Mobility of elements from cesium formate residue emplaced on pegmatite tailings, Bernic Lake, Manitoba, Canada

By

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Abstract

A Cesium Products Facility (CPF) at Bernic Lake, Manitoba, manufactures a Cs-formate drilling mud from pollucite ($CsAlSi_2O_6 \cdot H_2O$) ore. The waste residue is dry-stacked over pegmatite tailings. This thesis studied the mineralogy of the residue and tailings, and the mobility of residue related elements: Ca, Cs, Rb, S and Sr.

Major minerals in the residue include gypsum, quartz, barite, spodumene, feldspar, pollucite, and Cs-sulphate, and in the tailings, quartz, feldspar, spodumene, pollucite and micas. The residue contains an order of magnitude more Cs (<2 wt. %) than the tailings (<0.3 wt. %), with 47 % being mobile from Cs-sulphate and Cs-carbonate. Cs in the residue is immobile in microcline, pollucite, Cs-formate, and Cs in Fe-oxy-hydroxides. Elements from the residue are mobilized by water from several sources: meteoric water and surface runoff from the residue pile, precipitation leaching through the residue pile into the tailings, and direct contact of residue with groundwater.

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Chapter 1: Introduction

For decades, TANCO mine has been one of the world's premier producers of tantalum minerals and spodumene. More recently, pollucite ($CsAlSi_2O_6 \bullet H_2O$) mining was initiated to support the operating company's unique development of an offshore Cs-formate drilling mud. This mud is not only an effective drilling compound, but it is also environmentally friendly because it can be recycled and reused, therefore leaving behind a minimal footprint. As part of the drilling mud production process, a residue byproduct is generated and dry-stacked in an abandoned Tailings Management Area (TMA) that is hydrogeologically enclosed with the exception of four discharge points to local surface waters (Agassiz North, 2001). The residue leachate contains high concentrations of Cs and other elements including Ca, Rb and Sr (SEACOR, 2004). Cs is generally a very mobile alkaline element; for this reason it is important to get a preliminary understanding of the geochemistry of the residue pile, and determine precisely the amount of the residue elements that can be mobilized into the environment compared to the amount that is locked into the residue mineralogy.

1.1 Site History

Tantalum Mining Corporation of Canada and Cabot Specialty Fluids, respectively operate the TANCO mine and a Cesium Products Facility at the same site. The mine is adjacent to Bernic Lake, Manitoba, which is approximately 160 km northeast of Winnipeg, Manitoba, Canada (Figure 1-1). Tantalum Mining Corporation of Canada and Cabot Specialty Fluids are divisions of Cabot Corporation.

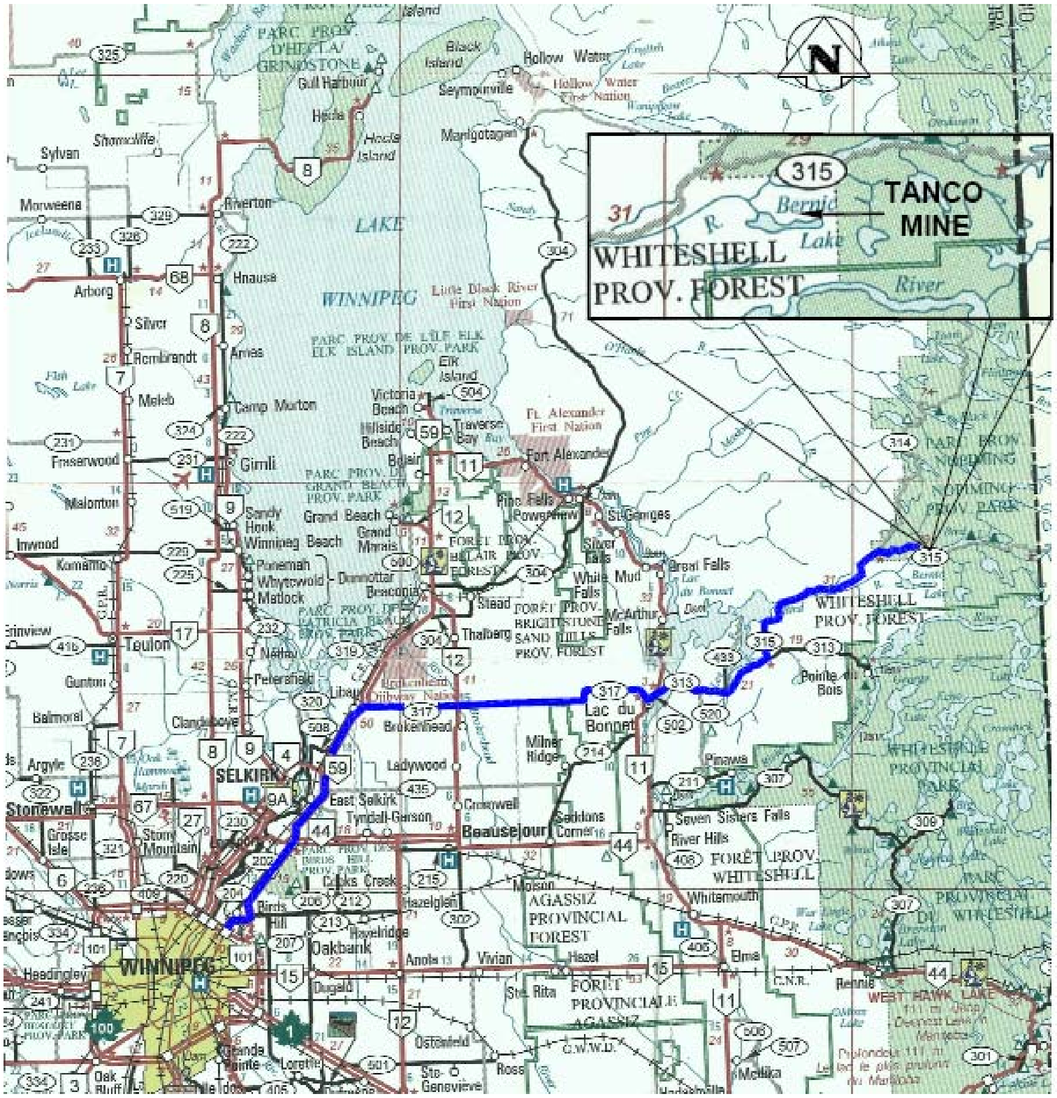


Figure 1-1 Location of TANCO mine site (Wardrop, 2009)

In 1914, federal land surveyors Harry Beresford and James Nicole unofficially named Bernic Lake; the name was not officially approved until 1933. Geological exploration of the area and small mining operations began in the mid-1920s, and continued for over 40 years. Sampling programs involving stripping and trenching were conducted, multiple drill programs were completed, and shafts were sunk and abandoned. As mineralization was identified, infrastructure investments were made by Montgary Explorations Limited, who later became Chemalloy Minerals Limited. These included the construction of an electrical transmission line from Pointe du Bois to the site in 1956, and a 90 foot head frame, hoist, bunk house, water tower, and a shaft sunk to 334 feet in 1957. Lack of funding slowed the project for 10 years until Chemalloy Minerals Limited partnered with Goldfield Corporation in 1967 to complete construction of a 500 ton/day tantalum concentrator and sink the shaft to 553 feet (Wardrop, 2008). In March 1969, the first tantalum concentrates were produced and the plant reached full production by September; TANCO's Grand Opening was held on September 8, 1969 (Wardrop, 2008).

1.1.1 Ownership and Production of TANCO Mine

Since 1969, TANCO has been one of the world's largest Ta, Li and Cs producers. Ta primarily occurs as wodginite ($Mn(Sn,Ta)(Ta,Nb)_2O_8$), tantalite ($(Fe,Mn)Ta_2O_6$), and microlite ($Ca_2Ta_2O_6(O,OH,F)$, Li is mined from spodumene ($LiAlSi_2O_6$), and Cs is extracted from pollucite ($CsAlSi_2O_6{\bullet}H_2O$) ore (Cerny *et al*, 1998). Ta is primarily used by the electronics industry for the manufacturing of capacitors, and as a key constituent of superalloys for the aerospace industry, cemented carbides and corrosion resistant applications such as tank linings. Li is mainly used by the ceramics and glass industries. The use of Cs on-site to produce drilling mud is described in section 1.1.3.

From 1969 to 1982, TANCO produced over four million pounds of Ta in concentrate (Hilliard, 2003). In 1970, Chemalloy Minerals Limited acquired 100% ownership of TANCO by buying out Goldfield Corporation; over the next 20 years, several other companies and the Manitoba government acquired partial ownership of TANCO. In 1973, TANCO briefly shutdown their Ta circuit to test a spodumene pilot project. In 1980, the value of Ta reached an all-time high due to market demand, future predictions, and a relatively low production rate. However, this value was short-lived and dramatically dropped by 1982 because end-users switched to other products and began recycling Ta to reduce costs. This market value change caused TANCO to suspend their Ta production later that year.

From 1984 to 1988, TANCO conducted a pilot operation to produce ceramic grade spodumene concentrate (Hilliard, 2003). By 1988, not only had the mine become a major supplier of spodumene concentrate for Corning, but an increase in the value of Ta had triggered a reactivation of their Ta circuit. From 1988 to 1992, TANCO mined both spodumene and Ta minerals, however, from 1992 to 1995 the production of Ta was once again suspended. In 1993, Cabot Corporation acquired 100% ownership of TANCO and has remained in this position to the present day. In 1995, Ta production began once again and continued until 2009. Although TANCO lost its contract with Corning in 2000, the production of spodumene has continued with minor periods of shutdown.

1.1.2 Tailings Management

In 1993, the original TMA to the east had reached its maximum capacity and tailings deposition was transferred to a new TMA in the west (Wardrop, 2008); from that moment forward the East TMA has been referred to as the Old TMA. Periodically between 1980 and 1994, tailings from the Old TMA were reprocessed for the extraction of Ta. Since 1994, the tailings within the Old TMA have not been reprocessed or used for other functional purposes. The Old TMA is bordered and underlain by impermeable crystalline bedrock and is therefore a hydrogeologically closed system with the exception of potential bedrock fractures, and four points where groundwater discharges to local surface waters through constructed dams: the North Dam, East Dam, West Dam and Main Dam which are directed towards Bernic Lake.

1.1.3 Cesium Products Facility

In 1995, Cabot Corporation started Cabot Specialty Fluids and began construction of a pilot plant for the production of Cs-formate (Hilliard, 2003). In 1997, the plant was commissioned and TANCO also began mining pollucite ore to supply the plant. Cs-formate is used to manufacture a non-toxic and effective offshore drilling mud that is used by the petroleum industry. From 1999 to 2000, the plant was deactivated due to a temporary drop in oil prices. In 2001, the plant was expanded to allow for the production of fine Cs chemicals (Hilliard, 2003), and became identified as the Cesium Products Facility (CPF).

The CPF was developed as a closed system, with the tailings slurry from the process discharged to one of two double-lined containment cells constructed inside the Old TMA: CPF Containment Cells 1 and 2 (Wardrop, 2009). The tailings solids settle out in the containment cell, and the decant is returned to the CPF for reuse in the process. The containment cells are used alternately; when one cell is full, the discharge is transferred to the second cell while the residue in the first cell is dewatered, removed, and dry-stacked in the eastern portion of the Old TMA (Wardrop, 2009). This area of the Old TMA was selected for residue discharge based on the following criteria (Agassiz North, 2001):

1) Residue leachate parameter concentrations at discharge points from the Old TMA would be directly related to the area of residue. Therefore, minimize the area coverage of the residue pile, so that a potential impact of residue leachate at locations where groundwater discharges to surface water is also minimized;
2) Residue would be piled at a maximum distance from any groundwater discharge point; and
3) If possible, stockpile residue at or near a groundwater flow divide so that seepage is divided between multiple discharge points.

By the time fieldwork for this project was conducted, both Cell 1 and Cell 2 had been emptied of residue three times (Table 1-1); additionally, subsequent emptying periods have occurred since fieldwork for this study ended. After each

Table 1-1: Residue deposition history in the old tailings management area

Time Period	Activity
August 2001	Cell 1 emptied and dry-stacked in Old TMA
August 2002	Cell 2 emptied and dry-stacked in Old TMA
June 2004	Cell 1 emptied and dry-stacked in Old TMA
May 2005	Cell 2 emptied and dry-stacked in Old TMA
June 2006	Cell 1 emptied and dry-stacked in Old TMA
June 2007	Cell 2 emptied and dry-stacked in Old TMA

residue deposition period, a layer of crushed feldspar was spread overtop of the residue to reduce the potential for wind erosion and transportation of the residue particles. Figure 1-2 shows the mine site on the shoreline of Bernic Lake, the East (Old) TMA, the West (Active) TMA, CPF Containment Cells 1 and 2, and the residue pile.

1.2 Environment

The Canadian Shield of southeastern Manitoba is host to a diverse ecological setting. Wildlife that inhabit this region includes black bears, deer, moose, lynx, wolves, beavers, bald eagles, crows, squirrels, hares and many more. In addition to those larger and more visible occupants, the geological and environmental settings are unique and support a large variety of vegetation, aquatic life and invertebrates.

1.2.1 Topography, Soils and Vegetation

The site is located on the PreCambrian drift plain of the Canadian Shield (Davies *et al*, 1962). The area is comprised of numerous granitic outcrops with minimal topographic relief generally of less than 15 m. Evidence of recent glaciation including eskers and glacial till is found throughout the region. Approximately 40 to 60% of the area is comprised of lakes and bogs, reflecting poor and disorganized drainage (Wardrop, 2009). Soils in the upland areas where the mine site is located are typically acidic and include podzol, brown podzolic and grey wooded types, whereas soil in the lower areas contain a high organic content common to bogs.

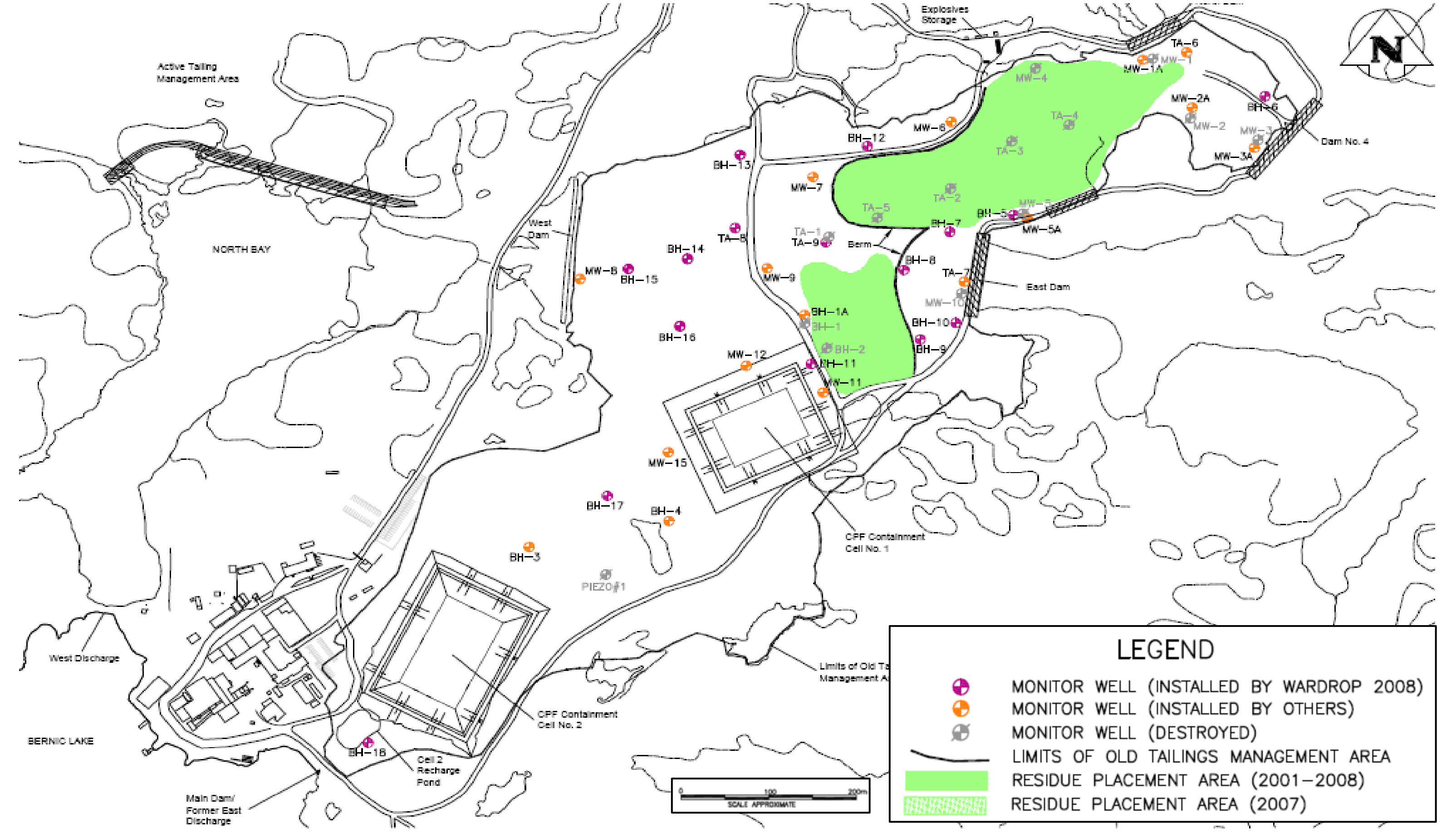


Figure 1-2 General site plan (Wardrop, 2009)

With respect to vegetation, the site is found in the Lac Seul Upland Ecoregion of the Boreal Shield Ecozone and is classified as having a sub-humid, mid-boreal ecoclimate with the dominant land cover being mainly coniferous with some limited area of mixed forest (Wardrop, 2008). The well-drained areas of the region contain white spruce, balsam fir, black spruce, trembling aspen and balsam poplar. The moderately drained spots play host to mostly jack pine and black spruce. Finally, the poorly drained areas, which are typically bogs and fens, are dominated by black spruce.

1.2.2 Surface Hydrology and Bernic Lake

Bernic Lake is a second order lake, receiving inflow from five headwater streams to the eastern and central parts of the lake as well as surface flow directly from the watershed (Wardrop, 2008). The drainage basin that feeds Bernic Lake is approximately 1,800 ha. Bernic Lake spans approximately 390 ha, averages about 8 m deep, and has a shoreline length of 37.5 km. The lake is composed of two basins of approximately equal size and joined by a narrows; both basins are characterized by relatively steep margins and wide flat bottoms (Wardrop, 2008). The residence time for water in Bernic Lake is approximately 10 years, during which time the water undergoes annual seasonal thermal stratification and followed by periods of uniform lake temperature. The majority of currents found on Bernic Lake's open water are wind driven (Wardrop, 2008). Prior to the start of TANCO operations in 1969, Bernic Lake was considered to be a typical soft water Shield lake with low hardness, alkalinity and Total Dissolved Solids (TDS), slightly acidic pH ranging from 6.6 to 7.4 (Crowe, 1976), and transparent but somewhat colored waters; by 1975, increases in major ion concentrations, alkalinity, hardness and TDS were evident (Crowe, 1976). Currently, the site's Environmental Licence requires regular effluent discharge monitoring and assessment to be reported in an annual Environmental Effects Monitoring (EEM) report.

Bernic Lake is home to a variety of fish and benthic invertebrates. The most common fish species that inhabit Bernic Lake include the cisco, white sucker, northern pike, yellow perch, pumpkinseed, western blacknose dace, slimy sculpin, spottail shiner, and the emerald shiner (Wardrop, 2008). The most prominent benthic invertebrates found in Bernic Lake are the Diptera, Chironomidae, and Chaoboridae (Wardrop, 2008).

1.2.3 Pegmatite Geology

Rare element pegmatites are commonly enriched in Li, Cs, Ta and Rb, and are the target deposit for most of the worlds tantalum mining projects; for this reason Cerny (1991) labeled these as Li-Cs-Ta pegmatites, or LCT pegmatites. LCT pegmatites are mainly derived from S-type granites and in addition to Li, Cs, Ta and Rb, they also commonly contain enriched levels of Be, B, F, P and Sn (Cerny and Ercit, 2005). The TANCO pegmatite is an LCT pegmatite. It is one of a number of subhorizontal pegmatite sheets which make up the Bernic Lake pegmatite group, and is hosted by a synvolcanic metagabbro intrusive (Cabot Corporation Specialty Fluids, 2001). It is located in the southern portion of the Bird River Greenstone belt, which flanks the exposed part of the Bird River Subprovince of the Archean Superior Province, in the southwestern part of the Canadian Shield (Van Lichtervelde *et al*, 2006). Stilling *et al*. (2006) described the bulk composition of the TANCO pegmatite as granitic and peraluminous with the exception of 9 vol.% petalite. It contains a high degree of fractionation being enriched in Li, Cs, Rb, and F, with moderate contents of Tl, Be, B, Ga, Sn, Nb and Ta, and depleted in Fe, Mn, Mg, Ca, Ba, Sc, Ti and Zr. The TANCO pegmatite is the host of more than 80 different minerals (Cabot Corporation Specialty Fluids, 2001). The primary minerals are albite, quartz, spodumene, pollucite and lepidolite. There are a multitude of accessory minerals with the most important being muscovite, tourmaline, beryl, amblygonite, and perthite (Hilliard, 2003). The emplacement of the pegmatite was controlled by gently east and west dipping joints and fractures. Its form is described as bilobate, shallowly north-dipping with an east and west plunging body that fingers out in swarms of parallel dykes along most of its margins (Cerny *et al*, 1998).

Based on mineralogy, texture and location, the TANCO pegmatite consists of nine internal zones numbered (10) to (90) (Stilling *et al*, 2006). Zones (10) and (20) are shell-shaped concentric envelopes around the pegmatite that are generally thicker along the footwall contact than the hanging wall. Zones (40) and (50) are also concentrically shell-shaped, but they gradually transition into one-another. Zones (30), (60), (70), (80), and (90) are discontinuous layers within the pegmatite and are predominantly located in the upper central portion of the pegmatite, or within the central portions of the eastern and western lobes. The *border zone* (10) average only 15 cm thick and is dominantly a saccharoidal assemblage of albite and quartz along the pegmatite-wallrock contacts (Stilling *et al*, 2006). The *wall zone* (20) reaches a thickness of 35 m along the footwall contact and contains giant columnar microcline perthite in a matrix of quartz, medium-grained albite and tabular greenish muscovite (Stilling *et al*, 2006). The *albite-rich aplite zone* (30) forms layers 16 m thick or greater as well as pod-like lenses found individually in the eastern lobe or as a network in the western lobe, commonly contains beryl crystals along its outer contacts, is characterized by saccharoidal albite, and carries significant Ta and Sn mineralization (Stilling *et al*, 2006). The *lower intermediate zone* (40) contains layers reaching 25 m thick, is mainly located in the lower central portion of the pegmatite, and contains two dominant assemblages and textures: one consists of crystals of microcline perthite and spodumene + quartz pseudomorphs after petalite embedded in medium-grained quartz, albite and micas sometimes with albite-rich aplite; the second containing quartz pods associated with amblygonite and spodumene + quartz aggregates (Stilling *et al*, 2006). The *upper intermediate zone* (50) is at least 24 m thick, which contains amblygonite and pollucite pods at least 2 m across and microcline perthite and petalite crystals reaching at least 10-13 m long, is the main economic source zone for petalite, spodumene + quartz pseudomorphs, amblygonite and quartz, and contains abundant cavities generated by hydrothermal leaching (Stilling *et al*, 2006). The *central intermediate zone* (60) is found in two individual segments of the eastern and western lobes, is characterized by perthitic to perthite-free microcline and quartz and fine-grained greenish muscovite containing high concentrations of Ta, Nb oxide minerals, beryl and hafnian zircon (Stilling *et al*, 2006). The *quartz zone* (70) makes up several lenticular bodies located asymmetrically toward the top of the pegmatite, and contains massive white to faintly pink quartz that carries minor quantities of petalite, primary spodumene and amblygonite (Stilling *et al*, 2006). The *pollucite zone* (80) is distinguished from other zones by its huge dimensions and distinctive locations. It consists of multiple lenticular bodies throughout the pegmatite with the largest located in the eastern lobe, and represents a unique economic concentration of about 75% pure pollucite found in coarse veins of micas, quartz and feldspars (Stilling *et al*, 2006). The *lepidolite zone* (90) forms two flat-lying sheets at least 18 m thick and elongate in the east-west direction as well as several smaller bodies in the central portion of the pegmatite. It contains both fine-grained lithian muscovite and true lepidolite phases intergrown with microcline and quartz, and is economically viable for its Rb and Cs rich lithium micas and Ta-Nb oixide minerals (Stilling *et al*, 2006). Tourmaline is not abundant, but it is widespread in zones (10) to (60) and appears black, brown, pink, or rarely green (Selway *et al*, 2000).

1.2.4 Overburden Geology of the Old TMA

Based on drilling program results described in UMA (2001) and Wardrop (2009), the overburden stratigraphy of the Old TMA comprises sand tailings overtop of peat, clay, sand/gravel and bedrock (Figure 1-3). The tailings layer is generally

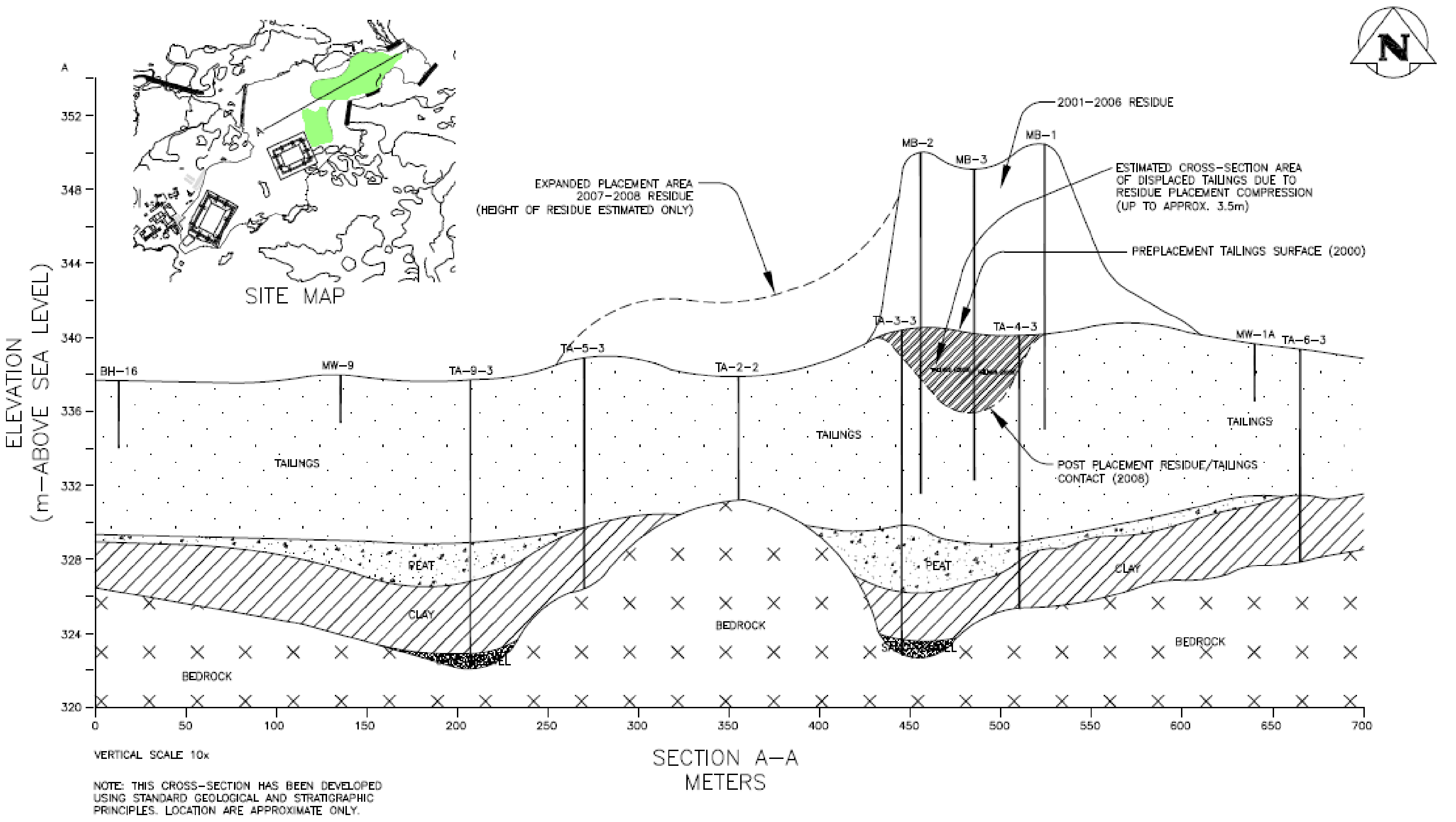


Figure 1-3 Stratigraphy of the old tailings management area (Wardrop, 2009)

light brown to grey, very fine to fine grained, well sorted, subangular to rounded, containing random greyish silt lenses, and approximately 9 m thick. The peat is described as dark red brown to black, containing a high organic content intermixed with silt, tightly packed, and averages about 1.5 m thick. The clay layer is approximately 3 m thick, light to dark grey, containing minor silt particles, exhibiting medium to high plasticity. Moisture content increases with depth. The sand/gravel unit rests on top of the PreCambrian bedrock and is found intermittently throughout the Old TMA, occuring in areas of bedrock low. The sand/gravel layer is brownish grey, medium to very coarse-grained, poorly sorted, angular to subangular, saturated, containing minor amounts of the overlying clay unit. This layer is approximately 1 m thick.

1.2.5 Hydrogeology

The PreCambrian bedrock is crystalline with an extremely low hydraulic conductivity and is, therefore, considered impermeable. The only migration of groundwater through the bedrock occurs at high to relatively free-flowing rates within random fractures.

Hydrogeological investigations, which are reported in UMA (2001) and Wardrop (2009), describe the groundwater conditions within the Old TMA. Individual groundwater regimes were found in the tailings and sand/gravel units; they are separated by the relatively impermeable clay. Static groundwater monitoring levels show that these regimes are not hydraulically connected. The hydraulic conductivity of the near surface tailings range from 10^{-5} to 10^{-6} m/s, which decreases at the base of the tailings to a range of 10^{-5} to 10^{-7} m/s. The clay unit acts as an aquitard with an estimated hydraulic conductivity of 10^{-8} m/s (UMA, 2001). The underlying sand/gravel unit has a very high hydraulic conductivity that was not measurable by standard field techniques because the rate of recharge was faster than technicians were able to drawdown the static water level and monitor recharge. Hydraulic conductivity values characteristic of sand/gravel formations range from 10^{-2} to 10^{-4} m/s (Freeze and Cherry, 1979).

The near surface hydraulic gradients calculated by UMA (2001) vary from 0.001 to 0.02 across the Old TMA. Wardrop (2009) reported the tailings hydraulic gradient between the areas of residue placement and the West Dam to be 0.0090, between the residue placement areas and the East Dam to be 0.0100, between the residue placement areas and the Main Dam to be 0.0086, between the residue placement areas and the North Dam to be 0.0048, and on an average across the entire Old TMA to be 0.0085. This apparent reduction in hydraulic gradient over time may be explained by a reduced groundwater infiltration rate into the tailings due to increased aerial coverage by the residue from 2001 to 2008 (Wardrop, 2009).

Water level monitoring in nested wells indicated a downward vertical gradient between the tailings and underlying sand/gravel aquifers (Wardrop, 2009); however, migration of water through the separate clay unit would be minimal. Additionally, a dominantly downward vertical gradient was reported within the tailings.

Wardrop (2009) states that the 2008 groundwater elevations and inferred contours indicate that groundwater within the Old TMA flows toward the Main Dam, West Dam, East Dam, and North Dam (Figure 1-4). There is a groundwater flow divide beneath the residue pile that may exist because of the residue pile. As shown in Figure 1-3, the residue/tailings contact beneath the residue pile has subsided approximately 4 m since residue placement began in 2001, which is likely due to pressure loading from the overlying weight of the residue pile (Wardrop, 2009). The hydraulic conductivity of the residue material has never been tested, but field investigations predict that it would be similar to marine clay/mud, for which hydraulic conductivities typically range from 10^{-9} to 10^{-12} (Freeze and Cherry, 1979). Therefore, the compression of the residue beneath the 2001 tailings surface elevation, is creating a flow barrier separating the groundwater that is being directed towards the North Dam, from the groundwater that is being directed to the East, West and Main Dams (Wardrop, 2009).

1.3 Residue Leachate Studies

In 2000, Lakefield Research Limited conducted a 20-week leach test on 2 kg (dry equivalent) samples from two cells of Cs sludge material (Lakefield, 2000). Initially, the samples contained 17% Ca, and during the course of the leach tests, approximately 4% or 80 g Cs, was lost at a relatively constant rate. SO_4 release peeked in week 1 at about 1900 mg/L, but remained relatively constant at

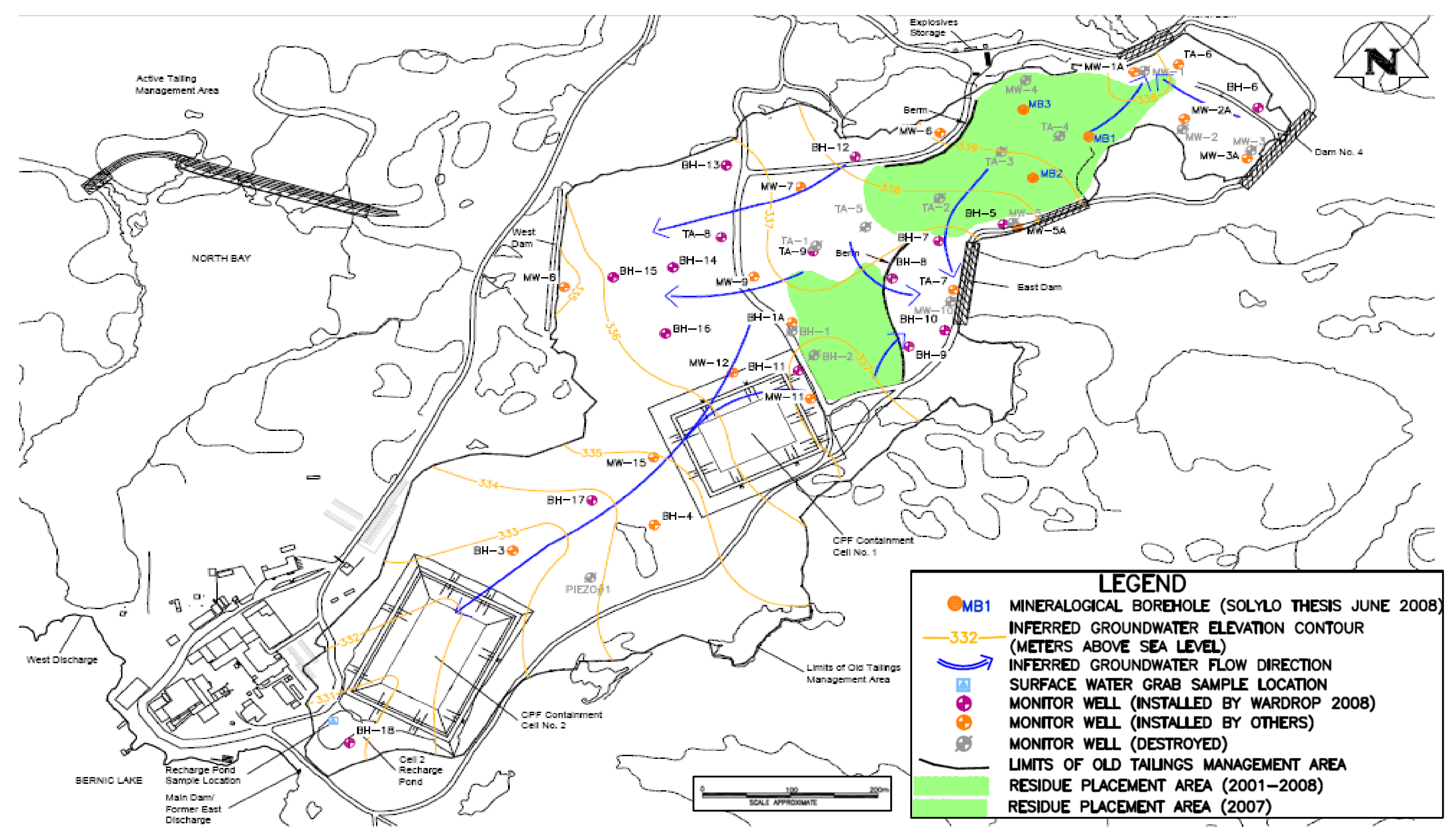


Figure 1-4 Inferred groundwater flow plan of the old tailings management area, June 2008 (Wardrop, 2009)

approximately 1500 mg/L per week for the remaining 19 weeks. The week 1 leachate had a Cs concentration of 1926 mg/L. A sharp decrease in Cs concentration then occurred over the next 6 weeks, and the week 20 leachate reported a Cs concentration of 18 mg/L. Rb and Sr concentrations were not included in this study.

The Environmental Approval to stockpile the residue in the Old TMA assumed a worst case of 100% mobility of elements and required Cabot Specialty Fluids to annually monitor the groundwater quality within the Old TMA (UMA 2001). The objective of this annual monitoring was to verify the effect of CPF residue leachate on groundwater quality in the TMA, and eventually on the quality of dyke seepage and discharges (Wardrop, 2009). SEACOR Environmental Incorporated documented the groundwater quality before residue placement in the Old TMA (i.e. before August 2001), and continued with the annual post-residue placement monitoring until the end of 2004. By using the results of Lakefield's 20-week leach test, baseline groundwater quality data, and post residue placement groundwater quality data, SEACOR (2004) was able to describe the progress of leachate movement through the Old TMA groundwater system. They used the leachate signature, which is comprised of elevated conductivity, increased concentrations of total Cs and Rb, dissolved Ca, dissolved Sr and SO_4. The annual groundwater monitoring program from 2005 was conducted by Wardrop Engineering, currently know as TetraTech.

1.3.1 Chemistry of Cesium and other Leachate Elements

Cs is one of five Group 1A alkali metals that are considered the most active metals whether by their low ionization energy, low electronegativity, or large negative electrode potential. Cs is most similar to the alkali metal Rb, with the primary differences being that Cs has a larger atomic mass and atomic and ionic radiuses. Both elements can form thermally stable carbonates, and under limited oxygen conditions can also form small amounts of superoxides CsO_2 and RbO_2 (Petrucci and Hardwood, 1985). Cs and Rb are rare in the Earth's crust with Cs primarily mined at three locations worldwide; the TANCO pegmatite in Canada, the Bikita pegmatite in Zimbabwe, and to a lesser extent in the Karibib Desert of Namibia.

Ca and Sr are Group 2A alkaline earth metals which are nearly as active as the Group 1A alkali metals, but are more metallic with respect to density, hardness, and melting point, and contain cations with a smaller ionic size and a larger ionic strength (Petrucci and Hardwood, 1985). Both Ca and Sr form carbonates and sulphates that are insoluble in pure water.

1.4 Objectives

The purpose of the study is to understand the geochemical interactions occurring between leachate from Cs-formate residue and the groundwater/tailings within the Old TMA. This study focuses on the determination of the residue mineralogy and the mobility potential of the residue signature elements Ca, Cs, S, Rb and Sr. All other elements are referred to as non-residue signature elements.

The results of the study, which were provided to Cabot Corporation in March 2010, were used to initiate a site relicensing project that required the assessment of residue management options.

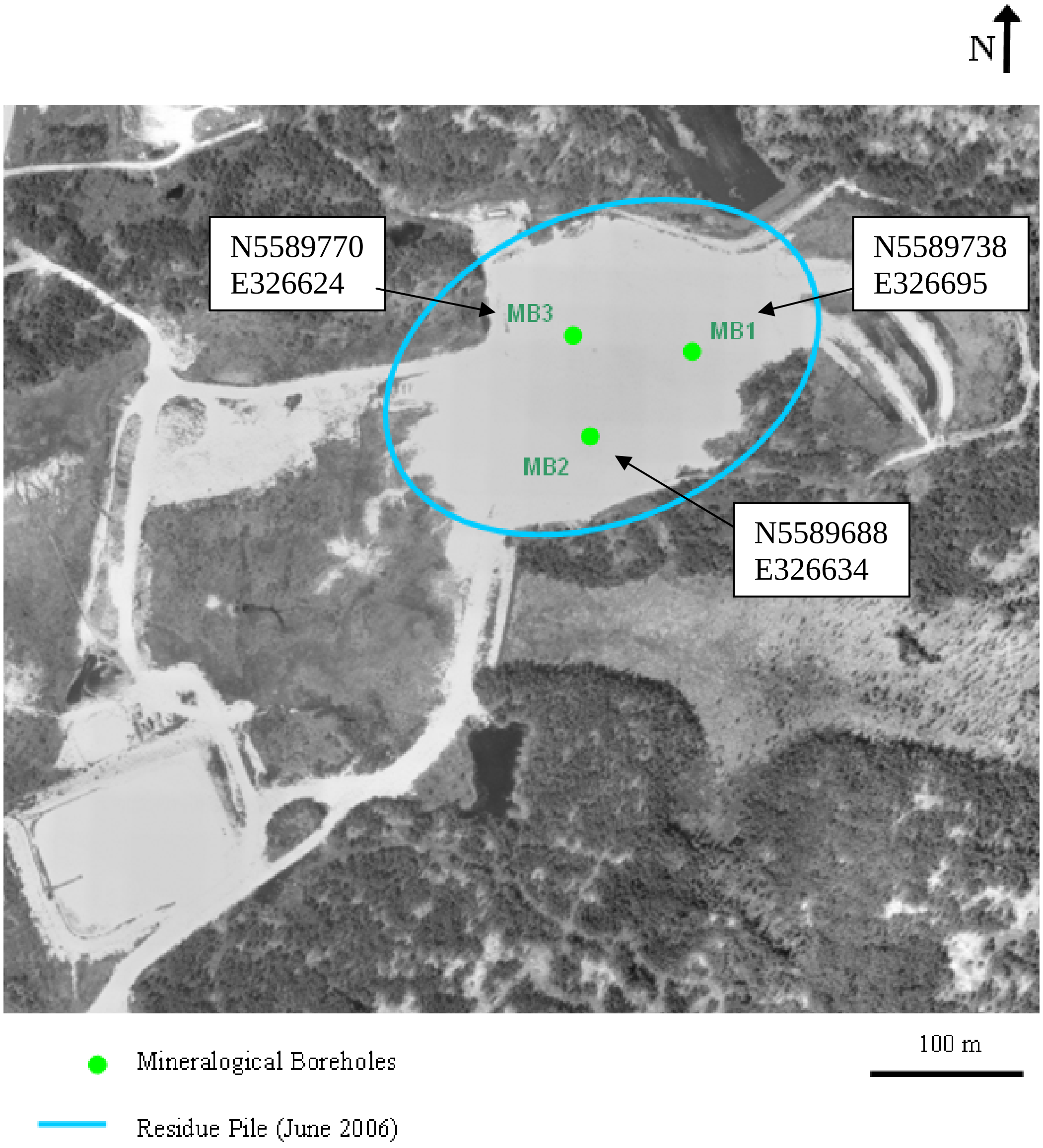
Chapter 2: Materials and Methods

The stratigraphy of the Old TMA and the leachate signature data presented in Chapter 1 were used to design the field and laboratory methods for this research.

2.1 Drilling and Core extraction

In June 2008, three mineralogical boreholes (MB1, MB2 and MB3) were cored through the residue pile and into the tailings using a direct-push method. The drill locations were selected in a triangular pattern to best represent the spatial coverage of the residue pile (Figure 2-1) and have the highest probability of encountering all six residue deposition periods.

Cortek Drilling used an AMS Power Probe 9635 Pro-D drill rig to acquire in-situ core by consecutive pushing and extracting of high-density clear plastic rods (1.22 m long and 4.1 cm inner diameter) into the residue/tailings. After being brought to the surface, each core rod was capped and sealed at both ends, immediately frozen to preserve the solids and porewater, and the borehole was cleaned out with an auger to the starting depth of the next core rod. The maximum attainable depths were dictated by the ability of the drill rig to push through the residue, into the tailings and retrieve core. All boreholes were backfilled with bentonite. The top elevation of each mineralogical borehole relative to each other was manually surveyed with a tripod, level, and rod. All the core was taken to the University of Manitoba and stored in a freezer. Fieldwork pictures of the residue pile, direct-push drill rig, and core extraction and field preparation are presented in Figure 2-2.



Note, the residue pile footprint has grown to the southwest since this aerial photograph was taken in June 2006

Figure 2-1 Location of mineralogical boreholes MB1, MB2 and MB3 (*Photograph was provided by TANCO*)

Figure 2-2 June 2008 fieldwork pictures of the residue pile (a), direct-push drill rig (b), core extraction (c) and field preparation of core (d)

2.2 Core Logs

Frozen core rods were cut in half lengthwise using a table saw equipped with a diamond blade; the saw and blade were cleaned between each cut. Half of each core rod was allowed to thaw and air dry before being logged and sampled for scanning electron microscope (SEM), electron microprobe (EMP), X-ray diffraction (XRD) and bulk solids analyses. The other half of each frozen core rod was resealed, re-labeled, and placed back in the freezer for porewater and sequential extraction analyses.

Once thawed, the residue and tailings stratigraphy were logged using the layers of granular feldspar as marker beds separating different periods of residue deposition.

2.3 Mineralogy

Sixteen residue and fifteen tailings thin sections were prepared for petrographic descriptions and instrumental analysis. Sample locations were selected to represent all six residue deposition periods and differing observations in the underlying tailings such as mineralogy, colour, grain size or grain distribution. To create the thin sections, solids from the desired core depths were placed into molded aluminum boxes and saturated with epoxy resin. Once the epoxy had hardened, the samples were submitted to Vancouver Petrographics for the preparation of polished thin sections without the use of water to preserve soluble minerals. Core sample depths selected for thin section preparation and analytical techniques are shown in Table 2-1.

Table 2-1: Borehole sampling intervals, mineralogical analyses and chemical procedures

Mineralogical Borehole	Sampling Interval		Middle of Interval Depth (m)	Thin Section	Instrumental Techniques			Analytical Techniques		
	(ft)	(m)			XRD	SEM	EMP	Bulk Solids	Porewater	Sequential Extraction
MB1	9.25 to 10.75	2.82 to 3.28	3.1	(x x)[1]					x	x
MB1	18.75 to 20.25	5.72 to 6.18	6.0						x	x
MB1	32.5 to 34.0	9.91 to 10.36	10.1	x (x x x)[1]				x	Dry	x
MB1	39.25 to 40.75	11.96 to 12.42	12.2	(x x)[1]					x	x
MB1	46.5 to 48.0	14.17 to 14.63	14.4	x				x	x	x
EOH @ 15.2 m										
MB2	9.25 to 10.75	2.82 to 3.28	3.1	(x x)[1]					x	x
MB2	19.25 to 20.75	5.87 to 6.32	6.1	x[1]					x	x
MB2	29.5 to 31.0	8.99 to 9.45	9.2	x[1]					x	x
MB2	38.5 to 40.0	11.73 to 12.19	12.0	x x x[1]				x	x	x
MB2	42.5 to 44.0	12.95 to 13.41	13.2	x				x	x	x
MB2	49.5 to 52.0	15.09 to 15.85	15.5	x				x	x	x
MB2	52.0 to 60.0	15.85 to 18.29	17.1						x	x
EOH @ 18.4 m										

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

EOH = End of Hole

"multiple x's" indicates that number of samples that were analysed within this interval

[1] indicates that a sampling point is slightly outside, but closest to, the listed interval

Table 2-1 continued: Borehole sampling intervals, mineralogical analyses and chemical procedures

Mineralogical Borehole	Sampling Interval		Middle of Interval Depth (m)	Thin Section	Instrumental Techniques			Analytical Techniques		
	(ft)	(m)			XRD	SEM	EMP	Bulk Solids	Porewater	Sequential Extraction
MB3	4.75 to 6.25	1.45 to 1.91	1.7	x	x	x		x	x	x
MB3	9.5 to 11.0	2.90 to 3.35	3.1	x	x				x	x
MB3	15.25 to 16.75	4.65 to 5.11	4.9	x	x			x	x	x
MB3	19.25 to 20.75	5.87 to 6.32	6.1	x x[1]	x	x[1]	x[1]	x x[1]	x	x
MB3	24.5 to 26.0	7.47 to 7.92	7.7	x	x				x	x
MB3	28.25 to 29.75	8.61 to 9.07	8.8	x x[1]	x			x	x	x
MB3	34.25 to 35.75	10.44 to 10.90	10.7	x	x				x	x
MB3	40.0 to 41.5	12.19 to 12.65	12.4	x	x	x		x	x	x
MB3	42.5 to 44.0	12.95 to 13.41	13.2	x x[1]	x	x x[1]		x	x	x
MB3	46.5 to 48.0	14.17 to 14.63	14.4	x	x	x	x	x	x	x
MB3	48.0 to 52.0	14.63 to 15.85	15.2		x				x	x
EOH @ 17.1 m										

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

EOH = End of Hole

"multiple x's" indicates that number of samples that were analysed within this interval

[1] indicates that a sampling point is slightly outside, but closest to, the listed interval

2.3.1 Optical Microscopy

All thirty-one thin sections were examined under transmitted and reflected light using a Nikon^{TM} Eclipse E400 optical microscope and the mineralogy and grain distribution of the residue and tailings described.

2.3.2 Scanning Electron Microscope (SEM)

Three residue and three tailings thin sections were selected for SEM analysis from core MB3 because it is the mineralogical borehole that contained the most residue deposition periods. The six polished thin sections were examined using Energy-Dispersive X-ray spectroscopy (EDX) on a Cambridge Stereoscan 120 Scanning Electron Microscope at the University of Manitoba. This allowed for elemental analyses of select grains, and observation of grain shape, texture, overgrowths and alteration. On the residue samples, 127 spots were analyzed; whereas 116 spots were analyzed on the tailings samples.

2.3.3 Electron Microprobe (EMP)

One sample from the residue and one from the tailings of core MB3 were selected for EMP analysis. X-ray mapping and quantitative analysis were conducted on polished thin sections using a Cameca SX100 Electron Microprobe at the University of Manitoba.

Elemental maps for Cs, Rb, Sr and S were generated for portions of the residue sample using a 15 kV electron beam regulated at 100 nA. Portions of the tailings sample were mapped for Cs, Rb and S under the same electron beam configuration. For Cs, Sr and S maps, PET crystals were used to analyze crystal combinations. TAP crystals with a Rb La line were used to generate Rb maps. Back scattered electron images of the same locations were produced before every X-ray elemental map.

Quantitative analysis was performed on 22 points in the residue sample and 38 points of the tailings sample. Each sample point was analyzed for 14 elements including Al, Ba, Ca, Cs, Fe, K, Mg, Na, O, P, Rb, Si, Sr and S. Analysis was done using a 15 keV electron beam regulated at 20 nA and 2 μm in diameter, K alpha and L alpha X-ray lines, and TAP, PET, LPET and LLIF crystals. Reported analytical weight percents were divided by respective elemental atomic weights to yield atomic proportions for mineralogical interpretation.

2.3.4 X-Ray Diffraction (XRD)

Eight residue and three tailings samples were selected for XRD analysis from MB3. Visible quartz and feldspar grains were removed before grinding residue samples. Dry core samples were prepared by grinding about 3 g of solid into a powder and spreading the powder onto a clean glass slide with acetone. The eleven samples were subjected to a Philips PW1710 Automated Powder X-ray Diffractometer for mineral identification at the University of Manitoba. The microprocessor was operated using MDI DataScan software. X-ray data were collected from 3 to 65º 2θ using step widths of 0.05º 2θ and dwell times of 1s/step. The data were processed using MDI Jade+ software and the Joint Committee on Powder Diffraction Standards (JPDS) database.

2.4 Solid State Analyses

Six samples of residue core were selected for bulk solids analysis; all residue samples were taken from MB3 at intervals that represented all deposition periods identified within the borehole. Seven samples of tailings core were selected for bulk solids analysis; tailings samples were taken from all three cores at locations that differed in mineralogy, colour, and grain size or distribution. The thirteen samples encompassed 30 to 35 cm of core length and weighed approximately 220 g. They were submitted to ALS Chemex Laboratory in Vancouver for analyses.

Inductively Couple Plasma Mass Spectrometry (ICP-MS) was used to detect 48 elements including Al, Ba, Ca, Cs, Fe, K, Li, Na, Rb, Sr and Ta by digesting a portion of each sample with perchloric, nitric, and hydrofluoric acids to near dryness, and further digestion in hydrochloric acid. The sample was brought to a final volume of 12.5 ml with 11% hydrochloric acid, homogenized, and then analyzed (ALS Chemex, 2009a). Atomic Absorption Spectroscopy (AAS) was used for Hg detection by digesting a portion of each sample in aqua regia inside a graphite heating block, cooling, diluting to 12.5 ml with deionized water, treating with stannous chloride to reduce the Hg, volatilizing by purging with Ar, and then analyzing (ALS Chemex, 2009a). Inductively Coupled Plasma Atomic Emission Spetroscopy (ICP-AES) was used for Si detection by adding a portion of each sample to a Na-peroxide flux, mixing and fusing in a furnace, cooling and dissolving in 30% hydrochloric acid, analyzing, and then correcting for spectral interelement interferences (ALS Chemex, 2006a). ICP-AES was also used for B detection by adding a portion of each sample to a NaOH flux in a Ni-crucible, fusing over a Bunsen burner, and cooling and dissolving in hot deionized water. Hydrochloric acid was then mixed into an aliquot of the sample, analyzed, and then corrected for spectral interelement interferences (ALS Chemex, 2004a).

Colometery was used to detect carbonate C and CO_2 by adding a portion of each sample to perchloric acid in a heated reaction vessel, the released free CO_2 was transferred to a CO_2 coulometer by a C free gas, was quantitatively absorbed to react with monoethanolamine in the presence of an indicator that faded in colour with increasing CO_2 concentration. The colour change was detected by a photo-cell to determine analytical concentrations (ALS Chemex, 2006b). A carbonate leach method was used to detect SO_4 S by boiling a portion of each sample with Na-carbonate for 30 minutes, removing insoluble materials by filtration, reducing ferric Fe to ferrous Fe by adding hydroxylamine hydrochloride, precipitating the remaining SO_4 with Ba-chloride in a dilute hydrochloric acid medium, and finally filtering, igniting and weighing the resulting Ba-sulphate precipitate to calculate the percent SO_4 S in the original samples (ALS Chemex, 2009b). Infrared spectroscopy was used to detect total C and total S by passing a stream of O through a portion of each sample while heating in a furnace to release CO_2 and SO_2 for infrared analysis (ALS Chemex, 2004b). Specific ion electrode matching was used for F detection by fusing a portion of each sample with KOH, leaching with deionized water, adjusting the pH, and analyzing using matrix matched reference materials (ALS Chemex, 2006c). X-Ray Fluorescence Spectroscopy (XRF) was used to detect Cl by fusing a portion of each sample with a Li metaborate flux and then analyzing (ALS Chemex, 2007a). Total N was determined colourimetrically by turning each sample into a Kjeldahl digest and exposing it to a Tenhicon Autoanalyser (ALS Chemex, 2004c).

Nuclear irradiation and gamma ray spectroscopy were used to detect Br and I by exposing each sample to a neutron flux in the McMaster Nuclear Reactor. This caused most elements to become radioactive and emit gamma rays that exhibited characteristic energies that were used to qualitatively and quantitatively identify the target elements (ALS Chemex, 2007b).

2.5 Porewater Analyses and Modeling

Attempts were made to extract porewater from thirteen core samples of residue and ten core samples of tailings from various depths within all three cores. Frozen samples were put into sealed 500 ml glass jars and placed in a fridge at 3ºC for 24 hours to allow for a slow thaw. Samples were then placed in a cylinder that contained 0.45 µm filter paper over a small hole at the bottom (Figure 2-3). A maximum of 5 tons of pressure was applied to the cylinder by a hydraulic press. Porewater was expelled through the hole at the bottom of the cylinder and collected in a sterile disposable syringe. From the syringe, 5 ml of porewater was passed through a 0.2 µm filter membrane into a sample vial, preserved with 50 µL of 20% HNO_3, and

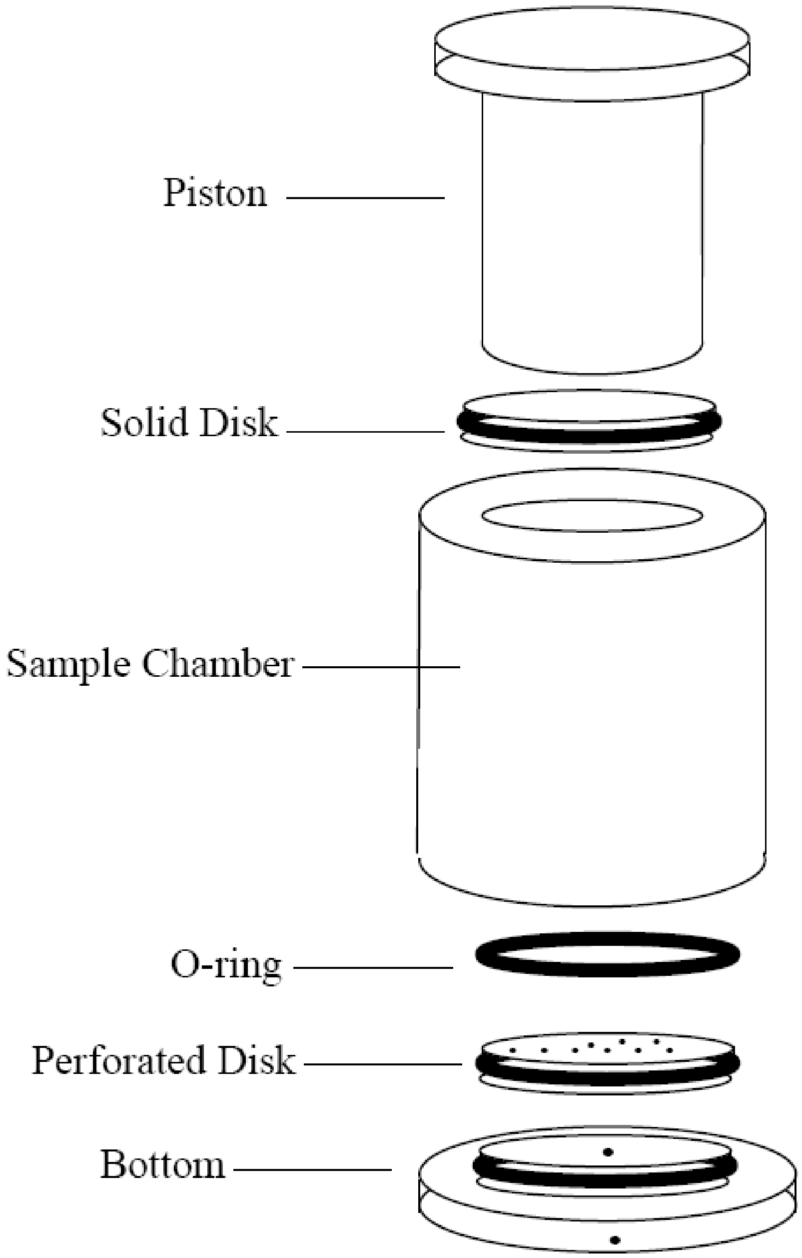


Figure 2-3	Squeezing apparatus used to extract porewater from solid tailings (Etcheverry *et al*, 2009)

submitted to ALS Environmental Laboratory in Winnipeg for analyses of hardness (as $CaCO_3$) and 39 elements including Al, Ba, Ca, Cs, Fe, K, Li, Na, Rb, Si, Sr and Ta. Additionally, 6 ml was released from the syringe porewater into an Ultrameter II 6P for measurement of pH, conductivity, temperature, Eh and total dissolved solids. Any remaining porewater was filtered into a second vial for the prioritized analysis of S, SO_4, Cl, F, pH and total dissolved solids as available volume allowed.

Laboratory methods used by ALS Environmental were similar to those described in section 2.4 with ICP-MS used to detect the majority of elements, ICP-AES for used to determine Ta concentrations, and specific ion electrode method used to detect F. Differences in laboratory methods included using a colorimeter to detect SO_4 and Cl, and cold vapour atomic fluorescence spectrophotometry to measure Hg concentrations. A standard hydrogen electrode and a reference electrode were used to determine pH.

For core sample intervals where porewater analytical data and field measurements were available, WATEQ4F geochemical modeling software was used to determine the saturation indices of potential precipitates. The available numerical porewater data was input into descriptive columns of a standard WATEQ4F Microsoft excel spreadsheet. In columns where data was not available, numerical values of zero were input. The resulting excel file was converted to a csv file and executed through WATEQ4F.

2.6 Sequential Extraction Analyses

After attempting porewater extraction, the same twenty-three samples were then subjected to a five-step sequential extraction procedure that targeted the phases listed in Table 2-2. This procedure was designed to determine the conditions needed to mobilize specific elements to the environment. Solutions from each step were collected and submitted to ALS Environmental Laboratory in Winnipeg, for the same analyses as the porewater with the exception of F and Ta. Laboratory methods were the same as those described in section 2.5. Ultrameter measurements were not taken because acids were added in the sequential extraction procedure that would have invalidated the results.

For each sample interval, concentrations for the residue signature elements Ca, Cs, Rb, Sr and S, and for other major anions and elements that are present in high concentrations were normalized to mg/g to bring all analytical results to a common unit of measurement for direct comparison. Average values for each sequential extraction step were calculated for the residue and for the tailings. The results from every sample point were averaged to obtain values representative of the entire data set for each stratigraphic unit. The weighted sum of porewater concentrations and step 1 results represent the water-soluble fraction of an element. Step 2 targeted elements in carbonates or other easily dissolvable minerals. Step 3 released elements bound to Fe-oxyhydroxides by reducing ferric Fe to soluble ferrous Fe, which mobilized the Fe and elements bound to it. Step 4 was an oxidizing phase that targeted elements bound to

Table 2-2: Sequential extraction procedure

Target Phase	Method	Reference
Step 1: Water Soluble Fraction	Weigh 4 grams of sample. Crush with a pestle and mortar and put in sterile 50 ml polypropylene tube. Mix with 40 ml reverse osmosis deionised (RODI) water. Shake at 300 RPM for 3 hours then centrifuge at 2400 RPM for 12 minutes. Remove supernatant liquid with a disposable syringe and a 0.45 µm filter membrane. For lab submission, place in 2 new labelled, sterile, 50 ml polypropylene tubes: 1) 5 ml of sample for metals analyses (expelled through a 0.2 µm filter membrane, preserved with 50 µL of 20% nitric acid (HNO_3)); and 2) if available, 15 ml or more for SO_4 and Cl analyses. Wash the remaining sample with 10 ml deionised water. Shake at 300 RPM for 6 minutes then centrifuge at 2400 RPM for 24 minutes. Remove supernatant liquid and discard. Remaining sample is ready for step 2.	Dold, 2003
Step 2: Exchangeable / Carbonates	Premix 40 ml of 1.0 M Na-acetate (CH_3COONa) in RODI water adjusted to pH 5 with acetic acid (CH_3COOH). Add solid sample from previous leach and shake at 300 RPM for 6 hours then centrifuge at 2400 RPM for 12 minutes. Remove supernatant liquid with a disposable syringe and a 0.45 µm filter membrane. For lab submission, place in 2 new labelled, sterile, 50 ml polypropylene tubes: 1) 5 ml of sample for metals analyses (expelled through a 0.2 µm filter membrane, preserved with 50 µL of 20% nitric acid (HNO_3)); and 2) if available, 15 ml or more for SO_4 and Cl analyses. Wash the remaining sample with 10 ml deionised water. Shake at 300 RPM for 6 minutes then centrifuge at 2400 RPM for 24 minutes. Remove supernatant liquid and discard. Remaining sample is ready for step 3.	Hall et al, 1996, and Wasserman et al, 2002

Table 2-2 continued: Sequential extraction procedure

Step 3: Bound to Iron and Manganese Oxides	Premix a 40 ml solution that contains 30 ml of RODI water and 10 ml of 100% acetic acid (CH_3COOH) at pH 1.5 with a concentration of 0.04M hydroxylamine hydrochloride ($NH_2OH{\cdot}HCl$). Add solid sample from previous leach and shake at 300 RPM for 1 minute. Heat solution at 95°C for 6 hours (stir every 90 minutes with a glass rod). Centrifuge at 2400 RPM for 12 minutes. Remove supernatant liquid with a disposable syringe and a 0.45 µm filter membrane. For lab submission, in 2 new labelled, sterile, 50 ml polypropylene tubes: 1) 5 ml of sample for metals analyses (expelled through a 0.2 µm filter membrane, preserved with 50 µL of 20% nitric acid (HNO_3)); and 2) if available, 15 ml or more for SO_4 and Cl analysis. Wash the remaining sample with 10 ml deionised water. Shake at 300 RPM for 6 minutes then centrifuge at 2400 RPM for 24 minutes. Remove supernatant liquid and discard. Remaining sample is ready for step 4.	Bunzl et al, 1997, and Hall et al, 1996
Step 4: Bound to Organic Matter	Prepare 2 solutions. "Solution 1" of 18.75 ml of 30% hydrogen peroxide (H_2O_2) adjusted to pH 1.5 with 20% nitric acid (HNO_3). "Solution 2" of 6.25 ml of 20% nitric acid (HNO_3) brought to a concentration of 3.2M ammonium acetate (NH_4Ac). Add solid sample from previous leach to 25 ml of RODI water and heat to 80°C while stirring with a glass rod. Slowly add "Solution 1" to the water/solid sample mixture. Cool solution to approx 25°C; about 1.5 hours. Add "Solution 2" and shake at 300 RPM for 1 hour then centrifuge at 2400 for 12 minutes. Remove supernatant liquid with disposable syringe and a 0.45 µm filter membrane. For lab submission, in 2 new labelled, sterile, 50 ml polypropylene tubes: 1) 5 ml of sample for metals analyses (through a 0.2 µm filter membrane, preserved with 50 µL of 20% nitric acid (HNO_3)); and 2) if available, 15 ml or more for SO_4 and Cl analyses. Wash the remaining sample with 10 ml deionised water. Shake at 300 RPM for 6 minutes then centrifuge 2400 RPM for 24 minutes. Remove supernatant liquid and discard. Remaining sample is for step 5.	Bunzl et al, 1997
Step 5: Residuals	Remaining solid sample submitted to ALS Chemex in Vancouver, BC, for total dissolution via hydrofluoric acid (HF). Sample liquid was analyzed for the same parameters: metals, SO_4, and Cl.	Tessier et al, 1979

organics, such as formate. Step 5 involved the complete dissolution of residual minerals such as sulphates and alumino-silicates.

Chapter 3: Results

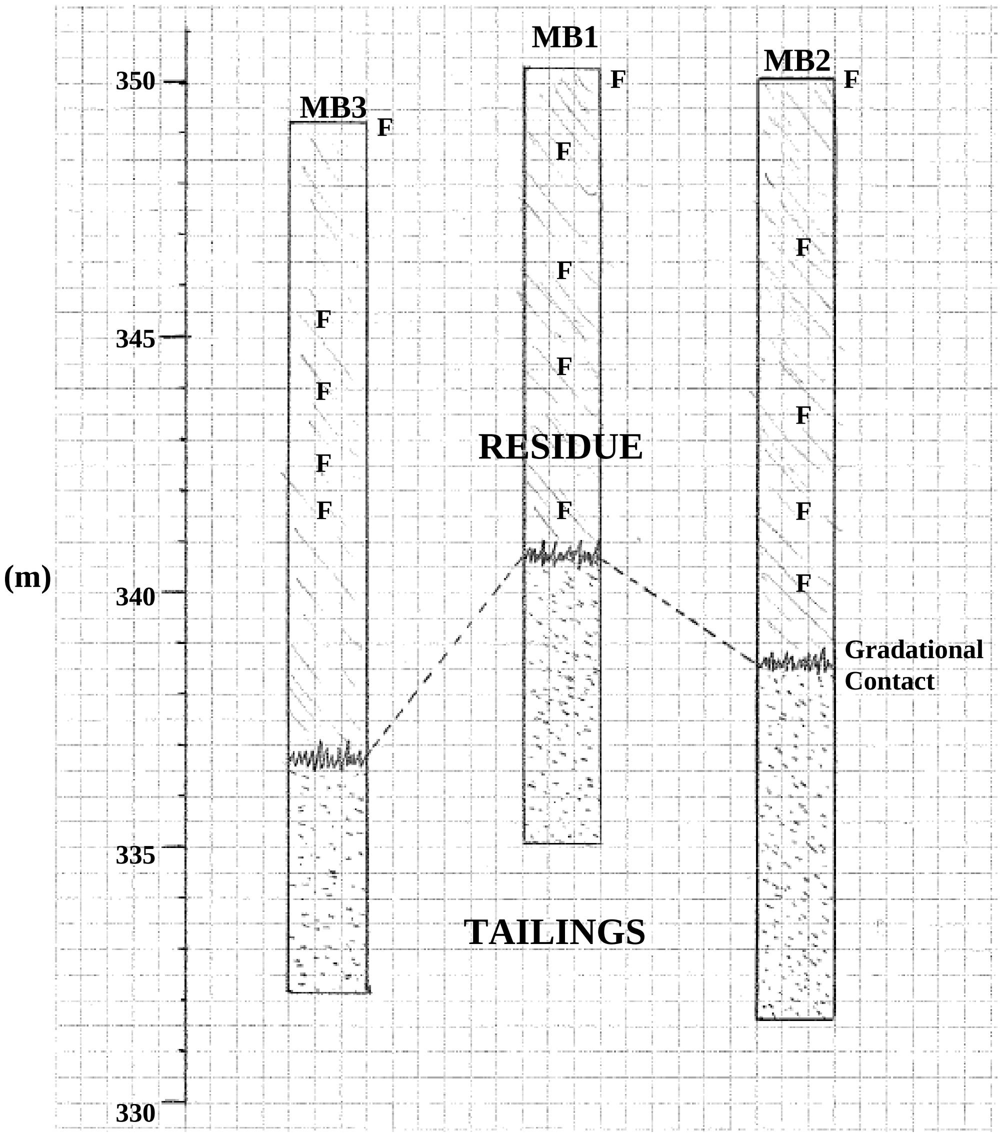
3.1 Drilling and Core Extraction

Maximum attainable depths of the mineralogical boreholes were 15.2 m in MB1, 18.4 m in MB2, and 17.1 m in MB3. MB1 contained 9.6 m of residue and 5.6 m of tailings, MB2 had 11.4 m of residue and 7.0 m of tailings, and MB3 contained 12.5 m of residue and 4.6 m of tailings. Stratigraphic correlation of these boreholes indicates that the residue/tailings contact is dipping west-northwest towards MB3 (Figure 3-1). The underlying peat and clay layers were not encountered.

The lower attainable depths within each borehole did not yield retrievable core; at these depths groundwater saturation increased and the tailings would slide out of the plastic core rods while being raised. Only a small amount of tailings grains remained on the core rods when they reached the surface. The lower 0.6 m of tailings core in MB1, 2.6 m of tailings in MB2, and 2.5 m of tailings in MB3 were not retrievable.

3.2 Core Logs

The residue is primarily bone white, corresponding to GLEY 8/1 to 5R8/1 on the Munsell Colour Chart, with shades of beige and brown (Figure 3-2). The upper 2.1 to 3.7 m also has a slight yellowish tinge. The residue is very fine-grained to clay size and generally lacks structure until about 4 m below grade where greyish-white layering and lenses randomly appear that increase frequency with depth. Fine to medium-grained black inclusions are also found sporadically throughout the residue, but appear in concentrated clusters around 9 m below grade and deeper. Six residue



Note:

- F = feldspar marker bed
- Vertical elevations are arbitrary; mineralogical boreholes were surveyed relative to each other and no other reference point / scale.
- For horizontal scale, refer to Figure 2-1.

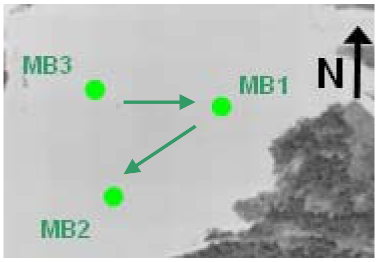
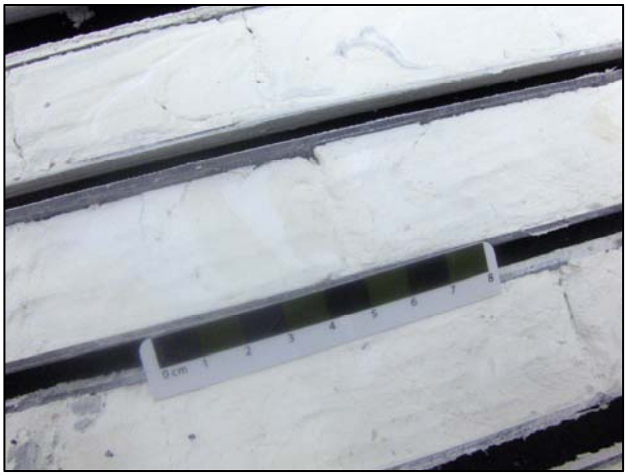


Figure 3-1	Stratigraphic correlation of MB1, MB2 and MB3

Residue is white, very fine-grained to clay size and lacks structure (top picture is a portion of MB2 from 0.5 - 6 m below grade, middle picture is a portion of MB2 at higher resolution from 1.8 to 4 m below grade)



Cluster of feldspar grains used as a marker to identify to top of a deposition period (bottom picture is a portion of MB2 from 9.7 to 11.3 m below grade)

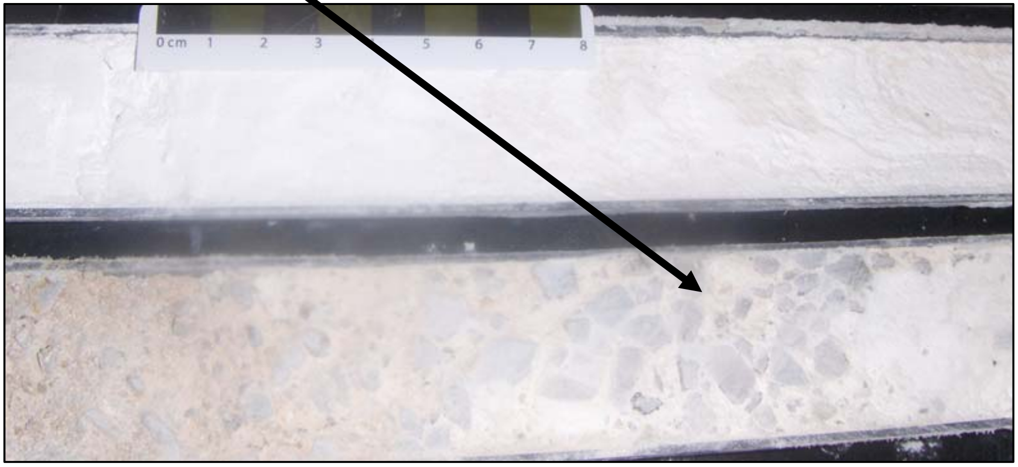
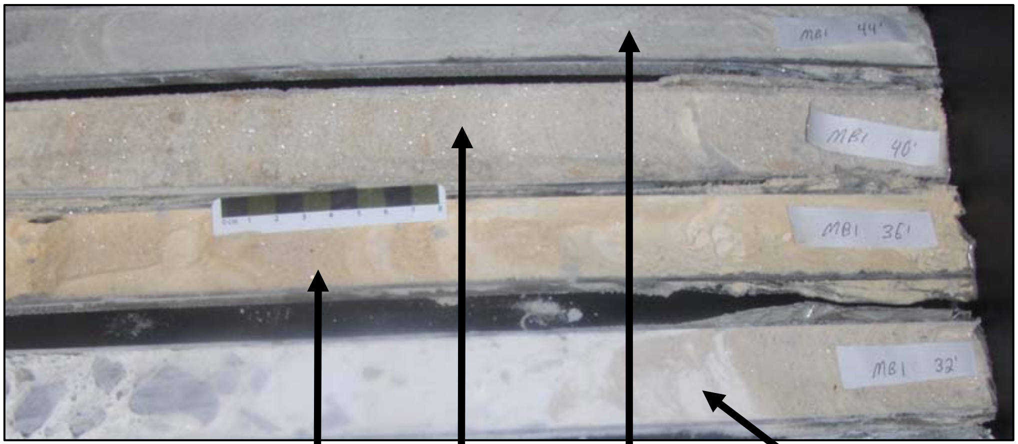


Figure 3-2 Residue core log pictures

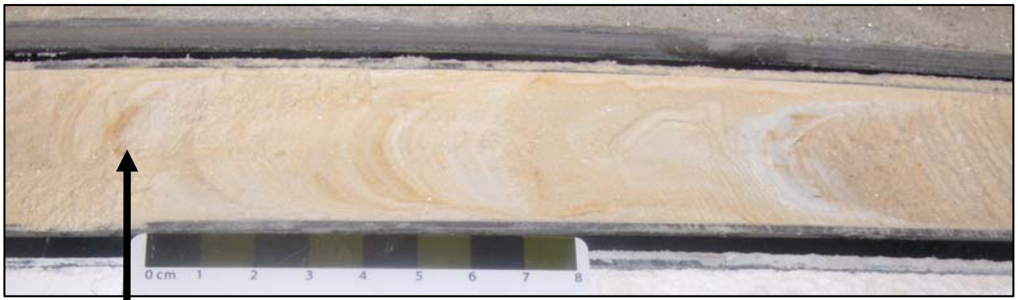
deposition periods had occurred before the drilling program for this study; the layers were separated by feldspar that was spread across each respective deposition surface to eliminate wind erosion. These feldspar grains have been incorporated into the residue and are found randomly as single coarse to very-coarse grains throughout the residue. Including a layer at grade, MB1, MB2 and MB3 all contain five feldspar marker beds that range from 25 to 40 cm thick, which separate five deposition periods; the feldspar marker beds in MB3 are more distinctive than in MB1 and MB2. All three mineralogical boreholes contain additional areas where feldspar grains could represent additional marker beds, but these are only 2 to 5 cm thick and, therefore, not as definitive of different deposition periods.

The tailings are very fine to fine-grained, sub-angular to sub-rounded, well sorted and primarily quartz (Figure 3-3). The contact between the residue and tailings is gradational with the two units intermixing within about 15 to 25 cm of core. There are three distinct tailings units that could represent different distances from the tailings discharge line, or different ore types or combinations. The upper layer of tailings is 1 to 1.9 m thick, brownish-red to pale beige (7.5YR 8/1 on the Munsell Colour Chart), very fine-grained and contains random Fe-stained lenses composed of clay size grains. The middle tailings unit is 0.9 to 1.1 m thick, pale grey to brown (5R8/1 to GLEY 7/1 5PB on the Munsell Colour Chart), very fine to fine-grained, appears to contain some micas and lacks structure. The lower tailings layer is pale beige to brown (GLEY 7/1 5PB on the Munsell Colour Chart), very fine-grained, and appears to contain minor amounts of clay. This unit lacks structure with the exception of one Fe-stained



Upper layer of tailings
Middle layer of tailings with micas
Lower layer of tailings with minor amounts of clay
(top picture is a portion of MB1 from 9.2 to 13.4 m below grade)

Gradational contact between residue and tailings



Very fine-grained upper tailings layer with iron-stained lenses (middle picture is of MB2 from 12.5 to 12.7 m below grade, bottom picture is a portion of MB1 from 10 to 11.3 m below grade)

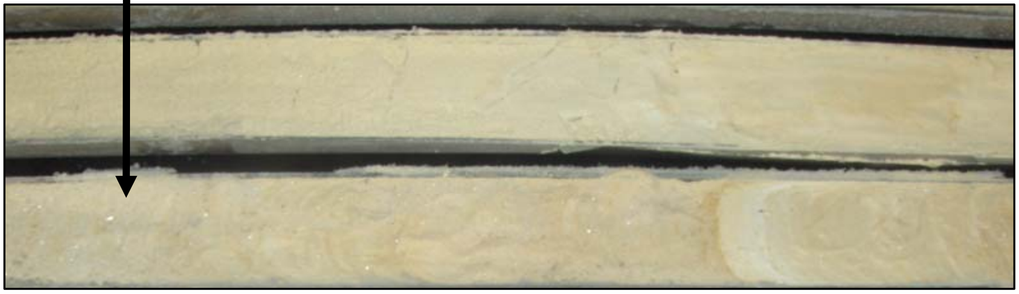


Figure 3-3 Tailings core log pictures

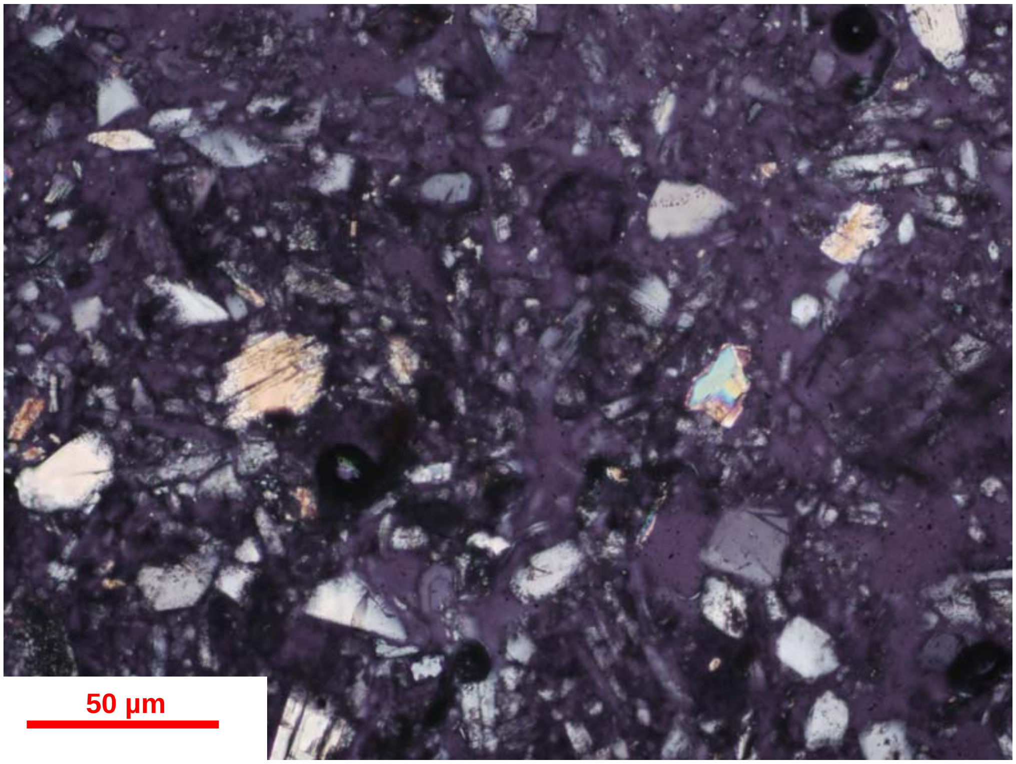
inclusion found in MB3. There is a gradational contact separating the three layers of tailings. Detailed core logs and depths are presented in Appendix A.

3.3 Mineralogy

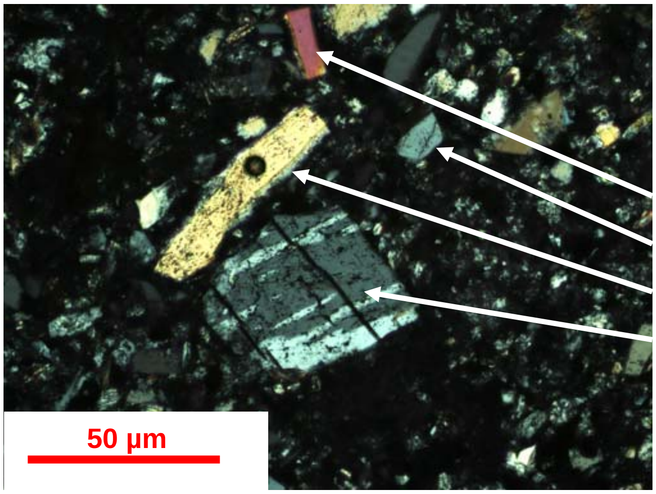
3.3.1 Optical Microscopy

Residue in the upper 5 m appears optically as framework grains clustered together in aggregates of about 1-5 mm that are separated by mud which is too fine-grained to characterize. The area of residue contains 30-35 % framework grains, 50-65 % matrix/mud, 5-10 % void space and 0-5 % calcite cement (Figure 3-4). The framework grains consist of 35-50 % quartz, 35-45 % sulphates (gypsum, barite, etc), 10-15 % microcline and plagioclase and 0-5 % muscovite. Individual framework grains range from 0.09 to 0.21 mm in diameter; quartz and sulphate grains are larger than the feldspar and muscovite. Below about 5 m depth in the residue, clustered aggregates are replaced by a more uniform distribution of framework grains and the overall framework grain size decreases with depth to 0.03 to 0.12 mm. The percentage of framework grains and void spaces also decreases with depth relative to the matrix/mud and calcite cement and there is an increase in the percentage of sulphate grains relative to quartz and feldspars. Additionally, towards the bottom of the residue pile there are black opaque mineral grains averaging about 0.8 mm in diameter.

Tailings immediately beneath the residue show a very fine-grained brown matrix and some mineral grain boundaries appear weathered. The brown matrix



MB3 Residue at 1.5 m below grade showing a higher percentage of matrix/mud than framework grains



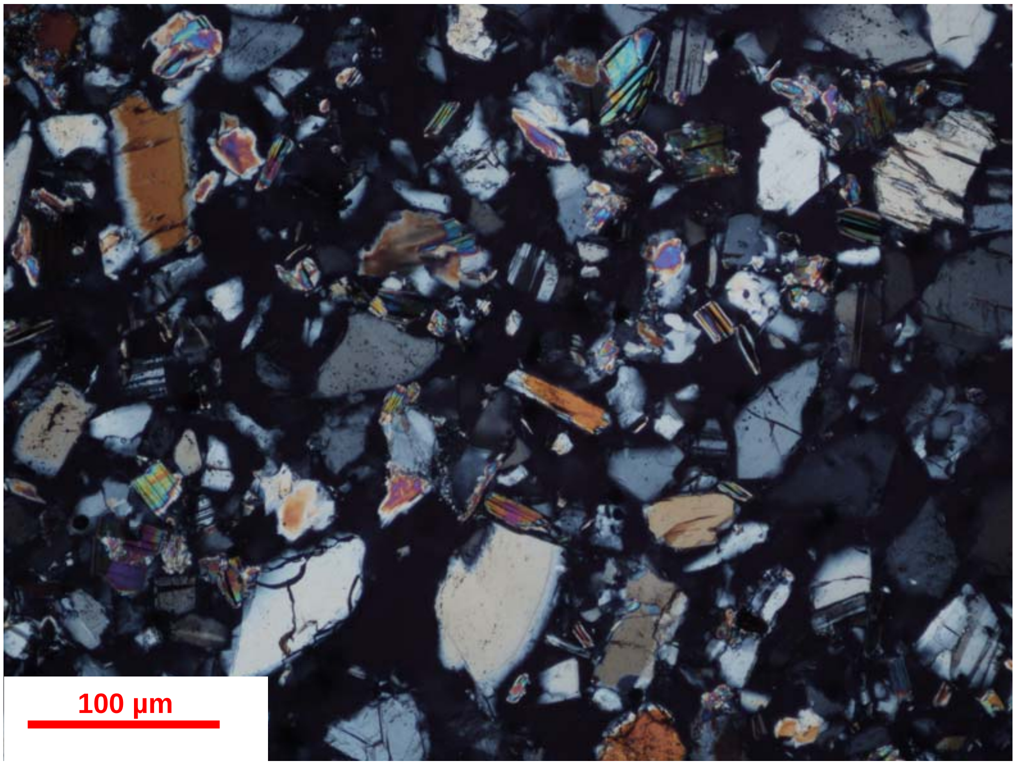
MB1 Residue at 0.9 m below grade showing framework grains:

- muscovite
- quartz
- gypsum
- microcline

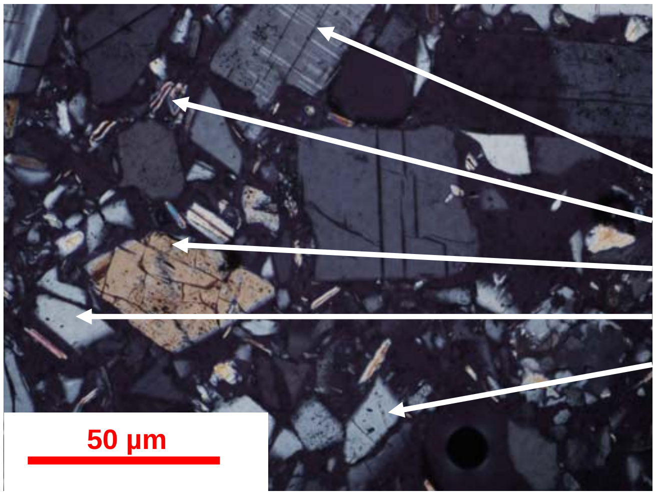
Figure 3-4 Photomicrographs of the residue under polarized light becomes less prevalent with about 1.5 m depth into the tailings to reveal clean uniform fine-grained minerals. In the upper 2 to 3 m of tailings, there are 55-85 % framework grains, 5-40 % matrix/mud, 5-10 % silica cement and 0-5 % void space (Figure 3-5). The framework grains appear to consist of 60-70 % quartz, 10-30 % microcline and plagioclase, 0-20 % sulphates (gypsum, barite, etc) and 0-10 % muscovite and other forms of micas. Individual framework grains range in diameter from 0.009 to 0.2 mm with an average of 0.06 mm; quartz and feldspar grains are larger than the sulphates and muscovite. Beyond 2 to 3 m depth within the tailings, the distribution of grains becomes less uniform. The percentage of framework grains to matrix and silica cement remains constant, but the percentage of quartz grains increases with depth relative to feldspars, sulphates, and muscovite throughout the remaining tailings core. The framework grain size increases from 0.06 mm to an average of 0.15 mm, then in the lower 0.5 to 1 m of tailings it decreases again to an average of 0.08 mm.

3.3.2 Scanning Electron Microscope (SEM)

Mineral observations and spot analyses were focused on the residue signature elements including Cs, Rb, Sr, Ca and S. Grains that contained Cs were the easiest to locate because they appeared bright in electron backscatter images. The residue appears to be moderately sorted, with individual grains ranging from angular to sub-rounded, containing a minor amount of fractures, and being frequently heterogeneous with respect to chemical composition.



MB1 Tailings at 11.9 m below grade showing a higher percentage of framework grains than matrix/mud



MB3 Tailings at 13.7 m below grade showing framework grains:

- microcline
- muscovite
- barite
- quartz
- plagioclase

Figure 3-5 Photomicrographs of the tailings under polarized light

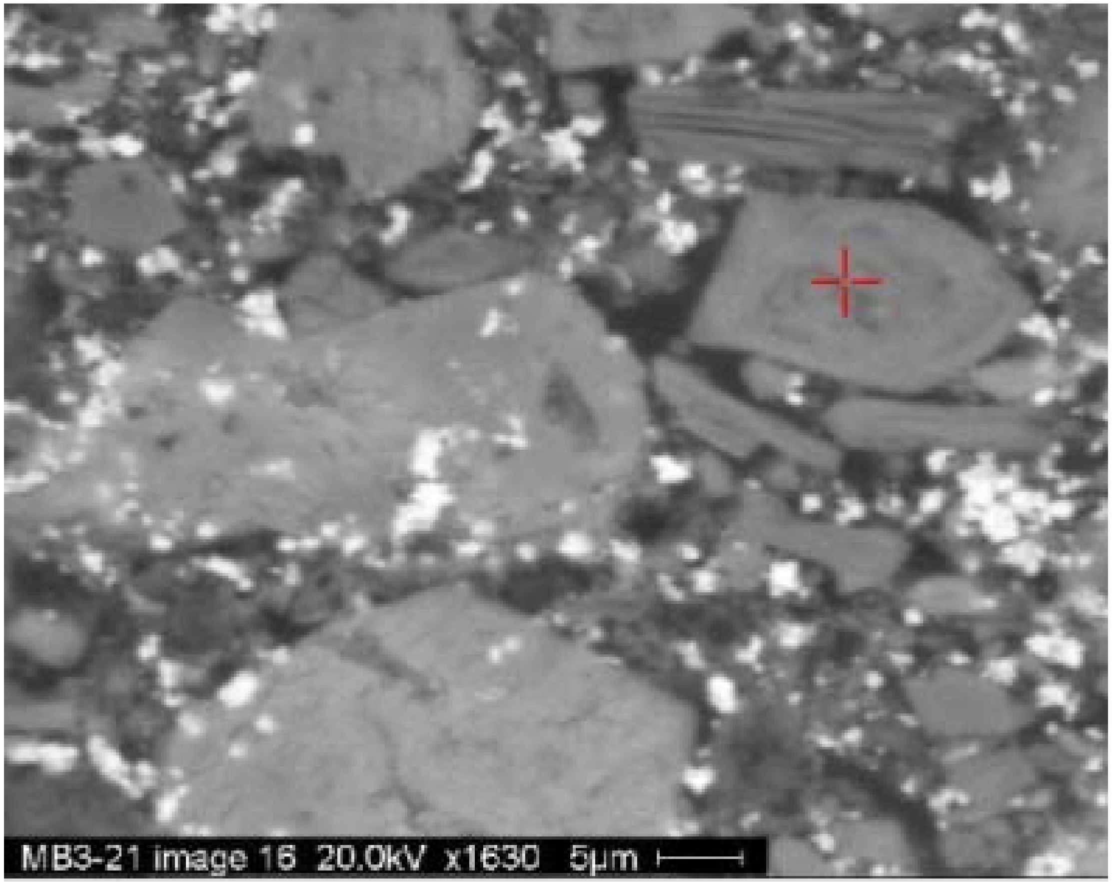
In the residue samples, Cs was detected numerous times in three different forms. In one case, Cs was found at 20 to 65 wt. % with Si and Al, in feldspar or pollucite (Figure 3-6). These grains are zoned with high Cs zones in the center and low Cs rims. Secondly, Cs at approximately 10 to 35 wt. % was detected with Si, where the highest Cs concentrations may occur along fractures (Figure 3-7). These grains likely represent a Cs-formate or Cs-hydroxide coating on quartz. Lastly, in a scan from MB3 at 6.4 m below grade, 23 wt. % Cs and 3 wt. % S were found associated with Si (Figure 3-8), representing Cs-sulphate and quartz. The Cs-formate or Cs-hydroxide, and Cs-sulphate, could represent secondary phases precipitated within the residue pile, but they more likely represent compounds generated within the CPF. Also in the residue samples, Sr was detected at 2 wt. % in association with S and Ba probably in barite (Figure 3-9). 60 wt. % Ca was found in association with 40 wt. % S in gypsum (Figure 3-10). Rb was detected in very small grains that were close to the size of the beam, or along the edge of mineral grains which may exist as a secondary phase.

The tailings appears to be well sorted, with individual grains ranging from sub-angular to sub-rounded, containing a minor amount of fractures, and with the exception of select feldspar or pollucite grains, being frequently homogeneous with respect to chemical composition or relative weight percent. In the tailings samples, Cs was located less often than in the residue, and only in one form. Cs at 45-65 wt. % was found with Si and Al in feldspar or pollucite. Some of these grains showed a degree of heterogeneity with areas containing Cs and others containing K or Na

Higher Cs concentration in the middle of the grain.
Atomic %: Al 22, Si 57, Cs 21
(MB3 at 1.5 m below grade)

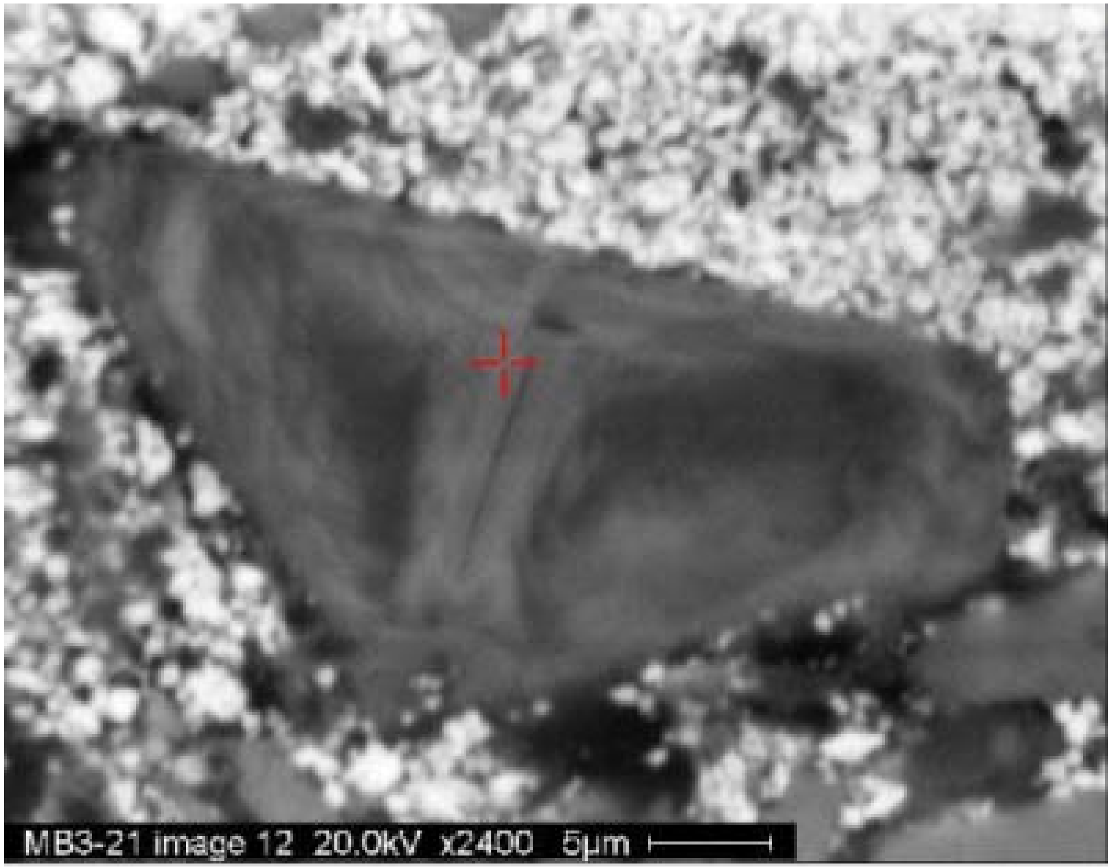
Lower Cs concentration in the outer portion of the grain.
Atomic %: Al 9, Si 86, Cs 5
(MB3 at 1.5 m below grade)

Figure 3-6 Residue SEM analysis of Cs in feldspar or pollucite



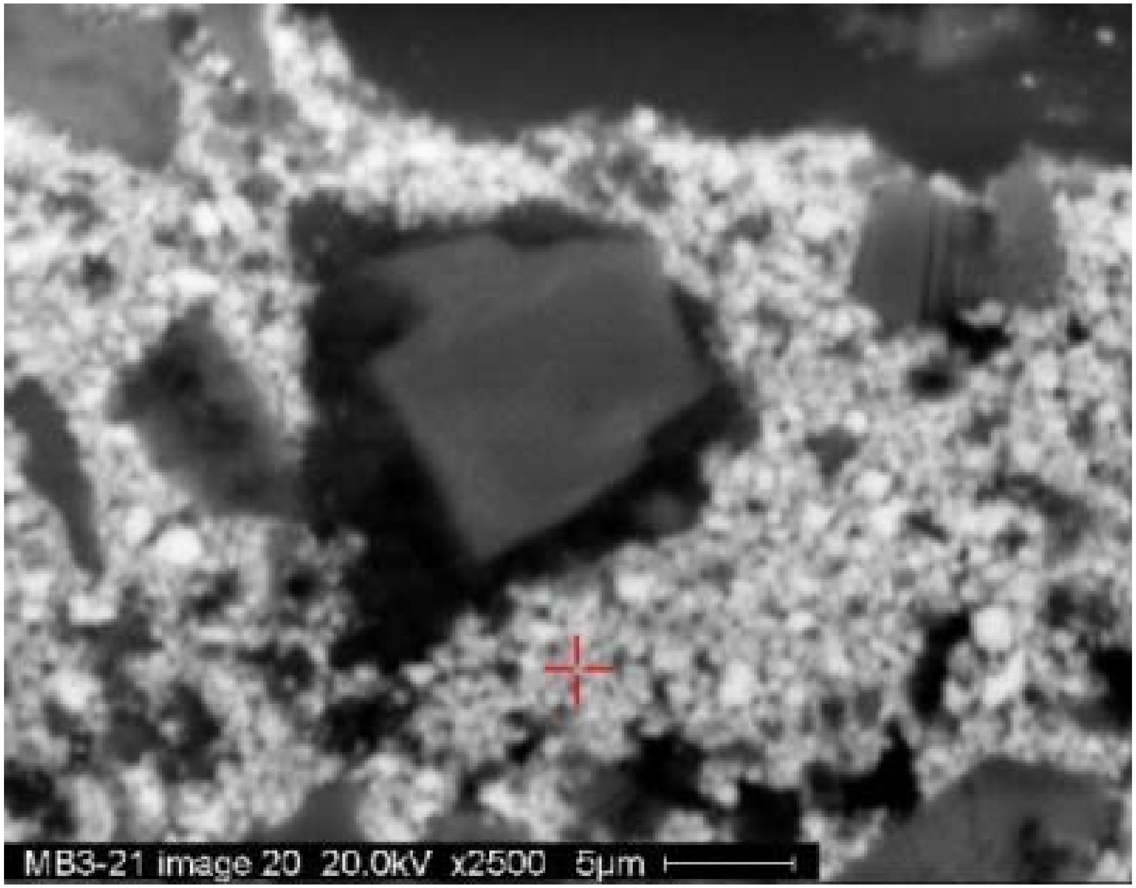
Atomic %:
Si 97, Cs 3

Figure 3-7 Residue SEM analysis of Cs-formate or hydroxide coating on quartz



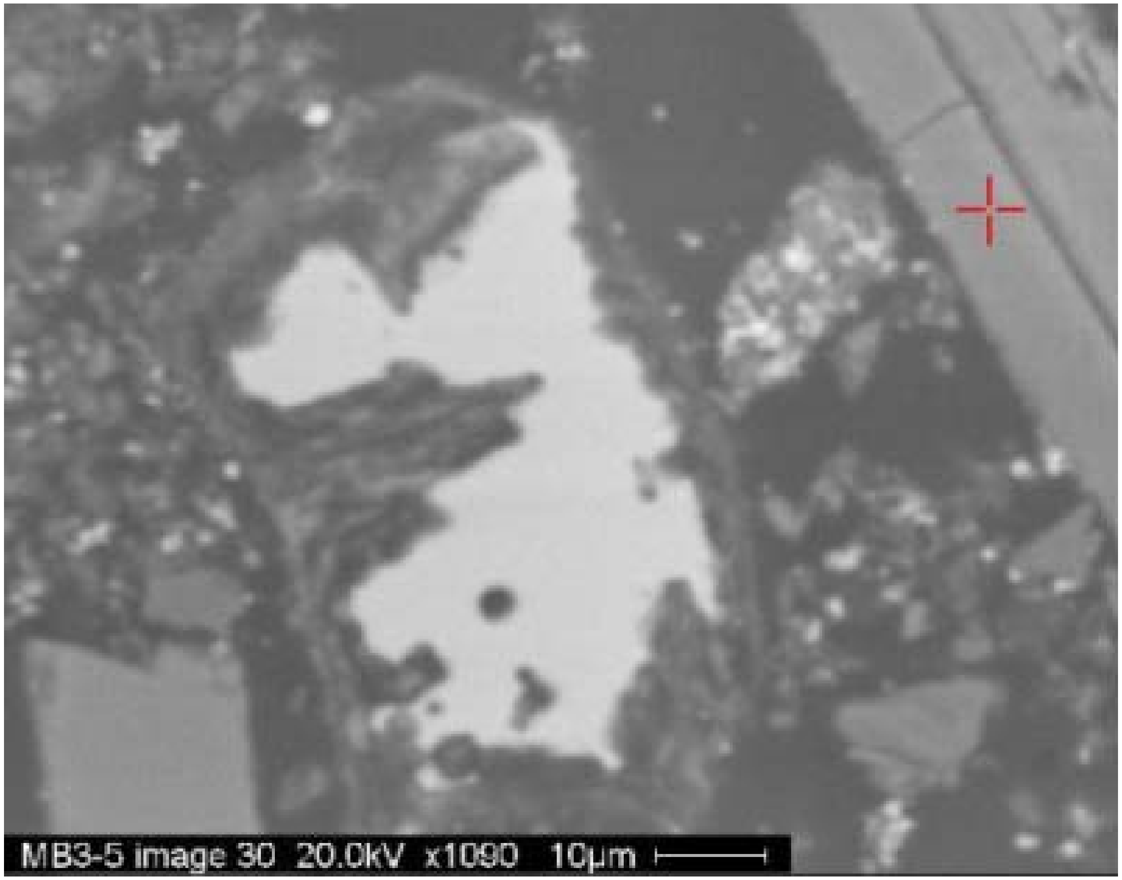
Atomic %:
Si 90, S 4, Cs 6

Figure 3-8	Residue SEM analysis of Cs-sulphate and quartz



Atomic %:
S 50, Ba 48,
Sr 2

Figure 3-9 Residue SEM analysis of Sr on barite



Atomic %:
S 47, Ca 53

Figure 3-10	Residue SEM analysis of gypsum

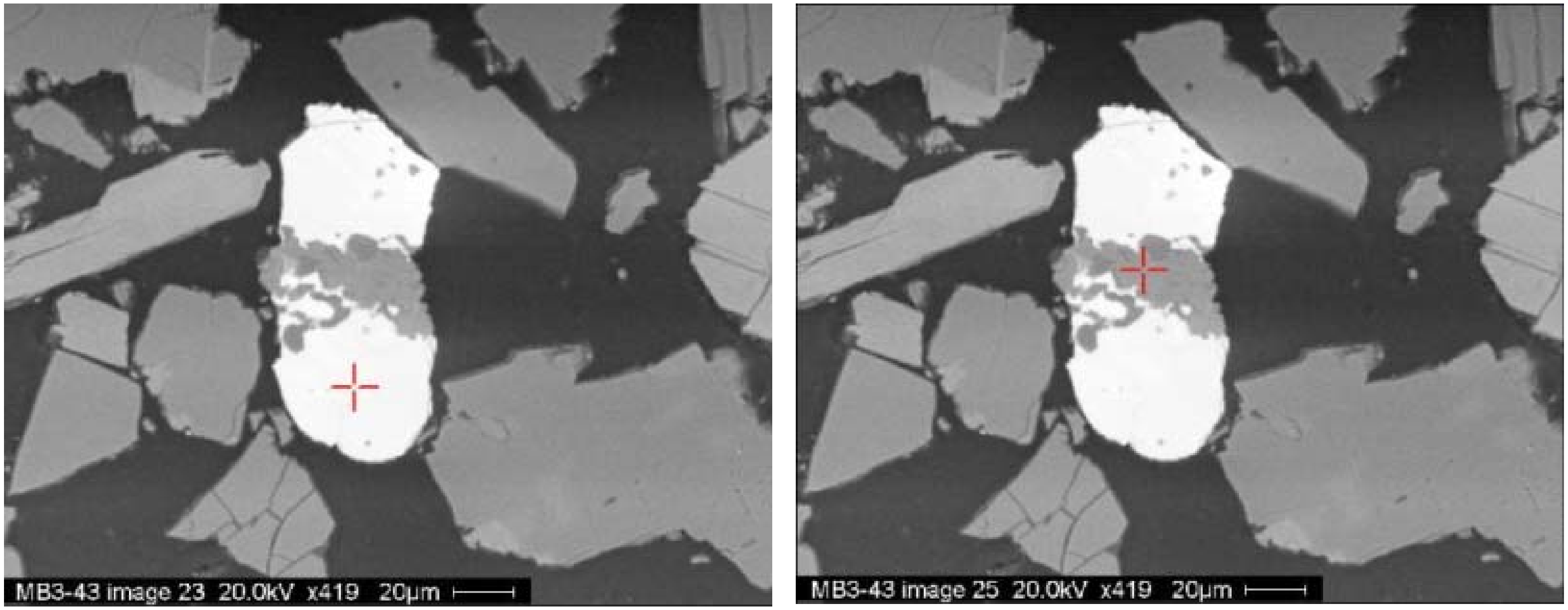
(Figure 3-11). This could be due to an initial inhomogeneity in the distribution of Cs, or to Cs mobilized from the residue replacing K or Na in feldspars. No secondary precipitate was observed around mineral grains in the tailings.

3.3.3 Electron Microprobe (EMP)

The EMP grain descriptions, elemental mapping and quantitative analytical results were consistent with the SEM results. The residue appears to be moderately sorted with individual grains ranging from angular to sub-rounded. The tailings appear to be well sorted with individual grains ranging from sub-angular to sub-rounded. No evidence of secondary precipitate was found around mineral grains in the tailings.

Elemental maps of residue reveal a heterogeneous distribution of areas containing Cs, abundant S, and minimal occurrences of Rb and Sr relative to other elements (Figure 3-12). Elemental maps of the tailings also revealed a heterogeneous distribution of areas containing Cs, relatively abundant homogenous distribution of Rb, and much less S and Sr than was detected in the residue (Figure 3-13).

The locations of multiple spot analysis scans in a residue sample from MB3 at 6.4 m below grade are shown in Figure 3-14. These locations were analyzed for Al, Ca, Cs, Fe, K, Na, S and Si. Spot analysis scans for the same elements were also conducted on a tailings sample from MB3 at 14.5 m below grade. Quantitative results for the residue and tailings scans are listed in Table 3-1. In the residue, pollucite, Cs-feldspar, gypsum and quartz were identified. Some quartz grains were found to be



Al, Si and Cs portion of the feldspar grain.
Atomic %: Al 22, Si 52, Cs 26
(MB3 at 13.1 m below grade)

Al, Si and K portion of the feldspar grain.
Atomic %: Al 32, Si 48, K 20
(MB3 at 13.1 m below grade)

Figure 3-11 Tailings SEM analysis of Cs-feldspar

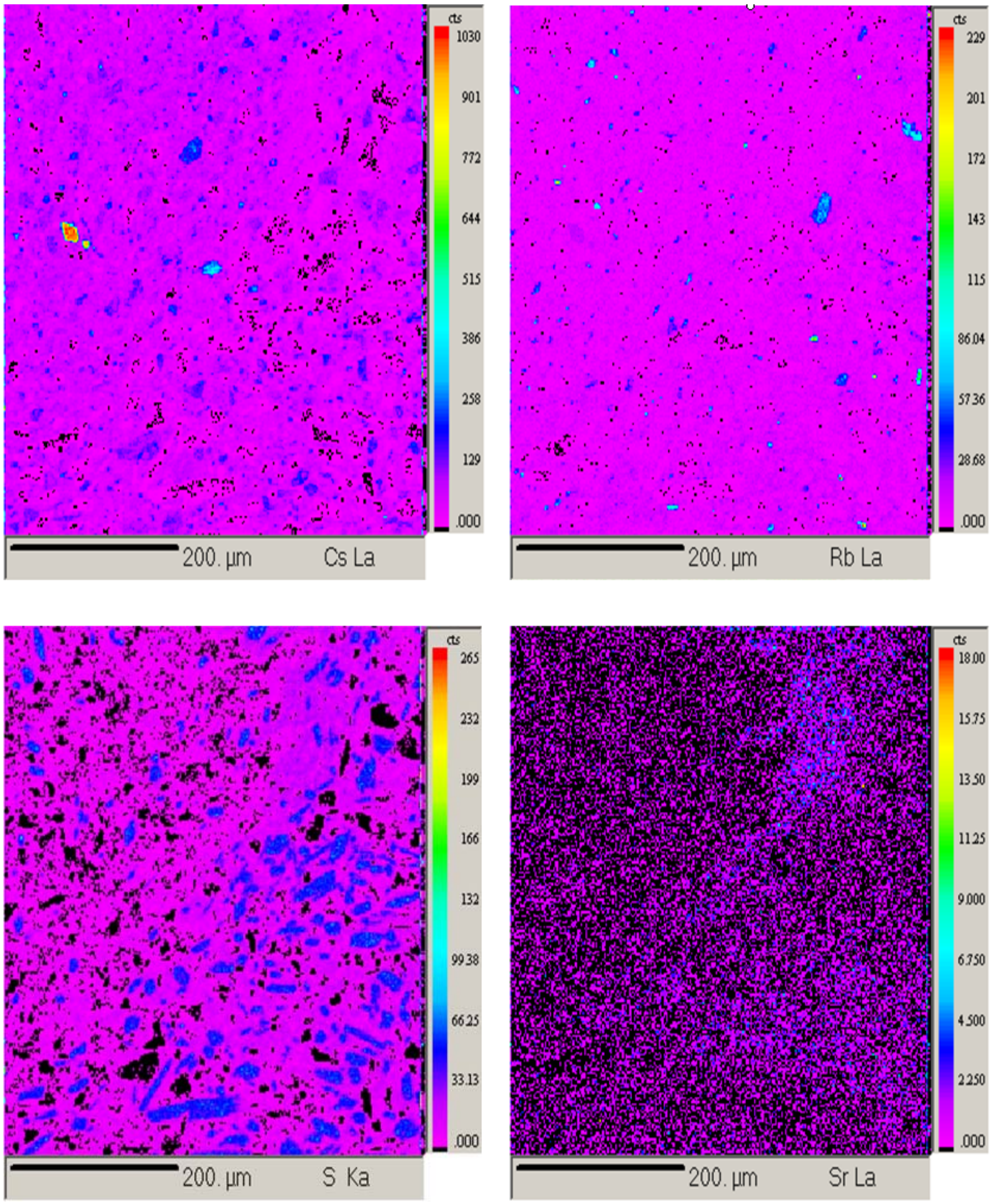


Figure 3-12 EMP elemental maps of residue from MB3 at 6.4 m below grade for Cs, Rb, S and Sr

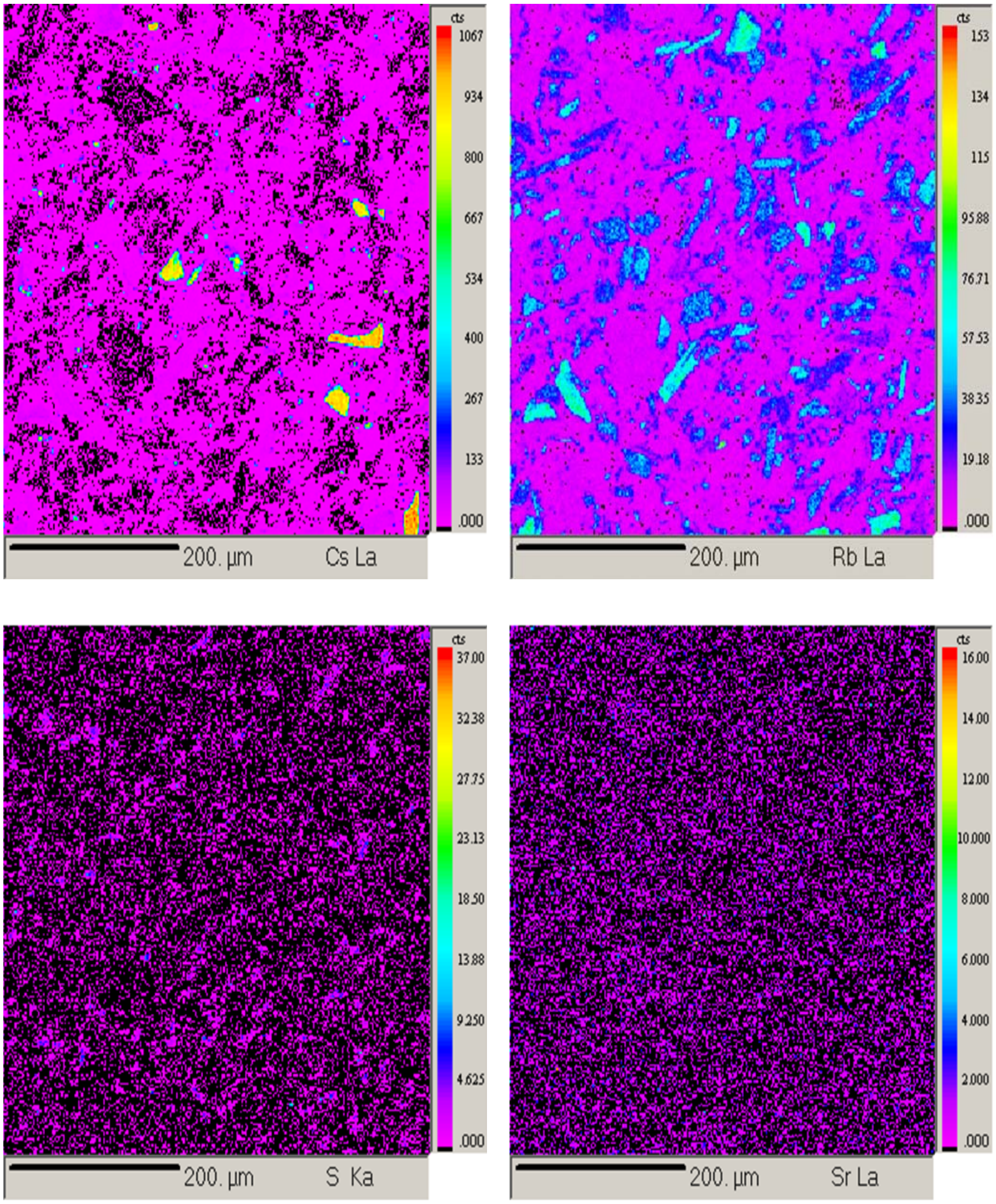


Figure 3-13 EMP elemental maps of tailings from MB3 at 14.5 m below grade for Cs, Rb, S and Sr

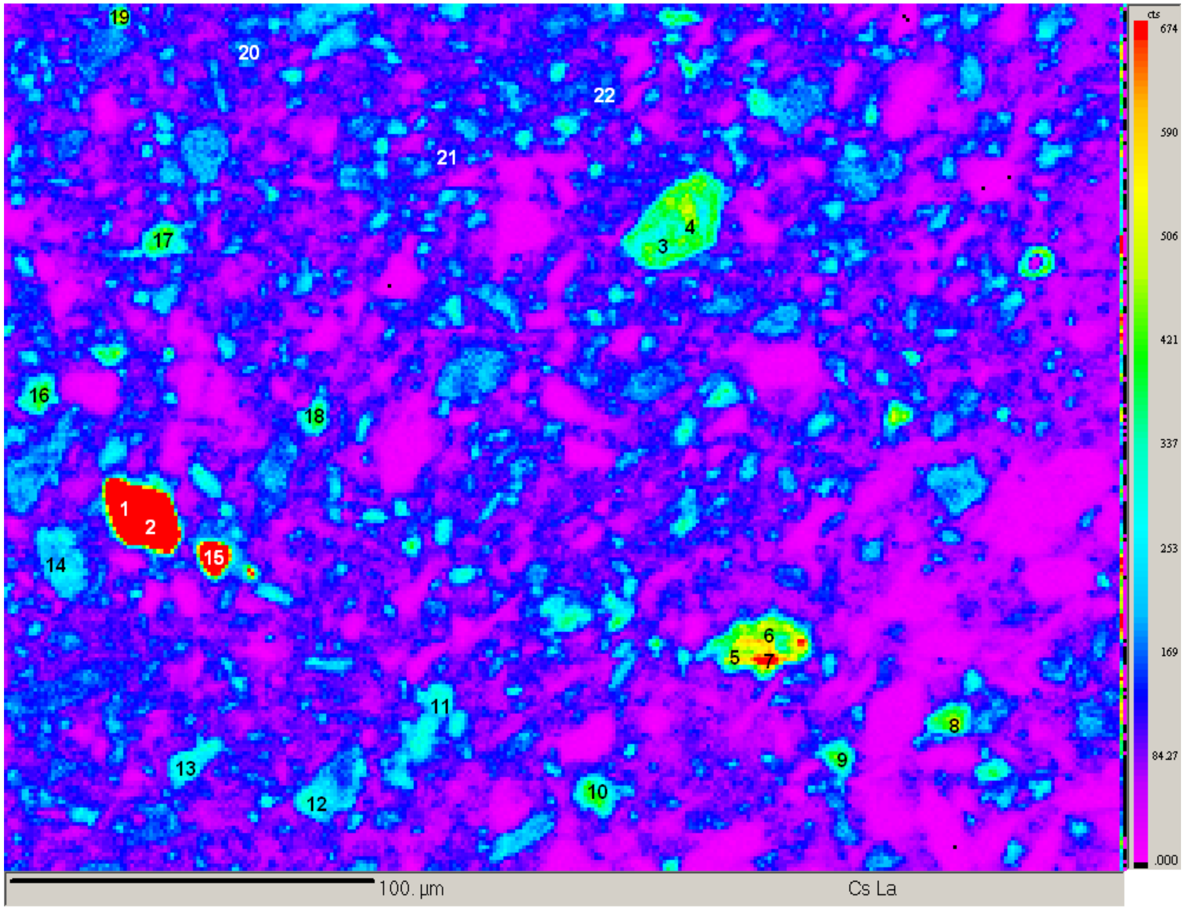


Figure 3-14 Locations of EMP quantitative analyses in residue from MB3 at 6.4 m below grade

Table 3-1: EMP quantitative results and mineralogical interpretations

Element:	Si	Al	Na	Cs	S	Ca	K	Fe	Mineralogical Interpretation	
Atomic Weight:	28.1	27.0	23.0	132.9	32.1	40.1	39.1	55.8		
Residue from MB3 at 6.4 m below grade: (Element Weight %) / (Atomic Weight)										
1 / 1 .	0.7	0.3		0.3					2:1:1 Si/Al/Cs	Pollucite
2 / 1 .	0.7	0.3		0.3					2:1:1 Si/Al/Cs	Pollucite
3 / 1 .	1.4			0.1					Quartz with CsOH or formate	
4 / 1 .	1.4			0.1					Quartz with CsOH or formate	
5 / 1 .	1.0	0.3		0.1					3:1 Si/Al with Cs	Cs-Feldspar
6 / 1 .	1.1	0.2		0.1						*inconclusive*
7 / 1 .	0.9	0.4		0.1						*inconclusive*
8 / 1 .	1.4	0.1		0.1						*inconclusive*
9 / 1 .					0.3	0.3				Gypsum
10 / 1 .	1.1	0.1								*inconclusive*
11 / 1 .	1.3	0.1								*inconclusive*
12 / 1 .	1.4									Quartz
13 / 1 .	1.4									Quartz
14 / 1 .	1.4	0.1								*inconclusive*
15 / 1 .	0.8	0.3		0.2					2:1:1 Si/Al/Cs	Pollucite
16 / 1 .	1.4			0.1						Quartz with CsOH
17 / 1 .	0.8	0.4		0.1						*inconclusive*
18 / 1 .	0.7	0.2			0.1					*inconclusive*
19 / 1 .	1.3			0.1						*inconclusive*
20 / 1 .	0.5	0.3			0.1					*inconclusive*
21 / 1 .	0.3	0.5			0.1					*inconclusive*
22 / 1 .	1.0	0.2			0.1					*inconclusive*

Spaces left blank represent values <0.1; values too small for element ratio consideration.
Rb, Mg, P, Sr and Ba were also included in analyses, but results in values <0.1.
Mineralogical Interpretations could not be made for every line; multiple possibilities exist for most data sets
Tailings scans 1-20 targeted Cs-mapping high concentration points.
Tailings scans 21-30 targeted Rb-mapping high concentration points (all aassociated with S, Al and K).
Tailings scans 31-38 targeted S-mapping high concentration points.

Table 3-1 continued: EMP quantitative results and mineralogical interpretations

Element:	Si	Al	Na	Cs	S	Ca	K	Fe	Mineralogical Interpretation	
Atomic Weight:	28.1	27.0	23.0	132.9	32.1	40.1	39.1	55.8		
Tailings from MB3 at 14.5 m below grade: (Element Weight %) / (Atomic Weight)										
1 / 1 .	0.8	0.3		0.2					3:1 Si/Al with Cs	Cs-Feldspar
2 / 1 .	0.7	0.3		0.1					3:1 Si/Al with Cs	Cs-Feldspar
3 / 1 .	0.7	0.3	0.1	0.1					3:1 Si/Al with Cs	Cs-Feldspar
4 / 1 .	0.9	0.2		0.2						*inconclusive*
5 / 1 .	0.9	0.2		0.1						*inconclusive*
6 / 1 .	0.8	0.3	0.1	0.2						*inconclusive*
7 / 1 .	0.8	0.3	0.1	0.2						*inconclusive*
8 / 1 .	0.8	0.3		0.2						*inconclusive*
9 / 1 .	0.8	0.3		0.2						*inconclusive*
10 / 1 .	0.8	0.3		0.2						*inconclusive*
11 / 1 .	0.8	0.3	0.1	0.2						*inconclusive*
12 / 1 .	0.8	0.3	0.1	0.2						*inconclusive*
13 / 1 .	0.7	0.3		0.2					2:1:1 Si/Al/Cs	Pollucite
14 / 1 .	0.8	0.3		0.2						*inconclusive*
15 / 1 .	0.7	0.2	0.1	0.1					3:1 Si/Al with Cs	Cs-Feldspar
16 / 1 .	0.8	0.3	0.1	0.2						*inconclusive*
17 / 1 .	0.7	0.3	0.1	0.2						*inconclusive*
18 / 1 .	0.8	0.3		0.2						*inconclusive*
19 / 1 .	0.7	0.3		0.3					2:1:1 Si/Al/Cs	Pollucite
20 / 1 .	0.8	0.3		0.2						*inconclusive*

Spaces left blank represent values <0.1; values too small for element ratio consideration.
Rb, Mg, P, Sr and Ba were also included in analyses, but results in values <0.1.
Mineralogical Interpretations could not be made for every line; multiple possibilities exist for most data sets
Tailings scans 1-20 targeted Cs-mapping high concentration points.
Tailings scans 21-30 targeted Rb-mapping high concentration points (all aassociated with S, Al and K).
Tailings scans 31-38 targeted S-mapping high concentration points.

Table 3-1 continued: EMP quantitative results and mineralogical interpretations

Element: Atomic Weight:	Si 28.1	Al 27.0	Na 23.0	Cs 132.9	S 32.1	Ca 40.1	K 39.1	Fe 55.8	Mineralogical Interpretation
Tailings from MB3 at 14.5 m below grade: (Element Weight %) / (Atomic Weight)									
21 / 1 .	0.8	0.6					0.1		Microcline
22 / 1 .	0.8	0.5					0.1		Microcline
23 / 1 .	0.8	0.6					0.1		Microcline
24 / 1 .	0.8	0.6					0.1		Microcline
25 / 1 .	0.8	0.6					0.1		Microcline
26 / 1 .	0.8	0.7					0.1		Microcline
27 / 1 .	0.8	0.6					0.1		Microcline
28 / 1 .	0.8	0.6					0.1		Microcline
29 / 1 .	0.8	0.6					0.1		Microcline
30 / 1 .	0.8	0.6					0.1		Microcline
31 / 1 .	1.1	0.4	0.3						*inconclusive*
32 / 1 .	0.2				0.2			0.4	Sulphide
33 / 1 .	0.4	0.1						0.3	*inconclusive*
34 / 1 .	1.1	0.4					0.2		*inconclusive*
35 / 1 .	0.6	0.1			0.1			0.2	*inconclusive*
36 / 1 .	0.9	0.3	0.2						*inconclusive*
37 / 1 .	1.0	0.1							*inconclusive*
38 / 1 .	0.9	0.3	0.3			0.1	0.1		Illite

Spaces left blank represent values <0.1; values too small for element ratio consideration.
Rb, Mg, P, Sr and Ba were also included in analyses, but results in values <0.1.
Mineralogical Interpretations could not be made for every line; multiple possibilities exist for most data sets
Tailings scans 1-20 targeted Cs-mapping high concentration points.
Tailings scans 21-30 targeted Rb-mapping high concentration points (all aassociated with S, Al and K).
Tailings scans 31-38 targeted S-mapping high concentration points.

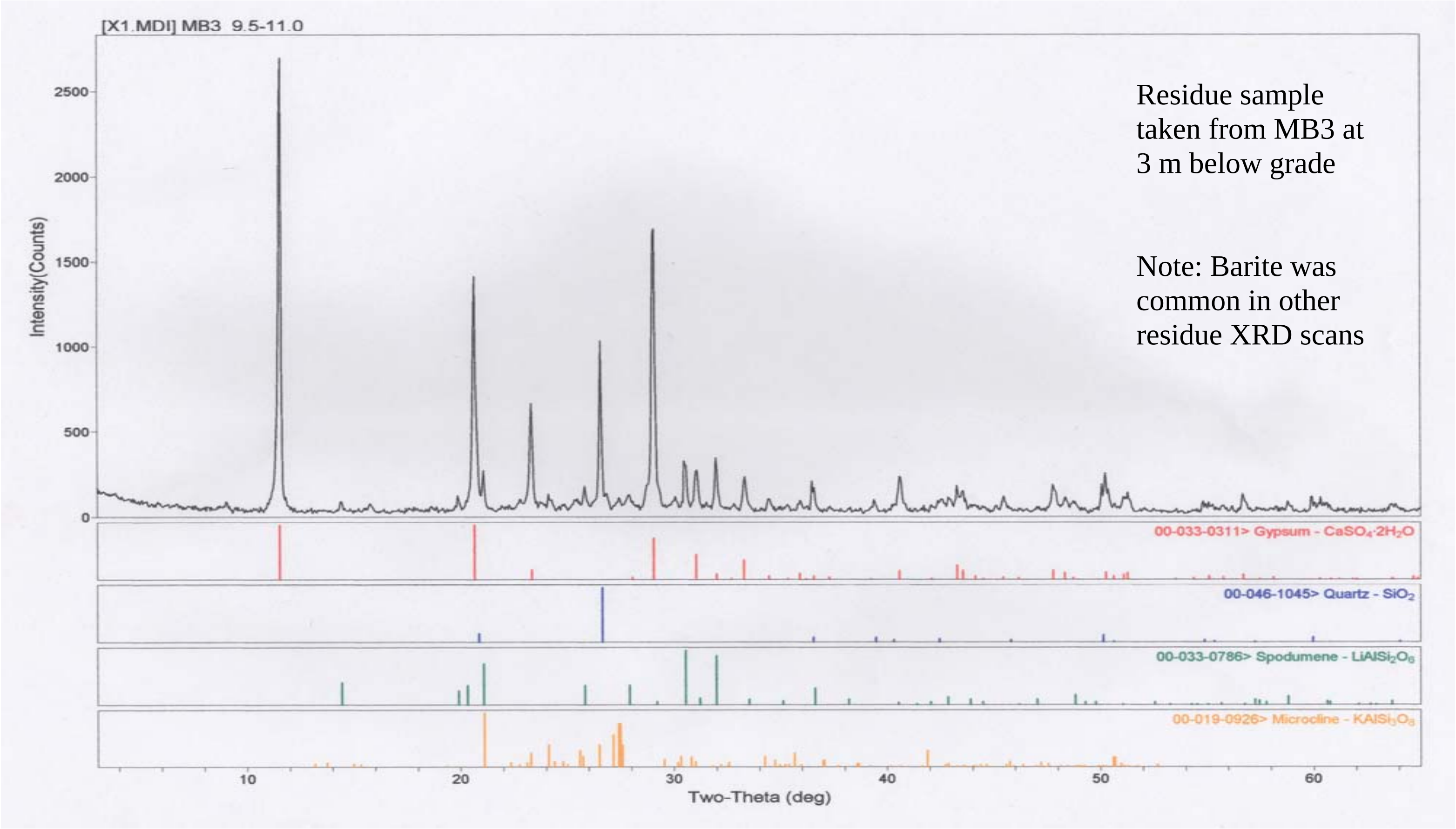
coated in Cs, possibly as Cs-formate or Cs-hydroxide. In the tailings, pollucite grains and Cs-feldspar were identified, Rb was found in K-feldspar that did not also contain Cs. S appeared greatest in association with Fe.

3.3.4 X-Ray Diffraction (XRD)

The XRD mineral identification results were consistent with the SEM and EMP results. Gypsum, quartz, spodumene, microcline and barite were identified by XRD as the most common minerals in the residue with less abundant albite and wollastonite (Figure 3-15). The most abundant minerals identified in the tailings include quartz, albite, illite and muscovite, as well as lesser amounts of microcline, spodumene and pollucite (Figure 3-16). No depth trends were observed in either the residue or the tailings as the mineralogy of the individual stratigraphies remain relatively consistent. XRD analysis allows for the identification of the most abundant minerals, but not necessarily all minerals in a sample. Table 3-2 lists all minerals identified by the XRD at the sample depths in MB3.

3.4 Solid State Composition

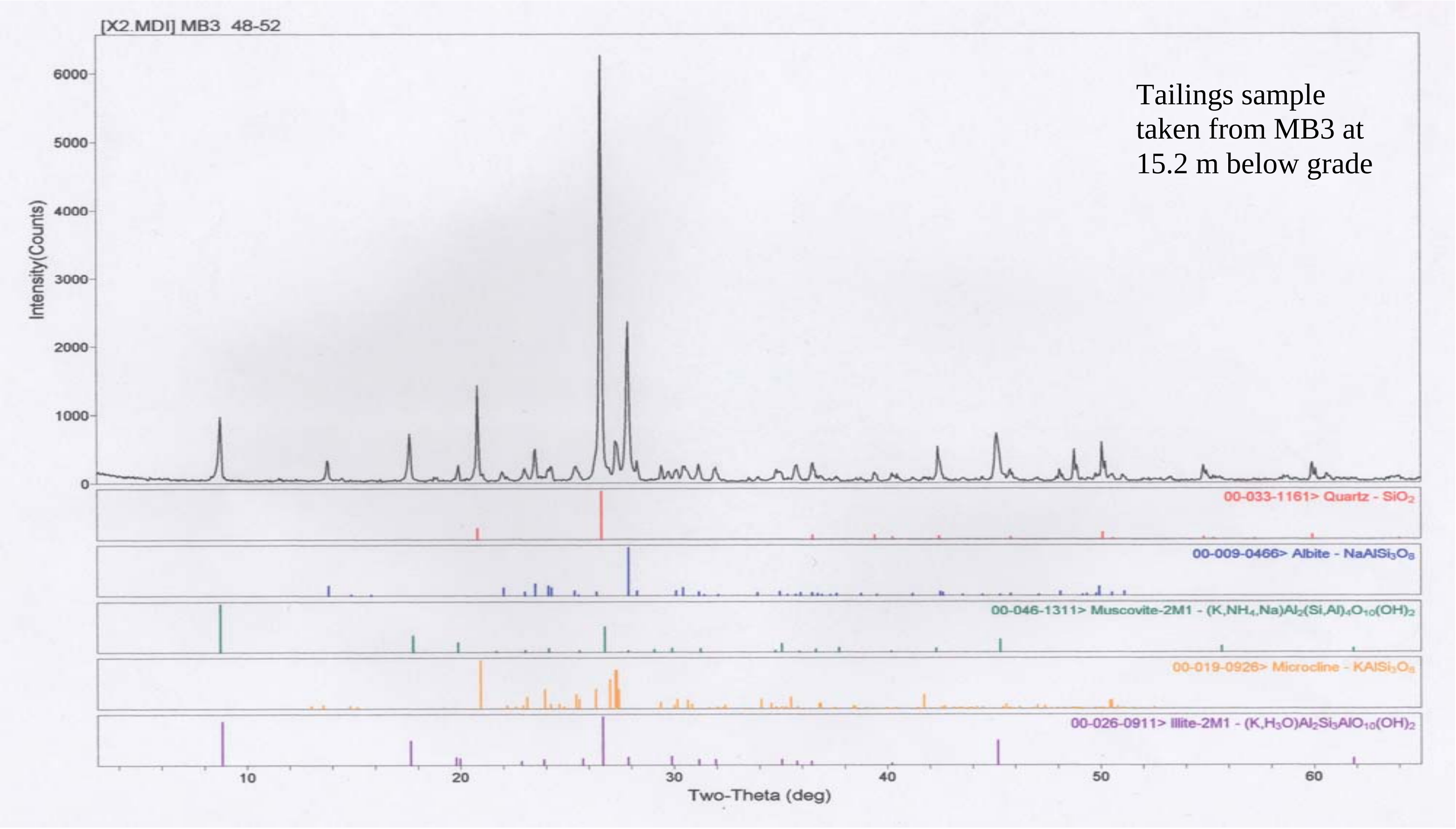
Chemical analysis of solid samples from the residue and tailings show that Cs, Ca, Sr and S, which are all residue signature elements, are present at greater concentrations in the residue than in the tailings (Figure 3-17). The average Cs concentration in the residue is 13,600 ppm, whereas in the tailings it is 2,300 ppm. The average Ca concentration in the residue is about 108,000 ppm, whereas in the



Residue sample taken from MB3 at 3 m below grade

Note: Barite was common in other residue XRD scans

Figure 3-15 Residue XRD diffractogram



Tailings sample taken from MB3 at 15.2 m below grade

Figure 3-16 Tailings XRD diffractogram

Table 3-2: Depth profile of minerals identified by XRD

	Residue: Depth and Mineralogy
RESIDUE - MB3	1.45 to 1.91 m
	Gypsum - $CaSO_4\ 2H_2O$
	Quartz - SiO_2
	Barite - $BaSO_4$
	2.90 to 3.35 m
	Gypsum - $CaSO_4\ 2H_2O$
	Quartz - SiO_2
	Spodumene - $LiAlSi_2O_6$
	Microcline - $KAlSi_3O_8$
	4.65 to 5.11 m
	Gypsum - $CaSO_4\ 2H_2O$
	Quartz - SiO_2
	Barite - $BaSO_4$
	5.87 to 6.32 m
	Gypsum - $CaSO_4\ 2H_2O$
	Barite - $BaSO_4$
	Quartz - SiO_2
	Albite - $NaAlSi_3O_8$
	7.47 to 7.92 m
	Gypsum - $CaSO_4\ 2H_2O$
	Quartz - SiO_2
	Barite - $BaSO_4$
	Wollastonite - $CaSiO_3$
	Spodumene - $LiAlSi_2O_6$
	8.61 to 9.07 m
	Gypsum - $CaSO_4\ 2H_2O$
	Quartz - SiO_2
	Barite - $BaSO_4$
	Spodumene - $LiAlSi_2O_6$
	10.44 to 10.90 m
	Gypsum - $CaSO_4\ 2H_2O$
	Quartz - SiO_2
	Azurite - $Cu_3^{+2}(CO_3)_2(OH)_2$
	12.19 to 12.65 m
	Gypsum - $CaSO_4\ 2H_2O$
	Quartz - SiO_2
	Spodumene - $LiAlSi_2O_6$

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

[1] XRD data provided by TANCO

Table 3-2 continued: Depth profile of minerals identified by XRD

	Tailings: Depth and Mineralogy
TAILINGS - MB3	12.95 to 13.41 m Quartz - SiO_2 Albite - $NaAlSi_3O_8$ Spodumene - $LiAlSi_2O_6$ Illite - $(K,H_{30})Al_2(Si_3Al)O_{10}(OH)_2\ xH_2O$ 14.17 to 14.63 m Quartz - SiO_2 Albite - $NaAlSi_3O_8$ Illite - $(K,H_3O)Al_2Si_3AlO_{10}(OH)_2$ Muscovite - $(K,Na)Al_2(Si,Al)_4O_{10}(OH)_2$ 14.63 to 15.85 m Quartz - SiO_2 Albite - $NaAlSi_3O_8$ Muscovite - $(K,NH_4,Na)Al_2(Si,Al)_4O_{10}(OH)_2$ Microcline - $KAlSi_3O_8$ Illite - $(K,H_3O)Al_2Si_3AlO_{10}(OH)_2$
	Pollucite[1] - $CsAlSi_2O_6\ xH_2O$

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

[1] XRD data provided by TANCO

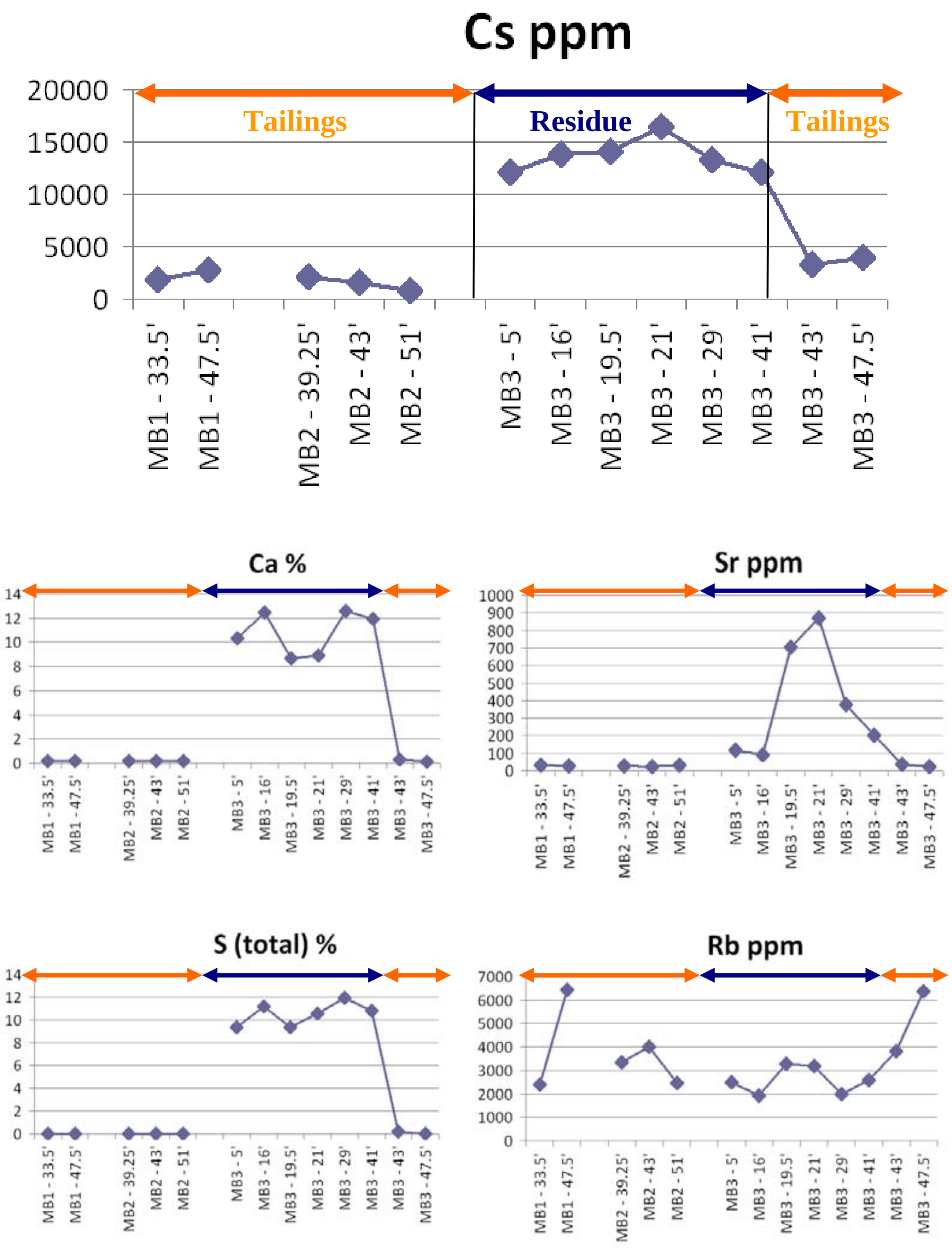


Figure 3-17 Solid state composition graphs of residue signature elements Cs, Ca, Sr, S and Rb

tailings it is 1,900 ppm. In the residue the average Sr concentration is ~ 390 ppm compared to ~ 30 ppm in the tailings. The average S concentration in the residue is approximately 105,000 ppm compared to about 400 ppm in the tailings. Additionally elements that are present at greater concentrations in the residue than in the tailings include Ba, C, Ce, La, Mg and Ni. Concentrations of Rb, which is also a residue signature element, are relatively high in both the residue and tailings, but slightly greater in the tailings (Figure 3-17). The average Rb concentration in the tailings is approximately 4,100 ppm, whereas in the residue it is 2,600 ppm. Other elements present at greater concentrations in the tailings than in the residue include Al, B, Be, Bi, F, Fe, Ga, Hf, In, K, Li, Mn, Na, Nb, P, Pb, Sc, Si, Sn, Ta, Th, U, W, Zn and Zr.

Concentration trends for the most abundant non-residue signature elements, including Ba from the residue, and Al, Li and Si from the tailings, are plotted with depth data in Figure 3-18. All other elements that were analyzed are present in smaller concentrations, or were non-detectable in the residue and tailings.

Figures 3-17 and 3-18 indicate positive correlations between Ca-S, Sr-Ba, and Al-Si. Cs has slight positive correlations to Ca, S, Sr, and Ba. Complete solid state compositional data are presented in Appendix B.

3.5 Porewater Composition and Precipitates

Porewater analytical results for the residue signature elements show different depth trends from the residue to the tailings, and in some cases within the residue

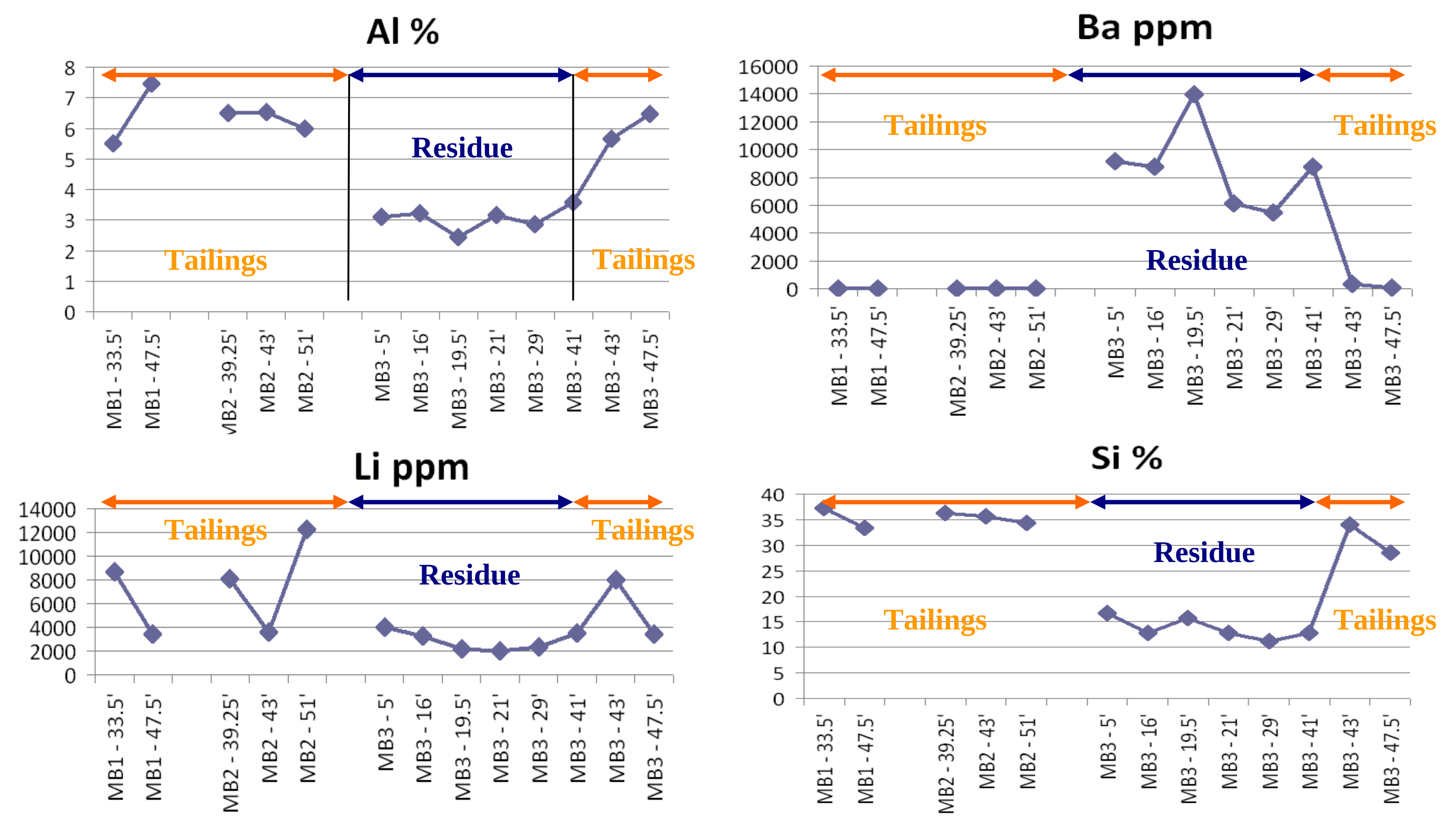


Figure 3-18 Solid state composition graphs of select non-residue signature elements Al, Ba, Li and Si

alone (Figure 3-19). Cs and Rb porewater concentrations at surface are approximately 4,000 ppm and 60 ppm, respectively. At 15 m below grade within the tailings, those concentrations decrease with depth to about 10 ppm and 5 ppm, respectively. Within the residue, the Cs and Rb porewater concentrations gradually decrease to approximately half their starting concentrations, then increase once again back to approximately their surface grade concentrations (Figure 3-19).

With the exception of one low outlying data point in the tailings of MB2, Ca concentrations in the porewater are relatively consistent throughout the residue and in the tailings at about 230 ppm. Concentrations of Sr in the porewater remain relatively constant through the residue at approximately 0.0015 ppm, but increase with depth in the tailings to a maximum of 1.5 ppm. Porewater concentrations of total S and sulphate follow similar trends as they both increase with depth in the residue from 1,000 ppm and 2,400 ppm to 1,900 ppm and 4,600 ppm respectively, but decrease with depth in the tailings to 400 ppm and 1,000 ppm. Other notable element trends include higher Si and Tl concentrations in the residue porewater than in the tailings porewater, and higher Ba concentrations in the tailings porewater than in the residue porewater. Complete tabulated porewater concentrations and Ultrameter II 6P data are presented in Appendix C.

Saturation Indices (SI) were calculated for more than 100 common precipitates using WATEQ4F software. Positive saturation indices indicate that the porewater is over-saturated with respect to a mineral precipitate, whereas negative values indicate that the porewater is under-saturated with respect to that precipitate. Eighteen

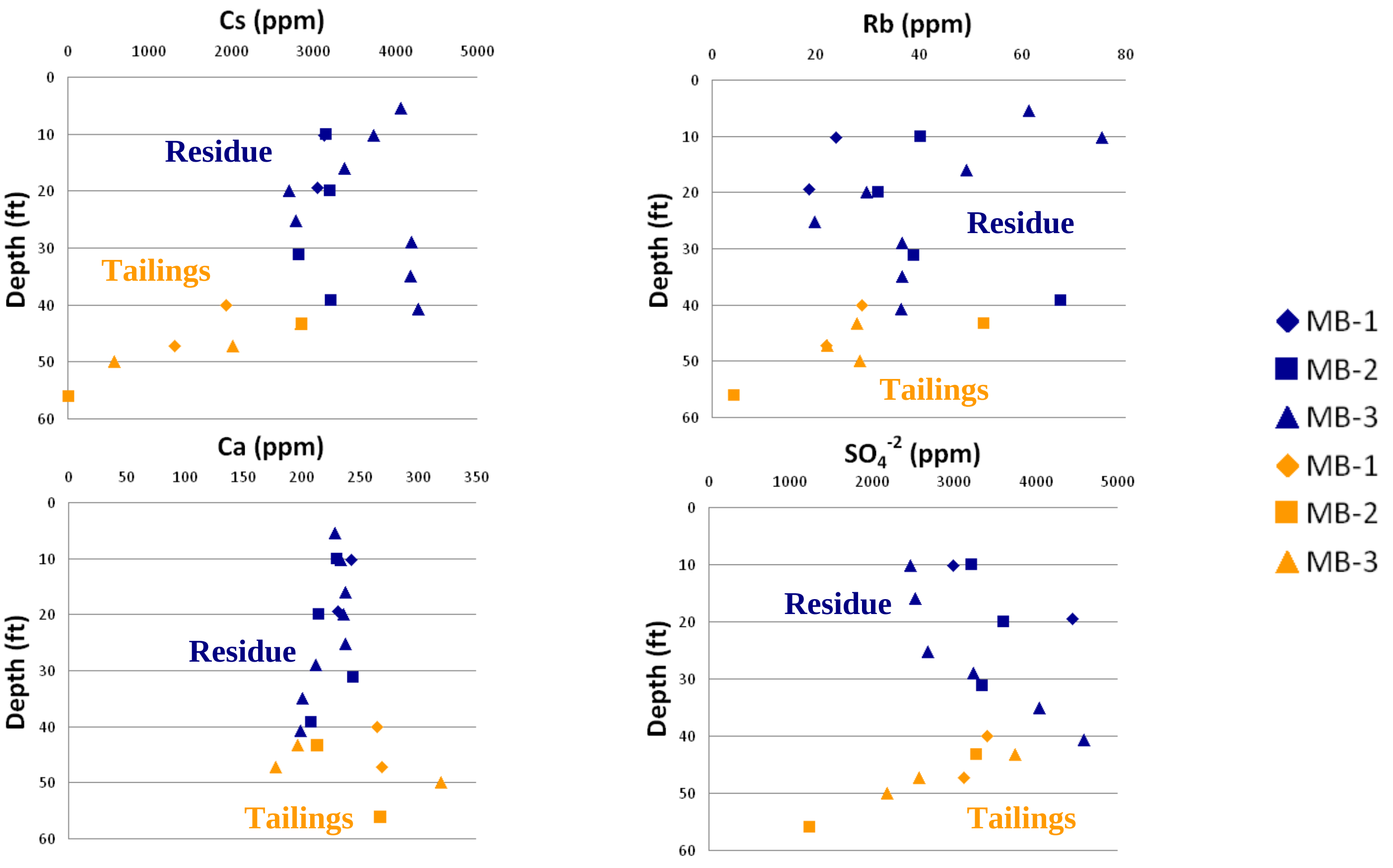


Figure 3-19	Porewater concentration graphs of residue signature elements Cs, Rb, Ca and SO_4, in MB1, MB2 and MB3

minerals or compounds resulted in saturation indices within 3.00 and -3.00, which include $Al(OH)_3$, alunite, anhydrite, barite, basaluminite, boehmite, cerargyrite, $Cu(OH)_2$, diaspora, epsomite, fluorite, gibbsite, jurbanite, theophrastite, $Pb(OH)_2$, tenorite, zincite, $Zn(OH)_2$. Complete tabulated model results for these 18 minerals and compounds are presented in Appendix D. Only saturation indices values at or close to zero indicate that the chemical composition of the porewater is sufficient to precipitate the mineral. For the purpose of this research, we assumed that values within 2.0 to -2.0 represent a potential solid precipitate. Additionally, the solid sample data presented in Appendix B shows that residue and tailings contain minimal amounts of Cu, Ni, Pb and Zn. Therefore, despite their saturation indices, cerargyrite, $Cu(OH)_2$, theophrastite, $Pb(OH)_2$, tenorite, zincite, $Zn(OH)_2$ should all be considered unlikely precipitates.

Minerals that may precipitate in either the residue or tailings porewater, with similar saturation indices, include anhydrite, barite, boehmite, gibbsite and gypsum. Minerals where the saturation indices indicate a higher potential of precipitation from the residue porewater than from the tailings porewater include basaluminite, diaspore and epsomite. Minerals where the saturation indices indicate a higher potential of precipitation from the tailings porewater than from the residue porewater include alunite, celestite and fluorite.

Similar to most computer generated models, results are only predictive and as good as the software code and the data input used. Furthermore, the WATEQ4F code did not contain the required thermodynamic data to include Cs and Rb minerals.

3.6 Sequential Extraction

The average concentration values of Ca, Cs, Rb, Sr and S, and of Al, Ba, Fe, Li, Mg, Mn, K and Si for each sequential extraction step in the residue and in the tailings were calculated and are presented in Table 3-3. The five residue signature elements account for 23 wt. % of the residue and <1 wt. % of the tailings, whereas all 13 elements together account for 42 wt. % of the residue and 44 wt. % of the tailings. Complete sequential extraction analytical data are presented in Appendix E. For every sample interval, the relative percentages of each element found in the porewater, sequential extraction steps 1 to 5, and bulk solids are presented in Appendix F.

The residue contains one order of magnitude more Cs (13.6 mg/g) than the tailings (2.3 mg/g). The sequential extraction procedure mobilized the highest percentage of residue Cs from step 2 (4.1 mg/g or 30 %), which targeted elements bound to carbonates and other easily dissolvable minerals. Step 3 released 3.3 mg/g or 24 %, step 5 liberated 3.0 mg/g or 22 % and step 1 along with the amount of Cs detected in the porewater accounted for 2.3 mg/g or 17 % of the total Cs in the residue. Only 0.9 mg/g or 7 % of the residue Cs was released by step 4. The most notable release percentages of Cs from the tailings were 1.6 mg/g or 70 % from step 5, and 0.3 mg/g or 13 % from step 1 combined with the amount of Cs detected in the tailings porewater. Figure 3-20 shows the sequential extraction release concentrations for Cs from each sample interval within MB1.

The residue contains two orders of magnitude more Ca (108 mg/g) than the tailings (1.9 mg/g). The highest amount of residue Ca (67 mg/g or 62 %) was

Table 3-3: Sequential extraction results: average mobility of elements

Element		Al		Ba		Ca		Cs	
		Residue	Tailings	Residue	Tailings	Residue	Tailings	Residue	Tailings
Average Porewater %	%	0.0	0.0	0.0	0.0	0.0	0.9	2.0	3.3
Average Step 1 %	%	0.0	0.0	0.1	0.1	4.8	9.8	14.8	13.3
Average Step 2 %	%	1.9	0.1	0.1	9.2	17.4	12.1	30.0	7.2
Average Step 3 %	%	17.4	0.5	0.1	4.3	4.2	29.6	24.1	5.0
Average Step 4 %	%	1.7	0.1	0.2	1.7	11.7	8.0	6.8	1.0
Average Step 5 %	%	79.0	99.3	99.5	84.6	62.0	39.6	22.4	70.4
		100.0	100.0	100.0	100.0	100.0	100.1	100.0	100.3
Average Bulk Solids (Analyical)	mg/g	30.6	63.0	8.7	0.1	108.0	1.9	13.6	2.3
Average Bulk Solids (PW+Stps1-5)	mg/g	36.7	64.6	3.0	0.2	122.9	2.3	16.9	3.0
Element		**Fe**		**Li**		**Mg**		**Mn**	
		Residue	Tailings	Residue	Tailings	Residue	Tailings	Residue	Tailings
Average Porewater %	%	0.0	0.0	0.1	0.0	2.5	3.5	0.1	0.0
Average Step 1 %	%	0.1	0.0	0.5	0.0	13.8	13.6	2.2	0.2
Average Step 2 %	%	4.0	4.9	1.5	0.2	27.9	8.4	24.9	14.5
Average Step 3 %	%	19.9	36.9	3.5	0.9	38.6	10.2	39.3	45.2
Average Step 4 %	%	1.7	3.0	0.4	0.1	4.2	2.1	4.0	5.0
Average Step 5 %	%	74.3	55.2	94.1	98.7	13.0	62.5	29.5	35.0
		100.0	100.0	100.0	100.0	100.0	100.4	100.0	100.0
Average Bulk Solids (Analyical)	mg/g	1.2	3.2	2.9	6.8	0.6	0.3	0.2	0.5
Average Bulk Solids (PW+Stps1-5)	mg/g	1.6	3.4	3.7	6.8	0.8	0.3	0.2	0.5

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Table 3-3 continued: Sequential extraction results: average mobility of elements

Element		K		Rb		Si	
		Residue	Tailings	Residue	Tailings	Residue	Tailings
Average Porewater %	%	0.0	0.0	0.1	0.1	0.0	0.0
Average Step 1 %	%	1.2	0.5	1.3	0.3	0.0	0.0
Average Step 2 %	%	5.8	2.6	5.4	0.2	0.1	0.0
Average Step 3 %	%	1.2	0.5	5.6	0.4	0.4	0.1
Average Step 4 %	%	1.5	0.6	1.8	0.1	0.1	0.0
Average Step 5 %	%	90.4	95.8	85.7	99.0	98.7	99.8
		100.0	100.0	100.0	100.0	99.4	99.9
Average Bulk Solids (Analyical)	mg/g	6.1	19.0	2.6	4.1	136.7	342.0
Average Bulk Solids (PW+Stps1-5)	mg/g	8.2	20.7	3.1	4.5	--	--

Element		Sr		Total S	
		Residue	Tailings	Residue	Tailings
Average Porewater %	%	0.0	0.2	0.1	9.0
Average Step 1 %	%	0.6	1.1	6.5	28.2
Average Step 2 %	%	3.2	5.8	19.2	14.9
Average Step 3 %	%	0.6	25.4	4.0	3.0
Average Step 4 %	%	1.4	7.5	14.1	3.7
Average Step 5 %	%	94.2	60.0	56.1	42.1
		100.0	100.0	100.0	100.9
Average Bulk Solids (Analyical)	mg/g	0.4	0.03	105.3	0.4
Average Bulk Solids (PW+Stps1-5)	mg/g	0.2	0.03	94.8	0.8

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

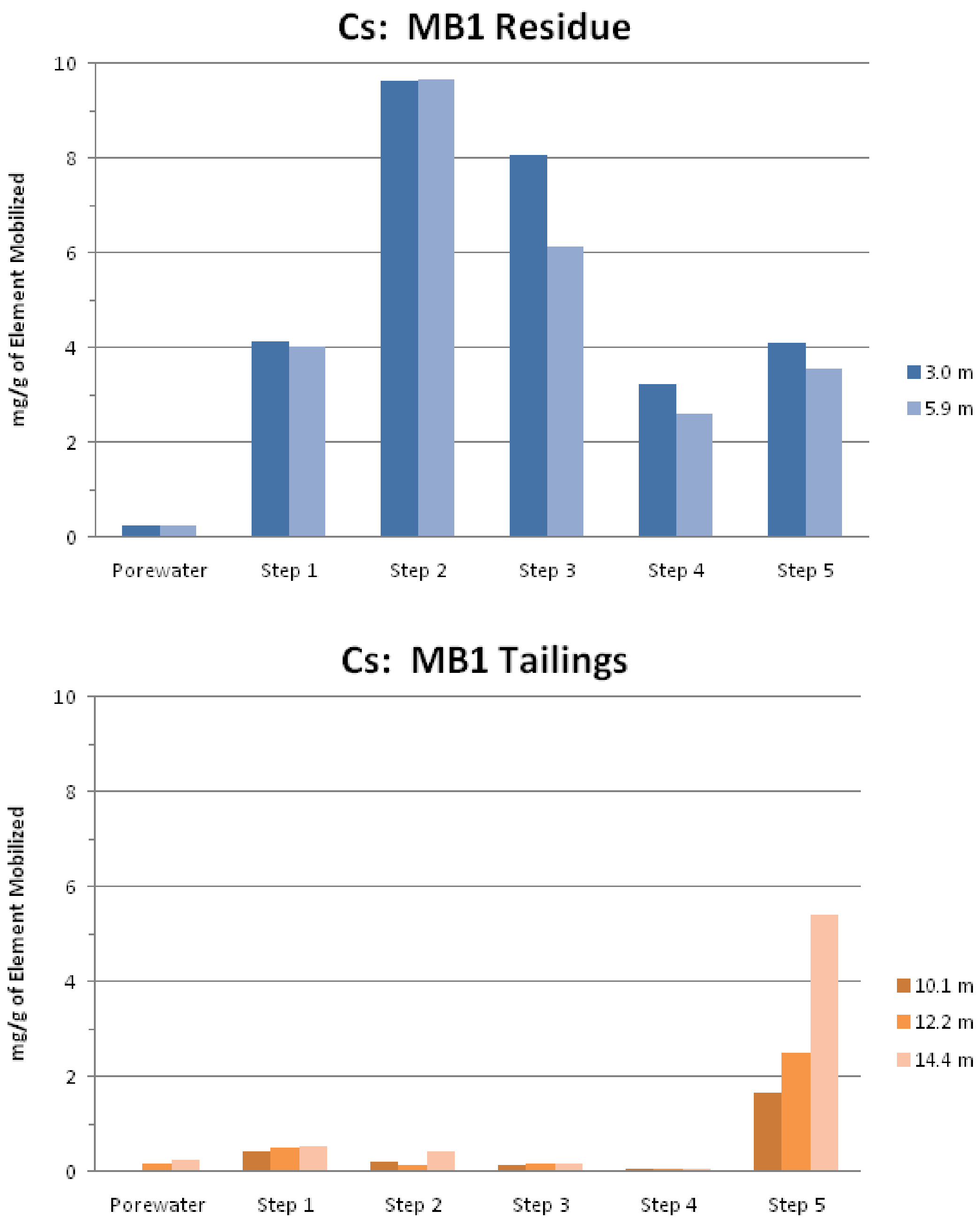
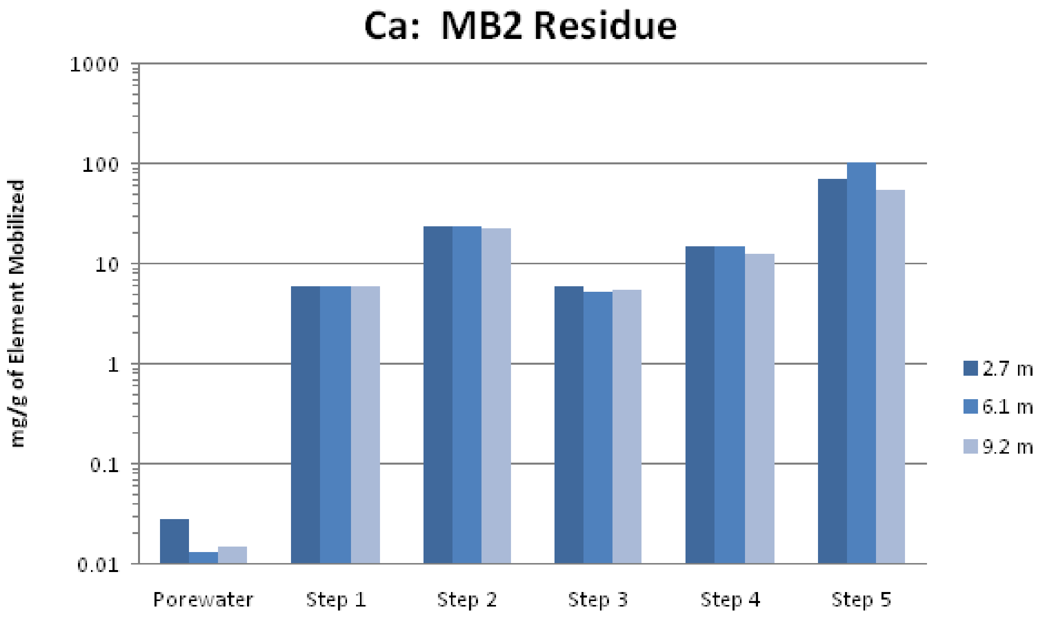


Figure 3-20	Sequential extraction release concentrations for Cs in MB1

mobilized from step 5 of the sequential extraction procedure, which targeted the residual minerals. The second highest percentage of Ca was released into solution from step 2 (18.4 mg/g or 17 %) which targeted elements bound to carbonates and other easily dissolvable minerals. However, in the tailings the majority of Ca was mobilized either from step 5 (0.8 mg/g or 40 %) or step 3 (0.6 mg/g or 30 %). Figure 3-21 shows the sequential extraction release concentrations for Ca from each sample interval within MB2.

The tailings contain slightly more Rb (4.1 mg/g) than the residue (2.6 mg/g). In the tailings, Rb was almost entirely mobilized by step 5 (>4.0 mg/g or 99 %), which involved complete dissolution of the residual minerals. In the residue the majority of Rb was also released into solution from step 5 (0.26 mg/g or 86 %). However, steps 2 and 3 accounted another <0.02 mg/g each, or 5 to 6 % respectively, of the residue Rb. Figure 3-22 shows the sequential extraction release concentrations for Rb from each sample interval within MB3.

The residue contains one order of magnitude more Sr (0.4 mg/g) than the tailings (0.03 mg/g). In the residue the majority of Sr was mobilized from step 5 (0.38 mg/g or 94 %), which involved complete dissolution of the residual minerals. Step 2 targeted elements bound to carbonates and other easily dissolvable minerals was the second most influential sequential extraction step, but only released 0.01 mg/g or 3 % of the residue Sr into solution. In the tailings, the majority of Sr was mobilized either from step 5 (0.018 mg/g or 60 %) or step 3 (0.008 mg/g or 25 %); similar to the



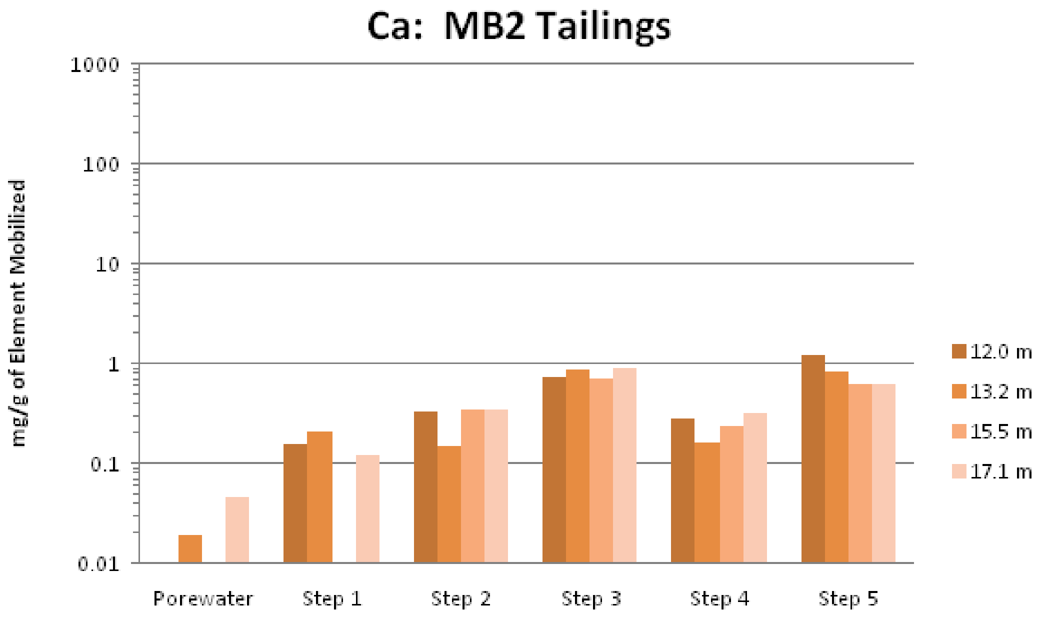


Figure 3-21 Sequential extraction release concentrations for Ca in MB2

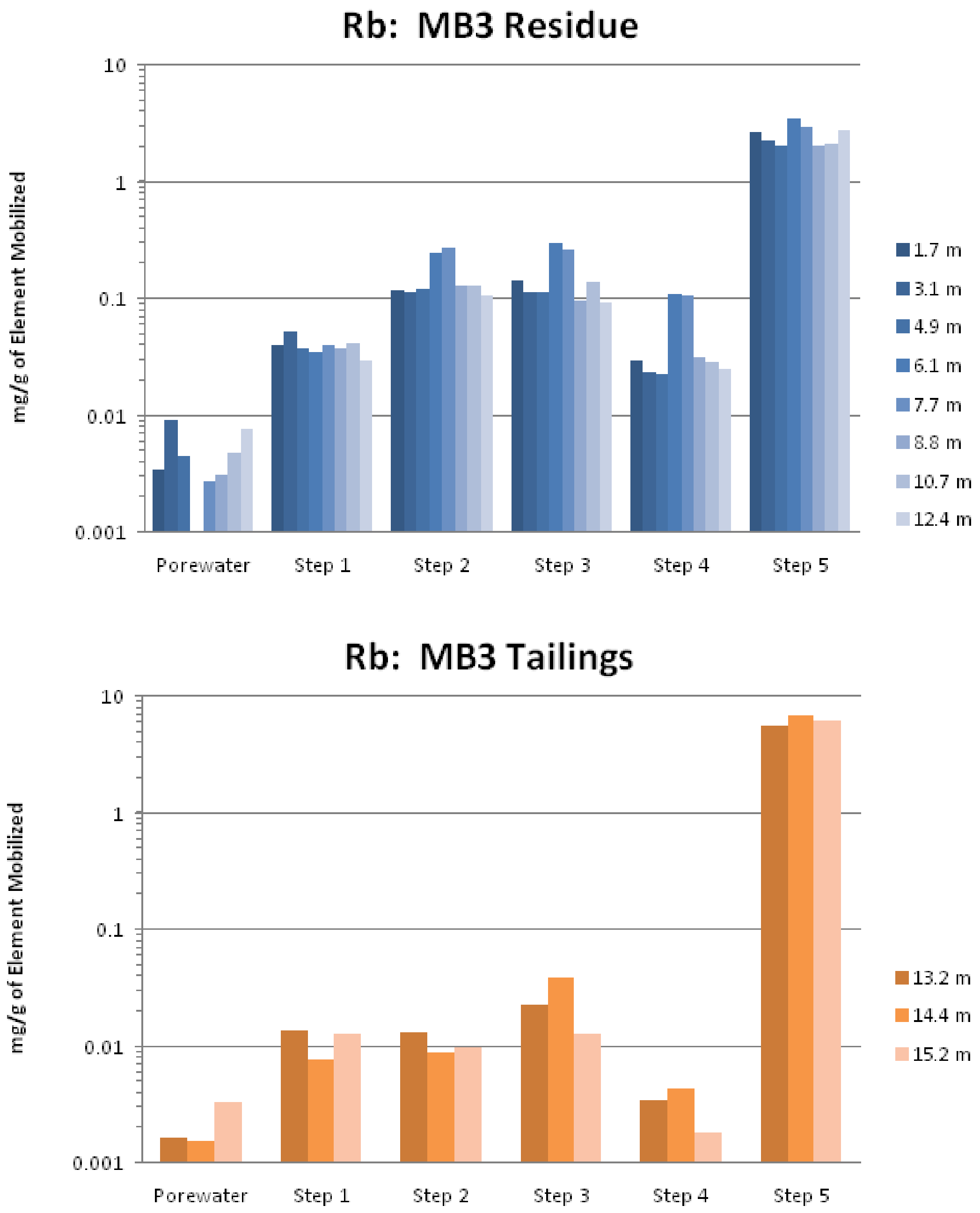


Figure 3-22 Sequential extraction release concentrations for Rb in MB3

corresponding results for Ca. Figure 3-23 shows the sequential extraction release concentrations for Sr from each sample interval within MB3.

The residue contains two orders of magnitude more S (105.3 mg/g) than the tailings (0.4 mg/g). Most of the residue S was released to solution from step 5 (59 mg/g or 56 %) which targeted the residual minerals, followed by step 2 (20 mg/g or 19 %) from carbonates and other easily dissolvable minerals, then from step 4 (14.8 mg/g or 14 %) where S was bound to organic compounds, and finally 7.4 mg/g or 7 % of the residue S was water soluble and detected within porewater and solution from step 1. In the tailings, again most of the S was mobilized from step 5 (0.17 mg/g or 42 %), however, the second most influential step was the water soluble fraction from the porewater and step 1 which released 0.15 mg/g or 37 % of the S. Figure 3-24 shows the sequential extraction release concentrations for S from each sample interval within MB2.

The sequential extraction procedure also provided notable results for other non-residue signature elements. The concentrations of Ba at 8.7 mg/g and Mg at 0.6 mg/g are highest in the residue than in the tailings where they are found at 0.1 mg/g and 0.3 mg/g, respectively. The concentrations of Al, Fe, Li, Mn and Si are higher in the tailings than in the residue but at the same level of magnitude, whereas the concentration of K is also higher in the tailings than in the residue but at one level of magnitude greater. There is 63 mg/g Al in the tailings, and 30.6 mg/g Al in the residue. The tailings contain 3.2 mg/g Fe, whereas the residue contains 1.2 mg/g Fe. There is 6.8 mg/g Li in the tailings, and 2.9 mg/g Li in the residue. The tailings

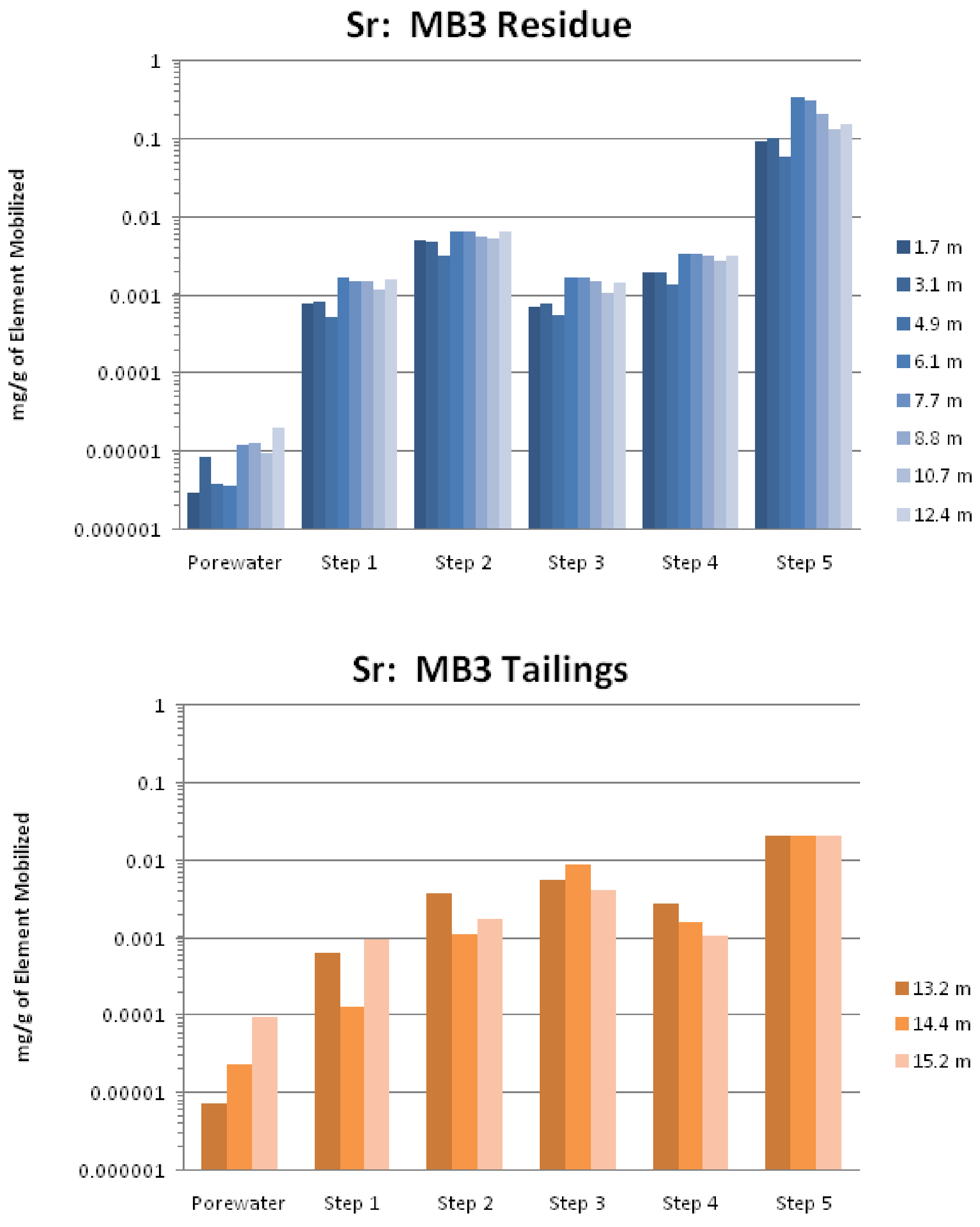
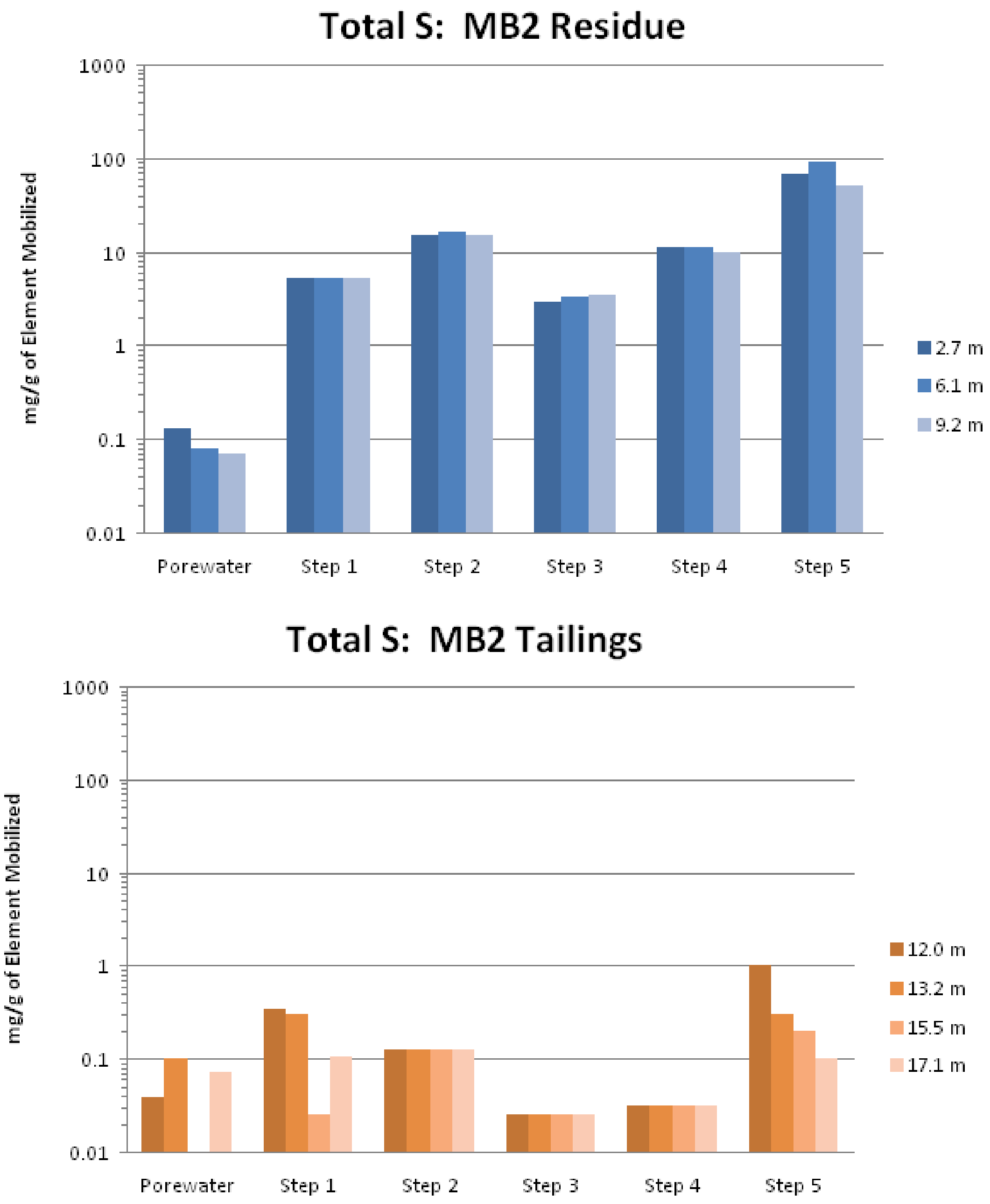


Figure 3-23 Sequential extraction release concentrations for Sr in MB3


Total S: MB2 Residue

Total S: MB2 Tailings

Figure 3-24 Sequential extraction release concentrations for total S in MB2 contain 0.5 mg/g Mn, whereas the residue contains 0.2 mg/g Mn. There is 342 mg/g Si in the tailings, and 137 mg/g Si in the residue. Finally, the tailings contain 19 mg/g K, whereas the residue contains 6.1 mg/g K.

In the residue and the tailings, 90 % or more of the Li, K and Si were not mobilized until step 5 when the residual alumino-silicate minerals were dissolved. The majority of Al and Ba were also not released until step 5, with the exceptions of 0.5 mg/g or 17 % of the residue Al released in step 3 when elements bound to iron-oxyhydroxides were targeted, and 0.01 mg/g or 10 % of the tailings Ba released in step 2 when elements bound to carbonates and other easily dissolvable minerals were targeted. Most the Fe was liberated from steps 5 and 3, whereas most of the Mn was mobilized from steps 3, 5 and 2 from both the residue and tailings. The sequential extraction results for Mg are different between the residue and tailings. From the residue, most Mg was released from step 3 (0.23 mg/g or 39 %), step 2 (0.17 mg/g or 28 %) and step 1 combined with the porewater concentration (0.1 mg/g or 16 %). From the tailings, most Mg was released from step 5 (0.19 mg/g or 63 %) and step 1 combined with the porewater concentration (0.05 mg/g or 17 %). The analytical results for Na were not examined further because sodium acetate was added to solution during the sequential extraction process, which would have skewed the results.

Chapter 4: Discussion

4.1 Mineralogy of the Residue and Tailings

Through the use of optical microscopy, SEM, EMP and XRD techniques, the residue was found to be primarily composed of gypsum ($CaSO_4•2H_2O$) and quartz (SiO_2). Albite ($NaAlSi_3O_8$) is also commonly found in the residue and was identified by the same four methods. Other minerals commonly found in the residue include barite ($BaSO_4$) and microcline ($KAlSi_3O_8$) which were identified by optical microscopy, SEM and XRD techniques, pollucite ($CsAlSi_2O_6•H_2O$) which was identified by SEM and EMP methods, spodumene ($LiAlSi_2O_6$) which was identified by XRD, and cesium sulphate ($CsSO_4$) which was identified by SEM.

To a lesser extent, the residue contains several other minerals and compounds. Though conclusive evidence was not obtained to prove the presence of any of these minerals and compounds, the historical literature presented in Chapter 1, conversations with Cabot representatives, and instrumental and analytical data including solid sample analysis, sequential extraction results, and WATEQ4F modeling results cumulatively suggest that other minerals and compounds are likely present in the residue. These minerals and compounds likely include cesium carbonate (Cs_2CO_3), cesium formate ($HCOO^-Cs^+$), aluminum cesium sulphate ($AlCs(SO_4)_2$), cesium oxide (Cs_2O) or one of its binary forms, celestite ($SrSO_4$), calcite ($CaCO_3$) and other carbonates, iron oxide-hydroxides ($FeO(OH)$), wollastonite ($CaSiO_3$), gibbsite ($Al(OH)_3$), boehmite ($\gamma AlO(OH)$), diaspore ($\alpha AlO(OH)$), anhydrite ($CaSO_4$), alunite ($KAl_3(SO_4)_2(OH)_6$), basaluminite ($Al_4(SO_4)(OH)_{10}•5(H_2O)$), epsomite ($MgSO_4•7H_2O$), and fluorite ($CaF_2$). SEM results indicate that portions of the Cs, Rb and other elements, may be present in secondary phases.

The elements detected at relatively large concentrations in the bulk solid residue analyses, are consistent with the elements required to yield the known and suspected residue mineralogy. For example, in the residue the most abundant elements are Al, Ba, Ca, Cs, K, Li, Na, Rb, S, Sr and Si. Nine of these eleven elements are major components of the known mineralogical suite: gypsum ($CaSO_4•2H_2O$), quartz (SiO_2), albite ($NaAlSi_3O_8$), barite ($BaSO_4$), microcline ($KAlSi_3O_8$), pollucite ($CsAlSi_2O_6•H_2O$), spodumene ($LiAlSi_2O_6$), or cesium sulphate ($CsSO_4$). Other major elements such as Rb and Sr are likely present in K-feldspars (Teertstra *et al*, 1998), and celestite ($SrSO_4$). Additionally, EMP and SEM results indicate that Cs also is present in Cs-feldspars.

The bulk solids analytical data also show fluctuating concentrations of six of the eleven most abundant elements in the residue, including Ba, Ca, Li, and Sr which shown in Figures 3-17 and 3-18, and K and Na. These variation trends in concentration throughout the residue could indicate heterogeneous spatial distributions of barite, gypsum or other Ca containing minerals, feldspars, spodumene, and celestite. The heterogeneous distribution of the elements could be caused by variable capillary re-distribution during dry seasons, incongruent dissolution of minerals, or variable leaching of minerals.

Through the use of optical microscopy, SEM, EMP and XRD techniques, the tailings were found to be primarily composed of microcline ($KAlSi_3O_8$) and albite

($NaAlSi_3O_8$). Other major minerals found in the tailings include quartz (SiO_2) and muscovite ($(K,Na)Al_2(AlSi_3O_{10})(OH)_2$) which were identified by optical microscopy, SEM and XRD techniques, pollucite ($CsAlSi_2O_6 \bullet H_2O$) which was identified by SEM, EMP and XRD methods, illite ($(K,H_30)(Al,Mg,Fe)_2(Si,Al)_4O_{10}(OH)_2 \bullet H_2O$) which was identified by optical microscopy and XRD, and finally spodumene ($LiAlSi_2O_6$) identified by XRD. Other minerals common to the TANCO pegmatite that could be in the tailings, but were not observed or detected, include petalite ($Li(AlSi_4O_{10})$), lepidolite ($K(Li,Al)_{2\text{-}3}(AlSi_3O_{10})(O,OH,F)_2$), amblygonite ($LiAlFPO_4$), beryl ($Be_3Al_2(Si_6O_{18})$), simpsonite ($Al_4(Ta,Nb)_3O_{13}(OH)$), tantalite ($(Fe,Mn)Ta_2O_6$), microlite ($Ca_2Ta_2O_6(O,OH,F)$ and wodginite ($Mn(Sn,Ta)(Ta,Nb)_2O_8$) (Cerny and Burt 1984, Cerny 1991, Cerny *et al* 1998, Teertstra *et al* 1998, Cerny and Ercit 2005, and Stilling *et al* 2006). Additionally, the tailings mineralogy is consistent with the mineralogy of similar rare-element pegmatites in Czech Republic, Russia, and Africa (Teertstra *et al* 1995, Teertstra and Cerny 1997, and Teertstra *et al* 1997).

In the tailings, no evidence of secondary precipitates was observed under the petrographic microscope, SEM or EMP. Additionally, the field drilling program conducted for this study and by Wardrop (2009) did not encounter a hardpan layer, which is a cemented layer formed by precipitation and cementation of secondary minerals in mine tailings (DeSisto *et al*, 2011). However, the SI of the tailings porewater indicates a potential to precipitate sulphates and other trace minerals and compounds. Should secondary precipitates form in the tailings, the residue signature elements would likely have a different affinity from one another to potential precipitates (Sidenko and Sherriff, 2005).

4.2 Element Mobility and Spatial Variation

The weighted sum of the porewater and sequential extraction steps 1 and 2 (Table 3-3) represents the fraction of an element that is water-soluble or within an easily dissolvable mineral, and therefore represents the amount of an element that should be considered mobile in the natural environmental conditions at TANCO. Environment Canada’s nearest weather station to the mine site is located in Pinawa, Manitoba, approximately 44 km southwest, where records between 2001 and 2006 show that the average annual total rain fall was 417 mm, the average annual total snow fall was 120 cm, and the average annual total precipitation was 536 mm (Table 4-1). There is also an assumption that the residue is both porous and permeable; this is supported by the fact that all thirteen residue samples that were acquired from above the groundwater table after freshet did contain extractable porewater.

Interpretation of the results presented in Section 3-6 shows that the following percentages of residue signature elements should be considered mobile from the residue: 47 % Cs, 26 % S, 22 % Ca, 7 % Rb and 4 % Sr. In the tailings 24 % Cs, 52 % S, 23 % Ca, 1 % Rb and 7 % Sr should be considered mobile. Oxic and anoxic conditions were not considered during the sequential extraction process as cesium and rubidium only have one valence and so changes in Eh would have a minimal effect on mobility. With respect to the other elements in the residue, 44 % Mg, 27 % Mn,

Table 4-1: Precipitation records from 2001 to 2006 in Pinawa, Manitoba (Environment Canada, 2007)

Year	Total Rain (mm)	Total Snow (cm)	Total Precipitation (mm)
2001	401	74	475
2002	370	98	469
2003	415	115	530
2004	486	280	768
2005	483	73	556
2006	349	77	419
Annual Average	417	120	536

7 % K, 4 % Fe, 2 % Al and Li were found to be mobile and Si and Ba immobile. In the tailings, 26 % Mg, 15 % Mn, 3 % K, 5 % Fe and 9 % Ba are mobile, with Al, Li, and Si immobile. In contrast to many other mine tailings sites where sulphide oxidation produces acid (Blowes *et al*, 1998, and Sherriff *et al*, 2011) and releases metals (Malmstrom *et al* 2006, and Koo *et al* 2012), the porewater pH in the Old TMA is near neutral ranging between 6.7 and 8.5 (Appendix C).

The mobile fraction of elements would exist in a different mineralogical form than the immobile fraction. The 47 % of Cs that is mobile in the residue, which is 6.4 mg/g, comes from Cs-sulphate which was conclusively identified by the SEM, and from Cs-carbonate which is likely but inconclusively present as indicated by the solid state and sequential extraction data results. The CRC Press (1984) states that Cs-sulphate is water-soluble and four orders of magnitude more soluble in cold water than gypsum or anhydrite, five orders more soluble than celestite, and seven orders more soluble than barite. This explains why Cs is more mobile from the residue under natural conditions than Ba, Sr, or Ca. The immobile fraction of Cs in the residue, which is 7.2 mg/g, is conclusively held in K-feldspar and pollucite. Additionally, Cs is probably also in Cs-formate, and possibly Cs adsorbed on Fe oxide-hydroxides, which are compounds and minerals that are likely present as indicated by the solid state and sequential extraction data results. Cornell (1993) and Gossuin *et al* (2002) both provided evidence of Cs adsorption onto Fe oxide-hydroxides in aqueous solutions.

The mobile fraction of Cs in the tailings correlates to 0.55 mg/g, whereas the immobile fraction is about 1.75 mg/g. Therefore, the majority of Cs should be considered immobile in the tailings. The small fraction of mobile Cs may result from the ion exchange properties of illite which is a ferro-magnesian clay mineral and relatively more soluble than muscovite. The enrichment of Cs (up to 5 wt. % Cs_2O) and Rb (up to 2 wt. % Rb_2O) in ferro-magnesian micas associated with rare-element granitic pegmatites is well known (Cerny and Burt 1984, Wise 1995, and Cerny *et al* 2003). The majority of Cs in the tailings occurs in feldspars and pollucite. This interpretation is supported by Teertstra *et al* (1998), who determined that K-dominant but Rb-rich feldspars from granitic pegmatites contain up to 26.2 wt. % Rb_2O and 1.5 wt. % Cs_2O.

In the residue, the mobile fractions of the other residue signature elements are approximately Ca 24 mg/g, S 27 mg/g, Rb 0.2 mg/g and Sr 0.02 mg/g, whereas the immobile fractions of the same residue elements are Ca 84 mg/g, S 78 mg/g, Rb 2.4 mg/g and Sr 0.38 mg/g. The mobile fractions of Ca and S in the residue come from Cs-sulphate, calcite and gypsum which are only moderately water-soluble at approximately 2.0 to 2.5 g/l at 25 °C (CRC Press, 1984). The portions of Ca and S that remain immobile in the residue are fixed within gypsum, anhydrite, fluorite, wollastonite, celestite and barite. Almost all of the Rb and Sr are immobile in the residue, respectively held within feldspar and celestite. In the tailings, the mobile fraction of these elements are approximately S 0.21 mg/g, Ca 0.4 mg/g, Sr 0.002 mg/g, and Rb 0.02 mg/g, whereas their immobile fraction is S 0.19 mg/g, Ca 1.5 mg/g, Sr

0.03 mg/g, and Rb 4.1 mg/g. The total concentrations of S, Ca and Sr, and the mobile concentrations of all four of these residue signature elements are very small. Rb exists in the tailings at a relatively high concentration, but the majority of it is fixed within the mineralogical structure of microcline; (K-Rb)-feldspars form under low temperature conditions in the interior zones of many pollucite-bearing rare-element granitic pegmatites (Teertstra *et al*, 1998).

The majority of Al, Ba, Fe, K, Li, Mg, Mn and Si are immobile in both the residue and the tailings. Though the sequential extraction results indicate that 44 % of residue Mg and 27 % of residue Mn are mobile in the residue, Table 3-3 shows that they are both present in relatively small amounts at 0.6 mg/g and 0.2 mg/g, respectively. In the residue, Al and Si are primarily in spodumene, microcline, albite and pollucite, Ba is in insoluble barite, K is immobile within microcline and alunite, and Li is trapped inside spodumene. Table 3-3 shows that the sequential extraction process mobilized the highest percentages of Fe, Mg and Mn from step 3; therefore, these three elements are most likely immobile within Fe oxide-hydroxides.

The mineralogical and element mobility results are consistent with the vertical analytical profiles for the solid state and porewater concentrations (Figures 3-17, 3-18 and 3-19). Cs is relatively abundant and partially mobile in the residue. The solid state depth profile for Cs in the residue fluctuates between 12,000 and 16,400 ppm, where Cs concentrations are lower at surface than they are at depth. Likewise, the depth profile for Cs concentration in the porewater indicates that the porewater closer to grade has a Cs concentration 1,300 mg/L higher than porewater near the bottom of the residue. Overall, the mobile fraction of Cs, from Cs-sulphates and Cs-carbonates, is being weathered closer to the surface where water infiltration first appears and may be most influential. Ca and S are also relatively abundant and partially mobile in the residue. The solid sample and porewater concentration depth profiles for Ca and S in the residue fluctuate in similar patterns. These profiles are similar because both Ca and S primarily occur in the residue as gypsum. The matching fluctuating trend of the profiles could be explained by the changing residue surface elevation over the course of multiple residue deposition periods; with the periods of lower concentrations representing increased weathering at near-surface elevations. The difference in porewater depth profiles could possibly be explained by an influx of Ca at near-surface elevations from the weathering of calcite; this would cause the Ca profile to be more consistent with depth, rather than matching the increasing trend of S with depth. Likewise, Rb is also considered mostly immobile, but its solid sample vertical profile does not fluctuate as much as the Ca and S solid sample vertical profiles, indicating that Rb in feldspars is more evenly distributed within each respective stratigraphy.

4.3 Residue Deposition in the Old Tailings Management Area

After residue has been deposited in the Old TMA, exposure to the precipitation conditions of the natural environment results in the mobilization of select elements from the residue into the groundwater. Water is the primary weathering mechanism. Water exposure comes from precipitation and freshet, which lead to surface runoff from the residue pile to the tailings, and leaching of water through the residue pile into the tailings. Water exposure may also come from subsidence of the residue pile beneath the original elevation of the pre-placement tailings surface, causing the residue to directly contact groundwater during seasonal periods of high potentiometric surface elevation (Wardrop, 2009). Surface runoff from the residue pile to the surrounding porous and permeable tailings is expected to be the most influential weathering mechanism. Due to its very fine-grained yet compact nature, and the presence of porewater, the residue is suspected to be porous and permeable enough to allow precipitation to leach through it, but at a very slow rate and minimal volume. The hydraulic conductivity of the residue material has never been tested; however, visual grain-size examination of residue samples suggests that the hydraulic conductivity would be similar to that of marine clay/mud, ranging between 10^{-9} to 10^{-12} m/s (Freeze and Cherry, 1979). Residue permeability near surface could be enhanced by the production of fractures associated with drying; additionally the porosity and horizontal hydraulic conductivity may be greater within the very fine to coarse-grained feldspar marker beds. The movement of residue leachate in the Old TMA groundwater is characterized by residue leachate signature elements which include increased concentrations of total cesium and rubidium, dissolved calcium, dissolved strontium, and sulphate (SEACOR, 2004).

Contrary to initial worst case estimations that assumed 100% mobility (UMA 2001), after exposure to water, only fractions of the residue leachate signature elements are actually mobile from the residue pile into the groundwater. Of their individual total concentration in the residue, only 47% of the cesium, 26% of the sulphur, 22% of the calcium, 7% of the rubidium and 4% of the strontium have the potential to be mobilized. The remaining portions of these elements in the residue are fixed into mineralogical structures that will not be broken down by the natural environmental conditions found at the TANCO mine site. These percentages require an extensive period of time for water that is under-saturated with respect to these elements to flush through the residue to promote the maximum weight percent mobilization. Analytical results show that the porewater is not under-saturated with respect to the residue signature elements, and visual observations indicate that the residue is very fine-grained and compact and therefore likely has a low hydraulic conductivity. Elemental loading and release rates from the residue pile were not accounted for in the scope of research for this study, but would further increase the real-world timeline for complete mobilization of the residue leachate signature elements.

TANCO's 2008 groundwater monitoring program was conducted at the same time as fieldwork for this research project. Using an interpretation of an increased concentration as a difference from an actual or inferred baseline mean of + two standard deviations, Wardrop (2009) identified the migration of residue leachate in near-surface (2.4 to 3.7 m depth) groundwater at least 10 m south, 30 m southeast, and at least 15 m northeast of the primary residue stockpile boundary. Near surface groundwater quality up to 8 m southwest of the 2007 secondary residue placement has also been affected by residue leachate. Groundwater quality at the base of the tailings and in the overburden was not been affected by leachate. Water level monitoring in nested wells indicated a downward vertical gradient between the tailings and underlying sand/gravel aquifers (Wardrop, 2009); however, migration of water through the separate clay unit would be minimal. Additionally, a dominantly downward vertical gradient was reported within the tailings. Wardrop (2009) also estimated that groundwater from the original residue placement area will take at least 8 years to reach the North Dam, and groundwater travel times from the original residue placement area and the 2007 residue placement area, respectively, are estimated at 44 and 38 years to reach the West Dam, 5 and 7 years to reach the East Dam, and 132 and 109 years to reach the Main Dam. Wardrop (2009) determined these travel times by calculating the *average linear velocity* (v) along each flow path in the Old TMA using the following equation: $v = \frac{-K}{n} \frac{\Delta h}{\Delta l}$. Extensive field data was used to determine an average near-surface tailings hydraulic conductivity (K) of 4.1 x 10^{-6} m/s and average hydraulic gradients ($\Delta h/\Delta l$) in specific areas of the Old TMA. A near-surface silty sand tailings porosity (n) of 45% was used (Wardrop, 2009 based on the values tabulated in Freeze and Cherry, 1979). Wardrop (2009) predicted that a progressive reduction of leachate signature concentrations over time is expected once residue placement has ended.

Though quantitative analysis of the residue leachate in the groundwater system of the Old TMA was outside of the scope of this research, we can qualitatively interpret that the total amount of residue signature elements that will be released to the environment outside of the Old TMA will be less than the mobile fraction of these elements in the residue, and that their release will occur at diluted concentrations over a significant period time rather than all at once. Residue signature elements entering the groundwater system of the Old TMA, are entering a relatively closed hydrogeological setting. The shallow aquifer of the Old TMA is underlain with impermeable crystalline bedrock that extends to topographic highs surrounding most of the Old TMA. Therefore the residue elements are confined to a predictable flow system. Additionally, the residue signature elements may not migrate through the tailings at the same rate as the groundwater. The aqueous form of the residue signature elements is unknown, but may increase their residence times in the Old TMA. Furthermore, even though mineralogical analysis of tailings samples did not find evidence of secondary precipitates, geochemical modeling did show that the chemistry of the tailings porewater was sufficiently saturated to produce some secondary precipitates from elements mobilized by the residue pile; therefore at some point along the flow path, a portion of the mobilized elements may be consumed by these secondary precipitates. For example, Wardrop (2009) reported that only some but not all of the residue signature elements have been detected at elevated concentrations in numerous monitoring wells near the residue pile from 2002 to 2008; this can be explained by different rates of mobilization, dilution, matrix diffusion and potential sorption reactions, and/or secondary precipitation. Harned and Blake Jr. (1951) and Lerman (1979) state that Cs and Rb have diffusion coefficients (D) for ions in dilute aqueous solutions at 25ºC of 15.7×10^{-6} and 20.6×10^{-6} cm^2/s, respectively; whereas Ca, Sr and sulphate have lower D values at 7.93×10^{-6}, 7.94×10^{-6}, 10.7×10^{-6}, respectively. Additionally, but with some exceptions, where Wardrop

(2009) reports detecting the residue leachate signature in groundwater monitoring wells close to the residue pile, the residue signature element concentrations in the groundwater was usually 1 to 2 orders of magnitude less than the residue porewater concentrations reported in Section 3.5. This further validates the conclusion that once elements are mobilized from the residue, they will not migrate uniformly through the tailings.

Chapter 5: Conclusions

After dry residue is stockpiled on the neutral tailings of the Old TMA, they become exposed to the site precipitation conditions, and subsequently mobilize a fraction of elements into the underlying tailings/groundwater system. The objectives of this study were to identify the mineralogy of the residue and tailings, and to determine the mobility potential of the residue signature elements, which are Cs, Ca, S, Rb and Sr.

The most common minerals found in the residue pile are gypsum, quartz, barite, spodumene, microcline, albite, pollucite, and Cs-sulphate. Smaller amounts of several other minerals and compounds are also present in the residue; analytical data suggest that these likely include Cs-carbonate, Cs-formate, Al-Cs-sulphate, Cs-oxide or one of its binary forms, celestite, calcite and other carbonates, Fe-oxide-hydroxides, wollastonite, gibbsite, boehmite, diaspore, anhydrite, alunite, basaluminite, epsomite, and fluorite. The most abundant minerals found in the tailings are quartz, microcline, albite, spodumene, pollucite, illite and muscovite.

The residue contains 13.6 mg/g of Cs. Under the natural environmental conditions at the residue pile, approximately 47 % of this Cs has potential to be mobilized if constantly exposed to water. The mobile fraction of Cs in the residue comes from Cs-sulphate and Cs-carbonate. The immobile fraction of Cs is trapped in the mineralogical structures of feldspar (primarily microcline), pollucite, Cs-formate, and Cs adsorbed on Fe oxide-hydroxides. There is only 2.3 mg/g of Cs in the tailings which is mostly immobile in feldspars and pollucite.

The residue also contains 108 mg/g of Ca and 105.3 mg/g of S. Again, under the natural environmental conditions at the residue pile, only about 22 % of the Ca and 26 % of the S have potential to be mobilized when exposed to water. The mobile fractions of Ca and S in the residue are found in Cs-sulphate, calcite and gypsum. The immobile fraction of these residue elements are contained within gypsum, anhydrite, fluorite, wollastonite, celestite and barite. There is only 1.9 mg/g of Ca and 0.4 mg/g of S in the tailings, both of which are mostly immobile.

The residue contains 2.6 mg/g of Rb and 0.4 mg/g of Sr. These residue signature elements can be considered mostly immobile because only 7 % of the Rb and 4 % of the Sr can be released under natural weathering conditions when the residue is exposed to water. The majority of residue Rb and Sr is fixed within the mineralogical structures of feldspars (primarily microcline) and celestite. Similarly, Al, Ba, K, Li and Si are relatively abundant in the residue, but are also mostly immobile within quartz, feldspars, barite and spodumene. In the tailings, the bulk concentrations of these seven elements are respectively different than in the residue, but they all remain mostly immobile under natural conditions.

The overall mobility of elements from the residue pile is dependent on constant exposure to water. Elements near the surface of the residue pile will have a better chance to be mobilized because of exposure to precipitation and freshnet. However, the bulk of elements found inside the residue pile will have minimal exposure to water due to the inherent very fine-grained and compacted nature of the residue. For this reason, the actual mobility of elements from the residue pile will occur over a significant period of time. We can also predict that the total amount of residue signature elements that will be released to the environment outside of the Old TMA will be less than the mobile fraction of these elements in the residue, and that their release will occur at diluted concentrations over a longer period of time than their initial release from the residue pile. Additionally, and though no evidence of secondary precipitation was found in the tailings, geochemical modeling suggests that the chemistry of the tailings porewater is sufficiently saturated to produce some secondary precipitates from elements mobilized by the residue pile.

Chapter 6: References

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Appendix A

Mineralogical borehole logs

Patrick Solylo, MSc Thesis

RECORD OF BOREHOLE

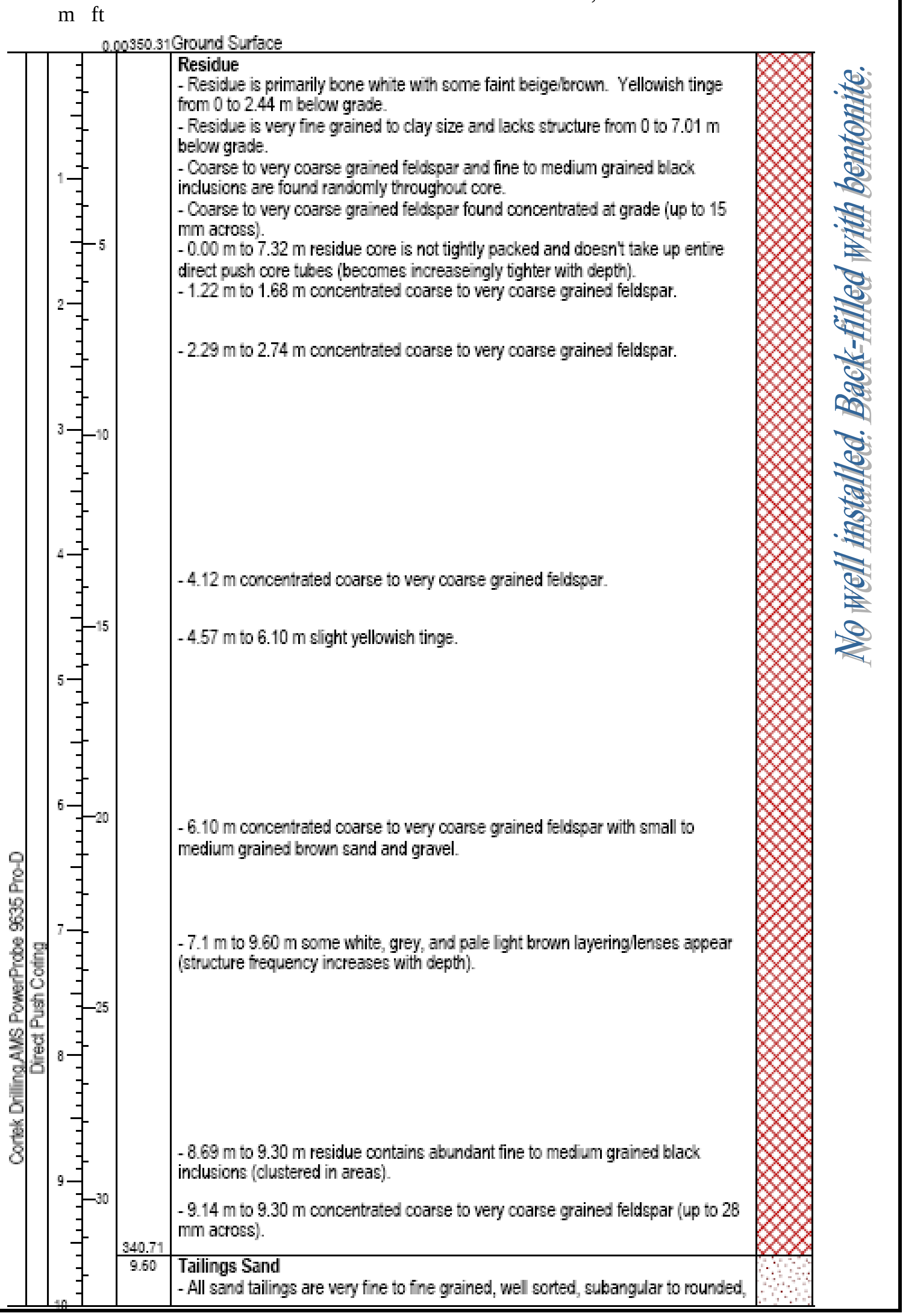
MB-1

Sheet 1 of 2

University of Manitoba, Department of Geological Sciences
Investigation of The Geochemical Behaviour of Residual Leachate in the Groundwater / Tailings
Old TMA, Tanco Mines, Bernic Lake Manitoba
East side of original pile footprint

DRILLED
June 2, 2008

NORTHING 5589738
EASTING 326695



Residue

- Residue is primarily bone white with some faint beige/brown. Yellowish tinge from 0 to 2.44 m below grade.
- Residue is very fine grained to clay size and lacks structure from 0 to 7.01 m below grade.
- Coarse to very coarse grained feldspar and fine to medium grained black inclusions are found randomly throughout core.
- Coarse to very coarse grained feldspar found concentrated at grade (up to 15 mm across).
- 0.00 m to 7.32 m residue core is not tightly packed and doesn't take up entire direct push core tubes (becomes increaseingly tighter with depth).
- 1.22 m to 1.68 m concentrated coarse to very coarse grained feldspar.
- 2.29 m to 2.74 m concentrated coarse to very coarse grained feldspar.
- 4.12 m concentrated coarse to very coarse grained feldspar.
- 4.57 m to 6.10 m slight yellowish tinge.
- 6.10 m concentrated coarse to very coarse grained feldspar with small to medium grained brown sand and gravel.
- 7.1 m to 9.60 m some white, grey, and pale light brown layering/lenses appear (structure frequency increases with depth).
- 8.69 m to 9.30 m residue contains abundant fine to medium grained black inclusions (clustered in areas).
- 9.14 m to 9.30 m concentrated coarse to very coarse grained feldspar (up to 28 mm across).

Tailings Sand

- All sand tailings are very fine to fine grained, well sorted, subangular to rounded,

Patrick Solylo, MSc Thesis

RECORD OF BOREHOLE

MB-1

Sheet 1 of 2

University of Manitoba, Department of Geological Sciences

Investigation of The Geochemical Behaviour of Residual Leachate in the Groundwater / Tailings

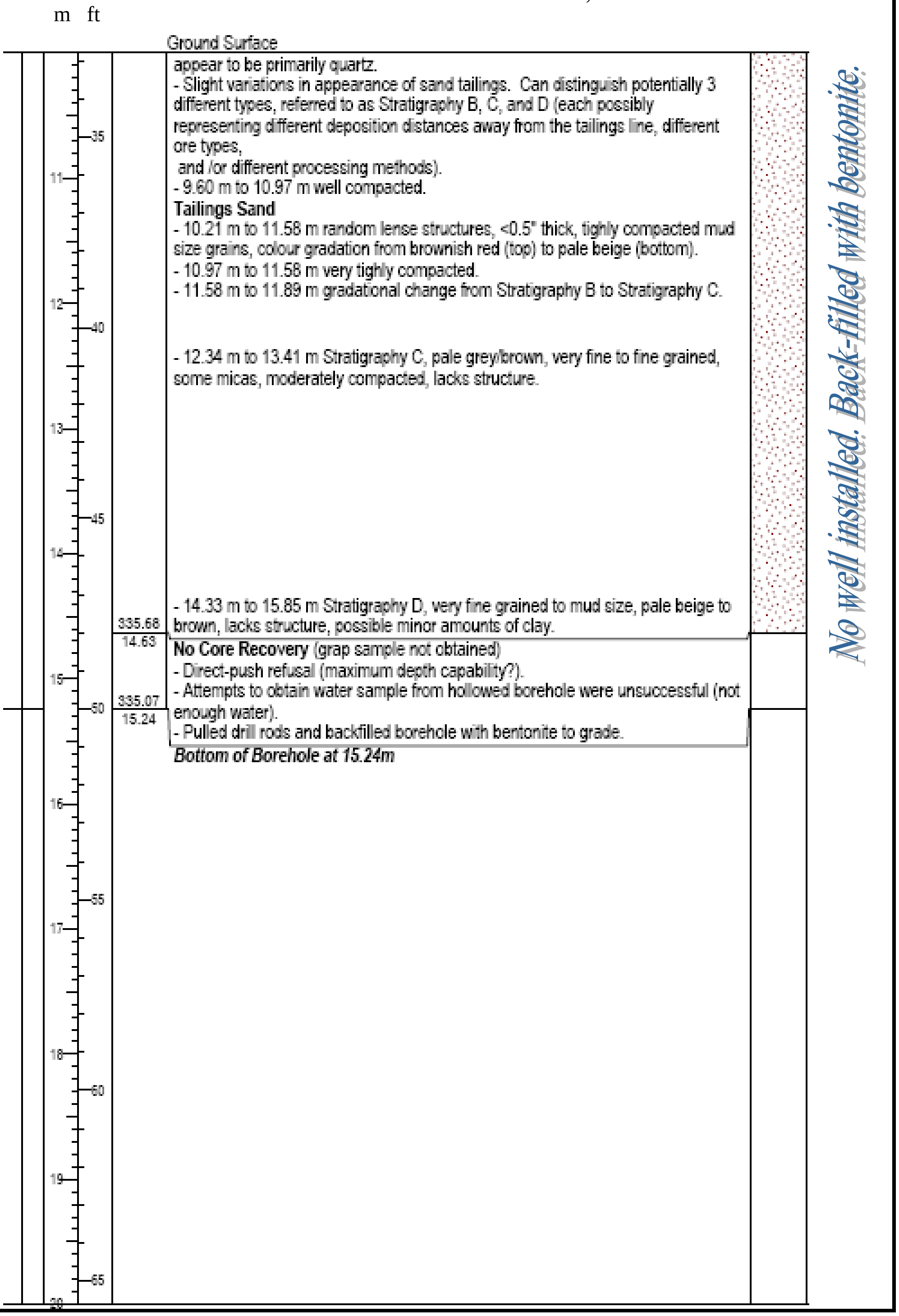
Old TMA, Tanco Mines, Bernic Lake Manitoba

East side of original pile footprint

NORTHING	5589738
EASTING	326695

DRILLED

June 2, 2008



appear to be primarily quartz.
- Slight variations in appearance of sand tailings. Can distinguish potentially 3 different types, referred to as Stratigraphy B, C, and D (each possibly representing different deposition distances away from the tailings line, different ore types,
and /or different processing methods).
- 9.60 m to 10.97 m well compacted.

Tailings Sand
- 10.21 m to 11.58 m random lense structures, <0.5" thick, tighly compacted mud size grains, colour gradation from brownish red (top) to pale beige (bottom).
- 10.97 m to 11.58 m very tighly compacted.
- 11.58 m to 11.89 m gradational change from Stratigraphy B to Stratigraphy C.

- 12.34 m to 13.41 m Stratigraphy C, pale grey/brown, very fine to fine grained, some micas, moderately compacted, lacks structure.

- 14.33 m to 15.85 m Stratigraphy D, very fine grained to mud size, pale beige to brown, lacks structure, possible minor amounts of clay.

No Core Recovery (grap sample not obtained)
- Direct-push refusal (maximum depth capability?).
- Attempts to obtain water sample from hollowed borehole were unsuccessful (not enough water).
- Pulled drill rods and backfilled borehole with bentonite to grade.

Bottom of Borehole at 15.24m

No well installed. Back-filled with bentonite.

Patrick Solylo, MSc Thesis

RECORD OF BOREHOLE

MB-2

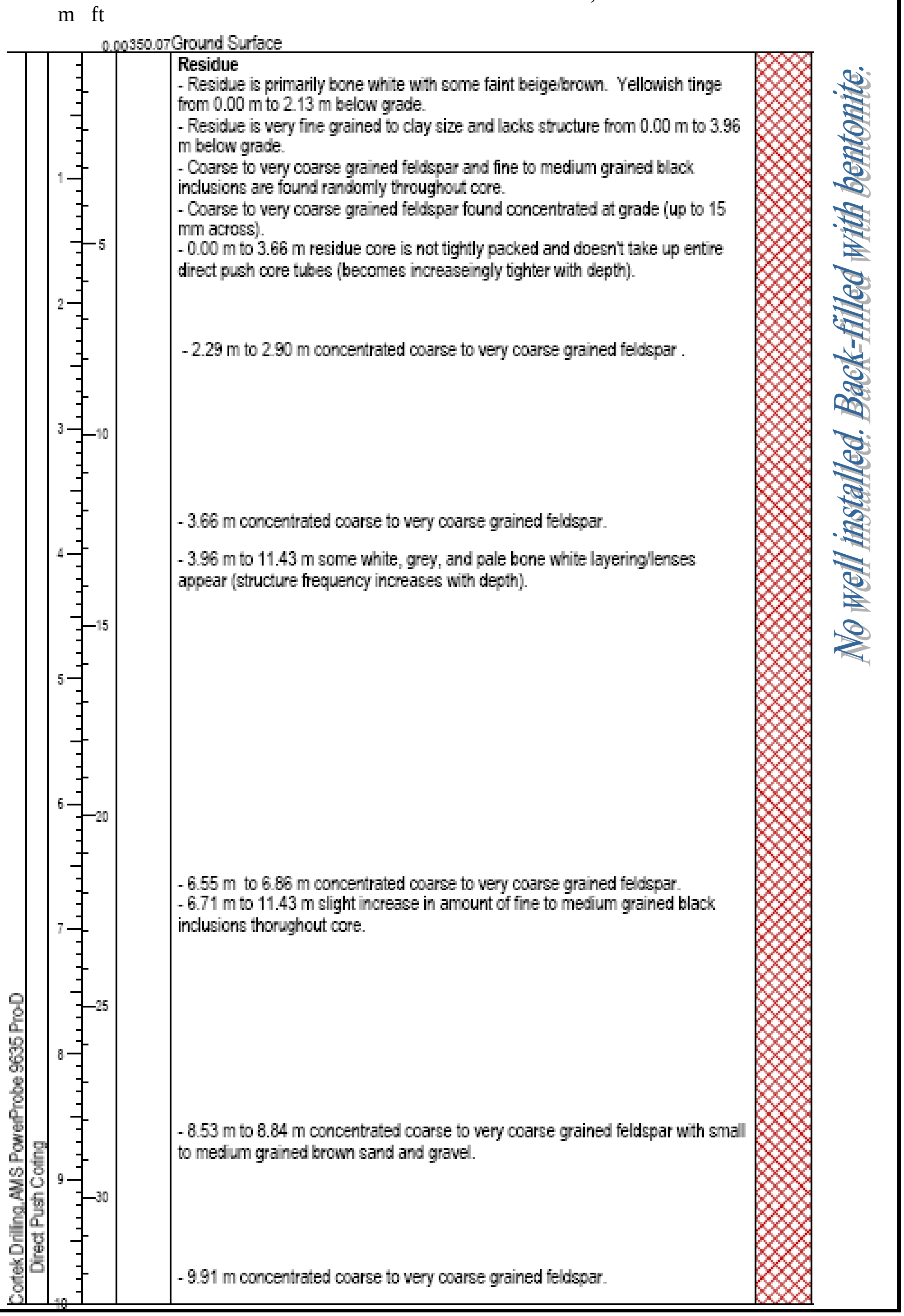
University of Manitoba, Department of Geological Sciences

Sheet 1 of 2

Investigation of The Geochemical Behaviour of Residual Leachate in the Groundwater / Tailings
Old TMA, Tanco Mines, Bernic Lake Manitoba
South-Southwest corner of original residue pile footprint

NORTHING	5589688
EASTING	326634

DRILLED
June 2, 2008



Residue

- Residue is primarily bone white with some faint beige/brown. Yellowish tinge from 0.00 m to 2.13 m below grade.
- Residue is very fine grained to clay size and lacks structure from 0.00 m to 3.96 m below grade.
- Coarse to very coarse grained feldspar and fine to medium grained black inclusions are found randomly throughout core.
- Coarse to very coarse grained feldspar found concentrated at grade (up to 15 mm across).
- 0.00 m to 3.66 m residue core is not tightly packed and doesn't take up entire direct push core tubes (becomes increaseingly tighter with depth).

- 2.29 m to 2.90 m concentrated coarse to very coarse grained feldspar .

- 3.66 m concentrated coarse to very coarse grained feldspar.

- 3.96 m to 11.43 m some white, grey, and pale bone white layering/lenses appear (structure frequency increases with depth).

- 6.55 m to 6.86 m concentrated coarse to very coarse grained feldspar.
- 6.71 m to 11.43 m slight increase in amount of fine to medium grained black inclusions thorughout core.

- 8.53 m to 8.84 m concentrated coarse to very coarse grained feldspar with small to medium grained brown sand and gravel.

- 9.91 m concentrated coarse to very coarse grained feldspar.

Patrick Solylo, MSc Thesis

RECORD OF BOREHOLE

MB-2

Sheet 1 of 2

University of Manitoba, Department of Geological Sciences
Investigation of The Geochemical Behaviour of Residual Leachate in the Groundwater / Tailings
Old TMA, Tanco Mines, Bernic Lake Manitoba
South-Southwest corner of original residue pile footprint

NORTHING 5589688
EASTING 326634

DRILLED
June 2, 2008

m ft

m: 11 12 13 14 15 16 17 18 19 20
ft: 35 40 45 50 55 60 65

Ground Surface

338.64	**Residue**	▨
11.43 334.22	**Tailings Sand** - All sand tailings are very fine to fine grained, well sorted, subangular to rounded, appear to be primarily quartz. - Slight variations in appearance of sand tailings. Can distinguish potentially 3 different types, referred to as Stratigraphy B, C, and D (each possibly representing different deposition distances away from the tailings line, different ore types, and /or different processing methods). - 11.43 m to 12.34 m Stratigraphy B, pale beige/brown, minor iron-stained inclusions, very fine grained, well compacted. - 11.43 m to 12.34 m random lense structures, <0.5" thick, tighly compacted mud size grains, colour gradation from brownish red (top) to pale beige (bottom). - 12.34 m to 13.41 m Stratigraphy C, pale grey/brown, very fine to fine grained, some micas, moderately compacted, lacks structure. - 13.41 m to 14.33 m gradational change from Stratigraphy C to Stratigraphy D. - 14.33 m to 15.85 m Stratigraphy D, very fine grained to mud size, pale beige to brown, lacks structure, possible minor amounts of clay.	░
15.85 331.63	**No Core Recovery** (two grab samples obtained - both appear same as Stratigraphy D) - Direct-push refusal (maximum depth capability?). - Attempts to obtain water sample from hollowed borehole were unsuccessful (not enough water). - Pulled drill rods and backfilled borehole with bentonite to grade.	
18.44	***Bottom of Borehole at 18.44m***	

No well installed. Back-filled with bentonite.

RECORD OF BOREHOLE

MB-3

Sheet 1 of 2

Patrick Solylo, MSc. Thesis
University of Manitoba, Department of Geological Sciences
Investigation of The Geotechemical Behaviour of Residue Leachate in the Groundwater / Tailings
Old TMA, Tanco Mines, Bernic Lake, Manitoba
South-Southwest corner of original residue pile footprint DRILLED June 2, 2008

NORTHING 5589770
EASTING 326624

m ft

0.00 349.25 Ground Surface

Residue

- Residue is primarily bone white with faint beige/brown. Yellowish tinge from 0.00 m to 3.66 m below grade.
- Residue is very fine grained to clay size and lacks structure from 0.00 to 3.81 m below grade.
- Coarse to very coarse grained feldspar are found randomly 0.00 m to 7.01 m.
- Fine to medium grained black inclusions are found randomly thoughout core.
- 0.00 m to 2.44 m residue core is not tightly packed and doesn't take up entire direct push core tubes (becomes increasingly tighter with depth).
- Individual residue dumps are easier to idently in MB-3 than in either MB-1 or MB-2. Feldspar markers are more concentrated; 5 seperate residue dumps can be identify in MB-3.
- Inferred Top of Dump 5; Coarse to very coarse grained feldspar found concentrated at grade (up to 15 mm across).
- Inferred Top of Dump 4; 3.81 m to 4.12 m concentrated coarse to very coarse grained feldspar.

- 4.12m to 12.19 m some white, gery, and pale bone white layering / lenses appear but not as many as observed in MB-1 or MB-2 (structure frequency increases with depth).

- Inferred Top of Dump 3; 5.33 m to 5.64 m concentrated coarse to very coarse grained feldspar with small to medium grained sand and gravel.

- Inferred Top of Dump 2; 6.10 m to 6.24 m concentrated coarse to very coarse grained feldspar.

- Inferred Top of Dump 1; 6.71 m to 7.10 m concentrated coarse to very coarse grained feldspar.
- 7.01 m to 12.19 m feldspar particles do not randomly occur anymore.

- 8.84 m to 9.45 m concentrated cluster of the fine to medium grained black inclusions.

- 9.60 m to 11.58 m Stratigraphy B, pale beige / brown, minor iron-stained inclusions, very fine grained.

No well installed. Back-filled with bentonite.

Cortek Drilling AMS PowerProbe 9635 Pro-D

Direct Push Coring

RECORD OF BOREHOLE

MB-3

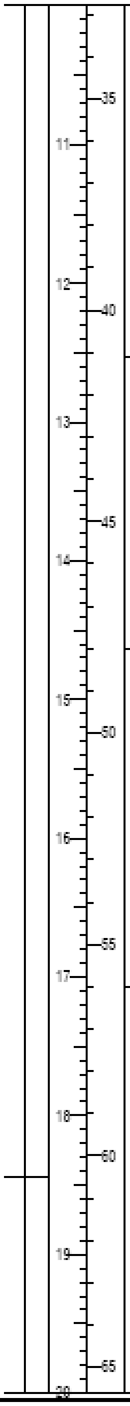
Sheet 1 of 2

Patrick Solylo, MSc. Thesis
University of Manitoba, Department of Geological Sciences
Investigation of The Geotechemical Behaviour of Residue Leachate in the Groundwater / Tailings
Old TMA, Tanco Mines, Bernic Lake, Manitoba
South-Southwest corner of original residue pile footprint

DRILLED June 2, 2008

NORTHING 5589770
EASTING 326624

m ft



Ground Surface

	Residue
336.72 12.53	**Tailings Sand** - 12.53 m to 12.8 m gradational/interlayered from Residue to Stratigraphy B. - 12.80 m to 13.56 m Stratigraphy B, pale beige / brown, minor iron-stained inclusions and faint lenses, very fine grained, well compacted. - 13.56 m to 14.63 m Gradational between Stratigraphy B, to Stratigraphy C, to Stratigraphy D. Tanges frm pale brown, very minor iron-stained inclusions, to fine grained greyish sand with micas, to very fine / mud size pale beige, particles.
334.62 14.63	**No Core Recovery** (two grab samples obtained - both appear same as Stratigraphy D). - Direct-push refuasl (maximum depth capacity?). - Attempts to obtain water sample from hallowed borehole were unsuccessful (not enough water). - Pulled drill rods and backfilled boreholes with bentonite to grade.
332.18 17.07	***Bottom of Borehole at 17.1m***

No well installed. Back-filled with bentonite.

Appendix B

Solid state composition analytical data

Appendix B: Solid state composition analytical data *(Page 1 of 6)*

	Units	MB1 - 33.5'	MB1 - 47.5'	MB2 - 39.25'	MB2 - 43'	MB2 - 51'
Received Weight	kg	0.22	0.22	0.24	0.22	0.22
Ag	ppm	0.09	0.05	0.02	0.02	0.08
Al	ppm	55100	74500	65100	65300	60000
As	ppm	<0.2	0.5	<0.2	<0.2	<0.2
B	ppm	20	150	90	250	30
Ba	ppm	9.2	8.8	6.1	5.4	4.1
Be	ppm	91.3	156.5	100	217	53.7
Bi	ppm	3.57	3.3	3.84	1.68	7.09
Br	ppm	<3	<4	<3	<3	<3
C (inorganic)	ppm	<500	<500	<500	<500	<500
C (total)	ppm	400	500	500	400	2300
Ca	ppm	1800	2000	1500	1900	1900
Cd	ppm	0.06	0.33	0.23	0.2	0.21
Ce	ppm	0.44	0.28	0.19	0.36	0.13
Cl	ppm	120	90	70	120	80
Co	ppm	0.5	0.4	0.4	0.5	0.5
Cr	ppm	13	11	10	9	20
Cs	ppm	1815	2790	2080	1640	796
Cu	ppm	9.3	7.2	8.8	6.6	9.6
Dy	ppm	<0.05	<0.05	<0.05	<0.05	<0.05
Er	ppm	<0.03	<0.03	<0.03	<0.03	<0.03
Eu	ppm	<0.03	<0.03	<0.03	<0.03	<0.03
F	ppm	1360	2540	1620	1910	1510
Fe	ppm	2500	2700	2900	2700	4500
Ga	ppm	63.6	172	91.4	119	75.5
Ge	ppm	0.19	0.17	0.19	0.16	0.15
Gd	ppm	<0.05	<0.05	<0.05	<0.05	<0.05
Hf	ppm	0.9	3.7	1.7	3.4	1.6
Hg	ppm	0.01	0.01	<0.01	<0.01	0.01
Ho	ppm	<0.01	<0.01	<0.01	<0.01	<0.01
I	ppm	<0.5	<0.7	<0.5	<0.6	<0.6
In	ppm	0.053	0.13	0.061	0.084	0.026
K	ppm	12900	29400	16500	17900	12300
La	ppm	<0.5	<0.5	<0.5	<0.5	<0.5
Li	ppm	8660	3390	8110	3560	12250
Lu	ppm	<0.01	<0.01	<0.01	<0.01	<0.01

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

When lab reported >x, unofficial results were requested (select Cs, Ba, and Li intervals).

When analytical packages reported the same element with similar results, the lowest detection limit method was used. When packages reported different results, the highest concentration was used as it could represent better digestion.

Appendix B: Solid state composition analytical data *(Page 2 of 6)*

	Units	MB1 - 33.5'	MB1 - 47.5'	MB2 - 39.25'	MB2 - 43'	MB2 - 51'
Mg	ppm	300	300	300	200	500
Mn	ppm	271	675	276	429	546
Mo	ppm	1.19	0.9	1.32	0.42	1.24
N (total)	ppm	60	60	40	40	90
Na	ppm	12500	26100	13900	26700	9500
Nb	ppm	19.9	35.7	27	22.7	25.1
Nd	ppm	0.1	0.1	<0.1	0.1	0.1
Ni	ppm	3.6	3.6	3.5	2.3	4.2
P	ppm	4740	4090	4060	4120	3470
Pb	ppm	8.6	10.4	6.6	8.4	8.6
Pr	ppm	<0.03	<0.03	<0.03	<0.03	<0.03
Rb	ppm	2390	6440	3330	4000	2470
Re	ppm	<0.002	<0.002	<0.002	<0.002	<0.002
S (sulphate)	ppm	300	300	200	<100	200
S (total)	ppm	100	300	200	<100	100
Sb	ppm	1.36	2.61	1.67	2.01	1.99
Sc	ppm	1.4	3.1	2.1	2.5	1.5
Se	ppm	<1	<1	<1	<1	<1
Si	ppm	373000	333000	363000	357000	343000
Sm	ppm	<0.03	0.03	<0.03	<0.03	<0.03
Sn	ppm	54	139	91	79	80
Sr	ppm	31.5	27.8	24.9	23.1	29.3
Ta	ppm	103.5	325	180.5	166.5	117.5
Tb	ppm	<0.01	<0.01	<0.01	<0.01	<0.01
Te	ppm	<0.05	<0.05	<0.05	<0.05	0.07
Th	ppm	0.5	2.13	1.07	1.72	1.1
Tl	ppm	14.45	35.3	18.45	21.9	14.65
Tm	ppm	<0.01	<0.01	<0.01	<0.01	<0.01
U	ppm	1.62	7.35	3.1	3.58	5.76
V	ppm	1	2	1	2	1
W	ppm	4	6	2	3	2
Y	ppm	0.2	0.1	0.1	0.2	0.1
Yb	ppm	<0.03	<0.03	<0.03	<0.03	<0.03
Zn	ppm	18	68	28	49	29
Zr	ppm	5	14	7	14	8

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

When lab reported >x, unofficial results were requested (select Cs, Ba, and Li intervals).

When analytical packages reported the same element with similar results, the lowest detection limit method was used. When packages reported different results, the highest concentration was used as it could represent better digestion.

Appendix B: Solid state composition analytical data *(Page 3 of 6)*

	Units	MB3 - 5'	MB3 - 16'	MB3 - 19.5'	MB3 - 21'	MB3 - 29'
Received Weight	kg	0.22	0.22	0.22	0.22	0.22
Ag	ppm	<0.01	0.06	0.08	0.02	0.01
Al	ppm	31100	32200	24300	31600	28500
As	ppm	<5	<5	0.2	1.4	5
B	ppm	<20	<20	<20	<20	<20
Ba	ppm	9150	8750	13950	6150	5450
Be	ppm	21.6	16.3	19.4	12.45	12.05
Bi	ppm	1.49	1.01	0.75	0.34	0.54
Br	ppm	<3	<3	<3	<3	<3
C (inorganic)	ppm	700	700	500	<500	<500
C (total)	ppm	2400	1900	1400	1200	4900
Ca	ppm	103000	124500	86800	89200	125500
Cd	ppm	0.1	0.09	0.08	0.04	0.03
Ce	ppm	0.87	1.14	0.42	4.14	2.81
Cl	ppm	100	110	90	130	140
Co	ppm	0.5	1	0.8	0.8	0.8
Cr	ppm	12	8	8	9	7
Cs	ppm	12050	13800	14100	16400	13350
Cu	ppm	4.2	18	11	6.4	4.9
Dy	ppm	0.08	0.1	0.05	0.06	0.08
Er	ppm	0.06	0.06	0.03	0.05	0.05
Eu	ppm	0.08	0.04	0.12	0.06	0.05
F	ppm	370	280	360	310	210
Fe	ppm	1200	1300	1400	1200	1000
Ga	ppm	34.6	26.7	35.3	33.8	22.1
Ge	ppm	0.22	0.14	0.09	<0.05	0.19
Gd	ppm	0.09	0.13	0.09	0.08	0.1
Hf	ppm	0.4	0.2	0.3	0.3	0.3
Hg	ppm	<0.01	0.01	<0.01	<0.01	0.01
Ho	ppm	0.01	0.02	0.01	0.01	0.01
I	ppm	<0.5	<0.5	<0.5	<0.5	<0.5
In	ppm	0.031	0.019	0.024	0.017	0.012
K	ppm	8700	4600	8600	5300	3400
La	ppm	0.8	0.9	0.5	2.8	1.7
Li	ppm	3990	3280	2130	1960	2360
Lu	ppm	<0.01	<0.01	<0.01	<0.01	<0.01

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

When lab reported >x, unofficial results were requested (select Cs, Ba, and Li intervals).

When analytical packages reported the same element with similar results, the lowest detection limit method was used. When packages reported different results, the highest concentration was used as it could represent better digestion.

Appendix B: Solid state composition analytical data *(Page 4 of 6)*

	Units	MB3 - 5'	MB3 - 16'	MB3 - 19.5'	MB3 - 21'	MB3 - 29'
Mg	ppm	600	1200	200	300	300
Mn	ppm	124	117	138	114	102
Mo	ppm	1.08	1.52	1.4	1.61	0.84
N (total)	ppm	40	40	40	80	60
Na	ppm	4900	2900	6400	4300	3000
Nb	ppm	6.4	3.6	6.8	3.5	3.4
Nd	ppm	0.4	0.5	0.4	0.3	0.4
Ni	ppm	4.5	8.2	9.7	10.1	5.7
P	ppm	910	1080	1300	1300	780
Pb	ppm	3.4	7.3	5.6	1.5	1.7
Pr	ppm	0.1	0.13	0.08	0.09	0.1
Rb	ppm	2490	1920	3290	3190	1990
Re	ppm	<0.002	0.011	0.011	<0.002	<0.002
S (sulphate)	ppm	90800	109000	91000	103500	118500
S (total)	ppm	93700	111500	93600	105500	119500
Sb	ppm	0.71	1.1	1.38	1.08	0.82
Sc	ppm	0.5	0.9	0.3	0.2	0.3
Se	ppm	<1	2	1	1	<1
Si	ppm	166500	128500	157000	128000	112000
Sm	ppm	0.1	0.09	0.09	0.08	0.09
Sn	ppm	27	14	16	12	11
Sr	ppm	117	89.5	702	868	376
Ta	ppm	49	37.9	38.3	27	24.6
Tb	ppm	0.01	0.01	<0.01	0.01	0.01
Te	ppm	<0.05	0.1	0.05	<0.05	<0.05
Th	ppm	0.47	0.23	0.23	0.14	0.17
Tl	ppm	21.6	17.15	30.5	31.8	20.2
Tm	ppm	<0.01	<0.01	<0.01	<0.01	<0.01
U	ppm	0.88	0.53	0.82	0.82	0.57
V	ppm	1	3	3	4	4
W	ppm	1	1	2	1	1
Y	ppm	0.8	1.1	0.7	0.7	1
Yb	ppm	0.04	0.06	0.04	0.04	0.04
Zn	ppm	11	7	17	22	20
Zr	ppm	3	3	3	3	3

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Light grey shading and black font indicates TAILINGS

When lab reported >x, unofficial results were requested (select Cs, Ba, and Li intervals).

When analytical packages reported the same element with similar results, the lowest detection limit method was used. When packages reported different results, the highest concentration was used as it could represent better digestion.

Appendix B: Solid state composition analytical data *(Page 5 of 6)*

	Units	MB3 - 41'	MB3 - 43'	MB3 - 47.5'
Received Weight	kg	0.22	0.22	0.22
Ag	ppm	<0.01	0.01	<0.01
Al	ppm	35800	56600	64600
As	ppm	<5	2.8	3.8
B	ppm	<20	20	100
Ba	ppm	8760	350	55
Be	ppm	31.1	122	128.5
Bi	ppm	0.82	1.77	1.86
Br	ppm	<3	<3	<4
C (inorganic)	ppm	1000	<500	<500
C (total)	ppm	3200	700	400
Ca	ppm	119000	3100	1400
Cd	ppm	0.05	0.06	0.1
Ce	ppm	2.1	1.35	1.24
Cl	ppm	150	80	90
Co	ppm	0.8	0.4	0.4
Cr	ppm	7	11	5
Cs	ppm	12100	3250	3900
Cu	ppm	5.6	7.4	4.1
Dy	ppm	0.08	<0.05	<0.05
Er	ppm	0.05	<0.03	<0.03
Eu	ppm	0.07	<0.03	<0.03
F	ppm	550	1940	2660
Fe	ppm	1300	4200	2700
Ga	ppm	35.3	94.8	159.5
Ge	ppm	0.16	<0.05	<0.05
Gd	ppm	0.1	<0.05	<0.05
Hf	ppm	0.5	1.2	3.8
Hg	ppm	0.01	<0.01	<0.01
Ho	ppm	0.01	<0.01	<0.01
I	ppm	<0.6	<0.5	<0.7
In	ppm	0.024	0.031	0.082
K	ppm	6200	18100	25900
La	ppm	1.2	0.8	0.7
Li	ppm	3540	7990	3390
Lu	ppm	<0.01	<0.01	<0.01

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Light grey shading and black font indicates TAILINGS

When lab reported >x, unofficial results were requested (select Cs, Ba, and Li intervals).

When analytical packages reported the same element with similar results, the lowest detection limit method was used. When packages reported different results, the highest concentration was used as it could represent better digestion.

Appendix B: Solid state composition analytical data *(Page 6 of 6)*

	Units	MB3 - 41'	MB3 - 43'	MB3 - 47.5'
Mg	ppm	1200	300	100
Mn	ppm	315	396	613
Mo	ppm	0.82	0.83	0.53
N (total)	ppm	40	60	40
Na	ppm	3800	12900	24100
Nb	ppm	28.2	19.2	25.2
Nd	ppm	0.5	0.1	<0.1
Ni	ppm	7.4	3.2	2
P	ppm	960	4930	3790
Pb	ppm	3	5.2	8.5
Pr	ppm	0.1	<0.03	<0.03
Rb	ppm	2590	3810	6380
Re	ppm	<0.002	<0.002	<0.002
S (sulphate)	ppm	107500	1600	300
S (total)	ppm	108000	1800	300
Sb	ppm	1.01	1.28	1.78
Sc	ppm	0.6	1.2	2.5
Se	ppm	2	2	1
Si	ppm	128000	340000	285000
Sm	ppm	0.09	<0.03	<0.03
Sn	ppm	76	76	104
Sr	ppm	200	38.1	22.1
Ta	ppm	190	151.5	196.5
Tb	ppm	0.01	<0.01	<0.01
Te	ppm	<0.05	<0.05	<0.05
Th	ppm	0.33	1.18	1.69
Tl	ppm	20.8	18.95	36.2
Tm	ppm	0.01	<0.01	<0.01
U	ppm	2.11	3.21	5.4
V	ppm	4	2	2
W	ppm	1	4	7
Y	ppm	0.9	0.1	0.1
Yb	ppm	0.05	<0.03	<0.03
Zn	ppm	16	29	52
Zr	ppm	4	8	15

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

When lab reported >x, unofficial results were requested (select Cs, Ba, and Li intervals).

When analytical packages reported the same element with similar results, the lowest detection limit method was used. When packages reported different results, the highest concentration was used as it could represent better digestion.

Appendix C

Porewater concentration analytical and field data

Appendix C: Porewater concentration analytical and field data *(Page 1 of 8)*

	Aluminum (Al)	Antimony (Sb)	Arsenic (As)	Boron (B)	Barium (Ba)	Beryllium (Be)	Bismuth (Bi)
MB1-PW-9.25'-10.75'	<0.02	0.01	0.0025	<0.02	0.0086	<0.001	<0.0003
MB1-PW-18.75'-20.25'	<0.02	0.006	0.0064	<0.02	0.0169	<0.001	<0.0003
MB1-PW-32.5'-34'	--	--	--	--	--	--	--
MB1-PW-39.25'-40.75'	<0.02	0.008	0.0059	<0.02	0.0311	<0.001	<0.0003
MB1-PW-46.5'-48'	<0.02	0.016	0.0421	0.03	0.0381	<0.001	<0.0003
MB2-PW-9.25'-10.75'	<0.02	0.002	0.0027	<0.02	0.0101	<0.001	<0.0003
MB2-PW-19.25'-20.75'	<0.02	0.002	0.0029	<0.02	0.0156	<0.001	<0.0003
MB2-PW-29.5'-31'	<0.02	0.004	0.0049	<0.02	0.0257	<0.001	<0.0003
MB2-PW-38.5'-40'	<0.02	0.009	0.0089	<0.02	0.0386	<0.001	<0.0003
MB2-PW-42.5'-44'	<0.02	0.015	0.0241	<0.02	0.0543	<0.001	<0.0003
MB2-PW-49.5'-52'	0.15	0.023	0.0201	0.19	0.0575	<0.001	<0.0003
MB2-PW-52'-60'	0.04	0.003	0.0177	0.17	0.0672	<0.001	<0.0003
MB3-PW-4.75'-6.25'	0.22	0.002	0.0035	<0.02	0.0155	<0.001	<0.0003
MB3-PW-9.5'-11'	0.72	<0.001	0.0068	<0.02	0.0276	<0.001	<0.0003
MB3-PW-15.25'-16.75'	0.05	0.002	0.0063	<0.02	0.0626	<0.001	<0.0003
MB3-PW-19.25'-20.75'	<0.02	0.003	0.0054	<0.02	0.019	<0.001	<0.0003
MB3-PW-24.5'-26'	<0.02	0.005	0.0056	<0.02	0.0185	<0.001	<0.0003
MB3-PW-28.25'-29.75'	<0.02	<0.001	0.0049	<0.02	0.0167	<0.001	<0.0003
MB3-PW-34.25'-35.75'	<0.02	0.003	0.0059	<0.02	0.0082	<0.001	<0.0003
MB3-PW-40'-41.5'	<0.02	0.004	0.0046	<0.02	0.0097	<0.001	<0.0003
MB3-PW-42.5'-44'	<0.02	0.005	0.0079	<0.02	0.0181	<0.001	<0.0003
MB3-PW-46.5'-48'	<0.02	0.011	0.0158	0.04	0.0219	<0.001	<0.0003
MB3-PW-48'-52'	0.09	0.017	0.029	0.16	0.129	<0.001	<0.0003

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

-- Indicates that not enough porewater was extracted from the core for analysis.

Porewater samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match".

All analytical is reported as dissolved mg/L; exceptions include pH, Eh, conductivity (µS/cm @ 25ºC), and temp (ºC).

Appendix C: Porewater concentration analytical and field data *(Page 2 of 8)*

	Calcium (Ca)	Cadmium (Cd)	Cesium (Cs)	Chloride (Cl)	Chromium (Cr)	Cobalt (Co)	Copper (Cu)
MB1-PW-9.25'-10.75'	243	0.0004	3130	26	<0.001	0.0003	<0.0004
MB1-PW-18.75'-20.25'	231	0.0004	3040	37	<0.001	0.002	0.0053
MB1-PW-32.5'-34'	--	--	--	--	--	--	--
MB1-PW-39.25'-40.75'	265	0.0002	1930	19	<0.001	0.0032	0.0101
MB1-PW-46.5'-48'	269	0.0002	1300	16	<0.001	0.0258	0.0014
MB2-PW-9.25'-10.75'	230	0.0002	3150	17	<0.001	<0.0002	<0.0004
MB2-PW-19.25'-20.75'	215	0.0002	3200	26	<0.001	<0.0002	0.0019
MB2-PW-29.5'-31'	244	0.0004	2820	35	<0.001	0.0012	<0.0004
MB2-PW-38.5'-40'	208	0.0006	3210	--	<0.001	0.0015	0.0118
MB2-PW-42.5'-44'	213	<0.0002	2860	18	<0.001	0.0028	<0.0004
MB2-PW-49.5'-52'	7.23	0.0008	1.92	10	0.001	<0.0002	0.0087
MB2-PW-52'-60'	267	<0.0002	11.1	19	0.001	0.0189	<0.0004
MB3-PW-4.75'-6.25'	229	<0.0002	4060	--	<0.001	<0.0002	0.0008
MB3-PW-9.5'-11'	234	<0.0002	3730	18	<0.001	<0.0002	<0.0004
MB3-PW-15.25'-16.75'	238	<0.0002	3380	20	<0.001	<0.0002	<0.0004
MB3-PW-19.25'-20.75'	236	<0.0002	2700	--	<0.001	0.0009	0.0055
MB3-PW-24.5'-26'	238	0.0002	2790	17	<0.001	0.0024	0.0006
MB3-PW-28.25'-29.75'	212	0.0002	4190	10	<0.001	0.0013	0.0029
MB3-PW-34.25'-35.75'	201	<0.0002	4180	11	<0.001	0.0014	<0.0004
MB3-PW-40'-41.5'	199	0.0002	4280	18	<0.001	0.0007	<0.0004
MB3-PW-42.5'-44'	197	0.0003	2840	17	<0.001	0.0025	0.0017
MB3-PW-46.5'-48'	178	0.0003	2010	15	<0.001	0.0034	0.0038
MB3-PW-48'-52'	320	0.0006	566	16	<0.001	0.003	0.0004

Dark grey shading and white font indicates RESIDUE

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-- Indicates that not enough porewater was extracted from the core for analysis.

Porewater samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match".

All analytical is reported as dissolved mg/L; exceptions include pH, Eh, conductivity (µS/cm @ 25ºC), and temp (ºC).

Appendix C: Porewater concentration analytical and field data *(Page 3 of 8)*

	Fluoride (F)	Iron (Fe)	Lead (Pb)	Lithium (Li)	Magnesium (Mg)	Manganese (Mn)	Mercury (Hg)
MB1-PW-9.25'-10.75'	0.5	<0.01	0.0002	17.4	69.2	0.556	0.0004
MB1-PW-18.75'-20.25'	1	<0.01	0.0001	23.7	602	2.34	<0.0002
MB1-PW-32.5'-34'	--	--	--	--	--	--	--
MB1-PW-39.25'-40.75'	1.1	<0.01	0.0005	9.9	176	2.36	<0.0002
MB1-PW-46.5'-48'	0.4	18.3	0.0001	8.41	162	9.23	<0.0002
MB2-PW-9.25'-10.75'	0.4	<0.01	0.0001	10.8	51.6	0.159	<0.0002
MB2-PW-19.25'-20.75'	0.6	<0.01	<0.0001	7.58	122	0.0694	<0.0002
MB2-PW-29.5'-31'	0.5	0.22	<0.0001	27.3	120	2.25	<0.0002
MB2-PW-38.5'-40'	--	<0.01	0.0003	20.2	173	0.761	0.0048
MB2-PW-42.5'-44'	1.7	0.55	0.0002	22.8	142	1.05	0.0002
MB2-PW-49.5'-52'	1.8	0.08	0.0002	34.4	0.8	0.0896	<0.0002
MB2-PW-52'-60'	0.6	25.4	0.0001	--	30.1	2.11	<0.0002
MB3-PW-4.75'-6.25'	--	<0.01	<0.0001	5.74	31.6	0.0238	<0.0002
MB3-PW-9.5'-11'	0.3	<0.01	<0.0001	3.49	1.38	0.0008	<0.0002
MB3-PW-15.25'-16.75'	0.5	<0.01	0.0001	6.12	26.2	0.135	<0.0002
MB3-PW-19.25'-20.75'	--	<0.01	0.0002	42.3	44.5	1.93	<0.0002
MB3-PW-24.5'-26'	0.2	0.77	<0.0001	31.6	141	3.59	<0.0002
MB3-PW-28.25'-29.75'	0.4	0.04	0.0012	17.5	128	3.56	<0.0002
MB3-PW-34.25'-35.75'	0.4	0.42	<0.0001	28.8	234	4.58	<0.0002
MB3-PW-40'-41.5'	0.5	0.24	0.0001	27.9	904	2.63	<0.0002
MB3-PW-42.5'-44'	0.5	0.64	<0.0001	14.9	182	1.96	<0.0002
MB3-PW-46.5'-48'	0.7	0.95	<0.0001	6.91	125	2.97	<0.0002
MB3-PW-48'-52'	0.6	1.89	<0.0001	10.9	82.3	3.3	<0.0002

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All analytical is reported as dissolved mg/L; exceptions include pH, Eh, conductivity (µS/cm @ 25ºC), and temp (ºC).

Appendix C: Porewater concentration analytical and field data *(Page 4 of 8)*

	Molybdenum (Mo)	Nickel (Ni)	Phosphorus (P)	Potassium (K)	Rubidium (Rb)	Selenium (Se)	Silicon (Si)
MB1-PW-9.25'-10.75'	0.219	0.0166	<0.02	<0.05	24	0.002	6.9
MB1-PW-18.75'-20.25'	0.129	0.0787	<0.02	<0.05	18.7	0.003	5.7
MB1-PW-32.5'-34'	--	--	--	--	--	--	--
MB1-PW-39.25'-40.75'	0.0753	0.371	<0.02	19.6	28.9	0.002	0.8
MB1-PW-46.5'-48'	0.043	0.741	<0.02	33.6	22.1	0.003	3.2
MB2-PW-9.25'-10.75'	0.0952	0.0049	<0.02	<0.05	40.2	0.002	7.3
MB2-PW-19.25'-20.75'	0.0748	0.0055	<0.02	<0.05	32.1	0.002	5.8
MB2-PW-29.5'-31'	0.104	0.0252	<0.02	0.09	39	0.002	4.3
MB2-PW-38.5'-40'	0.201	0.0983	<0.02	9.12	67.3	0.002	1.5
MB2-PW-42.5'-44'	0.0654	0.264	<0.02	10.2	52.6	0.001	0.9
MB2-PW-49.5'-52'	0.324	0.0141	0.25	34.6	2.83	<0.001	2.4
MB2-PW-52'-60'	0.0543	0.213	<0.02	56.2	4.26	0.002	4.1
MB3-PW-4.75'-6.25'	0.039	0.002	<0.02	0.54	61.3	0.003	1.6
MB3-PW-9.5'-11'	0.0726	0.0012	<0.02	1.06	75.4	0.003	3.7
MB3-PW-15.25'-16.75'	0.0489	0.0045	<0.02	<0.05	49.1	0.002	4.7
MB3-PW-19.25'-20.75'	0.0305	0.0381	<0.02	<0.05	29.8	0.002	6.7
MB3-PW-24.5'-26'	0.0615	0.134	<0.02	<0.05	19.9	0.002	5.7
MB3-PW-28.25'-29.75'	0.0122	0.0408	<0.02	<0.05	36.8	0.002	4.3
MB3-PW-34.25'-35.75'	0.0252	0.109	<0.02	<0.05	36.8	0.002	4.9
MB3-PW-40'-41.5'	0.0874	0.0477	<0.02	<0.05	36.6	0.002	4.4
MB3-PW-42.5'-44'	0.0942	0.111	<0.02	3.03	28.1	0.002	1.4
MB3-PW-46.5'-48'	0.0824	0.287	<0.02	25.5	22.3	0.002	1.2
MB3-PW-48'-52'	0.215	0.0972	<0.02	106	28.6	0.002	2.3

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Appendix C: Porewater concentration analytical and field data *(Page 5 of 8)*

	Silver (Ag)	Sodium (Na)	Strontium (Sr)	Sulfur (S)	Sulphate (SO4)	Tantalum (Ta)	Tellurium (Te)
MB1-PW-9.25'-10.75'	<0.0005	122	0.0257	1030	2980	<1	0.001
MB1-PW-18.75'-20.25'	<0.0005	69.3	0.0216	1620	4440	<1	0.0011
MB1-PW-32.5'-34'	--	--	--	--	--	--	--
MB1-PW-39.25'-40.75'	<0.0005	123	0.26	1070	3400	<1	0.0012
MB1-PW-46.5'-48'	<0.0005	133	0.56	1010	3120	<1	0.0012
MB2-PW-9.25'-10.75'	<0.0005	159	0.0379	1120	3210	<1	0.0015
MB2-PW-19.25'-20.75'	<0.0005	114	0.0493	1310	3600	<1	0.0015
MB2-PW-29.5'-31'	<0.0005	105	0.0844	1160	3340	<1	0.0016
MB2-PW-38.5'-40'	<0.0005	110	0.146	1200	--	<1	0.0023
MB2-PW-42.5'-44'	<0.0005	128	0.14	1130	3270	<1	0.0019
MB2-PW-49.5'-52'	<0.0005	166	0.0435	11.7	100	<1	<0.0005
MB2-PW-52'-60'	<0.0005	121	1.5	427	1230	<1	<0.0005
MB3-PW-4.75'-6.25'	<0.0005	158	0.0511	1010	--	<1	0.0017
MB3-PW-9.5'-11'	<0.0005	156	0.0698	930	2460	<1	0.0019
MB3-PW-15.25'-16.75'	<0.0005	131	0.0405	900	2520	<1	0.0014
MB3-PW-19.25'-20.75'	<0.0005	93.8	0.107	852	--	<1	0.0009
MB3-PW-24.5'-26'	<0.0005	51.6	0.0875	963	2680	<1	0.001
MB3-PW-28.25'-29.75'	<0.0005	62.8	0.154	1080	3230	<1	0.0013
MB3-PW-34.25'-35.75'	<0.0005	93.8	0.0735	1440	4040	<1	0.001
MB3-PW-40'-41.5'	<0.0005	118	0.0947	1890	4590	<1	0.001
MB3-PW-42.5'-44'	<0.0005	115	0.123	1360	3740	<1	0.0012
MB3-PW-46.5'-48'	<0.0005	110	0.335	933	2570	<1	0.001
MB3-PW-48'-52'	<0.0005	129	0.8	809	2180	<1	0.0011

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Appendix C: Porewater concentration analytical and field data *(Page 6 of 8)*

	Thallium (Tl)	Tin (Sn)	Titanium (Ti)	Tungsten (W)	Uranium (U)	Vanadium (V)	Zinc (Zn)
MB1-PW-9.25'-10.75'	0.132	<0.0003	<0.0005	0.0002	0.0006	<0.001	<0.005
MB1-PW-18.75'-20.25'	0.0886	0.0006	0.0014	<0.0002	0.0013	<0.001	0.014
MB1-PW-32.5'-34'	--	--	--	--	--	--	--
MB1-PW-39.25'-40.75'	0.0011	0.0058	0.0037	0.0003	0.0437	<0.001	0.01
MB1-PW-46.5'-48'	0.0068	<0.0003	0.0037	0.0003	0.0084	<0.001	0.036
MB2-PW-9.25'-10.75'	0.16	<0.0003	0.0029	<0.0002	0.0006	<0.001	<0.005
MB2-PW-19.25'-20.75'	0.137	0.0028	0.0057	0.0003	0.0003	<0.001	<0.005
MB2-PW-29.5'-31'	0.0506	0.0004	0.0062	<0.0002	0.0079	<0.001	0.009
MB2-PW-38.5'-40'	0.0071	0.0008	0.0078	0.0008	0.0299	<0.001	0.054
MB2-PW-42.5'-44'	0.0011	0.0017	0.0085	0.0007	0.0294	<0.001	0.007
MB2-PW-49.5'-52'	0.0009	0.0017	<0.0005	0.0065	0.0089	0.001	<0.005
MB2-PW-52'-60'	0.0014	0.0003	0.0047	0.0003	0.0116	<0.001	0.089
MB3-PW-4.75'-6.25'	0.13	0.0055	0.006	0.0002	0.0009	<0.001	<0.005
MB3-PW-9.5'-11'	0.0663	0.0031	0.0061	0.0004	<0.0001	<0.001	<0.005
MB3-PW-15.25'-16.75'	0.0721	0.0012	0.0065	0.0003	0.0002	<0.001	0.022
MB3-PW-19.25'-20.75'	0.143	<0.0003	0.0069	<0.0002	0.0023	<0.001	0.012
MB3-PW-24.5'-26'	0.0687	0.0004	0.0076	0.0002	0.0018	<0.001	0.01
MB3-PW-28.25'-29.75'	0.0888	<0.0003	0.0076	<0.0002	0.0005	<0.001	0.008
MB3-PW-34.25'-35.75'	0.0697	<0.0003	0.0098	<0.0002	0.0016	<0.001	0.005
MB3-PW-40'-41.5'	0.0026	<0.0003	0.0126	0.0002	0.0021	<0.001	<0.005
MB3-PW-42.5'-44'	0.0119	0.0008	0.0108	0.0008	0.0248	<0.001	0.009
MB3-PW-46.5'-48'	0.0051	0.0008	0.0093	<0.0002	0.103	<0.001	0.011
MB3-PW-48'-52'	0.0041	<0.0003	0.01	0.0004	0.0906	<0.001	0.024

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Appendix C: Porewater concentration analytical and field data *(Page 7 of 8)*

	Zirconium (Zr)	Hardness (as CaCO3)	TDS (lab)	TDS (field)	pH (lab)	pH (field)	Eh
MB1-PW-9.25'-10.75'	<0.0004	892	--	4650	--	6.80	274
MB1-PW-18.75'-20.25'	<0.0004	3050	--	6060	--	7.33	255
MB1-PW-32.5'-34'	--	--	--	--	--	--	--
MB1-PW-39.25'-40.75'	<0.0004	1380	--	4520	--	7.21	315
MB1-PW-46.5'-48'	<0.0004	1340	--	3900	6.71	7.11	188
MB2-PW-9.25'-10.75'	<0.0004	787	--	4830	--	7.16	285
MB2-PW-19.25'-20.75'	<0.0004	1040	--	5230	--	7.20	331
MB2-PW-29.5'-31'	<0.0004	1100	--	4960	--	7.18	212
MB2-PW-38.5'-40'	<0.0004	1230	--	4980	--	7.31	322
MB2-PW-42.5'-44'	<0.0004	1120	--	4660	7.21	7.25	-336
MB2-PW-49.5'-52'	<0.0004	21.3	--	660	--	7.55	345
MB2-PW-52'-60'	<0.0004	791	2100	1860	7.07	7.34	182
MB3-PW-4.75'-6.25'	<0.0004	701	--	4520	--	7.39	300
MB3-PW-9.5'-11'	<0.0004	589	--	4010	8.47	7.92	272
MB3-PW-15.25'-16.75'	<0.0004	703	--	3950	--	7.78	376
MB3-PW-19.25'-20.75'	<0.0004	773	--	3760	--	7.15	377
MB3-PW-24.5'-26'	<0.0004	1170	--	4020	7.92	7.83	328
MB3-PW-28.25'-29.75'	<0.0004	1060	--	4790	--	7.14	294
MB3-PW-34.25'-35.75'	<0.0004	1470	--	5720	7.8	7.58	268
MB3-PW-40'-41.5'	<0.0004	4220	9900	6780	7.79	7.70	210
MB3-PW-42.5'-44'	<0.0004	1240	--	5460	--	7.32	196
MB3-PW-46.5'-48'	<0.0004	960	--	3840	--	6.94	288
MB3-PW-48'-52'	<0.0004	1140	--	3140	--	7.27	204

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Appendix C: Porewater concentration analytical and field data *(Page 8 of 8)*

	Conductivity	Temperature
MB1-PW-9.25'-10.75'	5590	17.3
MB1-PW-18.75'-20.25'	7140	16.1
MB1-PW-32.5'-34'	--	--
MB1-PW-39.25'-40.75'	5470	18.5
MB1-PW-46.5'-48'	4790	18.5
MB2-PW-9.25'-10.75'	5810	17.3
MB2-PW-19.25'-20.75'	6250	18.3
MB2-PW-29.5'-31'	5970	18.6
MB2-PW-38.5'-40'	5990	20.9
MB2-PW-42.5'-44'	5630	18.2
MB2-PW-49.5'-52'	920	18.6
MB2-PW-52'-60'	2430	17.9
MB3-PW-4.75'-6.25'	5470	18.0
MB3-PW-9.5'-11'	4890	16.7
MB3-PW-15.25'-16.75'	4840	17.7
MB3-PW-19.25'-20.75'	4630	18.2
MB3-PW-24.5'-26'	4910	17.7
MB3-PW-28.25'-29.75'	5750	16.9
MB3-PW-34.25'-35.75'	6760	17.2
MB3-PW-40'-41.5'	7660	17.4
MB3-PW-42.5'-44'	6490	17.2
MB3-PW-46.5'-48'	4720	17.6
MB3-PW-48'-52'	3930	18.2

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Appendix D

WATEQ4F modeling results: saturation indices

Appendix D: WATEQ4F modeling results: saturation indices *(Page 1 of 3)*

Phase: Formula:	$Al(OH)_3$ $Al(OH)_3$	Alunite $KAl_3(SO_4)_2(OH)_6$	Anhydrite $CaSO_4$	Barite $BaSO_4$	Basaluminite $Al_4(SO_4)(OH)_{10}\,5(H_2O)$	Boehmite $\gamma AlO(OH)$	Celestite $SrSO_4$
MB1-PW-9.25'-10.75'	-1.4	-0.5	-0.5	0.3	1.4	0.8	-2.5
MB1-PW-18.75'-20.25'	-1.7	-2.7	-0.5	0.6	-0.4	0.5	-2.6
MB1-PW-39.25'-40.75'	-1.7	0.4	-0.4	0.8	-0.7	0.5	-1.5
MB1-PW-46.5'-48'	-1.4	2.9	-0.4	0.9	1.3	0.8	-1.2
MB2-PW-9.25'-10.75'	-1.5	-1.9	-0.5	0.4	0.1	0.6	-2.3
MB2-PW-19.25'-20.75'	-1.6	-2.3	-0.5	0.6	-0.5	0.6	-2.2
MB2-PW-29.5'-31'	-1.6	-1.8	-0.5	0.8	-0.6	0.6	-2.0
MB2-PW-38.5'-40'	-1.8	-1.0	-0.6	0.9	-2.3	0.4	-1.8
MB2-PW-42.5'-44'	-1.7	0.0	-0.5	1.1	-0.7	0.5	-1.8
MB2-PW-49.5'-52'	-0.7	0.0	-2.8	0.3	1.0	1.4	--
MB2-PW-52'-60'	-0.9	2.9	-0.6	1.0	2.4	1.3	-0.9
MB3-PW-4.75'-6.25'	-0.4	1.9	-0.5	0.5	--	1.7	-2.2
MB3-PW-9.5'-11'	-0.9	-2.5	-0.5	0.8	0.0	1.2	-2.1
MB3-PW-15.25'-16.75'	-1.5	--	-0.5	1.1	-0.9	0.7	-2.3
MB3-PW-19.25'-20.75'	-1.6	-2.1	-0.5	0.6	-0.2	0.6	-1.9
MB3-PW-24.5'-26'	-2.3	--	-0.5	0.6	--	-0.1	-2.0
MB3-PW-28.25'-29.75'	-1.5	-1.8	-0.5	0.6	0.4	0.7	-1.7
MB3-PW-34.25'-35.75'	-2.2	--	-0.5	0.3	--	0.0	-2.0
MB3-PW-40'-41.5'	-2.2	--	-0.6	0.3	--	0.0	-2.0
MB3-PW-42.5'-44'	-1.7	-0.7	-0.5	0.6	-0.7	0.5	-1.8
MB3-PW-46.5'-48'	-1.4	1.8	-0.6	0.7	0.8	0.7	-1.4
MB3-PW-48'-52'	-0.7	--	-0.4	1.4	2.8	1.5	-1.1

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-- Indicates that SI value calculated by WATEQ4F was greater that 3.0 or less than -3.0

+ SI = Porewater is oversaturated with respect to the mineral

0 SI = Porewater is saturated with respect to the mineral

- SI = Porewater is undersaturated with respect to the mineral

Appendix D: WATEQ4F modeling results: saturation indices *(Page 2 of 3)*

Phase:	Cerargyrite	$Cu(OH)_2$	Diaspore	Epsomite	Fluorite	Gibbsite	Gypsum
Formula:	AgCl	$Cu(OH)_2$	αAlO(OH)	$MgSO_4\ 7H_2O$	CaF_2	$Al(OH)_3$	$CaSO_4\ 2H_2O$
MB1-PW-9.25'-10.75'	-2.7	--	2.6	-3.0	-1.6	1.4	-0.2
MB1-PW-18.75'-20.25'	-2.6	-2.6	2.3	-2.0	-1.2	1.1	-0.3
MB1-PW-39.25'-40.75'	-2.8	-2.3	2.3	-2.6	-0.9	1.1	-0.2
MB1-PW-46.5'-48'	-2.8	--	2.6	-2.6	-1.8	1.4	-0.2
MB2-PW-9.25'-10.75'	-2.8	--	2.4		-1.8	1.2	-0.2
MB2-PW-19.25'-20.75'	-2.7	--	2.3	-2.7	-1.5	1.1	-0.3
MB2-PW-29.5'-31'	-2.7	--	2.3	-2.7	-1.6	1.1	-0.2
MB2-PW-38.5'-40'	-2.8	-2.0	2.1	-2.6	-1.7	0.9	-0.3
MB2-PW-42.5'-44'	-2.8	--	2.3	-2.6	-0.6	1.1	-0.3
MB2-PW-49.5'-52'	-2.8	-2.1	--	--	-1.4	2.0	-2.5
MB2-PW-52'-60'	-2.7	--	--	--	-1.1	1.9	-0.3
MB3-PW-4.75'-6.25'	-2.7	--	--	--	-1.6	2.3	-0.3
MB3-PW-9.5'-11'	-2.7	--	--	--	-1.9	1.8	-0.3
MB3-PW-15.25'-16.75'	-2.7	--	2.5	--	-1.5	1.3	-0.3
MB3-PW-19.25'-20.75'	-2.7	-2.6	2.4	--	-1.6	1.2	-0.2
MB3-PW-24.5'-26'	-2.8	--	1.7	-2.7	-2.4	0.5	-0.3
MB3-PW-28.25'-29.75'	-2.9	-3.0	2.4	-2.7	-1.8	1.3	-0.3
MB3-PW-34.25'-35.75'	-2.9	--	1.8	-2.4	-2.0	0.6	-0.3
MB3-PW-40'-41.5'	-2.8	--	1.8	-1.9	-2.0	0.6	-0.4
MB3-PW-42.5'-44'	-2.8	--	2.3	-2.5	-1.7	1.1	-0.3
MB3-PW-46.5'-48'	-2.8	--	2.5	-2.7	-1.4	1.3	-0.4
MB3-PW-48'-52'	-2.8	--	--	-2.9	-1.2	2.0	-0.2

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

-- Indicates that SI value calculated by WATEQ4F was greater that 3.0 or less than -3.0

+ SI = Porewater is oversaturated with respect to the mineral

0 SI = Porewater is saturated with respect to the mineral

- SI = Porewater is undersaturated with respect to the mineral

Appendix D: WATEQ4F modeling results: saturation indices *(Page 3 of 3)*

Phase:	Jurbanite	Theophrastite	$Pb(OH)_2$	Tenorite	Zincite	$Zn(OH)_2$
Formula:	$Al(SO_4)(OH)\ 5(H_2O)$	$Ni(OH)_2$	$Pb(OH)_2$	CuO	ZnO	$Zn(OH)_2$
MB1-PW-9.25'-10.75'	-2.4	--	--	--	--	--
MB1-PW-18.75'-20.25'	--	-2.0	--	-1.5	--	--
MB1-PW-39.25'-40.75'	--	-1.7	--	-1.3	--	--
MB1-PW-46.5'-48'	-2.3	-2.4	--	-2.8	--	--
MB2-PW-9.25'-10.75'	--	--	--	--	--	--
MB2-PW-19.25'-20.75'	--	--	--	-2.0	--	--
MB2-PW-29.5'-31'	--	-3.0	--	-3.0	--	--
MB2-PW-38.5'-40'	--	-2.3	--	-1.0	--	--
MB2-PW-42.5'-44'	--	-1.9	--	-3.0	--	--
MB2-PW-49.5'-52'	--	-2.0	-2.7	-1.1	--	--
MB2-PW-52'-60'	-2.8	-2.0	--	--	--	--
MB3-PW-4.75'-6.25'	-2.7	--	--	-2.2	--	--
MB3-PW-9.5'-11'	--	-1.5	-2.3	-2.8	-2.9	-2.8
MB3-PW-15.25'-16.75'	--	-2.4	--	-2.7	-2.9	--
MB3-PW-19.25'-20.75'	--	-2.8	--	-1.6	--	--
MB3-PW-24.5'-26'	--	-0.7	--	-2.3	-3.0	--
MB3-PW-28.25'-29.75'	--	-2.7	--	-1.9	--	--
MB3-PW-34.25'-35.75'	--	-1.0	--	-2.8	--	--
MB3-PW-40'-41.5'	--	-1.4	--	-2.7	--	--
MB3-PW-42.5'-44'	--	-2.0	--	-2.0	--	--
MB3-PW-46.5'-48'	-2.8	-2.3	--	-2.0	--	--
MB3-PW-48'-52'	-2.9	-2.1	--	-2.6	--	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

-- Indicates that SI value calculated by WATEQ4F was greater that 3.0 or less than -3.0

+ SI = Porewater is oversaturated with respect to the mineral

0 SI = Porewater is saturated with respect to the mineral

- SI = Porewater is undersaturated with respect to the mineral

Appendix E

Sequential extraction raw analytical data

Appendix E: Sequential extraction raw analytical data *(Page 1 of 30)*

		Ag	Al	As	B	Be	Bi	Ca	Cd
MB1 - SQE/STP 1, 9.25 - 10.75	mg/L	<0.00010	0.058	<0.0010	<0.10	<0.0050	<0.0050	595	<0.00050
MB1 - SQE/STP 2, 9.25 - 10.75	mg/L	<0.0050	31.5	<0.050	<5.0	<0.25	<0.25	1680	<0.025
MB1 - SQE/STP 3, 9.25 - 10.75	mg/L	<0.0010	1020	0.057	<1.0	0.096	<0.050	527	<0.0050
MB1 - SQE/STP 4, 9.25 - 10.75	mg/L	<0.00020	75.1	0.0363	<0.20	<0.010	<0.010	1230	<0.0010
MB1 - SQE/STP 5, 9.25 - 10.75	ppm	0.02	26000	7.4	--	16.25	0.29	36900	<0.02
MB1 - SQE/STP 1, 18.75 - 20.25	mg/L	<0.00010	0.056	0.0021	<0.10	<0.0050	<0.0050	579	<0.00050
MB1 - SQE/STP 2, 18.75 - 20.25	mg/L	<0.0050	82	<0.050	<5.0	<0.25	<0.25	2220	<0.025
MB1 - SQE/STP 3, 18.75 - 20.25	mg/L	<0.0010	785	0.044	<1.0	0.077	<0.050	516	<0.0050
MB1 - SQE/STP 4, 18.75 - 20.25	mg/L	0.00025	67.5	0.0095	<0.20	<0.010	<0.010	1170	<0.0010
MB1 - SQE/STP 5, 18.75 - 20.25	ppm	0.04	34100	2.6	--	12.65	0.19	55400	<0.02
MB1 - SQE/STP 1, 32.5 - 34	mg/L	<0.00010	0.143	0.002	<0.10	<0.0050	<0.0050	13.9	<0.00050
MB1 - SQE/STP 2, 32.5 - 34	mg/L	<0.0050	1.19	<0.050	<5.0	<0.25	<0.25	31.4	<0.025
MB1 - SQE/STP 3, 32.5 - 34	mg/L	0.00035	14.9	0.0675	<0.20	0.056	0.083	42	0.0011
MB1 - SQE/STP 4, 32.5 - 34	mg/L	0.00029	2.04	0.0108	<0.10	0.0072	0.0074	9.3	0.00061
MB1 - SQE/STP 5, 32.5 - 34	ppm	<0.01	61200	4.1	--	152.5	0.52	800	<0.02
MB1 - SQE/STP 1, 39.25 - 40.75	mg/L	<0.00010	0.116	0.002	<0.10	<0.0050	<0.0050	15	<0.00050
MB1 - SQE/STP 2, 39.25 - 40.75	mg/L	<0.0050	1.3	<0.050	<5.0	<0.25	<0.25	10.7	<0.025
MB1 - SQE/STP 3, 39.25 - 40.75	mg/L	<0.0010	20	0.089	<1.0	0.077	<0.050	76	<0.0050
MB1 - SQE/STP 4, 39.25 - 40.75	mg/L	0.00035	2.23	0.0551	<0.10	0.007	0.0069	11.9	0.00208
MB1 - SQE/STP 5, 39.25 - 40.75	ppm	<0.01	68500	6.2	--	241	0.3	900	<0.02

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 2 of 30)*

		Ag	Al	As	B	Be	Bi	Ca	Cd
MB1 - SQE/STP 1, 46.5 - 48	mg/L	<0.00010	0.071	0.005	<0.10	<0.0050	<0.0050	14	<0.00050
MB1 - SQE/STP 2, 46.5 - 48	mg/L	<0.0050	5.31	0.052	<5.0	<0.25	<0.25	24.3	<0.025
MB1 - SQE/STP 3, 46.5 - 48	mg/L	<0.0010	37.9	0.238	<1.0	0.086	0.107	67.2	<0.0050
MB1 - SQE/STP 4, 46.5 - 48	mg/L	0.00016	4.85	0.0971	<0.10	0.0112	0.0228	14.1	0.00804
MB1 - SQE/STP 5, 46.5 - 48	ppm	<0.01	77800	2.2	--	134.5	0.33	700	0.06
MB2 - SQE/STP 1, 9.25 - 10.75	mg/L	<0.00010	0.068	0.0012	<0.10	<0.0050	<0.0050	575	<0.00050
MB2 - SQE/STP 2, 9.25 - 10.75	mg/L	<0.0050	60.6	<0.050	<5.0	<0.25	<0.25	2350	<0.025
MB2 - SQE/STP 3, 9.25 - 10.75	mg/L	<0.0010	1110	0.061	<1.0	0.098	<0.050	580	<0.0050
MB2 - SQE/STP 4, 9.25 - 10.75	mg/L	0.00036	90	0.0101	<0.20	<0.010	<0.010	1150	<0.0010
MB2 - SQE/STP 5, 9.25 - 10.75	ppm	0.01	32300	2.3	--	15.85	0.47	68200	0.03
MB2 - SQE/STP 1, 19.25 - 20.75	mg/L	<0.00010	0.066	0.0013	<0.10	<0.0050	<0.0050	588	<0.00050
MB2 - SQE/STP 2, 19.25 - 20.75	mg/L	<0.0050	63.8	<0.050	<5.0	<0.25	<0.25	2310	<0.025
MB2 - SQE/STP 3, 19.25 - 20.75	mg/L	<0.00050	504	0.0444	<0.50	0.045	<0.025	513	<0.0025
MB2 - SQE/STP 4, 19.25 - 20.75	mg/L	0.00032	42.5	0.0072	<0.20	<0.010	<0.010	1170	<0.0010
MB2 - SQE/STP 5, 19.25 - 20.75	ppm	<0.01	30700	1.1	--	16.2	0.59	99900	<0.02
MB2 - SQE/STP 1, 29.5 - 31	mg/L	<0.00010	0.083	0.0018	<0.10	<0.0050	<0.0050	587	<0.00050
MB2 - SQE/STP 2, 29.5 - 31	mg/L	<0.0050	77.1	<0.050	<5.0	<0.25	<0.25	2170	<0.025
MB2 - SQE/STP 3, 29.5 - 31	mg/L	<0.0010	785	0.049	<1.0	0.068	<0.050	543	<0.0050
MB2 - SQE/STP 4, 29.5 - 31	mg/L	0.0003	56.4	0.0117	<0.10	0.0057	<0.0050	999	0.00062
MB2 - SQE/STP 5, 29.5 - 31	ppm	<0.01	32300	2	--	30.8	0.31	52600	0.03

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 3 of 30)*

		Ag	Al	As	B	Be	Bi	Ca	Cd
MB2 - SQE/STP 1, 38.5 - 40	mg/L	<0.00010	0.108	0.0017	<0.10	<0.0050	<0.0050	15.4	<0.00050
MB2 - SQE/STP 2, 38.5 - 40	mg/L	<0.0050	2.64	<0.050	<5.0	<0.25	<0.25	32.3	<0.025
MB2 - SQE/STP 3, 38.5 - 40	mg/L	0.00054	32.7	0.152	<0.20	0.064	0.382	71.3	0.0016
MB2 - SQE/STP 4, 38.5 - 40	mg/L	0.00031	3.62	0.0189	<0.10	0.0093	0.0228	21.4	0.00229
MB2 - SQE/STP 5, 38.5 - 40	ppm	<0.01	47700	<0.2	--	64.1	0.66	1200	0.04
MB2 - SQE/STP 1, 42.5 - 44	mg/L	<0.00010	0.142	0.0064	<0.10	<0.0050	<0.0050	20.4	<0.00050
MB2 - SQE/STP 2, 42.5 - 44	mg/L	<0.0050	1.54	<0.050	<5.0	<0.25	<0.25	14.4	<0.025
MB2 - SQE/STP 3, 42.5 - 44	mg/L	0.0005	17.9	0.164	<0.20	0.109	0.026	84.2	0.0018
MB2 - SQE/STP 4, 42.5 - 44	mg/L	0.00024	2.38	0.0635	<0.10	0.0126	0.0078	12.8	0.00196
MB2 - SQE/STP 5, 42.5 - 44	ppm	0.04	58900	1.9	--	114	0.53	800	0.06
MB2 - SQE/STP 1, 49.5 - 52	mg/L	<0.00010	0.471	0.0122	<0.10	<0.0050	<0.0050	<0.50	<0.00050
MB2 - SQE/STP 2, 49.5 - 52	mg/L	<0.0050	8.84	<0.050	<5.0	<0.25	<0.25	33.1	<0.025
MB2 - SQE/STP 3, 49.5 - 52	mg/L	0.00059	49.8	0.255	<0.20	0.054	0.38	68.6	0.0023
MB2 - SQE/STP 4, 49.5 - 52	mg/L	0.00045	7.38	0.0534	<0.10	0.009	0.055	18.6	0.00651
MB2 - SQE/STP 5, 49.5 - 52	ppm	<0.01	61300	3.4	--	96.5	0.91	600	0.10
MB2 - SQE/STP 1, 52 - 60	mg/L	<0.00010	0.169	0.0021	<0.10	<0.0050	<0.0050	12	<0.00050
MB2 - SQE/STP 2, 52 - 60	mg/L	<0.0050	5.64	<0.050	<5.0	<0.25	<0.25	34	<0.025
MB2 - SQE/STP 3, 52 - 60	mg/L	0.00064	40.7	0.206	<0.20	0.064	0.196	87.2	0.0016
MB2 - SQE/STP 4, 52 - 60	mg/L	0.00033	6.19	0.048	<0.10	0.0106	0.0305	24.4	0.00454
MB2 - SQE/STP 5, 52 - 60	ppm	<0.01	61100	2.4	--	67.4	1.03	600	0.11

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS
Recieved weight for all Step 5 samples = 0.02 kg
Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 4 of 30)*

		Ag	Al	As	B	Be	Bi	Ca	Cd
MB3 - SQE/STP 1, 4.75 - 6.25	mg/L	<0.00010	0.09	<0.0010	<0.10	<0.0050	<0.0050	611	<0.00050
MB3 - SQE/STP 2, 4.75 - 6.25	mg/L	<0.0050	81.7	<0.050	<5.0	<0.25	<0.25	2210	<0.025
MB3 - SQE/STP 3, 4.75 - 6.25	mg/L	<0.00050	643	0.055	<0.50	0.063	<0.025	454	0.0030
MB3 - SQE/STP 4, 4.75 - 6.25	mg/L	0.00023	29.9	0.0064	<0.20	<0.010	<0.010	1140	<0.0010
MB3 - SQE/STP 5, 4.75 - 6.25	ppm	<0.01	30700	1.5	--	28	1.14	77000	<0.02
MB3 - SQE/STP 1, 9.5 - 11	mg/L	<0.00010	2.84	0.0012	<0.10	<0.0050	<0.0050	586	<0.00050
MB3 - SQE/STP 2, 9.5 - 11	mg/L	<0.0050	165	<0.050	<5.0	<0.25	<0.25	2500	<0.025
MB3 - SQE/STP 3, 9.5 - 11	mg/L	<0.00050	575	0.0565	<0.50	0.054	<0.025	544	<0.0025
MB3 - SQE/STP 4, 9.5 - 11	mg/L	0.00023	44.2	0.0077	<0.20	<0.010	<0.010	1160	<0.0010
MB3 - SQE/STP 5, 9.5 - 11	ppm	<0.01	33200	2.3	--	24.7	0.94	89300	<0.02
MB3 - SQE/STP 1, 15.25 - 16.75	mg/L	<0.00010	0.15	0.001	<0.10	<0.0050	<0.0050	595	<0.00050
MB3 - SQE/STP 2, 15.25 - 16.75	mg/L	<0.0050	99.3	<0.050	<5.0	<0.25	<0.25	2220	<0.025
MB3 - SQE/STP 3, 15.25 - 16.75	mg/L	<0.00050	471	0.0428	<0.50	0.039	<0.025	465	<0.0025
MB3 - SQE/STP 4, 15.25 - 16.75	mg/L	0.00025	28	0.006	<0.20	<0.010	<0.010	1100	<0.0010
MB3 - SQE/STP 5, 15.25 - 16.75	ppm	<0.01	26800	<5	--	18.35	0.31	118500	<0.02
MB3 - SQE/STP 1, 19.25 - 20.75	mg/L	<0.00010	0.07	<0.0010	<0.10	<0.0050	<0.0050	584	<0.00050
MB3 - SQE/STP 2, 19.25 - 20.75	mg/L	<0.0050	66.9	<0.050	<5.0	<0.25	<0.25	2050	<0.025
MB3 - SQE/STP 3, 19.25 - 20.75	mg/L	<0.0010	911	0.059	<1.0	0.092	<0.050	530	<0.0050
MB3 - SQE/STP 4, 19.25 - 20.75	mg/L	0.00028	81	0.0095	<0.20	<0.010	<0.010	1170	<0.0010
MB3 - SQE/STP 5, 19.25 - 20.75	ppm	<0.01	41200	2	--	23.3	1.02	60200	<0.02

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 5 of 30)*

		Ag	Al	As	B	Be	Bi	Ca	Cd
MB3 - SQE/STP 1, 24.5 - 26	mg/L	<0.00010	0.117	0.0016	<0.10	<0.0050	<0.0050	596	<0.00050
MB3 - SQE/STP 2, 24.5 - 26	mg/L	<0.0050	85.7	<0.050	<5.0	<0.25	<0.25	2150	<0.025
MB3 - SQE/STP 3, 24.5 - 26	mg/L	<0.0010	781	0.051	<1.0	0.085	<0.050	500	<0.0050
MB3 - SQE/STP 4, 24.5 - 26	mg/L	0.00025	57.3	0.0082	<0.20	<0.010	<0.010	1150	<0.0010
MB3 - SQE/STP 5, 24.5 - 26	ppm	<0.01	34000	1.6	--	67.3	0.44	62600	<0.02
MB3 - SQE/STP 1, 28.25 - 29.75	mg/L	<0.00010	0.078	0.0018	<0.10	<0.0050	<0.0050	601	<0.00050
MB3 - SQE/STP 2, 28.25 - 29.75	mg/L	<0.0050	46.8	<0.050	<5.0	<0.25	<0.25	2090	<0.025
MB3 - SQE/STP 3, 28.25 - 29.75	mg/L	<0.00050	440	0.0473	<0.50	0.041	<0.025	484	<0.0025
MB3 - SQE/STP 4, 28.25 - 29.75	mg/L	<0.00020	42.7	0.015	<0.20	<0.010	<0.010	1180	<0.0010
MB3 - SQE/STP 5, 28.25 - 29.75	ppm	<0.01	23200	11	--	21.8	0.36	126500	<0.02
MB3 - SQE/STP 1, 34.25 - 35.75	mg/L	<0.00010	0.055	0.0011	<0.10	<0.0050	<0.0050	597	<0.00050
MB3 - SQE/STP 2, 34.25 - 35.75	mg/L	<0.0050	57.1	<0.050	<5.0	<0.25	<0.25	1960	<0.025
MB3 - SQE/STP 3, 34.25 - 35.75	mg/L	<0.0010	716	0.056	<1.0	0.063	<0.050	494	<0.0050
MB3 - SQE/STP 4, 34.25 - 35.75	mg/L	<0.00020	62.2	0.0152	<0.20	<0.010	<0.010	1150	<0.0010
MB3 - SQE/STP 5, 34.25 - 35.75	ppm	<0.01	31500	<5	--	40.0	0.27	120000	<0.02
MB3 - SQE/STP 1, 40 - 41.5	mg/L	<0.00010	0.066	0.002	<0.10	<0.0050	<0.0050	582	<0.00050
MB3 - SQE/STP 2, 40 - 41.5	mg/L	<0.0050	52.5	<0.050	<5.0	<0.25	<0.25	2140	<0.025
MB3 - SQE/STP 3, 40 - 41.5	mg/L	<0.00050	340	0.0638	<0.50	0.037	<0.025	503	<0.0025
MB3 - SQE/STP 4, 40 - 41.5	mg/L	0.0003	32.9	0.0141	<0.20	<0.010	<0.010	1150	<0.0010
MB3 - SQE/STP 5, 40 - 41.5	ppm	<0.01	28300	40	--	46.3	2.27	110000	<0.02

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Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 6 of 30)*

		Ag	Al	As	B	Be	Bi	Ca	Cd
MB3 - SQE/STP 1, 42.5 - 44	mg/L	<0.00010	0.119	0.0023	<0.10	<0.0050	<0.0050	47.8	<0.00050
MB3 - SQE/STP 2, 42.5 - 44	mg/L	<0.0050	10.7	<0.050	<5.0	<0.25	<0.25	64.3	<0.025
MB3 - SQE/STP 3, 42.5 - 44	mg/L	0.00045	39.7	0.249	<0.20	0.045	0.14	50.1	0.0019
MB3 - SQE/STP 4, 42.5 - 44	mg/L	0.00023	5.43	0.0397	<0.10	0.0057	0.0173	16.6	0.00297
MB3 - SQE/STP 5, 42.5 - 44	ppm	<0.01	63700	2	--	196.5	0.48	2100	<0.02
MB3 - SQE/STP 1, 46.5 - 48	mg/L	<0.00010	0.089	0.0026	<0.10	<0.0050	<0.0050	8.32	<0.00050
MB3 - SQE/STP 2, 46.5 - 48	mg/L	<0.0050	3.96	<0.050	<5.0	<0.25	<0.25	19.4	<0.025
MB3 - SQE/STP 3, 46.5 - 48	mg/L	0.00225	45.1	0.345	<0.20	0.096	0.143	93.6	0.0030
MB3 - SQE/STP 4, 46.5 - 48	mg/L	0.00036	5.57	0.0643	<0.10	0.0103	0.0202	12	0.00353
MB3 - SQE/STP 5, 46.5 - 48	ppm	<0.01	75600	2.4	--	156	0.49	1600	0.15
MB3 - SQE/STP 1, 48 - 52	mg/L	<0.00010	0.102	0.0022	<0.10	<0.0050	<0.0050	128	<0.00050
MB3 - SQE/STP 2, 48 - 52	mg/L	<0.0050	4.31	<0.050	<5.0	<0.25	<0.25	37.7	<0.025
MB3 - SQE/STP 3, 48 - 52	mg/L	<0.00020	26.3	0.213	<0.20	0.07	0.06	53.8	0.0013
MB3 - SQE/STP 4, 48 - 52	mg/L	0.00016	2.9	0.0609	<0.10	0.0078	0.0126	10.9	0.00349
MB3 - SQE/STP 5, 48 - 52	ppm	<0.01	76500	2.6	--	189	0.35	800	0.04
Sample Blank (QA/QC RODI)	mg/L	<0.00010	<0.060	<0.0010	<0.10	<0.0050	<0.0050	<0.50	<0.00050

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS
Recieved weight for all Step 5 samples = 0.02 kg
Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 7 of 30)*

		Co	Cr	Cs	Cu	Fe	Hg	K	Mg
MB1 - SQE/STP 1, 9.25 - 10.75	mg/L	<0.0010	<0.0050	410	0.0078	<0.30	<0.00020	<20	6.2
MB1 - SQE/STP 2, 9.25 - 10.75	mg/L	<0.050	<0.25	960	0.074	2.0	<0.00020	<100	8.6
MB1 - SQE/STP 3, 9.25 - 10.75	mg/L	0.025	<0.70	803	0.061	33.0	<0.00020	<20	58.3
MB1 - SQE/STP 4, 9.25 - 10.75	mg/L	0.0026	<0.070	257	0.129	2.16	<0.0010	<20	5.3
MB1 - SQE/STP 5, 9.25 - 10.75	ppm	0.5	29	4080	9.1	1600	0.01	7800	100
MB1 - SQE/STP 1, 18.75 - 20.25	mg/L	<0.0010	<0.0050	401	0.0021	<0.30	<0.00020	<20	23.7
MB1 - SQE/STP 2, 18.75 - 20.25	mg/L	<0.050	<0.25	965	0.164	7.5	<0.00020	<100	17.9
MB1 - SQE/STP 3, 18.75 - 20.25	mg/L	0.016	<0.60	612	0.036	22.0	<0.00020	<20	39.7
MB1 - SQE/STP 4, 18.75 - 20.25	mg/L	<0.0020	<0.060	207	0.177	1.55	<0.0010	<20	3.8
MB1 - SQE/STP 5, 18.75 - 20.25	ppm	0.6	20	3510	6.9	1300	<0.1	6800	100
MB1 - SQE/STP 1, 32.5 - 34	mg/L	<0.0010	<0.0050	38.5	0.0029	<0.30	<0.00020	<20	3.8
MB1 - SQE/STP 2, 32.5 - 34	mg/L	<0.050	<0.25	17.3	1.07	7.5	<0.00020	<100	<5.0
MB1 - SQE/STP 3, 32.5 - 34	mg/L	0.0037	<0.30	9.68	0.503	41.9	<0.00020	<20	1.4
MB1 - SQE/STP 4, 32.5 - 34	mg/L	<0.0010	<0.040	1.58	0.0557	2.96	<0.0010	<20	<1.0
MB1 - SQE/STP 5, 32.5 - 34	ppm	0.5	141	1650	4.0	1900	<0.1	14400	200
MB1 - SQE/STP 1, 39.25 - 40.75	mg/L	<0.0010	<0.0050	46.1	0.0041	<0.30	<0.00020	<20	5.1
MB1 - SQE/STP 2, 39.25 - 40.75	mg/L	<0.050	<0.25	12.0	0.362	6.2	<0.00020	<100	<5.0
MB1 - SQE/STP 3, 39.25 - 40.75	mg/L	<0.010	<0.30	16.3	0.752	27.9	<0.00020	<20	2.0
MB1 - SQE/STP 4, 39.25 - 40.75	mg/L	0.0022	<0.030	2.11	0.208	2.23	<0.0010	<20	<1.0
MB1 - SQE/STP 5, 39.25 - 40.75	ppm	0.7	123	2460	3.4	2300	<0.1	26200	200

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 8 of 30)*

		Co	Cr	Cs	Cu	Fe	Hg	K	Mg
MB1 - SQE/STP 1, 46.5 - 48	mg/L	<0.0010	<0.0050	51.8	0.0016	<0.30	<0.00020	<20	5.5
MB1 - SQE/STP 2, 46.5 - 48	mg/L	<0.050	<0.25	39.7	0.151	17.9	<0.00020	<100	<5.0
MB1 - SQE/STP 3, 46.5 - 48	mg/L	<0.010	<0.70	15.5	0.242	121	<0.00020	<20	2.5
MB1 - SQE/STP 4, 46.5 - 48	mg/L	0.0015	<0.070	2.65	0.0950	7.55	<0.0010	<20	<1.0
MB1 - SQE/STP 5, 46.5 - 48	ppm	0.4	102	5400	2.0	1800	<0.1	30700	200
MB2 - SQE/STP 1, 9.25 - 10.75	mg/L	<0.0010	<0.0050	326	0.0025	<0.30	<0.00020	<20	7.7
MB2 - SQE/STP 2, 9.25 - 10.75	mg/L	<0.050	<0.25	601	0.078	5.6	<0.00020	<100	46.8
MB2 - SQE/STP 3, 9.25 - 10.75	mg/L	0.036	0.784	708	0.074	57.5	<0.00020	<20	56.9
MB2 - SQE/STP 4, 9.25 - 10.75	mg/L	0.0031	<0.080	158	0.107	4.27	<0.0010	<20	5.2
MB2 - SQE/STP 5, 9.25 - 10.75	ppm	0.9	86	4380	7.2	1800	0.02	7900	200
MB2 - SQE/STP 1, 19.25 - 20.75	mg/L	<0.0010	<0.0050	247	0.0023	<0.30	<0.00020	<20	13.9
MB2 - SQE/STP 2, 19.25 - 20.75	mg/L	<0.050	<0.25	390	0.090	6.2	<0.00020	<100	59.2
MB2 - SQE/STP 3, 19.25 - 20.75	mg/L	0.0185	0.390	348	0.0997	35.2	<0.00020	<20	35.9
MB2 - SQE/STP 4, 19.25 - 20.75	mg/L	<0.0020	<0.040	68.6	0.0860	2.46	<0.0010	<20	3.0
MB2 - SQE/STP 5, 19.25 - 20.75	ppm	0.5	90	4330	4.6	1200	0.01	6800	100
MB2 - SQE/STP 1, 29.5 - 31	mg/L	<0.0010	<0.0050	312	0.0032	<0.30	<0.00020	<20	12.6
MB2 - SQE/STP 2, 29.5 - 31	mg/L	<0.050	<0.25	562	0.157	9.9	<0.00020	<100	11.3
MB2 - SQE/STP 3, 29.5 - 31	mg/L	0.018	0.662	456	0.029	49.7	<0.00020	<20	20.7
MB2 - SQE/STP 4, 29.5 - 31	mg/L	0.0030	<0.070	112	0.129	4.05	<0.0010	<20	2.0
MB2 - SQE/STP 5, 29.5 - 31	ppm	0.6	89	4890	5.1	1500	0.01	18400	100

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 9 of 30)*

		Co	Cr	Cs	Cu	Fe	Hg	K	Mg
MB2 - SQE/STP 1, 38.5 - 40	mg/L	<0.0010	<0.0050	106	0.0026	<0.30	<0.00020	<20	6.6
MB2 - SQE/STP 2, 38.5 - 40	mg/L	<0.050	<0.25	64.3	0.401	8.2	<0.00020	<100	<5.0
MB2 - SQE/STP 3, 38.5 - 40	mg/L	0.0081	0.840	18.6	0.382	176	<0.00020	<20	3.3
MB2 - SQE/STP 4, 38.5 - 40	mg/L	<0.0010	<0.080	2.88	0.0633	10.0	<0.0010	<20	<1.0
MB2 - SQE/STP 5, 38.5 - 40	ppm	0.3	88	764	4.1	1200	<0.01	9700	200
MB2 - SQE/STP 1, 42.5 - 44	mg/L	<0.0010	<0.0050	55.1	0.0023	<0.30	<0.00020	<20	3.9
MB2 - SQE/STP 2, 42.5 - 44	mg/L	<0.050	<0.25	14.7	0.253	6.3	<0.00020	<100	<5.0
MB2 - SQE/STP 3, 42.5 - 44	mg/L	0.0032	<0.20	27.1	0.354	25.7	<0.00020	<20	2.0
MB2 - SQE/STP 4, 42.5 - 44	mg/L	0.0012	<0.030	3.41	0.0916	1.92	<0.0010	<20	<1.0
MB2 - SQE/STP 5, 42.5 - 44	ppm	0.3	76	1630	5.6	1500	0.02	18400	300
MB2 - SQE/STP 1, 49.5 - 52	mg/L	<0.0010	<0.0050	0.373	0.0064	<0.30	<0.00020	<20	<1.0
MB2 - SQE/STP 2, 49.5 - 52	mg/L	<0.050	<0.25	0.73	0.265	34.8	<0.00020	<100	<5.0
MB2 - SQE/STP 3, 49.5 - 52	mg/L	0.0164	1.41	2.38	0.319	269	<0.00020	<20	3.8
MB2 - SQE/STP 4, 49.5 - 52	mg/L	0.0027	<0.20	0.688	0.163	18.7	<0.0010	<20	<1.0
MB2 - SQE/STP 5, 49.5 - 52	ppm	0.3	98	748	2.1	1700	<0.01	14600	400
MB2 - SQE/STP 1, 52 - 60	mg/L	<0.0010	<0.0050	0.846	0.0027	<0.30	<0.00020	<20	<1.0
MB2 - SQE/STP 2, 52 - 60	mg/L	<0.050	0.31	4.41	0.133	38.6	<0.00020	<100	<5.0
MB2 - SQE/STP 3, 52 - 60	mg/L	0.0149	1.55	14.9	0.352	299	<0.00020	<20	5.0
MB2 - SQE/STP 4, 52 - 60	mg/L	0.0023	<0.20	4.13	0.202	21.0	<0.0010	<20	<1.0
MB2 - SQE/STP 5, 52 - 60	ppm	0.4	114	4390	2.6	1900	0.02	18500	300

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Light grey shading and black font indicates TAILINGS
Recieved weight for all Step 5 samples = 0.02 kg
Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 10 of 30)*

		Co	Cr	Cs	Cu	Fe	Hg	K	Mg
MB3 - SQE/STP 1, 4.75 - 6.25	mg/L	<0.0010	<0.0050	199	0.0016	<0.30	<0.00020	<20	6.6
MB3 - SQE/STP 2, 4.75 - 6.25	mg/L	<0.050	<0.25	357	0.155	7.8	<0.00020	<100	41.0
MB3 - SQE/STP 3, 4.75 - 6.25	mg/L	0.0217	<0.45	359	0.199	42.1	<0.00020	<20	26.3
MB3 - SQE/STP 4, 4.75 - 6.25	mg/L	<0.0020	<0.030	51.2	0.0720	1.66	<0.0010	<20	1.4
MB3 - SQE/STP 5, 4.75 - 6.25	ppm	0.6	99	4920	4.4	1100	<0.01	10400	100
MB3 - SQE/STP 1, 9.5 - 11	mg/L	<0.0010	<0.0050	200	<0.0010	<0.30	<0.00020	<20	2.0
MB3 - SQE/STP 2, 9.5 - 11	mg/L	<0.050	<0.25	383	0.144	13.1	<0.00020	<100	73.2
MB3 - SQE/STP 3, 9.5 - 11	mg/L	0.0246	<0.40	333	0.159	50.8	<0.00020	<20	40.5
MB3 - SQE/STP 4, 9.5 - 11	mg/L	<0.0020	<0.040	51.8	0.111	3.57	<0.0010	<20	3.4
MB3 - SQE/STP 5, 9.5 - 11	ppm	0.7	92	4420	4.6	1100	0.01	7600	100
MB3 - SQE/STP 1, 15.25 - 16.75	mg/L	<0.0010	<0.0050	211	0.0014	<0.30	<0.00020	<20	8.7
MB3 - SQE/STP 2, 15.25 - 16.75	mg/L	<0.050	<0.25	405	0.094	7.3	<0.00020	<100	50.6
MB3 - SQE/STP 3, 15.25 - 16.75	mg/L	0.0142	<0.40	328	0.0816	26.1	<0.00020	<20	20.4
MB3 - SQE/STP 4, 15.25 - 16.75	mg/L	<0.0020	<0.030	47.5	0.0428	1.09	<0.0010	<20	1.2
MB3 - SQE/STP 5, 15.25 - 16.75	ppm	0.5	61	3640	3.2	800	<0.01	6800	100
MB3 - SQE/STP 1, 19.25 - 20.75	mg/L	<0.0010	<0.0050	227	0.0014	<0.30	<0.00020	<20	5.5
MB3 - SQE/STP 2, 19.25 - 20.75	mg/L	<0.050	<0.25	589	0.064	2.4	<0.00020	<100	<5.0
MB3 - SQE/STP 3, 19.25 - 20.75	mg/L	0.026	<0.70	534	0.104	30.8	<0.00020	<20	31.2
MB3 - SQE/STP 4, 19.25 - 20.75	mg/L	0.0022	<0.080	132	0.0364	2.49	<0.0010	<20	3.0
MB3 - SQE/STP 5, 19.25 - 20.75	ppm	0.7	104	2520	5.1	1700	0.01	9100	100

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 11 of 30)*

		Co	Cr	Cs	Cu	Fe	Hg	K	Mg
MB3 - SQE/STP 1, 24.5 - 26	mg/L	<0.0010	<0.0050	284	0.0021	<0.30	<0.00020	<20	10.4
MB3 - SQE/STP 2, 24.5 - 26	mg/L	<0.050	<0.25	716	0.133	6.2	<0.00020	<100	8.0
MB3 - SQE/STP 3, 24.5 - 26	mg/L	0.018	<0.60	502	0.057	23.1	<0.00020	<20	31.3
MB3 - SQE/STP 4, 24.5 - 26	mg/L	<0.0020	<0.060	134	0.139	1.52	<0.0010	<20	2.6
MB3 - SQE/STP 5, 24.5 - 26	ppm	0.6	90	2070	5.8	1400	0.01	7200	100
MB3 - SQE/STP 1, 28.25 - 29.75	mg/L	<0.0010	<0.0050	228	0.0018	<0.30	<0.00020	<20	7.2
MB3 - SQE/STP 2, 28.25 - 29.75	mg/L	<0.050	<0.25	499	0.077	3.8	<0.00020	<100	<5.0
MB3 - SQE/STP 3, 28.25 - 29.75	mg/L	0.0114	<0.45	280	0.0509	17.8	<0.00020	<20	11.7
MB3 - SQE/STP 4, 28.25 - 29.75	mg/L	0.0038	<0.040	74.2	0.0507	1.41	<0.0010	<20	1.1
MB3 - SQE/STP 5, 28.25 - 29.75	ppm	0.5	64	3320	3.7	800	0.01	5300	<100
MB3 - SQE/STP 1, 34.25 - 35.75	mg/L	<0.0010	<0.0050	262	0.0032	<0.30	<0.00020	<20	14.9
MB3 - SQE/STP 2, 34.25 - 35.75	mg/L	<0.050	<0.25	436	0.071	4.2	<0.00020	<100	5.1
MB3 - SQE/STP 3, 34.25 - 35.75	mg/L	0.012	<0.70	321	0.077	19.5	<0.00020	<20	17.0
MB3 - SQE/STP 4, 34.25 - 35.75	mg/L	0.0023	<0.060	53.7	0.0337	1.55	<0.0010	<20	1.4
MB3 - SQE/STP 5, 34.25 - 35.75	ppm	0.5	48	4490	2.5	800	<0.01	6600	100
MB3 - SQE/STP 1, 40 - 41.5	mg/L	<0.0010	<0.0050	217	0.0026	<0.30	<0.00020	<20	16.7
MB3 - SQE/STP 2, 40 - 41.5	mg/L	<0.050	<0.25	419	0.150	9.3	<0.00020	<100	54.8
MB3 - SQE/STP 3, 40 - 41.5	mg/L	0.0169	<1.0	283	0.0794	43.4	<0.00020	<20	37.2
MB3 - SQE/STP 4, 40 - 41.5	mg/L	0.0022	<0.060	57.4	0.0862	3.21	<0.0010	<20	3.1
MB3 - SQE/STP 5, 40 - 41.5	ppm	0.7	96	3820	3.9	1600	0.01	8500	100

Dark grey shading and white font indicates RESIDUE

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 12 of 30)*

		Co	Cr	Cs	Cu	Fe	Hg	K	Mg
MB3 - SQE/STP 1, 42.5 - 44	mg/L	<0.0010	<0.0050	91.5	0.0031	<0.30	<0.00020	<20	8.2
MB3 - SQE/STP 2, 42.5 - 44	mg/L	<0.050	0.28	63.9	0.343	44.4	<0.00020	<100	<5.0
MB3 - SQE/STP 3, 42.5 - 44	mg/L	0.0136	<1.4	17.4	0.362	215	<0.00020	<20	4.0
MB3 - SQE/STP 4, 42.5 - 44	mg/L	0.0015	<0.10	3.00	0.246	12.8	<0.0010	<20	<1.0
MB3 - SQE/STP 5, 42.5 - 44	ppm	0.3	99	4440	2.0	1600	<0.01	21700	100
MB3 - SQE/STP 1, 46.5 - 48	mg/L	<0.0010	<0.0050	53.2	0.0017	<0.30	<0.00020	<20	3.6
MB3 - SQE/STP 2, 46.5 - 48	mg/L	<0.050	<0.25	32.7	0.146	13.4	<0.00020	<100	<5.0
MB3 - SQE/STP 3, 46.5 - 48	mg/L	0.0104	<1.0	33.6	0.422	197	<0.00020	<20	4.6
MB3 - SQE/STP 4, 46.5 - 48	mg/L	0.0018	<0.080	4.17	0.0785	11.5	<0.0010	<20	<1.0
MB3 - SQE/STP 5, 46.5 - 48	ppm	0.3	61	2050	1.6	1600	0.01	29200	100
MB3 - SQE/STP 1, 48 - 52	mg/L	<0.0010	<0.0050	16.1	0.0027	<0.30	<0.00020	<20	2.1
MB3 - SQE/STP 2, 48 - 52	mg/L	<0.050	<0.25	11.9	0.100	14.2	<0.00020	<100	<5.0
MB3 - SQE/STP 3, 48 - 52	mg/L	0.0060	<0.60	8.54	0.127	88.6	<0.00020	<20	2.2
MB3 - SQE/STP 4, 48 - 52	mg/L	<0.0010	<0.050	1.35	0.0335	5.99	<0.0010	<20	<1.0
MB3 - SQE/STP 5, 48 - 52	ppm	0.4	142	1565	2.2	2300	<0.01	27100	100
Sample Blank (QA/QC RODI)	mg/L	<0.0010	<0.0050	<0.010	<0.0010	<0.30	<0.0010	<20	<1.0

Dark grey shading and white font indicates RESII

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 13 of 30)*

		Mn	Mo	Na	Ni	P	Pb	Rb	S
MB1 - SQE/STP 1, 9.25 - 10.75	mg/L	0.128	0.00796	<20	<0.0050	<3.0	<0.00050	4.13	529
MB1 - SQE/STP 2, 9.25 - 10.75	mg/L	3.75	<0.025	14200	<0.25	<15	<0.025	30.7	1180
MB1 - SQE/STP 3, 9.25 - 10.75	mg/L	10.2	0.0558	1520	0.780	7.9	<0.0050	35.2	283
MB1 - SQE/STP 4, 9.25 - 10.75	mg/L	0.994	0.0065	102	0.074	<3.0	0.0053	12.4	946
MB1 - SQE/STP 5, 9.25 - 10.75	ppm	49	2.90	6200	4.0	1730	2.8	3670	50200
MB1 - SQE/STP 1, 18.75 - 20.25	mg/L	0.351	0.0111	<20	<0.0050	<3.0	<0.00090	3.82	548
MB1 - SQE/STP 2, 18.75 - 20.25	mg/L	4.49	<0.025	19800	0.40	<15	<0.025	32.1	1600
MB1 - SQE/STP 3, 18.75 - 20.25	mg/L	6.53	0.0286	1840	0.637	6.9	<0.0050	27.9	319
MB1 - SQE/STP 4, 18.75 - 20.25	mg/L	0.544	0.0072	137	0.046	<3.0	<0.0010	10.6	905
MB1 - SQE/STP 5, 18.75 - 20.25	ppm	47	2.19	5800	3.6	1820	2.4	3430	62500
MB1 - SQE/STP 1, 32.5 - 34	mg/L	0.0163	0.00367	<20	<0.0050	<3.0	<0.00050	1.02	19.5
MB1 - SQE/STP 2, 32.5 - 34	mg/L	4.28	<0.025	20900	1.72	<15	<0.040	<0.50	<25
MB1 - SQE/STP 3, 32.5 - 34	mg/L	8.59	0.0117	1540	0.648	25.7	0.0692	0.494	<5.0
MB1 - SQE/STP 4, 32.5 - 34	mg/L	0.761	0.00345	63	0.0515	4.4	0.00897	0.064	<5.0
MB1 - SQE/STP 5, 32.5 - 34	ppm	103	0.43	16400	6.2	3470	3.2	2870	900
MB1 - SQE/STP 1, 39.25 - 40.75	mg/L	0.105	0.00560	<20	0.0107	<3.0	<0.00050	0.914	24.8
MB1 - SQE/STP 2, 39.25 - 40.75	mg/L	6.61	<0.025	19800	0.45	<15	<0.025	<0.50	<25
MB1 - SQE/STP 3, 39.25 - 40.75	mg/L	32.2	0.0120	1570	1.89	55.0	0.0813	0.79	<5.0
MB1 - SQE/STP 4, 39.25 - 40.75	mg/L	2.79	0.00137	56	0.130	7.0	0.0176	0.092	<5.0
MB1 - SQE/STP 5, 39.25 - 40.75	ppm	284	0.27	17400	4.6	5200	5.0	6220	100

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 14 of 30)*

		Mn	Mo	Na	Ni	P	Pb	Rb	S
MB1 - SQE/STP 1, 46.5 - 48	mg/L	0.297	0.0175	<20	<0.0050	<3.0	<0.00050	1.07	26.7
MB1 - SQE/STP 2, 46.5 - 48	mg/L	11.0	<0.025	20500	<0.25	<15	<0.10	1.26	<25
MB1 - SQE/STP 3, 46.5 - 48	mg/L	36.4	0.0339	1640	0.304	40.0	0.225	2.17	<5.0
MB1 - SQE/STP 4, 46.5 - 48	mg/L	2.96	0.00600	137	0.0230	8.5	0.0435	0.279	<5.0
MB1 - SQE/STP 5, 46.5 - 48	ppm	332	0.22	19100	2.6	3870	6.2	7800	100
MB2 - SQE/STP 1, 9.25 - 10.75	mg/L	0.101	0.00634	<20	<0.0050	<3.0	<0.00080	5.54	519
MB2 - SQE/STP 2, 9.25 - 10.75	mg/L	5.49	<0.025	19200	<0.25	<15	<0.025	21.8	1490
MB2 - SQE/STP 3, 9.25 - 10.75	mg/L	9.58	0.0512	2080	0.862	10.5	<0.0050	30.6	296
MB2 - SQE/STP 4, 9.25 - 10.75	mg/L	0.955	0.0064	189	0.064	<3.0	<0.0010	7.97	883
MB2 - SQE/STP 5, 9.25 - 10.75	ppm	50	2.28	4800	4.2	1500	2.7	2960	67300
MB2 - SQE/STP 1, 19.25 - 20.75	mg/L	0.0324	0.00280	<20	<0.0050	<3.0	<0.00050	3.44	517
MB2 - SQE/STP 2, 19.25 - 20.75	mg/L	3.52	<0.025	19900	<0.25	<15	<0.025	9.98	1620
MB2 - SQE/STP 3, 19.25 - 20.75	mg/L	4.95	0.0219	1840	0.472	7.4	<0.0025	12.2	329
MB2 - SQE/STP 4, 19.25 - 20.75	mg/L	0.368	0.0026	76	0.025	<3.0	<0.0010	2.43	907
MB2 - SQE/STP 5, 19.25 - 20.75	ppm	41	1.14	3200	3.1	930	2.7	2190	89500
MB2 - SQE/STP 1, 29.5 - 31	mg/L	0.352	0.0146	<20	<0.0050	<3.0	<0.00080	5.83	517
MB2 - SQE/STP 2, 29.5 - 31	mg/L	5.12	<0.025	18100	0.31	<15	<0.025	22.1	1470
MB2 - SQE/STP 3, 29.5 - 31	mg/L	5.29	0.0438	2060	0.613	8.7	<0.0050	20.3	346
MB2 - SQE/STP 4, 29.5 - 31	mg/L	0.501	0.00603	63	0.0467	<3.0	<0.00080	4.48	771
MB2 - SQE/STP 5, 29.5 - 31	ppm	71	1.52	11100	4.9	1540	4.6	4160	51300

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 15 of 30)*

		Mn	Mo	Na	Ni	P	Pb	Rb	S
MB2 - SQE/STP 1, 38.5 - 40	mg/L	0.0208	0.0127	<20	<0.0050	<3.0	<0.00050	2.42	33.6
MB2 - SQE/STP 2, 38.5 - 40	mg/L	6.45	<0.025	19300	<0.25	<15	<0.050	1.28	<25
MB2 - SQE/STP 3, 38.5 - 40	mg/L	10.1	0.0318	1550	0.458	40.7	0.235	1.35	<5.0
MB2 - SQE/STP 4, 38.5 - 40	mg/L	0.958	0.0141	61	0.0346	10.2	0.0199	0.131	<5.0
MB2 - SQE/STP 5, 38.5 - 40	ppm	96	0.41	8600	2.6	5520	4.2	1870	1000
MB2 - SQE/STP 1, 42.5 - 44	mg/L	0.0952	0.00664	<20	0.0057	<3.0	<0.00050	1.27	29.6
MB2 - SQE/STP 2, 42.5 - 44	mg/L	6.29	<0.025	19100	<0.25	<15	<0.025	<0.50	<25
MB2 - SQE/STP 3, 42.5 - 44	mg/L	26.3	0.0072	1820	0.855	55.3	0.0779	1.02	<5.0
MB2 - SQE/STP 4, 42.5 - 44	mg/L	2.35	0.00088	50	0.0733	7.0	0.0746	0.100	<5.0
MB2 - SQE/STP 5, 42.5 - 44	ppm	147	0.44	12300	2.5	4960	5.4	3690	300
MB2 - SQE/STP 1, 49.5 - 52	mg/L	0.0115	0.0236	<20	<0.0050	<3.0	<0.00070	0.131	<5.0
MB2 - SQE/STP 2, 49.5 - 52	mg/L	10.4	<0.025	19100	<0.25	<15	<0.040	1.68	<25
MB2 - SQE/STP 3, 49.5 - 52	mg/L	25.5	0.0337	1910	0.354	25.0	0.311	1.78	<5.0
MB2 - SQE/STP 4, 49.5 - 52	mg/L	2.64	0.0161	73	0.0365	7.9	0.0535	0.231	<5.0
MB2 - SQE/STP 5, 49.5 - 52	ppm	165	0.30	15500	2.7	2040	4.3	3000	200
MB2 - SQE/STP 1, 52 - 60	mg/L	0.0454	0.0170	<20	<0.0050	<3.0	<0.00050	0.332	10.4
MB2 - SQE/STP 2, 52 - 60	mg/L	3.17	<0.025	18600	<0.25	<15	<0.075	1.21	<25
MB2 - SQE/STP 3, 52 - 60	mg/L	23.2	0.0839	1890	0.268	34.3	0.398	2.82	<5.0
MB2 - SQE/STP 4, 52 - 60	mg/L	2.68	0.0177	67	0.0314	9.7	0.0540	0.374	<5.0
MB2 - SQE/STP 5, 52 - 60	ppm	109	1.16	13000	3.6	2500	4.5	3540	100

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 16 of 30)*

		Mn	Mo	Na	Ni	P	Pb	Rb	S
MB3 - SQE/STP 1, 4.75 - 6.25	mg/L	0.0114	0.00344	<20	<0.0050	<3.0	<0.00050	3.84	510
MB3 - SQE/STP 2, 4.75 - 6.25	mg/L	3.35	<0.025	19200	0.27	<15	<0.025	11.5	1530
MB3 - SQE/STP 3, 4.75 - 6.25	mg/L	7.79	0.0307	1700	0.583	8.2	<0.0025	13.9	286
MB3 - SQE/STP 4, 4.75 - 6.25	mg/L	0.365	0.0032	94	0.014	<3.0	<0.0010	2.28	885
MB3 - SQE/STP 5, 4.75 - 6.25	ppm	62	0.94	6100	3.7	890	4.0	2610	68600
MB3 - SQE/STP 1, 9.5 - 11	mg/L	0.00224	0.00673	<20	<0.0050	<3.0	<0.00050	5.03	484
MB3 - SQE/STP 2, 9.5 - 11	mg/L	4.94	<0.025	18900	<0.25	<15	<0.040	11.2	1420
MB3 - SQE/STP 3, 9.5 - 11	mg/L	7.05	0.0321	1760	0.567	8.9	<0.0045	11.2	316
MB3 - SQE/STP 4, 9.5 - 11	mg/L	0.499	0.0041	97	0.029	<3.0	<0.0010	1.82	905
MB3 - SQE/STP 5, 9.5 - 11	ppm	53	1.13	4400	4.1	760	3.5	2170	78500
MB3 - SQE/STP 1, 15.25 - 16.75	mg/L	0.0283	0.00371	<20	<0.0050	<3.0	<0.00050	3.70	504
MB3 - SQE/STP 2, 15.25 - 16.75	mg/L	3.77	<0.025	19300	<0.25	<15	<0.025	11.8	1530
MB3 - SQE/STP 3, 15.25 - 16.75	mg/L	3.63	0.0195	1350	0.336	8.7	<0.0025	10.9	303
MB3 - SQE/STP 4, 15.25 - 16.75	mg/L	0.199	0.0020	79	<0.010	<3.0	<0.0010	1.79	862
MB3 - SQE/STP 5, 15.25 - 16.75	ppm	30	0.70	2700	1.8	710	2.1	1990	10300
MB3 - SQE/STP 1, 19.25 - 20.75	mg/L	0.473	0.00222	<20	<0.0050	<3.0	<0.00050	3.46	497
MB3 - SQE/STP 2, 19.25 - 20.75	mg/L	2.33	<0.025	18600	<0.25	<15	<0.025	24.3	1570
MB3 - SQE/STP 3, 19.25 - 20.75	mg/L	10.2	0.0363	1970	0.736	11.7	<0.0050	29.5	292
MB3 - SQE/STP 4, 19.25 - 20.75	mg/L	0.949	0.0045	181	0.050	<3.0	<0.0010	8.52	896
MB3 - SQE/STP 5, 19.25 - 20.75	ppm	50	1.69	8000	4.7	1360	3.1	3380	61200

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 17 of 30)*

		Mn	Mo	Na	Ni	P	Pb	Rb	S
MB3 - SQE/STP 1, 24.5 - 26	mg/L	0.760	0.0121	<20	<0.0050	<3.0	0.00133	3.86	518
MB3 - SQE/STP 2, 24.5 - 26	mg/L	3.65	<0.025	18900	0.33	<15	<0.025	26.8	1550
MB3 - SQE/STP 3, 24.5 - 26	mg/L	7.64	0.0295	1730	0.848	9.2	<0.0050	26.0	288
MB3 - SQE/STP 4, 24.5 - 26	mg/L	0.562	0.0039	94	0.050	<3.0	<0.0010	8.18	898
MB3 - SQE/STP 5, 24.5 - 26	ppm	47	1.44	6200	3.8	1210	2.5	2930	63500
MB3 - SQE/STP 1, 28.25 - 29.75	mg/L	0.837	0.00368	<20	<0.0050	<3.0	<0.00050	3.68	510
MB3 - SQE/STP 2, 28.25 - 29.75	mg/L	2.41	<0.025	19000	<0.25	<15	<0.025	12.8	1620
MB3 - SQE/STP 3, 28.25 - 29.75	mg/L	3.27	0.0159	1660	0.338	8.8	<0.0025	9.20	340
MB3 - SQE/STP 4, 28.25 - 29.75	mg/L	0.319	0.0035	125	0.043	<3.0	<0.0010	2.48	918
MB3 - SQE/STP 5, 28.25 - 29.75	ppm	38	0.71	2900	2.2	780	2.0	2000	10900
MB3 - SQE/STP 1, 34.25 - 35.75	mg/L	0.711	0.00471	<20	<0.0050	<3.0	<0.00090	4.01	528
MB3 - SQE/STP 2, 34.25 - 35.75	mg/L	1.64	<0.025	18200	<0.25	<15	<0.025	12.8	1550
MB3 - SQE/STP 3, 34.25 - 35.75	mg/L	4.61	0.0176	1920	0.479	12.7	<0.0050	13.7	350
MB3 - SQE/STP 4, 34.25 - 35.75	mg/L	0.395	0.0029	78	0.034	<3.0	<0.0010	2.25	899
MB3 - SQE/STP 5, 34.25 - 35.75	ppm	39	0.38	4300	1.5	610	1.9	2090	10300
MB3 - SQE/STP 1, 40 - 41.5	mg/L	0.557	0.0112	<20	<0.0050	<3.0	<0.00060	2.91	510
MB3 - SQE/STP 2, 40 - 41.5	mg/L	13.2	<0.025	18900	<0.25	<15	<0.025	10.5	1560
MB3 - SQE/STP 3, 40 - 41.5	mg/L	7.20	0.0330	1740	0.702	7.3	<0.0030	9.06	319
MB3 - SQE/STP 4, 40 - 41.5	mg/L	0.536	0.0056	81	0.051	<3.0	0.0011	1.94	901
MB3 - SQE/STP 5, 40 - 41.5	ppm	67	1.17	4900	3.8	850	3.0	2710	95300

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 18 of 30)*

		Mn	Mo	Na	Ni	P	Pb	Rb	S
MB3 - SQE/STP 1, 42.5 - 44	mg/L	0.159	0.0310	<20	<0.0050	<3.0	<0.00050	1.35	59.5
MB3 - SQE/STP 2, 42.5 - 44	mg/L	8.87	<0.025	18600	<0.25	<15	<0.10	1.30	<25
MB3 - SQE/STP 3, 42.5 - 44	mg/L	15.9	0.0539	1870	0.529	26.2	0.192	2.24	<5.0
MB3 - SQE/STP 4, 42.5 - 44	mg/L	1.40	0.0158	54	0.0424	7.5	0.0318	0.271	<5.0
MB3 - SQE/STP 5, 42.5 - 44	ppm	219	0.19	23600	3.1	2980	5.2	5530	1700
MB3 - SQE/STP 1, 46.5 - 48	mg/L	0.278	0.0126	<20	<0.0050	<3.0	<0.00050	0.763	18.9
MB3 - SQE/STP 2, 46.5 - 48	mg/L	11.9	<0.025	18600	<0.25	<15	<0.10	0.85	<25
MB3 - SQE/STP 3, 46.5 - 48	mg/L	81.8	0.0513	1920	0.533	67.7	0.359	3.71	<5.0
MB3 - SQE/STP 4, 46.5 - 48	mg/L	5.63	0.00585	76	0.0391	7.9	0.0473	0.339	<5.0
MB3 - SQE/STP 5, 46.5 - 48	ppm	268	0.43	22900	2.3	2850	5.5	6570	1100
MB3 - SQE/STP 1, 48 - 52	mg/L	0.438	0.0178	<20	<0.0050	<3.0	<0.00050	1.26	111
MB3 - SQE/STP 2, 48 - 52	mg/L	9.70	<0.025	18100	<0.25	<15	<0.050	0.94	<25
MB3 - SQE/STP 3, 48 - 52	mg/L	25.6	0.0457	1660	0.099	36.5	0.0763	1.24	<5.0
MB3 - SQE/STP 4, 48 - 52	mg/L	1.90	0.00523	68	0.0093	6.3	0.0218	0.141	<5.0
MB3 - SQE/STP 5, 48 - 52	ppm	270	0.36	23400	3.4	3280	5.4	6140	200
Sample Blank (QA/QC RODI)	mg/L	<0.00050	<0.00050	<20	<0.0050	<3.0	<0.00050	<0.010	<5.0

Dark grey shading and white font indicates RESIDUE

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 19 of 30)*

		Sb	Se	Si	Sn	Sr	Te	Ti	Tl
MB1 - SQE/STP 1, 9.25 - 10.75	mg/L	0.0195	<0.010	4.49	<0.0010	0.0354	<0.010	<0.10	0.0301
MB1 - SQE/STP 2, 9.25 - 10.75	mg/L	<0.050	<0.50	15.5	<0.050	0.238	<0.50	<0.50	0.462
MB1 - SQE/STP 3, 9.25 - 10.75	mg/L	<0.010	<0.10	173	0.111	0.043	<0.10	0.16	0.713
MB1 - SQE/STP 4, 9.25 - 10.75	mg/L	<0.0020	<0.020	42.1	0.0120	0.0685	<0.020	0.15	0.369
MB1 - SQE/STP 5, 9.25 - 10.75	ppm	1.17	2	--	10.8	93.7	<0.05	80	31.6
MB1 - SQE/STP 1, 18.75 - 20.25	mg/L	0.0021	<0.010	7.06	<0.0010	0.0349	<0.010	<0.10	0.0394
MB1 - SQE/STP 2, 18.75 - 20.25	mg/L	<0.050	<0.50	30.4	<0.050	0.198	<0.50	<0.50	0.587
MB1 - SQE/STP 3, 18.75 - 20.25	mg/L	<0.010	<0.10	147	0.294	0.037	<0.10	0.19	0.598
MB1 - SQE/STP 4, 18.75 - 20.25	mg/L	<0.0020	<0.020	26.3	0.0280	0.0693	<0.020	0.18	0.339
MB1 - SQE/STP 5, 18.75 - 20.25	ppm	1.04	2	--	13.2	89.9	<0.05	70	26.4
MB1 - SQE/STP 1, 32.5 - 34	mg/L	0.0325	<0.010	0.74	<0.0010	0.0222	<0.010	<0.10	0.0041
MB1 - SQE/STP 2, 32.5 - 34	mg/L	<0.050	<0.50	<2.5	<0.050	0.161	<0.50	<0.50	<0.050
MB1 - SQE/STP 3, 32.5 - 34	mg/L	0.0074	<0.020	14.2	0.0386	0.566	<0.020	<0.10	0.0110
MB1 - SQE/STP 4, 32.5 - 34	mg/L	0.0022	<0.010	1.76	0.0163	0.134	<0.010	<0.10	0.0016
MB1 - SQE/STP 5, 32.5 - 34	ppm	1.2	1	--	46.3	19.2	<0.05	70	18.85
MB1 - SQE/STP 1, 39.25 - 40.75	mg/L	0.0013	<0.010	<0.50	<0.0010	0.0175	<0.010	<0.10	0.0018
MB1 - SQE/STP 2, 39.25 - 40.75	mg/L	<0.050	<0.50	<2.5	<0.050	<0.050	<0.50	<0.50	<0.050
MB1 - SQE/STP 3, 39.25 - 40.75	mg/L	<0.010	<0.10	16.0	0.051	0.652	<0.10	<0.10	<0.010
MB1 - SQE/STP 4, 39.25 - 40.75	mg/L	0.0038	<0.010	1.86	0.0093	0.0997	<0.010	<0.10	0.0014
MB1 - SQE/STP 5, 39.25 - 40.75	ppm	1.49	1	--	76.7	20.4	<0.05	140	38.2

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Recieved weight for all Step 5 samples = 0.02 kg
Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 20 of 30)*

		Sb	Se	Si	Sn	Sr	Te	Ti	Tl
MB1 - SQE/STP 1, 46.5 - 48	mg/L	0.0026	<0.010	1.52	<0.0010	0.0149	<0.010	<0.10	0.0019
MB1 - SQE/STP 2, 46.5 - 48	mg/L	<0.050	<0.50	7.6	<0.050	0.111	<0.50	<0.50	<0.050
MB1 - SQE/STP 3, 46.5 - 48	mg/L	<0.010	<0.10	48.5	0.016	0.506	<0.10	<0.10	0.018
MB1 - SQE/STP 4, 46.5 - 48	mg/L	0.0081	<0.010	5.47	0.0036	0.111	<0.010	<0.10	0.0037
MB1 - SQE/STP 5, 46.5 - 48	ppm	1.32	1	--	84.6	15.4	<0.05	110	47.4
MB2 - SQE/STP 1, 9.25 - 10.75	mg/L	0.0017	<0.010	8.84	<0.0010	0.0521	<0.010	<0.10	0.0268
MB2 - SQE/STP 2, 9.25 - 10.75	mg/L	<0.050	<0.50	35.2	<0.050	0.456	<0.50	<0.50	0.293
MB2 - SQE/STP 3, 9.25 - 10.75	mg/L	<0.010	<0.10	162	0.075	0.075	<0.10	0.19	0.587
MB2 - SQE/STP 4, 9.25 - 10.75	mg/L	<0.0020	<0.020	32.4	0.0093	0.110	<0.020	0.18	0.236
MB2 - SQE/STP 5, 9.25 - 10.75	ppm	1.18	2	--	12.9	137.0	<0.05	80	24.2
MB2 - SQE/STP 1, 19.25 - 20.75	mg/L	0.0016	<0.010	6.38	<0.0010	0.0574	<0.010	<0.10	0.0206
MB2 - SQE/STP 2, 19.25 - 20.75	mg/L	<0.050	<0.50	37.4	<0.050	0.344	<0.50	<0.50	0.213
MB2 - SQE/STP 3, 19.25 - 20.75	mg/L	<0.0050	<0.050	126	0.0409	0.0659	<0.050	0.24	0.327
MB2 - SQE/STP 4, 19.25 - 20.75	mg/L	<0.0020	<0.020	20.4	0.0088	0.105	<0.020	0.17	0.0913
MB2 - SQE/STP 5, 19.25 - 20.75	ppm	0.85	1	--	15.3	95.0	<0.05	<50	16.10
MB2 - SQE/STP 1, 29.5 - 31	mg/L	0.004	<0.010	4.79	<0.0010	0.221	<0.010	<0.10	0.0440
MB2 - SQE/STP 2, 29.5 - 31	mg/L	<0.050	<0.50	29.8	<0.050	1.00	<0.50	<0.50	0.408
MB2 - SQE/STP 3, 29.5 - 31	mg/L	<0.010	<0.10	132	0.081	0.242	<0.10	0.20	0.612
MB2 - SQE/STP 4, 29.5 - 31	mg/L	0.0015	<0.010	22.8	0.0096	0.259	<0.010	0.16	0.227
MB2 - SQE/STP 5, 29.5 - 31	ppm	1.19	1	--	17.7	419	<0.05	60	32.4

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 21 of 30)*

		Sb	Se	Si	Sn	Sr	Te	Ti	Tl
MB2 - SQE/STP 1, 38.5 - 40	mg/L	0.0039	<0.010	1.10	<0.0010	0.0231	<0.010	<0.10	<0.0010
MB2 - SQE/STP 2, 38.5 - 40	mg/L	<0.050	<0.50	5.2	<0.050	0.183	<0.50	<0.50	<0.050
MB2 - SQE/STP 3, 38.5 - 40	mg/L	0.0123	<0.020	49.3	0.0175	1.39	<0.020	<0.10	0.0061
MB2 - SQE/STP 4, 38.5 - 40	mg/L	0.0043	<0.010	4.78	0.0015	0.382	<0.010	<0.10	<0.0010
MB2 - SQE/STP 5, 38.5 - 40	ppm	1.26	2	--	49.9	21.0	0.06	70	11.25
MB2 - SQE/STP 1, 42.5 - 44	mg/L	0.0013	<0.010	0.57	<0.0010	0.0193	<0.010	<0.10	0.0018
MB2 - SQE/STP 2, 42.5 - 44	mg/L	<0.050	<0.50	<2.5	<0.050	0.063	<0.50	<0.50	<0.050
MB2 - SQE/STP 3, 42.5 - 44	mg/L	0.006	<0.020	19.4	0.0206	0.894	<0.020	<0.10	0.0097
MB2 - SQE/STP 4, 42.5 - 44	mg/L	0.0035	<0.010	2.10	0.0118	0.109	<0.010	<0.10	0.0013
MB2 - SQE/STP 5, 42.5 - 44	ppm	1.76	1	--	52.3	30.2	<0.05	90	22.0
MB2 - SQE/STP 1, 49.5 - 52	mg/L	0.0037	<0.010	2.22	<0.0010	<0.0010	<0.010	<0.10	<0.0010
MB2 - SQE/STP 2, 49.5 - 52	mg/L	<0.050	<0.50	13.1	<0.050	0.267	<0.50	<0.50	<0.050
MB2 - SQE/STP 3, 49.5 - 52	mg/L	0.0112	<0.020	82.6	0.0122	0.826	<0.020	<0.10	0.0133
MB2 - SQE/STP 4, 49.5 - 52	mg/L	0.0085	<0.010	11.2	0.0026	0.214	<0.010	<0.10	0.0027
MB2 - SQE/STP 5, 49.5 - 52	ppm	1.56	1	--	48.6	10.6	<0.05	80	17.30
MB2 - SQE/STP 1, 52 - 60	mg/L	0.0013	<0.010	1.45	<0.0010	0.0729	<0.010	<0.10	<0.0010
MB2 - SQE/STP 2, 52 - 60	mg/L	<0.050	<0.50	5.9	<0.050	0.375	<0.50	<0.50	<0.050
MB2 - SQE/STP 3, 52 - 60	mg/L	0.0119	<0.020	66.1	0.0068	1.71	<0.020	<0.10	0.0268
MB2 - SQE/STP 4, 52 - 60	mg/L	0.0102	<0.010	8.66	0.0018	0.516	<0.010	<0.10	0.0054
MB2 - SQE/STP 5, 52 - 60	ppm	1.63	1	--	47.5	12.1	<0.05	70	24.4

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 22 of 30)*

		Sb	Se	Si	Sn	Sr	Te	Ti	Tl
MB3 - SQE/STP 1, 4.75 - 6.25	mg/L	0.0014	<0.010	4.53	<0.0010	0.0774	<0.010	<0.10	0.0181
MB3 - SQE/STP 2, 4.75 - 6.25	mg/L	<0.050	<0.50	54.1	<0.050	0.481	<0.50	<0.50	0.214
MB3 - SQE/STP 3, 4.75 - 6.25	mg/L	<0.0050	<0.050	124	0.0784	0.0703	<0.050	0.19	0.373
MB3 - SQE/STP 4, 4.75 - 6.25	mg/L	<0.0020	<0.020	12.6	0.0090	0.147	<0.020	0.16	0.0895
MB3 - SQE/STP 5, 4.75 - 6.25	ppm	1.02	1	--	22.6	90.6	<0.05	<50	18.85
MB3 - SQE/STP 1, 9.5 - 11	mg/L	<0.0010	<0.010	0.56	0.0016	0.0808	<0.010	<0.10	0.0176
MB3 - SQE/STP 2, 9.5 - 11	mg/L	<0.050	<0.50	170	<0.050	0.469	<0.50	<0.50	0.233
MB3 - SQE/STP 3, 9.5 - 11	mg/L	<0.0050	<0.050	145	0.112	0.0750	<0.050	0.33	0.341
MB3 - SQE/STP 4, 9.5 - 11	mg/L	<0.0020	<0.020	21.7	0.0141	0.153	<0.020	0.17	0.0723
MB3 - SQE/STP 5, 9.5 - 11	ppm	0.89	1	--	23.6	99.6	<0.05	<50	16.55
MB3 - SQE/STP 1, 15.25 - 16.75	mg/L	0.0012	<0.010	3.00	<0.0010	0.0511	<0.010	<0.10	0.0224
MB3 - SQE/STP 2, 15.25 - 16.75	mg/L	<0.050	<0.50	58.0	<0.050	0.309	<0.50	<0.50	0.258
MB3 - SQE/STP 3, 15.25 - 16.75	mg/L	<0.0050	<0.050	112	0.0243	0.0521	<0.050	0.25	0.326
MB3 - SQE/STP 4, 15.25 - 16.75	mg/L	<0.0020	<0.020	11.0	0.0092	0.103	<0.020	0.16	0.0690
MB3 - SQE/STP 5, 15.25 - 16.75	ppm	0.77	1	--	11.0	56.5	<0.05	<50	14.85
MB3 - SQE/STP 1, 19.25 - 20.75	mg/L	0.0039	<0.010	7.38	<0.0010	0.158	<0.010	<0.10	0.0309
MB3 - SQE/STP 2, 19.25 - 20.75	mg/L	<0.050	<0.50	20.8	<0.050	0.623	<0.50	<0.50	0.385
MB3 - SQE/STP 3, 19.25 - 20.75	mg/L	<0.010	<0.10	127	0.026	0.161	<0.10	0.18	0.616
MB3 - SQE/STP 4, 19.25 - 20.75	mg/L	<0.0020	<0.020	22.4	0.0070	0.255	<0.020	0.16	0.219
MB3 - SQE/STP 5, 19.25 - 20.75	ppm	1.31	2	--	13.1	334	<0.05	50	24.8

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 23 of 30)*

		Sb	Se	Si	Sn	Sr	Te	Ti	Tl
MB3 - SQE/STP 1, 24.5 - 26	mg/L	0.0046	<0.010	6.69	<0.0010	0.148	<0.010	<0.10	0.0357
MB3 - SQE/STP 2, 24.5 - 26	mg/L	<0.050	<0.50	27.2	<0.050	0.641	<0.50	<0.50	0.427
MB3 - SQE/STP 3, 24.5 - 26	mg/L	<0.010	<0.10	131	0.063	0.158	<0.10	0.16	0.545
MB3 - SQE/STP 4, 24.5 - 26	mg/L	<0.0020	<0.020	23.2	0.0068	0.259	<0.020	0.16	0.226
MB3 - SQE/STP 5, 24.5 - 26	ppm	1.28	2	--	16.0	297	<0.05	50	23.80
MB3 - SQE/STP 1, 28.25 - 29.75	mg/L	0.0031	<0.010	5.51	<0.0010	0.146	<0.010	<0.10	0.0374
MB3 - SQE/STP 2, 28.25 - 29.75	mg/L	<0.050	<0.50	17.8	<0.050	0.536	<0.50	<0.50	0.306
MB3 - SQE/STP 3, 28.25 - 29.75	mg/L	<0.0050	<0.050	105	0.0229	0.147	<0.050	0.18	0.320
MB3 - SQE/STP 4, 28.25 - 29.75	mg/L	<0.0020	<0.020	18.9	0.0059	0.254	<0.020	0.16	0.117
MB3 - SQE/STP 5, 28.25 - 29.75	ppm	0.77	1	--	16.2	200	<0.05	<50	14.20
MB3 - SQE/STP 1, 34.25 - 35.75	mg/L	0.0029	<0.010	5.37	<0.0010	0.115	<0.010	<0.10	0.0353
MB3 - SQE/STP 2, 34.25 - 35.75	mg/L	<0.050	<0.50	17.2	<0.050	0.511	<0.50	<0.50	0.257
MB3 - SQE/STP 3, 34.25 - 35.75	mg/L	<0.010	<0.10	138	0.048	0.105	<0.10	0.14	0.370
MB3 - SQE/STP 4, 34.25 - 35.75	mg/L	<0.0020	<0.020	18.3	0.0103	0.216	<0.020	0.16	0.0802
MB3 - SQE/STP 5, 34.25 - 35.75	ppm	0.78	1	--	14.3	126.5	<0.05	<50	15.20
MB3 - SQE/STP 1, 40 - 41.5	mg/L	0.003	<0.010	6.59	<0.0010	0.150	<0.010	<0.10	0.0226
MB3 - SQE/STP 2, 40 - 41.5	mg/L	<0.050	<0.50	24.1	<0.050	0.626	<0.50	<0.50	0.227
MB3 - SQE/STP 3, 40 - 41.5	mg/L	<0.0050	<0.050	114	0.0790	0.139	<0.050	0.16	0.272
MB3 - SQE/STP 4, 40 - 41.5	mg/L	<0.0020	<0.020	19.8	0.0108	0.245	<0.020	0.18	0.0739
MB3 - SQE/STP 5, 40 - 41.5	ppm	0.91	1	--	23.9	146.5	<0.05	<50	19.05

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 24 of 30)*

		Sb	Se	Si	Sn	Sr	Te	Ti	Tl
MB3 - SQE/STP 1, 42.5 - 44	mg/L	0.002	<0.010	1.67	<0.0010	0.0615	<0.010	<0.10	0.0015
MB3 - SQE/STP 2, 42.5 - 44	mg/L	<0.050	<0.50	11.7	<0.050	0.356	<0.50	<0.50	<0.050
MB3 - SQE/STP 3, 42.5 - 44	mg/L	0.0078	<0.020	60.4	0.0150	0.530	<0.020	<0.10	0.0127
MB3 - SQE/STP 4, 42.5 - 44	mg/L	0.0054	<0.010	6.75	0.0033	0.216	<0.010	<0.10	0.0025
MB3 - SQE/STP 5, 42.5 - 44	ppm	1.3	1	--	63.3	19.9	<0.05	90	32.2
MB3 - SQE/STP 1, 46.5 - 48	mg/L	0.0023	<0.010	1.42	<0.0010	0.0124	<0.010	<0.10	0.0022
MB3 - SQE/STP 2, 46.5 - 48	mg/L	<0.050	<0.50	5.4	<0.050	0.106	<0.50	<0.50	<0.050
MB3 - SQE/STP 3, 46.5 - 48	mg/L	0.0107	<0.020	82.2	0.0146	0.867	<0.020	<0.10	0.0362
MB3 - SQE/STP 4, 46.5 - 48	mg/L	0.0059	<0.010	6.68	0.0047	0.124	<0.010	<0.10	0.0042
MB3 - SQE/STP 5, 46.5 - 48	ppm	1.58	1	--	87.9	20.2	<0.05	120	39.5
MB3 - SQE/STP 1, 48 - 52	mg/L	0.002	<0.010	1.28	<0.0010	0.0921	<0.010	<0.10	0.0026
MB3 - SQE/STP 2, 48 - 52	mg/L	<0.050	<0.50	6.1	<0.050	0.172	<0.50	<0.50	<0.050
MB3 - SQE/STP 3, 48 - 52	mg/L	0.0083	<0.020	33.3	0.0048	0.398	<0.020	<0.10	0.0135
MB3 - SQE/STP 4, 48 - 52	mg/L	0.006	<0.010	4.06	0.0056	0.0831	<0.010	<0.10	0.0022
MB3 - SQE/STP 5, 48 - 52	ppm	1.49	1	--	74.5	19.6	<0.05	120	38.2
Sample Blank (QA/QC RODI)	mg/L	<0.0010	<0.010	<0.50	<0.0010	<0.0010	<0.010	<0.10	<0.0010

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 25 of 30)*

		U	V	W	Zn	Zr	Hardness (as CaCO3)
MB1 - SQE/STP 1, 9.25 - 10.75	mg/L	<0.00010	<0.010	<0.020	0.045	<0.010	1510
MB1 - SQE/STP 2, 9.25 - 10.75	mg/L	0.0099	<0.50	<1.0	<0.50	<0.50	4220
MB1 - SQE/STP 3, 9.25 - 10.75	mg/L	0.0312	0.13	<0.20	0.96	<0.10	1550
MB1 - SQE/STP 4, 9.25 - 10.75	mg/L	0.00249	<0.020	<0.040	4.78	<0.020	3100
MB1 - SQE/STP 5, 9.25 - 10.75	ppm	0.2	3	0.2	5	2.6	--
MB1 - SQE/STP 1, 18.75 - 20.25	mg/L	0.00020	<0.010	<0.020	0.053	<0.010	1540
MB1 - SQE/STP 2, 18.75 - 20.25	mg/L	0.0125	<0.50	<1.0	<0.50	<0.50	5620
MB1 - SQE/STP 3, 18.75 - 20.25	mg/L	0.0219	<0.10	<0.20	0.71	<0.10	1450
MB1 - SQE/STP 4, 18.75 - 20.25	mg/L	0.00211	<0.020	<0.040	4.11	<0.020	2940
MB1 - SQE/STP 5, 18.75 - 20.25	ppm	0.5	3	0.1	4	2.7	--
MB1 - SQE/STP 1, 32.5 - 34	mg/L	<0.00010	<0.010	<0.020	0.037	<0.010	50.5
MB1 - SQE/STP 2, 32.5 - 34	mg/L	0.0138	<0.50	<1.0	<0.50	<0.50	78.5
MB1 - SQE/STP 3, 32.5 - 34	mg/L	0.0206	<0.020	<0.040	0.494	<0.020	111
MB1 - SQE/STP 4, 32.5 - 34	mg/L	0.00397	<0.010	<0.020	3.35	<0.010	23.2
MB1 - SQE/STP 5, 32.5 - 34	ppm	1.4	1	1.1	12	6.5	--
MB1 - SQE/STP 1, 39.25 - 40.75	mg/L	<0.00010	<0.010	<0.020	0.028	<0.010	58.4
MB1 - SQE/STP 2, 39.25 - 40.75	mg/L	0.0283	<0.50	<1.0	<0.50	<0.50	26.8
MB1 - SQE/STP 3, 39.25 - 40.75	mg/L	0.0762	<0.10	<0.20	0.84	<0.10	198
MB1 - SQE/STP 4, 39.25 - 40.75	mg/L	0.0160	<0.010	<0.020	5.09	<0.010	29.7
MB1 - SQE/STP 5, 39.25 - 40.75	ppm	3.4	3	2.8	45	20.6	--

Dark grey shading and white font indicates RESIDUE

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Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 26 of 30)*

		U	V	W	Zn	Zr	Hardness (as CaCO3)
MB1 - SQE/STP 1, 46.5 - 48	mg/L	<0.00010	<0.010	<0.020	0.035	<0.010	57.7
MB1 - SQE/STP 2, 46.5 - 48	mg/L	0.113	<0.50	<1.0	<0.50	<0.50	60.6
MB1 - SQE/STP 3, 46.5 - 48	mg/L	0.125	<0.10	<0.20	0.70	<0.10	178
MB1 - SQE/STP 4, 46.5 - 48	mg/L	0.0486	<0.010	<0.020	1.54	<0.010	35.2
MB1 - SQE/STP 5, 46.5 - 48	ppm	4.3	2	3.4	45	13.2	--
MB2 - SQE/STP 1, 9.25 - 10.75	mg/L	<0.00010	<0.010	<0.020	0.022	<0.010	1470
MB2 - SQE/STP 2, 9.25 - 10.75	mg/L	0.0140	<0.50	<1.0	<0.50	<0.50	6070
MB2 - SQE/STP 3, 9.25 - 10.75	mg/L	0.0357	0.19	<0.20	0.70	<0.10	1680
MB2 - SQE/STP 4, 9.25 - 10.75	mg/L	0.00341	0.023	<0.040	4.97	<0.020	2890
MB2 - SQE/STP 5, 9.25 - 10.75	ppm	0.4	3	0.3	4	2.7	--
MB2 - SQE/STP 1, 19.25 - 20.75	mg/L	<0.00010	<0.010	<0.020	0.022	<0.010	1530
MB2 - SQE/STP 2, 19.25 - 20.75	mg/L	0.0104	<0.50	<1.0	<0.50	<0.50	6020
MB2 - SQE/STP 3, 19.25 - 20.75	mg/L	0.0178	0.110	<0.10	0.728	<0.050	1430
MB2 - SQE/STP 4, 19.25 - 20.75	mg/L	0.00153	<0.020	<0.040	4.43	<0.020	2940
MB2 - SQE/STP 5, 19.25 - 20.75	ppm	0.5	1	0.3	2	2.2	--
MB2 - SQE/STP 1, 29.5 - 31	mg/L	0.00037	<0.010	<0.020	0.033	<0.010	1520
MB2 - SQE/STP 2, 29.5 - 31	mg/L	0.0224	<0.50	<1.0	0.51	<0.50	5470
MB2 - SQE/STP 3, 29.5 - 31	mg/L	0.0287	<0.10	<0.20	1.00	<0.10	1440
MB2 - SQE/STP 4, 29.5 - 31	mg/L	0.00376	<0.010	<0.020	2.84	<0.010	2500
MB2 - SQE/STP 5, 29.5 - 31	ppm	0.6	2	0.5	11	5.4	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 27 of 30)*

		U	V	W	Zn	Zr	Hardness (as CaCO3)
MB2 - SQE/STP 1, 38.5 - 40	mg/L	<0.00010	<0.010	<0.020	0.034	<0.010	65.8
MB2 - SQE/STP 2, 38.5 - 40	mg/L	0.0373	<0.50	<1.0	<0.50	<0.50	80.7
MB2 - SQE/STP 3, 38.5 - 40	mg/L	0.0362	<0.020	<0.040	0.495	<0.020	192
MB2 - SQE/STP 4, 38.5 - 40	mg/L	0.00952	<0.010	<0.020	6.02	<0.010	53.5
MB2 - SQE/STP 5, 38.5 - 40	ppm	1.6	1	1.0	13	5.7	--
MB2 - SQE/STP 1, 42.5 - 44	mg/L	0.00010	<0.010	<0.020	0.026	<0.010	67.2
MB2 - SQE/STP 2, 42.5 - 44	mg/L	0.0269	<0.50	<1.0	<0.50	<0.50	36.0
MB2 - SQE/STP 3, 42.5 - 44	mg/L	0.0838	<0.020	<0.040	0.474	<0.020	218
MB2 - SQE/STP 4, 42.5 - 44	mg/L	0.0167	<0.010	<0.020	2.95	<0.010	31.9
MB2 - SQE/STP 5, 42.5 - 44	ppm	1.9	1	2.1	21	4.9	--
MB2 - SQE/STP 1, 49.5 - 52	mg/L	0.00036	<0.010	<0.020	0.027	<0.010	<3.1
MB2 - SQE/STP 2, 49.5 - 52	mg/L	0.0745	<0.50	<1.0	<0.50	<0.50	82.8
MB2 - SQE/STP 3, 49.5 - 52	mg/L	0.107	<0.020	<0.040	0.548	<0.020	187
MB2 - SQE/STP 4, 49.5 - 52	mg/L	0.0224	<0.010	<0.020	2.50	<0.010	46.3
MB2 - SQE/STP 5, 49.5 - 52	ppm	1.3	1	1.3	27	6.4	--
MB2 - SQE/STP 1, 52 - 60	mg/L	<0.00010	<0.010	<0.020	0.026	<0.010	29.9
MB2 - SQE/STP 2, 52 - 60	mg/L	0.0392	<0.50	<1.0	<0.50	<0.50	85.0
MB2 - SQE/STP 3, 52 - 60	mg/L	0.0788	<0.020	<0.040	1.03	<0.020	238
MB2 - SQE/STP 4, 52 - 60	mg/L	0.0173	<0.010	<0.020	2.63	<0.010	61.0
MB2 - SQE/STP 5, 52 - 60	ppm	1.4	1	1.1	16	4.3	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 28 of 30)*

		U	V	W	Zn	Zr	Hardness (as CaCO3)
MB3 - SQE/STP 1, 4.75 - 6.25	mg/L	0.00017	<0.010	<0.020	0.025	<0.010	1550
MB3 - SQE/STP 2, 4.75 - 6.25	mg/L	0.0160	<0.50	<1.0	<0.50	<0.50	5700
MB3 - SQE/STP 3, 4.75 - 6.25	mg/L	0.0243	0.102	<0.10	0.827	<0.050	1240
MB3 - SQE/STP 4, 4.75 - 6.25	mg/L	0.00189	<0.020	<0.040	3.34	<0.020	2850
MB3 - SQE/STP 5, 4.75 - 6.25	ppm	1.2	1	0.4	5	2.1	--
MB3 - SQE/STP 1, 9.5 - 11	mg/L	0.00040	<0.010	<0.020	0.012	<0.010	1470
MB3 - SQE/STP 2, 9.5 - 11	mg/L	0.0190	<0.50	<1.0	<0.50	<0.50	6550
MB3 - SQE/STP 3, 9.5 - 11	mg/L	0.0200	0.124	<0.10	0.865	<0.050	1530
MB3 - SQE/STP 4, 9.5 - 11	mg/L	0.00174	<0.020	<0.040	6.34	<0.020	2920
MB3 - SQE/STP 5, 9.5 - 11	ppm	1.1	1	0.4	3	2.3	--
MB3 - SQE/STP 1, 15.25 - 16.75	mg/L	0.00020	<0.010	<0.020	0.030	<0.010	1520
MB3 - SQE/STP 2, 15.25 - 16.75	mg/L	0.0122	<0.50	<1.0	<0.50	<0.50	5750
MB3 - SQE/STP 3, 15.25 - 16.75	mg/L	0.0136	0.100	<0.10	0.473	<0.050	1250
MB3 - SQE/STP 4, 15.25 - 16.75	mg/L	0.00088	<0.020	<0.040	2.33	<0.020	2750
MB3 - SQE/STP 5, 15.25 - 16.75	ppm	0.3	1	0.1	<2	1.8	--
MB3 - SQE/STP 1, 19.25 - 20.75	mg/L	0.00038	<0.010	<0.020	0.021	<0.010	1480
MB3 - SQE/STP 2, 19.25 - 20.75	mg/L	0.0152	<0.50	<1.0	<0.50	<0.50	5110
MB3 - SQE/STP 3, 19.25 - 20.75	mg/L	0.0360	0.11	<0.20	1.43	<0.10	1450
MB3 - SQE/STP 4, 19.25 - 20.75	mg/L	0.00377	<0.020	<0.040	2.99	<0.020	2920
MB3 - SQE/STP 5, 19.25 - 20.75	ppm	0.5	2	0.3	5	2.1	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 29 of 30)*

		U	V	W	Zn	Zr	Hardness (as CaCO3)
MB3 - SQE/STP 1, 24.5 - 26	mg/L	0.00030	<0.010	<0.020	0.019	<0.010	1530
MB3 - SQE/STP 2, 24.5 - 26	mg/L	0.0135	<0.50	<1.0	<0.50	<0.50	5400
MB3 - SQE/STP 3, 24.5 - 26	mg/L	0.0235	<0.10	<0.20	0.94	<0.10	1380
MB3 - SQE/STP 4, 24.5 - 26	mg/L	0.00195	<0.020	<0.040	4.04	<0.020	2890
MB3 - SQE/STP 5, 24.5 - 26	ppm	0.4	2	0.2	4	2.3	--
MB3 - SQE/STP 1, 28.25 - 29.75	mg/L	0.00015	<0.010	<0.020	0.028	<0.010	1530
MB3 - SQE/STP 2, 28.25 - 29.75	mg/L	0.0063	<0.50	<1.0	0.64	<0.50	5220
MB3 - SQE/STP 3, 28.25 - 29.75	mg/L	0.0137	0.056	<0.10	0.893	<0.050	1260
MB3 - SQE/STP 4, 28.25 - 29.75	mg/L	0.00131	<0.020	<0.040	2.23	<0.020	2950
MB3 - SQE/STP 5, 28.25 - 29.75	ppm	0.4	<1	0.2	3	1.5	--
MB3 - SQE/STP 1, 34.25 - 35.75	mg/L	<0.00010	<0.010	<0.020	0.022	<0.010	1550
MB3 - SQE/STP 2, 34.25 - 35.75	mg/L	0.0093	<0.50	<1.0	0.78	<0.50	4920
MB3 - SQE/STP 3, 34.25 - 35.75	mg/L	0.0212	<0.10	<0.20	0.99	<0.10	1300
MB3 - SQE/STP 4, 34.25 - 35.75	mg/L	0.00208	<0.020	<0.040	2.28	<0.020	2870
MB3 - SQE/STP 5, 34.25 - 35.75	ppm	0.7	<1	0.4	4	1.5	--
MB3 - SQE/STP 1, 40 - 41.5	mg/L	0.00013	<0.010	<0.020	0.024	<0.010	1520
MB3 - SQE/STP 2, 40 - 41.5	mg/L	0.0089	<0.50	<1.0	<0.50	<0.50	5570
MB3 - SQE/STP 3, 40 - 41.5	mg/L	0.0182	0.071	<0.10	0.863	<0.050	1410
MB3 - SQE/STP 4, 40 - 41.5	mg/L	0.00205	<0.020	<0.040	2.37	<0.020	2890
MB3 - SQE/STP 5, 40 - 41.5	ppm	0.9	1	1.6	8	2.2	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Recieved weight for all Step 5 samples = 0.02 kg

Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix E: Sequential extraction raw analytical data *(Page 30 of 30)*

		U	V	W	Zn	Zr	Hardness (as CaCO3)
MB3 - SQE/STP 1, 42.5 - 44	mg/L	0.00078	<0.010	<0.020	0.036	<0.010	153
MB3 - SQE/STP 2, 42.5 - 44	mg/L	0.0560	<0.50	<1.0	<0.50	<0.50	160
MB3 - SQE/STP 3, 42.5 - 44	mg/L	0.0517	<0.020	<0.040	0.527	<0.020	142
MB3 - SQE/STP 4, 42.5 - 44	mg/L	0.0121	<0.010	<0.020	2.50	<0.010	41.5
MB3 - SQE/STP 5, 42.5 - 44	ppm	2.6	1	2.3	36	5.7	--
MB3 - SQE/STP 1, 46.5 - 48	mg/L	<0.00010	<0.010	<0.020	0.033	<0.010	35.5
MB3 - SQE/STP 2, 46.5 - 48	mg/L	0.0428	<0.50	<1.0	<0.50	<0.50	48.5
MB3 - SQE/STP 3, 46.5 - 48	mg/L	0.111	<0.020	<0.040	0.891	<0.020	253
MB3 - SQE/STP 4, 46.5 - 48	mg/L	0.0180	<0.010	<0.020	3.34	<0.010	30.0
MB3 - SQE/STP 5, 46.5 - 48	ppm	3.4	1	2.8	55	10.8	--
MB3 - SQE/STP 1, 48 - 52	mg/L	0.00054	<0.010	<0.020	0.027	<0.010	329
MB3 - SQE/STP 2, 48 - 52	mg/L	0.0641	<0.50	<1.0	<0.50	<0.50	94.3
MB3 - SQE/STP 3, 48 - 52	mg/L	0.0771	<0.020	<0.040	1.02	<0.020	143
MB3 - SQE/STP 4, 48 - 52	mg/L	0.0256	<0.010	<0.020	3.88	<0.010	27.2
MB3 - SQE/STP 5, 48 - 52	ppm	2.5	2	2.8	58	9.7	--
Sample Blank (QA/QC RODI)	mg/L	<0.00010	<0.010	<0.020	<0.020	<0.010	<3.1

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS
Recieved weight for all Step 5 samples = 0.02 kg
Water samples could not be analyzed for sulphate or anions (chloride etc) because lab could not "Matrix Match"

Appendix F

Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 1 of 40)*

		Aluminum (Al)	%	Barium (Ba)	%	Calcium (Ca)	%
			<u>3.0 m</u>		<u>3.0 m</u>		<u>3.0 m</u>
MB1 - PW, 9.25' - 10.75'	mg/g	0.00000072	0.0	0.00000062	0.0	0.017	0.0
MB1 - SQE/STP 1, 9.25 - 10.75	mg/g	0.00058	0.0	0.00014	0.0	6.0	7.4
MB1 - SQE/STP 2, 9.25 - 10.75	mg/g	0.32	0.8	0.00033	0.1	16.8	20.9
MB1 - SQE/STP 3, 9.25 - 10.75	mg/g	10.2	27.2	0.00027	0.1	5.3	6.6
MB1 - SQE/STP 4, 9.25 - 10.75	mg/g	0.94	2.5	0.00063	0.2	15.4	19.1
MB1 - SQE/STP 5, 9.25 - 10.75	mg/g	26.0	69.4	0.39	99.6	36.9	45.9
Total PW + STPS 1-5	mg/g	37.5	--	0.4	--	80.3	--
			<u>5.9 m</u>		<u>5.9 m</u>		<u>5.9 m</u>
MB1 - PW, 18.75' - 20.25'	mg/g	0.00000069	0.0	0.0000012	0.0	0.016	0.0
MB1 - SQE/STP 1, 18.75 - 20.25	mg/g	0.00056	0.0	0.00019	0.1	5.8	5.6
MB1 - SQE/STP 2, 18.75 - 20.25	mg/g	0.82	1.9	0.00038	0.1	22.2	21.5
MB1 - SQE/STP 3, 18.75 - 20.25	mg/g	7.9	18.0	0.00031	0.1	5.2	5.0
MB1 - SQE/STP 4, 18.75 - 20.25	mg/g	0.84	1.9	0.00059	0.2	14.6	14.2
MB1 - SQE/STP 5, 18.75 - 20.25	mg/g	34.1	78.2	0.33	99.6	55.4	53.7
Total PW + STPS 1-5	mg/g	43.6	--	0.33	--	103.2	--
		no PW	<u>10.1 m</u>	*no PW*	<u>10.1 m</u>	*no PW*	<u>10.1 m</u>
MB1 - SQE/STP 1, 32.5 - 34	mg/g	0.0014	0.0	0.00047	0.0	0.14	7.8
MB1 - SQE/STP 2, 32.5 - 34	mg/g	0.012	0.0	0.011	1.0	0.31	17.5
MB1 - SQE/STP 3, 32.5 - 34	mg/g	0.15	0.2	0.0028	0.2	0.42	23.5
MB1 - SQE/STP 4, 32.5 - 34	mg/g	0.026	0.0	0.0014	0.1	0.12	6.5
MB1 - SQE/STP 5, 32.5 - 34	mg/g	61.2	99.7	1.2	98.7	0.80	44.7
BULK SOLID (MB1-33.5')	mg/g	55.1	--	0.0092	--	1.8	--
Total STPS 1-5	mg/g	61.4	--	1.2	--	1.8	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 2 of 40)*

		Aluminum (Al)	%	Barium (Ba)	%	Calcium (Ca)	%
			12.2 m		12.2 m		12.2 m
MB1 - PW, 39.25' - 40.75'	mg/g	0.00000081	0.0	0.0000025	0.0	0.021	1.0
MB1 - SQE/STP 1, 39.25 - 40.75	mg/g	0.0012	0.0	0.00043	0.4	0.15	7.2
MB1 - SQE/STP 2, 39.25 - 40.75	mg/g	0.013	0.0	0.0072	5.9	0.11	5.1
MB1 - SQE/STP 3, 39.25 - 40.75	mg/g	0.20	0.3	0.0020	1.6	0.76	36.4
MB1 - SQE/STP 4, 39.25 - 40.75	mg/g	0.028	0.0	0.0026	2.1	0.15	7.1
MB1 - SQE/STP 5, 39.25 - 40.75	mg/g	68.5	99.6	0.11	90.0	0.90	43.1
Total PW + STPS 1-5	mg/g	68.7	--	0.12	--	2.1	--
			14.4 m		14.4 m		14.4 m
MB1 - PW, 46.5' - 48'	mg/g	0.0000016	0.2	0.0000001	0.0	0.000	0.0
MB1 - SQE/STP 1, 46.5 - 48	mg/g	0.00021	24.4	0.000044	1.1	0.001	2.8
MB1 - SQE/STP 2, 46.5 - 48	mg/g	0.000	29.1	0.0010	23.4	0.01	14.0
MB1 - SQE/STP 3, 46.5 - 48	mg/g	0.00	25.6	0.0026	61.8	0.00	2.8
MB1 - SQE/STP 4, 46.5 - 48	mg/g	0.000	9.1	0.0003	7.2	0.00	4.4
MB1 - SQE/STP 5, 46.5 - 48	mg/g	0.0001	11.6	0.000	6.5	0.03	76.0
BULK SOLID (MB1-47.5')	mg/g	0.000183597	--	0.000651505	--	0.0	--
Total PW + STPS 1-5	mg/g	0.0	--	0.004	--	0.0	--
% Diff. In Bulk & Summations	%	78.6	--	84.3	--	21.7	--
			2.7 m		2.7 m		2.7 m
MB2 - PW, 9.25' - 10.75'	mg/g	0.0000000	0.0	0.0000000	0.0	0.000	0.0
MB2 - SQE/STP 1, 9.25 - 10.75	mg/g	0.0001	0.0	0.00009	9.1	2.4	7.4
MB2 - SQE/STP 2, 9.25 - 10.75	mg/g	0.00	0.0	0.000143	15.1	5.95	18.0
MB2 - SQE/STP 3, 9.25 - 10.75	mg/g	0.315	2.4	0.00033	34.9	16.8	50.9
MB2 - SQE/STP 4, 9.25 - 10.75	mg/g	12.8	97.0	0.00034	35.5	6.6	20.0
MB2 - SQE/STP 5, 9.25 - 10.75	mg/g	0.0751	0.6	0.0000503	5.3	1.23	3.7
Total PW + STPS 1-5	mg/g	13.1	--	0.00	--	33.0	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 3 of 40)*

		Aluminum (Al)	%	Barium (Ba)	%	Calcium (Ca)	%
			6.1 m		6.1 m		6.1 m
MB2 - PW, 19.25' - 20.75'	mg/g	0.00000000	0.0	0.00000000	0.0	0.000	0.0
MB2 - SQE/STP 1, 19.25 - 20.75	mg/g	0.0001	0.0	0.00017	14.3	2.3	6.1
MB2 - SQE/STP 2, 19.25 - 20.75	mg/g	0.00	0.0	0.000192	16.3	5.8	15.3
MB2 - SQE/STP 3, 19.25 - 20.75	mg/g	0.8	7.7	0.00038	32.2	22.2	58.5
MB2 - SQE/STP 4, 19.25 - 20.75	mg/g	9.81	91.7	0.00039	33.2	6.5	17.0
MB2 - SQE/STP 5, 19.25 - 20.75	mg/g	0.1	0.6	0.00	4.0	1.2	3.1
Total PW + STPS 1-5	mg/g	10.7	--	0.00	--	37.9	--
			9.2 m		9.2 m		9.2 m
MB2 - PW, 29.5' - 31'	mg/g	0.00000000	0.0	0.0000000	0.0	0.000	0.0
MB2 - SQE/STP 1, 29.5 - 31	mg/g	0.00143	0.0	0.00047	0.0	0.1	7.8
MB2 - SQE/STP 2, 29.5 - 31	mg/g	0.01	0.0	0.0113	1.0	0.3	17.5
MB2 - SQE/STP 3, 29.5 - 31	mg/g	0.1	0.2	0.00277	0.2	0.4	23.5
MB2 - SQE/STP 4, 29.5 - 31	mg/g	0.03	0.0	0.00143	0.1	0.1	6.5
MB2 - SQE/STP 5, 29.5 - 31	mg/g	61.2	99.7	1.17	98.7	0.8	44.7
Total PW + STPS 1-5	mg/g	61.4	--	1.19	--	1.8	--
			12.0 m		12.0 m		12.0 m
MB2 - PW, 38.5' - 40'	mg/g	0.00000031	0.0	0.0000012	0.0	0.0065	0.2
MB2 - SQE/STP 1, 38.5 - 40	mg/g	0.0011	0.0	0.00021	0.0	0.15	5.8
MB2 - SQE/STP 2, 38.5 - 40	mg/g	0.026	0.1	0.0097	1.9	0.32	12.1
MB2 - SQE/STP 3, 38.5 - 40	mg/g	0.33	0.7	0.0034	0.6	0.71	26.8
MB2 - SQE/STP 4, 38.5 - 40	mg/g	0.045	0.1	0.0023	0.4	0.27	10.0
MB2 - SQE/STP 5, 38.5 - 40	mg/g	47.7	99.2	0.50	97.0	1.2	45.0
BULK SOLID (MB2-39.25')	mg/g	65.1	--	0.0061	--	1.5	--
Total PW + STPS 1-5	mg/g	48.1	--	0.52	--	2.7	--
% Diff. In Bulk & Summations	%	-35.3	--	98.8	--	43.7	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 4 of 40)*

		Aluminum (Al)	%	Barium (Ba)	%	Calcium (Ca)	%
			13.2 m		13.2 m		13.2 m
MB2 - PW, 42.5' - 44'	mg/g	0.00000088	0.0	0.0000048	0.0	0.019	0.9
MB2 - SQE/STP 1, 42.5 - 44	mg/g	0.0014	0.0	0.00050	0.1	0.20	9.4
MB2 - SQE/STP 2, 42.5 - 44	mg/g	0.015	0.0	0.025	4.8	0.14	6.6
MB2 - SQE/STP 3, 42.5 - 44	mg/g	0.18	0.3	0.0042	0.8	0.84	38.8
MB2 - SQE/STP 4, 42.5 - 44	mg/g	0.030	0.1	0.0023	0.4	0.16	7.4
MB2 - SQE/STP 5, 42.5 - 44	mg/g	58.9	99.6	0.48	93.8	0.80	36.9
BULK SOLID (MB2-43')	mg/g	65.3	--	0.0054	--	1.9	--
Total PW + STPS 1-5	mg/g	59.1	--	0.51	--	2.2	--
% Diff. In Bulk & Summations	%	-10.4	--	98.9	--	12.4	--
			15.5 m		15.5 m		15.5 m
MB2 - PW, 49.5' - 52'	mg/g	0.000011	0.0	0.0000043	0.0	0.00054	0.0
MB2 - SQE/STP 1, 49.5 - 52	mg/g	0.0047	0.0	0.000030	0.0	0.0025	0.1
MB2 - SQE/STP 2, 49.5 - 52	mg/g	0.088	0.1	0.0035	2.2	0.33	17.9
MB2 - SQE/STP 3, 49.5 - 52	mg/g	0.50	0.8	0.0020	1.2	0.69	37.0
MB2 - SQE/STP 4, 49.5 - 52	mg/g	0.092	0.1	0.0020	1.3	0.23	12.6
MB2 - SQE/STP 5, 49.5 - 52	mg/g	61.3	98.9	0.15	95.3	0.60	32.4
BULK SOLID (MB2-51')	mg/g	60.0	--	0.0041	--	1.9	--
Total PW + STPS 1-5	mg/g	62.0	--	0.16	--	1.9	--
% Diff. In Bulk & Summations	%	3.2	--	97.4	--	-2.6	--
			17.1 m		17.1 m		17.1 m
MB2 - PW, 52' - 60'	mg/g	0.0000068	0.0	0.000012	0.0	0.046	2.0
MB2 - SQE/STP 1, 52 - 60	mg/g	0.0017	0.0	0.0010	0.5	0.12	5.3
MB2 - SQE/STP 2, 52 - 60	mg/g	0.056	0.1	0.067	31.4	0.34	14.9
MB2 - SQE/STP 3, 52 - 60	mg/g	0.41	0.7	0.021	9.6	0.87	38.2
MB2 - SQE/STP 4, 52 - 60	mg/g	0.077	0.1	0.0043	2.0	0.31	13.4
MB2 - SQE/STP 5, 52 - 60	mg/g	61.1	99.1	0.12	56.4	0.60	26.3
Total PW + STPS 1-5	mg/g	61.6	--	0.21	--	2.3	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 5 of 40)*

		Aluminum (Al)	%	Barium (Ba)	%	Calcium (Ca)	%
			1.7 m		1.7 m		1.7 m
MB3 - PW, 4.75' - 6.25'	mg/g	0.000012	0.0	0.00000086	0.0	0.013	0.0
MB3 - SQE/STP 1, 4.75 - 6.25	mg/g	0.00090	0.0	0.00027	0.1	6.1	4.9
MB3 - SQE/STP 2, 4.75 - 6.25	mg/g	0.82	2.1	0.00056	0.2	22.1	17.8
MB3 - SQE/STP 3, 4.75 - 6.25	mg/g	6.4	16.8	0.00029	0.1	4.5	3.7
MB3 - SQE/STP 4, 4.75 - 6.25	mg/g	0.37	1.0	0.00081	0.3	14.3	11.5
MB3 - SQE/STP 5, 4.75 - 6.25	mg/g	30.7	80.1	0.31	99.4	77.0	62.1
BULK SOLID (MB3-5')	mg/g	31.1	--	9.2	--	103.0	--
Total PW + STPS 1-5	mg/g	38.3	--	0.31	--	124.0	--
% Diff. In Bulk & Summations	%	18.8	--	-2833.3	--	16.9	--
			3.1 m		3.1 m		3.1 m
MB3 - PW, 9.5' - 11'	mg/g	0.000085	0.0	0.0000032	0.0	0.028	0.0
MB3 - SQE/STP 1, 9.5 - 11	mg/g	0.028	0.1	0.00022	0.1	5.9	4.2
MB3 - SQE/STP 2, 9.5 - 11	mg/g	1.7	4.0	0.00052	0.2	25.0	17.8
MB3 - SQE/STP 3, 9.5 - 11	mg/g	5.8	14.0	0.00033	0.1	5.4	3.9
MB3 - SQE/STP 4, 9.5 - 11	mg/g	0.55	1.3	0.00065	0.2	14.5	10.3
MB3 - SQE/STP 5, 9.5 - 11	mg/g	33.2	80.6	0.30	99.4	89.3	63.7
Total PW + STPS 1-5	mg/g	41.2	--	0.30	--	140.1	--
			4.9 m		4.9 m		4.9 m
MB3 - PW, 15.25' - 16.75'	mg/g	0.0000045	0.0	0.0000056	0.0	0.021	0.0
MB3 - SQE/STP 1, 15.25 - 16.75	mg/g	0.0015	0.0	0.00021	0.0	6.0	3.6
MB3 - SQE/STP 2, 15.25 - 16.75	mg/g	0.99	3.0	0.00043	0.1	22.2	13.4
MB3 - SQE/STP 3, 15.25 - 16.75	mg/g	4.7	14.3	0.00023	0.0	4.7	2.8
MB3 - SQE/STP 4, 15.25 - 16.75	mg/g	0.35	1.1	0.00064	0.1	13.8	8.3
MB3 - SQE/STP 5, 15.25 - 16.75	mg/g	26.8	81.6	0.58	99.7	118.5	71.8
BULK SOLID (MB3-16')	mg/g	32.2	--	8.8	--	124.5	--
Total PW + STPS 1-5	mg/g	32.9	--	0.58	--	165.1	--
% Diff. In Bulk & Summations	%	2.0	--	-1404.7	--	24.6	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 6 of 40)*

		Aluminum (Al)	%	Barium (Ba)	%	Calcium (Ca)	%
			6.1 m		6.1 m		6.1 m
MB3 - PW, 19.25' - 20.75'	mg/g	0.00000034	0.0	0.00000064	0.0	0.0079	0.0
MB3 - SQE/STP 1, 19.25 - 20.75	mg/g	0.00070	0.0	0.00015	0.1	5.8	5.5
MB3 - SQE/STP 2, 19.25 - 20.75	mg/g	0.67	1.3	0.00034	0.2	20.5	19.3
MB3 - SQE/STP 3, 19.25 - 20.75	mg/g	9.1	17.5	0.00028	0.2	5.3	5.0
MB3 - SQE/STP 4, 19.25 - 20.75	mg/g	1.0	1.9	0.00066	0.4	14.6	13.7
MB3 - SQE/STP 5, 19.25 - 20.75	mg/g	41.2	79.2	0.15	99.1	60.2	56.5
BULK SOLID a (MB3-19.5')	mg/g	24.3	--	14.0	--	86.8	--
BULK SOLID b (MB3-21')	mg/g	31.6	--	6.2	--	89.2	--
Total PW + STPS 1-5	mg/g	52.0	--	0.15	--	106.5	--
% Diff. In Bulk a & Summations	%	53.3	--	-9112.4	--	18.5	--
% Diff. In Bulk b & Summations	%	39.2	--	-3961.4	--	16.2	--
			7.7 m		7.7 m		7.7 m
MB3 - PW, 24.5' - 26'	mg/g	0.0000013	0.0	0.0000024	0.0	0.031	0.0
MB3 - SQE/STP 1, 24.5 - 26	mg/g	0.0012	0.0	0.00016	0.1	6.0	5.4
MB3 - SQE/STP 2, 24.5 - 26	mg/g	0.86	2.0	0.00035	0.2	21.5	19.6
MB3 - SQE/STP 3, 24.5 - 26	mg/g	7.8	18.0	0.00021	0.1	5.0	4.6
MB3 - SQE/STP 4, 24.5 - 26	mg/g	0.72	1.7	0.00061	0.3	14.4	13.1
MB3 - SQE/STP 5, 24.5 - 26	mg/g	34.0	78.4	0.23	99.4	62.6	57.2
Total PW + STPS 1-5	mg/g	43.4	--	0.23	--	109.5	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 7 of 40)*

		Aluminum (Al)	%	Barium (Ba)	%	Calcium (Ca)	%
			8.8 m		8.8 m		8.8 m
MB3 - PW, 28.25' - 29.75'	mg/g	0.00000082	0.0	0.0000014	0.0	0.017	0.0
MB3 - SQE/STP 1, 28.25 - 29.75	mg/g	0.00078	0.0	0.00015	0.0	6.0	3.5
MB3 - SQE/STP 2, 28.25 - 29.75	mg/g	0.47	1.6	0.00035	0.1	20.9	12.1
MB3 - SQE/STP 3, 28.25 - 29.75	mg/g	4.4	15.4	0.00022	0.1	4.8	2.8
MB3 - SQE/STP 4, 28.25 - 29.75	mg/g	0.53	1.9	0.00055	0.1	14.8	8.5
MB3 - SQE/STP 5, 28.25 - 29.75	mg/g	23.2	81.1	0.41	99.7	127	73.1
BULK SOLID (MB3-29')	mg/g	28.5	--	5.5	--	126	--
Total PW + STPS 1-5	mg/g	28.6	--	0.41	--	173	--
% Diff. In Bulk & Summations	%	0.4	--	-1225.2	--	27.5	--
			10.7 m		10.7 m		10.7 m
MB3 - PW, 34.25' - 35.75'	mg/g	0.0000013	0.0	0.0000010	0.0	0.025	0.0
MB3 - SQE/STP 1, 34.25 - 35.75	mg/g	0.00055	0.0	0.00013	0.0	6.0	3.6
MB3 - SQE/STP 2, 34.25 - 35.75	mg/g	0.57	1.4	0.00039	0.0	19.6	11.9
MB3 - SQE/STP 3, 34.25 - 35.75	mg/g	7.2	17.9	0.00021	0.0	4.9	3.0
MB3 - SQE/STP 4, 34.25 - 35.75	mg/g	0.78	1.9	0.00058	0.1	14.4	8.7
MB3 - SQE/STP 5, 34.25 - 35.75	mg/g	31.6	78.8	0.98	99.9	120	72.8
Total PW + STPS 1-5	mg/g	40.1	--	0.98	--	164.9	--
			12.4 m		12.4 m		12.4 m
MB3 - PW, 40' - 41.5'	mg/g	0.0000021	0.0	0.0000020	0.0	0.041	0.0
MB3 - SQE/STP 1, 40 - 41.5	mg/g	0.00066	0.0	0.00014	0.1	5.8	3.7
MB3 - SQE/STP 2, 40 - 41.5	mg/g	0.53	1.6	0.00035	0.2	21.4	13.7
MB3 - SQE/STP 3, 40 - 41.5	mg/g	3.4	10.4	0.00030	0.1	5.0	3.2
MB3 - SQE/STP 4, 40 - 41.5	mg/g	0.41	1.3	0.00065	0.3	14.4	9.2
MB3 - SQE/STP 5, 40 - 41.5	mg/g	28.3	86.7	0.23	99.4	110	70.2
BULK SOLID (MB3-41')	mg/g	35.8	--	8.8	--	119	--
Total PW + STPS 1-5	mg/g	32.6	--	0.23	--	157	--
% Diff. In Bulk & Summations	%	-9.7	--	-3685.1	--	24.0	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 8 of 40)*

		Aluminum (Al)	%	Barium (Ba)	%	Calcium (Ca)	%
			13.2 m		13.2 m		13.2 m
MB3 - PW, 42.5' - 44'	mg/g	0.00000057	0.0	0.0	0.0	0.011	0.3
MB3 - SQE/STP 1, 42.5 - 44	mg/g	0.0012	0.0	0.00032	0.1	0.48	12.1
MB3 - SQE/STP 2, 42.5 - 44	mg/g	0.11	0.2	0.040	10.6	0.64	16.3
MB3 - SQE/STP 3, 42.5 - 44	mg/g	0.40	0.6	0.0077	2.0	0.50	12.7
MB3 - SQE/STP 4, 42.5 - 44	mg/g	0.068	0.1	0.0019	0.5	0.21	5.3
MB3 - SQE/STP 5, 42.5 - 44	mg/g	63.7	99.1	0.33	86.8	2.1	53.3
BULK SOLID (MB3-43')	mg/g	56.6	--	0.35	--	3.1	--
Total PW + STPS 1-5	mg/g	64.3	--	0.38	--	3.9	--
% Diff. In Bulk & Summations	%	11.9	--	7.9	--	21.3	--
			14.4 m		14.4 m		14.4 m
MB3 - PW, 46.5'-48'	mg/g	0.00000066	0.0	0.0000015	0.0	0.012	0.4
MB3 - SQE/STP 1, 46.5 - 48	mg/g	0.00089	0.0	0.000030	0.0	0.083	2.8
MB3 - SQE/STP 2, 46.5 - 48	mg/g	0.040	0.1	0.0037	1.4	0.19	6.5
MB3 - SQE/STP 3, 46.5 - 48	mg/g	0.45	0.6	0.0018	0.7	0.94	31.5
MB3 - SQE/STP 4, 46.5 - 48	mg/g	0.070	0.1	0.0017	0.7	0.15	5.0
MB3 - SQE/STP 5, 46.5 - 48	mg/g	75.6	99.3	0.25	97.2	1.6	53.8
BULK SOLID (MB3-47.5')	mg/g	64.6	--	0.055	--	1.4	--
Total PW + STPS 1-5	mg/g	76.2	--	0.26	--	3.0	--
% Diff. In Bulk & Summations	%	15.2	--	78.6	--	52.9	--
			15.2 m		15.2 m		15.2 m
MB3 - PW, 48'-52'	mg/g	0.000010	0.0	0.000015	0.0	0.036	1.1
MB3 - SQE/STP 1, 48 - 52	mg/g	0.0010	0.0	0.00028	0.1	1.3	40.4
MB3 - SQE/STP 2, 48 - 52	mg/g	0.043	0.1	0.067	30.7	0.38	11.9
MB3 - SQE/STP 3, 48 - 52	mg/g	0.26	0.3	0.050	22.9	0.54	17.0
MB3 - SQE/STP 4, 48 - 52	mg/g	0.036	0.0	0.010	4.7	0.14	4.3
MB3 - SQE/STP 5, 48 - 52	mg/g	76.5	99.6	0.090	41.5	0.80	25.3
Total PW + STPS 1-5	mg/g	76.8	--	0.22	--	3.2	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 9 of 40)*

		Cesium (Cs)	%	Iron (Fe)	%	Lithium (Li)	%
			3.0 m		3.0 m		3.0 m
MB1 - PW, 9.25' - 10.75'	mg/g	0.22	0.8	0.00000036	0.0	0.0013	0.0
MB1 - SQE/STP 1, 9.25 - 10.75	mg/g	4.1	14.0	0.0015	0.1	0.023	0.8
MB1 - SQE/STP 2, 9.25 - 10.75	mg/g	9.6	32.8	0.020	1.0	0.053	1.9
MB1 - SQE/STP 3, 9.25 - 10.75	mg/g	8.0	27.5	0.33	16.7	0.22	7.8
MB1 - SQE/STP 4, 9.25 - 10.75	mg/g	3.2	11.0	0.027	1.4	0.022	0.8
MB1 - SQE/STP 5, 9.25 - 10.75	mg/g	4.1	13.9	1.6	80.9	2.5	88.7
Total PW + STPS 1-5	mg/g	29.2	--	2.0	--	2.9	--
			5.9 m		5.9 m		5.9 m
MB1 - PW, 18.75' - 20.25'	mg/g	0.21	0.8	0.00000035	0.0	0.0016	0.1
MB1 - SQE/STP 1, 18.75 - 20.25	mg/g	4.0	15.4	0.0015	0.1	0.022	0.8
MB1 - SQE/STP 2, 18.75 - 20.25	mg/g	9.7	37.0	0.075	4.6	0.090	3.3
MB1 - SQE/STP 3, 18.75 - 20.25	mg/g	6.1	23.5	0.22	13.6	0.16	5.9
MB1 - SQE/STP 4, 18.75 - 20.25	mg/g	2.6	9.9	0.019	1.2	0.019	0.7
MB1 - SQE/STP 5, 18.75 - 20.25	mg/g	3.5	13.5	1.3	80.5	2.4	89.2
Total PW + STPS 1-5	mg/g	26.1	--	1.6	--	2.7	--
		no PW	10.1 m	*no PW*	10.1 m	*no PW*	10.1 m
MB1 - SQE/STP 1, 32.5 - 34	mg/g	0.39	16.6	0.0015	0.1	0.0016	0.0
MB1 - SQE/STP 2, 32.5 - 34	mg/g	0.17	7.4	0.075	3.1	0.013	0.2
MB1 - SQE/STP 3, 32.5 - 34	mg/g	0.10	4.2	0.42	17.2	0.017	0.2
MB1 - SQE/STP 4, 32.5 - 34	mg/g	0.020	0.8	0.037	1.5	0.0023	0.0
MB1 - SQE/STP 5, 32.5 - 34	mg/g	1.7	71.0	1.9	78.1	8.1	99.6
BULK SOLID (MB1-33.5')	mg/g	1.8	--	2.5	--	8.7	--
Total STPS 1-5	mg/g	2.3	--	2.4	--	8.2	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 10 of 40)*

		Cesium (Cs)	%	Iron (Fe)	%	Lithium (Li)	%
			12.2 m		12.2 m		12.2 m
MB1 - PW, 39.25' - 40.75'	mg/g	0.16	4.6	0.00000040	0.0	0.00080	0.0
MB1 - SQE/STP 1, 39.25 - 40.75	mg/g	0.46	13.6	0.0015	0.1	0.0022	0.0
MB1 - SQE/STP 2, 39.25 - 40.75	mg/g	0.12	3.5	0.062	2.3	0.013	0.2
MB1 - SQE/STP 3, 39.25 - 40.75	mg/g	0.16	4.8	0.28	10.4	0.044	0.9
MB1 - SQE/STP 4, 39.25 - 40.75	mg/g	0.026	0.8	0.028	1.0	0.0049	0.1
MB1 - SQE/STP 5, 39.25 - 40.75	mg/g	2.5	72.7	2.3	86.1	5.0	98.7
Total PW + STPS 1-5	mg/g	3.4	--	2.7	--	5.0	--
			14.4 m		14.4 m		14.4 m
MB1 - PW, 46.5' - 48'	mg/g	0.00	0.0	0.0032	0.1	0.0015	0.0
MB1 - SQE/STP 1, 46.5 - 48	mg/g	0.00	1.9	0.0015	0.0	0.0011	0.0
MB1 - SQE/STP 2, 46.5 - 48	mg/g	0.00	1.4	0.18	5.4	0.013	0.3
MB1 - SQE/STP 3, 46.5 - 48	mg/g	0.00	1.9	1.2	36.8	0.048	1.0
MB1 - SQE/STP 4, 46.5 - 48	mg/g	0.000	0.3	0.094	2.9	0.0055	0.1
MB1 - SQE/STP 5, 46.5 - 48	mg/g	0.0	94.4	1.8	54.7	4.8	98.6
BULK SOLID (MB1-47.5')	mg/g	0.0	--	2.7	--	3.4	--
Total PW + STPS 1-5	mg/g	0.0	--	3.3	--	4.9	--
% Diff. In Bulk & Summations	%	5.0	--	17.9	--	30.8	--
			2.7 m		2.7 m		2.7 m
MB2 - PW, 9.25' - 10.75'	mg/g	0.00	0.0	0.00000000	0.0	0.0013	0.0
MB2 - SQE/STP 1, 9.25 - 10.75	mg/g	31.3	56.6	0.00005	0.0	0.018	0.5
MB2 - SQE/STP 2, 9.25 - 10.75	mg/g	4.1	7.4	0.0015	0.3	0.049	1.3
MB2 - SQE/STP 3, 9.25 - 10.75	mg/g	9.6	17.4	0.02	4.6	0.28	7.3
MB2 - SQE/STP 4, 9.25 - 10.75	mg/g	10.0	18.2	0.413	94.6	0.030	0.8
MB2 - SQE/STP 5, 9.25 - 10.75	mg/g	0.3	0.5	0.00216	0.5	3.4	90.1
Total PW + STPS 1-5	mg/g	55.3	--	0.4	--	3.8	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 11 of 40)*

		Cesium (Cs)	%	Iron (Fe)	%	Lithium (Li)	%
			6.1 m		6.1 m		6.1 m
MB2 - PW, 19.25' - 20.75'	mg/g	0.00	0.0	0.00000000	0.0	0.00045	0.0
MB2 - SQE/STP 1, 19.25 - 20.75	mg/g	30.4	58.6	0.00005	0.0	0.013	0.3
MB2 - SQE/STP 2, 19.25 - 20.75	mg/g	4.0	7.7	0.002	0.4	0.040	0.8
MB2 - SQE/STP 3, 19.25 - 20.75	mg/g	9.7	18.6	0.08	21.2	0.11	2.1
MB2 - SQE/STP 4, 19.25 - 20.75	mg/g	7.65	14.7	0.275	77.9	0.012	0.2
MB2 - SQE/STP 5, 19.25 - 20.75	mg/g	0.2	0.4	0.0	0.4	4.8	96.6
Total PW + STPS 1-5	mg/g	51.9	--	0.4	--	5.0	--
			9.2 m		9.2 m		9.2 m
MB2 - PW, 29.5' - 31'	mg/g	0.00	0.0	0.000000	0.0	0.0016	0.1
MB2 - SQE/STP 1, 29.5 - 31	mg/g	0.4	16.6	0.0015	0.1	0.021	0.8
MB2 - SQE/STP 2, 29.5 - 31	mg/g	0.2	7.4	0.075	3.1	0.066	2.5
MB2 - SQE/STP 3, 29.5 - 31	mg/g	0.1	4.2	0.42	17.2	0.099	3.7
MB2 - SQE/STP 4, 29.5 - 31	mg/g	0.0	0.8	0.037	1.5	0.0088	0.3
MB2 - SQE/STP 5, 29.5 - 31	mg/g	1.7	71.0	1.9	78.1	2.5	92.6
Total PW + STPS 1-5	mg/g	2.3	--	2.4	--	2.6	--
			12.0 m		12.0 m		12.0 m
MB2 - PW, 38.5' - 40'	mg/g	0.10	3.6	0.00000016	0.0	0.00063	0.0
MB2 - SQE/STP 1, 38.5 - 40	mg/g	1.1	38.0	0.0015	0.0	0.0052	0.0
MB2 - SQE/STP 2, 38.5 - 40	mg/g	0.64	23.0	0.082	2.6	0.013	0.1
MB2 - SQE/STP 3, 38.5 - 40	mg/g	0.19	6.7	1.8	55.5	0.038	0.3
MB2 - SQE/STP 4, 38.5 - 40	mg/g	0.036	1.3	0.13	3.9	0.0050	0.0
MB2 - SQE/STP 5, 38.5 - 40	mg/g	0.76	27.4	1.2	37.9	11.1	99.5
BULK SOLID (MB2-39.25')	mg/g	2.1	--	2.9	--	8.1	--
Total PW + STPS 1-5	mg/g	2.8	--	3.2	--	11.2	--
% Diff. In Bulk & Summations	%	25.4	--	8.5	--	27.3	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 12 of 40)*

		Cesium (Cs)	%	Iron (Fe)	%	Lithium (Li)	%
			13.2 m		13.2 m		13.2 m
MB2 - PW, 42.5' - 44'	mg/g	0.25	8.7	0.000048	0.0	0.0020	0.0
MB2 - SQE/STP 1, 42.5 - 44	mg/g	0.55	19.0	0.0015	0.1	0.0032	0.0
MB2 - SQE/STP 2, 42.5 - 44	mg/g	0.15	5.1	0.063	3.4	0.013	0.1
MB2 - SQE/STP 3, 42.5 - 44	mg/g	0.27	9.4	0.26	13.9	0.025	0.3
MB2 - SQE/STP 4, 42.5 - 44	mg/g	0.043	1.5	0.024	1.3	0.0038	0.0
MB2 - SQE/STP 5, 42.5 - 44	mg/g	1.6	56.3	1.5	81.3	9.1	99.5
BULK SOLID (MB2-43')	mg/g	1.6	--	2.7	--	3.6	--
Total PW + STPS 1-5	mg/g	2.9	--	1.8	--	9.1	--
% Diff. In Bulk & Summations	%	43.3	--	-46.3	--	61.0	--
			15.5 m		15.5 m		15.5 m
MB2 - PW, 49.5' - 52'	mg/g	0.00014	0.0	0.0000060	0.0	0.0026	0.0
MB2 - SQE/STP 1, 49.5 - 52	mg/g	0.0037	0.5	0.0015	0.0	0.0067	0.1
MB2 - SQE/STP 2, 49.5 - 52	mg/g	0.0073	0.9	0.35	7.0	0.013	0.1
MB2 - SQE/STP 3, 49.5 - 52	mg/g	0.024	3.0	2.7	54.1	0.065	0.6
MB2 - SQE/STP 4, 49.5 - 52	mg/g	0.0086	1.1	0.23	4.7	0.011	0.1
MB2 - SQE/STP 5, 49.5 - 52	mg/g	0.75	94.5	1.7	34.2	10.0	99.0
BULK SOLID (MB2-51')	mg/g	0.80	--	4.5	--	12.3	--
Total PW + STPS 1-5	mg/g	0.79	--	5.0	--	10.1	--
% Diff. In Bulk & Summations	%	-0.6	--	9.5	--	-21.4	--
			17.1 m		17.1 m		17.1 m
MB2 - PW, 52' - 60'	mg/g	0.0019	0.0	0.0043	0.1	*no PW*	--
MB2 - SQE/STP 1, 52 - 60	mg/g	0.0085	0.2	0.0015	0.0	0.0025	0.0
MB2 - SQE/STP 2, 52 - 60	mg/g	0.044	0.9	0.39	7.0	0.013	0.1
MB2 - SQE/STP 3, 52 - 60	mg/g	0.15	3.2	3.0	53.9	0.063	0.7
MB2 - SQE/STP 4, 52 - 60	mg/g	0.052	1.1	0.26	4.7	0.011	0.1
MB2 - SQE/STP 5, 52 - 60	mg/g	4.4	94.5	1.9	34.3	9.1	99.0
Total PW + STPS 1-5	mg/g	4.6	--	5.5	--	9.2	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 13 of 40)*

		Cesium (Cs)	%	Iron (Fe)	%	Lithium (Li)	%
			<u>1.7 m</u>		<u>1.7 m</u>		<u>1.7 m</u>
MB3 - PW, 4.75' - 6.25'	mg/g	0.22	1.5	0.00000028	0.0	0.00032	0.0
MB3 - SQE/STP 1, 4.75 - 6.25	mg/g	2.0	13.3	0.0015	0.1	0.0086	0.2
MB3 - SQE/STP 2, 4.75 - 6.25	mg/g	3.6	23.9	0.078	4.8	0.042	0.7
MB3 - SQE/STP 3, 4.75 - 6.25	mg/g	3.6	24.0	0.42	26.0	0.17	3.0
MB3 - SQE/STP 4, 4.75 - 6.25	mg/g	0.64	4.3	0.021	1.3	0.010	0.2
MB3 - SQE/STP 5, 4.75 - 6.25	mg/g	4.9	32.9	1.1	67.8	5.5	96.0
BULK SOLID (MB3-5')	mg/g	12.1	--	1.2	--	4.0	--
Total PW + STPS 1-5	mg/g	14.9	--	1.6	--	5.7	--
% Diff. In Bulk & Summations	%	19.3	--	26.0	--	30.4	--
			<u>3.1 m</u>		<u>3.1 m</u>		<u>3.1 m</u>
MB3 - PW, 9.5' - 11'	mg/g	0.44	3.0	0.00000059	0.0	0.00041	0.0
MB3 - SQE/STP 1, 9.5 - 11	mg/g	2.0	13.6	0.0015	0.1	0.0046	0.1
MB3 - SQE/STP 2, 9.5 - 11	mg/g	3.8	26.1	0.13	7.3	0.028	0.4
MB3 - SQE/STP 3, 9.5 - 11	mg/g	3.3	22.7	0.51	28.5	0.12	1.8
MB3 - SQE/STP 4, 9.5 - 11	mg/g	0.65	4.4	0.045	2.5	0.012	0.2
MB3 - SQE/STP 5, 9.5 - 11	mg/g	4.4	30.1	1.1	61.6	6.8	97.6
Total PW + STPS 1-5	mg/g	14.7	--	1.8	--	7.0	--
			<u>4.9 m</u>		<u>4.9 m</u>		<u>4.9 m</u>
MB3 - PW, 15.25' - 16.75'	mg/g	0.30	2.2	0.00000045	0.0	0.00055	0.0
MB3 - SQE/STP 1, 15.25 - 16.75	mg/g	2.1	15.1	0.0015	0.1	0.0067	0.1
MB3 - SQE/STP 2, 15.25 - 16.75	mg/g	4.1	29.0	0.073	6.4	0.036	0.7
MB3 - SQE/STP 3, 15.25 - 16.75	mg/g	3.3	23.5	0.26	22.7	0.11	2.3
MB3 - SQE/STP 4, 15.25 - 16.75	mg/g	0.59	4.2	0.014	1.2	0.0083	0.2
MB3 - SQE/STP 5, 15.25 - 16.75	mg/g	3.6	26.0	0.80	69.6	4.7	96.7
BULK SOLID (MB3-16')	mg/g	13.8	--	1.3	--	3.3	--
Total PW + STPS 1-5	mg/g	14.0	--	1.1	--	4.9	--
% Diff. In Bulk & Summations	%	1.3	--	-13.1	--	32.7	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 14 of 40)*

		Cesium (Cs)	%	Iron (Fe)	%	Lithium (Li)	%
			6.1 m		6.1 m		6.1 m
MB3 - PW, 19.25' - 20.75'	mg/g	0.090	0.5	0.00000017	0.0	0.0014	0.0
MB3 - SQE/STP 1, 19.25 - 20.75	mg/g	2.3	12.8	0.0015	0.1	0.023	0.8
MB3 - SQE/STP 2, 19.25 - 20.75	mg/g	5.9	33.2	0.024	1.2	0.075	2.6
MB3 - SQE/STP 3, 19.25 - 20.75	mg/g	5.3	30.1	0.31	14.9	0.14	4.9
MB3 - SQE/STP 4, 19.25 - 20.75	mg/g	1.7	9.3	0.031	1.5	0.016	0.6
MB3 - SQE/STP 5, 19.25 - 20.75	mg/g	2.5	14.2	1.7	82.3	2.6	91.1
BULK SOLID a (MB3-19.5')	mg/g	14.1	--	1.4	--	2.1	--
BULK SOLID b (MB3-21')	mg/g	16.4	--	1.2	--	2.0	--
Total PW + STPS 1-5	mg/g	17.8	--	2.1	--	2.9	--
% Diff. In Bulk a & Summations	%	20.6	--	32.2	--	26.2	--
% Diff. In Bulk b & Summations	%	7.7	--	41.9	--	32.1	--
			7.7 m		7.7 m		7.7 m
MB3 - PW, 24.5' - 26'	mg/g	0.37	1.9	0.00010	0.0	0.0042	0.1
MB3 - SQE/STP 1, 24.5 - 26	mg/g	2.8	14.8	0.0015	0.1	0.023	0.5
MB3 - SQE/STP 2, 24.5 - 26	mg/g	7.2	37.4	0.062	3.6	0.089	1.9
MB3 - SQE/STP 3, 24.5 - 26	mg/g	5.0	26.2	0.23	13.5	0.12	2.6
MB3 - SQE/STP 4, 24.5 - 26	mg/g	1.7	8.8	0.019	1.1	0.012	0.3
MB3 - SQE/STP 5, 24.5 - 26	mg/g	2.1	10.8	1.4	81.7	4.4	94.6
Total PW + STPS 1-5	mg/g	19.1	--	1.7	--	4.6	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 15 of 40)*

		Cesium (Cs)	%	Iron (Fe)	%	Lithium (Li)	%
			8.8 m		8.8 m		8.8 m
MB3 - PW, 28.25' - 29.75'	mg/g	0.34	2.3	0.0000033	0.0	0.0014	0.0
MB3 - SQE/STP 1, 28.25 - 29.75	mg/g	2.3	15.6	0.0015	0.1	0.014	0.4
MB3 - SQE/STP 2, 28.25 - 29.75	mg/g	5.0	34.0	0.038	3.7	0.048	1.3
MB3 - SQE/STP 3, 28.25 - 29.75	mg/g	2.8	19.1	0.18	17.2	0.038	1.1
MB3 - SQE/STP 4, 28.25 - 29.75	mg/g	0.93	6.3	0.018	1.7	0.0045	0.1
MB3 - SQE/STP 5, 28.25 - 29.75	mg/g	3.3	22.6	0.80	77.3	3.5	97.1
BULK SOLID (MB3-29')	mg/g	13.4	--	1.0	--	2.4	--
Total PW + STPS 1-5	mg/g	14.7	--	1.0	--	3.6	--
% Diff. In Bulk & Summations	%	8.9	--	3.4	--	34.2	--
			10.7 m		10.7 m		10.7 m
MB3 - PW, 34.25' - 35.75'	mg/g	0.53	3.3	0.000053	0.0	0.0036	0.1
MB3 - SQE/STP 1, 34.25 - 35.75	mg/g	2.6	16.5	0.0015	0.1	0.019	0.5
MB3 - SQE/STP 2, 34.25 - 35.75	mg/g	4.4	27.5	0.042	4.0	0.055	1.4
MB3 - SQE/STP 3, 34.25 - 35.75	mg/g	3.2	20.2	0.20	18.4	0.058	1.4
MB3 - SQE/STP 4, 34.25 - 35.75	mg/g	0.67	4.2	0.019	1.8	0.0060	0.1
MB3 - SQE/STP 5, 34.25 - 35.75	mg/g	4.5	28.3	0.80	75.6	3.9	96.5
Total PW + STPS 1-5	mg/g	15.9	--	1.1	--	4.1	--
			12.4 m		12.4 m		12.4 m
MB3 - PW, 40' - 41.5'	mg/g	0.88	6.0	0.000050	0.0	0.0058	0.2
MB3 - SQE/STP 1, 40 - 41.5	mg/g	2.2	14.9	0.0015	0.1	0.015	0.4
MB3 - SQE/STP 2, 40 - 41.5	mg/g	4.2	28.7	0.093	4.3	0.036	0.9
MB3 - SQE/STP 3, 40 - 41.5	mg/g	2.8	19.4	0.43	20.0	0.065	1.7
MB3 - SQE/STP 4, 40 - 41.5	mg/g	0.72	4.9	0.040	1.9	0.0074	0.2
MB3 - SQE/STP 5, 40 - 41.5	mg/g	3.8	26.1	1.6	73.8	3.7	96.6
BULK SOLID (MB3-41')	mg/g	12.1	--	1.3	--	3.5	--
Total PW + STPS 1-5	mg/g	14.6	--	2.2	--	3.8	--
% Diff. In Bulk & Summations	%	17.2	--	40.1	--	7.1	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 16 of 40)*

		Cesium (Cs)	%	Iron (Fe)	%	Lithium (Li)	%
			13.2 m		13.2 m		13.2 m
MB3 - PW, 42.5' - 44'	mg/g	0.16	2.6	0.000037	0.0	0.00085	0.0
MB3 - SQE/STP 1, 42.5 - 44	mg/g	0.92	14.4	0.0015	0.0	0.0032	0.1
MB3 - SQE/STP 2, 42.5 - 44	mg/g	0.64	10.0	0.44	10.2	0.013	0.3
MB3 - SQE/STP 3, 42.5 - 44	mg/g	0.17	2.7	2.2	49.4	0.048	1.2
MB3 - SQE/STP 4, 42.5 - 44	mg/g	0.038	0.6	0.16	3.7	0.0067	0.2
MB3 - SQE/STP 5, 42.5 - 44	mg/g	4.4	69.7	1.6	36.7	4.1	98.3
BULK SOLID (MB3-43')	mg/g	3.3	--	4.2	--	8.0	--
Total PW + STPS 1-5	mg/g	6.4	--	4.4	--	4.1	--
% Diff. In Bulk & Summations	%	49.0	--	3.6	--	-92.9	--
			14.4 m		14.4 m		14.4 m
MB3 - PW, 46.5'-48'	mg/g	0.13	3.9	0.000063	0.0	0.00046	0.0
MB3 - SQE/STP 1, 46.5 - 48	mg/g	0.53	15.5	0.0015	0.0	0.0017	0.0
MB3 - SQE/STP 2, 46.5 - 48	mg/g	0.33	9.5	0.13	3.5	0.013	0.4
MB3 - SQE/STP 3, 46.5 - 48	mg/g	0.34	9.8	2.0	51.2	0.094	2.8
MB3 - SQE/STP 4, 46.5 - 48	mg/g	0.052	1.5	0.14	3.7	0.010	0.3
MB3 - SQE/STP 5, 46.5 - 48	mg/g	2.1	59.8	1.6	41.6	3.3	96.5
BULK SOLID (MB3-47.5')	mg/g	3.9	--	2.7	--	3.4	--
Total PW + STPS 1-5	mg/g	3.4	--	3.8	--	3.4	--
% Diff. In Bulk & Summations	%	-13.7	--	29.9	--	0.8	--
			15.2 m		15.2 m		15.2 m
MB3 - PW, 48'-52'	mg/g	0.064	3.2	0.00021	0.0	0.0012	0.0
MB3 - SQE/STP 1, 48 - 52	mg/g	0.16	8.0	0.0015	0.0	0.0022	0.1
MB3 - SQE/STP 2, 48 - 52	mg/g	0.12	5.9	0.14	4.2	0.013	0.4
MB3 - SQE/STP 3, 48 - 52	mg/g	0.085	4.2	0.89	26.0	0.030	0.9
MB3 - SQE/STP 4, 48 - 52	mg/g	0.017	0.8	0.075	2.2	0.0033	0.1
MB3 - SQE/STP 5, 48 - 52	mg/g	1.6	77.8	2.3	67.6	3.4	98.6
Total PW + STPS 1-5	mg/g	2.0	--	3.4	--	3.4	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 17 of 40)*

		Magnesium (Mg)	%	Manganese (Mn)	%	Potassium (K)	
			3.0 m		3.0 m		3.0 m
MB1 - PW, 9.25' - 10.75'	mg/g	0.0050	0.6	0.000040	0.0	0.0000018	0.0
MB1 - SQE/STP 1, 9.25 - 10.75	mg/g	0.062	6.9	0.0013	0.6	0.10	1.2
MB1 - SQE/STP 2, 9.25 - 10.75	mg/g	0.086	9.5	0.038	18.5	0.50	5.8
MB1 - SQE/STP 3, 9.25 - 10.75	mg/g	0.58	64.6	0.10	50.4	0.10	1.2
MB1 - SQE/STP 4, 9.25 - 10.75	mg/g	0.066	7.3	0.012	6.1	0.13	1.4
MB1 - SQE/STP 5, 9.25 - 10.75	mg/g	0.10	11.1	0.049	24.2	7.8	90.4
Total PW + STPS 1-5	mg/g	0.9	--	0.2	--	8.6	--
			5.9 m		5.9 m		5.9 m
MB1 - PW, 18.75' - 20.25'	mg/g	0.042	4.2	0.00016	0.1	0.0000017	0.0
MB1 - SQE/STP 1, 18.75 - 20.25	mg/g	0.24	23.6	0.0035	2.1	0.10	1.3
MB1 - SQE/STP 2, 18.75 - 20.25	mg/g	0.18	17.9	0.045	26.8	0.50	6.6
MB1 - SQE/STP 3, 18.75 - 20.25	mg/g	0.40	39.6	0.065	38.9	0.10	1.3
MB1 - SQE/STP 4, 18.75 - 20.25	mg/g	0.048	4.7	0.0068	4.1	0.13	1.6
MB1 - SQE/STP 5, 18.75 - 20.25	mg/g	0.10	10.0	0.047	28.0	6.8	89.2
Total PW + STPS 1-5	mg/g	1.00	--	0.168	--	7.6	--
		no PW	10.1 m	*no PW*	10.1 m	*no PW*	10.1 m
MB1 - SQE/STP 1, 32.5 - 34	mg/g	0.038	13.4	0.00016	0.1	0.10	0.7
MB1 - SQE/STP 2, 32.5 - 34	mg/g	0.025	8.8	0.043	17.7	0.50	3.3
MB1 - SQE/STP 3, 32.5 - 34	mg/g	0.014	4.9	0.086	35.6	0.10	0.7
MB1 - SQE/STP 4, 32.5 - 34	mg/g	0.0063	2.2	0.0095	3.9	0.13	0.8
MB1 - SQE/STP 5, 32.5 - 34	mg/g	0.20	70.6	0.10	42.7	14.4	94.6
BULK SOLID (MB1-33.5')	mg/g	0.30	--	0.27	--	12.9	--
Total STPS 1-5	mg/g	0.3	--	0.2	--	15.2	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 18 of 40)*

		Magnesium (Mg)	%	Manganese (Mn)	%	Potassium (K)	
			12.2 m		12.2 m		12.2 m
MB1 - PW, 39.25' - 40.75'	mg/g	0.014	4.5	0.00019	0.0	0.0016	0.0
MB1 - SQE/STP 1, 39.25 - 40.75	mg/g	0.051	16.1	0.0011	0.1	0.10	0.4
MB1 - SQE/STP 2, 39.25 - 40.75	mg/g	0.025	7.9	0.066	9.3	0.50	1.9
MB1 - SQE/STP 3, 39.25 - 40.75	mg/g	0.020	6.3	0.32	45.5	0.10	0.4
MB1 - SQE/STP 4, 39.25 - 40.75	mg/g	0.0063	2.0	0.035	4.9	0.13	0.5
MB1 - SQE/STP 5, 39.25 - 40.75	mg/g	0.20	63.2	0.28	40.1	26.2	96.9
Total PW + STPS 1-5	mg/g	0.32	--	0.708	--	27.0	--
			14.4 m		14.4 m		14.4 m
MB1 - PW, 46.5' - 48'	mg/g	0.028	8.4	0.0016	0.2	0.0059	0.0
MB1 - SQE/STP 1, 46.5 - 48	mg/g	0.055	16.2	0.0030	0.4	0.10	0.3
MB1 - SQE/STP 2, 46.5 - 48	mg/g	0.025	7.4	0.11	13.0	0.50	1.6
MB1 - SQE/STP 3, 46.5 - 48	mg/g	0.025	7.4	0.36	42.9	0.10	0.3
MB1 - SQE/STP 4, 46.5 - 48	mg/g	0.0063	1.8	0.037	4.4	0.13	0.4
MB1 - SQE/STP 5, 46.5 - 48	mg/g	0.20	58.9	0.33	39.2	30.7	97.4
BULK SOLID (MB1-47.5')	mg/g	0.30	--	0.68	--	29.4	--
Total PW + STPS 1-5	mg/g	0.34	--	0.85	--	31.5	--
% Diff. In Bulk & Summations	%	11.7	--	20.4	--	6.8	--
			2.7 m		2.7 m		2.7 m
MB2 - PW, 9.25' - 10.75'	mg/g	0.0061	0.4	0.000019	0.0	0.0000030	0.0
MB2 - SQE/STP 1, 9.25 - 10.75	mg/g	0.077	5.6	0.0010	0.5	0.10	1.1
MB2 - SQE/STP 2, 9.25 - 10.75	mg/g	0.47	33.8	0.055	25.7	0.50	5.7
MB2 - SQE/STP 3, 9.25 - 10.75	mg/g	0.57	41.1	0.096	44.8	0.10	1.1
MB2 - SQE/STP 4, 9.25 - 10.75	mg/g	0.065	4.7	0.012	5.6	0.13	1.4
MB2 - SQE/STP 5, 9.25 - 10.75	mg/g	0.20	14.4	0.050	23.4	7.9	90.5
Total PW + STPS 1-5	mg/g	1.39	--	0.214	--	8.7	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 19 of 40)*

		Magnesium (Mg)	%	Manganese (Mn)	%	Potassium (K)	
			6.1 m		6.1 m		6.1 m
MB2 - PW, 19.25' - 20.75'	mg/g	0.0073	0.6	0.0000042	0.0	0.0000015	0.0
MB2 - SQE/STP 1, 19.25 - 20.75	mg/g	0.14	11.3	0.00032	0.2	0.10	1.3
MB2 - SQE/STP 2, 19.25 - 20.75	mg/g	0.59	47.9	0.035	26.9	0.50	6.6
MB2 - SQE/STP 3, 19.25 - 20.75	mg/g	0.36	29.1	0.050	37.9	0.10	1.3
MB2 - SQE/STP 4, 19.25 - 20.75	mg/g	0.038	3.0	0.0046	3.5	0.13	1.6
MB2 - SQE/STP 5, 19.25 - 20.75	mg/g	0.1	8.1	0.041	31.4	6.8	89.2
Total PW + STPS 1-5	mg/g	1.23	--	0.131	--	7.6	--
			9.2 m		9.2 m		9.2 m
MB2 - PW, 29.5' - 31'	mg/g	0.0072	1.2	0.00014	0.1	0.0000054	0.0
MB2 - SQE/STP 1, 29.5 - 31	mg/g	0.13	21.8	0.0035	1.9	0.10	0.5
MB2 - SQE/STP 2, 29.5 - 31	mg/g	0.11	19.5	0.051	27.7	0.50	2.6
MB2 - SQE/STP 3, 29.5 - 31	mg/g	0.21	35.8	0.053	28.6	0.10	0.5
MB2 - SQE/STP 4, 29.5 - 31	mg/g	0.025	4.3	0.0063	3.4	0.13	0.7
MB2 - SQE/STP 5, 29.5 - 31	mg/g	0.1	17.3	0.071	38.4	18.4	95.7
Total PW + STPS 1-5	mg/g	0.58	--	0.185	--	19.2	--
			12.0 m		12.0 m		12.0 m
MB2 - PW, 38.5' - 40'	mg/g	0.0054	1.6	0.000024	0.0	0.00029	0.0
MB2 - SQE/STP 1, 38.5 - 40	mg/g	0.066	19.7	0.00021	0.1	0.10	1.0
MB2 - SQE/STP 2, 38.5 - 40	mg/g	0.025	7.4	0.065	23.6	0.50	4.8
MB2 - SQE/STP 3, 38.5 - 40	mg/g	0.033	9.8	0.10	36.9	0.10	1.0
MB2 - SQE/STP 4, 38.5 - 40	mg/g	0.0063	1.9	0.012	4.4	0.13	1.2
MB2 - SQE/STP 5, 38.5 - 40	mg/g	0.20	59.6	0.096	35.1	9.7	92.2
BULK SOLID (MB2-39.25')	mg/g	0.30	--	0.28	--	16.5	--
Total PW + STPS 1-5	mg/g	0.34	--	0.27	--	10.5	--
% Diff. In Bulk & Summations	%	10.6	--	-0.8	--	-56.8	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 20 of 40)*

		Magnesium (Mg)	%	Manganese (Mn)	%	Potassium (K)	
			13.2 m		13.2 m		13.2 m
MB2 - PW, 42.5' - 44'	mg/g	0.012	3.1	0.000092	0.0	0.00090	0.0
MB2 - SQE/STP 1, 42.5 - 44	mg/g	0.039	9.7	0.00095	0.2	0.10	0.5
MB2 - SQE/STP 2, 42.5 - 44	mg/g	0.025	6.2	0.063	12.5	0.50	2.6
MB2 - SQE/STP 3, 42.5 - 44	mg/g	0.020	5.0	0.26	52.3	0.10	0.5
MB2 - SQE/STP 4, 42.5 - 44	mg/g	0.0063	1.6	0.029	5.8	0.13	0.7
MB2 - SQE/STP 5, 42.5 - 44	mg/g	0.30	74.5	0.15	29.2	18.4	95.7
BULK SOLID (MB2-43')	mg/g	0.20	--	0.43	--	17.9	--
Total PW + STPS 1-5	mg/g	0.40	--	0.50	--	19.2	--
% Diff. In Bulk & Summations	%	50.3	--	14.8	--	6.9	--
			15.5 m		15.5 m		15.5 m
MB2 - PW, 49.5' - 52'	mg/g	0.000060	0.0	0.0000067	0.0	0.0026	0.0
MB2 - SQE/STP 1, 49.5 - 52	mg/g	0.0050	1.1	0.00012	0.0	0.10	0.6
MB2 - SQE/STP 2, 49.5 - 52	mg/g	0.025	5.3	0.10	18.7	0.50	3.2
MB2 - SQE/STP 3, 49.5 - 52	mg/g	0.038	8.0	0.26	45.8	0.10	0.6
MB2 - SQE/STP 4, 49.5 - 52	mg/g	0.0063	1.3	0.033	5.9	0.13	0.8
MB2 - SQE/STP 5, 49.5 - 52	mg/g	0.40	84.3	0.17	29.6	14.6	94.6
BULK SOLID (MB2-51')	mg/g	0.50	--	0.55	--	12.3	--
Total PW + STPS 1-5	mg/g	0.47	--	0.56	--	15.4	--
% Diff. In Bulk & Summations	%	-5.4	--	2.0	--	20.3	--
			17.1 m		17.1 m		17.1 m
MB2 - PW, 52' - 60'	mg/g	0.0052	1.3	0.00036	0.1	0.0096	0.0
MB2 - SQE/STP 1, 52 - 60	mg/g	0.0050	1.3	0.00045	0.1	0.10	0.5
MB2 - SQE/STP 2, 52 - 60	mg/g	0.025	6.4	0.032	7.8	0.50	2.6
MB2 - SQE/STP 3, 52 - 60	mg/g	0.050	12.8	0.23	57.0	0.10	0.5
MB2 - SQE/STP 4, 52 - 60	mg/g	0.0063	1.6	0.034	8.2	0.13	0.6
MB2 - SQE/STP 5, 52 - 60	mg/g	0.30	76.6	0.11	26.8	18.5	95.7
Total PW + STPS 1-5	mg/g	0.39	--	0.407	--	19.3	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 21 of 40)*

		Magnesium (Mg)	%	Manganese (Mn)	%	Potassium (K)	
			1.7 m		1.7 m		1.7 m
MB3 - PW, 4.75' - 6.25'	mg/g	0.0017	0.2	0.0000013	0.0	0.000030	0.0
MB3 - SQE/STP 1, 4.75 - 6.25	mg/g	0.066	7.7	0.00011	0.1	0.10	0.9
MB3 - SQE/STP 2, 4.75 - 6.25	mg/g	0.41	47.8	0.034	18.8	0.50	4.5
MB3 - SQE/STP 3, 4.75 - 6.25	mg/g	0.26	30.6	0.078	43.7	0.10	0.9
MB3 - SQE/STP 4, 4.75 - 6.25	mg/g	0.018	2.0	0.0046	2.6	0.13	1.1
MB3 - SQE/STP 5, 4.75 - 6.25	mg/g	0.10	11.7	0.062	34.8	10.4	92.7
BULK SOLID (MB3-5')	mg/g	0.60	--	0.12	--	8.7	--
Total PW + STPS 1-5	mg/g	0.86	--	0.18	--	11.2	--
% Diff. In Bulk & Summations	%	30.1	--	30.4	--	22.5	--
			3.1 m		3.1 m		3.1 m
MB3 - PW, 9.5' - 11'	mg/g	0.00016	0.0	0.000000094	0.0	0.00012	0.0
MB3 - SQE/STP 1, 9.5 - 11	mg/g	0.020	1.5	0.000022	0.0	0.10	1.2
MB3 - SQE/STP 2, 9.5 - 11	mg/g	0.73	56.3	0.049	27.6	0.50	5.9
MB3 - SQE/STP 3, 9.5 - 11	mg/g	0.41	31.2	0.071	39.4	0.10	1.2
MB3 - SQE/STP 4, 9.5 - 11	mg/g	0.043	3.3	0.0062	3.5	0.13	1.5
MB3 - SQE/STP 5, 9.5 - 11	mg/g	0.10	7.7	0.053	29.6	7.6	90.2
Total PW + STPS 1-5	mg/g	1.30	--	0.179	--	8.4	--
			4.9 m		4.9 m		4.9 m
MB3 - PW, 15.25' - 16.75'	mg/g	0.0023	0.3	0.000012	0.0	0.0000022	0.0
MB3 - SQE/STP 1, 15.25 - 16.75	mg/g	0.087	9.5	0.00028	0.3	0.10	1.3
MB3 - SQE/STP 2, 15.25 - 16.75	mg/g	0.51	55.3	0.038	35.3	0.50	6.6
MB3 - SQE/STP 3, 15.25 - 16.75	mg/g	0.20	22.3	0.036	34.0	0.10	1.3
MB3 - SQE/STP 4, 15.25 - 16.75	mg/g	0.015	1.6	0.0025	2.3	0.13	1.6
MB3 - SQE/STP 5, 15.25 - 16.75	mg/g	0.10	10.9	0.030	28.1	6.8	89.2
BULK SOLID (MB3-16')	mg/g	1.2	--	0.12	--	4.6	--
Total PW + STPS 1-5	mg/g	0.91	--	0.11	--	7.6	--
% Diff. In Bulk & Summations	%	-31.2	--	-9.6	--	39.7	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 22 of 40)*

		Magnesium (Mg)	%	Manganese (Mn)	%	Potassium (K)	
			6.1 m		6.1 m		6.1 m
MB3 - PW, 19.25' - 20.75'	mg/g	0.0015	0.3	0.000065	0.0	0.00000084	0.0
MB3 - SQE/STP 1, 19.25 - 20.75	mg/g	0.055	10.4	0.0047	2.5	0.10	1.0
MB3 - SQE/STP 2, 19.25 - 20.75	mg/g	0.025	4.7	0.023	12.1	0.50	5.0
MB3 - SQE/STP 3, 19.25 - 20.75	mg/g	0.31	58.8	0.10	53.1	0.10	1.0
MB3 - SQE/STP 4, 19.25 - 20.75	mg/g	0.038	7.1	0.012	6.2	0.13	1.3
MB3 - SQE/STP 5, 19.25 - 20.75	mg/g	0.10	18.8	0.050	26.0	9.1	91.7
BULK SOLID a (MB3-19.5')	mg/g	0.20	--	0.14	--	8.6	--
BULK SOLID b (MB3-21')	mg/g	0.30	--	0.11	--	5.3	--
Total PW + STPS 1-5	mg/g	0.53	--	0.19	--	9.9	--
% Diff. In Bulk a & Summations	%	62.3	--	28.1	--	13.4	--
% Diff. In Bulk b & Summations	%	43.5	--	40.6	--	46.6	--
			7.7 m		7.7 m		7.7 m
MB3 - PW, 24.5' - 26'	mg/g	0.019	2.9	0.00047	0.3	0.0000033	0.0
MB3 - SQE/STP 1, 24.5 - 26	mg/g	0.10	16.0	0.0076	4.3	0.10	1.2
MB3 - SQE/STP 2, 24.5 - 26	mg/g	0.080	12.3	0.037	20.9	0.50	6.2
MB3 - SQE/STP 3, 24.5 - 26	mg/g	0.31	48.3	0.076	43.7	0.10	1.2
MB3 - SQE/STP 4, 24.5 - 26	mg/g	0.033	5.0	0.0070	4.0	0.13	1.6
MB3 - SQE/STP 5, 24.5 - 26	mg/g	0.10	15.4	0.047	26.9	7.2	89.7
Total PW + STPS 1-5	mg/g	0.65	--	0.175	--	8.0	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 23 of 40)*

		Magnesium (Mg)	%	Manganese (Mn)	%	Potassium (K)	
			8.8 m		8.8 m		8.8 m
MB3 - PW, 28.25' - 29.75'	mg/g	0.010	3.6	0.00029	0.3	0.0000020	0.0
MB3 - SQE/STP 1, 28.25 - 29.75	mg/g	0.072	25.0	0.0084	7.8	0.10	1.6
MB3 - SQE/STP 2, 28.25 - 29.75	mg/g	0.025	8.7	0.024	22.4	0.50	8.2
MB3 - SQE/STP 3, 28.25 - 29.75	mg/g	0.12	40.6	0.033	30.4	0.10	1.6
MB3 - SQE/STP 4, 28.25 - 29.75	mg/g	0.014	4.8	0.0040	3.7	0.13	2.0
MB3 - SQE/STP 5, 28.25 - 29.75	mg/g	0.050	17.3	0.038	35.4	5.3	86.5
BULK SOLID (MB3-29')	mg/g	0.30	--	0.10	--	3.4	--
Total PW + STPS 1-5	mg/g	0.29	--	0.11	--	6.1	--
% Diff. In Bulk & Summations	%	-4.1	--	5.1	--	44.5	--
			10.7 m		10.7 m		10.7 m
MB3 - PW, 34.25' - 35.75'	mg/g	0.029	5.7	0.00058	0.5	0.0000031	0.0
MB3 - SQE/STP 1, 34.25 - 35.75	mg/g	0.15	28.8	0.0071	6.2	0.10	1.3
MB3 - SQE/STP 2, 34.25 - 35.75	mg/g	0.051	9.9	0.016	14.4	0.50	6.7
MB3 - SQE/STP 3, 34.25 - 35.75	mg/g	0.17	32.9	0.046	40.4	0.10	1.3
MB3 - SQE/STP 4, 34.25 - 35.75	mg/g	0.018	3.4	0.0049	4.3	0.13	1.7
MB3 - SQE/STP 5, 34.25 - 35.75	mg/g	0.10	19.3	0.039	34.2	6.6	88.9
Total PW + STPS 1-5	mg/g	0.52	--	0.114	--	7.4	--
			12.4 m		12.4 m		12.4 m
MB3 - PW, 40' - 41.5'	mg/g	0.19	13.2	0.00054	0.2	0.0000052	0.0
MB3 - SQE/STP 1, 40 - 41.5	mg/g	0.17	11.8	0.0056	2.0	0.10	1.1
MB3 - SQE/STP 2, 40 - 41.5	mg/g	0.55	38.8	0.13	46.5	0.50	5.4
MB3 - SQE/STP 3, 40 - 41.5	mg/g	0.37	26.3	0.072	25.4	0.10	1.1
MB3 - SQE/STP 4, 40 - 41.5	mg/g	0.039	2.7	0.0067	2.4	0.13	1.3
MB3 - SQE/STP 5, 40 - 41.5	mg/g	0.10	7.1	0.067	23.6	8.5	91.2
BULK SOLID (MB3-41')	mg/g	1.2	--	0.32	--	6.2	--
Total PW + STPS 1-5	mg/g	1.4	--	0.28	--	9.3	--
% Diff. In Bulk & Summations	%	15.0	--	-11.0	--	33.5	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 24 of 40)*

		Magnesium (Mg)	%	Manganese (Mn)	%	Potassium (K)	
			13.2 m		13.2 m		13.2 m
MB3 - PW, 42.5' - 44'	mg/g	0.010	4.0	0.00011	0.0	0.00017	0.0
MB3 - SQE/STP 1, 42.5 - 44	mg/g	0.082	31.1	0.0016	0.3	0.10	0.4
MB3 - SQE/STP 2, 42.5 - 44	mg/g	0.025	9.5	0.089	18.3	0.50	2.2
MB3 - SQE/STP 3, 42.5 - 44	mg/g	0.040	15.2	0.16	32.7	0.10	0.4
MB3 - SQE/STP 4, 42.5 - 44	mg/g	0.0063	2.4	0.018	3.6	0.13	0.6
MB3 - SQE/STP 5, 42.5 - 44	mg/g	0.10	37.9	0.22	45.1	21.7	96.3
BULK SOLID (MB3-43')	mg/g	0.30	--	0.40	--	18.1	--
Total PW + STPS 1-5	mg/g	0.26	--	0.49	--	22.5	--
% Diff. In Bulk & Summations	%	-13.8	--	18.5	--	19.6	--
			14.4 m		14.4 m		14.4 m
MB3 - PW, 46.5'-48'	mg/g	0.0083	3.7	0.00020	0.0	0.0017	0.0
MB3 - SQE/STP 1, 46.5 - 48	mg/g	0.036	16.2	0.0028	0.2	0.10	0.3
MB3 - SQE/STP 2, 46.5 - 48	mg/g	0.025	11.3	0.12	9.3	0.50	1.7
MB3 - SQE/STP 3, 46.5 - 48	mg/g	0.046	20.8	0.82	64.0	0.10	0.3
MB3 - SQE/STP 4, 46.5 - 48	mg/g	0.0063	2.8	0.070	5.5	0.13	0.4
MB3 - SQE/STP 5, 46.5 - 48	mg/g	0.10	45.1	0.27	21.0	29.2	97.2
BULK SOLID (MB3-47.5')	mg/g	0.10	--	0.61	--	25.9	--
Total PW + STPS 1-5	mg/g	0.22	--	1.3	--	30.0	--
% Diff. In Bulk & Summations	%	54.9	--	52.0	--	13.7	--
			15.2 m		15.2 m		15.2 m
MB3 - PW, 48'-52'	mg/g	0.0093	5.1	0.00037	0.1	0.012	0.0
MB3 - SQE/STP 1, 48 - 52	mg/g	0.021	11.4	0.0044	0.7	0.10	0.4
MB3 - SQE/STP 2, 48 - 52	mg/g	0.025	13.6	0.097	14.9	0.50	1.8
MB3 - SQE/STP 3, 48 - 52	mg/g	0.022	12.0	0.26	39.3	0.10	0.4
MB3 - SQE/STP 4, 48 - 52	mg/g	0.0063	3.4	0.024	3.6	0.13	0.4
MB3 - SQE/STP 5, 48 - 52	mg/g	0.10	54.5	0.27	41.4	27.1	97.0
Total PW + STPS 1-5	mg/g	0.18	--	0.652	--	27.9	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 25 of 40)*

		Rubidium (Rb)	%	Silicon (Si)	%
			3.0 m		3.0 m
MB1 - PW, 9.25' - 10.75'	mg/g	0.0017	0.0	0.00050	--
MB1 - SQE/STP 1, 9.25 - 10.75	mg/g	0.041	0.9	0.045	--
MB1 - SQE/STP 2, 9.25 - 10.75	mg/g	0.31	6.8	0.16	--
MB1 - SQE/STP 3, 9.25 - 10.75	mg/g	0.35	7.8	1.7	--
MB1 - SQE/STP 4, 9.25 - 10.75	mg/g	0.16	3.4	0.53	--
MB1 - SQE/STP 5, 9.25 - 10.75	mg/g	3.7	81.1	--	--
Total PW + STPS 1-5	mg/g	4.5	--	--	--
			5.9 m		5.9 m
MB1 - PW, 18.75' - 20.25'	mg/g	0.0013	0.0	0.00039	--
MB1 - SQE/STP 1, 18.75 - 20.25	mg/g	0.038	0.9	0.071	--
MB1 - SQE/STP 2, 18.75 - 20.25	mg/g	0.32	7.6	0.30	--
MB1 - SQE/STP 3, 18.75 - 20.25	mg/g	0.28	6.6	1.5	--
MB1 - SQE/STP 4, 18.75 - 20.25	mg/g	0.13	3.2	0.33	--
MB1 - SQE/STP 5, 18.75 - 20.25	mg/g	3.4	81.6	--	--
Total PW + STPS 1-5	mg/g	4.2	--	--	--
		no PW	10.1 m	*no PW*	10.1 m
MB1 - SQE/STP 1, 32.5 - 34	mg/g	0.010	0.4	0.0074	--
MB1 - SQE/STP 2, 32.5 - 34	mg/g	0.0025	0.1	0.013	--
MB1 - SQE/STP 3, 32.5 - 34	mg/g	0.0049	0.2	0.14	--
MB1 - SQE/STP 4, 32.5 - 34	mg/g	0.00080	0.0	0.022	--
MB1 - SQE/STP 5, 32.5 - 34	mg/g	2.9	99.4	372.8	--
BULK SOLID (MB1-33.5')	mg/g	2.4	--	373	--
Total STPS 1-5	mg/g	2.9	--	373.0	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 26 of 40)*

		Rubidium (Rb)	%	Silicon (Si)	%
			12.2 m		12.2 m
MB1 - PW, 39.25' - 40.75'	mg/g	0.0023	0.0	0.000065	--
MB1 - SQE/STP 1, 39.25 - 40.75	mg/g	0.0091	0.1	0.0025	--
MB1 - SQE/STP 2, 39.25 - 40.75	mg/g	0.0025	0.0	0.013	--
MB1 - SQE/STP 3, 39.25 - 40.75	mg/g	0.0079	0.1	0.16	--
MB1 - SQE/STP 4, 39.25 - 40.75	mg/g	0.0012	0.0	0.023	--
MB1 - SQE/STP 5, 39.25 - 40.75	mg/g	6.2	99.6	--	--
Total PW + STPS 1-5	mg/g	6.2	--	--	--
			14.4 m		14.4 m
MB1 - PW, 46.5' - 48'	mg/g	0.0039	0.0	0.00056	0.0
MB1 - SQE/STP 1, 46.5 - 48	mg/g	0.011	0.1	0.015	0.0
MB1 - SQE/STP 2, 46.5 - 48	mg/g	0.013	0.2	0.076	0.0
MB1 - SQE/STP 3, 46.5 - 48	mg/g	0.022	0.3	0.49	0.1
MB1 - SQE/STP 4, 46.5 - 48	mg/g	0.0035	0.0	0.068	0.0
MB1 - SQE/STP 5, 46.5 - 48	mg/g	7.8	99.3	332.4	99.8
BULK SOLID (MB1-47.5')	mg/g	6.4	--	333	--
Total PW + STPS 1-5	mg/g	7.9	--	--	--
% Diff. In Bulk & Summations	%	18.0	--	--	--
			2.7 m		2.7 m
MB2 - PW, 9.25' - 10.75'	mg/g	0.0047	0.1	0.00086	--
MB2 - SQE/STP 1, 9.25 - 10.75	mg/g	0.055	1.5	0.088	--
MB2 - SQE/STP 2, 9.25 - 10.75	mg/g	0.22	6.0	0.35	--
MB2 - SQE/STP 3, 9.25 - 10.75	mg/g	0.31	8.4	1.6	--
MB2 - SQE/STP 4, 9.25 - 10.75	mg/g	0.10	2.7	0.41	--
MB2 - SQE/STP 5, 9.25 - 10.75	mg/g	3.0	81.2	--	--
Total PW + STPS 1-5	mg/g	3.6	--	--	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 27 of 40)*

		Rubidium (Rb)	%	Silicon (Si)	%
			6.1 m		6.1 m
MB2 - PW, 19.25' - 20.75'	mg/g	0.0019	0.1	0.00035	--
MB2 - SQE/STP 1, 19.25 - 20.75	mg/g	0.034	1.4	0.064	--
MB2 - SQE/STP 2, 19.25 - 20.75	mg/g	0.10	4.0	0.37	--
MB2 - SQE/STP 3, 19.25 - 20.75	mg/g	0.12	4.9	1.3	--
MB2 - SQE/STP 4, 19.25 - 20.75	mg/g	0.030	1.2	0.26	--
MB2 - SQE/STP 5, 19.25 - 20.75	mg/g	2.2	88.4	--	--
Total PW + STPS 1-5	mg/g	2.5	--	--	--
			9.2 m		9.2 m
MB2 - PW, 29.5' - 31'	mg/g	0.0023	0.0	0.00026	--
MB2 - SQE/STP 1, 29.5 - 31	mg/g	0.058	1.2	0.048	--
MB2 - SQE/STP 2, 29.5 - 31	mg/g	0.22	4.7	0.30	--
MB2 - SQE/STP 3, 29.5 - 31	mg/g	0.20	4.3	1.3	--
MB2 - SQE/STP 4, 29.5 - 31	mg/g	0.056	1.2	0.29	--
MB2 - SQE/STP 5, 29.5 - 31	mg/g	4.2	88.5	--	--
Total PW + STPS 1-5	mg/g	4.7	--	--	--
			12.0 m		12.0 m
MB2 - PW, 38.5' - 40'	mg/g	0.0021	0.1	0.000047	0.0
MB2 - SQE/STP 1, 38.5 - 40	mg/g	0.024	1.3	0.011	0.0
MB2 - SQE/STP 2, 38.5 - 40	mg/g	0.013	0.7	0.052	0.0
MB2 - SQE/STP 3, 38.5 - 40	mg/g	0.014	0.7	0.49	0.1
MB2 - SQE/STP 4, 38.5 - 40	mg/g	0.0016	0.1	0.060	0.0
MB2 - SQE/STP 5, 38.5 - 40	mg/g	1.9	97.2	362.4	99.8
BULK SOLID (MB2-39.25')	mg/g	3.3	--	363	--
Total PW + STPS 1-5	mg/g	1.9	--	--	--
% Diff. In Bulk & Summations	%	-73.1	--	--	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 28 of 40)*

		Rubidium (Rb)	%	Silicon (Si)	%
			13.2 m		13.2 m
MB2 - PW, 42.5' - 44'	mg/g	0.0046	0.1	0.000079	0.0
MB2 - SQE/STP 1, 42.5 - 44	mg/g	0.013	0.3	0.0057	0.0
MB2 - SQE/STP 2, 42.5 - 44	mg/g	0.0025	0.1	0.013	0.0
MB2 - SQE/STP 3, 42.5 - 44	mg/g	0.010	0.3	0.19	0.0
MB2 - SQE/STP 4, 42.5 - 44	mg/g	0.0013	0.0	0.026	0.0
MB2 - SQE/STP 5, 42.5 - 44	mg/g	3.7	99.2	356.8	99.9
BULK SOLID (MB2-43')	mg/g	4.0	--	357	--
Total PW + STPS 1-5	mg/g	3.7	--	--	--
% Diff. In Bulk & Summations	%	-7.5	--	--	--
			15.5 m		15.5 m
MB2 - PW, 49.5' - 52'	mg/g	0.00021	0.0	0.00018	0.0
MB2 - SQE/STP 1, 49.5 - 52	mg/g	0.0013	0.0	0.022	0.0
MB2 - SQE/STP 2, 49.5 - 52	mg/g	0.017	0.6	0.13	0.0
MB2 - SQE/STP 3, 49.5 - 52	mg/g	0.018	0.6	0.83	0.1
MB2 - SQE/STP 4, 49.5 - 52	mg/g	0.0029	0.1	0.14	0.0
MB2 - SQE/STP 5, 49.5 - 52	mg/g	3.0	98.7	341.9	99.7
BULK SOLID (MB2-51')	mg/g	2.5	--	343	--
Total PW + STPS 1-5	mg/g	3.0	--	--	--
% Diff. In Bulk & Summations	%	18.7	--	--	--
			17.1 m		17.1 m
MB2 - PW, 52' - 60'	mg/g	0.00073	0.0	0.00070	--
MB2 - SQE/STP 1, 52 - 60	mg/g	0.0033	0.1	0.015	--
MB2 - SQE/STP 2, 52 - 60	mg/g	0.012	0.3	0.059	--
MB2 - SQE/STP 3, 52 - 60	mg/g	0.028	0.8	0.66	--
MB2 - SQE/STP 4, 52 - 60	mg/g	0.0047	0.1	0.11	--
MB2 - SQE/STP 5, 52 - 60	mg/g	3.5	98.6	--	--
Total PW + STPS 1-5	mg/g	3.6	--	--	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 29 of 40)*

		Rubidium (Rb)	%	Silicon (Si)	%
			1.7 m		1.7 m
MB3 - PW, 4.75' - 6.25'	mg/g	0.0034	0.1	0.000089	0.0
MB3 - SQE/STP 1, 4.75 - 6.25	mg/g	0.038	1.3	0.045	0.0
MB3 - SQE/STP 2, 4.75 - 6.25	mg/g	0.12	3.9	0.54	0.2
MB3 - SQE/STP 3, 4.75 - 6.25	mg/g	0.14	4.7	1.2	0.4
MB3 - SQE/STP 4, 4.75 - 6.25	mg/g	0.029	1.0	0.16	0.0
MB3 - SQE/STP 5, 4.75 - 6.25	mg/g	2.6	88.9	164.5	98.8
BULK SOLID (MB3-5')	mg/g	2.5	--	167	--
Total PW + STPS 1-5	mg/g	2.9	--	--	--
% Diff. In Bulk & Summations	%	15.1	--	--	--
			3.1 m		3.1 m
MB3 - PW, 9.5' - 11'	mg/g	0.0089	0.4	0.00044	--
MB3 - SQE/STP 1, 9.5 - 11	mg/g	0.050	2.0	0.0056	--
MB3 - SQE/STP 2, 9.5 - 11	mg/g	0.11	4.5	1.7	--
MB3 - SQE/STP 3, 9.5 - 11	mg/g	0.11	4.5	1.5	--
MB3 - SQE/STP 4, 9.5 - 11	mg/g	0.023	0.9	0.27	--
MB3 - SQE/STP 5, 9.5 - 11	mg/g	2.2	87.6	--	--
Total PW + STPS 1-5	mg/g	2.5	--	--	--
			4.9 m		4.9 m
MB3 - PW, 15.25' - 16.75'	mg/g	0.0044	0.2	0.00042	0.0
MB3 - SQE/STP 1, 15.25 - 16.75	mg/g	0.037	1.6	0.030	0.0
MB3 - SQE/STP 2, 15.25 - 16.75	mg/g	0.12	5.2	0.58	0.2
MB3 - SQE/STP 3, 15.25 - 16.75	mg/g	0.11	4.8	1.1	0.4
MB3 - SQE/STP 4, 15.25 - 16.75	mg/g	0.022	1.0	0.14	0.1
MB3 - SQE/STP 5, 15.25 - 16.75	mg/g	2.0	87.3	126.6	98.5
BULK SOLID (MB3-16')	mg/g	1.9	--	129	--
Total PW + STPS 1-5	mg/g	2.3	--	--	--
% Diff. In Bulk & Summations	%	15.8	--	--	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 30 of 40)*

		Rubidium (Rb)	%	Silicon (Si)	%
			6.1 m		6.1 m
MB3 - PW, 19.25' - 20.75'	mg/g	0.0010	0.0	0.00022	0.0
MB3 - SQE/STP 1, 19.25 - 20.75	mg/g	0.035	0.9	0.074	0.0
MB3 - SQE/STP 2, 19.25 - 20.75	mg/g	0.24	6.0	0.21	0.1
MB3 - SQE/STP 3, 19.25 - 20.75	mg/g	0.30	7.3	1.3	0.4
MB3 - SQE/STP 4, 19.25 - 20.75	mg/g	0.11	2.6	0.28	0.1
MB3 - SQE/STP 5, 19.25 - 20.75	mg/g	3.4	83.2	155.2	98.8
BULK SOLID a (MB3-19.5')	mg/g	3.3	--	157	--
BULK SOLID b (MB3-21')	mg/g	3.2	--	128	--
Total PW + STPS 1-5	mg/g	4.1	--	--	--
% Diff. In Bulk a & Summations	%	19.0	--	--	--
% Diff. In Bulk b & Summations	%	21.4	--	--	--
			7.7 m		7.7 m
MB3 - PW, 24.5' - 26'	mg/g	0.0026	0.1	0.00075	--
MB3 - SQE/STP 1, 24.5 - 26	mg/g	0.039	1.1	0.067	--
MB3 - SQE/STP 2, 24.5 - 26	mg/g	0.27	7.4	0.27	--
MB3 - SQE/STP 3, 24.5 - 26	mg/g	0.26	7.2	1.3	--
MB3 - SQE/STP 4, 24.5 - 26	mg/g	0.10	2.8	0.29	--
MB3 - SQE/STP 5, 24.5 - 26	mg/g	2.9	81.4	--	--
Total PW + STPS 1-5	mg/g	3.6	--	--	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 31 of 40)*

		Rubidium (Rb)	%	Silicon (Si)	%
			8.8 m		8.8 m
MB3 - PW, 28.25' - 29.75'	mg/g	0.0030	0.1	0.00035	0.0
MB3 - SQE/STP 1, 28.25 - 29.75	mg/g	0.037	1.6	0.055	0.0
MB3 - SQE/STP 2, 28.25 - 29.75	mg/g	0.13	5.6	0.18	0.1
MB3 - SQE/STP 3, 28.25 - 29.75	mg/g	0.092	4.0	1.1	0.5
MB3 - SQE/STP 4, 28.25 - 29.75	mg/g	0.031	1.4	0.24	0.1
MB3 - SQE/STP 5, 28.25 - 29.75	mg/g	2.0	87.3	110.5	98.6
BULK SOLID (MB3-29')	mg/g	2.0	--	112	--
Total PW + STPS 1-5	mg/g	2.3	--	--	--
% Diff. In Bulk & Summations	%	13.1	--	--	--
			10.7 m		10.7 m
MB3 - PW, 34.25' - 35.75'	mg/g	0.0046	0.2	0.00062	--
MB3 - SQE/STP 1, 34.25 - 35.75	mg/g	0.040	1.7	0.054	--
MB3 - SQE/STP 2, 34.25 - 35.75	mg/g	0.13	5.3	0.17	--
MB3 - SQE/STP 3, 34.25 - 35.75	mg/g	0.14	5.6	1.4	--
MB3 - SQE/STP 4, 34.25 - 35.75	mg/g	0.028	1.2	0.23	--
MB3 - SQE/STP 5, 34.25 - 35.75	mg/g	2.1	86.1	--	--
Total PW + STPS 1-5	mg/g	2.4	--	--	--
			12.4 m		12.4 m
MB3 - PW, 40' - 41.5'	mg/g	0.0076	0.3	0.00091	0.0
MB3 - SQE/STP 1, 40 - 41.5	mg/g	0.029	1.0	0.066	0.0
MB3 - SQE/STP 2, 40 - 41.5	mg/g	0.11	3.5	0.24	0.1
MB3 - SQE/STP 3, 40 - 41.5	mg/g	0.091	3.1	1.1	0.4
MB3 - SQE/STP 4, 40 - 41.5	mg/g	0.024	0.8	0.25	0.1
MB3 - SQE/STP 5, 40 - 41.5	mg/g	2.7	91.4	126.3	98.7
BULK SOLID (MB3-41')	mg/g	2.6	--	128	--
Total PW + STPS 1-5	mg/g	3.0	--	--	--
% Diff. In Bulk & Summations	%	12.7	--	--	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 32 of 40)*

		Rubidium (Rb)	%	Silicon (Si)	%
			13.2 m		13.2 m
MB3 - PW, 42.5' - 44'	mg/g	0.0016	0.0	0.000080	0.0
MB3 - SQE/STP 1, 42.5 - 44	mg/g	0.014	0.2	0.017	0.0
MB3 - SQE/STP 2, 42.5 - 44	mg/g	0.013	0.2	0.12	0.0
MB3 - SQE/STP 3, 42.5 - 44	mg/g	0.022	0.4	0.60	0.1
MB3 - SQE/STP 4, 42.5 - 44	mg/g	0.0034	0.1	0.084	0.0
MB3 - SQE/STP 5, 42.5 - 44	mg/g	5.5	99.0	339.2	99.8
BULK SOLID (MB3-43')	mg/g	3.8	--	340	--
Total PW + STPS 1-5	mg/g	5.6	--	--	--
% Diff. In Bulk & Summations	%	31.8	--	--	--
			14.4 m		14.4 m
MB3 - PW, 46.5'-48'	mg/g	0.0015	0.0	0.000080	0.0
MB3 - SQE/STP 1, 46.5 - 48	mg/g	0.0076	0.1	0.014	0.0
MB3 - SQE/STP 2, 46.5 - 48	mg/g	0.0085	0.1	0.054	0.0
MB3 - SQE/STP 3, 46.5 - 48	mg/g	0.037	0.6	0.82	0.1
MB3 - SQE/STP 4, 46.5 - 48	mg/g	0.0042	0.1	0.084	0.0
MB3 - SQE/STP 5, 46.5 - 48	mg/g	6.6	99.1	284.0	99.7
BULK SOLID (MB3-47.5')	mg/g	6.4	--	285	--
Total PW + STPS 1-5	mg/g	6.6	--	--	--
% Diff. In Bulk & Summations	%	3.8	--	--	--
			15.2 m		15.2 m
MB3 - PW, 48'-52'	mg/g	0.0032	0.1	0.00026	--
MB3 - SQE/STP 1, 48 - 52	mg/g	0.013	0.2	0.013	--
MB3 - SQE/STP 2, 48 - 52	mg/g	0.0094	0.2	0.061	--
MB3 - SQE/STP 3, 48 - 52	mg/g	0.012	0.2	0.33	--
MB3 - SQE/STP 4, 48 - 52	mg/g	0.0018	0.0	0.051	--
MB3 - SQE/STP 5, 48 - 52	mg/g	6.1	99.4	--	--
Total PW + STPS 1-5	mg/g	6.2	--	--	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 33 of 40)*

		Strontium (Sr)	%	Sulfur (S)	%
			3.0 m		3.0 m
MB1 - PW, 9.25' - 10.75'	mg/g	0.0000018	0.0	0.074	0.1
MB1 - SQE/STP 1, 9.25 - 10.75	mg/g	0.00035	0.4	5.3	6.4
MB1 - SQE/STP 2, 9.25 - 10.75	mg/g	0.0024	2.4	11.8	14.4
MB1 - SQE/STP 3, 9.25 - 10.75	mg/g	0.00043	0.4	2.8	3.5
MB1 - SQE/STP 4, 9.25 - 10.75	mg/g	0.00086	0.9	11.8	14.4
MB1 - SQE/STP 5, 9.25 - 10.75	mg/g	0.094	95.9	50.2	61.2
Total PW + STPS 1-5	mg/g	0.1	--	82.0	--
			5.9 m		5.9 m
MB1 - PW, 18.75' - 20.25'	mg/g	0.0000015	0.0	0.11	0.1
MB1 - SQE/STP 1, 18.75 - 20.25	mg/g	0.00035	0.4	5.5	5.6
MB1 - SQE/STP 2, 18.75 - 20.25	mg/g	0.0020	2.1	16.0	16.2
MB1 - SQE/STP 3, 18.75 - 20.25	mg/g	0.00037	0.4	3.2	3.2
MB1 - SQE/STP 4, 18.75 - 20.25	mg/g	0.00087	0.9	11.3	11.5
MB1 - SQE/STP 5, 18.75 - 20.25	mg/g	0.090	96.2	62.5	63.4
Total PW + STPS 1-5	mg/g	0.1	--	98.6	--
		no PW	10.1 m	*no PW*	*10.1 m*
MB1 - SQE/STP 1, 32.5 - 34	mg/g	0.00022	0.8	0.20	15.3
MB1 - SQE/STP 2, 32.5 - 34	mg/g	0.0016	5.7	0.13	9.8
MB1 - SQE/STP 3, 32.5 - 34	mg/g	0.0057	20.0	0.025	2.0
MB1 - SQE/STP 4, 32.5 - 34	mg/g	0.0017	5.9	0.031	2.4
MB1 - SQE/STP 5, 32.5 - 34	mg/g	0.019	67.7	0.90	70.5
BULK SOLID (MB1-33.5')	mg/g	0.032	--	0.10	--
Total STPS 1-5	mg/g	0.0	--	1.3	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 34 of 40)*

		Strontium (Sr)	%	Sulfur (S)	%
			12.2 m		12.2 m
MB1 - PW, 39.25' - 40.75'	mg/g	0.000021	0.1	0.086	14.0
MB1 - SQE/STP 1, 39.25 - 40.75	mg/g	0.00018	0.6	0.25	40.3
MB1 - SQE/STP 2, 39.25 - 40.75	mg/g	0.00025	0.9	0.13	20.3
MB1 - SQE/STP 3, 39.25 - 40.75	mg/g	0.0065	22.8	0.025	4.1
MB1 - SQE/STP 4, 39.25 - 40.75	mg/g	0.0012	4.4	0.031	5.1
MB1 - SQE/STP 5, 39.25 - 40.75	mg/g	0.020	71.3	0.10	16.2
Total PW + STPS 1-5	mg/g	0.0	--	0.6	--
			14.4 m		14.4 m
MB1 - PW, 46.5' - 48'	mg/g	0.000098	0.4	0.18	24.4
MB1 - SQE/STP 1, 46.5 - 48	mg/g	0.00015	0.6	0.27	36.8
MB1 - SQE/STP 2, 46.5 - 48	mg/g	0.0011	4.8	0.13	17.2
MB1 - SQE/STP 3, 46.5 - 48	mg/g	0.0051	21.8	0.025	3.4
MB1 - SQE/STP 4, 46.5 - 48	mg/g	0.0014	6.0	0.031	4.3
MB1 - SQE/STP 5, 46.5 - 48	mg/g	0.015	66.4	0.10	13.8
BULK SOLID (MB1-47.5')	mg/g	0.028	--	0.30	--
Total PW + STPS 1-5	mg/g	0.023	--	0.73	--
% Diff. In Bulk & Summations	%	-19.8	--	58.7	--
			2.7 m		2.7 m
MB2 - PW, 9.25' - 10.75'	mg/g	0.0000045	0.0	0.13	0.1
MB2 - SQE/STP 1, 9.25 - 10.75	mg/g	0.00052	0.4	5.2	5.1
MB2 - SQE/STP 2, 9.25 - 10.75	mg/g	0.0046	3.2	14.9	14.7
MB2 - SQE/STP 3, 9.25 - 10.75	mg/g	0.00075	0.5	3.0	2.9
MB2 - SQE/STP 4, 9.25 - 10.75	mg/g	0.0014	1.0	11.0	10.9
MB2 - SQE/STP 5, 9.25 - 10.75	mg/g	0.14	95.0	67.3	66.3
Total PW + STPS 1-5	mg/g	0.1	--	101.5	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 35 of 40)*

		Strontium (Sr)	%	Sulfur (S)	%
			6.1 m		6.1 m
MB2 - PW, 19.25' - 20.75'	mg/g	0.0000030	0.0	0.079	0.1
MB2 - SQE/STP 1, 19.25 - 20.75	mg/g	0.00057	0.6	5.2	4.1
MB2 - SQE/STP 2, 19.25 - 20.75	mg/g	0.0034	3.4	16.2	12.9
MB2 - SQE/STP 3, 19.25 - 20.75	mg/g	0.00066	0.7	3.3	2.6
MB2 - SQE/STP 4, 19.25 - 20.75	mg/g	0.0013	1.3	11.3	9.0
MB2 - SQE/STP 5, 19.25 - 20.75	mg/g	0.095	94.1	89.5	71.3
Total PW + STPS 1-5	mg/g	0.1	--	125.6	--
			9.2 m		9.2 m
MB2 - PW, 29.5' - 31'	mg/g	0.0000051	0.0	0.070	0.1
MB2 - SQE/STP 1, 29.5 - 31	mg/g	0.0022	0.5	5.2	6.1
MB2 - SQE/STP 2, 29.5 - 31	mg/g	0.010	2.3	14.7	17.4
MB2 - SQE/STP 3, 29.5 - 31	mg/g	0.0024	0.6	3.5	4.1
MB2 - SQE/STP 4, 29.5 - 31	mg/g	0.0032	0.7	9.6	11.4
MB2 - SQE/STP 5, 29.5 - 31	mg/g	0.42	95.9	51.3	60.8
Total PW + STPS 1-5	mg/g	0.4	--	84.3	--
			12.0 m		12.0 m
MB2 - PW, 38.5' - 40'	mg/g	0.0000046	0.0	0.038	2.4
MB2 - SQE/STP 1, 38.5 - 40	mg/g	0.00023	0.6	0.34	21.6
MB2 - SQE/STP 2, 38.5 - 40	mg/g	0.0018	4.4	0.13	8.0
MB2 - SQE/STP 3, 38.5 - 40	mg/g	0.014	33.3	0.025	1.6
MB2 - SQE/STP 4, 38.5 - 40	mg/g	0.0048	11.4	0.031	2.0
MB2 - SQE/STP 5, 38.5 - 40	mg/g	0.021	50.3	1.0	64.3
BULK SOLID (MB2-39.25')	mg/g	0.025	--	0.20	--
Total PW + STPS 1-5	mg/g	0.042	--	1.6	--
% Diff. In Bulk & Summations	%	40.3	--	87.1	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 36 of 40)*

		Strontium (Sr)	%	Sulfur (S)	%
			13.2 m		13.2 m
MB2 - PW, 42.5' - 44'	mg/g	0.000012	0.0	0.099	11.3
MB2 - SQE/STP 1, 42.5 - 44	mg/g	0.00019	0.5	0.30	33.8
MB2 - SQE/STP 2, 42.5 - 44	mg/g	0.00063	1.5	0.13	14.3
MB2 - SQE/STP 3, 42.5 - 44	mg/g	0.0089	21.6	0.025	2.9
MB2 - SQE/STP 4, 42.5 - 44	mg/g	0.0014	3.3	0.031	3.6
MB2 - SQE/STP 5, 42.5 - 44	mg/g	0.030	73.1	0.30	34.2
BULK SOLID (MB2-43')	mg/g	0.023	--	0.050	--
Total PW + STPS 1-5	mg/g	0.041	--	0.88	--
% Diff. In Bulk & Summations	%	44.1	--	94.3	--
			15.5 m		15.5 m
MB2 - PW, 49.5' - 52'	mg/g	0.0000033	0.0	0.00087	0.2
MB2 - SQE/STP 1, 49.5 - 52	mg/g	0.0000050	0.0	0.025	6.1
MB2 - SQE/STP 2, 49.5 - 52	mg/g	0.0027	11.0	0.13	30.7
MB2 - SQE/STP 3, 49.5 - 52	mg/g	0.0083	34.1	0.025	6.1
MB2 - SQE/STP 4, 49.5 - 52	mg/g	0.0027	11.0	0.031	7.7
MB2 - SQE/STP 5, 49.5 - 52	mg/g	0.011	43.8	0.20	49.1
BULK SOLID (MB2-51')	mg/g	0.029	--	0.10	--
Total PW + STPS 1-5	mg/g	0.024	--	0.41	--
% Diff. In Bulk & Summations	%	-21.0	--	75.4	--
			17.1 m		17.1 m
MB2 - PW, 52' - 60'	mg/g	0.00026	0.6	0.073	15.9
MB2 - SQE/STP 1, 52 - 60	mg/g	0.00073	1.8	0.10	22.7
MB2 - SQE/STP 2, 52 - 60	mg/g	0.0038	9.3	0.13	27.3
MB2 - SQE/STP 3, 52 - 60	mg/g	0.017	42.3	0.025	5.5
MB2 - SQE/STP 4, 52 - 60	mg/g	0.0065	16.0	0.031	6.8
MB2 - SQE/STP 5, 52 - 60	mg/g	0.012	30.0	0.10	21.8
Total PW + STPS 1-5	mg/g	0.0	--	0.5	--

Dark grey shading and white font indicates RESIDUE

Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 37 of 40)*

		Strontium (Sr)	%	Sulfur (S)	%
			1.7 m		1.7 m
MB3 - PW, 4.75' - 6.25'	mg/g	0.0000028	0.0	0.056	0.1
MB3 - SQE/STP 1, 4.75 - 6.25	mg/g	0.00077	0.8	5.1	5.0
MB3 - SQE/STP 2, 4.75 - 6.25	mg/g	0.0048	4.9	15.3	14.9
MB3 - SQE/STP 3, 4.75 - 6.25	mg/g	0.00070	0.7	2.9	2.8
MB3 - SQE/STP 4, 4.75 - 6.25	mg/g	0.0018	1.9	11.1	10.7
MB3 - SQE/STP 5, 4.75 - 6.25	mg/g	0.091	91.8	68.6	66.6
BULK SOLID (MB3-5')	mg/g	0.12	--	93.7	--
Total PW + STPS 1-5	mg/g	0.099	--	103	--
% Diff. In Bulk & Summations	%	-18.5	--	9.0	--
			3.1 m		3.1 m
MB3 - PW, 9.5' - 11'	mg/g	0.0000082	0.0	0.11	0.1
MB3 - SQE/STP 1, 9.5 - 11	mg/g	0.00081	0.7	4.8	4.3
MB3 - SQE/STP 2, 9.5 - 11	mg/g	0.0047	4.4	14.2	12.7
MB3 - SQE/STP 3, 9.5 - 11	mg/g	0.00075	0.7	3.2	2.8
MB3 - SQE/STP 4, 9.5 - 11	mg/g	0.0019	1.8	11.3	10.1
MB3 - SQE/STP 5, 9.5 - 11	mg/g	0.10	92.4	78.5	70.0
Total PW + STPS 1-5	mg/g	0.1	--	112.1	--
			4.9 m		4.9 m
MB3 - PW, 15.25' - 16.75'	mg/g	0.0000036	0.0	0.081	0.2
MB3 - SQE/STP 1, 15.25 - 16.75	mg/g	0.00051	0.8	5.0	11.3
MB3 - SQE/STP 2, 15.25 - 16.75	mg/g	0.0031	5.0	15.3	34.4
MB3 - SQE/STP 3, 15.25 - 16.75	mg/g	0.00052	0.8	3.0	6.8
MB3 - SQE/STP 4, 15.25 - 16.75	mg/g	0.0013	2.1	10.8	24.2
MB3 - SQE/STP 5, 15.25 - 16.75	mg/g	0.057	91.3	10.3	23.1
BULK SOLID (MB3-16')	mg/g	0.090	--	112	--
Total PW + STPS 1-5	mg/g	0.062	--	44.5	--
% Diff. In Bulk & Summations	%	-44.6	--	-150.4	--

Dark grey shading and white font indicates RESIDUE
Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 38 of 40)*

		Strontium (Sr)	%	Sulfur (S)	%
			6.1 m		6.1 m
MB3 - PW, 19.25' - 20.75'	mg/g	0.0000036	0.0	0.029	0.0
MB3 - SQE/STP 1, 19.25 - 20.75	mg/g	0.0016	0.5	5.0	5.2
MB3 - SQE/STP 2, 19.25 - 20.75	mg/g	0.0062	1.8	15.7	16.4
MB3 - SQE/STP 3, 19.25 - 20.75	mg/g	0.0016	0.5	2.9	3.0
MB3 - SQE/STP 4, 19.25 - 20.75	mg/g	0.0032	0.9	11.2	11.7
MB3 - SQE/STP 5, 19.25 - 20.75	mg/g	0.33	96.4	61.2	63.7
BULK SOLID a (MB3-19.5')	mg/g	0.70	--	93.6	--
BULK SOLID b (MB3-21')	mg/g	0.87	--	106	--
Total PW + STPS 1-5	mg/g	0.35	--	96.0	--
% Diff. In Bulk a & Summations	%	-102.5	--	2.5	--
% Diff. In Bulk b & Summations	%	-150.4	--	-9.9	--
			7.7 m		7.7 m
MB3 - PW, 24.5' - 26'	mg/g	0.000011	0.0	0.13	0.1
MB3 - SQE/STP 1, 24.5 - 26	mg/g	0.0015	0.5	5.2	5.3
MB3 - SQE/STP 2, 24.5 - 26	mg/g	0.0064	2.1	15.5	15.8
MB3 - SQE/STP 3, 24.5 - 26	mg/g	0.0016	0.5	2.9	2.9
MB3 - SQE/STP 4, 24.5 - 26	mg/g	0.0032	1.0	11.2	11.4
MB3 - SQE/STP 5, 24.5 - 26	mg/g	0.30	95.9	63.5	64.5
Total PW + STPS 1-5	mg/g	0.3	--	98.4	--

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Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 39 of 40)*

		Strontium (Sr)	%	Sulfur (S)	%
			8.8 m		8.8 m
MB3 - PW, 28.25' - 29.75'	mg/g	0.000013	0.0	0.088	0.2
MB3 - SQE/STP 1, 28.25 - 29.75	mg/g	0.0015	0.7	5.1	10.8
MB3 - SQE/STP 2, 28.25 - 29.75	mg/g	0.0054	2.5	16.2	34.3
MB3 - SQE/STP 3, 28.25 - 29.75	mg/g	0.0015	0.7	3.4	7.2
MB3 - SQE/STP 4, 28.25 - 29.75	mg/g	0.0032	1.5	11.48	24.3
MB3 - SQE/STP 5, 28.25 - 29.75	mg/g	0.20	94.6	10.9	23.1
BULK SOLID (MB3-29')	mg/g	0.38	--	120	--
Total PW + STPS 1-5	mg/g	0.21	--	47.2	--
% Diff. In Bulk & Summations	%	-77.8	--	-153.4	--
			10.7 m		10.7 m
MB3 - PW, 34.25' - 35.75'	mg/g	0.0000092	0.0	0.18	0.4
MB3 - SQE/STP 1, 34.25 - 35.75	mg/g	0.0012	0.8	5.3	11.5
MB3 - SQE/STP 2, 34.25 - 35.75	mg/g	0.0051	3.7	15.5	33.7
MB3 - SQE/STP 3, 34.25 - 35.75	mg/g	0.0011	0.8	3.5	7.6
MB3 - SQE/STP 4, 34.25 - 35.75	mg/g	0.0027	2.0	11.2	24.4
MB3 - SQE/STP 5, 34.25 - 35.75	mg/g	0.13	92.7	10.3	22.4
Total PW + STPS 1-5	mg/g	0.1	--	46.0	--
			12.4 m		12.4 m
MB3 - PW, 40' - 41.5'	mg/g	0.000020	0.0	0.39	0.3
MB3 - SQE/STP 1, 40 - 41.5	mg/g	0.0015	0.9	5.1	3.9
MB3 - SQE/STP 2, 40 - 41.5	mg/g	0.0063	3.9	15.6	11.9
MB3 - SQE/STP 3, 40 - 41.5	mg/g	0.0014	0.9	3.2	2.4
MB3 - SQE/STP 4, 40 - 41.5	mg/g	0.0031	1.9	11.3	8.6
MB3 - SQE/STP 5, 40 - 41.5	mg/g	0.15	92.3	95.3	72.8
BULK SOLID (MB3-41')	mg/g	0.20	--	108	--
Total PW + STPS 1-5	mg/g	0.16	--	131	--
% Diff. In Bulk & Summations	%	-26.0	--	17.5	--

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Light grey shading and black font indicates TAILINGS

Appendix F: Normalized data for select residue and tailings elements: porewater, sequential extraction and bulk solids *(Page 40 of 40)*

		Strontium (Sr)	%	Sulfur (S)	%
			13.2 m		13.2 m
MB3 - PW, 42.5' - 44'	mg/g	0.0000071	0.0	0.078	3.1
MB3 - SQE/STP 1, 42.5 - 44	mg/g	0.00062	1.9	0.60	23.3
MB3 - SQE/STP 2, 42.5 - 44	mg/g	0.0036	11.1	0.13	4.9
MB3 - SQE/STP 3, 42.5 - 44	mg/g	0.0053	16.5	0.025	1.0
MB3 - SQE/STP 4, 42.5 - 44	mg/g	0.0027	8.4	0.031	1.2
MB3 - SQE/STP 5, 42.5 - 44	mg/g	0.020	62.0	1.7	66.6
BULK SOLID (MB3-43')	mg/g	0.038	--	1.8	--
Total PW + STPS 1-5	mg/g	0.032	--	2.6	--
% Diff. In Bulk & Summations	%	-18.8	--	29.5	--
			14.4 m		14.4 m
MB3 - PW, 46.5'-48'	mg/g	0.000022	0.1	0.062	4.0
MB3 - SQE/STP 1, 46.5 - 48	mg/g	0.00012	0.4	0.19	12.3
MB3 - SQE/STP 2, 46.5 - 48	mg/g	0.0011	3.4	0.13	8.2
MB3 - SQE/STP 3, 46.5 - 48	mg/g	0.0087	27.4	0.025	1.6
MB3 - SQE/STP 4, 46.5 - 48	mg/g	0.0016	4.9	0.031	2.0
MB3 - SQE/STP 5, 46.5 - 48	mg/g	0.020	63.9	1.1	71.8
BULK SOLID (MB3-47.5')	mg/g	0.022	--	0.30	--
Total PW + STPS 1-5	mg/g	0.032	--	1.53	--
% Diff. In Bulk & Summations	%	30.1	--	80.4	--
			15.2 m		15.2 m
MB3 - PW, 48'-52'	mg/g	0.000091	0.3	0.092	5.8
MB3 - SQE/STP 1, 48 - 52	mg/g	0.00092	3.4	1.1	70.1
MB3 - SQE/STP 2, 48 - 52	mg/g	0.0017	6.3	0.13	7.9
MB3 - SQE/STP 3, 48 - 52	mg/g	0.0040	14.6	0.025	1.6
MB3 - SQE/STP 4, 48 - 52	mg/g	0.0010	3.8	0.031	2.0
MB3 - SQE/STP 5, 48 - 52	mg/g	0.020	71.7	0.20	12.6
Total PW + STPS 1-5	mg/g	0.0	--	1.6	--

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