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# **Technical Memorandum**

**Date: November 30, 2015**

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**From: Norm Healey & Eric Franz**

**Cc: Beth Power (Azimuth)**

**Our File: TC-15-02 Task 4 – HHRA Update**

**RE: Updates to the April 2014 Human Health Risk Assessment for the Sä Dena Hes Mine Site**

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## **1 Introduction**

Azimuth prepared a Human Health Risk Assessment (HHRA) of environmental contamination at the Sä Dena Hes mine site in April 2014 (Azimuth 2014). Since that time, Teck has carried out reclamation and remediation works and conducted additional environmental sampling at the Site. This memo provides an updated assessment of potential human health risks associated with residual environmental contamination at the Sä Dena Hes mine site.

This memo provides:

- A summary of the conclusions and recommendations from the 2014 HHRA;
- A summary of changes in conditions at the Site and new environmental quality data since the 2014 HHRA and implications for potential human health risks from exposure to environmental contamination at the Site; and
- Updated recommendations for managing potential human health risks associated with exposure to environmental contamination at the Site.

Unless otherwise noted, the methods used in this HHRA update to identify contaminants of potential concern (COPCs), estimate exposure doses, and characterize human health risks are the same as those used in the 2014 HHRA.

## **2 Summary of the 2014 HHRA Findings**

The 2014 HHRA recommended risk management measures to prevent public contact with contaminated soils at Jewelbox Hill, 1380 Gully, the Mill Site, and the Tailings Management Facility.

The 2014 HHRA concluded that human health risks were unlikely, but that additional data were required to support more definitive conclusions about the potential human health risks from direct contact with contaminated soils at the Burnick, 1300, and 1250 portals and waste rock areas.

The 2014 HHRA recommended risk management measures to prevent the consumption of plants and small animals as country foods or traditional medicines from the Jewelbox Hill, 1380 Gully, Mill Site and an area north of the North Tailings Pond dam. The 2014 HHRA concluded that human health risks from consumption of country foods or traditional medicines from the Burnick, 1300, and 1250 portals and waste rock areas and the periphery of the Tailings Management Facility, except for the area north of the North Tailings Pond dam, were unlikely.

The scope of the 2014 assessment of potential risks from consumption of plants and small animals as country foods or traditional medicines was quite limited. Sampling and analysis was restricted to three types of berries (lingonberry, crowberry, and *Vaccinium* spp. [huckleberry or blueberry]) and medicinal tisanes, or herbal teas, prepared from dried samples of two plant species (caribou weed and Labrador tea). Although limited in scope, efforts were focused on the plant species, tissues, and uses thought to represent a relatively high potential for risk based on the distribution and relative abundance of the organisms, the quantity and duration of potential human consumption, and how humans may be exposed to contaminants in the tissues of these organisms. However, because of the limited scope of the assessment, caution must be used in extrapolating the results to other species, tissues, and uses.

Although they were not tested, the 2014 HHRA concluded that larger animals, such as deer and moose, are likely safe for humans to eat because they don't spend a lot of time at the Site.

The surface water and groundwater on the Site meets the Guidelines for Canadian Drinking Water Quality for chemical contaminants most of the time at most locations. But, since future water quality can't be measured at this time, the 2014 HHRA concluded that risks from future drinking water uses could not be assessed with sufficient certainty and recommended that people only use water from the Site as a long-term source for drinking water if it has been tested to show that it meets the Guidelines for Canadian Drinking Water Quality.

## **3 Changes in Site Conditions**

Teck has implemented extensive reclamation and remediation measures since the 2014 HHRA. These include:

- Recontouring the Burnick, Jewelbox, Main Zone and 1250 Portal waste rock piles;
- Placing remediation covers constructed with native till material over contaminated soils at the Jewelbox and Main Zone waste rock piles, Mill Site, a portion of the Boneyard, the North and South Tailings Ponds, and Reclaim Pond; and
- Re-routing the channel of the lower reaches of Camp Creek.

The extent of the remediation covers are illustrated in Figures 1 to 5. The thickness of the remediation covers substantially exceeds the minimum thickness indicated in Table 1, but complete data on the range of thickness of the remediation covers was not available at the time of this HHRA Update.

The remediation covers will substantially reduce human exposure to environmental contamination in the areas where they have been placed. The remediation covers will, as long as they remain physically intact, prevent public contact with the underlying contaminated soils. Direct human contact with metals-contaminated soils at the Jewelbox Hill, Mill Site, and in areas where mill tailings were deposited was identified in the 2014 HHRA as a high priority risk and the placement of remediation covers in these areas will substantially reduce the overall potential for human health risks associated with exposure to environmental contamination at the Site.

The remediation covers in the Jewelbox Hill / Main Zone Pit areas, the Boneyard, and the Tailings Management Facility (TMF) were constructed using soil / till from the former South Dam and Reclaim Dams. Golder (2015a and 2015b) presents evidence to support the conclusion that the soil material is suitable for use as cover material. In addition, SRK (2015a) concluded that the surface soils of the covers are not expected to become contaminated over time through upward migration (i.e., capillary wicking) of the underlying contamination.

The Mill Site was covered using soil from the former camp area at the north end of the AEC. Test pit soil sampling completed in the area in 2014 (TP14-40 in Golder 2015a) showed that, with the exception of surficial material, the soils were below the YT CSR soil guidelines (Golder 2015a). The Golden Hill Shop area was covered using till from two stockpiles on the mine access road, just east of the on-site reference area NC-Ref. No chemistry data were collected to confirm the material meets the CSR soil guidelines.

It is expected that, over time, vegetation will become established on the remediation covers. Depending on the thickness of the cover, climatic conditions, the geochemical characteristics of the cover material, and the species of vegetation that grows in the cover material, it is possible that future vegetation growing in the cover materials may bioaccumulate contaminants from the underlying contaminated soils. Animals that, in turn, eat these plants may also bioaccumulate contaminants. Therefore, it is possible that human may be exposed to metals through the consumption of plants or small animals that live on the remediation covers. The future bioaccumulation of contaminants in plants and small animals that live on or in the vicinity of the remediation covers to concentrations that may present risks to humans that consume these plants or small animals is unlikely, but the absence of human health risks through this potential exposure pathway should be confirmed through future monitoring and analysis.

## **4 Additional Environmental Quality Data**

Additional environmental quality data, including soil, berry tissue, and groundwater data, have become available since the 2014 HHRA. The new data included in the updated HHRA is limited to 2014 data as reported in Golder's 2015 reports (2015a, 2015b). Additional environmental data was collected in 2015 but has not been included in this memo, and is not expected to change conclusions of the HHRA. Additional surface water data were collected in 2014 and 2015, but were not evaluated in the updated HHRA because of the potential for decommissioning activities on site to temporarily affect water quality (SRK 2015b).

### **4.1 Groundwater Quality Data**

Golder completed groundwater monitoring at 13 monitoring locations during two periods from June 13<sup>th</sup> to 21<sup>st</sup> and September 7<sup>th</sup> to 12<sup>th</sup>. Locations of the monitoring wells are presented in Azimuth (2015; Figure 2–8). Groundwater chemistry samples were submitted to Maxxam Analytics for analysis of dissolved metals, LEPHw/HEPHw, PAHs, BTEX, anions and VPHw. Two well locations (one in the Jewelbox Zone and one in the Burnick Zone) were damaged during recontouring activities in the summer; consequently, no samples were collected from either of these locations during the September sampling event. Tabulated results from 2014 are present in Table 2 below. A complete and detailed record of the methods and results of additional groundwater and surface water data sampling and analyses is reported in (Golder 2015a).

The additional groundwater data are of limited relevance to the HHRA update as it remains uncertain how representative these data are of future groundwater or surface water quality. Therefore, as per the recommendations of the 2014 HHRA, people should only use the water from on or near the site as a long-term source for drinking water if it has been tested to show that it meets the Guidelines for Canadian Drinking Water Quality.

Occasionally drinking water from the Site, such as filling a water bottle from a creek, is unlikely to present a risk to human health from the presence of metals contamination, but the practice is not recommended because of the potential risk of exposure to naturally occurring microbiological contaminants, such as bacteria, protozoa and viruses, that may be present in all untreated surface waters.

### **4.2 Berry Tissue Quality Data**

Berry sampling was completed in August 2014 by Gebauer & Associates with assistance from members of the Liard First Nation (LFN). Berry samples (lingonberry, crowberry, huckleberry, and/or bearberry) were collected from four general locations around the Site: 1380 Gully, Jewelbox Hill alpine (above the waste rock area), TPN, and the Mill Site. Paired washed and unwashed samples were collected to evaluate the potential for dust as a source of metal contamination to berries. Berry chemistry results for the 2014 samples were previously reported in the Volume 2 Addendum (Azimuth 2015b). Locations of the berry sampling stations are shown in Azimuth (2015a; Figure 2–7).

The complete berry tissue chemistry dataset (2013 and 2014) is presented in Table 3 (huckleberry), Table 4 (lingonberry) and Table 5 (crowberry and bearberry). The berry samples that were collected from the Mill Site in 2014 were collected when that area of

the Site was under active remediation and are not considered representative of post-remediation conditions. Therefore, the data from these samples, while included in this memo for completeness, were not used in the HHRA update. Similarly, data from washed berry samples collected in 2014 are included in this memo for completeness, but those data were not used in HHRA update as they were collected to provide information on the potential sources of contamination to the berries but are not considered representative of potential human exposure conditions.

Figure 6 illustrates the concentration of lead in berry tissue samples, by species, location, and year. The only location where lead in berry samples collected in 2014 were higher than contaminant concentrations in berry samples collected for the 2014 HHRA was the area north of the Tailings Pond North dam (TPN), where the lead concentration in the sample of unwashed crowberries was 0.39 µg/g ww, compared to the maximum concentration of lead in the berry samples collected from this area in 2013 of 0.12 µg/g ww. The higher concentration of lead in the 2014 sample is likely due to temporal and spatial variation of lead in berries in this area of the site and is considered representative of potential future conditions. Therefore, the new berry tissue data for lead from this area were evaluated in this HHRA update.

Arsenic was not considered a COPC in berries for the 2014 HHRA. A sample of crowberry from down-slope of the Burnick waste rock pile (see Table 5) exceeded the screening criterion for identifying COPCs in berries (i.e., greater than two-fold higher than the maximum concentration measured in local reference samples); however, the concentration was within 10-fold of the laboratory reporting limit for arsenic in berry tissue and for this reason was not considered a COPC. The maximum concentration of arsenic measured in all berry samples, including the 2013 sample of crowberry from Burnick, was considered in the HHRA update to provide assurances that a potential issue was not missed because of the data quality issues that precluded this analysis in the 2014 HHRA.

### **4.3 Soil Quality Data**

Additional soil chemistry data were collected in 2014 to further delineate the extent of elevated soil metals concentrations at the various AECs. The scope of the 2014 soil sampling program is summarized in the Volume 1 Addendum to the Problem Formulation (Azimuth 2015a). A complete and detailed record of the methods and results of additional soil sampling and analyses is reported in the updated Environmental Site Assessment (ESA; Golder 2015a).

Some x-ray fluorescence (XRF) soil quality data collected since the 2014 HHRA was not considered in the update to the HHRA because Golder reported that these data were unreliable. Measurements of some metals (i.e., cobalt, mercury) by XRF were not considered valid because of potential interferences caused by the presence of other elements. Golder (2015b) identifies the samples and parameters that were considered invalid; Azimuth excluded these data from the HHRA update. Chromium results from the XRF were also considered unreliable for use in the risk assessment. Several samples throughout the Site had elevated chromium concentrations when measured with the XRF, but when compared against the analytical data from ALS, the XRF data were consistently higher. None of the analytical samples submitted to ALS exceeded the human health guideline for chromium (100 µg/g), and for this reason, the XRF results for chromium were not carried forward in the updated HHRA. The reader is referred to the

2015 ESA (Golder 2015a) for more details on the exclusion of the XRF chromium results from the soil dataset.

The available surface soil quality data are presented in Table 6 to Table 13 for the various AECs/APECs. Maps of the soil samples showing exceedances of lead and other COPCs are presented in Figures 1 to 5. Soil samples that have been covered by clean soil material or recontoured are not presented in the tables or figures. Based on information provided to Azimuth, reclamation activities (i.e., capping and recontouring) are complete, and the soil chemistry data presented in the figures and tables for the updated HHRA reflect the post-closure soil conditions on Site. Previous versions of the soil chemistry maps that were prepared for Volume 2 Addendum (Azimuth 2015b) do not reflect current conditions at some of the AECs where remediation activities were carried out after that report was issued.

#### ***4.4 Soil Lead Human Health Risk Management Areas***

The criterion for identifying lead-contaminated soils that require risk management was changed since the 2014 HHRA. There are a number of significant challenges to using an HHRA to develop a site-specific, risk-based criterion for lead in soil for the protection of human health at the Sä Dena Hes mine. These challenges are described in detail in the 2014 HHRA, but include: (1) the current lack of regulatory guidance on how to conduct a HHRA for lead-contaminated soils; (2) uncertainty about the potential future land-use at the Site; and (3) the relatively high bioaccessibility of lead in the soils at the Site.

The future land use at the Sä Dena Hes Site could result in human exposures that are not dissimilar from those at residential or parkland sites and exposure to lead can only be defensibly time-averaged to a limited degree. Therefore, even if eventual human exposures to lead-contaminated soil at the Sä Dena Hes mine site were of a relatively short duration, it is unlikely that a defensible site-specific criterion for lead in soil for the protection of human health would be substantially different from the existing YT CSR soil quality standard for lead for the protection of human health for residential and parkland land uses of 500 µg/g. For these reasons, the YT CSR soil quality standard for lead for the protection of human health for residential and parkland land uses was identified in the 2014 HHRA as the criterion for lead in soil for the protection of human health at the Sä Dena Hes mine and any areas of contaminated soil where the average concentration of lead exceeded 500 µg/g were identified as areas that required risk management measures to prevent public contact with soil. These areas were identified as Soil Lead Human Health Risk Management Areas.

Teck decided, based on review comments on the 2014 HHRA, to adjust the site-specific criterion for lead in soil for the protection of human health to be consistent with the British Columbia CSR's recently amended soil quality standard for lead for residential and parkland land uses of 400 µg/g. Therefore, the boundaries of the Soil Lead Human Health Risk Management Areas were updated to reflect the updated site-specific criterion for lead in soil for the protection of human health.

Figures 1 to 5 illustrate the locations at the Sä Dena Hes site where soil samples exceed the updated site-specific criterion for lead in soil for the protection of human health of 400 µg/g. In general, locations on Figures 1 to 5 where the symbol for soil samples is red represent areas where risk management measures are required to prevent direct human contact with lead-contaminated soils. The placement of remediation covers over

locations of lead-contaminated soil will significantly reduce the potential human health risks associated with environmental contamination at the Să Dena Hes site.

It is only necessary to conduct a HHRA for soil contact for those metals where the average of representative samples outside of areas with soil lead concentrations in excess of 400 µg/g exceeds their respective screening criteria for the protection of human health. In cases where there were insufficient samples to calculate a representative estimate of the average concentration of a COPC in soil, the maximum reported value of the available data was compared to the screening criteria for the protection of human health.

Updated soil chemistry screening by AEC/area are shown in Tables 6 to 13 to identify COPCs in soil for inclusion in the HHRA update. The tables show the chemistry results for all the soil samples that have not been remediated, including those samples with soil lead concentrations over 400 µg/g that require risk management measures.

## **5 Updates to the HHRA**

There are a few locations on the Site where the concentration of lead in soil is greater than 400 µg/g that are without a remediation cover. There are also a few locations on the Site where the concentrations of metals other than lead in soil exceed their respective human health soil quality standards (yellow soil sample symbols on Figures 1 to 5). And finally, there are areas of the Site where the consumption of plants or small animals as country foods or traditional medicines may present a potential human health risk. These issues are examined in more detail below.

### ***5.1 Jewelbox, Main Zone, 1380 Gully & 1250 Portal***

The Jewelbox Hill, Main Zone, 1380 Portal and 1380 Gully, and 1250 Portal areas of the Site are illustrated in Figure 2. The highest recorded soil lead concentrations on the Site have generally been found in the Jewelbox Hill and the 1380 Gully AECs (see Tables 6 and 12, respectively). As illustrated in Figure 2, the Jewelbox waste rock has been recontoured to increase slope stability and mitigate migration of contaminants through surface slumping and run-off. Additionally, a remediation cover has been placed over much of the Jewelbox waste rock to prevent direct human contact with the underlying contaminated soils.

As illustrated in Figure 2, there are locations downslope of the Jewelbox waste rock and in the 1380 Gully that where surface soil lead concentrations exceed 400 µg/g. These areas require risk management measures to prevent direct human contact with the contaminated soil.

The extent of soil lead concentrations in excess of 400 µg/g on the west slope of the 1380 Gully remains unknown. There is a general pattern of declining soil lead concentrations to the west of the Gully and the lead in the soils in this area may be naturally occurring. Nonetheless, there are also some relatively high concentrations of lead reported west of the Gully (e.g., soil lead concentrations of approximately 5,000 µg/g) and the uncertainty in the extent of lead-contaminated soils must be addressed through (1) additional soil sampling or (2) extending the boundaries of any risk management measures to appropriately account for the uncertainty in the extent of soil lead concentrations in excess of 400 µg/g.

There are some locations above the Jewelbox waste rock and Main Zone Pit areas where soil lead concentrations exceed 400 µg/g (Figure 2). The lead in these areas may be naturally occurring, the concentrations are generally relatively low, and the areas where soil lead concentrations exceed 400 µg/g are bounded by samples where all metals, including lead, were less than their respective YT CSR soil quality standards. Nonetheless, the areas where soil lead concentrations exceed 400 µg/g require risk management measures to prevent direct human contact with the soil.

Excluding those soil samples requiring risk management because of lead, no other metals exceed their respective human health soil quality screening criteria in soil samples collected from the Jewelbox Hill, Main Zone, 1380 Portal and 1380 Gully, and 1250 Portal areas of the Site.

The 2014 HHRA concluded that the concentration of lead in samples of berries from the Jewelbox Hill and 1380 Gully and lead in samples of medicinal infusions prepared from samples of caribou weed from Jewelbox Hill were associated with risks that exceed the maximum acceptable risks defined in the YT CSR. Therefore, risk management was recommended to prevent humans from consuming plant or small animal tissues from the Jewelbox Hill and 1380 Gully.

Lead and cadmium in some samples of crowberry or bearberry collected from the 1380 Gully in 2014 were higher than the concentrations of these metals in samples collected from these areas of the Site in 2013. Therefore, updated human health risk estimates from the consumption of lead and cadmium-contaminated berries from the 1380 Gully were calculated. These risk estimates are presented in Table 15. Potential human health risks from exposure to cadmium from consumption of berries from 1380 Gully were less than the maximum permissible human health risks under the YT CSR. On the other hand, potential human health risks from exposure to lead from consumption of berries from 1380 Gully exceed the maximum acceptable risks for a single exposure media (i.e., HQ > 0.2). Since there is potential human exposure to environmental lead at the Site through other media (e.g., lead-contaminated soil), these results support the recommendations of the 2014 HHRA – that risk management measures are required to prevent human consumption of plant tissues from the 1380 Gully.

The remediation covers placed over the Jewelbox and Main Zone waste rock may limit, but will not likely prevent the bioaccumulation of contaminants from the underlying contaminated soils by plants and animals. Additionally, areas of lead-contaminated soil remain outside of the remediation cover areas. Therefore, the conclusion that risk management measures are required to prevent humans from consuming plant or small animal tissues from the Jewelbox Hill and 1380 Gully remains valid.

## **5.2 Burnick and 1300**

The Burnick and 1300 portal and waste rock areas of the Site are illustrated in Figure 3. The concentrations of metals in samples collected from these areas of the Site have generally been generally lower than those from Jewelbox Hill, 1380 Gully, Mill Site and Tailings Management Facility.

As illustrated in Figure 3, the Burnick Zone and 1300 Portal waste rock has been recontoured to increase slope stability and mitigate migration of contaminants through surface slumping and run-off. Additionally, a remediation cover has been placed over the area of the former Burnick shop complex to prevent direct human contact with the underlying contaminated soils. The objective of the cover at Burnick was to limit



exposure to hydrocarbon-contaminated soil beneath the former shop. Test pits were completed along the crest of the waste rock dump to document for visual evidence of petroleum hydrocarbons (PHCs). Based on the absence of hydrocarbon-contaminated soil, the material was considered suitable for use as capping material (see Golder 2015a).

## **Burnick Soil**

There is a hot spot of lead-contaminated soils (2,500-7,500 µg/g) in an area of undisturbed forest in the northwest quadrant of the Burnick area (Figure 3 map sample labels 502 & 540; see Table 7 for concentrations). The hot spot is delineated with a maximum extent of approximately 75 m by 75 m. The concentration of lead in a sample from one other location (Figure 3 map sample label 933) was 584 µg/g and marginally exceeds the soil lead risk management criteria. Samples from the recontoured waste rock all had lead concentrations less than 400 µg/g, but the area is not well characterized. Therefore, the Burnick area requires risk management measures to prevent direct human contact with the lead-contaminated soil, unless additional sampling is conducted to demonstrate that the extent of lead-contaminated soils in excess of 400 µg/g is very small.

Zinc and cadmium exceed their respective HHRA soil quality screening criteria at one sample location where soil lead concentrations are less than 400 µg/g (Figure 3 map label 880).

There are only six soil samples from the Burnick area (AEC and samples from the forest areas) where cadmium was measured and the concentration of lead was less than 400 µg/g. The mean cadmium concentration from these six samples was 14.6 µg/g; however, these six samples may not be sufficiently representative of the Burnick area. Therefore, human health risks from potential direct contact with cadmium-contaminated soils at Burnick were calculated based on the maximum cadmium concentration from the available data (69.8 µg/g). The risk estimates from potential direct contact with cadmium-contaminated soils at Burnick are presented in Table 14 and were less than the maximum permissible human health risks under the YT CSR.

The average concentration of zinc from 36 samples at Burnick, excluding those samples with lead concentrations greater than 400 µg/g, was 1,677 µg/g, which is less than the HHRA soil screening criterion for zinc of 10,000 µg/g (see Table 7). Nonetheless, human health risks from potential direct contact with zinc-contaminated soils at Burnick were calculated based on the maximum zinc concentration from the available data (13,500 µg/g). The risk estimates from potential direct contact with zinc-contaminated soils at Burnick are presented in Table 14 and were less than the maximum permissible human health risks under the YT CSR.

## **1300 Soil**

The concentration of lead in samples from four locations in the recontoured 1300 Portal waste rock exceeds 400 µg/g (Figure 3). The average concentration of lead from nine samples (map labels 426, 429, 430, 436, 965, 1024, 1025, 1026, and 1027) collected from within the boundary of the AEC is 527 µg/g and the maximum is approximately 1,200 µg/g (map label 965; Table 7). Therefore, this area requires risk management to prevent direct human contact with lead-contaminated soil.

The concentration of zinc exceeds the HHRA soil quality screening criteria (10,000 µg/g) for zinc at two sample locations where soil lead concentrations are less than 400 µg/g (Figure 3 map sample labels 426 and 429). Both samples are located at the toe of the 1300 waste rock piles, at the edge of the recontoured area.

The average concentration of zinc from nine soil samples within the boundary of the AEC at 1300 was 43,715 µg/g (see Table 7). Human health risks from potential direct contact with zinc-contaminated soils at 1300 were calculated based on the average zinc concentration (43,715 µg/g). The risk estimates from potential direct contact with zinc-contaminated soils at Burnick are presented in Table 14. Exposure to zinc in contaminated soil at the 1300 Portal area exceeds the maximum acceptable threshold for potential risks from multi-media exposures (i.e., a HQ of 0.2) for toddlers, but not adults. However, given that zinc was not identified as a COPC in any other exposure media, the potential human health risks from exposure to zinc-contaminated soils at 1300 are considered acceptable.

### **Burnick and 1300 Country Foods and Traditional Medicines**

The 2014 HHRA concluded that human health risks from consumption of country foods or traditional medicines from the Burnick and 1300 areas of the Site were unlikely. No additional data on country foods or traditional medicines were collected from Burnick or 1300 since the 2014 HHRA. However, potential human health risks from arsenic in berries from the Burnick area were re-examined to provide assurances that a potential risk wasn't masked by a data quality decision made in advance of the 2014 HHRA (see Section 4.2).

The maximum concentration of arsenic in all berry tissue samples collected from the Site was 0.0102 µg/g wet weight in a sample of crowberries collected down-gradient of the Burnick waste rock pile in 2013. The human health risk estimates associated with the consumption of berries with this arsenic concentration in their tissues are presented in Table 15 and were less than the maximum permissible human health risks under the YT CSR. Therefore, the conclusions of the 2014 HHRA with respect to potential risks from the consumption of country foods or traditional medicines from the Burnick and 1300 areas of the Site remain valid.

### **5.3 Mill Site & Haul Roads**

The Mill Site and the lower stretches of the ore-haul roads are illustrated in Figure 4 and chemistry data are presented in Table 8. Soil samples were collected from three locations on the road leading to the Site at distances of 4.5 km, 1.5 km and 200 m from the gate. These data are presented in Table 9, but the locations are not shown on the maps. These areas, as well as roads outside the Mill Site, were not retained as an AEC (Golder 2015a). Pre-remediation soil and berry samples from the Mill Site and surrounding areas had relatively high concentrations of lead. A remediation cover has been placed over much of the extent of the former Mill Site, including the ore stock-pile area to the west of the mill, the area of the former Golden Hill Shop, and some of the connecting roads. Soil material used for capping the majority of the Mill AEC was taken from the location where the camp trailers were located (AMEC 2015 in prep.). Chemistry results presented in the 2014 HHRA indicate soil metals concentrations from this area are below the human health soil screening criteria (Azimuth 2014). The majority of the Mill Site was covered in 2014. The ore storage areas west of the mill, as well as a few

peripheral areas in the AEC were covered in 2015. Cover material for the Golden Hill Shop was taken from two stockpiles located on the mine access road near the location of the North Creek Reference station sampled for the ERA (AMEC 2015 in prep). The remediation cover is intended to prevent direct human contact with the underlying contaminated soils. The remediation cover is also expected, to some extent, reduce the amount of lead in plants and small animals that live in the area.

As illustrated in Figure 4, there are locations around the periphery of the Mill Site and beyond the extent of the remediation cover where the concentration of lead in post-remediation soil samples is greater than 400 µg/g. The average concentration of lead in 38 soil samples representative of current conditions in surface soils at the Mill Site and Golden Hill Shop was approximately 1,100 µg/g (Table 8). Therefore, while the remediation cover greatly reduces the potential for human exposure to lead from direct contact with lead-contaminated soils, the residual concentration of lead in the surface soils in the periphery of the Mill Site exceeds the criterion for risk management and, therefore, these areas require risk management measures to prevent direct human contact with the lead-contaminated soil.

Excluding samples with lead concentrations greater than 400 µg/g, no metals exceed their respective human health soil quality screening criteria in soil samples collected from the Mill Site, Golden Hill Shop, and lower haul roads.

The 2014 HHRA concluded that potential human health risks from exposure to lead from consumption of berries from the Mill Site exceeded the maximum acceptable risks defined in the YT CSR. The data from berry tissue samples collected from the Mill Site in 2014 are not considered representative of post-remediation conditions (see Section 4.2); therefore the conclusions of the 2014 HHRA regarding potential human health risks from the consumption of plant tissues from the Mill Site remain valid, unless future monitoring data demonstrate that post-remediation plant tissue concentrations have declined to acceptable concentrations.

## **5.4 Tailings Management Area**

The Tailings Management Area and associated AECs are illustrated in Figure 5. Pre-remediation samples of tailings material had relatively high concentrations of metals, while the concentrations of metals in soil and plant tissue samples from the periphery of the Tailings Management Facility were generally relatively low. The tailings ponds were drained, Camp Creek was re-directed, and a remediation cover has been placed over tailings-impacted areas of the North Tailings Pond, South Tailings Pond, and Reclaim Pond. The remediation cover is intended to prevent direct human contact with the underlying contaminated soils. The remediation cover is also expected, to some extent, reduce the amount of metals in plants and small animals that live in the area.

### **Tailings Management Area Soil**

As illustrated in Figure 5, there are locations around the periphery of the Tailings Management Facility, beyond the extent of the remediation cover where the concentration of lead in post-remediation samples of surface soil was greater than 400 µg/g.

There are sufficient representative post-remediation surface soil samples from the Reclaim Pond and the area between the North Tailings Pond and South Tailings Pond to

calculate the average concentration of lead in surface soils from these areas. The average lead concentration from 45 post-remediation surface soil samples from the Reclaim Pond was 95.3 µg/g. There were four samples from two locations in the wetland area between the North and South Tailings where the concentration of lead was greater than 400 µg/g. Samples labeled 879, 903, and 905 were collected from one location. The surficial sample (map label 903) collected from 0.1 m and analyzed with the XRF had a lead concentration of 20.1 µg/g, while the deeper soil collected from 0.2 m had a lead concentration of 735 µg/g measured with XRF compared with 2,720 µg/g as measured by the laboratory (Table 11). Similarly, samples labeled 892 and 902 were collected from the same location, but at different depths. Sample label 892 was collected at 0.1 m and had a lead concentration of 874 µg/g compared to sample 902 that was collected at 0.2 m and had a lead concentration of 2,187 µg/g (Table 11). Higher lead concentrations in the deeper soil samples are likely indicative of tailings material. For the purpose of the HHRA, the deeper soil samples collected at 0.2 m were excluded from the calculation of an average lead concentration in the wetland area. The average lead concentration was 231 µg/g in the nine surface soil samples collected at 0.1 m depth (map labels 11, 892, 893, 894, 895, 897, 899, 903, and 904) in the wetland area between the North and South Tailings areas. Based on the available data, the former Reclaim Pond and wetland area north of the South Tailings area do not require risk management measures to prevent direct human contact with the lead-contaminated soil.

There are insufficient samples to calculate a representative estimate of the average concentration of lead in soil in the forested strip to the west of the North Tailings Pond and the area just north of the North Tailings Pond dam. Therefore, unless additional data are collected to demonstrate otherwise, these areas require risk management measures to prevent direct human contact with the lead-contaminated soil.

One soil sample from west of the Reclaim Pond (map label 264) had a cobalt concentration that exceeded its respective HHRA soil screening criteria. However, the average concentration of cobalt from all surface soil samples from the surrounding areas, excluding those that have lead concentrations greater than 400 µg/g, is less than the soil quality screening criterion for the protection of human health for cobalt. Therefore, no further assessment of potential human health risks from cobalt resulting from direct human contact with soil at the Tailings Management Area is warranted.

A small area of the Boneyard that had exceedances of arsenic has been capped with clean fill from the former Reclaim Dam. Seven post-remediation samples are within the boundary of the Boneyard AEC, and the highest reported concentration of arsenic is 27.0 µg/g at sample label 627 collected at a depth of 0.6 m. The surficial sample collected at this location was below the limit of detection for the XRF (sample label 622; Table 10). No further assessment of soil arsenic concentrations at the Boneyard is required given the arsenic concentrations are below the HHRA screening criterion of 100 µg/g.

## **Tailings Management Area Soil Country Foods and Traditional Medicines**

The 2014 HHRA reported that the concentration of lead in samples of crowberry and lingonberry, but not huckleberry (*Vaccinium* spp.), from north of the North Tailings Pond dam were associated with HQs > 0.2, but less than 1. The 2014 HHRA concluded that the consumption of lead-contaminated berries from north of NTP required risk management because of the potential for cumulative lead exposures to exceed the maximum acceptable risks defined in the YT CSR.

As discussed in Section 4.2, the concentration of lead in a 2014 sample of unwashed bearberry from north of the North Tailings Pond dam was approximately four-fold higher than the maximum concentration of lead in samples of berry tissue collected from this area in 2013. Therefore, the potential human health risks associated with exposure to lead from the consumption of berries from north of the North Tailings Pond dam were re-calculated based on the maximum concentration of lead in unwashed bearberry tissue from the 2014 data (0.393 µg/g wet weight). These risk estimates are presented in Table 15. Potential human health risks from exposure to lead from consumption of berries from north of the North Tailings Pond dam were greater than the maximum permissible human health risks under the YT CSR. Therefore, the conclusions of the 2014 HHRA remain and risk management measures are recommended to prevent humans from consuming the tissues of plants and small animals collected from the area north of the North Tailings Pond dam.

The remediation covers placed on the North Tailings Pond, South Tailings Pond, and Reclaim Pond are expected to mitigate the bioaccumulation of contaminants by plants and animals living in these areas. However, the tailings cover may not completely eliminate the bioaccumulation of contaminants by organisms that inhabit the remediation covers. Therefore, risk management measures to prevent humans from consuming plants and small animals that live in these areas are recommended until such time as future monitoring data may show that potential human health risks from these exposure pathways are acceptable.

## **6 Summary**

A HHRA was prepared for the Sä Dena Hes mine site in April 2014. The 2014 HHRA identified a number of sources of metals exposure that exceeded the maximum permissible human health risks under the YT CSR. Since that time, Teck has placed remediation covers over the highest risk areas of the Site, conducted other closure activities, and collected post-remediation environmental quality data. This memo provides updates to the 2014 HHRA and identifies areas of the Site and exposure media that require risk management measures.

Table 16 presents a summary of recommended risk management measures to address potential human health risks associated with exposure to environmental contamination associated with the Site.

Risk management measures to prevent human exposure to residual contaminated soils are recommended for the Jewelbox Hill, 1380 Gully, 1250 Portal and Waste Rock, Burnick Portal and Waste Rock, 1300 Portal and Waste Rock, Mill Site, and the area north of the North Tailings Pond dam.

Risk management measures to prevent human consumption of plants and small animals as food or traditional medicines are recommended for the Jewelbox Hill, 1380 Gully, and the area north of the North Tailings Pond dam.

The remediation covers placed at the Mill Site, North Tailings Pond, South Tailings Pond, and Reclaim Pond are expected to mitigate the bioaccumulation of metals by plants and small animals living in these areas, but no representative post-remediation data yet exist for plant or small animal tissues from these areas. Risk management measures to prevent human consumption of plants and small animals from these areas

as food or traditional medicines are recommended until such time as future monitoring data may show that these risks are acceptable.

Larger animals, such as lynx, deer and moose, are likely safe for humans to eat because these animals don't spend enough time at the Site to build-up contaminants to levels that would present a potential human health risk.

The surface water and groundwater on the Site meets the Guidelines for Canadian Drinking Water Quality for chemical contaminants most of the time at most locations. But, since future water quality is uncertain, risks from future drinking water uses could not be assessed with sufficient certainty. It is recommended that people only use water from the Site as a long-term source for drinking water if it has been tested to show that it meets the Guidelines for Canadian Drinking Water Quality. Occasional consumption of small quantities of water, such as filling a water bottle from a creek, are not expected to present a health risks from exposure to metals, but consumption of untreated surface water may present a risk to health from exposure to naturally occurring microbial pathogens, such as *Giardia lamblia* (i.e., the protozoa responsible for "beaver fever") and, therefore, the practice should be discouraged.

## 7 References

- AMEC (AMEC Foster Wheeler Environment & Infrastructure, a division of AMEC Americas Limited. 2015. 2015 Reclamation Activities and As-Built Report, Sä Dena Hes Mine Yukon Territory. In preparation as of October 23<sup>rd</sup>, 2015.
- Azimuth (Azimuth Consulting Group Partnership). 2014. Sä Dena Hes Mine: Human Health Risk Assessment. Prepared for Teck Metals Ltd. April 2014.
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- Golder (Golder Associates Ltd). 2015a. Environmental Site Assessment – Sä Dena Hes Mine Closure, Yukon Territory. Submitted to Michelle Unger, Teck Resources Ltd. May 2015.
- Golder. 2015b. Results of Soil Geochemical Characterization – Former Reclaim Dam Material, Sä Dena Hes Mine, Yukon Territory. Submitted to Michelle Unger, Teck Resources Ltd. August, 2015.
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- SRK (SRK Consulting (Canada) Ltd.). 2015a. Sä Dena Hes – Performance Evaluation of Jewelbox Pit Waste Rock Soil Cap. Memo prepared for Teck Resources Ltd. March 27, 2015.
- SRK. 2015b. – 2014 Annual Report Yukon Water Licence QZ99-045. Prepared for Teck Resources Ltd. March 2015.

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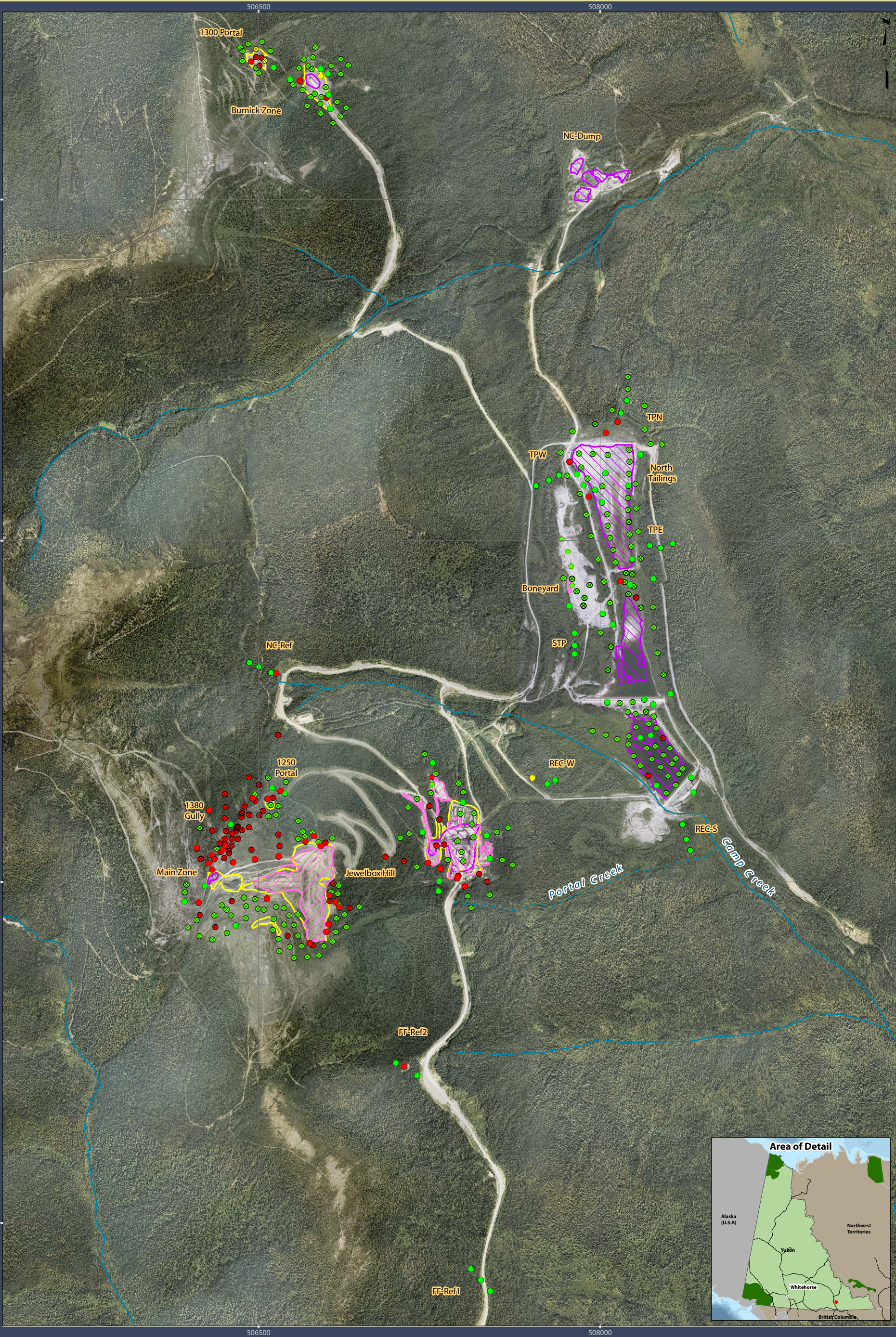
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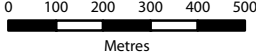
**Legend**

- River/Creek
- Ephemeral stream
- Remediation Cover Areas 2015
- Remediation Cover Areas 2014
- Recontoured Areas

- Soil Sample Method
- Shallow Soil Sample
  - Test Pit
  - XRF

**Symbol color legend**

- Green:** Soil metals concentrations are less than applicable human health screening criteria
- Yellow:** One or more metals > human health screening criteria, but Lead <400 µg/g
- Red:** Lead > 400 µg/g



Projection: UTM Zone 9 NAD83

**Data Sources:**  
Natural Resources Canada, GeoBase®  
Teck Metals Ltd.  
Azimuth Consulting Group

**Figure 1. Remediation Cover Areas and Post-Remediation Surface Soil Chemistry**

**Sä Dena Hes**

Prepared for:

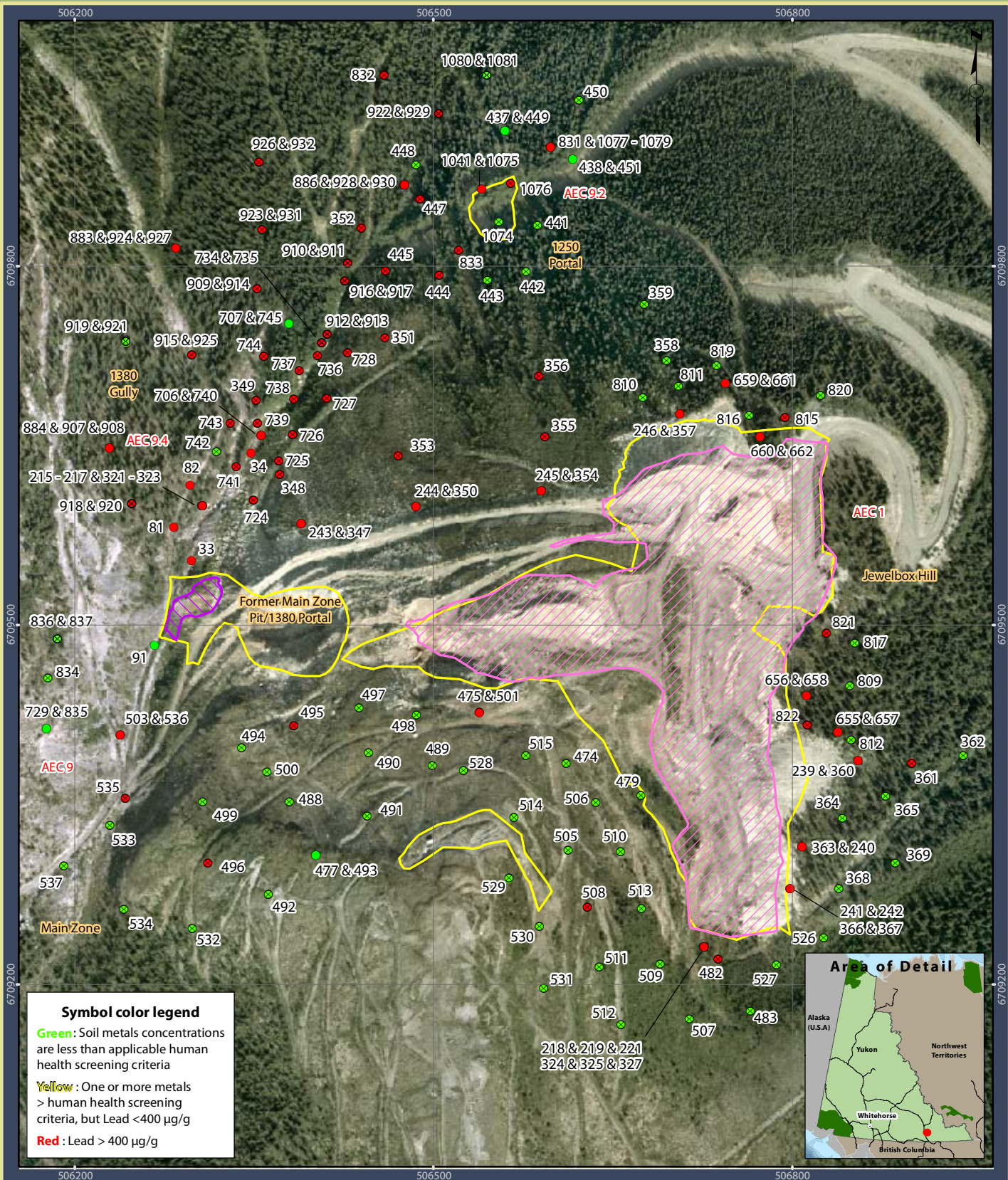


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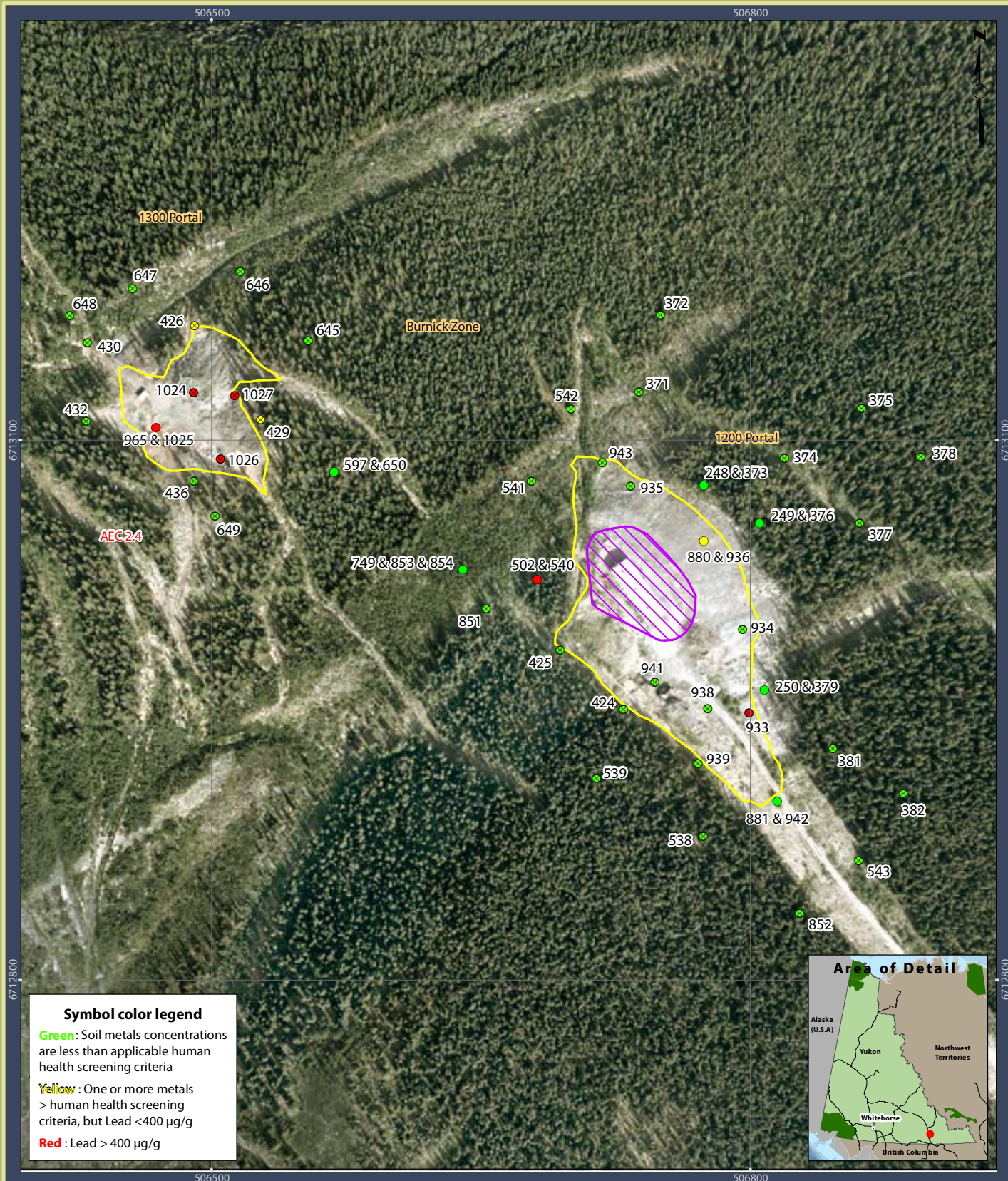


December 11, 2015









— River/Creek  
 - - Ephemeral stream  
 Remediation Cover Areas 2014  
 Recontoured areas

#### Legend

**Soil Sample Method**  
 ● Shallow Soil Sample  
 ● Test Pit  
 ⊙ XRF

0 25 50 75  
 Metres

**Projection:** UTM Zone 9N NAD83

**Data Sources:**  
 Natural Resources Canada, GeoBase®  
 Teck Metals Ltd.  
 Azimuth Consulting Group

**Figure 3. Remediation Cover Areas and Post-Remediation Surface Soil Chemistry for the Burnick Zone and 1300 Portal Areas**

**Sä Dena Hes**

Prepared for:

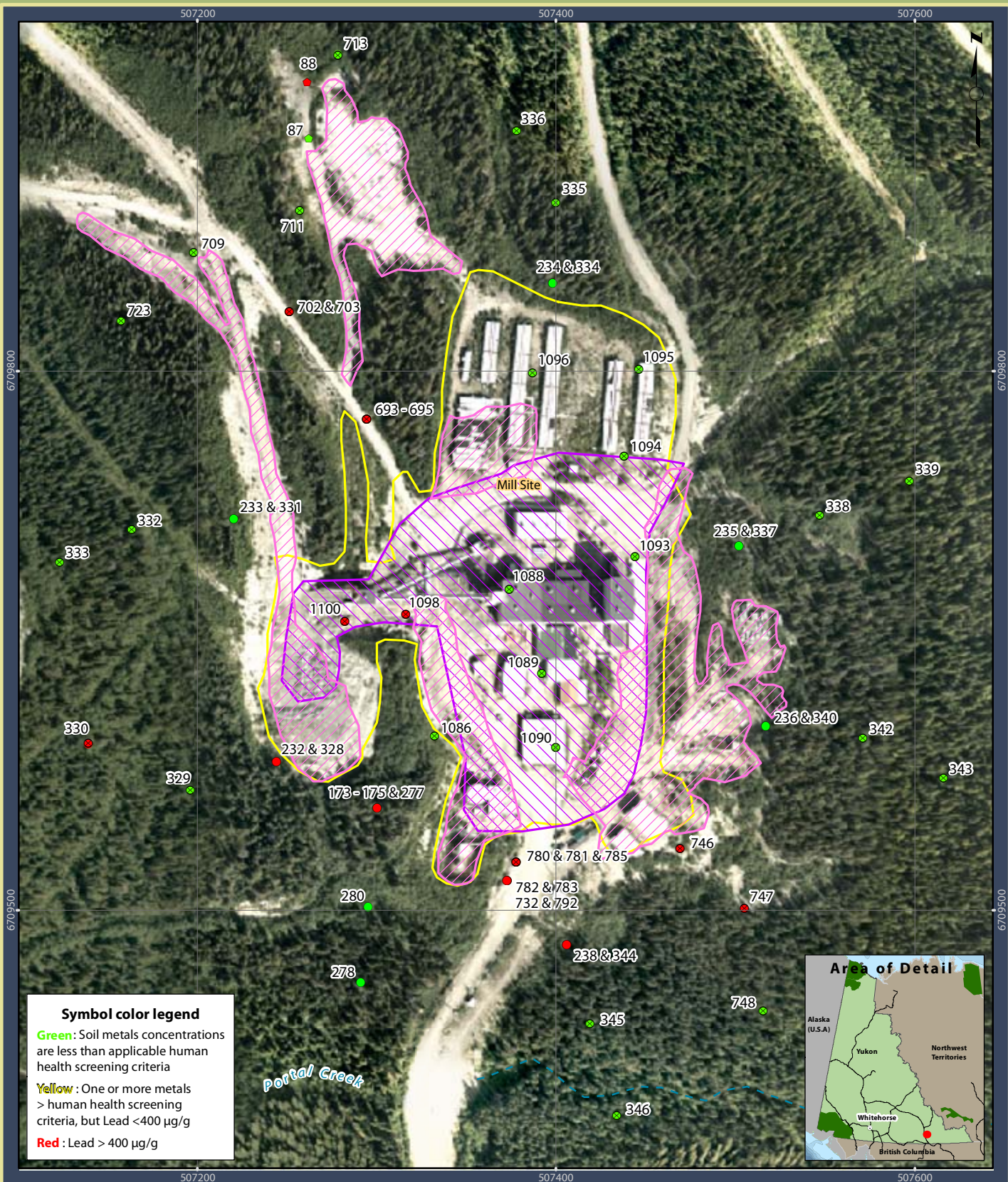


By:



December 11, 2015





**Symbol color legend**

**Green:** Soil metals concentrations are less than applicable human health screening criteria

**Yellow:** One or more metals > human health screening criteria, but Lead <400 µg/g

**Red:** Lead > 400 µg/g

- |                                |                       |
|--------------------------------|-----------------------|
| <b>Legend</b>                  |                       |
| — River/Creek                  | ● Soil Sample Method  |
| - - Ephemeral stream           | ● Shallow Soil Sample |
| ▨ Remediation Cover Areas 2015 | ● Test Pit            |
| ▨ Remediation Cover Areas 2014 | ⊗ XRF                 |
| ▭ Recontoured Areas            |                       |

0 25 50 75  
Metres

**Projection:** UTM Zone 9N NAD83

**Data Sources:**  
Natural Resources Canada, GeoBase®  
Teck Metals Ltd.  
Azimuth Consulting Group

**Figure 4. Remediation Cover Areas and Post-Remediation Surface Soil Chemistry for the Mill Site Area**

**Sä Dena Hes**

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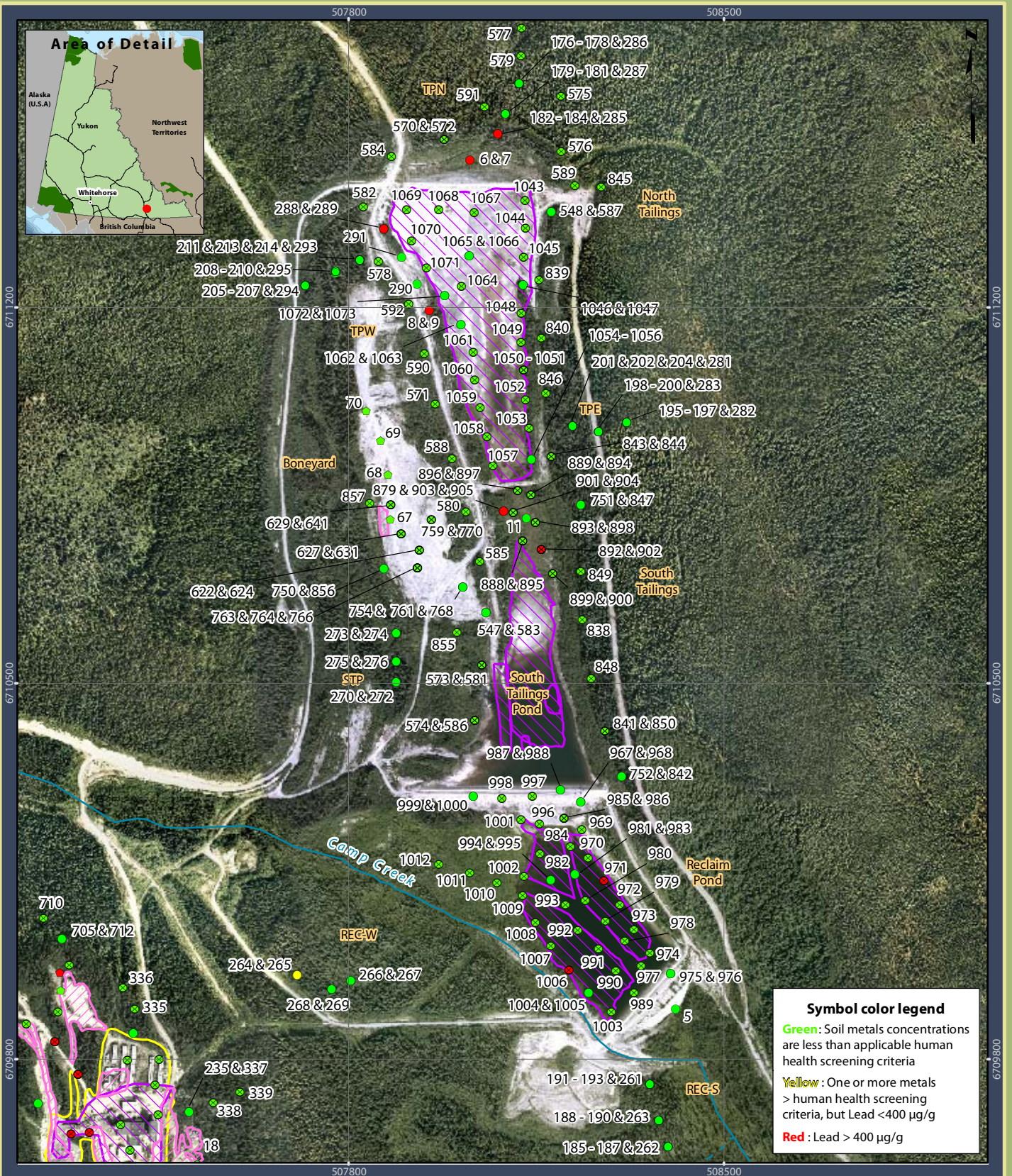


By:



December 11, 2015





- Legend**
- River/Creek
  - - Ephemeral stream
  - ▨ Remediation Cover Areas 2015
  - ▨ Remediation Cover Areas 2014
  - ▨ Recontoured Areas

- Soil Sample Method**
- Shallow Soil Sample
  - Test Pit
  - ⊗ XRF

0 50 100 150  
Metres

**Projection:** UTM Zone 9N NAD83

**Data Sources:**  
Natural Resources Canada, GeoBase®  
Teck Metals Ltd.  
Azimuth Consulting Group

**Figure 5. Remediation Cover Areas and Post-Remediation Surface Soil Chemistry for the Tailings Management Facility Area**

**Sä Dena Hes**

Prepared for:



By:

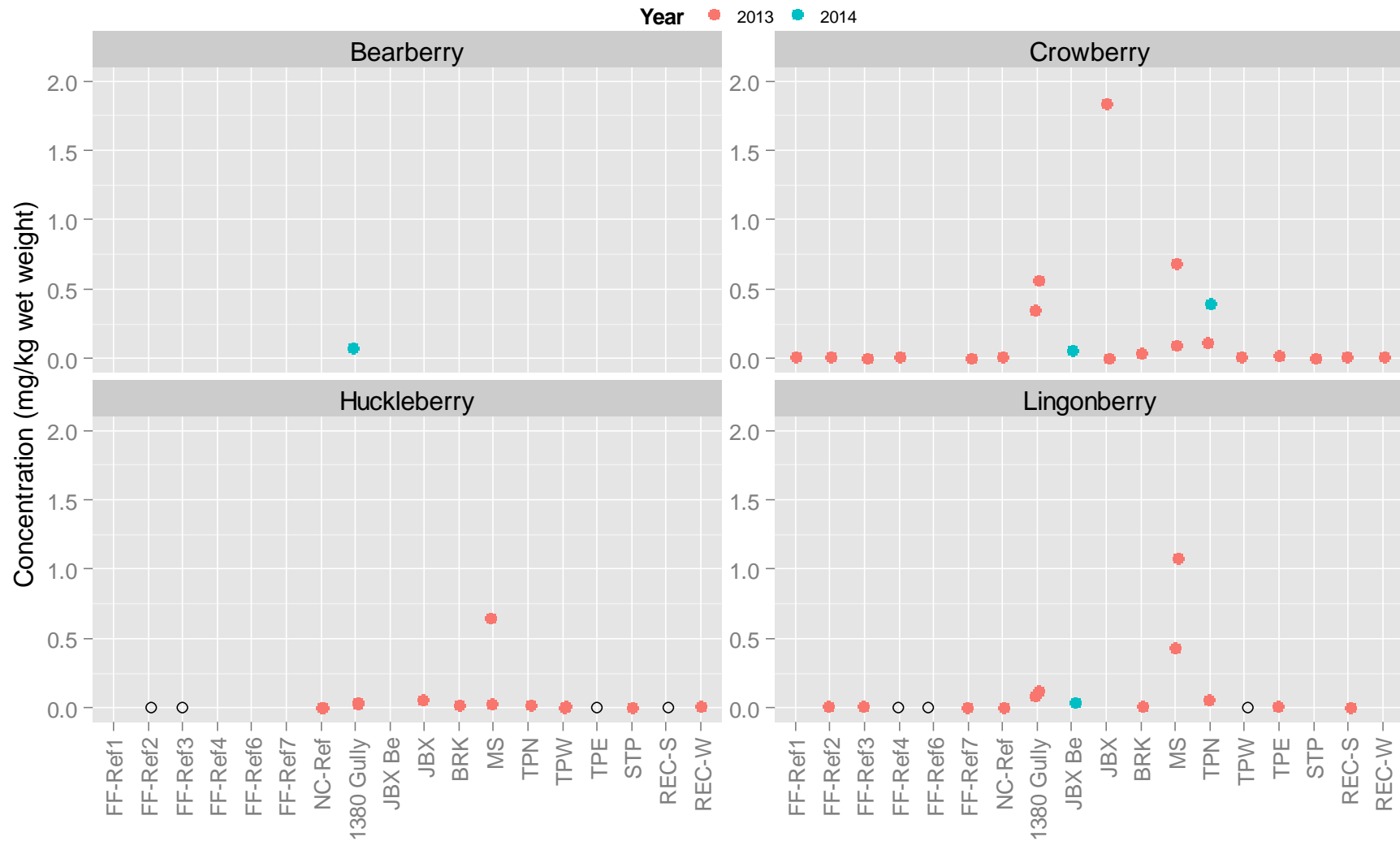


December 11, 2015



**Figure 6. Lead concentrations in unwashed berries collected from the Să Dena Hes Mine Site in 2013 and 2014.**

Note: open symbols indicate concentrations are less than the detection limit. Refer to Figure 2-8 in Azimuth (2015a) for station locations.



**Table 1. Information on the cover materials used for remediation at various AECs.**

AECs where covers were placed <sup>1</sup>	AEC	Year Cover was Placed	Source of Cover Material	Minimum Thickness (mm) <sup>1</sup>	Data Source (Citation)
Jewelbox	1	2015	Reclaim Dam	200 mm	Golder (2015a) Golder (2015b)
Jewelbox Fuel Tanks and Shop Area	1	2014	Reclaim Dam	600 mm	
Jewelbox Sediment Pond & Gully	9	2014	Reclaim Dam	1000 mm	
Reclaim Pond	8	2014	Reclaim Dam	500 mm	
Boneyard (high As area)	5	2015	Reclaim Dam	200 mm	
South Pond (high As, Pb, and Zn area)	8	2015	Reclaim Dam	500 mm	Golder (2015a)
South Pond	8	2014	South Dam	500 mm	
North Pond	8	2014	South Dam	500 mm	
Golden Hill Shop	3	2013	Stockpiles near NC-Ref <sup>2</sup>	600 mm	AMEC (2015 in prep)
Mill Site	3	2014 and 2015	Mill Site Camp Area	2014: 400-500 mm 2015: 200 mm	Golder (2015a)
Burnick Zone Shop Area	2.1	2014	Crest of the waste rock dump at the Burnick 1200 Portal area	600 mm	Golder (2015a)

Notes:

<sup>1</sup> Cover “footprints” and thicknesses are based on information provided by AMEC (2015 in prep).

<sup>2</sup> Soil material used to cover the Golden Hill Shop was taken from two stockpiles on the long access road, west of the pumphouse on Camp Creek near the North Camp Creek reference (NC-Ref). No samples were analyzed for characterization of the cover material.



Table 2. Groundwater chemistry data from 2014 screened against human health drinking water quality guidelines.

Table 2. Groundwater chemistry data from 2014 screened against human health drinking water quality guidelines.

Location Site Code SCN Date Sampled QA/QC	Human Health Drinking Water Screening Criteria	2013 Groundwater Chemistry Comparison  Max Conc.      Site Code		Lower 1380 Gully (on the road upgradient from PH-1)		Jewelbox Haul Road		Jewelbox 1408 Portal	Mine Site Road (near FF-Ref2)	Upper Portal Creek	Burnick Zone 1200 Portal	Mine site road north of the North Tailings Pond		Camp Creek Rd (near MH-04)		Reclaim Pond Borrow Area		Mine site road west of the Reclaim Pond		South of the Reclaim Dam			East of the North Tailings Pond			1380 Gully (upgradient of 1250 Portal)		
				MW13-01	MW13-01	MW13-02	MW13-02	MW13-03†	MW13-04	MW13-04	MW13-05†	MW13-06†	MW13-07	MW13-07	MW13-08	MW13-08	MW13-09	MW13-09	MW13-10	MW13-10	MW13-11	MW13-11	MW13-11	MW13-12	MW13-12	MW13-12	MW13-13	MW13-13
				6418-05	20757-01	6418-07	20770-02	6424-01	6424-03	20757-04	6418-06	6418-01	6418-08	20757-07	6418-09	20757-08	6418-03	20757-09	6418-04	20757-10	6418-02	20757-11	20758-02	6418-10	6418-11	20770-01	6424-02	20758-01
				14-Jun-14	6-Sep-14	15-Jun-14	12-Sep-14	21-Jun-14	21-Jun-14	7-Sep-14	14-Jun-14	13-Jun-14	15-Jun-14	6-Sep-14	15-Jun-14	6-Sep-14	14-Jun-14	6-Sep-14	14-Jun-14	7-Sep-14	13-Jun-14	7-Sep-14	7-Sep-14 FDA	7-Sep-14 FD	7-Sep-14 FDA	16-Jun-14 FD	12-Sep-14	21-Jun-14
Physical Tests																												
pH (field, pH units)				7.66	7.08	7.63	7.56	6.85	7.73	7.47	7.60	7.02	7.25	7.14	7.38	7.03	7.20	7.09	7.45	7.29	7.00	6.75	6.75	7.49	7.49	7.56	7.64	
Hardness (as CaCO <sub>3</sub> )				154000	159000	194000	196000	65400	120000	145000	157000	328000	243000	245000	210000	261000	267000	253000	223000	247000	554000	565000	536000	416000	404000	411000	94500	117000
Anions and Nutrients (µg/L)																												
Chloride (Cl)				-	690	-	1400	-	-	<500	-	-	-	1500	-	860	-	820	-	1400	-	5400	4400	-	-	2000	-	<500
Fluoride (F)				-	350	-	39.0	-	-	61.0	-	-	-	320	-	52.0	-	61.0	-	66.0	-	210	190	-	-	21.0	-	160
Nitrate (as N)	10,000			305	334	595	631	49.0	217	303	1500	<20	<20	60.0	361	254	123	1330	610	626	<20	227	82.0	119	116	1370	159	322
Nitrite (as N)	1,000	12.9	MW13-02	14.1	<5.0	7.20	<5.0	<5	<5	<5.0	9.00	<5	<5	<5.0	5.60	<5.0	6.90	<5.0	7.20	<5.0	<5	<5.0	<5.0	<5	<5	<5.0	28.3	<5.0
Nitrate and nitrite (as N)				320	334	602	631	49.0	217	303	1510	<20	<20	60.0	367	254	130	1330	617	626	<20	227	82.0	119	116	1370	188	322
Ammonia Nitrogen				<5	-	<5	-	-	-	-	<5	11.8	145	-	<5	-	<5	-	<5	-	843	-	-	<5	<5	-	-	-
Sulfate (SO4)				12400	9220	39100	30600	6510	5870	5380	44700	128000	55500	41800	8210	8440	8020	6080	30700	34800	260000	282000	201000	15400	15900	14100	17900	18100
Dissolved Metals (µg/L)																												
Aluminum				5.10	5.40	4.10	12.5	3.10	<3.0	20.3	<3.0	3.90	4.40	11.4	<3.0	11.6	<3.0	14.6	<3.0	5.30	3.70	43.7	7.00	<3.0	<3.0	11.5	4.20	7.70
Antimony	6			<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Arsenic	10	38.7	MW13-06	0.74	0.21	0.93	1.04	4.15	0.65	0.67	0.58	39.0	2.06	1.99	0.25	0.33	<0.1	0.16	0.90	0.86	3.99	5.21	4.59	0.21	0.22	1.06	0.36	0.40
Barium	1,000			18.5	21.0	11.5	13.9	27.5	28.9	35.3	52.2	28.7	16.9	20.4	116	150	66.4	55.5	12.0	8.90	19.8	33.8	27.3	49.1	47.9	48.3	8.60	10.4
Beryllium				<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Bismuth				<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Boron	5,000			<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	0.076	74.0	78.0	<50	<50	<50	<50	
Cadmium	5			0.24	0.82	0.031	0.40	0.42	0.34	0.36	0.038	0.17	0.032	0.021	0.054	0.094	0.044	0.073	0.035	0.036	<0.01	0.040	<0.010	0.011	0.010	0.021	1.04	0.49
Calcium				54400	57700	69100	69600	21800	43400	52900	57200	118000	70500	71400	71600	89700	92100	88000	76000	85100	121000	131000	122000	67100	64500	67100	35600	43800
Chromium	50			<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	
Cobalt				<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	4.63	3.58	1.41	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	10.3	10.9	9.29	<0.50	<0.50	<0.50	<0.50	
Copper				0.82	1.18	2.16	2.15	0.73	0.49	1.23	0.41	0.28	<0.2	<0.20	0.27	1.25	<0.2	1.51	0.30	1.09	<0.2	0.89	<0.20	1.00	0.48	2.25	0.65	1.49
Iron	6,500	1,160	TH10-91	5.30	7.60	<5	19.1	5.20	<5	14.3	<5	381	1760	1460	<5	19.9	<5	14.0	5.10	5.90	4480	7110	6460	<5	<5	9.00	<5	16.5
Lead	10	1.95	MW13-08	5.73	3.19	0.85	8.05	0.55	0.25	2.11	<0.2	0.39	<0.2	1.91	<0.2	3.02	<0.2	4.19	<0.2	0.95	<0.2	4.22	0.38	<0.2	<0.2	0.49	0.35	0.61
Lithium				<5	<5.0	<5	<5.0	<5	<5	<5.0	<5	8.10	8.40	8.70	<5	<5.0	<5	<5.0	<5	<5.0	19.8	18.1	19.9	11.7	11.3	9.60	<5	<5.0
Magnesium				4380	3530	5130	5310	2660	2730	3220	3420	7970	16300	16300	7510	9050	8850	8080	8060	8360	60900	58000	56500	60200	59000	59100	1370	1940
Manganese	550	2,850	MW13-11	15.8	1.40	10.1	8.20	5.20	<1	17.4	<1	1170	1690	1210	<1	19.1	5.60	11.0	1.50	5.30	4430	4660	3920	2.50	2.30	3.50	1.40	39.6
Mercury	1			< 0.010	<0.010	< 0.010	< 0.010	< 0.010	< 0.010	<0.010	< 0.010	< 0.010	< 0.010	<0.010	< 0.010	<0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	<0.010
Molybdenum				1.40	<1.0	<1.0	<1.0	14.2	<1.0	<1.0	<1.0	40.1	3.10	3.00	<1.0	<1.0	1.10	1.20	1.70	1.80	1.50	1.70	1.60	<1.0	<1.0	<1.0	<1.0	<1.0
Nickel				1.80	<1.0	<1.0	1.00	4.50	<1.0	<1.0	<1.0	17.7	6.40	1.90	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	16.0	15.6	12.9	<1.0	<1.0	1.20	<1.0	22.6
Potassium				508	650	958	1420	456	382	409	442	2040	3060	2870	562	677	750	780	981	1030	3140	3330	3150	386	413	509	410	705
Selenium	10			1.08	1.05	1.53	1.49	2.33	0.99	0.99	2.98	0.10	<0.1	<0.10	0.83	1.13	0.93	0.87	1.49	1.57	<0.1	0.13	0.10	1.26	1.19	1.06	0.59	0.18
Silicon				3350	3270	3310	3780	5340	3700	4010	3980	14500	6490	7440	3280	3700	3150	3620	3470	4100	7300	8220	8130	2010	1980	2320	1820	2610
Silver				< 0.020	<0.020	< 0.020	0.0.																					

Table 3. Chemistry data for samples of huckleberry (*Vaccinium sp.* ) collected in 2013 and 2014 from the S  Dena Hes Mine Site.

					Reference				Exposure											
					FF-Ref2	FF-Ref3	NC-Ref		1380 Gully		BRK	JBX	MS	MS	REC-S	REC-W				
					Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed				
					8-Aug-13	10-Aug-13	9-Aug-13	9-Aug-13	8-Aug-13	9-Aug-13	8-Aug-13	11-Aug-13	11-Aug-13	11-Aug-13	8-Aug-13	8-Aug-13				
					2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013				
COPCs by Media																				
Soil	Berry (2013)	Parameter	Detection Limit	Maximum Background	FFR2-VACC-1	FFR3-VACC-1	NCREF-VACC-1	NCREF-VACC-2	1380-VACC-1	1380 VACC-2	BRNK-VACC-1	JBX-VACC-1	MILL-VACC-1	MILL-VACC-2	RES-VACC-1	REW-VACC-1				
Physical Properties																				
Moisture (%)					0.1				87.1	87.6	87.2	89.1	87.7	84.6	87.4	86.0	87.6	89.3	89.7	89.6
Total Metals (µg/g wet weight)																				
No	No	Aluminum	0.4	3.91	2.75	3.03	3.91	3.12	2.01	1.36	2.10	1.56	2.89	3.47	3.72	3.73				
No	No	Antimony	0.002	0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020				
COPC	No	Arsenic	0.004	0.0040	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004				
No	No	Boron	0.2	0.75	0.48	0.49	0.75	0.46	0.48	0.72	0.80	0.49	0.64	0.68	0.61	0.48				
COPC	COPC	Cadmium	0.002	0.014	0.014	0.013	0.0082	0.0052	0.0083	0.0097	0.022	0.013	0.0026	0.015	0.0032	0.016				
No	No	Calcium	0.5	220	140	178	220	124	123	158	225	197	169	198	186	211				
No	No	Chromium	0.01	0.010	<0.01	<0.01	<0.01	<0.01	<0.01	0.023	<0.01	<0.01	<0.01	0.017	<0.01	<0.01				
No	No	Cobalt	0.004	0.0040	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004				
No	No	Copper	0.01	0.63	0.62	0.63	0.62	0.37	0.52	0.68	0.69	0.67	0.73	0.60	0.60	0.78				
No	No	Iron	0.2	2.05	1.78	1.85	2.05	0.99	1.28	1.74	2.51	1.46	1.77	1.98	1.78	2.41				
No <sup>3</sup>	COPC	Lead	0.004	0.0044	<0.004	<0.004	0.0044	0.0042	0.031	0.044	0.018	0.062	0.029	0.65	<0.004	0.0075				
No	No	Magnesium	1	79.1	57.6	79.1	77.5	43.9	57.7	67.6	102	62.6	75.1	49.6	87.5	100				
No	No	Manganese	0.004	35.5	13.0	29.0	35.5	16.9	12.3	4.82	13.0	5.33	23.1	6.65	21.7	16.4				
No	No	Molybdenum	0.004	0.096	0.096	0.057	0.034	0.012	0.016	0.041	0.23	0.012	0.027	0.019	0.051	0.11				
No	No	Nickel	0.01	0.045	0.045	0.033	0.030	0.025	0.032	0.073	0.047	0.13	0.030	0.048	0.048	0.063				
No	No	Selenium	0.02	0.020	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.021	0.022	<0.02	<0.02	<0.02	<0.02				
No	No	Sodium	20	40.0	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20				
No	No	Strontium	0.01	0.34	0.34	0.19	0.12	0.089	0.14	0.24	0.33	0.26	0.24	0.39	0.25	0.44				
COPC	No	Thallium	0.0004	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004				
No	No	Tin	0.02	0.21	0.21	0.066	0.086	0.068	0.097	0.078	0.29	0.033	0.067	0.044	0.084	0.10				
COPC	No	Uranium	0.0004	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004				
COPC	No	Vanadium	0.02	0.020	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				
COPC	COPC	Zinc	0.1	1.30	1.11	1.30	1.18	0.51	1.04	1.16	2.00	1.44	1.06	1.51	0.98	1.39				

Notes:

- <sup>1</sup> Washed berry samples were not used in the HHRA as they are not considered representative of potential human health exposure conditions.
- <sup>2</sup> The 2014 Mill Site (MS) berry samples were excluded from the HHRA update because they were collected from an area that was under active remediation.
- <sup>3</sup> Lead was not considered a soil COPC in the HHRA because of the need for risk management in areas where the soil lead concentration is > 400  g/g.

<b>Bold text</b>	Concentration is > 2x the maximum background concentration.
<b>Bold , shaded</b>	Concentration is > 10x the maximum background concentration.
<i>Italics</i>	Results are less than the detection limit (DL).





Table 3. Chemistry data for samples of huckleberry (*Vaccinium sp.* ) collected in 2013 and 2014 from the S  Dena Hes Mine Site.

					Exposure							
					STP		TPE	TPN	TPW		MS <sup>2</sup>	
					Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Washed
					8-Aug-13	8-Aug-13	8-Aug-13	8-Aug-13	10-Aug-13	10-Aug-13	6-Aug-14	6-Aug-14
					2013	2013	2013	2013	2013	2013	2014	2014
COPCs by Media												
Soil	Berry (2013)		Site Code Washed/Unwashed Date Year	Maximum Background							MS- HUCKLEBERRY- NOT WASHED	MS- HUCKLEBERRY- WASHED
		Parameter	Detection Limit		STP-VACC-1	TPE-VACC-1	TPN-VACC-1	TPW-VACC-1	TPW-VACC-2	TPW-VACC-3		
Physical Properties												
		Moisture (%)	0.1		87.4	88.5	87.3	87.1	86.6	87.7	85.6	87.6
Total Metals (µg/g wet weight)												
No	No	Aluminum	0.4	3.91	3.06	4.39	2.12	1.58	1.87	1.63	6.84	4.35
No	No	Antimony	0.002	0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0035	<0.0020
COPC	No	Arsenic	0.004	0.0040	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0053	<0.004
No	No	Boron	0.2	0.75	0.70	0.59	0.34	0.52	0.48	0.48	1.11	0.90
COPC	COPC	Cadmium	0.002	0.014	0.014	0.0029	0.0062	<0.0020	<0.0020	<0.0020	0.061	0.032
No	No	Calcium	0.5	220	230	182	235	178	270	169	219	179
No	No	Chromium	0.01	0.010	0.012	<0.01	<0.01	0.063	<0.01	<0.01	<0.01	<0.01
No	No	Cobalt	0.004	0.0040	<0.004	<0.004	<0.004	0.0063	<0.004	<0.004	0.0050	<0.004
No	No	Copper	0.01	0.63	0.66	0.60	0.52	0.64	0.72	0.56	1.01	0.76
No	No	Iron	0.2	2.05	2.62	2.45	1.89	1.80	2.05	1.52	5.47	2.88
No <sup>3</sup>	COPC	Lead	0.004	0.0044	0.0041	<0.004	0.020	0.0041	0.016	0.0059	9.11	3.56
No	No	Magnesium	1	79.1	102	86.6	83.3	63.1	86.6	59.1	88.2	69.6
No	No	Manganese	0.004	35.5	31.3	22.7	7.40	8.50	14.2	6.52	7.61	6.80
No	No	Molybdenum	0.004	0.096	0.075	0.062	0.11	0.046	0.088	0.056	0.019	0.012
No	No	Nickel	0.01	0.045	0.046	0.036	0.051	0.25	0.046	0.030	0.047	<0.040
No	No	Selenium	0.02	0.020	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.01	<0.01
No	No	Sodium	20	40.0	<20	<20	<20	<20	<20	<20	<4.0	<4.0
No	No	Strontium	0.01	0.34	0.19	0.31	0.34	0.62	0.76	0.52	0.34	0.33
COPC	No	Thallium	0.0004	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
No	No	Tin	0.02	0.21	0.18	0.12	0.11	0.15	0.045	0.075	0.45	0.22
COPC	No	Uranium	0.0004	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
COPC	No	Vanadium	0.02	0.020	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.022	<0.02
COPC	COPC	Zinc	0.1	1.30	1.21	1.21	1.07	0.94	1.08	0.87	8.62	3.64

Notes:

- <sup>1</sup> Washed berry sample:Washed berry samples were not used in the HHRA as they are not considered representative of potential human health exposure conditions.
- <sup>2</sup> The 2014 Mill Site (MS)The 2014 Mill Site (MS) berry samples were excluded from the HHRA update because they were collected from an area that was under active remediation.
- <sup>3</sup> Lead was not considerLead was not considered a soil COPC in the HHRA because of the need for risk management in areas where the soil lead concentration is > 400  g/g.

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Concentration is > 2x the maximum background concentration.

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Concentration is > 10x the maximum background concentration.

*Italics*

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*Italics*

Results are less than the detection limit (DL).



Table 4. Chemistry data for samples of lingonberry (*Vaccinium vitis-idaea* ) collected in 2013 and 2014 from the S  Dena Hes Mine Site.

				Reference						Exposure						
Site Code				FF-Ref2	FF-Ref3	FF-Ref4	FF-Ref6	FF-Ref7	NC-Ref	1380 Gully		BRK	MS		REC-S	
Washed/Unwashed <sup>1</sup>				Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	
Date				9-Aug-13	10-Aug-13	10-Aug-13	10-Aug-13	10-Aug-13	10-Aug-13	10-Aug-13	8-Aug-13	9-Aug-13	8-Aug-13	11-Aug-13	11-Aug-13	8-Aug-13
Year				2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	2013	
COPCs by Media																
Soil	Berry (2013)	Parameter	Detection Limit	Maximum Background	FFR2-LNG-1	FFR3-LNG-1	FFR4-LNG-1	FFR6-LNG-1	FFR7-LNG-1	NCREF-LNG-1	1380-LNG-1	1380-LNG-2	BRNK-LNG-1	MILL-LNG-1	MILL-LNG-2	RES-LNG-1
Physical Properties																
		Moisture (%)	0.1		83.4	86.3	83.7	84.2	80.8	84.0	85.6	84.0	86.2	82.3	85.3	84.6
Total Metals (µg/g wet weight)																
No	No	Aluminum	0.4	7.71	3.93	6.90	4.63	3.04	7.71	5.53	5.29	3.13	2.56	9.34	11.3	6.49
No	No	Antimony	0.002	0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020
COPC	No	Arsenic	0.004	0.0040	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0046	<0.004
No	No	Boron	0.2	1.27	0.73	<0.20	1.27	0.66	0.87	0.71	0.61	0.49	0.75	1.65	0.43	0.79
COPC	COPC	Cadmium	0.002	0.015	0.0090	0.0050	0.013	0.0096	<0.0020	0.015	0.011	0.0038	0.010	0.0043	0.023	0.0039
No	No	Calcium	0.5	343	343	203	274	172	285	237	174	252	249	181	209	253
No	No	Chromium	0.01	0.031	<0.01	0.031	<0.01	<0.01	<0.01	<0.01	<0.01	<b>0.18</b>	<0.01	0.050	0.013	<b>0.19</b>
No	No	Cobalt	0.004	0.0052	<0.004	0.0052	<0.004	<0.004	<0.004	0.0048	<0.004	0.010	<0.004	<0.004	0.0044	<0.004
No	No	Copper	0.01	0.78	0.70	0.73	0.49	0.62	0.78	0.75	0.48	0.56	0.51	0.72	0.76	0.77
No	No	Iron	0.2	5.61	2.86	3.96	3.24	3.01	5.61	2.54	2.34	5.29	2.04	4.41	9.12	5.03
No <sup>4</sup>	COPC	Lead	0.004	0.0094	0.0093	0.0094	<0.004	<0.004	0.0049	0.0046	<b>0.091</b>	<b>0.13</b>	0.0091	<b>1.08</b>	<b>0.43</b>	0.0069
No	No	Magnesium	1	149	149	128	107	89.2	136	119	83.0	73.8	119	91.5	83.9	127
No	No	Manganese	0.004	67.0	57.9	52.2	34.8	17.0	67.0	66.8	25.2	8.61	45.5	50.1	16.8	61.6
No	No	Molybdenum	0.004	0.26	0.079	0.034	0.038	0.26	0.026	0.047	0.0076	0.070	0.078	0.017	0.022	0.018
No	No	Nickel	0.01	0.27	0.067	0.27	0.048	0.039	0.096	0.13	0.030	0.50	0.051	0.062	0.055	<b>1.43</b>
No	No	Selenium	0.02	0.020	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
No	No	Sodium	20	40.0	<40	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<40
No	No	Strontium	0.01	0.86	0.33	0.33	0.86	0.16	0.38	0.27	0.22	0.33	0.37	0.21	0.34	0.66
COPC	No	Thallium	0.0004	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
No	No	Tin	0.02	0.20	0.20	0.074	<0.02	0.040	0.057	0.057	0.020	0.15	0.13	0.021	0.052	0.26
COPC	No	Uranium	0.0004	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004
COPC	No	Vanadium	0.02	0.020	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.023	<0.02
COPC	COPC	Zinc	0.1	2.17	2.16	1.99	1.88	1.66	2.17	2.02	2.40	2.81	2.78	2.26	3.80	2.24

Notes:

- <sup>1</sup> Washed berry samples were not used in the HHRA as they are not considered representative of potential human health exposure conditions.
- <sup>2</sup> The 2014 Mill Site (MS) berry samples were excluded from the HHRA update because they were collected from an area that was under active remediation.
- <sup>3</sup> The maximum concentration of the unwashed lingonberry samples from the Jewelbox area.
- <sup>4</sup> Lead was not considered a soil COPC in the HHRA because of the need for risk management in areas where the soil lead concentration is > 400  g/g.
- Bold text**

Concentration is > 2x the maximum background concentration.
- Bold , shaded**

Concentration is > 10x the maximum background concentration.
- Italics*

Results are less than the detection limit (DL).



Table 4. Chemistry data for samples of lingonberry (*Vaccinium vitis-idaea* ) collected in 2013 and 2014 from the Să Dena Hes Mine Site.

COPCs by Media				Exposure						Comparison of maximum on-Site metals concentrations between 2013 and 2014.				
				Site Code	TPE	TPN	TPW	MS <sup>2</sup>					JBX	
				Washed/Unwashed <sup>1</sup>	Unwashed	Unwashed	Unwashed	Unwashed	Washed				Unwashed	Washed
				Date	8-Aug-13	9-Aug-13	9-Aug-13	6-Aug-14	6-Aug-14				7-Aug-14	7-Aug-14
				Year	2013	2013	2013	2014	2014				2014	2014
Soil	Berry (2013)	Parameter	Detection Limit	TPE-LNG-1	TPN-LNG-1	TPW-LNG-1	MS-LINGONBERRY-NOT WASHED	MS-LINGONBERRY-WASHED	JEWELBOX-LINGONBERRY-NOT WASHED	JEWELBOX-LINGONBERRY-WASHED	2013 Max Concentration	2014 Max Concentration <sup>3</sup>	Conc. in 2014 greater than 2013?	
Physical Properties														
		Moisture (%)	0.1	81.3	81.2	84.6	83.5	85.9	83.3	86.3				
Total Metals (µg/g wet weight)														
No	No	Aluminum	0.4	4.72	0.66	3.70	14.7	7.46	4.27	2.85	11.3	4.27	No	
No	No	Antimony	0.002	<0.0020	<0.0020	<0.0020	0.0063	<0.0020	<0.0020	<0.0020	<0.002	<0.002	No	
COPC	No	Arsenic	0.004	<0.004	<0.004	<0.004	0.0082	<0.004	<0.004	<0.004	0.0046	<0.004	No	
No	No	Boron	0.2	0.64	1.19	0.81	1.73	1.08	0.65	0.53	1.65	0.65	No	
COPC	COPC	Cadmium	0.002	0.0065	0.015	0.010	0.060	0.016	0.0059	0.0035	0.023	0.0059	No	
No	No	Calcium	0.5	306	309	193	223	184	315	267	309	315	Yes	
No	No	Chromium	0.01	0.085	0.020	0.010	0.019	0.011	<0.01	<0.01	0.19	<0.01	No	
No	No	Cobalt	0.004	0.0046	<0.004	<0.004	0.0077	0.0040	<0.004	<0.004	0.010	<0.004	No	
No	No	Copper	0.01	0.73	0.84	0.58	0.79	0.54	0.73	0.62	0.84	0.73	No	
No	No	Iron	0.2	2.96	2.98	1.92	10.1	3.66	2.81	2.06	9.12	2.81	No	
No <sup>4</sup>	COPC	Lead	0.004	0.0082	0.062	<0.004	12.4	3.16	0.041	0.0069	1.08	0.041	No	
No	No	Magnesium	1	110	111	95.0	120	92.9	149	118	127	149	Yes	
No	No	Manganese	0.004	43.6	22.4	47.1	47.7	34.1	21.5	17.0	61.6	21.5	No	
No	No	Molybdenum	0.004	0.040	0.029	0.034	0.021	0.017	0.0085	0.0053	0.078	0.0085	No	
No	No	Nickel	0.01	0.11	0.034	0.088	0.059	0.045	0.066	0.055	1.43	0.066	No	
No	No	Selenium	0.02	<0.02	<0.02	<0.02	0.011	<0.01	<0.01	<0.01	0.020	<0.01	No	
No	No	Sodium	20	<20	<20	<20	4.10	<4.0	<4.0	<4.0	40.0	<4.0	No	
No	No	Strontium	0.01	0.46	0.56	0.23	0.34	0.31	0.46	0.46	0.66	0.46	No	
COPC	No	Thallium	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	No	
No	No	Tin	0.02	0.13	0.077	0.037	0.61	0.62	0.45	0.60	0.26	0.45	Yes	
COPC	No	Uranium	0.0004	<0.0004	<0.0004	<0.0004	0.0005	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	No	
COPC	No	Vanadium	0.02	<0.02	<0.02	<0.02	0.047	<0.02	<0.02	<0.02	0.023	<0.02	No	
COPC	COPC	Zinc	0.1	2.13	2.58	1.55	11.0	3.64	2.41	1.80	3.80	2.41	No	

Notes:

- <sup>1</sup> Washed berry samples were not used in the HHRA as they are not considered representative of potential human health exposure conditions.
- <sup>2</sup> The 2014 Mill Site (MS) berry samples were excluded from the HHRA update because they were collected from an area that was under active remediation.
- <sup>3</sup> The maximum concentration of the unwashed lingonberry samples from the Jewelbox area.
- <sup>4</sup> Lead was not considered a soil COPC in the HHRA because of the need for risk management in areas where the soil lead concentration is > 400 µg/g.
- Bold text**Concentration is > 2x the maximum background concentration.
- Bold , shaded**Concentration is > 10x the maximum background concentration.
- Italics*Results are less than the detection limit (DL).



Table 5. Chemistry data for samples of crowberry (*Empetrum nigrum*) and bearberry (genus *Arctostaphylos*) collected in 2013 and 2014 from the S  Dena Hes Mine Site.

COPCs by Media				Crowberry													
				Reference							Exposure						
				FF-Ref1	FF-Ref2	FF-Ref3	FF-Ref4	FF-Ref7	NC-Ref	1380 Gully		JBX		BRK	MS		
				Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	
Site Code Washed/Unwashed Date Year				9-Aug-13 2013	8-Aug-13 2013	10-Aug-13 2013	10-Aug-13 2013	10-Aug-13 2013	10-Aug-13 2013	8-Aug-13 2013	9-Aug-13 2013	10-Aug-13 2013	11-Aug-13 2013	8-Aug-13 2013	11-Aug-13 2013		
Soil	Berry (2013)	Parameter	Detection Limit	Maximum Background	FFR1-CRB-1	FFR2-CRB-1	FFR3-CRB-1	FFR4-CRB-1	FFR7-CRB-1	NCREF-CRB-1	1380-CRB-1	1380-CRB-2	JBX-CRB-1	JBX-CRB-2	BRNK-CRB-1	MILL-CRB-1	
Physical Properties																	
		Moisture (%)	0.1		84.7	86.7	85.4	83.2	81.0	90.0	89.7	88.8	87.7	85.2	86.8	88.4	
Total Metals (µg/g wet weight)																	
No	No	Aluminum	0.4	3.45	1.45	0.52	0.71	0.82	3.45	1.24	<0.40	4.88	<0.40	0.77	0.86	<0.40	
No	No	Antimony	0.002	0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0021	<0.0020	<0.0020	<0.0020	<0.0020	
COPC	No	Arsenic	0.004	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0043	<0.004	<0.004	0.0102	<0.004	
No	No	Boron	0.2	0.52	<0.20	<0.20	<0.20	0.52	<0.20	<0.20	<0.20	0.29	<0.20	0.45	0.26	<0.20	
COPC	COPC	Cadmium	0.002	0.002	<0.0020	<0.0020	<0.0020	<0.0020	0.0042	<0.0020	0.0021	<0.0020	<0.0020	0.0117	<0.0020	<0.0020	
No	No	Calcium	0.5	90.70	90.7	73.0	79.3	79.3	82.4	77.4	67.3	64.0	56.6	100	67.9	67.7	
No	No	Chromium	0.01	0.16	0.043	0.086	<0.01	<0.01	0.026	0.156	0.011	0.453	<0.01	<0.01	0.027	<0.01	
No	No	Cobalt	0.004	0.007	<0.004	<0.004	<0.004	<0.004	<0.004	0.0073	<0.004	0.0336	<0.004	<0.004	<0.004	<0.004	
No	No	Copper	0.01	0.76	0.763	0.579	0.561	0.392	0.701	0.533	0.483	0.534	0.533	0.641	0.576	0.647	
No	No	Iron	0.2	4.86	3.25	2.31	1.91	2.20	4.86	3.26	1.54	8.09	1.44	2.54	3.41	1.68	
No <sup>4</sup>	COPC	Lead	0.004	0.02	0.0130	0.0156	0.0056	0.0103	0.0045	0.0127	0.347	0.568	0.0062	1.84	0.0446	0.0969	
No	No	Magnesium	1	69.20	69.2	55.6	63.1	55.6	59.8	48.7	46.8	44.0	49.4	56.6	48.7	50.6	
No	No	Manganese	0.004	5.16	4.24	3.45	4.59	2.79	5.16	2.31	2.50	2.00	7.89	1.18	1.68	4.63	
No	No	Molybdenum	0.004	0.04	0.0124	0.0258	0.0215	0.0143	0.0379	0.0334	0.0203	0.0624	0.0448	0.0352	0.508	0.0139	
No	No	Nickel	0.01	0.12	0.053	0.053	0.039	0.021	0.077	0.124	0.031	0.347	0.053	0.073	0.020	0.036	
No	No	Selenium	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
No	No	Sodium	20	20.00	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	
No	No	Strontium	0.01	0.20	0.201	0.069	0.095	0.190	0.103	0.169	0.073	0.123	0.041	0.125	0.108	0.059	
COPC	No	Thallium	0.0004	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	
No	No	Tin	0.02	0.09	0.091	0.041	0.048	0.038	<0.02	0.066	0.078	0.104	0.064	<0.02	0.229	<0.02	
COPC	No	Uranium	0.0004	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	
COPC	No	Vanadium	0.02	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	
COPC	COPC	Zinc	0.1	1.09	1.09	1.03	0.85	0.79	0.81	0.78	1.28	1.36	0.95	2.97	1.08	1.00	

Notes:

- <sup>1</sup> Washed berry samples were not used in the HHRA as they are not considered representative of potential human health exposure conditions.
- <sup>2</sup> The 2014 Mill Site (MS) berry samples were excluded from the HHRA update because they were collected from an area that was under active remediation.
- <sup>3</sup> The maximum concentration of the unwashed samples.
- <sup>4</sup> Lead was not considered a soil COPC in the HHRA because of the need for risk management in areas where the soil lead concentration is > 400  g/g.

<b>Bold text</b>	Concentration is > 2x the maximum background concentration.
<b>Bold , shaded</b>	Concentration is > 10x the maximum background concentration.
<i>Italics</i>	Results are less than the detection limit (DL).



Table 5. Chemistry data for samples of crowberry (*Empetrum nigrum*) and bearberry (genus *Arctostaphylos*) collected in 2013 and 2014 from the S  Dena Hes Mine Site.

				Crowberry													
				Exposure													
Site Code				MS	TPN	TPW	TPE	STP	REC-S	REC-W	MS <sup>2</sup>		TPN	TPN	JBX	JBX	
Washed/Unwashed				Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Unwashed	Washed	Unwashed	Washed	Unwashed	Washed	
Date				11-Aug-13	8-Aug-13	8-Aug-13	8-Aug-13	8-Aug-13	8-Aug-13	8-Aug-13	8-Aug-13	6-Aug-14	6-Aug-14	7-Aug-14	7-Aug-14	7-Aug-14	7-Aug-14
Year				2013	2013	2013	2013	2013	2013	2013	2013	2014	2014	2014	2014	2014	2014
COPCs by Media																	
Soil	Berry (2013)	Parameter	Detection Limit	MILL-CRB-2	TPN-CRB-1	TPW-CRB-1	TPE-CRB-1	STP-CRB-1	RES-CRB-1	REW-CRB-1	MS-CROWBERRY- NOT WASHED	MS-CROWBERRY- WASHED	CROWBERRY- NOT WASHED	TPN- CROWBERRY- WASHED	JEWELBOX- CROWBERRY- NOT WASHED	JEWELBOX- CROWBERRY- WASHED	
Physical Properties																	
Moisture (%)				0.1	89.4	89.9	88.8	84.7	85.3	87.7	89.1	86.4	87.1	86.6	87.5	81.1	83.8
Total Metals (µg/g wet weight)																	
No	No	Aluminum	0.4	1.76	<0.40	<0.40	<0.40	<0.40	<0.40	0.44	10.4	5.74	2.77	1.56	0.99	0.67	
No	No	Antimony	0.002	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0181	0.0134	<0.0020	<0.0020	<0.0020	<0.0020	
COPC	No	Arsenic	0.004	<0.004	0.0044	<0.004	<0.004	<0.004	<0.004	<0.004	0.0148	0.0095	0.0069	0.0066	<0.004	<0.004	
No	No	Boron	0.2	<0.20	<0.20	0.24	0.27	0.32	0.20	<0.20	0.43	0.39	0.35	0.33	0.39	0.35	
COPC	COPC	Cadmium	0.002	0.0074	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.264	0.181	0.0025	0.0017	<0.0010	<0.0010	
No	No	Calcium	0.5	65.2	78.8	61.8	59.8	81.2	71.1	98.3	101	95.7	110	99.6	124	99.0	
No	No	Chromium	0.01	<0.01	<0.01	0.011	<0.01	<0.01	<0.01	<0.01	0.023	0.015	0.012	<0.01	<0.01	<0.01	
No	No	Cobalt	0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	<0.004	0.0180	0.0123	<0.004	<0.004	<0.004	<0.004	
No	No	Copper	0.01	0.687	0.552	0.470	0.629	0.526	0.627	0.563	0.844	0.720	0.592	0.578	0.742	0.622	
No	No	Iron	0.2	2.70	1.84	1.70	1.96	1.97	1.78	1.96	17.5	12.0	4.79	3.50	2.52	1.94	
No <sup>4</sup>	COPC	Lead	0.004	0.690	0.118	0.0130	0.0199	0.0064	0.0090	0.0101	48.9	34.5	0.393	0.293	0.0566	0.0756	
No	No	Magnesium	1	39.7	45.6	49.4	46.7	64.9	56.0	62.7	68.9	62.6	66.0	58.2	86.7	71.9	
No	No	Manganese	0.004	0.996	0.967	3.99	3.32	5.03	3.72	2.38	2.73	2.71	1.54	1.48	2.58	1.88	
No	No	Molybdenum	0.004	0.0093	0.0757	0.0264	0.0284	0.0264	0.0279	0.0507	0.0157	0.0145	0.102	0.0898	0.0081	0.0057	
No	No	Nickel	0.01	0.037	0.074	0.040	0.036	0.028	0.042	0.048	0.054	0.046	<0.040	<0.040	0.046	0.045	
No	No	Selenium	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.037	0.027	<0.01	<0.01	<0.01	<0.01	
No	No	Sodium	20	<20	<20	<20	<20	<20	<20	<20	7.2	5.6	4.5	<4.0	<4.0	<4.0	
No	No	Strontium	0.01	0.110	0.072	0.074	0.088	0.073	0.093	0.207	0.171	0.170	0.110	0.122	0.148	0.136	
COPC	No	Thallium	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	
No	No	Tin	0.02	0.026	0.128	0.090	0.134	0.082	0.151	0.071	0.264	0.230	0.496	0.064	0.294	0.075	
COPC	No	Uranium	0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	<0.0004	0.00104	0.00065	<0.0004	<0.0004	<0.0004	<0.0004	
COPC	No	Vanadium	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.081	0.044	<0.02	<0.02	<0.02	<0.02	
COPC	COPC	Zinc	0.1	1.88	0.90	0.74	0.82	0.94	1.08	0.80	43.9	29.5	1.25	1.08	1.45	1.17	

Notes:

- <sup>1</sup> Washed berry samples were not used in the HHRA as they are not considered representative of potential human health exposure conditions.
- <sup>2</sup> The 2014 Mill Site (MS) berry samples were excluded from the HHRA update because they were collected from an area that was under active remediation.
- <sup>3</sup> The maximum concentration of the unwashed samples.
- <sup>4</sup> Lead was not considered a soil COPC in the HHRA because of the need for risk management in areas where the soil lead concentration is > 400  g/g.

<b>Bold text</b>	Concentration is > 2x the maximum background concentration.
<b>Bold , shaded</b>	Concentration is > 10x the maximum background concentration.
<i>Italics</i>	Results are less than the detection limit (DL).



Table 5. Chemistry data for samples of crowberry (*Empetrum nigrum*) and bearberry (genus *Arctostaphylos*) collected in 2013 and 2014 from the S  Dena Hes Mine Site.

				Crowberry			Bearberry	
							Exposure	
				Comparison of maximum on-site metals concentrations between 2013 and 2014.			1380 Gully Unwashed 6-Aug-14 2014	1380 Gully Washed 6-Aug-14 2014
COPCs by Media							1380 GULLY-S-BEARBERRY-NOT WASHED	1380 GULLY-S-BEARBERRY-WASHED
Soil	Berry (2013)	Parameter	Detection Limit	2013 Max Concentration	2014 Max Concentration <sup>3</sup>	Conc. in 2014 greater than 2013?		
Physical Properties								
		Moisture (%)	0.1					
Total Metals (�g/g wet weight)								
No	No	Aluminum	0.4	4.88	2.77	No	<0.40	<0.40
No	No	Antimony	0.002	0.0021	<0.002	No	<0.0020	<0.0020
COPC	No	Arsenic	0.004	0.0102	0.01	No	<0.004	<0.004
No	No	Boron	0.2	0.45	0.39	No	0.42	0.37
COPC	COPC	Cadmium	0.002	0.0117	0.0025	No	<b>0.0162</b>	<b>0.0116</b>
No	No	Calcium	0.5	100	124.00	Yes	<b>228</b>	<b>197</b>
No	No	Chromium	0.01	0.453	0.012	No	<0.01	<0.01
No	No	Cobalt	0.004	0.0336	<0.004	No	<0.004	<0.004
No	No	Copper	0.01	0.687	0.74	Yes	0.337	0.306
No	No	Iron	0.2	8.09	4.79	No	1.74	1.67
No <sup>4</sup>	COPC	Lead	0.004	1.84	0.39	No	<b>0.0735</b>	0.0118
No	No	Magnesium	1	64.9	86.70	Yes	69.6	63.6
No	No	Manganese	0.004	7.89	2.58	No	0.834	0.768
No	No	Molybdenum	0.004	0.508	0.10	No	0.0080	0.0060
No	No	Nickel	0.01	0.347	0.05	No	<0.040	<0.040
No	No	Selenium	0.02	<0.02	<0.01	No	<0.01	<0.01
No	No	Sodium	20	<20	4.50	No	21.3	<4.0
No	No	Strontium	0.01	0.207	0.15	No	<b>0.455</b>	0.311
COPC	No	Thallium	0.0004	<0.0004	0.00	No	<0.0004	<0.0004
No	No	Tin	0.02	0.229	0.50	Yes	<0.02	<b>0.497</b>
COPC	No	Uranium	0.0004	<0.0004	<0.0004	No	<0.0004	<0.0004
COPC	No	Vanadium	0.02	<0.02	<0.02	No	<0.02	<0.02
COPC	COPC	Zinc	0.1	2.97	1.45	No	<b>2.29</b>	2.06

Notes:

- <sup>1</sup> Washed berry samples were not used in the HHRA as they are not considered representative of potential human health exposure conditions.
- <sup>2</sup> The 2014 Mill Site (MS) berry samples were excluded from the HHRA update because they were collected from an area that was under active remediation.
- <sup>3</sup> The maximum concentration of the unwashed samples.
- <sup>4</sup> Lead was not considered a soil COPC in the HHRA because of the need for risk management in areas where the soil lead concentration is > 400  g/g.

**Bold text**

**Bold , shaded**

*Italics*



Table 6. Metals concentrations in soil samples collected from the Jewelbox Hill area (AEC 1) and the surrounding forested area.

Area (AEC / Outside AEC)		Jewelbox Hill (AEC 1)															
		Jewel Box T1				Jewel Box T2				Jewel Box T3				M Zone T4			
Sample ID		Jewel Box A	Jewel Box B	Jewel Box C	000	000	000	000	Jewel Box A	Jewel Box B	Jewel Box C	MZONE T4	J BOX T1	J BOX T1	J BOX T2	J BOX T3	
Date		5-Jul-13	5-Jul-13	5-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	
Mapping Label		218	219	221	239	240	241	246	324	325	327	357	360	361	363	366	
Method		SS	SS	SS	SS	SS	SS	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	
Start Depth (m)		0.05	0.05	0.05	0.20	0.20	0.20	0.15	0.05	0.05	0.05	0.15	0.20	0.20	0.20	0.20	
pH		6.34	5.81	6.13	5.93	7.17	7.71	5.06									
TOC																	
HHRA Screening Criteria																	
Parameter	Criteria	5.87	11.2	14.4	2.64	2.78	3.37	3.53									
Antimony	31	5.87	11.2	14.4	2.64	2.78	3.37	3.53									
Arsenic	100	43.5	70.8	78.7	41.7	20.2	23.3	29.3	-	-	-	-	-	-	-	-	
Barium	15000	90.7	91.3	101	154	84.1	71.9	100									
Beryllium	160	1.40	1.76	1.94	1.00	0.72	0.44	0.84									
Cadmium	35	1.86	3.05	2.28	24.8	22.0	21.7	1.49									
Chromium	100	37.3	36.3	41.0	28.3	25.7	14.9	30.1									
Cobalt	50	16.9	19.2	19.9	28.5	9.14	6.64	11.9									
Copper	15000	93.8	158	230	38.2	30.3	34.5	50.3									
Lead	400	415	481	461	504	2830	2800	448	249	352	318	229	265	505	1027	1477	
Mercury	15	<0.05	<0.05	0.076	<0.05	<0.05	<0.05	<0.05									
Molybdenum	390	4.41	5.00	7.42	4.41	3.58	5.13	4.17	-	-	-	-	-	-	-	-	
Nickel	820	48.7	53.7	58.4	113	28.3	27.1	34.6									
Selenium	390	0.50	0.59	0.63	0.52	2.77	1.89	0.56									
Silver	390	1.04	1.09	1.41	1.32	4.01	2.66	1.03									
Thallium	1	0.53	0.65	0.95	0.74	0.23	0.21	0.34									
Tin	47000	<2	<2	<2	<2	<2	<2	<2									
Uranium	23	1.71	1.92	2.34	0.96	1.32	1.43	1.82									
Vanadium	200	96.9	120	167	60.6	52.0	54.2	71.5									
Zinc	10000	451	616	505	3110	3910	3780	393	339	379	398	307	2625	501	1486	2377	

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 6. Metals concentrations in soil samples collected from the Jewelbox Hill area (AEC 1) and the surrounding forested area.

Area (AEC / Outside AEC)		Jewelbox Hill (AEC 1)														
Sample ID		JB1408-04	JB1408-05	JB1408-08	JB1408-17	JB1408-14	JB1408-18	JB1408-13	JB1408-15	1408 - OM - INORG -1	1408 - OM - INORG -2	1408 - OM - ORGANIC -1	1408 - OM - ORGANIC -2	JBX - WR-OM - INORG -1	JBX - WR-OM - INORG -2	JBX - WR-OM - ORGANIC -1
Date		16-Jun-14	17-Jun-14	17-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14	26-Jun-14
Mapping Label		474	479	482	505	506	508	510	515	655	656	657	658	659	660	661
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	SS	SS	SS	SS	SS	SS	SS
Start Depth (m)		0.20	0.20	0.20	0.25	0.20	0.20	0.20	0.20	0.09	0.07	0.00	0.00	0.1	0.08	0.04
pH										4.91	4.78	5.12	5.04	5.43	4.29	6.74
TOC										2.29	2.05	37.6	33.1	3.79	3.08	14
HHRA Screening Criteria																
Parameter																
Antimony	31									1.87	1.46	1.57	2.01	1.42	1.68	4.50
Arsenic	100	-	32.0	87.9	36.9	35.6	55.3	-	-	18.0	10.7	3.04	5.36	12.5	11.9	23.7
Barium	15000									79.9	63.1	162	176	62.3	60.4	111
Beryllium	160									0.53	0.30	0.26	0.56	0.47	0.44	1.21
Cadmium	35									1.28	0.76	31.6	35.4	1.76	0.62	24.4
Chromium	100	* 367	-	-	* 302	-	* 386	-	-	30.8	22.3	5.80	9.19	27.4	26.3	28.8
Cobalt	50	-	-	-	-	-	-	* 217	* 253	9.08	5.87	5.91	7.84	10.3	7.89	14.4
Copper	15000	143	-	209	-	85.5	92.2	-	-	18.0	11.4	11.1	21.0	16.2	17.8	45.8
Lead	400	278	109	582	80.0	73.0	401	39.0	89.6	314	318	2050	4650	314	197	3030
Mercury	15	-	* 24.0	-	-	-	-	-	-	<0.050	<0.050	0.16	0.15	<0.050	<0.050	0.090
Molybdenum	390	18.9	-	-	22.0	6.71	-	-	-	2.83	1.53	1.67	1.84	1.55	1.65	3.67
Nickel	820	158	-	-	-	-	117	-	-	26.1	17.6	9.42	14.0	25.3	22.4	52.2
Selenium	390	-	-	-	-	-	-	-	-	0.29	<0.20	1.41	1.50	<0.20	<0.20	0.91
Silver	390									1.44	0.59	4.16	5.56	0.68	0.40	4.68
Thallium	1									0.20	0.15	0.13	0.14	0.16	0.17	0.37
Tin	47000									<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Uranium	23									0.84	0.53	0.30	0.56	0.60	0.61	1.84
Vanadium	200									58.9	43.8	10.1	17.8	41.7	46.1	58.8
Zinc	10000	390	177	384	229	213	475	69.8	200	305	180	3090	5650	531	168	6780

Notes:

Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).

bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).

Dash (-)

In situ XRF data were below the limit of detection for the instrument.

Blank cells

Data were not collected.

Italics

Results are less than the detection limit (DL).





Table 6. Metals concentrations in soil samples collected from the Jewelbox Hill area (AEC 1) and the surrounding forested area.

Area (AEC / Outside AEC)		Jewelbox Hill (AEC 1)								Outside the AEC Boundary						
Sample ID Date Mapping Label Method Start Depth (m) pH TOC		JBX - WR-OM - ORGANIC -2	JB1408-37	JB1408-36	JB1408-29	JB1408-27	JB1408-33	JB1408-26	JB1408-28	J BOX T1 0+100	J BOX T2 0+50	J BOX T2 0+100	J BOX T3 0+50	J BOX T3 0+100	JB1408-09	JB1408-10
		26-Jun-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	17-Jun-14	18-Jun-14
		662	810	811	812	813	815	821	822	362	364	365	368	369	483	507
		SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
		0.01	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.15	0.20	0.10	0.20	0.2	0.3
		4.65														
		40.5														
HHRA Screening Criteria																
Parameter		31	1.08													
Antimony	100	3.21	-	37.9	-	-	70.1	-	-	-	-	-	-	-	-	-
Arsenic	15000	118														
Barium	160	0.27														
Beryllium	35	8.76														
Cadmium	100	4.78	-	-	-	-	-	-	-						-	-
Chromium	50	3.44	-	-	-	-	-	-	-						-	-
Cobalt	15000	10.3	90.2	-	-	-	-	-	-						-	-
Copper	400	1450	307	308	363	330	910	2522	746	174	220	90.4	251	119	54.3	58.5
Lead	15	0.18	-	-	-	-	-	-	-						-	-
Mercury	390	0.80	-	-	-	-	5.26	-	-	-	-	-	-	-	-	-
Molybdenum	820	9.28	-	-	-	-	-	-	-						-	-
Nickel	390	0.34	-	-	-	-	-	-	-						-	-
Selenium	390	3.84														
Silver	1	0.13														
Thallium	47000	<2.0														
Tin	23	0.35														
Uranium	200	7.00														
Vanadium	10000	2080	365	455	323	1146	1427	2838	335	297	253	140	348	177	108	97.8
Zinc																

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 6. Metals concentrations in soil samples collected from the Jewelbox Hill area (AEC 1) and the surrounding forested area.

Area (AEC / Outside AEC)		Outside the AEC Boundary														
Sample ID		JB1408-11	JB1408-19	JB1408-20	JB1408-12	JB1408-16	JB1408-22	JB1408-21	JB1408-23	JB1408-24	JB1408-25	TP14-18-01	TP14-18-02	JB1408-30	JB1408-32	JB1408-31
Date		18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	19-Jun-14	19-Jun-14	28-Jul-14	28-Jul-14	28-Jul-14
Mapping Label		509	511	512	513	514	526	527	529	530	531	562	563	809	816	817
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.3	0.20	0.30	0.20	0.30	0.20	0.15	0.15	0.15	0.15	0.1	0.6	0.20	0.20	0.20
pH																
TOC																
Parameter	HHRA Screening Criteria															
Antimony	31															
Arsenic	100	-	12.0	19.2	-	-	-	-	-	21.3	-	-	49.8	-	-	-
Barium	15000															
Beryllium	160															
Cadmium	35															
Chromium	100	-	-	-	-	-	-	-	-	* 331	-	-	-	* 437	-	* 354
Cobalt	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	15000	-	-	-	-	-	-	-	-	78.2	-	-	-	-	-	-
Lead	400	70.0	27.4	60.7	54.2	49.4	193	213	59.1	78.6	107	3525	127	202	130	296
Mercury	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	390	3.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	820	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	390															
Thallium	1															
Tin	47000															
Uranium	23															
Vanadium	200															
Zinc	10000	112	77.1	135	79.6	58.6	265	299	90.5	98.7	268	5473	357	333	103	289

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 6. Metals concentrations in soil samples collected from the Jewelbox Hill area (AEC 1) and the surrounding forested area.

Area (AEC / Outside AEC)		Outside the AEC Boundary	
Sample ID		JB1408-35	JB1408-34
Date		28-Jul-14	28-Jul-14
Mapping Label		819	820
Method		XRF	XRF
Start Depth (m)		0.20	0.20
pH			
TOC			
HHRA Screening Criteria			
Parameter			
Antimony	31		
Arsenic	100	-	-
Barium	15000		
Beryllium	160		
Cadmium	35		
Chromium	100	-	-
Cobalt	50	-	-
Copper	15000	-	-
Lead	400	136	71.4
Mercury	15	-	-
Molybdenum	390	-	-
Nickel	820	-	-
Selenium	390	-	-
Silver	390		
Thallium	1		
Tin	47000		
Uranium	23		
Vanadium	200		
Zinc	10000	198	249

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded**

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics*

Results are less than the detection limit (DL).



Table 7. Metals concentrations in soil samples collected from the Burnick Zone and 1300 Portal areas (AEC 2) and the surrounding forested area.

Area (AEC / Outside AEC)		Burnick Zone (AEC 2.1)														
Sample ID		BR1200-03	BR1200-06	BR1200-06	BR1200-09	CS14-18	CS14-21	CS14-20	CS14-19	CS14-17	CS14-18	CS14-26	CS14-22	CS14-23	CS14-21	CS14-16
Date		14-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	4-Sep-14	4-Sep-14	5-Sep-14	5-Sep-14	5-Sep-14	5-Sep-14	5-Sep-14	5-Sep-14	5-Sep-14	5-Sep-14	5-Sep-14
Mapping Label		424	502	540	543	880	881	933	934	935	936	938	939	941	942	943
Method		XRF	SS	XRF	XRF	SS	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.1	0.2	0.20	0.25	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
pH			5.7			7.99	7.63									
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31		1.95			8.46	3.52									
Arsenic	100	-	9.89	-	21.5	57.4	22.9	61.6	89.6	77.9	60.3	39.4	40.4	62.3	-	54.2
Barium	15000		444			140	132									
Beryllium	160		3.30			1.57	1.32									
Cadmium	35		71.3			69.8	10.5									
Chromium	100	-	19.9	-	-	23.7	37.2	-	* 510	-	-	* 561	* 514	-	-	-
Cobalt	50	-	13.9	-	-	18.7	13.2	-	-	-	-	-	-	-	-	-
Copper	15000	-	65.2	-	-	20.5	23.2	-	-	-	-	-	-	-	-	-
Lead	400	51.0	7460	2483	-	294	136	585	41.4	181	200	250	179	202	112	241
Mercury	15	-	0.073	-	-	<0.050	<0.050	-	-	-	-	-	-	-	-	-
Molybdenum	390	-	1.05	-	-	6.75	2.57	-	4.94	-	-	-	-	-	-	-
Nickel	820	-	25.9	-	109	34.1	36.3	-	174	-	-	-	-	-	-	-
Selenium	390	-	1.08	-	-	8.32	0.87	-	-	-	-	-	-	-	-	-
Silver	390		3.46			6.58	2.23									
Thallium	1		0.41			0.57	0.56									
Tin	47000		< 2.0			<2.0	<2.0									
Uranium	23		1.45			2.76	2.06									
Vanadium	200		25.8			62.5	102									
Zinc	10000	1021	3810	1664	215	13500	2810	12017	1331	4641	7804	6214	5018	6960	2280	2892

Notes:

Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).

bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).

Dash (-)

In situ XRF data were below the limit of detection for the instrument.

Blank cells

Data were not collected.

Italics

Results are less than the detection limit (DL).



Table 7. Metals concentrations in soil samples collected from the Burnick Zone and 1300 Portal areas (AEC 2) and the surrounding forested area.

Area (AEC / Outside AEC)		1300 Portal (AEC 2.4)									Outside AEC Boundary (Burnick)					
Sample ID		BR1300-01	BR1300-03	BR1300-07	BR1300-09	CS14-101	CS14-100	CS14-101	CS14-102	CS14-103	Burnick T2	Burnick T3	Burnick T4	BURNICK T1	BURNICK T1	BURNICK T2
Date		14-Jun-14	14-Jun-14	14-Jun-14	14-Jun-14	25-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	8-Jul-13	8-Jul-13	8-Jul-13	8-Jul-13	8-Jul-13	8-Jul-13
Mapping Label		426	429	430	436	965	1024	1025	1026	1027	248	249	250	371	372	373
Method		XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF	SS	SS	SS	XRF	XRF	XRF
Start Depth (m)		0.22	0.3	0.30	0.20	0.1	0.1	0.1	0.1	0.1	0.20	0.20	0.15	0.20	0.20	0.20
pH						7.77					4.23	5.01	4.68			
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31					8.11					1.22	1.00	1.08			
Arsenic	100	34.6	48.1	-	-	57.7	-	55.7	-	-	7.82	10.6	10.5	-	-	-
Barium	15000					126					70.5	78.8	71.0			
Beryllium	160					3.39					0.26	0.35	0.23			
Cadmium	35					195					1.04	1.91	1.86			
Chromium	100	-	-	-	-	26.1	-	-	-	-	16.7	18.8	19.1			
Cobalt	50	-	-	-	-	52.5	-	-	-	-	3.63	3.93	3.57			
Copper	15000	-	-	-	-	45.8	-	-	-	-	7.49	6.70	5.78			
Lead	400	145	272	28.3	131	730	1183	213	795	1247	131	76.9	33.1	45.1	38.3	104
Mercury	15	-	-	-	* 30.8	<0.050	-	-	-	-	<0.05	<0.05	<0.05			
Molybdenum	390	-	-	-	-	8.75	-	5.93	-	-	1.45	2.34	2.13	-	-	-
Nickel	820	-	-	-	-	44.7	-	-	-	-	13.4	14.1	11.1			
Selenium	390	-	-	-	-	21.1	45.6	19.4	29.8	95.7	0.28	0.48	0.46			
Silver	390					9.69					0.34	0.38	0.89			
Thallium	1					0.98					0.11	0.12	0.13			
Tin	47000					3.70					<2	<2	<2			
Uranium	23					2.83					0.45	0.59	0.52			
Vanadium	200					87.0					35.3	39.8	55.0			
Zinc	10000	16106	24385	918	3208	36200	114635	14428	57334	126223	261	246	264	305	423	221

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).



Table 7. Metals concentrations in soil samples collected from the Burnick Zone and 1300 Portal areas (AEC 2) and the surrounding forested area.

Area (AEC / Outside AEC)		Outside AEC Boundary (Burnick)														
		BURNICK T2	BURNICK T2	BURNICK T3	BURNICK T3	BURNICK T3	BURNICK T4	BURNICK T4	BURNICK T4							
Sample ID		0+50	1+00	0+00	0+50	1+00	0+00	0+50	0+100	BR1200-02	BR1200-04	BR1200-05	BR1200-07	BR1200-08	BR1200-10B	BR1200-12
Date		8-Jul-13	8-Jul-13	8-Jul-13	8-Jul-13	8-Jul-13	8-Jul-13	8-Jul-13	8-Jul-13	14-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	27-Jul-14	28-Jul-14
Mapping Label		374	375	376	377	378	379	381	382	425	538	539	541	542	749	851
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	SS	XRF
Start Depth (m)		0.20	0.20	0.20	0.20	0.30	0.15	0.30	0.20	0.1	0.20	0.15	0.15	0.30	0.2	0.20
pH															3.86	
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31														2.84	
Arsenic	100	-	-	-	-	-	-	-	-	-	-	-	-	-	8.39	19.3
Barium	15000														82.7	
Beryllium	160														0.30	
Cadmium	35														2.49	
Chromium	100									-	* 202	-	-	-	17.7	-
Cobalt	50									-	-	-	-	-	3.96	-
Copper	15000									-	-	-	-	-	7.17	-
Lead	400	-	64.8	45.2	-	137	-	-	75.9	26.7	14.8	18.3	201	83.9	128	28.8
Mercury	15									-	-	-	-	-	< 0.050	-
Molybdenum	390	-	-	-	-	-	-	-	-	-	-	-	-	-	1.37	-
Nickel	820									-	-	-	-	78.2	11.1	-
Selenium	390									-	-	-	-	-	0.20	-
Silver	390														0.35	
Thallium	1														0.20	
Tin	47000														<2.0	
Uranium	23														0.47	
Vanadium	200														44.7	
Zinc	10000	288	179	177	139	609	159	297	582	38.8	103	141	105	410	218	121

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 7. Metals concentrations in soil samples collected from the Burnick Zone and 1300 Portal areas (AEC 2) and the surrounding forested area.

Area (AEC / Outside AEC)		Outside AEC Boundary (Burnick)			Outside AEC Boundary (1300 Portal)							
Sample ID		BR1200-11	BR1200-10b	BR1200-10a	BR1300-08	BR1300-17	BR1300-12	BR1300-13	BR1300-14	BR1300-15	BR1300-16	BR1300-17
Date		28-Jul-14	28-Jul-14	28-Jul-14	14-Jun-14	20-Jun-14	21-Jun-14	21-Jun-14	21-Jun-14	21-Jun-14	21-Jun-14	21-Jun-14
Mapping Label		852	853	854	432	597	645	646	647	648	649	650
Method		XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.15	0.20	0.15	0.25	0.3	0.25	0.20	0.20	0.25	0.20	0.30
pH						3.82						
TOC												
	HHRA											
	Screening											
Parameter	Criteria											
Antimony	31					1.04						
Arsenic	100	-	28.0	-	-	10.1	-	-	-	-	-	16.1
Barium	15000					86.6						
Beryllium	160					0.26						
Cadmium	35					1.05						
Chromium	100	-	-	-	-	19.3	-	-	-	-	-	-
Cobalt	50	-	-	-	-	3.97	-	-	-	-	-	-
Copper	15000	-	-	-	-	4.52	-	-	-	-	-	-
Lead	400	-	143	73.6	12.2	52.1	-	-	-	-	44.0	14.7
Mercury	15	-	-	-	-	< 0.050	-	-	-	-	-	-
Molybdenum	390	-	-	-	-	1.44	-	-	-	-	-	-
Nickel	820	-	73.4	-	-	10.3	-	-	-	-	-	89.4
Selenium	390	-	-	-	-	< 0.20	-	-	-	-	-	-
Silver	390					0.32						
Thallium	1					0.15						
Tin	47000					< 2.0						
Uranium	23					0.38						
Vanadium	200					51.5						
Zinc	10000	163	175	77.1	114	269	160	37.7	131	84.2	277	232

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded**

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics*

Results are less than the detection limit (DL).



Table 8. Metals concentrations in soil samples collected from the Mill Site / Golden Hills Shop (AEC 3) and surrounding forested area.

Area (AEC / Outside AEC)		Mill Site (AEC3)														
Sample ID		Mill Site A	Mill Site B	Mill Site C	Mill T1 000	Mill T3 000	Mill T6 000	MILL SITE	Mill T1 0+00	Mill T3 0+00	Mill T6 0+00	TP14-35-01	TP14-35-03	TP14-35-02	TP14-34-01	TP14-34-02
Date		3-Jul-13	3-Jul-13	3-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	29-Sep-13	6-Jul-13	6-Jul-13	6-Jul-13	24-Jul-14	24-Jul-14	24-Jul-14	24-Jul-14	24-Jul-14
Mapping Label		173	174	175	232	234	238	277	328	334	344	693	694	695	702	703
Method		SS	SS	SS	SS	SS	SS	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.10	0.20	0.10	0.10	0.15	0.10	0.00	0.10	0.15	0.10	0.1	0.6	0.6	0.1	0.6
pH		4.75	5.22	5.09	7.25	6.32	6.4	4.83								
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31	1.46	0.78	0.79	5.01	4.61	4.72	0.71								
Arsenic	100	10.2	8.04	9.70	33.0	23.8	22.9	1.44	130	23.8	175	-	-	25.4	-	26.0
Barium	15000	84.8	89.8	94.8	94.1	136	136	82.0								
Beryllium	160	0.23	0.28	0.40	1.03	0.33	0.58	<0.2								
Cadmium	35	1.05	0.84	1.05	57.2	1.90	44.3	16.4								
Chromium	100	21.5	21.5	24.0	33.3	15.6	23.9	2.36				* 609	* 464	-	-	-
Cobalt	50	5.19	3.97	6.94	18.7	4.22	10.7	1.79				-	-	-	-	-
Copper	15000	10.9	7.90	11.5	47.2	15.1	33.7	8.37				-	-	-	-	-
Lead	400	50.3	72.1	76.8	5630	55.8	4320	1140	3046	31.0	2290	1084	83.3	62.7	880	67.5
Mercury	15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.23				-	-	-	-	-
Molybdenum	390	1.45	1.15	1.18	7.93	7.79	5.76	1.29	-	-	-	-	-	-	-	5.71
Nickel	820	16.7	12.8	17.9	60.7	20.0	31.9	3.16				-	-	-	-	-
Selenium	390	0.38	<0.2	<0.2	2.86	0.50	3.51	0.86				-	-	-	-	-
Silver	390	0.41	0.46	0.53	4.97	0.90	4.38	2.03								
Thallium	1	0.12	0.13	0.13	0.25	0.18	0.18	0.055								
Tin	47000	<2	<2	<2	<2	<2	<2	<2								
Uranium	23	0.48	0.58	0.56	1.00	1.05	1.20	0.21								
Vanadium	200	45.1	43.1	42.6	41.9	86.0	64.8	4.62								
Zinc	10000	135	119	172	10600	215	7200	2190	6391	172	3681	2651	340	201	1934	204

- Notes:
- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).





Table 8. Metals concentrations in soil samples collected from the Mill Site / Golden Hills Shop (AEC 3) and surrounding forested area.

Area (AEC / Outside AEC)		Mill Site (AEC 3)														
Sample ID		TP14-45-01	MS14-01	MS14-02	TP14-44-02	TP14-44-01	TP14-45-02	TP14-45-03	TP14-44-03	TP14-45-01	CS14-119	CS14-121	CS14-122	CS14-123	CS14-124	CS14-125
Date		26-Jul-14	26-Jul-14	26-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	8-Oct-14	8-Oct-14	8-Oct-14	8-Oct-14	8-Oct-14	8-Oct-14
Mapping Label		<b>732</b>	<b>746</b>	<b>747</b>	<b>780</b>	<b>781</b>	<b>782</b>	<b>783</b>	<b>785</b>	<b>792</b>	<b>1086</b>	<b>1088</b>	<b>1089</b>	<b>1090</b>	<b>1091</b>	<b>1092</b>
Method		SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.1	0.20	0.20	0.5	0.1	0.5	1.0	1.0	0.1	0.15	0.15	0.15	0.15	0.15	0.15
pH		7.98														
TOC																
Parameter	HHRA Screening Criteria															
Antimony	31	5.51														
Arsenic	100	27.5	-	-	-	-	-	-	-	-	34.9	-	52.1	62.6	211	-
Barium	15000	132														
Beryllium	160	0.49														
Cadmium	35	15.1														
Chromium	100	15.0	-	-	-	-	-	-	-	-	* 388	-	-	-	* 525	-
Cobalt	50	7.85	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	15000	35.7	-	-	-	-	-	-	-	89.1	-	-	-	-	-	-
Lead	400	1610	1148	735	173	803	171	54.4	20.0	467	119	257	121	82.6	2732	1434
Mercury	15	0.28	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	390	7.10	6.00	-	-	-	-	-	-	-	-	-	-	19.4	5.59	-
Nickel	820	39.8	-	-	-	-	-	-	-	114	-	-	-	-	-	-
Selenium	390	2.41	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	390	1.66														
Thallium	1	0.21														
Tin	47000	< 2.0														
Uranium	23	1.51														
Vanadium	200	58.7														
Zinc	10000	2390	5015	1648	236	1219	402	208	134	1122	504	574	538	525	13082	2068

- Notes:
- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded**

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics*

Results are less than the detection limit (DL).



Table 8. Metals concentrations in soil samples collected from the Mill Site / Golden Hills Shop (AEC 3) and surrounding forested area.

Area (AEC / Outside AEC)		Mill Site (AEC 3)							Golden Hill Shop	Outside the AEC Boundary (Mill Site)					
Sample ID		CS14-126	CS14-127	CS14-128	CS14-129	CS14-130	CS14-131	CS14-132	GHS14-04	Mill T2 000	Mill T4 000	Mill T5 000	MILL SITE		
Date		8-Oct-14	8-Oct-14	8-Oct-14	8-Oct-14	8-Oct-14	8-Oct-14	8-Oct-14	25-Jul-14	6-Jul-13	6-Jul-13	6-Jul-13	+100	MILL SITE +50	Mill T1 0+50
Mapping Label		1093	1094	1095	1096	1097	1098	1100	711	233	235	236	278	280	329
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	SS	SS	SS	SS	SS	XRF
Start Depth (m)		0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.10	0.10	0.20	0.15	0.00	0.00	0.20
pH										5.76	4.26	4.38	4.39	4.85	
TOC															
Parameter	HHRA Screening Criteria														
Antimony	31									1.14	1.37	1.03	0.79	1.36	
Arsenic	100	70.6	45.5	-	-	-	-	-	-	12.4	13.3	7.73	4.62	11.0	-
Barium	15000									118	62.7	59.1	85.5	103	
Beryllium	160									0.67	0.33	<0.2	0.26	0.51	
Cadmium	35									2.59	0.60	0.31	3.32	2.65	
Chromium	100	-	* 474	* 410	-	-	-	* 609	* 334	29.5	28.2	21.9	12.3	24.3	
Cobalt	50	-	-	-	-	-	-	-	-	10.7	7.56	4.63	3.14	8.86	
Copper	15000	-	-	-	-	-	-	-	-	16.2	14.6	7.30	9.39	16.2	
Lead	400	257	104	187	242	5723	1864	4486	104	159	44.3	28.3	126	196	63.7
Mercury	15	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05	0.051	
Molybdenum	390	13.7	-	-	-	-	-	-	-	0.86	1.24	1.03	0.88	1.01	-
Nickel	820	-	95.0	93.9	-	-	-	-	-	26.0	25.7	17.0	8.36	20.3	
Selenium	390	-	-	-	-	-	-	-	-	0.25	<0.2	<0.2	<0.2	0.22	
Silver	390									0.43	0.14	0.17	0.82	0.64	
Thallium	1									0.15	0.11	0.086	0.12	0.15	
Tin	47000									<2	<2	<2	<2	<2	
Uranium	23									0.99	0.44	0.35	0.52	0.60	
Vanadium	200									35.1	40.7	41.9	24.0	31.2	
Zinc	10000	710	384	511	434	11337	5255	12405	186	318	153	92.1	141	300	74.4

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 8. Metals concentrations in soil samples collected from the Mill Site / Golden Hills Shop (AEC 3) and surrounding forested area.

Area (AEC / Outside AEC)		Outside the AEC Boundary (Mill Site)														
Sample ID		Mill T1 0+100	Mill T2 0+00	Mill T2 0+50	Mill T2 0+100	Mill T3 0+50	Mill T3 0+100	Mill T4 0+00	Mill T4 0+50	Mill T4 0+100	Mill T5 0+00	Mill T5 0+50	Mill T5 0+100	Mill T6 0+50	Mill T6 0+100	MS14-03
Date		6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	6-Jul-13	26-Jul-14
Mapping Label		330	331	332	333	335	336	337	338	339	340	342	343	345	346	748
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.20	0.10	0.15	0.20	0.20	0.20	0.20	0.20	0.20	0.15	0.20	0.20	0.30	0.30	0.20
pH																
TOC																
Parameter	HHRA Screening Criteria															
Antimony	31															
Arsenic	100	65.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	15000															
Beryllium	160															
Cadmium	35															
Chromium	100															-
Cobalt	50															-
Copper	15000															-
Lead	400	508	79.8	51.6	74.0	24.8	-	21.8	47.2	29.8	-	41.9	33.0	37.2	239	24.8
Mercury	15															-
Molybdenum	390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	820															-
Selenium	390															-
Silver	390															
Thallium	1															
Tin	47000															
Uranium	23															
Vanadium	200															
Zinc	10000	547	367	154	131	51.8	133	-	150	66.6	61.8	86.7	127	110	459	58.5

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 8. Metals concentrations in soil samples collected from the Mill Site / Golden Hills Shop (AEC 3) and surrounding forested area.

Area (AEC / Outside AEC)		Outside the AEC Boundary (Golden Hills Shop)					
Sample ID		GHS14-02	GHS14-05	GHS14-03	GHS14-02	GHS14-01	GHS14-06
Date		25-Jul-14	25-Jul-14	25-Jul-14	25-Jul-14	25-Jul-14	25-Jul-14
Mapping Label		705	709	710	712	713	723
Method		SS	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.2	0.15	0.20	0.20	0.15	0.35
pH		4.10					
TOC							
HHRA Screening Criteria							
Parameter							
Antimony	31	1.94					
Arsenic	100	16.2	-	-	-	-	-
Barium	15000	69.3					
Beryllium	160	<0.20					
Cadmium	35	1.52					
Chromium	100	20.6	-	-	-	-	-
Cobalt	50	4.96	-	-	* 168	-	-
Copper	15000	12.5	-	-	-	-	-
Lead	400	30.4	84.5	42.5	15.9	110	47.2
Mercury	15	<0.050	-	-	-	-	-
Molybdenum	390	2.71	-	-	-	-	-
Nickel	820	15.7	-	-	-	-	-
Selenium	390	0.21	-	-	-	-	-
Silver	390	0.51					
Thallium	1	0.14					
Tin	47000	<2.0					
Uranium	23	0.53					
Vanadium	200	69.5					
Zinc	10000	98.1	206	109	90.2	219	48.4

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded**

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics*

Results are less than the detection limit (DL).



Table 9. Metals concentrations in soil samples collected from three locations along the Haul Road leading to the Mine Site.

Area		Mine Access Road (200 m from the gate)							Mine Access Road (1.5 km from the gate)					
Sample ID		HR14-01a	HR14-01a	HR14-01b	HR14-01c	HR14-01c	HR14-01d	HR14-01d	HR14-02a	HR14-02b	HR14-02b	HR14-02c	HR14-02c	HR14-02d
Date		8-Sep-14	9-Sep-14	9-Sep-14	8-Sep-14	9-Sep-14	8-Sep-14	9-Sep-14	8-Sep-14	8-Sep-14	9-Sep-14	8-Sep-14	9-Sep-14	9-Sep-14
Mapping Label		944	961	962	945	963	946	964	947	948	958	949	959	960
Method		SS	XRF	XRF	SS	XRF	SS	XRF	SS	SS	XRF	SS	XRF	XRF
Start Depth (m)		0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
pH		7.90			8.06		7.22		5.02	8.33		8.29		
TOC														
HHRA Screening Criteria														
Parameter		4.92			5.92		5.40		1.46	5.94		3.42		
Antimony	31	4.92			5.92		5.40		1.46	5.94		3.42		
Arsenic	100	24.0	-	73.4	25.9	-	48.6	45.4	16.1	28.2	32.7	21.7	-	37.5
Barium	15000	136			146		124		78.9	159		101		
Beryllium	160	0.69			0.58		0.79		0.52	0.42		0.68		
Cadmium	35	14.8			8.51		9.59		0.53	2.40		1.80		
Chromium	100	23.6	-	-	18.3	-	28.7	-	35.2	11.8	-	25.4	-	-
Cobalt	50	10.6	-	-	9.13	-	13.5	-	9.45	6.28	-	11.9	-	-
Copper	15000	32.6	-	-	34.1	-	59.8	-	18.9	28.3	-	28.0	-	-
Lead	400	1690	252	1282	937	548	1370	338	65.0	109	83.7	110	85.9	115
Mercury	15	0.055	-	-	0.10	-	0.29	-	<0.050	0.069	-	<0.050	-	-
Molybdenum	390	6.10	-	-	7.33	-	6.00	-	0.81	7.87	-	3.61	-	-
Nickel	820	40.1	-	-	45.1	-	45.7	94.1	32.1	43.5	82.8	37.9	-	-
Selenium	390	1.85	8.84	-	1.78	-	1.44	-	<0.20	1.64	-	0.74	-	-
Silver	390	1.66			1.37		1.63		0.20	0.64		0.39		
Thallium	1	0.26			0.28		0.32		0.14	0.26		0.20		
Tin	47000	<2.0			<2.0		<2.0		<2.0	<2.0		<2.0		
Uranium	23	1.32			1.25		1.51		0.46	1.27		0.89		
Vanadium	200	59.0			50.1		88.8		35.1	41.6		32.5		
Zinc	10000	2730	301	1912	1540	1008	2080	825	181	290	314	290	231	382

Notes:

Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).

bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).

Dash (-)

In situ XRF data were below the limit of detection for the instrument.

Blank cells

Data were not collected.

Italics

Results are less than the detection limit (DL).





Table 9. Metals concentrations in soil samples collected from three locations along the Haul Road leading to the Mine Site.

Area		Mine Access Road (4.5 km for the gate)						
Sample ID		HR14-03a	HR14-03a	HR14-03b	HR14-03b	HR14-03c	HR14-03c	HR14-03d
Date		8-Sep-14	9-Sep-14	8-Sep-14	9-Sep-14	8-Sep-14	9-Sep-14	9-Sep-14
Mapping Label		950	954	952	955	953	956	957
Method		SS	XRF	SS	XRF	SS	XRF	XRF
Start Depth (m)		0.2	0.2	0.2	0.2	0.2	0.2	0.2
pH		4.57		8.39		8.30		
TOC								
HHRA Screening Criteria								
Parameter								
Antimony	31	4.74		5.88		5.13		
Arsenic	100	17.1	-	22.6	-	19.1	-	-
Barium	15000	114		154		165		
Beryllium	160	0.43		0.37		0.40		
Cadmium	35	0.43		2.08		1.67		
Chromium	100	18.8	-	9.77	-	16.0	* 261	-
Cobalt	50	5.05	-	5.54	-	6.50	-	-
Copper	15000	17.4	-	25.0	-	23.2	-	-
Lead	400	11.2	17.9	63.6	58.6	53.1	47.8	41.4
Mercury	15	0.074	-	0.060	-	0.069	-	-
Molybdenum	390	9.51	-	7.25	-	6.22	4.74	-
Nickel	820	34.3	-	41.9	-	42.8	76.6	-
Selenium	390	0.72	-	1.62	-	1.12	-	-
Silver	390	2.65		0.51		0.34		
Thallium	1	0.34		0.21		0.22		
Tin	47000	<2.0		<2.0		<2.0		
Uranium	23	1.09		1.00		1.15		
Vanadium	200	72.7		41.0		41.4		
Zinc	10000	107	108	244	187	227	189	124

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 10. Metals concentrations in soil samples collected from the Boneyard (AEC 5).

Area (AEC / Outside AEC)		Boneyard (AEC 5)							Outside AEC							
Sample ID		TP12-43	TP14-32-01	TP14-32-02	TP14-31-02	TP14-29-01	TP14-31-01	TP14-29-04	TP12-44	TP12-45	TP12-46	BY14-02	TP14-51-02	TP14-50-02	TP14-51-02	TP14-49-02
Date		29-Sep-12	20-Jun-14	20-Jun-14	20-Jun-14	20-Jun-14	20-Jun-14	20-Jun-14	29-Sep-12	29-Sep-12	29-Sep-12	27-Jul-14	27-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14
Mapping Label		67	622	624	627	629	631	641	68	69	70	750	754	759	761	763
Method		TP	XRF	XRF	XRF	XRF	XRF	XRF	TP	TP	TP	SS	SS	XRF	XRF	XRF
Start Depth (m)		0.50	0.1	0.6	0.7	0.5	0.1	0.1	0.40	0.30	0.50	0.2	0.5	0.7	0.5	0.5
pH		7.56							8.28	8.27	8.42	7.94	8.35			
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31	3.19							2.14	2.30	1.38	3.14	3.05			
Arsenic	100	23.7	-	27.0	18.3	-	-	16.1	17.0	18.2	9.87	19.9	20.1	-	21.1	-
Barium	15000	123							136	87.4	81.0	120	120			
Beryllium	160	1.17							1.17	0.88	0.80	0.63	0.81			
Cadmium	35	0.50							0.33	0.74	0.44	1.08	0.73			
Chromium	100	34.6	* 354	-	* 432	-	-	-	33.0	19.9	25.5	26.9	32.0	-	-	-
Cobalt	50	19.8	-	-	-	-	* 357	-	26.0	36.7	18.7	13.4	18.1	-	-	-
Copper	15000	38.9	-	-	-	-	-	67.4	39.2	32.7	28.7	28.0	48.0	-	-	-
Lead	400	46.9	23.2	-	24.0	-	-	-	32.9	32.8	30.2	32.7	26.5	24.3	-	25.3
Mercury	15	<0.05	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.050	<0.050	-	-	-
Molybdenum	390	5.00	-	-	-	-	-	-	3.61	7.41	2.44	3.14	3.81	-	-	-
Nickel	820	45.9	-	-	-	-	-	-	50.0	45.4	37.6	38.5	44.8	-	-	-
Selenium	390	0.47	-	-	-	-	-	-	0.37	0.39	0.25	0.64	0.67	-	-	-
Silver	390	0.30							0.16	0.14	0.11	0.28	0.26			
Thallium	1	0.12							0.12	0.20	0.11	0.12	0.13			
Tin	47000	<2							<2	<2	<2	<2.0	<2.0			
Uranium	23	1.41							1.15	1.63	0.77	1.29	0.93			
Vanadium	200	45.3							34.7	19.4	28.0	55.3	55.9			
Zinc	10000	207	131	177	127	220	132	164	147	153	157	186	167	93.1	170	155

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 10. Metals concentrations in soil samples collected from the Boneyard (AEC 5).

Area (AEC / Outside AEC)		Outside AEC						
Sample ID		TP14-49-01	TP14-49-03	TP14-51-01	TP14-50-01	BY14-01	BY14-02	BY14-03
Date		28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14
Mapping Label		<b>764</b>	<b>766</b>	<b>768</b>	<b>770</b>	<b>855</b>	<b>856</b>	<b>857</b>
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.1	1.0	0.1	0.1	0.15	0.20	0.20
pH								
TOC								
HHRA Screening Criteria								
Parameter								
Antimony	31							
Arsenic	100	-	-	-	20.2	23.6	26.5	20.1
Barium	15000							
Beryllium	160							
Cadmium	35							
Chromium	100	-	-	-	-	* 323	-	-
Cobalt	50	-	-	-	-	-	-	-
Copper	15000	-	-	-	-	67.5	-	-
Lead	400	29.2	20.8	20.6	-	-	21.4	-
Mercury	15	-	-	-	-	-	-	-
Molybdenum	390	-	-	-	-	-	-	-
Nickel	820	-	-	-	-	-	-	-
Selenium	390	-	-	-	-	-	-	-
Silver	390							
Thallium	1							
Tin	47000							
Uranium	23							
Vanadium	200							
Zinc	10000	162	142	120	102	126	189	135

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded**

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics*

Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		North Tailings Cover (AEC 8)															
Sample ID		CS14-76	CS14-77	CS14-78	CS14-79	CS14-79	CS14-80	CS14-81	CS14-82	CS14-82	CS14-83	CS14-84	CS14-85	CS14-85	CS14-85	CS14-86	CS14-87
Date		26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14
Mapping Label		<b>1043</b>	<b>1044</b>	<b>1045</b>	<b>1046</b>	<b>1047</b>	<b>1048</b>	<b>1049</b>	<b>1050</b>	<b>1051</b>	<b>1052</b>	<b>1053</b>	<b>1054</b>	<b>1055</b>	<b>1056</b>	<b>1057</b>	<b>1058</b>
Method		XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	SS	XRF	XRF
Start Depth (m)		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
pH						8.45									7.78		
TOC																	
Parameter	HHRA Screening Criteria																
Antimony	31					2.26									1.91		
Arsenic	100	-	-	15.7	-	22.4	18.6	-	19.7	-	21.0	-	17.8	-	14.8	19.6	28.1
Barium	15000					137									130		
Beryllium	160					0.56									0.64		
Cadmium	35					0.98									0.98		
Chromium	100	-	-	-	-	20.7	-	-	-	* 345	-	-	-	* 406	27.5	-	-
Cobalt	50	-	-	-	-	11.0	-	-	-	-	-	-	-	-	13.3	-	-
Copper	15000	-	-	-	-	26.3	-	-	-	-	-	-	-	-	27.9	-	-
Lead	400	27.7	31.8	22.3	34.6	32.3	22.4	36.0	41.8	52.6	44.1	35.1	34.6	36.9	36.3	64.4	40.9
Mercury	15	-	-	-	-	<0.050	* 28.9	-	-	-	-	-	-	-	<0.050	-	-
Molybdenum	390	-	-	-	-	2.28	-	-	-	-	-	-	-	-	2.20	-	-
Nickel	820	-	-	-	-	31.7	-	-	-	-	-	-	-	-	34.8	-	103
Selenium	390	-	-	-	-	0.41	-	-	-	-	-	-	-	14.9	0.36	-	-
Silver	390					0.26									0.25		
Thallium	1					0.13									0.12		
Tin	47000					<2.0									<2.0		
Uranium	23					0.97									0.92		
Vanadium	200					37.2									39.1		
Zinc	10000	131	144	151	165	155	181	168	208	223	172	135	155	135	169	183	188

- Notes:
- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded**

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics*

Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		North Tailings Cover (AEC 8)														
Sample ID		CS14-88	CS14-89	CS14-90	CS14-91	CS14-91	CS14-92	CS14-93	CS14-93	CS14-94	CS14-95	CS14-96	CS14-97	CS14-98	CS14-99	CS14-99
Date		26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14	26-Sep-14
Mapping Label		1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073
Method		XRF	XRF	XRF	XRF	SS	XRF	XRF	SS	XRF	XRF	XRF	XRF	XRF	XRF	SS
Start Depth (m)		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
pH						8.26			8.39							8.45
TOC																
Parameter	HHRA Screening Criteria															
Antimony	31					2.30			2.39							2.48
Arsenic	100	16.8	18.2	-	45.4	21.0	31.0	20.3	23.8	-	18.6	24.1	-	25.4	23.8	20.4
Barium	15000					162			149							163
Beryllium	160					0.60			0.62							0.58
Cadmium	35					2.35			0.86							1.14
Chromium	100	-	-	-	-	23.8	* 805	-	22.3	* 374	-	-	-	* 510	-	23.2
Cobalt	50	-	-	-	-	11.1	-	-	11.6	-	-	-	-	-	-	10.4
Copper	15000	-	-	-	-	27.8	-	-	26.5	-	-	-	-	-	-	27.5
Lead	400	29.5	39.4	53.9	383	305	-	45.7	37.9	28.2	26.0	31.6	36.3	31.6	51.9	42.4
Mercury	15	-	-	-	-	<0.050	-	-	<0.050	-	-	-	-	-	-	<0.050
Molybdenum	390	-	-	-	-	2.50	-	-	2.29	-	-	-	-	-	-	2.66
Nickel	820	-	-	-	-	33.2	-	-	32.5	-	-	102	-	-	-	31.8
Selenium	390	-	-	-	-	0.50	-	-	0.38	-	-	-	-	-	-	0.41
Silver	390					0.42			0.23							0.30
Thallium	1					0.15			0.13							0.15
Tin	47000					<2.0			<2.0							<2.0
Uranium	23					1.02			1.09							0.94
Vanadium	200					39.2			37.5							41.7
Zinc	10000	171	152	160	609	445	186	166	150	151	155	151	144	171	273	177

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).





Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		South Dam / Reclaim Pond Cover (AEC 8)														
Sample ID		CS14-25	CS14-25	CS14-26	CS14-27	CS14-28	CS14-29	CS14-30	CS14-31	CS14-32	CS14-32	CS14-33	CS14-34	CS14-35	CS14-36	CS14-37
Date		25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14
Mapping Label		967	968	969	970	971	972	973	974	975	976	977	978	979	980	981
Method		XRF	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
pH			8.38								8.35					
TOC																
Parameter	HHRA Screening Criteria															
Antimony	31		1.94								2.36					
Arsenic	100	-	18.2	-	21.5	-	46.9	-	-	19.1	20.5	23.4	-	-	-	-
Barium	15000		189								130					
Beryllium	160		0.90								0.64					
Cadmium	35		0.58								1.32					
Chromium	100	-	24.7	-	-	-	-	-	-	-	24.3	* 394	-	-	* 333	-
Cobalt	50	-	18.2	-	-	-	-	-	-	-	13.0	-	-	-	-	-
Copper	15000	-	27.5	-	-	-	-	-	-	-	29.3	-	-	62.7	-	-
Lead	400	62.8	79.3	66.3	58.0	578	308	172	82.7	41.2	69.9	39.1	42.4	89.6	79.6	49.6
Mercury	15	-	<0.050	-	-	-	-	-	-	-	<0.050	-	-	-	-	-
Molybdenum	390	-	1.87	-	-	-	-	-	-	6.95	4.01	-	-	-	-	-
Nickel	820	118	39.2	-	-	-	-	-	-	-	36.1	-	-	-	-	-
Selenium	390	-	0.41	-	-	-	-	-	-	-	0.58	-	-	-	-	-
Silver	390		0.33								0.26					
Thallium	1		0.11								0.13					
Tin	47000		<2.0								<2.0					
Uranium	23		0.63								1.17					
Vanadium	200		29.2								54.9					
Zinc	10000	203	184	251	277	1931	799	495	313	193	224	139	176	240	219	173

Notes:

Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).

bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).

Dash (-)

In situ XRF data were below the limit of detection for the instrument.

Blank cells

Data were not collected.

Italics

Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		South Dam / Reclaim Pond Cover (AEC 8)														
Sample ID		CS14-47	CS14-37	CS14-38	CS14-39	CS14-39	CS14-40	CS14-40	CS14-41	CS14-42	CS14-43	CS14-44	CS14-45	CS14-46	CS14-46	CS14-48
Date		25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14
Mapping Label		982	983	984	985	986	987	988	989	990	991	992	993	994	995	996
Method		XRF	SS	XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF	XRF	XRF	SS	XRF
Start Depth (m)		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
pH			8.08					8.11								6.99
TOC																
Parameter	HHRA Screening Criteria															
Antimony	31		2.49					3.08							2.03	
Arsenic	100	19.2	20.5	-	-	19.7	29.9	26.8	24.1	-	-	-	-	-	18.5	-
Barium	15000		144					152							139	
Beryllium	160		0.63					0.84							0.58	
Cadmium	35		1.05					2.58							3.65	
Chromium	100	* 298	25.0	-	-	-	-	28.4	-	-	-	-	-	-	25.9	-
Cobalt	50	-	12.0	-	-	-	-	13.5	-	-	-	-	-	-	10.0	-
Copper	15000	-	28.7	-	-	-	56.5	38.3	-	-	-	-	-	-	28.1	-
Lead	400	28.7	42.3	18.3	34.0	26.0	27.7	33.8	42.5	40.2	78.6	68.6	72.9	86.9	119	40.7
Mercury	15	-	<0.050	-	-	-	-	<0.050	* 31.5	-	-	-	-	-	<0.050	-
Molybdenum	390	-	2.48	-	5.82	-	5.49	11.1	-	-	-	-	-	-	2.40	-
Nickel	820	-	33.9	-	-	-	-	51.7	-	-	-	-	-	-	28.0	-
Selenium	390	-	0.39	10.4	-	-	-	1.25	-	-	-	-	-	-	2.54	-
Silver	390		0.29					0.38							0.31	
Thallium	1		0.14					0.20							0.15	
Tin	47000		<2.0					<2.0							<2.0	
Uranium	23		0.97					1.64							3.31	
Vanadium	200		45.9					128							34.8	
Zinc	10000	865	167	141	177	119	281	341	195	232	290	313	241	207	279	206

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		South Dam / Reclaim Pond Cover (AEC 8)															
Sample ID		CS14-49	CS14-50	CS14-51	CS14-51	CS14-52	CS14-53	CS14-54	CS14-55	CS14-55	CS14-56	CS14-57	CS14-58	CS14-59	CS14-60	CS14-61	CS14-62
Date		25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14	25-Sep-14
Mapping Label		997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012
Method		XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
pH					8.07						8.38						
TOC																	
Parameter	HHRA Screening Criteria																
Antimony	31				2.44					2.25							
Arsenic	100	22.6	22.5	-	16.9	37.4	-	-	-	17.2	-	25.4	-	-	-	-	-
Barium	15000				146					115							
Beryllium	160				0.56					0.48							
Cadmium	35				1.35					1.23							
Chromium	100	-	-	-	23.6	-	-	-	-	19.9	-	-	-	-	-	-	-
Cobalt	50	-	-	-	9.27	-	-	-	-	9.41	-	-	-	-	-	-	-
Copper	15000	-	-	-	24.2	-	-	-	-	23.4	-	75.4	-	-	-	-	-
Lead	400	39.1	39.8	41.7	52.6	-	81.3	137	72.3	66.6	789	62.7	41.4	78.6	74.5	74.8	61.0
Mercury	15	-	-	-	<0.050	-	-	-	-	<0.050	-	-	-	-	-	-	* 36.5
Molybdenum	390	-	-	-	2.44	-	-	-	-	2.53	-	-	-	-	-	-	-
Nickel	820	-	-	85.7	31.1	-	-	-	-	29.0	-	-	-	-	-	-	-
Selenium	390	-	-	-	0.50	-	11.5	-	-	0.43	-	-	-	-	-	-	-
Silver	390				0.29					0.27							
Thallium	1				0.15					0.12							
Tin	47000				<2.0					<2.0							
Uranium	23				0.98					0.86							
Vanadium	200				42.6					36.8							
Zinc	10000	163	141	215	204	173	267	294	247	210	1262	256	241	213	239	224	209

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		South Tailings Pond Wetland (AEC 8)														
		TPS- NORTH -														
		ORGANIC	STP14-21b	STP14-18b	STP14-12b	STP14-14a	STP14-13a	STP14-12a	STP14-18a	STP14-20b	STP14-20a	STP14-13b	STP14-15a	STP14-15b	STP14-19b	STP14-14b
		22-Aug-12	3-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14
Mapping Label		11	879	888	889	892	893	894	895	896	897	898	899	900	901	902
Method		SS	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.00	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.2	0.1	0.2	0.2	0.2
pH		7.98	7.26													
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31	0.16	3.13													
Arsenic	100	0.70	16.9	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	15000	83.4	153													
Beryllium	160	<0.20	0.82													
Cadmium	35	1.72	10.1													
Chromium	100	3.33	15.6	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	50	0.59	10.9	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	15000	3.28	48.5	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	400	156	2720	111	197	874	8.67	56.4	393	-	23.3	-	318	-	33.0	2187
Mercury	15	<0.050	0.066	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	390	0.64	3.69	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	820	2.54	26.3	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	390	0.38	3.65	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	390	0.17	3.04													
Thallium	1		0.15													
Tin	47000	<2.0	<2.0													
Uranium	23	0.51	3.76													
Vanadium	200	0.77	28.4													
Zinc	10000	272	1750	375	265	305	27.4	165	485	-	53.5	-	344	77.1	123	1730

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).





Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		South Tailings Pond Wetland (AEC 8)				Tailings Pond North (TPN, AEC 8)										
Sample ID Date Mapping Label Method Start Depth (m) pH TOC		STP14-21a	STP14-19a	STP14-21b	TMA14-19	TPN- NORTH - INORGANIC	TPN- NORTH - ORGANIC	TPN North 100 A	TPN North 100 B	TPN North 100 C	TPN North 50 A	TPN North 50 B	TPN North 50 C	TPN North A	TPN North B	TPN North C
		4-Sep-14	4-Sep-14	4-Sep-14	19-Jun-14	22-Aug-12	22-Aug-12	3-Jul-13	3-Jul-13	3-Jul-13	3-Jul-13	3-Jul-13	3-Jul-13	3-Jul-13	3-Jul-13	3-Jul-13
		903	904	905	589	6	7	176	177	178	179	180	181	182	183	184
		XRF	XRF	XRF	XRF	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
		0.1	0.1	0.2	0.20	0.03	0.00	0.20	0.20	0.20	0.10	0.10	0.20	0.20	0.15	0.10
						8.01	7.20	4.62	4.83	5.1	4.74	4.89	4.41	4.93	4.69	4.86
HHRA Screening Criteria																
Parameter																
Antimony	31					1.73	2.15	1.13	1.37	1.00	0.92	1.66	1.45	0.66	0.62	0.77
Arsenic	100	-	-	-	40.2	17.1	19.6	27.2	36.6	21.0	15.6	34.3	32.5	9.27	9.76	9.36
Barium	15000					119	40.8	125	129	193	115	100	83.8	102	112	129
Beryllium	160					0.54	0.50	0.44	0.38	0.59	0.44	0.55	0.26	0.31	0.35	0.32
Cadmium	35					1.75	14.9	0.72	0.64	1.40	0.32	0.67	0.60	0.34	0.32	0.28
Chromium	100	-	-	-	-	18.4	7.22	15.4	16.7	15.0	23.5	19.4	16.6	20.7	21.9	20.4
Cobalt	50	-	-	-	-	11.3	4.31	7.61	10.9	9.99	7.11	10.1	7.76	4.13	5.32	4.47
Copper	15000	-	-	-	-	24.4	24.4	11.4	11.5	17.8	7.60	12.9	10.7	6.58	6.67	6.98
Lead	400	20.1	232	735	64.5	275	3180	17.7	18.6	19.1	20.2	19.1	20.0	43.1	20.4	35.9
Mercury	15	-	-	-	-	<0.050	<0.050	<0.05	<0.05	0.055	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Molybdenum	390	-	-	-	-	1.90	7.80	0.96	1.01	0.86	1.23	1.09	1.15	1.61	1.36	1.41
Nickel	820	-	-	-	-	27.8	19.6	19.2	17.4	17.5	17.4	26.4	16.6	14.7	16.2	14.9
Selenium	390	-	-	-	-	0.39	1.37	<0.2	<0.2	0.35	0.21	0.25	<0.2	0.20	0.21	0.24
Silver	390					0.41	3.36	0.12	<0.1	0.38	0.10	0.15	0.11	0.13	0.19	<0.1
Thallium	1							0.075	0.084	0.083	0.11	0.089	0.075	0.098	0.091	0.12
Tin	47000					<2.0	<2.0	<2	<2	<2	<2	<2	<2	<2	<2	<2
Uranium	23					0.84	2.25	0.52	0.78	1.39	0.59	0.51	0.39	0.49	0.51	0.54
Vanadium	200					28.9	9.92	28.8	25.5	26.4	45.1	29.9	32.9	48.8	45.9	47.2
Zinc	10000	129	476	416	443	399	2830	83.0	89.7	90.9	82.9	93.1	85.1	81.7	78.8	85.4

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		Tailings Pond North (TPN, AEC 8)			TPN West Berm (AEC 8)		Outside the AEC (Reclaim Pond South [REC-S])								
Sample ID		TPN NORTH	TPN NORTH	TPN NORTH	TPN WEST	TPN WEST	RP- SOUTH -	Rec South	Rec South	Rec South	Rec South 50	Rec South 50	Rec South 50		
Date		29-Sep-13	29-Sep-13	29-Sep-13	29-Sep-13	29-Sep-13	22-Aug-12	4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13
Mapping Label		285	286	287	288	289	5	185	186	187	188	189	190	191	192
Method		SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
Start Depth (m)		0.00	0.00	0.00	0.00	0.02	0.00	0.20	0.20	0.20	0.10	0.15	0.20	0.15	0.10
pH		7	4.5	5.94	7.07	6.94	7.98	7.35	6.18	7.08	6.84	7.07	7.25	4.49	5.06
TOC															
HHRA Screening Criteria															
Parameter															
Antimony	31	0.76	0.35	0.42	1.21	2.21	1.94	2.16	1.14	1.17	1.38	1.08	2.43	0.97	1.29
Arsenic	100	4.99	2.67	2.95	9.00	14.4	14.3	12.4	8.99	11.6	11.9	11.2	22.9	13.9	15.5
Barium	15000	44.7	55.8	88.2	113	131	95.3	279	136	176	313	211	250	84.9	97.9
Beryllium	160	<0.2	<0.2	<0.2	0.45	0.62	0.39	0.55	0.27	0.42	0.88	0.52	0.72	0.32	0.55
Cadmium	35	5.63	4.17	2.88	16.6	4.27	2.03	0.68	0.43	0.52	1.13	1.13	2.17	0.58	0.50
Chromium	100	1.50	1.51	1.30	16.1	23.8	17.9	23.7	19.2	22.4	20.5	20.7	24.8	25.0	26.6
Cobalt	50	0.86	1.10	0.58	10.2	10.4	8.13	8.31	4.93	7.49	12.7	11.6	13.6	5.84	9.93
Copper	15000	9.46	6.63	5.77	23.0	28.6	19.5	19.0	10.7	13.6	25.0	17.2	31.3	9.32	17.0
Lead	400	602	391	156	431	2470	263	19.8	16.0	23.4	35.3	34.3	40.9	25.1	38.5
Mercury	15	0.10	0.11	0.13	<0.05	<0.05	<0.050	<0.05	<0.05	<0.05	0.11	0.056	0.067	<0.05	<0.05
Molybdenum	390	2.08	1.33	1.08	1.95	2.39	1.93	3.09	1.57	1.33	1.80	1.45	2.41	1.23	1.28
Nickel	820	5.06	3.73	3.14	22.4	27.5	25.5	28.9	18.6	24.4	24.4	22.7	35.9	19.8	28.4
Selenium	390	0.81	0.27	0.49	0.69	2.12	0.66	0.66	0.25	0.28	0.75	0.39	0.65	0.20	0.33
Silver	390	1.19	0.70	0.97	0.60	3.09	0.36	0.30	0.35	0.23	1.20	0.40	0.64	0.18	0.16
Thallium	1	0.052	<0.05	<0.05	0.069	0.13		0.14	0.12	0.11	0.14	0.094	0.16	0.086	0.098
Tin	47000	<2	<2	<2	<2	<2	<2.0	<2	<2	<2	<2	<2	<2	<2	<2
Uranium	23	0.46	0.39	0.14	0.60	0.87	1.04	1.05	0.62	0.65	2.01	1.04	1.43	0.42	0.55
Vanadium	200	2.17	2.41	1.77	23.7	42.7	32.7	47.8	41.0	41.2	29.8	29.3	38.4	38.3	36.8
Zinc	10000	887	482	520	687	1070	345	131	83.2	102	111	99.5	170	81.3	117

- Notes:
- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		Outside the AEC (Reclaim Pond [REC-S])				Outside the AEC (Reclaim Pond West [REC-W])						Outside the AEC (Perimeter of the Tailings Management Facility)			
Sample ID Date Mapping Label Method Start Depth (m) pH TOC		Rec South C		REP SOUTH	REP SOUTH	REP WEST		REP WEST	REP WEST	REP WEST	REP WEST	TPN SOUTH		TPN SOUTH	TPN SOUTH
		4-Jul-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13	28-Sep-13
		193	261	262	263	264	265	266	267	268	269	270	272	273	274
		SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
		0.15	0.00	0.02	0.00	0.02	0.07	0.00	0.05	0.00	0.14	0.00	0.05	0.00	0.12
		4.41	3.98	4.8	6.73	5.3	4.91	3.64	3.92	6.57	7.21	3.89	4.33	3.8	4.19
HHRA Screening Criteria															
Parameter		0.95	0.13	0.12	1.20	1.02	0.64	0.21	1.18	0.32	1.07	0.27	0.61	0.18	2.57
Antimony	31	0.95	0.13	0.12	1.20	1.02	0.64	0.21	1.18	0.32	1.07	0.27	0.61	0.18	2.57
Arsenic	100	12.4	0.62	0.44	11.0	4.57	4.91	1.10	4.31	0.52	11.4	1.61	6.75	0.54	17.2
Barium	15000	90.9	142	67.0	122	521	245	122	59.7	99.5	228	117	60.5	49.7	287
Beryllium	160	0.36	<0.2	<0.2	0.31	0.48	0.56	<0.2	<0.2	<0.2	1.37	<0.2	<0.2	<0.2	0.69
Cadmium	35	0.54	2.27	2.91	2.79	16.4	2.38	3.95	0.23	10.2	4.71	3.83	0.44	6.34	3.48
Chromium	100	23.0	2.68	1.77	14.4	8.29	17.2	4.04	9.56	5.69	18.2	3.89	15.2	1.31	22.2
Cobalt	50	6.42	0.77	1.00	6.64	91.0	12.5	0.80	0.85	1.02	24.1	1.25	2.00	0.88	14.1
Copper	15000	10.7	5.07	4.79	19.2	12.5	17.2	4.62	3.55	7.14	38.1	5.89	4.11	4.35	26.0
Lead	400	27.9	38.9	25.7	22.9	287	78.2	273	10.5	303	207	70.8	23.3	48.2	45.9
Mercury	15	<0.05	0.10	0.085	<0.05	0.15	0.061	0.13	<0.05	0.090	0.23	0.11	<0.05	0.089	0.089
Molybdenum	390	1.19	<0.5	0.64	1.87	4.21	1.38	1.13	0.83	6.35	2.71	1.10	1.29	1.24	5.30
Nickel	820	18.3	3.10	2.42	19.2	12.9	10.1	3.77	3.46	4.92	17.2	4.00	6.18	2.86	31.7
Selenium	390	0.22	<0.2	<0.2	0.42	0.43	0.24	0.22	<0.2	0.90	1.91	0.30	<0.2	0.31	1.12
Silver	390	0.18	2.25	0.91	0.21	4.11	1.29	2.56	0.11	0.62	4.43	2.04	0.53	1.12	2.96
Thallium	1	0.11	<0.05	<0.05	0.082	0.32	0.15	<0.05	0.11	0.11	0.27	0.077	0.094	<0.05	0.31
Tin	47000	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Uranium	23	0.50	0.28	0.089	1.19	0.88	1.20	0.080	0.34	12.0	6.24	0.15	0.48	0.11	5.01
Vanadium	200	40.6	3.68	2.23	22.9	18.2	31.6	4.23	28.6	12.4	24.8	8.52	41.9	2.09	58.4
Zinc	10000	104	82.0	88.4	125	268	111	517	22.2	832	74.5	146	44.9	117	275

- Notes:
- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		Outside the AEC (Perimeter of the Tailings Management Facility)														
Sample ID Date Mapping Label Method Start Depth (m) pH TOC	HHRA Screening Criteria	TPN SOUTH	TPN SOUTH	TMA14-03	TMA14-20	TMA14-13b	TMA14-07	TMA14-13a	TMA14-02a	TMA14-01a	TMA14-17	TMA14-18	TMA14-16	TMA14-10	TMA14-15	TMA14-05
		+50	+50													
		28-Sep-13	28-Sep-13	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14
		275	276	547	548	570	571	572	573	574	575	576	577	578	579	580
		SS	SS	SS	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
		0.00	0.06	0.15	0.3	0.30	0.30	0.10	0.15	0.10	0.25	0.35	0.20	0.15	0.40	0.10
Parameter	Criteria															
Antimony	31	0.37	0.51	2.33	1.61											
Arsenic	100	3.31	5.83	17.9	22.3	-	-	-	-	-	-	18.0	-	-	-	-
Barium	15000	190	134	156	151											
Beryllium	160	<0.2	<0.2	0.71	0.51											
Cadmium	35	7.77	2.26	0.93	0.23											
Chromium	100	5.38	8.51	28.3	20.5	-	-	-	-	-	-	-	-	-	-	-
Cobalt	50	2.22	2.15	12.8	11.4	-	262	-	-	-	-	-	-	-	-	-
Copper	15000	10.8	5.78	26.8	16.3	-	-	-	-	-	-	-	-	-	-	-
Lead	400	40.9	18.0	31.1	18.0	-	-	-	-	-	-	-	-	28.9	-	21.3
Mercury	15	0.080	<0.05	< 0.050	< 0.050	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	390	1.17	0.83	2.75	1.14	-	-	-	-	-	-	-	-	-	-	-
Nickel	820	7.86	7.89	35.6	25.7	-	-	-	-	-	-	-	-	-	-	-
Selenium	390	0.38	<0.2	0.54	0.25	-	-	-	-	-	-	-	-	-	-	-
Silver	390	2.04	1.28	0.25	0.11											
Thallium	1	0.060	0.097	0.12	0.088											
Tin	47000	<2	<2	< 2.0	< 2.0											
Uranium	23	0.58	0.63	1.50	0.66											
Vanadium	200	10.2	19.5	47.8	35.0											
Zinc	10000	111	82.8	156	84.0	-	101	30.9	32.5	43.2	-	88.7	84.5	112	-	125

- Notes:
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  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).





Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		Outside the AEC (Perimeter of the Tailings Management Facility)														
Sample ID		TMA14-02b	TMA14-11	TMA14-03	TMA14-12	TMA14-04	TMA14-01b	TMA14-20	TMA14-06	TMA14-08	TMA14-14	TMA14-09	TMA14-28	TMA14-33	TMA14-30	TMA14-24
Date		19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	19-Jun-14	27-Jul-14	27-Jul-14	28-Jul-14	28-Jul-14
Mapping Label		581	582	583	584	585	586	587	588	590	591	592	751	752	838	839
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	SS	SS	XRF	XRF
Start Depth (m)		0.30	0.10	0.15	0.15	0.20	0.20	0.15	0.20	0.20	0.40	0.30	0.2	0.2	0.20	0.20
pH													4.68	4.85		
TOC																
Parameter	HHRA Screening Criteria															
Antimony	31												1.10	0.41		
Arsenic	100	-	-	23.7	-	-	-	18.8	-	-	-	-	9.44	4.22	-	-
Barium	15000												136	197		
Beryllium	160												0.38	0.44		
Cadmium	35												0.20	1.04		
Chromium	100	-	-	-	-	* 268	-	-	-	-	-	-	22.4	14.4	-	-
Cobalt	50	-	-	-	-	-	-	-	-	-	-	-	8.74	7.17	-	-
Copper	15000	-	-	-	-	-	-	-	-	-	-	-	10.2	12.2	-	-
Lead	400	-	-	-	24.2	-	-	-	24.4	-	-	-	19.5	27.5	-	21.1
Mercury	15	-	-	-	-	-	-	-	-	-	-	-	< 0.050	0.061	-	-
Molybdenum	390	-	-	-	-	-	-	-	-	-	-	-	1.03	0.92	-	-
Nickel	820	-	-	-	-	-	-	-	-	-	-	-	20.8	9.69	-	-
Selenium	390	-	-	-	-	-	-	-	-	-	-	-	<0.20	0.26	-	-
Silver	390												0.11	0.46		
Thallium	1												0.13	0.11		
Tin	47000												< 2.0	< 2.0		
Uranium	23												0.64	1.23		
Vanadium	200												53.1	39.3		
Zinc	10000	141	128	130	105	73.0	68.8	47.8	100	47.6	22.5	30.1	81.7	84.5	92.9	106

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		Outside the AEC (Perimeter of the Tailings Management Facility)														
													TPN East 100	TPN East 100	TPN East 100	
Sample ID		TMA14-25	TMA14-32b	TMA14-33	TMA14-27a	TMA14-27b	TMA14-21	TMA14-26	TMA14-28	TMA14-31	TMA14-29	TMA14-32a	A	B	C	TPN East 50 A
Date		28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13
Mapping Label		840	841	842	843	844	845	846	847	848	849	850	195	196	197	198
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	SS	SS	SS	SS
Start Depth (m)		0.20	0.35	0.20	0.25	0.30	0.30	0.20	0.20	0.30	0.20	0.15	0.20	0.10	0.20	0.15
pH													4.67	4.91	4.7	4.56
TOC																
	HHRA Screening Criteria															
Antimony	31												0.97	0.83	1.00	0.66
Arsenic	100	-	-	11.7	-	-	-	10.3	13.0	-	-	-	13.4	12.4	14.2	7.34
Barium	15000												109	148	121	85.7
Beryllium	160												0.31	0.38	0.32	<0.2
Cadmium	35												0.23	0.21	0.21	0.14
Chromium	100	-	-	-	-	-	-	-	-	-	-	-	17.7	21.5	20.0	17.2
Cobalt	50	-	-	-	-	-	-	-	-	-	-	-	7.23	7.58	6.70	3.95
Copper	15000	-	-	-	-	-	-	-	-	60.0	-	-	10.3	9.62	9.04	6.13
Lead	400	-	-	-	-	-	-	-	-	17.7	14.0	-	19.3	18.8	16.5	15.4
Mercury	15	-	-	-	-	-	-	-	-	-	-	-	<0.05	<0.05	<0.05	<0.05
Molybdenum	390	-	-	-	-	-	-	-	-	-	-	-	1.24	0.95	0.86	0.81
Nickel	820	-	-	-	-	-	-	-	-	-	-	-	16.5	18.1	16.8	10.4
Selenium	390	-	-	-	-	-	-	-	-	-	-	-	<0.2	<0.2	<0.2	<0.2
Silver	390												<0.1	0.19	0.13	<0.1
Thallium	1												0.076	0.091	0.088	0.095
Tin	47000												<2	<2	<2	<2
Uranium	23												0.39	0.48	0.46	0.42
Vanadium	200												42.2	44.9	44.8	42.8
Zinc	10000	71.3	51.6	102	48.2	38.7	58.5	-	72.6	103	41.1	30.3	69.0	83.0	71.9	56.3

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		Outside the AEC (Perimeter of the Tailings Management Facility)														
Sample ID		TPN East 50 B	TPN East 50 C	TPN East A	TPN East B	TPN East C	TPN EAST	TPN EAST	TPN EAST	TPN- WEST -	TPN- WEST -	TPN WEST	TPN WEST	TPN West	TPN West	TPN West
Date		4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13	29-Sep-13	29-Sep-13	29-Sep-13	22-Aug-12	22-Aug-12	29-Sep-13	29-Sep-13	4-Jul-13	4-Jul-13	4-Jul-13
Mapping Label		199	200	201	202	204	281	282	283	8	9	290	291	205	206	207
Method		SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
Start Depth (m)		0.10	0.20	0.20	0.20	0.30	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.10	0.20	0.20
pH		4.43	5.02	5.61	5.18	5.19	4.45	4.48	4.12	6.43	6.09	8.19	7.77	5.3	5.35	5.28
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31	0.46	0.81	0.82	0.86	0.85	0.20	0.21	0.16	1.20	0.82	1.15	1.08	5.87	6.79	4.29
Arsenic	100	5.42	11.1	9.94	8.70	8.23	0.92	1.58	0.54	10.6	6.25	10.8	11.3	42.0	51.8	31.9
Barium	15000	72.4	120	243	142	143	80.6	99.4	44.3	120	75.2	104	114	234	221	246
Beryllium	160	<0.2	0.34	0.56	0.31	0.29	<0.2	<0.2	<0.2	0.67	0.29	0.82	0.53	0.57	0.56	0.60
Cadmium	35	0.14	0.22	0.63	0.20	0.23	1.58	1.05	1.54	1.05	6.85	0.92	0.73	3.17	3.17	2.92
Chromium	100	14.9	21.4	25.2	23.0	20.9	2.23	2.38	1.35	23.3	7.95	24.1	26.0	24.9	24.7	23.3
Cobalt	50	3.09	6.16	14.4	6.72	5.72	2.81	2.13	0.49	11.0	5.00	15.7	10.4	12.0	12.2	9.95
Copper	15000	4.24	7.73	13.0	9.27	9.58	6.31	7.09	4.56	17.5	13.9	26.5	17.5	32.8	34.2	32.5
Lead	400	16.0	23.6	23.7	15.5	14.8	130	83.0	135	183	617	216	177	23.5	26.0	25.2
Mercury	15	<0.05	<0.05	<0.05	<0.05	<0.05	0.16	0.13	0.13	<0.050	<0.050	<0.05	<0.05	<0.05	<0.05	0.059
Molybdenum	390	0.76	1.02	0.83	0.86	0.96	0.68	0.73	<0.5	1.21	2.77	1.10	1.19	5.78	7.86	5.39
Nickel	820	8.11	16.1	21.3	17.3	15.7	2.90	2.91	1.88	25.8	11.3	33.6	24.5	39.6	46.3	30.1
Selenium	390	<0.2	<0.2	0.27	<0.2	<0.2	0.20	<0.2	<0.2	0.32	0.44	0.36	0.29	1.60	1.68	1.78
Silver	390	<0.1	0.18	0.28	0.13	<0.1	0.50	0.69	0.38	0.29	0.75	0.23	0.23	0.97	1.05	1.07
Thallium	1	0.080	0.11	0.11	0.11	0.096	<0.05	<0.05	<0.05			0.090	0.092	0.27	0.27	0.18
Tin	47000	<2	<2	<2	<2	<2	<2	<2	<2	<2.0	<2.0	<2	<2	<2	<2	<2
Uranium	23	0.46	0.53	0.94	0.51	0.51	0.19	0.18	0.073	0.61	0.64	0.69	0.62	3.13	3.50	3.81
Vanadium	200	35.7	43.0	45.9	48.0	45.4	3.09	5.88	1.05	30.9	11.2	25.1	34.5	69.8	81.5	68.2
Zinc	10000	50.7	86.1	131	77.3	63.5	197	135	238	231	573	259	185	242	242	181

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 11. Metals concentrations in soil samples collected from the Tailings Management Area (AEC 8) and surrounding forested areas.

Area (AEC / Outside AEC)		Outside the AEC (Perimeter of the Tailings Management Facility)								
		TPN West 50	TPN West 50	TPN West 50					TPN WEST	TPN WEST
Sample ID		A	B	C	TPN West A	TPN West B	TPN West C	TPN WEST	+100	+50
Date		4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13	4-Jul-13	29-Sep-13	29-Sep-13	29-Sep-13
Mapping Label		208	209	210	211	213	214	293	294	295
Method		SS	SS	SS	SS	SS	SS	SS	SS	SS
Start Depth (m)		0.30	0.15	0.10	0.10	0.20	0.15	0.00	0.00	0.00
pH		4.24	4.24	4.83	4.24	4.26	4.74	4.07	5.38	3.98
TOC										

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).





Table 12. Metals concentrations in soil samples collected from the Main Zone Pit (AEC 9), the 1380 Gully (AEC 9.4), and the 1250 Portal areas (AEC 9.2).

Area (AEC / Outside AEC)		Main Zone Pit (AEC 9)														
		M Zone T1	M Zone T2	M Zone T3	MZONE T1	MZONE T2	MZONE T2	MZONE T2	MZONE T2	MZONE T3	MZONE T3	MZONE T3				
Sample ID		000	000	000	0+00	0+00	0+50	1+00	0+52	0+00	0+50	0+100	MZ1380-01	MZ1380-05	MZ1380-04	MZ1380-07
Date		7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	7-Jul-13	17-Jun-14	17-Jun-14	17-Jun-14	17-Jun-14
Mapping Label		243	244	245	347	350	351	352	353	354	355	356	475	494	495	496
Method		SS	SS	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF
Start Depth (m)		0.15	0.20	0.10	0.15	0.20	0.15	0.20	0.15	0.10	0.10	0.20	0.3	0.30	0.30	0.15
pH		7.55	7.58	7.74									7.57			
TOC																

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).



Table 12. Metals concentrations in soil samples collected from the Main Zone Pit (AEC 9), the 1380 Gully (AEC 9.4), and the 1250 Portal areas (AEC 9.2).

Area (AEC / Outside AEC)		Main Zone Pit (AEC 9)					1250 Portal (AEC 9.2)							1380 Gully (AEC 9.4)	
Sample ID		MZ1380-02	MZ1380-01	MZ1380-16	MZ1380-19	MZ1380-20	MZ1250-06	MZ1250-09	MZ1250-14	CS14-115	CS14-114	CS14-115	CS14-116	1380 GULLY 2	1380 GULLY 3
Date		17-Jun-14	17-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	15-Jun-14	15-Jun-14	28-Jul-14	26-Sep-14	28-Sep-14	28-Sep-14	28-Sep-14	23-Aug-12	23-Aug-12
Mapping Label		498	501	533	535	536	444	447	833	1041	1074	1075	1076	33	34
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	SS	SS
Start Depth (m)		0.20	0.30	0.15	0.20	0.20	0.10	0.1	0.20	0.1	0.1	0.1	0.1	0.00	0.00
pH										8.18				7.75	7.60
TOC															
HHRA Screening Criteria															
Parameter															
Antimony	31									12.0				40.8	30.5
Arsenic	100	-	-	-	-	-	-	-	-	92.5	-	90.1	-	58.3	68.5
Barium	15000									235				111	105
Beryllium	160									1.17				2.32	2.22
Cadmium	35									3.19				243	171
Chromium	100	-	-	-	-	-	-	-	-	41.0	-	* 698	-	21.8	25.5
Cobalt	50	-	-	-	-	-	-	-	-	10.8	-	-	-	27.9	25.9
Copper	15000	-	-	-	-	-	-	-	-	114	-	96.4	-	74.8	65.9
Lead	400	291	8812	394	2620	913	593	1122	1038	424	383	238	484	35400	29900
Mercury	15	-	-	-	-	-	-	-	-	<0.050	-	-	-	0.075	0.072
Molybdenum	390	-	-	-	-	-	-	-	-	34.9	10.4	21.6	-	4.84	4.86
Nickel	820	-	-	-	-	-	-	-	-	57.4	-	-	-	59.5	63.1
Selenium	390	-	-	-	-	-	-	-	-	2.53	-	-	-	13.6	8.09
Silver	390									1.59				29.8	19.2
Thallium	1									0.70					
Tin	47000									<2.0				<2.0	<2.0
Uranium	23									15.9				2.34	2.36
Vanadium	200									499				74.5	80.4
Zinc	10000	758	32502	381	4522	1353	927	1433	1592	741	807	612	999	44800	33100

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).



Table 12. Metals concentrations in soil samples collected from the Main Zone Pit (AEC 9), the 1380 Gully (AEC 9.4), and the 1250 Portal areas (AEC 9.2).

Area (AEC / Outside AEC)		1380 Gully (AEC 9.4)															
											MZONE T1	MZONE T1					
Sample ID		SS12-10	SS12-11	1380 Gully A	1380 Gully B	1380 Gully C	1380 Gully A	1380 Gully B	1380 Gully C	0+50	0+100	MZG14-12	MZG14-01	MZG14-02	MZG14-03	MZG14-04	
Date		30-Sep-12	30-Sep-12	5-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	7-Jul-13	7-Jul-13	25-Jul-14	25-Jul-14	25-Jul-14	25-Jul-14	25-Jul-14	
Mapping Label		81	82	215	216	217	321	322	323	348	349	706	724	725	726	727	
Method		SS	SS	SS	SS	SS	XRF	XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF	
Start Depth (m)		0.20	0.20	0.15	0.20	0.20	0.15	0.20	0.20	0.15	0.20	0.2	0.2	0.2	0.2	0.2	
pH		7.65	7.05	5.74	6.23	5.8						7.47					
TOC																	
HHRA Screening Criteria																	
Parameter		31	29.2	19.0	11.1	18.6	8.84					33.6					
Antimony		100	82.8	80.3	28.3	58.3	23.3	357	237	-	-	-	72.6	342	96.1	-	-
Arsenic		15000	125	109	170	112	152					126					
Barium		160	2.41	2.91	1.35	2.11	2.48					2.37					
Beryllium		35	220	82.9	20.6	42.6	13.1					131					
Cadmium		100	25.2	39.3	22.9	33.3	40.8					28.2	-	-	-	-	-
Chromium		50	33.4	18.6	16.4	22.9	20.9					24.6	-	-	-	-	-
Cobalt		15000	70.5	74.5	30.1	42.0	31.8					73.0	-	-	-	-	-
Copper		400	26600	7830	6910	10400	2670	3953	4813	1142	1191	543	26900	9543	1130	3401	755
Lead		15	0.078	0.11	0.11	0.079	<0.05					0.080	-	-	-	-	-
Mercury		390	4.41	4.89	1.82	3.46	1.11	-	-	-	-	4.08	-	-	-	-	-
Molybdenum		820	61.2	81.5	28.6	44.2	39.3					73.2	184	99.9	-	-	-
Nickel		390	7.66	1.59	0.95	1.84	0.52					8.14	-	-	-	-	-
Selenium		390	17.4	7.10	3.12	5.71	1.61					19.0					
Silver		1	0.75	1.05	0.60	0.73	0.58					0.89					
Thallium		47000	<2	<2	<2	<2	<2					< 0.050					
Tin		23	2.52	4.03	1.32	2.03	1.76					2.45					
Uranium		200	90.9	101	70.5	94.6	55.1					81.1					
Vanadium		10000	44900	17000	4810	11300	3100	3334	6946	1850	2021	773	27400	24734	1804	7408	3174
Zinc																	

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).



Table 12. Metals concentrations in soil samples collected from the Main Zone Pit (AEC 9), the 1380 Gully (AEC 9.4), and the 1250 Portal areas (AEC 9.2).

Area (AEC / Outside AEC)		1380 Gully (AEC 9.4)														
Sample ID		MZG14-05	MZG14-07a	MZG14-07b	MZG14-08	MZG14-09	MZG14-10	MZG14-11	MZG14-12	MZG14-13	MZG14-18b	MZG14-18a	MZG14-20a	MZG14-20b	MZG14-19a	MZG14-19b
Date		25-Jul-14	26-Jul-14	26-Jul-14	26-Jul-14	26-Jul-14	26-Jul-14	26-Jul-14	26-Jul-14	26-Jul-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14
Mapping Label		728	734	735	736	737	738	739	740	741	910	911	912	913	916	917
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.2	0.10	0.30	0.20	0.20	0.10	0.20	0.10	0.20	0.2	0.1	0.1	0.2	0.1	0.2
pH																
TOC																
Parameter	HHRA Screening Criteria															
Antimony	31															
Arsenic	100	-	73.6	-	-	114	-	-	403	67.5	-	-	-	-	76.0	-
Barium	15000															
Beryllium	160															
Cadmium	35															
Chromium	100	* 520	-	-	-	-	-	-	-	-	-	-	-	-	-	* 299
Cobalt	50	-	-	-	-	305	-	-	-	-	-	-	-	-	-	-
Copper	15000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	400	1003	1931	1659	16371	1402	26156	1318	16810	445	1427	2577	2916	1003	2931	1091
Mercury	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	820	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	390															
Thallium	1															
Tin	47000															
Uranium	23															
Vanadium	200															
Zinc	10000	1526	1510	1857	22521	1635	30609	1389	26956	905	2297	4842	1514	1452	1197	1184

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).





Table 12. Metals concentrations in soil samples collected from the Main Zone Pit (AEC 9), the 1380 Gully (AEC 9.4), and the 1250 Portal areas (AEC 9.2).

Area (AEC / Outside AEC)		1380 Gully (AEC 9.4)		Outside the AEC Boundary (1250 Portal)												
Sample ID		MZG14-25a	MZG14-25b	MZ1250-11	MZ1250-13	MZ1250-03	MZ1250-04	MZ1250-05	MZ1250-07	MZ1250-10	MZ1250-11	MZ1250-12	MZ1250-13	MZ1250-16	MZ1250-15	MZ1250-16a
Date		4-Sep-14	4-Sep-14	15-Jun-14	15-Jun-14	15-Jun-14	15-Jun-14	15-Jun-14	15-Jun-14	15-Jun-14	15-Jun-14	15-Jun-14	15-Jun-14	28-Jul-14	28-Jul-14	29-Sep-14
Mapping Label		918	920	437	438	441	442	443	445	448	449	450	451	831	832	1077
Method		XRF	XRF	SS	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.1	0.2	0.15	0.05	0.2	0.05	0.05	0.10	0.25	0.15	0.05	0.05	0.20	0.20	0.1
pH				4.82	7.71											
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31			2.52	2.67											
Arsenic	100	218	480	22.9	28.2	-	-	-	-	-	-	-	31.0	-	-	-
Barium	15000			114	93.4											
Beryllium	160			1.09	1.03											
Cadmium	35			1.97	1.40											
Chromium	100	-	-	36.0	35.0	-	-	-	-	-	-	-	-	-	-	-
Cobalt	50	-	-	15.0	19.6	-	-	-	-	-	-	-	-	-	-	-
Copper	15000	-	-	45.1	43.5	-	-	-	-	-	73.4	-	-	-	-	-
Lead	400	3982	6867	367	390	172	207	311	439	211	241	-	161	128	735	98.2
Mercury	15	-	-	< 0.050	< 0.050	-	-	-	-	-	-	-	-	* 27.5	-	-
Molybdenum	390	-	-	2.31	2.75	-	-	-	-	-	-	-	-	-	-	-
Nickel	820	-	-	37.9	47.5	-	-	-	-	-	-	-	192	-	-	-
Selenium	390	-	-	0.46	0.42	-	-	-	-	-	-	-	-	-	-	-
Silver	390			1.33	0.48											
Thallium	1			0.27	0.25											
Tin	47000			< 2.0	< 2.0											
Uranium	23			1.47	1.42											
Vanadium	200			55.3	52.5											
Zinc	10000	2152	4110	444	364	428	464	133	528	90.6	348	42.7	281	187	949	278

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



Table 12. Metals concentrations in soil samples collected from the Main Zone Pit (AEC 9), the 1380 Gully (AEC 9.4), and the 1250 Portal areas (AEC 9.2).

Area (AEC / Outside AEC)		Outside the AEC Boundary (1250 Portal)				Outside the AEC Boundary (1380 Gully)										
Sample ID		MZ1250-16b	MZ1250-16b	MZ1250-17a	MZ1250-17b	SS12-37	MZG14-17	MZG14-14	MZG14-15	MZG14-16	MZG14-17	MZG14-22a	MZG14-24b	MZG14-29b	MZG14-24a	MZG14-24b
Date		29-Sep-14	29-Sep-14	29-Sep-14	29-Sep-14	1-Oct-12	25-Jul-14	26-Jul-14	26-Jul-14	26-Jul-14	26-Jul-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14
Mapping Label		1078	1079	1080	1081	91	707	742	743	744	745	883	884	886	907	908
Method		XRF	SS	XRF	XRF	SS	SS	XRF	XRF	XRF	XRF	SS	SS	SS	XRF	XRF
Start Depth (m)		0.3	0.1	0.1	0.3	0.20	0.2	0.20	0.20	0.20	0.20	0.1	0.2	0.2	0.1	0.2
pH			6.03			6.14	8.24					4.99	6.74	6.91		
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31		2.46			1.52	2.28					1.43	1.09	6.09		
Arsenic	100	-	21.7	-	-	7.39	15.6	53.3	48.9	-	37.6	14.0	8.91	35.9	-	-
Barium	15000		84.6			55.1	47.2					98.6	63.4	57.5		
Beryllium	160		0.95			0.86	1.00					0.26	1.33	1.43		
Cadmium	35		4.62			1.76	1.89					15.2	9.24	10.0		
Chromium	100	-	34.6	-	-	12.5	38.2	-	-	-	-	9.84	14.0	31.8	-	-
Cobalt	50	-	15.4	-	-	6.91	14.7	-	-	-	-	5.30	5.79	19.5	-	-
Copper	15000	-	40.0	-	81.4	18.1	30.2	-	-	-	-	10.4	13.5	27.1	-	-
Lead	400	295	566	45.3	105	340	310	340	482	603	184	525	643	1940	140	399
Mercury	15	-	<0.050	-	-	0.070	< 0.050	-	-	-	-	0.080	<0.050	<0.050	-	-
Molybdenum	390	-	2.45	2.53	-	0.92	0.71	-	-	-	-	0.96	0.66	1.13	-	-
Nickel	820	-	39.8	-	-	17.0	39.6	-	-	-	-	8.61	11.5	38.9	-	-
Selenium	390	-	0.57	-	-	0.32	< 0.20	-	-	-	-	0.37	0.71	0.26	-	-
Silver	390		0.63			0.47	0.42					0.56	0.67	0.71		
Thallium	1		0.25			0.15	0.17					0.093	0.18	0.59		
Tin	47000		<2.0			<2	< 0.050					<2.0	<2.0	<2.0		
Uranium	23		2.10			0.45	0.63					0.36	9.95	0.84		
Vanadium	200		47.5			14.1	27.8					16.5	21.2	27.3		
Zinc	10000	612	874	83.2	193	363	512	600	602	666	407	431	715	2000	282	569

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).



Table 12. Metals concentrations in soil samples collected from the Main Zone Pit (AEC 9), the 1380 Gully (AEC 9.4), and the 1250 Portal areas (AEC 9.2).

Area (AEC / Outside AEC)		Outside the AEC Boundary (1380 Gully)														
Sample ID		MZG14-21a	MZG14-21b	MZG14-26b	MZG14-23a	MZG14-23b	MZG14-30b	MZG14-27a	MZG14-22a	MZG14-26a	MZG14-28a	MZG14-22b	MZG14-29a	MZG14-30a	MZG14-29b	MZG14-27b
Date		4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14	4-Sep-14
Mapping Label		909	914	915	919	921	922	923	924	925	926	927	928	929	930	931
Method		XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.2	0.2
pH																
TOC																
Parameter	HHRA Screening Criteria															
Antimony	31															
Arsenic	100	-	-	-	-	-	-	-	-	66.2	13.2	-	309	-	-	-
Barium	15000															
Beryllium	160															
Cadmium	35															
Chromium	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cobalt	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	15000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lead	400	335	411	384	57.4	216	1198	268	221	529	80.1	237	4089	1161	959	464
Mercury	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Molybdenum	390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nickel	820	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Selenium	390	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	390															
Thallium	1															
Tin	47000															
Uranium	23															
Vanadium	200															
Zinc	10000	265	737	429	102	325	3080	90.8	257	537	52.6	491	7224	2176	1832	935

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).



Table 12. Metals concentrations in soil samples collected from the Main Zone Pit (AEC 9), the 1380 Gully (AEC 9.4), and the 1250 Portal areas (AEC 9.2).

Area (AEC / Outside AEC)		Outside the AEC Boundary (1380 Gully)					Outside the AEC Boundary (Main Zone Pit)									
Sample ID		MZG14-28b	MZG14-31a	MZG14-31b	MZONE T4 0+50	MZONE T4 1+00	MZ1380-09	MZ1380-13	MZ1380-11	MZ1380-12	MZ1380-10	MZ1380-08	MZ1380-09	MZ1380-03	MZ1380-06	MZ1380-14
Date		4-Sep-14	29-Sep-14	29-Sep-14	7-Jul-13	7-Jul-13	17-Jun-14	17-Jun-14	17-Jun-14	17-Jun-14	17-Jun-14	17-Jun-14	17-Jun-14	17-Jun-14	17-Jun-14	17-Jun-14
Mapping Label		932	1082	1083	358	359	477	488	489	490	491	492	493	497	499	500
Method		XRF	XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
Start Depth (m)		0.2	0.3	0.3	0.20	0.20	0.2	0.15	0.30	0.20	0.20	0.20	0.20	0.15	0.20	0.20
pH							5.97									
TOC																
HHRA Screening Criteria																
Parameter																
Antimony	31															
Arsenic	100	-	-	-	-	-	13.8	-	-	-	-	19.7	-	-	-	-
Barium	15000															
Beryllium	160															
Cadmium	35															
Chromium	100	-	-	-			33.2	-	-	-	-	-	-	-	* 359	-
Cobalt	50	-	-	-			14.5	-	-	-	-	-	-	-	-	-
Copper	15000	-	-	-			18.7	-	-	-	113	-	-	-	-	-
Lead	400	515	102	634	125	61.1	44.9	27.0	43.9	45.3	69.1	22.0	40.6	177	277	69.7
Mercury	15	-	-	-			< 0.050	-	-	-	-	-	-	-	-	-
Molybdenum	390	-	-	-	-	-	0.69	-	-	-	-	-	-	-	-	-
Nickel	820	202	-	-			32.8	-	-	-	-	-	-	-	81.9	-
Selenium	390	-	-	-			< 0.20	-	-	-	-	-	-	-	-	-
Silver	390															
Thallium	1															
Tin	47000															
Uranium	23															
Vanadium	200															
Zinc	10000	627	238	982	214	149	136	109	86.8	105	245	92.1	88.8	613	373	321

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).



Table 12. Metals concentrations in soil samples collected from the Main Zone Pit (AEC 9), the 1380 Gully (AEC 9.4), and the 1250 Portal areas (AEC 9.2).

Area (AEC / Outside AEC)		Outside the AEC Boundary (Main Zone Pit)									
Sample ID		MZ1380-21	MZ1380-15	MZ1380-17	MZ1380-18	MZ1380-21a	MZ1380-24	MZ1380-22	MZ1380-24	MZ1380-23b	MZ1380-23a
Date		18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	18-Jun-14	26-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14	28-Jul-14
Mapping Label		503	528	532	534	537	729	834	835	836	837
Method		SS	XRF	XRF	XRF	XRF	SS	XRF	XRF	XRF	XRF
Start Depth (m)		0.2	0.15	0.20	0.10	0.20	0.2	0.20	0.20	0.35	0.10
pH		7.81					5.08				
TOC											
HHRA Screening Criteria											
Parameter											
Antimony	31	2.95					5.65				
Arsenic	100	20.2	-	-	-	-	12.6	-	-	-	-
Barium	15000	102					93.3				
Beryllium	160	1.87					1.87				
Cadmium	35	2.75					2.52				
Chromium	100	30.3	-	-	-	-	28.8	-	-	-	-
Cobalt	50	12.9	-	-	-	-	27.4	-	-	-	-
Copper	15000	41.8	-	-	-	-	33.6	-	-	-	-
Lead	400	405	-	248	257	276	280	-	196	60.3	50.6
Mercury	15	< 0.050	-	-	-	-	< 0.050	-	-	-	-
Molybdenum	390	1.79	-	-	-	-	0.57	-	-	-	-
Nickel	820	34.8	-	-	-	-	40.3	-	-	-	-
Selenium	390	0.36	-	-	-	-	< 0.20	-	-	-	-
Silver	390	0.70					0.65				
Thallium	1	0.22					0.20				
Tin	47000	< 0.050					< 0.050				
Uranium	23	2.37					0.43				
Vanadium	200	45.5					39.0				
Zinc	10000	611	156	389	342	412	473	34.3	361	108	108

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics

Results are less than the detection limit (DL).





Table 13. Metals concentrations in soil samples collected from the Powder Magazine area (APEC 10) and reference stations.

Area		Powder Magazine (APEC 10)			North Camp Creek Reference Area (NC Ref)												
Sample ID		TP14-52-03	TP14-52-02	TP14-52-01	NC Ref 100 A	NC Ref 100 B	NC Ref 100 C	NC Ref 50 A	NC Ref 50 B	NC Ref 50 C	NC Ref A	NC Ref B	NC Ref C	NORTH CAMP REF	NORTH CAMP REF +100	NORTH CAMP REF +50	
Date		28-Jul-14	28-Jul-14	28-Jul-14	5-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	5-Jul-13	30-Sep-13	30-Sep-13	30-Sep-13	
Mapping Label		756	757	767	222	223	224	225	226	227	228	230	231	318	319	320	
Method		XRF	XRF	XRF	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	
Start Depth (m)		1.0	0.5	0.1	0.15	0.15	0.20	0.10	0.10	0.10	0.20	0.10	0.10	0.00	0.00	0.00	
pH					5.23	4.47	4.22	4.48	4.5	4.56	4.51	5.13	4.14	4.31	4.21	4.03	
TOC																	
HHRA Screening Criteria																	
Parameter																	
Antimony	31				5.13	3.20	2.23	3.71	3.12	2.98	2.96	2.84	3.01	0.28	<0.1	0.13	
Arsenic	100	-	-	-	24.1	12.7	6.74	18.7	9.18	14.5	13.7	15.8	10.2	0.86	0.20	0.36	
Barium	15000				58.3	51.9	56.5	43.8	61.5	43.1	73.0	89.5	50.1	63.6	46.4	57.0	
Beryllium	160				0.83	0.27	0.27	0.37	0.33	0.38	0.40	0.93	0.27	<0.2	<0.2	<0.2	
Cadmium	35				2.21	2.62	2.93	3.23	4.01	1.41	2.42	7.79	0.98	8.51	6.95	7.14	
Chromium	100	-	-	-	27.9	19.8	21.7	24.6	20.5	32.4	16.5	24.5	16.3	1.82	<0.5	0.90	
Cobalt	50	-	-	-	8.44	4.16	4.83	6.28	4.99	8.96	4.32	8.07	3.37	0.69	0.24	0.48	
Copper	15000	-	-	-	17.9	7.84	8.88	16.8	9.09	12.6	12.2	19.5	9.17	5.46	4.22	4.42	
Lead	400	-	-	-	271	103	85.7	92.0	90.4	194	128	268	67.0	153	32.2	41.4	
Mercury	15	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.14	0.078	0.14	
Molybdenum	390	-	-	-	1.30	1.13	0.94	1.08	1.00	1.14	0.77	1.25	1.40	<0.5	<0.5	<0.5	
Nickel	820	-	-	-	25.9	12.8	14.0	19.3	14.1	25.8	12.9	20.5	11.3	2.24	0.84	1.19	
Selenium	390	-	-	-	0.20	<0.2	<0.2	0.22	<0.2	<0.2	<0.2	0.25	<0.2	<0.2	<0.2	<0.2	
Silver	390				0.50	0.54	0.37	0.49	0.60	0.18	0.64	0.62	0.55	1.04	1.39	3.89	
Thallium	1				0.29	0.15	0.19	0.21	0.20	0.17	0.20	0.20	0.20	0.16	0.050	0.068	
Tin	47000				<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Uranium	23				0.61	0.52	0.43	0.51	0.49	0.44	0.51	1.11	0.58	0.17	<0.05	<0.05	
Vanadium	200				38.0	40.9	39.2	39.3	40.6	40.1	30.0	37.4	40.7	2.51	0.73	1.29	
Zinc	10000	95.8	67.5	93.8	679	218	214	281	204	401	151	359	112	104	94.3	119	

Notes:

- Asterisk (\*)

Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
- bold, shaded**

Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
- Dash (-)

In situ XRF data were below the limit of detection for the instrument.
- Blank cells

Data were not collected.
- Italics*

Results are less than the detection limit (DL).



Table 13. Metals concentrations in soil samples collected from the Powder Magazine area (APEC 10) and reference stations.

Area		Far Field Reference Area 1 (FF-Ref 1)						Far Field Reference Area 2 (FF-Ref 2)					
Sample ID		FAR FIELD REF 1	FAR FIELD REF 1	FAR FIELD REF 1 +100	FAR FIELD REF 1 +100	FAR FIELD REF 1 +50	FAR FIELD REF 1 +50	FAR FIELD REF 2	FAR FIELD REF 2	FAR FIELD REF 2 +100	FAR FIELD REF 2 +100	FAR FIELD REF 2 +50	FAR FIELD REF 2 +50
Date		30-Sep-13	30-Sep-13	30-Sep-13	30-Sep-13	30-Sep-13	30-Sep-13	30-Sep-13	30-Sep-13	30-Sep-13	30-Sep-13	30-Sep-13	30-Sep-13
Mapping Label		<b>302</b>	<b>303</b>	<b>305</b>	<b>306</b>	<b>307</b>	<b>308</b>	<b>310</b>	<b>311</b>	<b>313</b>	<b>314</b>	<b>315</b>	<b>317</b>
Method		SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS	SS
Start Depth (m)		0.00	0.03	0.00	0.03	0.00	0.09	0.00	0.08	0.00	0.15	0.00	0.10
pH		7.12	7.32	5.61	5.82	6.21	5.7	4.06	4.14	4.83	6.64	4.47	4.79
TOC													
HHRA Screening Criteria													
Parameter	Criteria												
Antimony	31	1.64	2.19	0.36	1.19	0.60	1.14	0.65	2.26	<0.1	2.53	0.11	2.45
Arsenic	100	16.1	23.0	6.94	23.0	8.57	23.9	2.85	17.5	0.38	20.6	0.45	18.1
Barium	15000	88.0	78.3	44.3	83.0	74.7	105	126	83.0	87.5	133	22.9	79.8
Beryllium	160	0.59	0.69	<0.2	0.46	0.27	0.60	<0.2	0.42	<0.2	1.10	<0.2	0.55
Cadmium	35	5.71	2.15	5.48	1.19	14.4	1.41	2.43	1.15	0.92	4.15	6.04	6.74
Chromium	100	25.0	29.4	10.3	32.2	12.6	35.8	3.44	21.5	0.69	30.4	0.79	20.8
Cobalt	50	9.97	12.4	3.78	10.0	5.43	13.4	1.59	6.63	0.26	14.3	0.43	13.9
Copper	15000	53.9	48.6	14.0	25.6	27.3	38.2	7.59	15.8	5.12	46.0	11.9	44.7
Lead	400	181	217	33.8	93.6	79.9	179	208	104	49.4	182	51.1	<b>569</b>
Mercury	15	<0.05	<0.05	<0.05	<0.05	0.16	<0.05	0.13	<0.05	0.15	0.054	0.10	0.058
Molybdenum	390	1.39	1.60	0.52	0.80	1.06	0.60	1.69	2.52	<0.5	1.64	0.86	1.87
Nickel	820	27.6	33.4	9.76	25.1	12.9	29.2	5.68	21.9	1.09	35.7	2.52	26.9
Selenium	390	0.35	0.42	<0.2	<0.2	<0.2	<0.2	0.22	0.35	<0.2	0.33	0.23	0.42
Silver	390	2.31	0.80	0.96	0.73	2.09	1.01	3.82	0.65	0.30	0.52	2.87	1.73
Thallium	1	0.11	0.11	<0.05	0.13	0.058	0.15	0.15	0.16	<0.05	0.32	<0.05	0.21
Tin	47000	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Uranium	23	0.50	0.58	0.14	0.51	0.23	0.62	0.24	0.83	<0.05	1.96	<0.05	1.07
Vanadium	200	22.8	26.6	9.73	36.9	13.1	37.2	10.0	47.0	0.90	38.9	1.06	30.9
Zinc	10000	676	372	136	178	346	271	218	194	162	395	182	659

- Notes:
- Asterisk (\*) Samples and analytes that were excluded from the HHRA because of unreliable XRF results (see text for details).
  - bold, shaded** Concentration exceeds the human health soil screening criteria (refer to Azimuth 2014 for information on the agency responsible for the various screening criteria).
  - Dash (-) In situ XRF data were below the limit of detection for the instrument.
  - Blank cells Data were not collected.
  - Italics* Results are less than the detection limit (DL).



**Table 14. Input parameters, estimated exposure doses, and associated risks from direct human contact with soil.**

Area		Burnick		1300 Waste Rock	REC-W	
Mapping Label		880	880	NA	264	264
Parameter	Units	Cadmium	Zinc	Zinc	Cobalt	Cobalt
Concentration in soil	µg/g	69.8	13500	43715	91	91
<b>COPC Intake from Soil Contact</b>						
Soil Ingestion						
Soil ingestion ET (days per month/30 days)	unitless	0.5	0.5	0.5	0.5	0.5
Toddler monthly average	µg/kg BW/d	1.7E-01	3.3E+01	1.1E+02	2.2E-01	2.2E-01
Adult monthly average	µg/kg BW/d	9.9E-03	1.9E+00	6.2E+00	1.3E-02	1.3E-02
Carcinogen ET (months per year/12 months)	unitless	4.2E-01	4.2E-01	4.2E-01	4.2E-01	4.2E-01
Carcinogen ET (years exposed/80 years)	unitless	6.3E-01	6.3E-01	6.3E-01	6.3E-01	6.3E-01
Adult lifetime average	µg/kg BW/d	2.6E-03	5.0E-01	1.6E+00	3.4E-03	3.4E-03
Soil Inhalation						
Concentration of PM <sub>10</sub>	g/m <sup>3</sup>	2.5E-04	2.5E-04	2.5E-04	2.5E-04	2.5E-04
Soil inhalation ET (hrs per day/24 hrs)	unitless	1.7E-01	1.7E-01	1.7E-01	1.7E-01	1.7E-01
Toddler monthly average	µg/kg BW/d	7.3E-04	1.4E-01	4.6E-01	9.5E-04	9.5E-04
Adult monthly average	µg/kg BW/d	3.4E-04	6.6E-02	2.1E-01	4.5E-04	4.5E-04
Adult lifetime average	µg/kg BW/d	8.9E-05	1.7E-02	5.6E-02	1.2E-04	1.2E-04
<b>Risks from Soil Contact</b>						
Toddler monthly soil ingestion HQ	unitless	1.7E-01	6.7E-02	<b>2.2E-01</b>	7.4E-01	1.5E-02
Toddler monthly soil inhalation HQ	unitless	7.3E-04	2.9E-04	9.3E-04	3.2E-03	6.4E-05
Toddler monthly soil contact HQ	unitless	1.7E-01	6.7E-02	<b>2.2E-01</b>	7.4E-01	1.5E-02
Adult monthly soil ingestion HQ	unitless	9.9E-03	3.9E-03	1.3E-02	4.3E-02	8.6E-04
Adult monthly soil inhalation HQ	unitless	3.4E-04	1.3E-04	4.4E-04	1.5E-03	3.0E-05
Adult monthly soil contact HQ	unitless	1.0E-02	4.0E-03	1.3E-02	4.4E-02	8.9E-04
Adult lifetime soil ingestion ILCR	unitless	-	-	-	6.0E-06	-
Adult lifetime soil inhalation ILCR	unitless	3.7E-06	-	-	3.1E-06	-
Adult lifetime soil contact ILCR	unitless	3.7E-06	-	-	9.2E-06	-

**Bold: Risk estimate exceeds HQ of 0.2 or ILCR of 2.0E-06**

**Bold & shaded: Risk estimate exceeds HQ of 1 or ILCR of 1.0E-05**

NA: not applicable - point estimate exposure concentration based on mean of representative samples



**Table 15. Input parameters, estimated exposure doses, and associated risks from exposure to arsenic, cadmium, and lead from human consumption of berries.**

Parameter	Units	Crowberry/bearberry			
		Burnick Arsenic	1380 Cadmium	1380 Lead	TPN Lead
Concentration in berry tissue <sup>1</sup>	µg/g wet weight	0.0102	0.0162	0.0735	0.393
<b>COPC Intake from Berries</b>					
Ingestion					
Berry ingestion ET (days per month/30 days)	unitless	0.5	0.5	0.5	0.5
Toddler monthly average	µg/kg BW/d	2.4E-02	3.8E-02	1.7E-01	9.3E-01
Adult monthly average	µg/kg BW/d	7.6E-03	1.2E-02	5.5E-02	2.9E-01
Adult lifetime average	µg/kg BW/d	2.0E-03	3.2E-03	1.4E-02	7.7E-02
<b>Risks from Berry Consumption</b>					
Toddler monthly berry ingestion HQ	unitless	8.0E-02	3.8E-02	<b>2.9E-01</b>	<b>1.5E+00</b>
Adult monthly berry ingestion HQ	unitless	2.5E-02	1.2E-02	9.2E-02	4.9E-01
Adult lifetime berry ingestion ILCR	unitless	3.6E-06	-	-	-

<sup>1</sup> Maximum concentration of available composite unwashed berry samples.

**Bold: Risk estimate exceeds HQ of 0.2 or ILCR of 2.0E-06**

**Bold & shaded: Risk estimate exceeds HQ of 1 or ILCR of 1.0E-05**



**Table 16. Summary of Updated Human Health Risk Assessment Conclusions for the Sä Dena Hes Mine Site.**

Area	Direct contact with residual contaminated soil	Consumption of plants and small animals <sup>1,2</sup>
Jewelbox Hill & 1380 Gully	✗	✗
1250 Portal & Waste Rock	✗	✓
Burnick Portal & Waste Rock	✗	✓
1300 Portal & Waste Rock	✗	✓
Mill Site	✗	?
Boneyard	✓	✓
North Tailings Pond	✓	?
North of North Tailings Pond Dam	✓	✗
West of North Tailings Pond	✗	✓
South Tailings Pond	✓	?
Reclaim Pond	✓	?
West of Reclaim Pond	✓	✓

✗ Human health risks in excess of those allowed under the YT CSR - risk management measures required

? Potential human health risks in excess of those allowed under the YT CSR - risk management measures may be required, depending on future conditions

✓ Human health risks within those allowed under the YT CSR - risk management measures not required

<sup>1</sup> Plants includes mushrooms and small animals includes marmots and ground squirrels

<sup>2</sup> Although they were not tested, the HHRA concluded that larger animals, such as lynx, deer and moose, are likely safe for humans to eat because these animals don't spend enough time at the Site to build-up contaminants to levels that would present a potential human health risk.

\* Risks from future long-term consumption of surface water or groundwater as drinking water are unknown because the future water quality is uncertain. Occasional consumption of small quantities of water, such as filling a water bottle from a creek, are not expected to present a health risks from exposure to metals, but consumption of untreated surface water may present a risk to health from exposure to naturally occurring microbial pathogens, such as *Giardia lamblia* (i.e., the protozoa responsible for "beaver fever").

