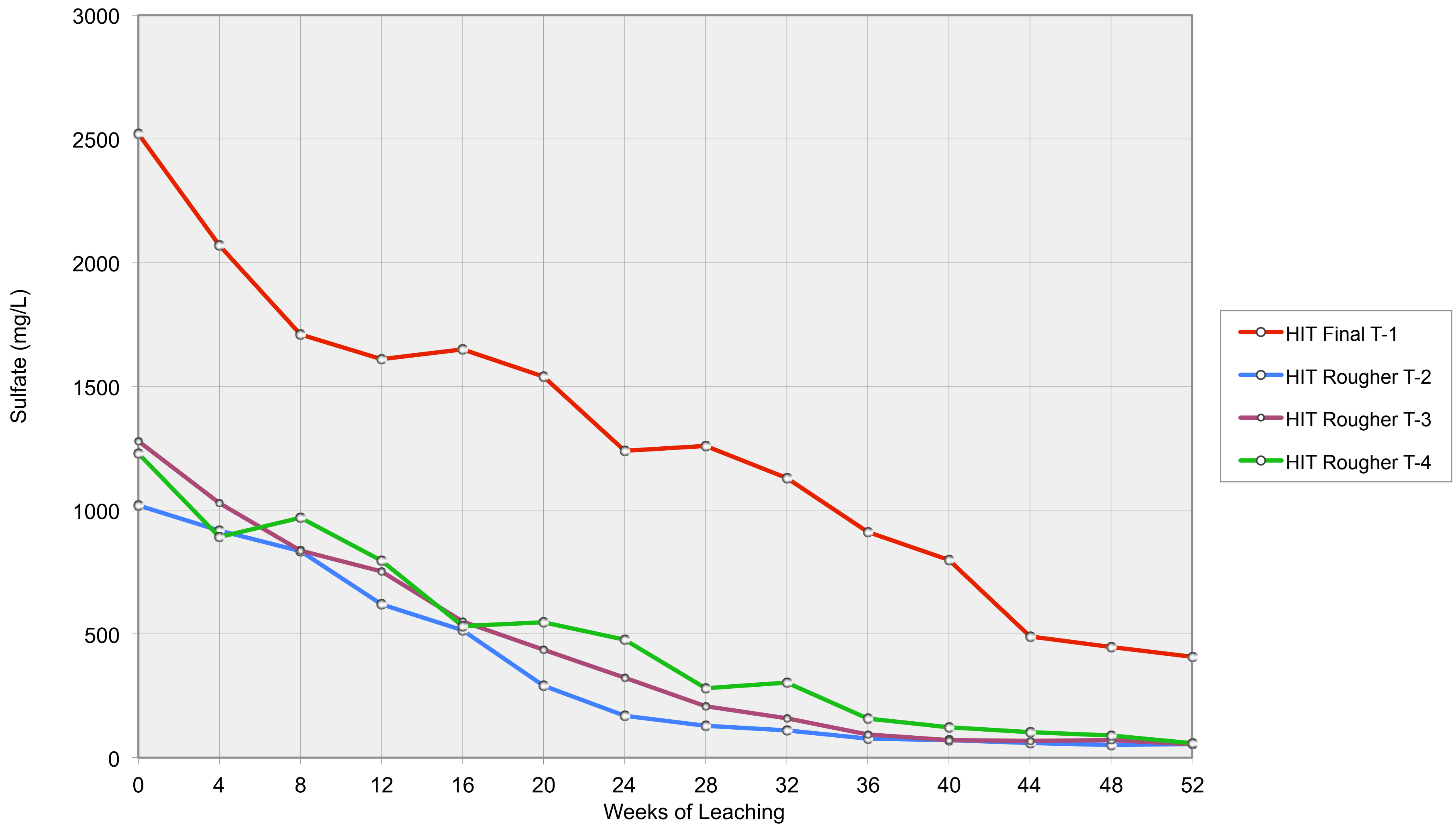
APPENDIX D2-1: Plot of leachate pH versus time for HIT tailings column tests



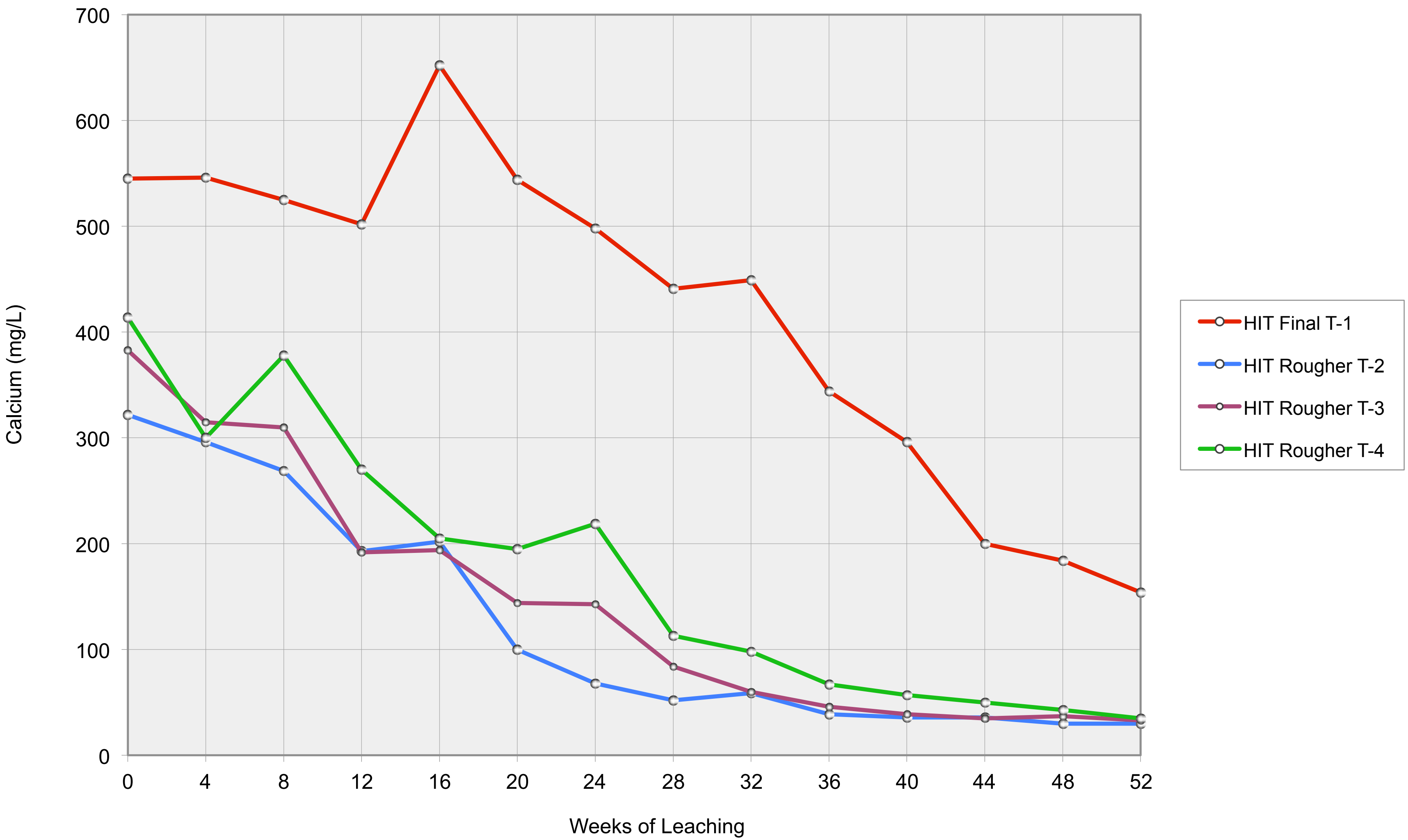
APPENDIX D2-2: Plot of leachate alkalinity versus time for HIT tailings column tests



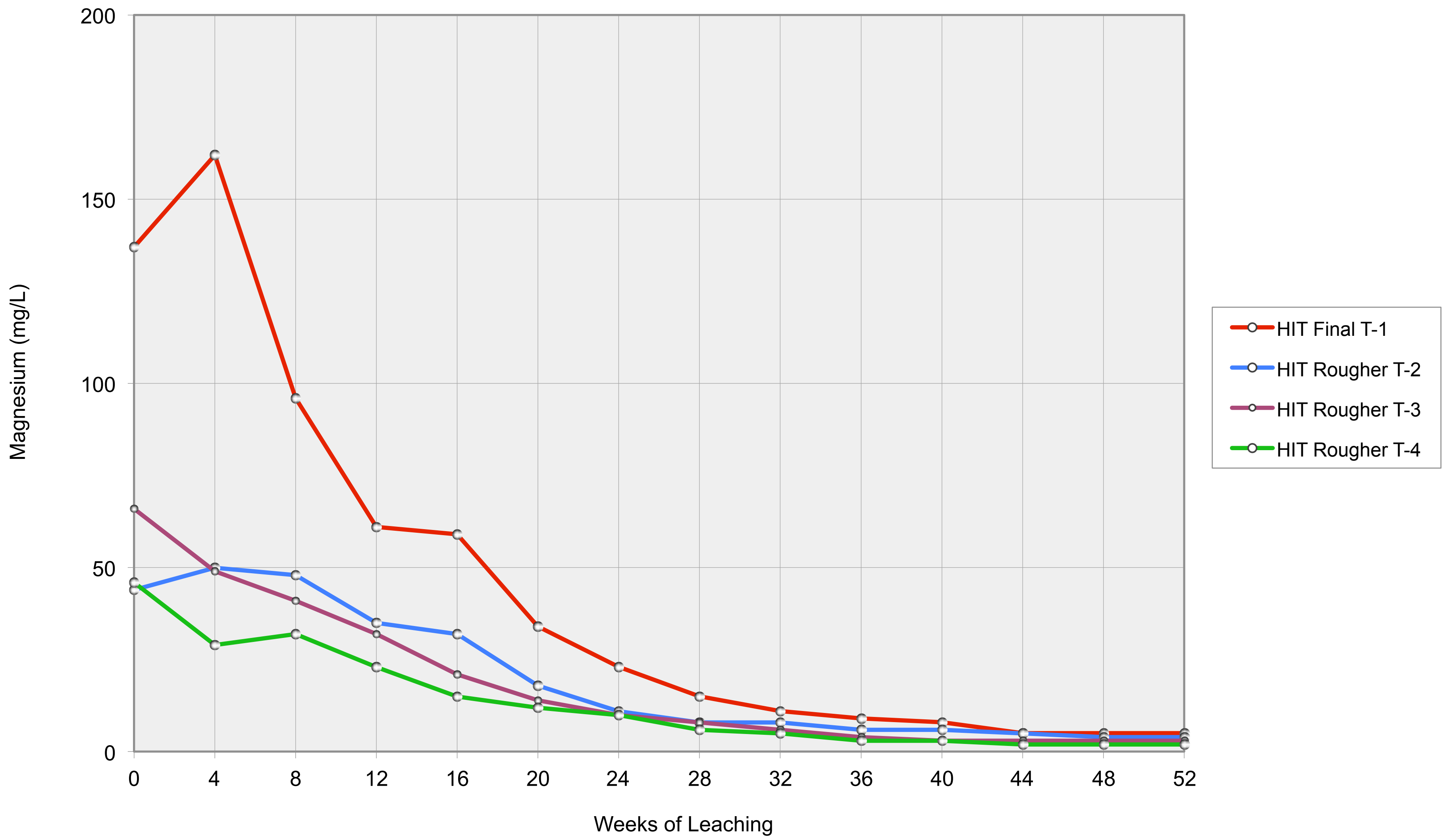
APPENDIX D2-3: Plot of leachate conductivity versus time for HIT tailings column tests



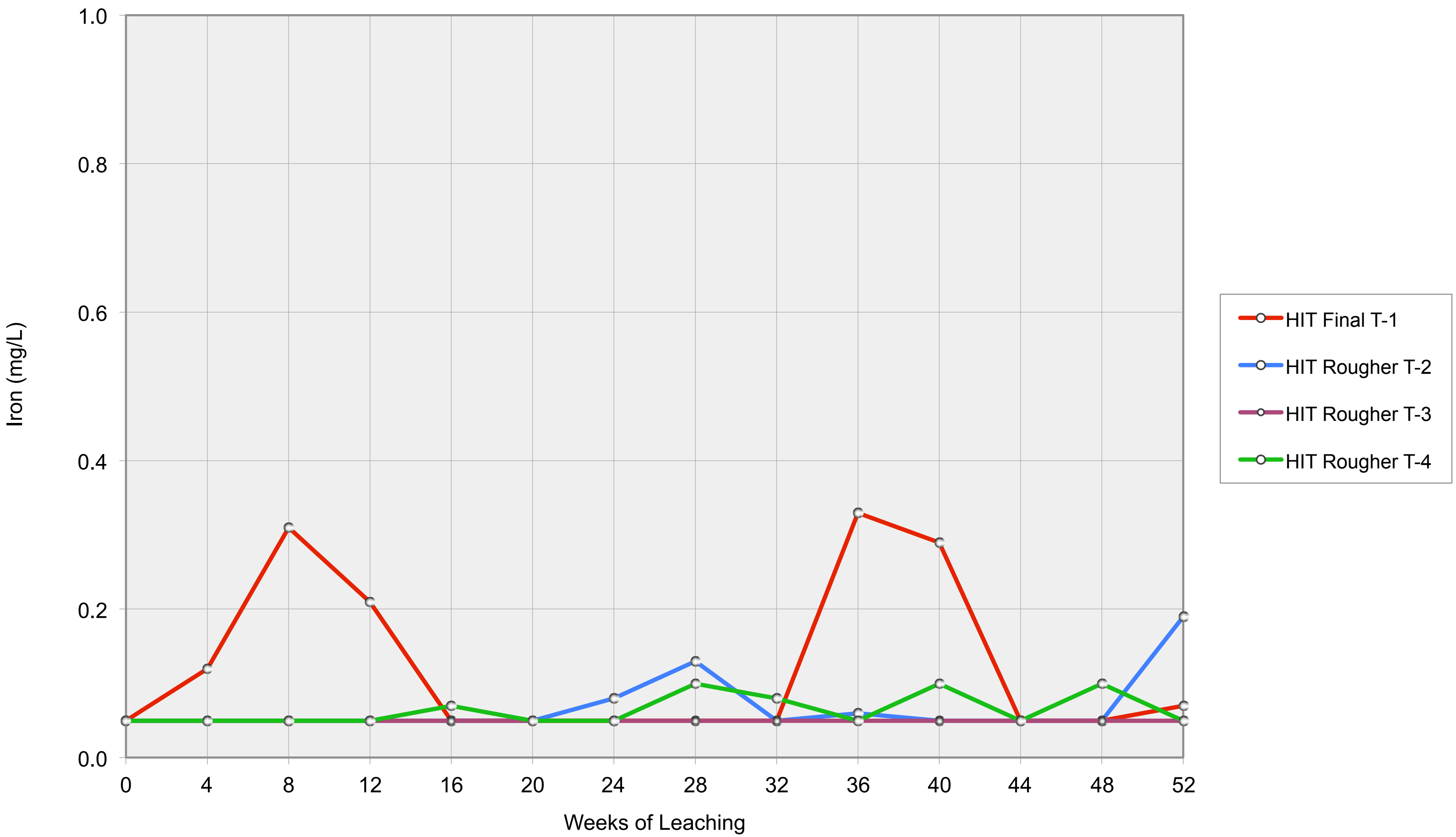
APPENDIX D2-4: Plot of sulfate concentration versus time for HIT tailings column tests



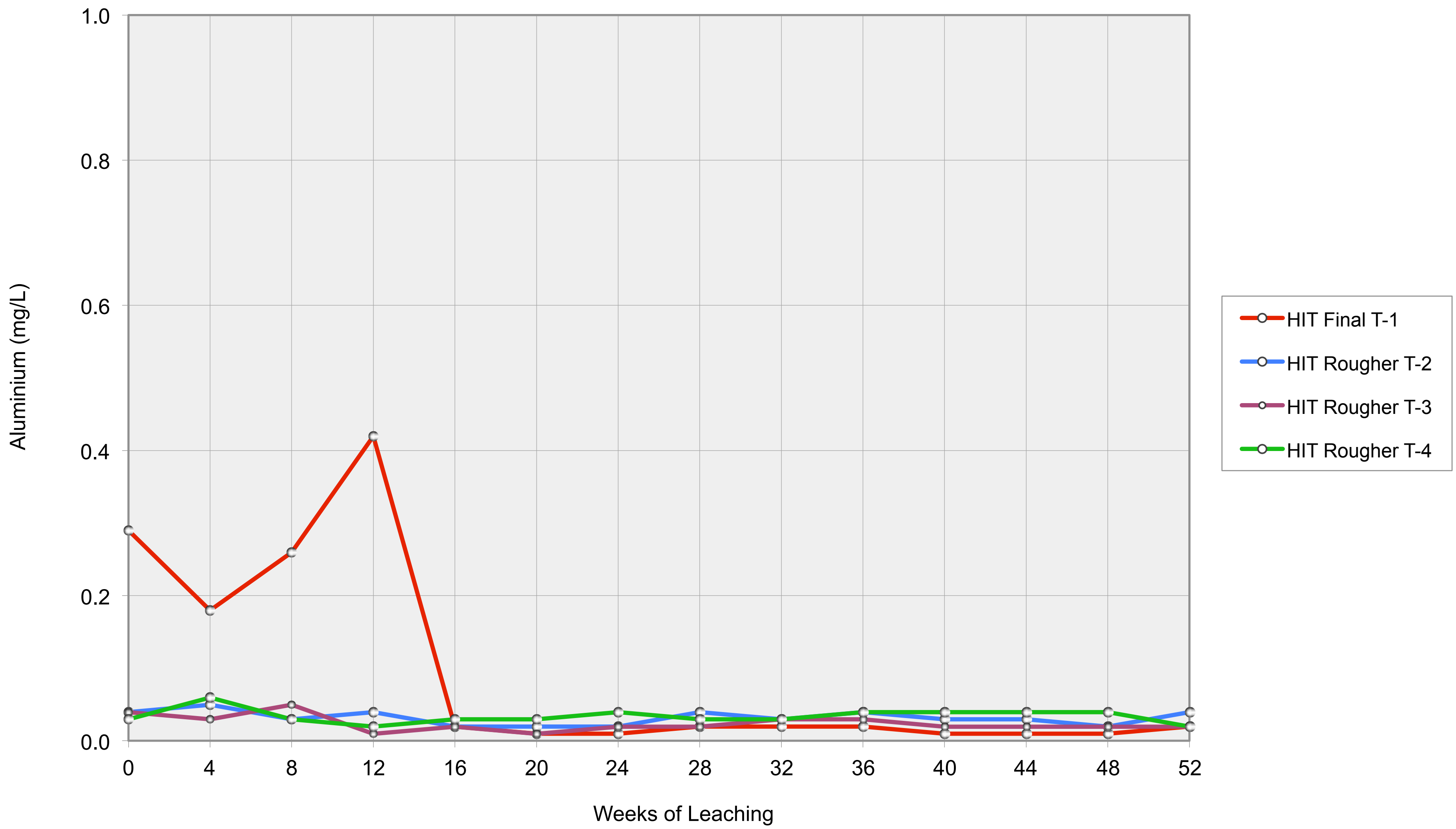
APPENDIX D2-5: Plot of calcium concentration versus time for HIT tailings column tests



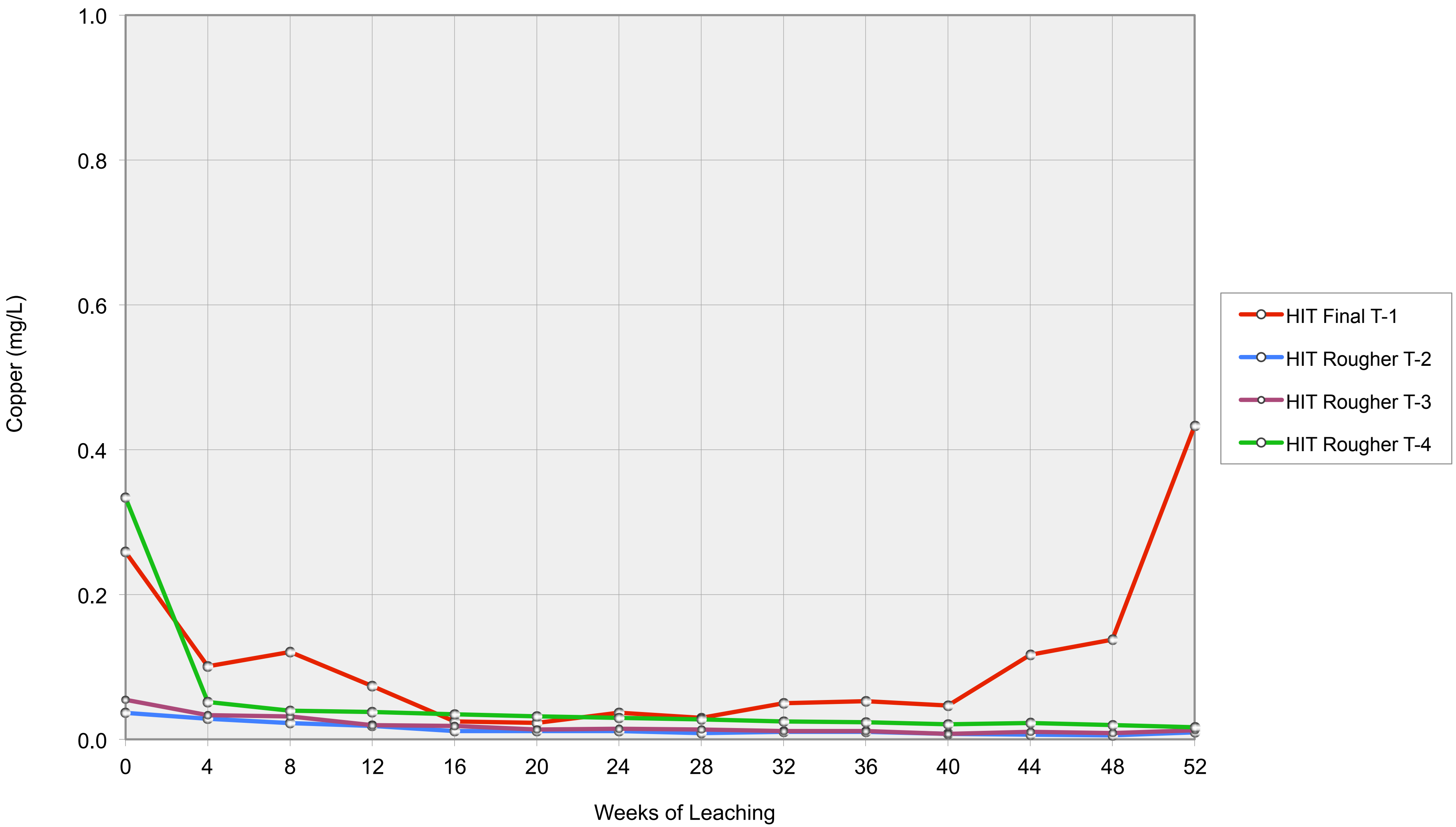
APPENDIX D2-6: Plot of magnesium concentration versus time for HIT tailings column tests



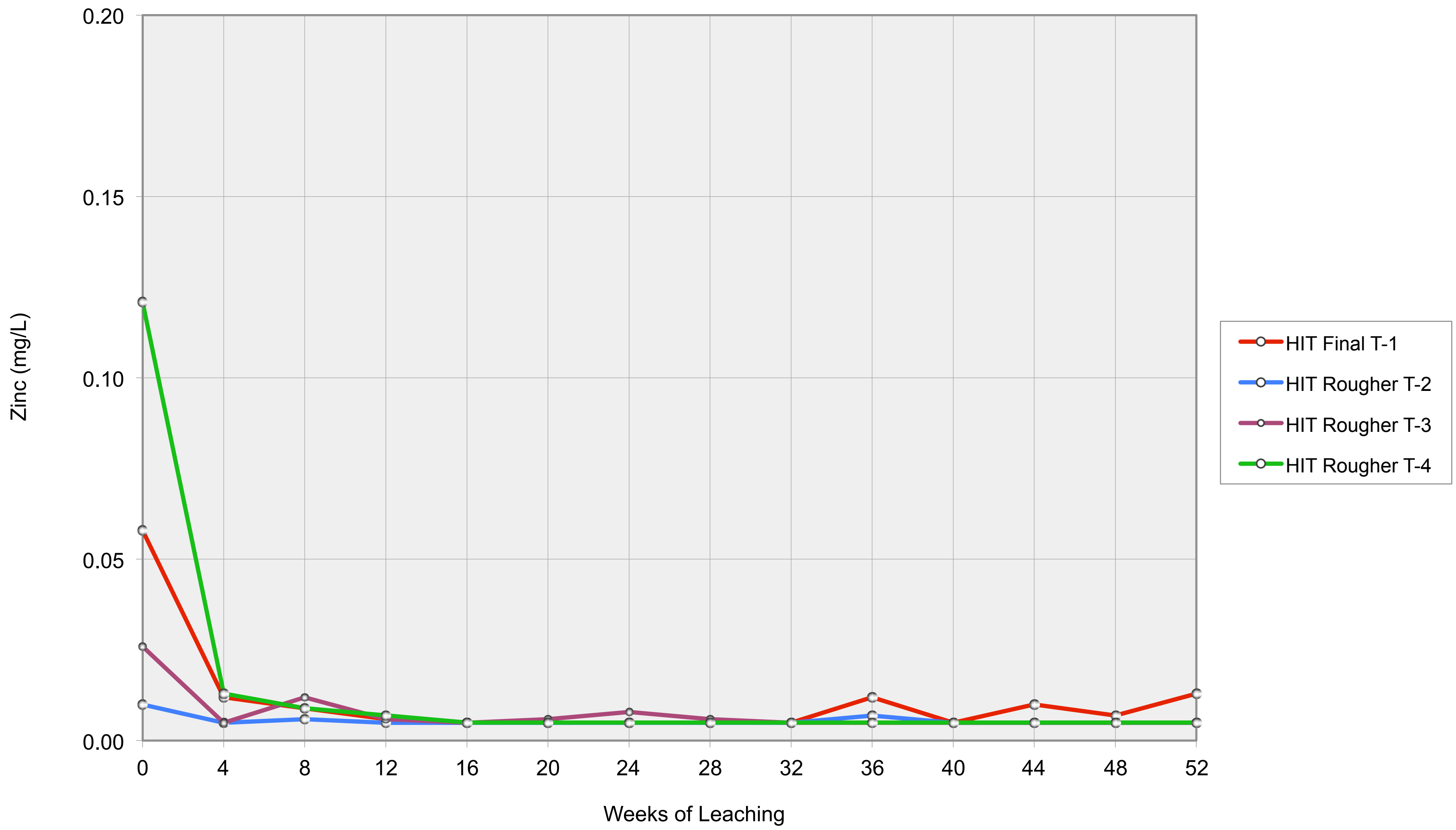
APPENDIX D2-7: Plot of iron concentration versus time for HIT tailings column tests



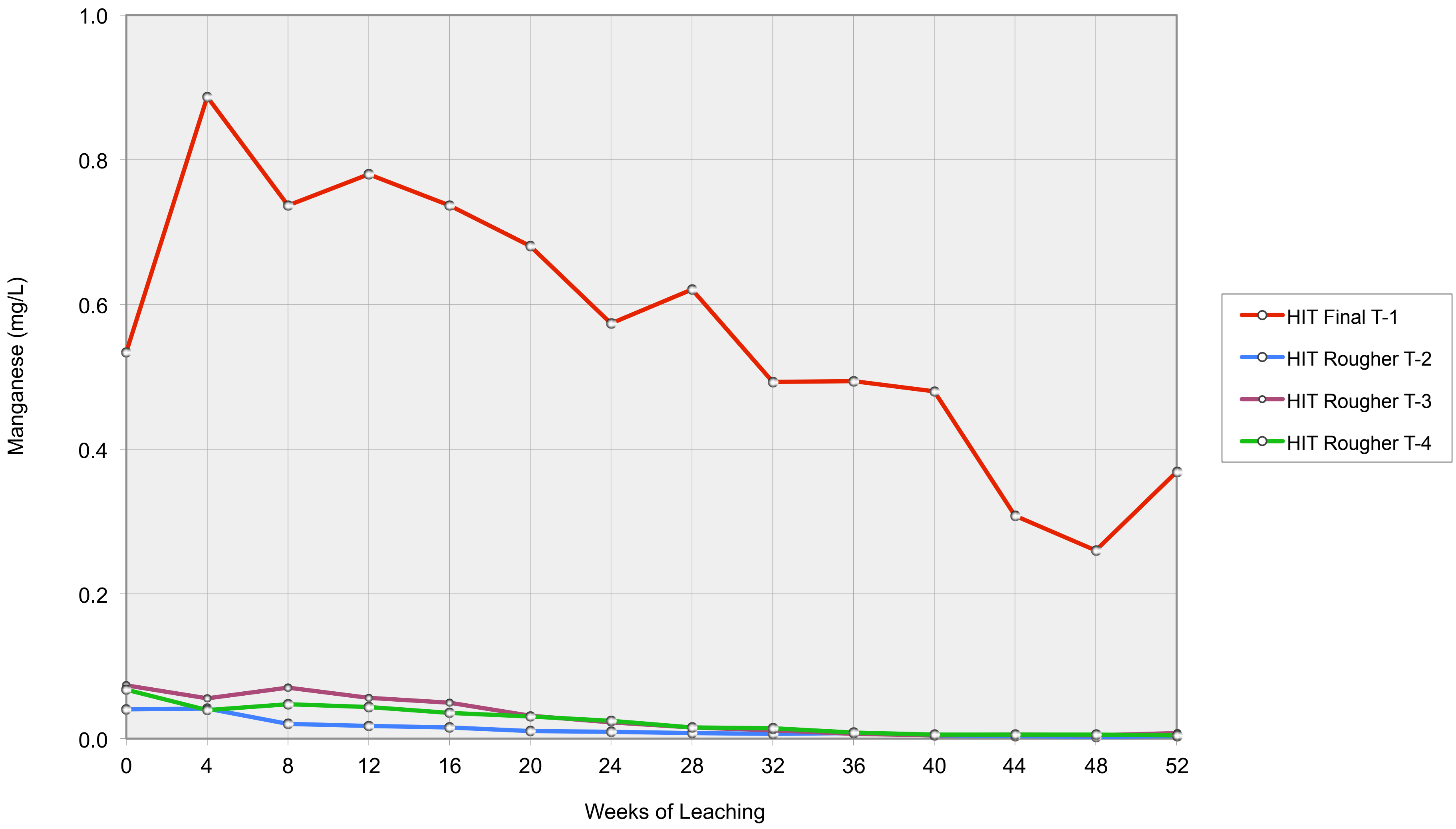
APPENDIX D2-8: Plot of aluminium concentration versus time for HIT tailings column tests



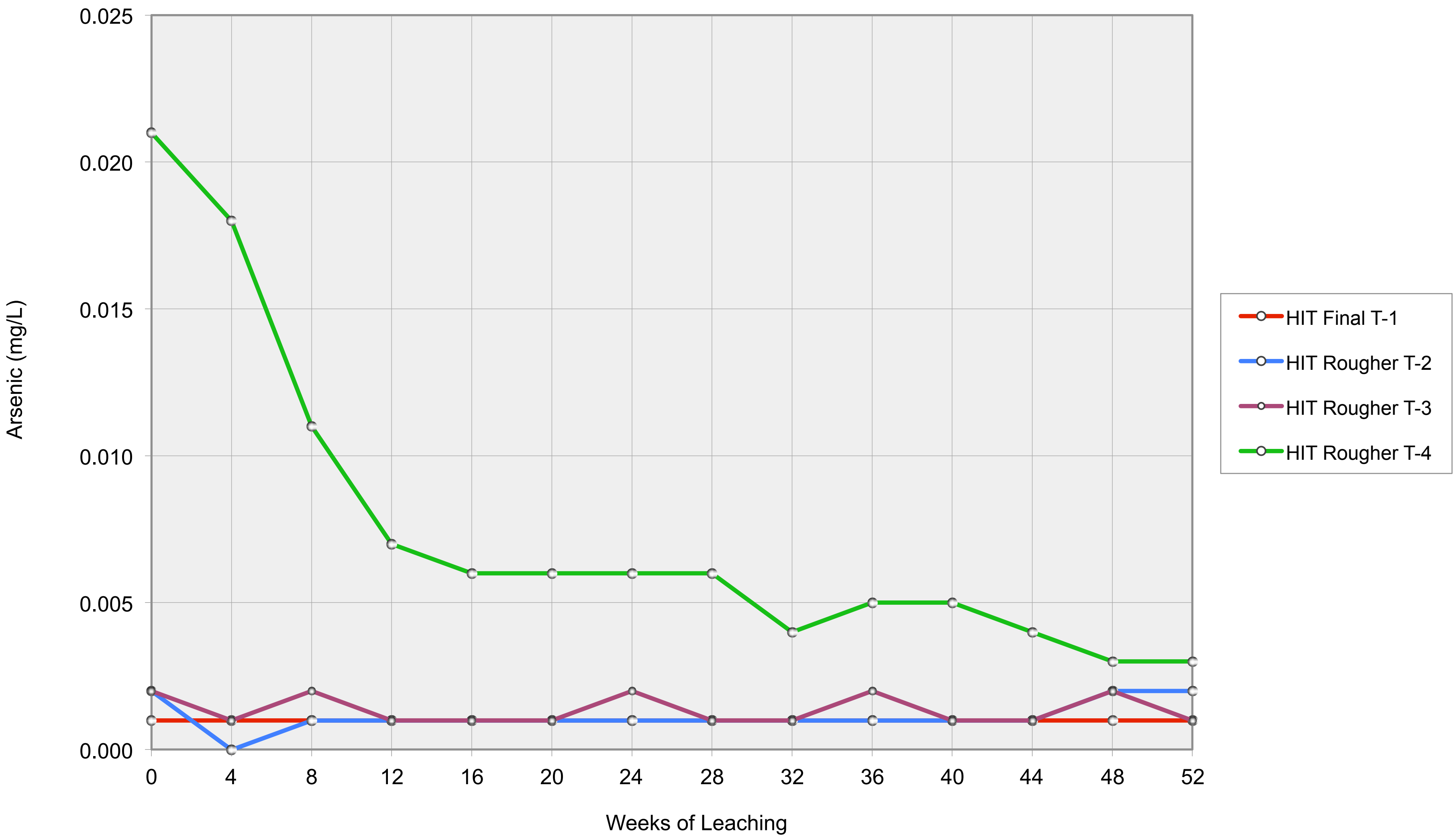
APPENDIX D2-9: Plot of copper concentration versus time for HIT tailings column tests



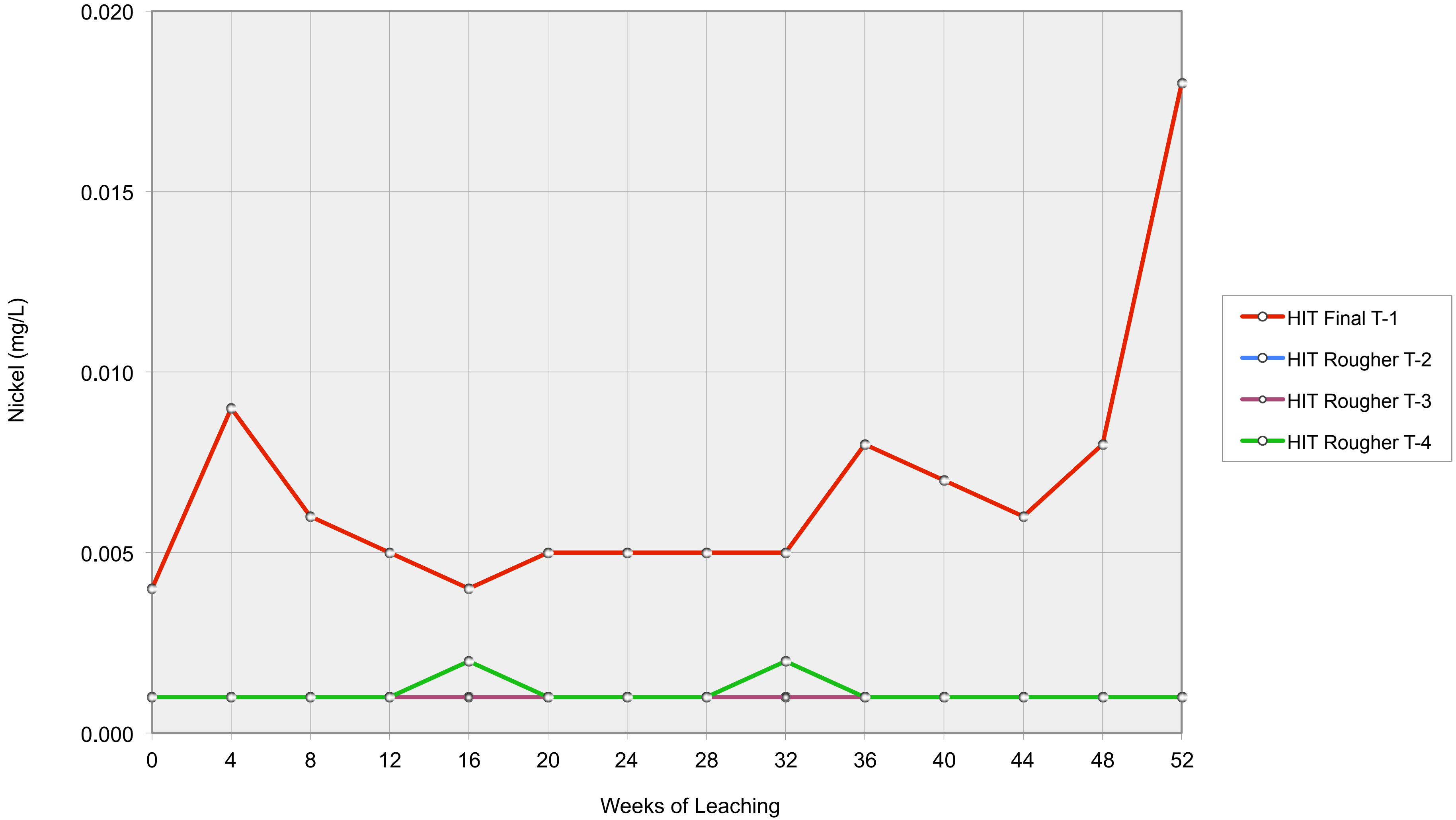
APPENDIX D2-10: Plot of zinc concentration versus time for HIT tailings column tests



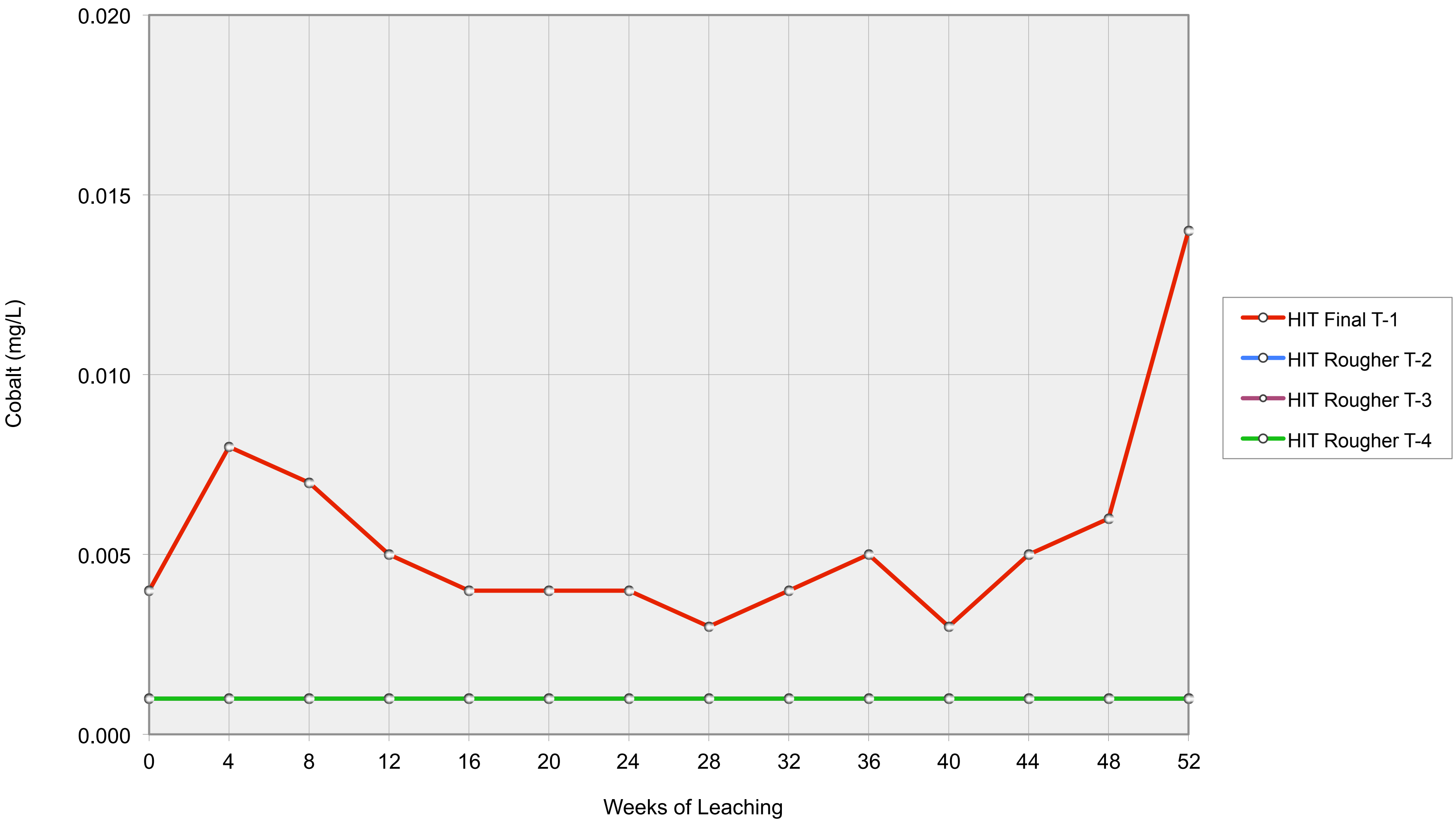
APPENDIX D2-11: Plot of manganese concentration versus time for HIT tailings column tests



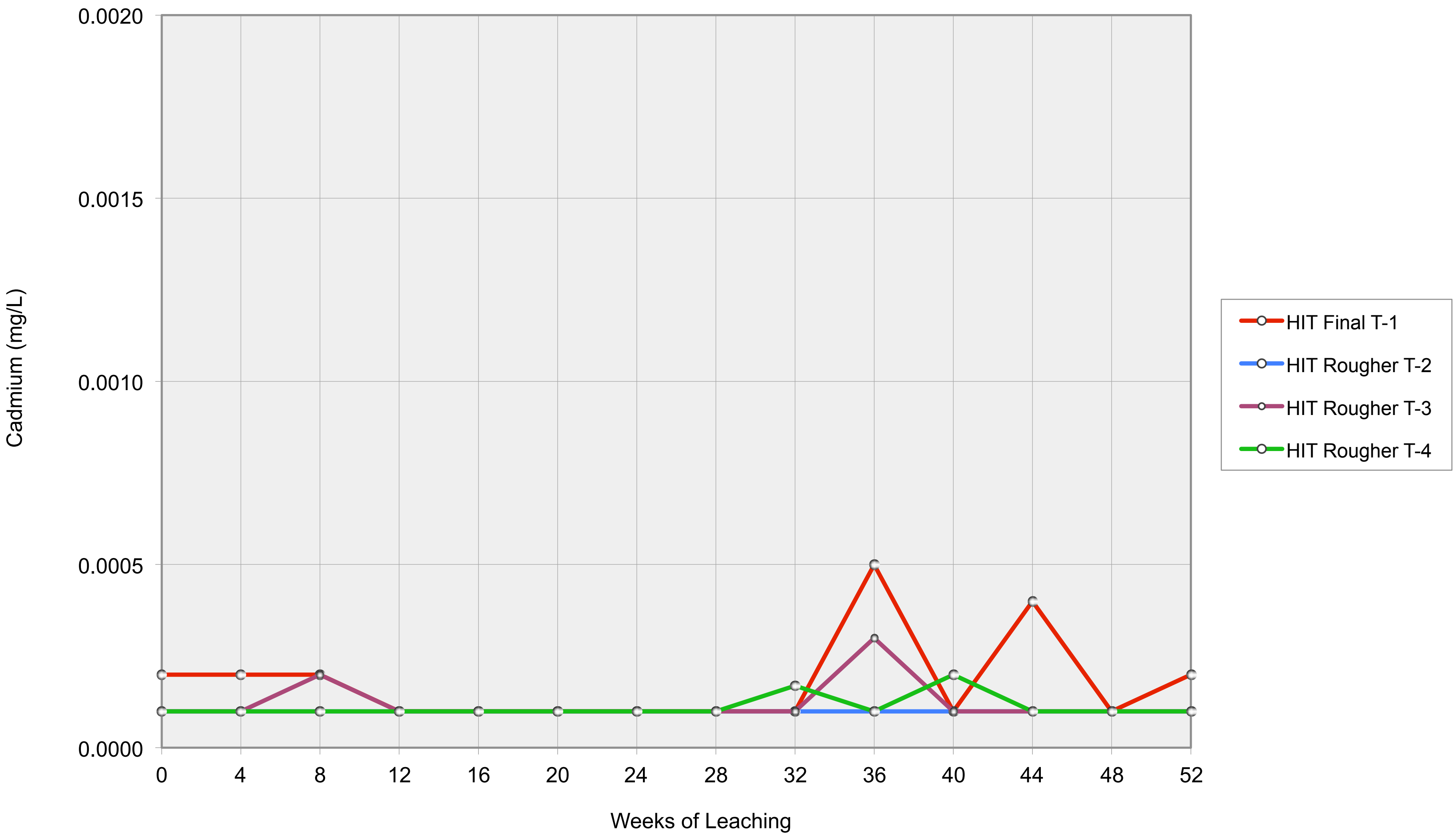
APPENDIX D2-12: Plot of arsenic concentration versus time for HIT tailings column tests



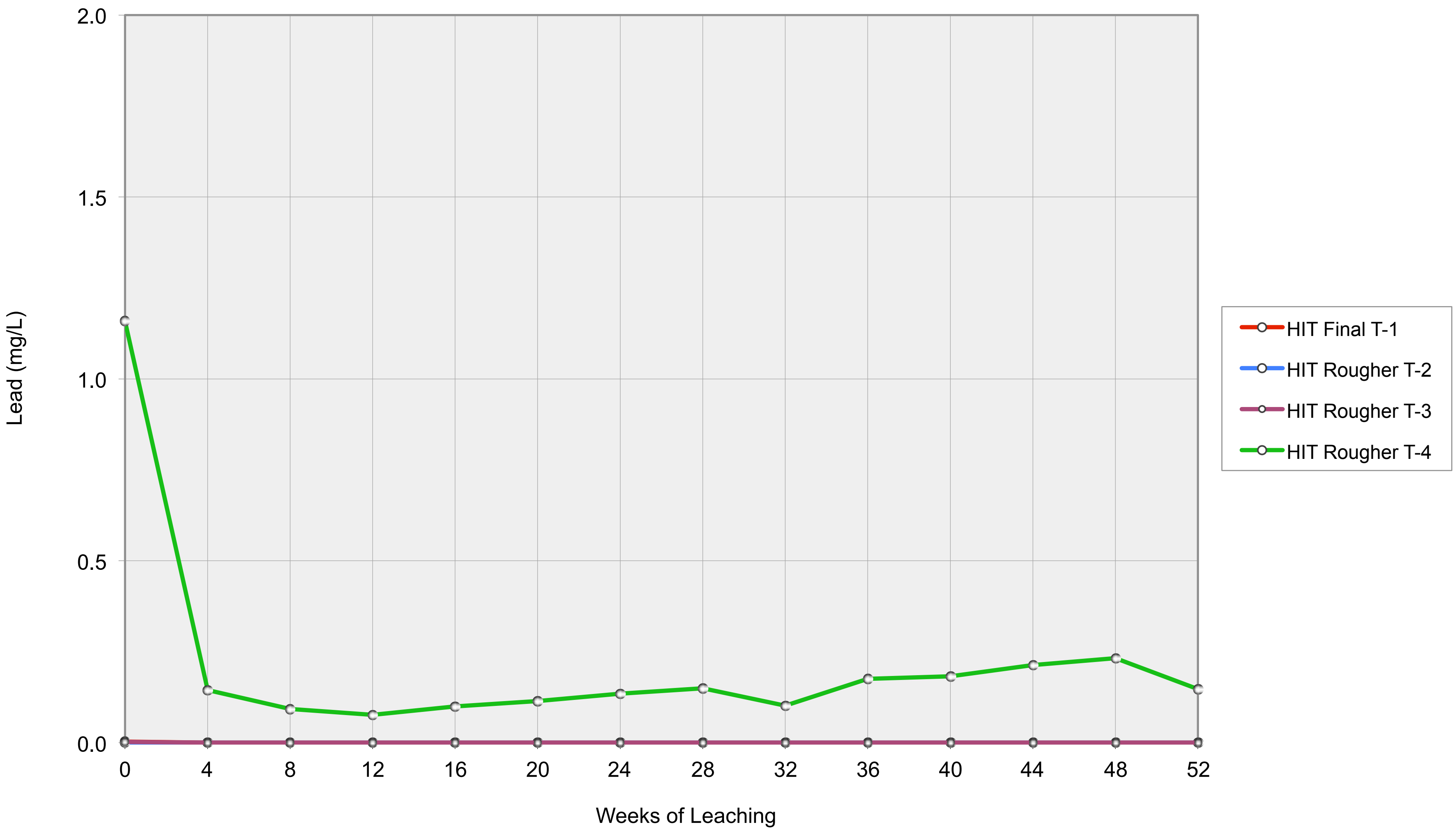
APPENDIX D2-13: Plot of nickel concentration versus time for HIT tailings column tests



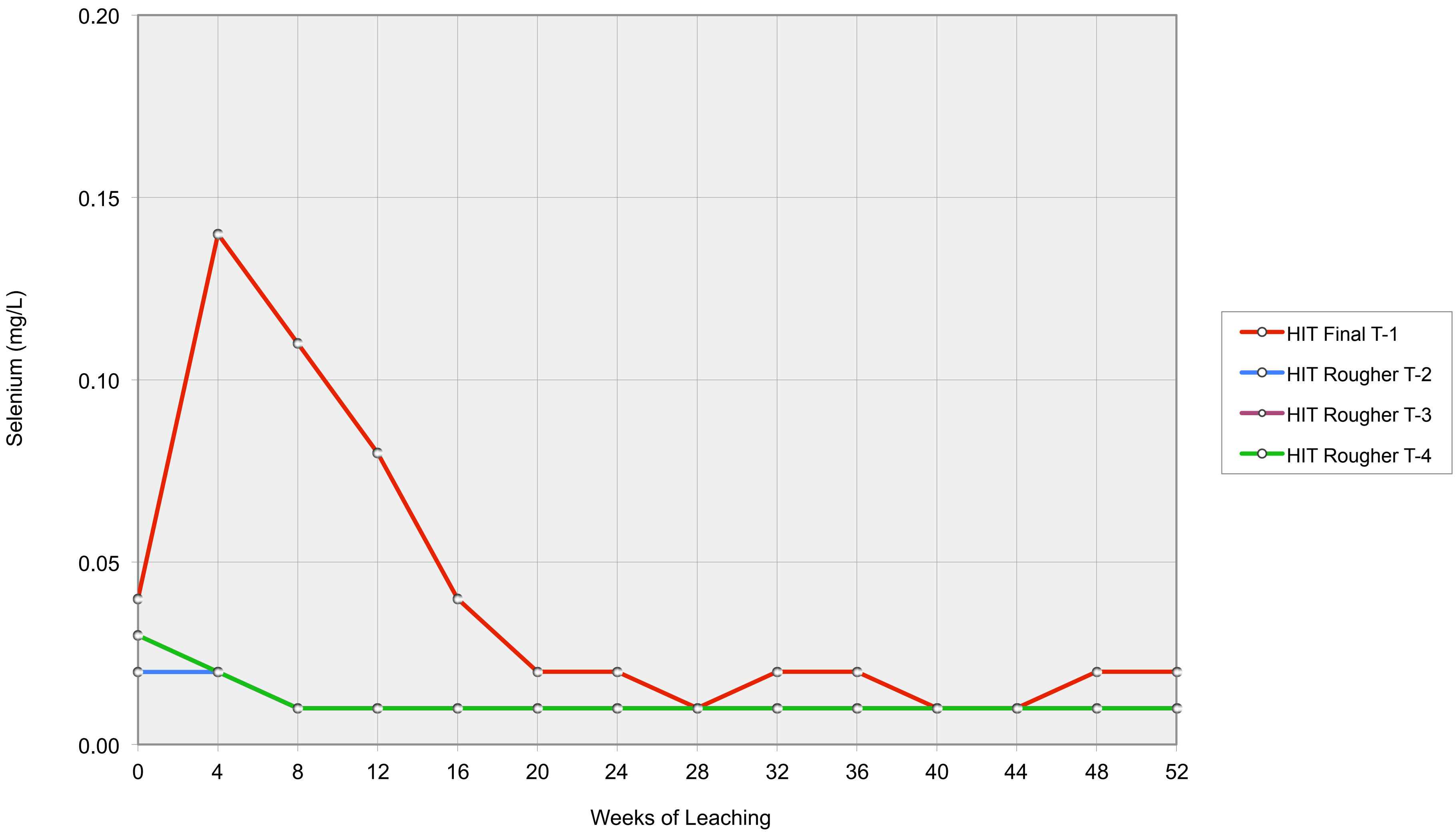
APPENDIX D2-14: Plot of cobalt concentration versus time for HIT tailings column tests



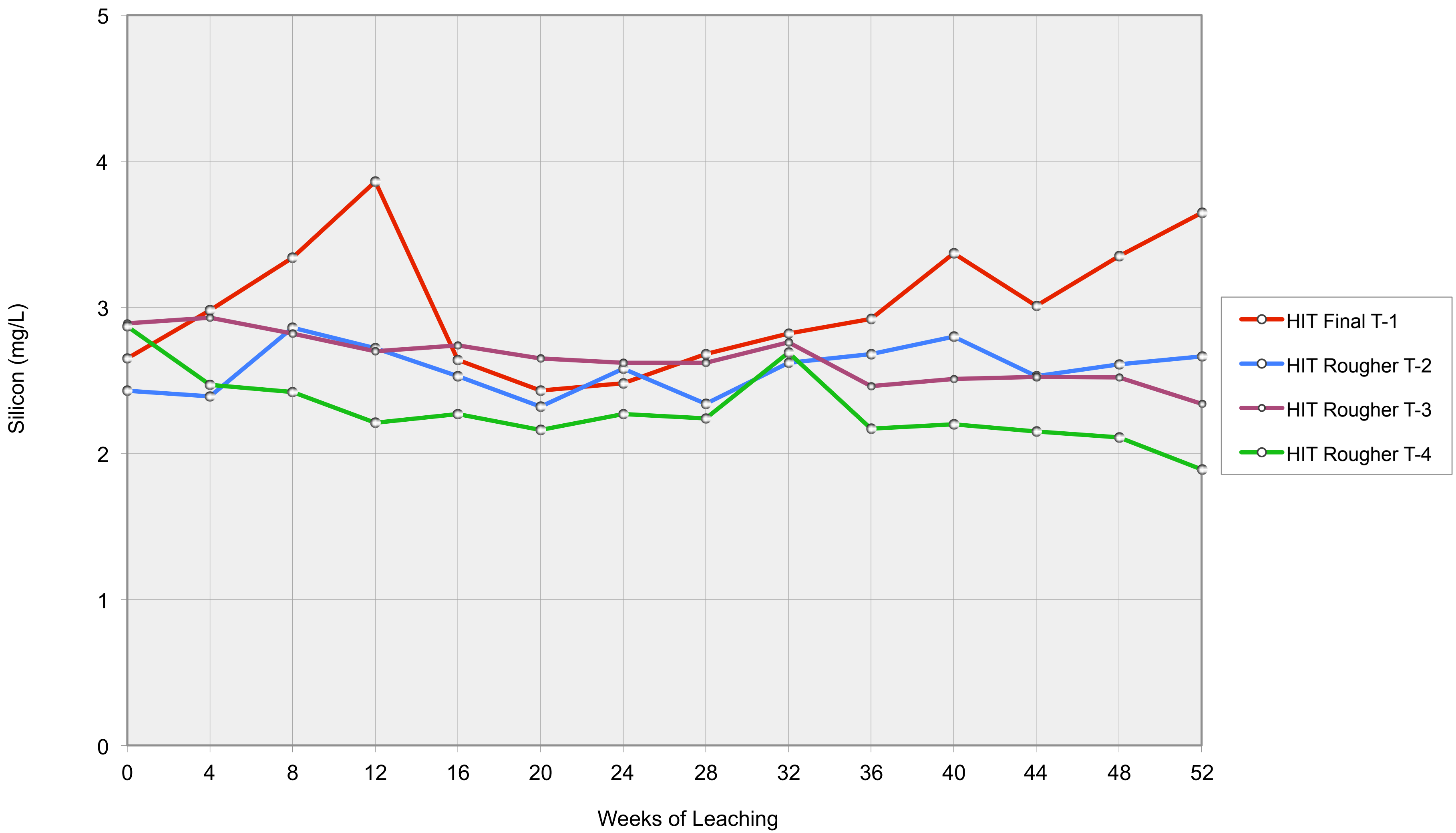
APPENDIX D2-15: Plot of cadmium concentration versus time for HIT tailings column tests



APPENDIX D2-16: Plot of lead concentration versus time for HIT tailings column tests



APPENDIX D2-17: Plot of selenium concentration versus time for HIT tailings column tests



APPENDIX D2-18: Plot of silicon concentration versus time for HIT tailings column tests