LIMITED PHASE 2 ENVIRONMENTAL SITE ASSESSMENT
MOUNT NANSEN MINE SITE
YUKON TERRITORY

Submitted to:

DEPARTMENT OF ENERGY, MINES & RESOUCES
Yukon Government
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DRAFT REPORT (REV. 2)

File No.: K1013-002-08

July 2008

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EXECUTIVE SUMMARY

Kearah & WERI Environmental Contracting Limited (KWEC) was retained by the department of Energy, Mines & Resources of the Yukon Government to conduct a limited Phase 2 Environmental Site Assessment (ESA) of the mill facility, Mount Nansen Mine site, Yukon Territory. The Mount Nansen Mine site is located approximately 60km west of Carmacks, Yukon Territory. The Phase 2 ESA included the sampling, characterization and recommended handling and disposal options for unidentified substances remaining in the mill complex of the abandoned mine site. The field work was conducted in March 2008. This report details the work conducted by KWEC site assessors and the results of the analytical testing.

The original scope of work provided by the Owner (in RFP # AAMB-07-002) identified 41 sampling locations throughout the facility. However, the sampling program was expanded to 60 sampling locations to include additional materials discovered in previously unidentified storage tanks and to analyze additional hazardous materials.

As part of the assessment, samples were obtained from storage tanks, screens and storage containers from various locations at the mill complex. The samples consisted primarily of sediment (fine and coarse-grained materials) and scale material contained in the storage tanks. There were also ice/water samples obtained from the storage tanks, sampling of materials from the floor of the mill facility and sampling of products contained in rubber drums. The sediment and water samples were submitted to an accredited environmental laboratory for the testing of several relevant parameters, including cyanides, heavy metals and pH. Laboratory analysis confirmed the presence of hazardous materials containing cyanide, according to the Environment Canada *Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Materials*, and parameter concentrations exceeding the environmental regulations of the Yukon Contaminated Sites Regulations and the guidelines of the Canadian Council of Ministers of the Environment (CCME) Environmental Quality Guidelines.

There were also field and analytical testing of paint chips (for lead) and bulk insulation samples (for asbestos fibres). Asbestos was not contained in any of the samples submitted but one sample obtained from the ball mill contained lead-based paint. KWEC site assessors also investigated the sulphur dioxide (SO_2) storage tank located adjacent to the mill complex and discovered that the tank was still pressurized and contained a nominal amount of SO_2. A survey of the electrical equipment contained in the mill complex concluded that the equipment did not contain polychlorinated biphenyls (PCBs).

1.0 INTRODUCTION

1.1 Terms of Reference

Kearah & WERI Environmental Contracting Ltd. (KWEC) was retained by the Department of Energy, Mines & Resources, Yukon Government, also referred to as the Client, to conduct a limited Phase 2 Environmental Site Assessment (ESA) of the mill facility, Mount Nansen Mine site, Yukon Territory. The Phase 2 ESA included the sampling, characterization and recommended handling and disposal options for unidentified substances remaining in the mill complex of the abandoned mine site. KWEC received authorization to proceed from Mr. Hugh Copland, Project Manager, Energy, Mines & Resources. The field work was conducted in March 2008 by Mr. Dennis Antony, B.Sc., R.R.D., Site Assessor, KWEC and Mr. Mike Mahoney, Site Assessor, KWEC. This report details the work conducted by the KWEC site assessors and technicians and the results of the analytical testing.

1.2 Background

There has been intermittent gold and silver exploration and mining in the Mount Nansen area since 1942. A mill was constructed at the mine site and ore from the Huestis and Webber veins was mined underground. Two attempts at production were undertaken from September 1968 to April 1969 and again for five months from 1975–1976. Both attempts did not meet gold and silver recovery expectations and were not profitable.

BYG Natural Resources Incorporated was part or whole owner of the property since 1985, when the company and various partners began exploration of the Brown McDade vein system. A mine and mill operated from November 1996 to November 1997 and March 1998 to February 1999. In February of 1999, the company failed to meet its water license obligations and the Department of Indian Affairs and Northern Development (DIAND) ordered the company to meet these requirements or shut down. Operations ceased on 17 February 1999.

The Yukon Government is currently coordinating the final cleanup of the mine site. Cleanup activities include continuing care and maintenance of the mine site, various remedial works and site reclamation.

1.3 Objectives

The Mount Nansen mine site is an abandoned mine site that is currently managed by Yukon Government through a care and maintenance contract. A caretaker/maintenance supervisor is on site at all times. The mine site consists of several buildings, as shown in Figure 1; however, the Phase II ESA was limited to the mill complex, which consisted of crusher buildings 1 & 2 and mill buildings 1 & 2.

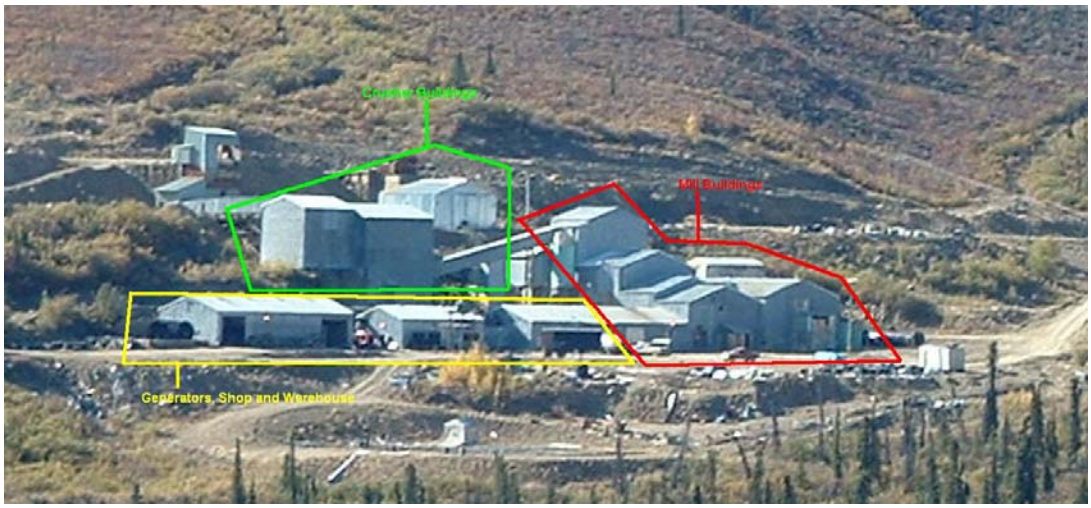


Figure 1: Mount Nansen Mine Complex

A hazardous materials assessment was conducted in 2006 by KWEC, which focused primarily on industrial chemicals in use during mine operation and water treatment that were left on the property. Several varieties of hazardous materials were identified during the site investigation. A detailed inventory was prepared for Energy, Mines & Resources, which identified the type and quantity of materials present at the mine site. Subsequent to the hazardous material assessment, the materials were removed from the mine site on behalf of the Yukon Government by an environmental contractor; nevertheless, it was suspected that some hazardous materials remained on site.

The purpose of the limited Phase 2 ESA was to identify the remaining chemical hazards at the mine site in order to facilitate the removal and disposal of these materials at a later date, prior to or in conjunction with the demolition of various buildings of the mill complex. This latest assessment (with a few exceptions) focused mainly on materials that were generally mill process wastes that were left as residual material in the bottom of large, open tanks or sealed tanks.

1.4 Scope of Work

The scope of work for this project included:

- Sampling and characterization of substances of interest
- Record the sampling locations and estimate the quantity of each substance that is sampled
- Preparation of a closure report detailing site activities, discussing the sampling results and recommending disposal options or additional testing

Only chemically processed ore, industrial chemicals and unidentified substances were sampled. Materials in the crusher buildings or in storage containers, which appeared to be coarse or crushed ore was not included in the sampling program. Substances of interest included:

- Tank residues
- Precipitation mixed with tank residues (in a frozen state)
- Containers that contain chemical products from either the mill or water treatment processes
- Woodstave tanks that have absorbed unknown chemicals
- Solids remaining in screens above the tanks
- Small heaps of solids around the base of the larger tanks
- Painted surfaces that may contain lead
- Containers resembling rubber garbage cans that were labeled in handwriting as containing Borax
- A few remaining containers of unidentified substances
- Electrical switchgear and motor controllers that may contain polychlorinated biphenyls (PCBs)
- Insulating materials that may contain asbestos fibres

2.0 SITE DESCRIPTION

The Mount Nansen Mine site (62° 5'N, 137° 5'W) is located 60km west of Carmacks and 180km north of Whitehorse, Yukon Territory, in the Little Salmon/Carmacks First Nation traditional territory. The Mount Nansen Mine site consists of the following main components:

- Three areas of underground workings—Webber, Huestis and Brown McDade
- Brown McDade open pit
- Tailings pond in the Dome Creek valley containing approximately 258,000 tonnes of tailings
- Seepage collection dam and pump-back facilities immediately downstream of the main tailings dam
- Mill/generator/warehouse complex
- Cookhouse and bunkhouse buildings
- Victoria Creek water well building and pump
- Various miscellaneous buildings, pump shacks, pipelines and power lines

The Phase 2 ESA was limited to the mill facility, which consisted of several storage tanks (including among these a thickener tank, cyanide destruction agitator tank, carbon-in-leach (CIL) and carbon-in-pulp (CIP) agitator tanks, cyanide mix tank, SO_2 tank, lime tank and water tanks), carbon regeneration system, ball mill, ore bins, pumps, *etc.*

3.0 SITE INVENTORY AND SITE ASSESSMENT

3.1 Survey of Storage Tanks and Containers

In conjunction with the sampling program, KWEC site assessors also measured tank capacities and estimated volumes of sediment and/or ice/snow within the storage tanks. General physical observations describing the sediment and the condition of the equipment at the mill facility were also recorded. Where possible, information obtained from container labels, physical observations and historical site information provided by

the Client were recorded; this information, in corroboration with the confirmatory sampling, can be used to facilitate identification or characterization of unknown substances. For the most part, however, the substances of interest at the mill facility consisted of mixtures, solutions or blends generated during the mine site's operation.

The chemical inventory and site assessment consisted of denoting visible activities and physical evidence present at the Mount Nansen Mine site. However, the chemical inventory and site assessment may be limited by the availability of information at the time of the assessment. Hence, it is possible that unreported or unrecorded activities could have impacted the environmental condition of the site, which could not be identified at the time of the assessment. Verification of some of the information may not always be possible and the chemical inventory and site assessment may also be limited by time, budgetary constraints, scope of work and the reliability of information on the containers and from others.

The inventory assessment identified the following:

- Chemicals associated with ore process, water treatment, *etc*
- Above ground storage tanks (ASTs) and pressurized gas cylinders
- Electrical equipment
- Description of sediment/scale and other substances identified in storage tanks, storage containers (*e.g.* rubber drums), identification of dangerous goods, *etc*
- General condition of storage areas and storage containers

Labelled information on the containers, if present, was recorded by the site assessors. Visual and/or olfactory observations were also recorded, where containers were open or easily accessible, or where the contents were visible. Some materials that could not be identified were recorded as an unknown substance. A Hazardous Materials Inventory detailing the inventory of material(s) at each sampling location is attached in Annex A. Photographs of site activities are included in Annex B. (While the site assessors photographed all of the sample locations, some of the photographs appeared only as dark, unrecognizable images, which was attributed to the level of darkness in the facility, even in the presence of a flash.)

3.2 Survey of Electrical Equipment

A survey of the electrical equipment contained in the mill complex was conducted specifically to locate equipment that potentially contained PCBs. Table 1 summarizes the results of the inventory.

Table 1: Results of Electrical Equipment Inventory in the Mill Complex

No.	Location	Type of Electrical Equipment (Number of Units)	Manufacturer's Data	PCB-containing (Yes (Y)/No (N))
1.	MCC Room	Switch panels (9)	General Electric, 800 line control centre, Cat. # 525X01 86B01, 800A, 480V, 3-phase, 60Hz	N

2.	MCC Room	Switch panel (1)	General Electric, 8000 line control centre, Cat. # 612X09 53F01, 800A, 480V, 3-phase, 60Hz	N
3.	Generator Room	Transformer (1)	Hevi-Duty, HDC 4895, KVR 2, Cat. # T2000, CSA LR 14326, UL Listed 42G7	N
4.	Generator Room	Transformer (2)	Instrumental Transformer Inc., PRI48V, Cat. # 460-480, Ratio 41, ACC 0.6W 1.2X, Thermal 150V @ 30°C, 50-60MHz	N
5.	Generator Room	Switch panels (2)	Cutler Hammer, Westinghouse Power Line Switch Board, 400 AF/400 AT, 480V	N
6.	Generator Room	Switch panel (1)	General Electric, NEMA, Size 3, CR 3808E1**1EAAADA, 4-300 in-line controls, cooling fans 1-3, UL Listed A153	N
7.	Generator Room	Switch panel (1)	Cutler Hammer, EEMAC 12ESA Encl. 5	N
8.	Crusher Building	Switch panel (1)	OLEN, Cat. # 520X0X0407802, 480V, 3-phase, 60Hz, ULC 0665416, USMP 302A3482P1	N

Electrical equipment known to potentially contain PCBs includes transformers and ballasts. Transformers were located in the Generator Room. The manufacturers were contacted by KWEC and they confirmed from data collected from the equipment labels that these products do not contain PCBs. The transformer manufactured by Hevi-Duty was manufactured after PCB use was phased out; conversely, the transformers manufactured by Instrumental Transformer Inc. (ITI) contained resin but no oil and, therefore, it will not contain PCBs.

The care and maintenance supervisor, Mr. Bruce Wheeler, confirmed that the new electrical equipment was installed at the mine site in the mid-1990s, which included the sodium lighting that replaced the fluorescent light fixtures. He also indicated that transformers were removed by an environmental contractor in 2007 on behalf of the Yukon Government. Fluorescent lighting was found in the 2nd floor bathroom and shop; however, this lighting is not likely to contain PCBs since it was installed in the late 1980s; PCB use in ballasts was phased out circa 1980.

4.0 SAMPLING PROGRAM

The sampling program for the mill complex included the investigation of 60 sampling locations of interest, as identified in the Hazardous Materials Inventory. However, only 49 representative samples were submitted to the analytical laboratory for testing since sampling was not possible at certain locations due to a lack of material to sample. The sampling program consisted of 42 sediment/scale samples, four (4) water samples, two (2) bulk samples and one (1) paint chip sample. The Phase 2 ESA was designed in cooperation with the department of Energy, Mines & Resources Yukon. Sampling locations are identified in Drawing No. C-1, Annex C.

4.1 Analytical Laboratory

All confirmatory samples obtained from the mill complex were submitted for analysis to ALS Laboratory Group, Vancouver, British Columbia, a Canadian Association for Environmental Analytical Laboratories (CAEAL) and Standards Council of Canada (SCC) accredited laboratory. A copy of the laboratory report is included in Annex D.

4.2 Sediment Sampling Program

Analytical Analysis of Sediment Samples

The sediment samples obtained from the mill complex of the Mount Nansen Mine site were tested for:

- Contaminated Sites Regulations (CSR) metals scan (including pH)
- Total cyanide (equivalent of strong acid dissociable (SAD) cyanide)
- Weak acid dissociable (WAD) cyanide
- Sulphide
- Available nitrate
- Available ammonia

Regulatory Framework for Sediment Samples

The analytical results for sediment samples, as summarized in Table E-1, Annex E, were compared to the generic numerical standards for soil at industrial sites published in the Yukon Contaminated Sites Regulations (CSR), 2001 and the Canadian Council of Ministers of the Environment (CCME) *Canadian Environmental Quality Guidelines* for soil at industrial sites, 1999 with 2003 update. Table 2 identifies the standards and or guidelines used for comparison.

Table 2: Soil Standards or Guidelines Applied to the Analytical Analyses of Sediment Samples

Parameter	Standard/Guideline used for Comparison
pH	CCME industrial soil quality guideline
Sulphide (as S)	No standard/guideline available
Available Nitrate-N	No standard/guideline available
WAD cyanide	Yukon CSR industrial soil standard
SAD cyanide (or total cyanide)	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Antimony	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Arsenic	CCME industrial soil quality guideline
Barium	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Beryllium	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Cadmium	CCME industrial soil quality guideline
Chromium	CCME industrial soil quality guideline
Cobalt	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Copper	CCME industrial soil quality guideline

Lead	CCME industrial soil quality guideline
Mercury	CCME industrial soil quality guideline
Molybdenum	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Nickel	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Selenium	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Silver	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Tin	Yukon CSR industrial soil standard, CCME industrial soil quality guideline
Vanadium	CCME industrial soil quality guideline
Zinc	CCME industrial soil quality guideline
Available ammonium	No standard/guideline available

Discussion of Analytical Analyses of Sediment Samples

The sediment was obtained from the sidewall and base of tanks, floor of the mill complex, storage containers, *etc*. It consisted of sludge/scale material, granular materials, fine/coarse powders, *etc.* The sampling locations and a physical description of the type of material encountered at each sampling location, and identification of parameters that exceeded numerical standards/guidelines of Yukon CSR and/or CCME environmental quality guidelines, are included in the Hazardous Materials Inventory. Drawing No. C-1 also identifies the sampling locations.

The results of the sediment sampling program are summarized as follows:

- Overall, 32 of the sampling locations exhibited parameters that exceeded the Yukon CSR generic numeric soil standards for industrial sites. Some of the substances sampled at these sampling locations also consisted of moderate-strong acids or bases.
- Ten of the sediment locations (16, 43, 34C, 34B, 13A, 35, 34A, 11, 5 & 37A) had results that did not exceed the standards of the Yukon CSR generic numeric soil standards for industrial sites.
- Parameters that frequently exceeded the Yukon CSR generic numeric soil standards for industrial sites included: antimony (25/32 samples) and silver (24/32 samples).
- Other parameters that exceeded the Yukon CSR generic numeric soil standards for industrial sites included: cyanide (8/32 samples), molybdenum (4/32 samples), selenium (2/32 samples) and nickel (1/32 samples).
- Conversely, all of the sampling locations exhibited parameters that exceeded the CCME industrial soil quality guidelines.
- Parameters that frequently exceeded the CCME industrial soil quality guidelines included: cyanide (38/42 samples), antimony (25/42 samples), arsenic (40/42 samples), copper (39/42 samples), silver (24/42 samples) and zinc (28/42 samples).
- Other parameters that exceeded the CCME industrial soil quality guidelines included: cadmium (16/42 samples), lead (15/42 samples), molybdenum (4/42

samples), nickel (16/42 samples), chromium (10/42 samples) and selenium (3/42 samples).

- Additionally, 21 of 42 samples had a pH that fell outside the range established by the CCME industrial soil quality guidelines (7 of the samples consist of moderate-strong acidic content (pH<6), while 14 of the samples are composed of moderate-strong base (pH>8)).
- Very high concentrations of copper were found in tank nos. 12, 13 & 14, which were used during water treatment.
- Arsenic was found in the majority of the sediment samples. Information provided by the Client did not reflect the use of arsenic during the mill process. It may be possible that the presence of arsenic is due to background levels that may have been present in the ore.
- The basic content of sampling location 34A is consistent with the composition of Borax.
- Sampling location 34-B likely does not contain Borax based on the acidic content in the representative sample.

As an adjunct to the comparative analysis of samples to environmental regulations/guidelines, the testing results were also compared to previous test results of samples obtained from several areas within the tailings pond at the Mount Nansen Mine site. This comparison shows that 12 sediment samples (obtained from sampling locations 3, 5, 16, 29, 34A, 34B, 34C, 35, 37, 37A, 41 & 43) had results that were below the highest concentration for given parameters. However, 5 of these 12 samples (34A, 34B, 34C, 35 and 41) are likely industrial chemicals, not milling waste sediments,

Identification of Sediment Hazardous Waste

Yukon Environment currently defaults to the Environment Canada *Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Material Regulations*, published in the Canada Gazette, Part I, Vol. 140, No. 35, 2 September 2006. This document identifies cyanide, or substances containing cyanide, in a concentration equal to or exceeding 100mg/kg as hazardous waste. Based upon this definition, the following sediment sample locations, as shown in Table 3, consist of mixtures that are characterized as hazardous waste:

Table 3: Sampling Locations Characterized as Hazardous Waste

No.	Sample Location	Sample ID	Cyanide Concentration (mg/kg)
1	1—Carbon-in-pulp process tank	MN1	155
2	2—Large tank next to CIL agitator tank 1	MN2	203
3	3—Carbon-in-pulp process tank	MN3	192
4	5—Carbon-in-pulp process tank	MN5	168
5	6—CIL agitator	MN6	558

	tank		
6	10—Carbon screen at CIL agitator tank 6	MN10	392
7	12—Tank R2 used during water treatment	MN12	163
8	13—Water treatment tank	MN13	173
9	17—Blue tank near water treatment tank R3	M17	212
10	18—New grey carbon tank	MN18	335
11	21—Strip tank	MN21	550
12	22—New reactivated/stripped carbon tank	M22	101
13	24A—Mixing cyanide pump for eductor water thickener tank	MN24A	151
14	24A—Wood chips adj. to eductor water thickener tank 24	24A WOOD CHIPS OUTSIDE T.	1400
15	32—Carbon column tank in clarifier building	MN32	295
16	33—Hi rate thickener tank	MN33	147
17	37—Cyanide mix tank	MN37	3340
18	38—Valve body tank leading to hi rate thickener tank	MN38 MN	122
19	39--Cyanide destruction agitation tank	MN39	1810
20	41--Lime screw feeder	MN41	109
21	42—Delta clarifier tank	MN DELTA CLARI P.	1170

The *Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Material Regulations* also identifies, in Schedule 6, hazardous constituents controlled under leachate test and regulated limits. Based upon this schedule, a toxicity characteristic leaching procedure (TCLP) test should be conducted on the sediment samples to

determine compliance with regulated limits identified in Schedule 6. Table 4 identifies the pertinent parameters to be tested and the corresponding regulated limits.

Table 4: Hazardous Constituents Controlled Under Leachate Test and Regulated Limits (for sediment samples)

No.	Hazardous Constituents	Concentration (mg/L)*
1	Arsenic	2.500
2	Barium	100.000
3	Boron	500.000
4	Cadmium	0.500
5	Chromium	5.000
6	Cyanide	20.000
7	Fluoride	150.00
8	Lead	5.00
9	Mercury	0.10
10	Selenium	1.00

* As determined in accordance with *Method 1311, Toxicity Characteristic Leaching Procedure*, July 1992, in *Test Methods for Evaluating Solid Waste, Volume 1C: Laboratory Manual, Physical/Chemical Methods*, Third Edition, SW-846, November 1986, published by the United States Environmental Protection Agency

4.3 Water Sampling Program

Analytical Analysis of Water Samples

The water samples obtained from the mill complex of the Mount Nansen Mine site were tested for:

- Anion scan (Br, Cl, F, NO_3, NO_2, SO_4)
- pH
- Conductivity
- Alkalinity
- Total dissolved solids
- Ammonia
- Total Kjeldahl Nitrogen (TKN)
- Total CSR metals (including hardness)
- Total cyanide
- WAD cyanide

Regulatory Framework for Water Samples

The results of the water analyses, as summarized in Table E-1, were compared to the generic numerical water standards for freshwater aquatic life published in the Yukon CSR, 2001 and the CCME *Canadian Environmental Quality Guidelines* for freshwater aquatic life, 1999 with 2003 update. Table 5 identifies the standards and or guidelines used for comparison.

Table 5: Water Standards or Guidelines Applied to the Analytical Analyses of Water Samples	
Parameter	**Standard/Guideline used for Comparison**
pH	CCME freshwater guideline
Sulphide	No standard/guideline available
Ammonia	Yukon CSR freshwater standard
Available Nitrate	No standard/guideline available
Alkalinity, Total	No standard/guideline available
Bromide	No standard/guideline available
Chloride	No standard/guideline available
Fluoride	Yukon CSR freshwater standard
Sulfate	Yukon CSR freshwater standard
Nitrate	Yukon CSR freshwater standard, CCME freshwater guideline
Nitrite	Yukon CSR freshwater standard, CCME freshwater guideline
Total Kjeldahl Nitrogen	No standard/guideline available
WAD cyanide	Yukon CSR freshwater standard
SAD cyanide	CCME freshwater guideline
Aluminum	CCME freshwater guideline
Antimony	Yukon CSR freshwater standard
Arsenic	Yukon CSR freshwater standard, CCME freshwater guideline
Barium	Yukon CSR freshwater standard
Beryllium	Yukon CSR freshwater standard
Boron	No standard/guideline available
Cadmium	CCME freshwater guideline
Calcium	No standard/guideline available
Chromium	Yukon CSR freshwater standard
Cobalt	Yukon CSR freshwater standard
Copper	Yukon CSR freshwater standard, CCME freshwater guideline
Iron	CCME freshwater guideline
Lead	Yukon CSR freshwater standard, CCME freshwater guideline
Lithium	No standard/guideline available
Magnesium	No standard/guideline available
Manganese	No standard/guideline available
Mercury	Yukon CSR freshwater standard
Molybdenum	Yukon CSR freshwater standard, CCME freshwater guideline
Nickel	Yukon CSR freshwater standard, CCME freshwater guideline
Selenium	Yukon CSR freshwater standard, CCME freshwater guideline
Silver	Yukon CSR freshwater standard, CCME freshwater guideline
Sodium	No standard/guideline available
Thallium	Yukon CSR freshwater standard, CCME freshwater guideline
Titanium	Yukon CSR freshwater standard
Uranium	Yukon CSR freshwater standard

Vanadium	No standard/guideline available
Zinc	CCME freshwater guideline, CCME freshwater guideline

Discussion of Analytical Analyses of Water Samples

Ice was encountered in several tanks and on the floor of the mill complex, particularly in the area of the CIL agitator tanks. The source of the ice is likely roof leaking and natural seepage from a nearby slope. The presence of ice was recorded at the following sampling locations:

- Tanks—1, 3, 5, 6, 14A, 23, 24, 33 & 39

Nevertheless, only four (4) water samples were submitted for analytical analysis, as per the Client's direction. These were submitted from sampling locations 39, 33, 14A & 24. The results of the water sampling program can be further summarized as follows:

- Three of the water sampling locations exhibited parameters that exceeded the Yukon CSR generic numeric water standards for freshwater environments.
- Sample TW3 (obtained from sampling location 24) did not have results exceeding the Yukon CSR generic numeric water standards for freshwater environments.
- Parameters that frequently exceeded the Yukon CSR generic numeric water standards for freshwater aquatic life included arsenic (2/4 samples), copper (3/4 samples), lead (3/4 samples) and silver (2/4 samples).
- Other parameters that exceeded the Yukon CSR generic numeric water standards for freshwater environments included sulphate (1/4 samples) and chromium (1/4 samples).
- Each of the four water sampling locations had results that exceeded the CCME freshwater guidelines.
- Parameters that frequently exceeded the CCME freshwater guidelines included ammonia (2/4 samples), SAD cyanide (4/4 samples), aluminium (3/4 samples), arsenic (3/4 samples), cadmium (3/4 samples), copper (4/4 samples), iron (4/4 samples), lead (4/4 samples), silver (3/4 samples) and zinc (4/4 samples).
- One sample (obtained from sampling location 14A) had a pH lower than the CCME freshwater guideline.

Identification of Water Hazardous Waste

The *Interprovincial Movement of Hazardous Waste and Hazardous Recyclable Material Regulations* identifies, in Schedule 6, hazardous constituents controlled under leachate test and regulated limits. Based upon this schedule, a toxicity characteristic leaching procedure (TCLP) test should be conducted on the water samples to determine compliance with regulated limits identified in Schedule 6. Table 6 identifies the pertinent parameters to be tested and the corresponding regulated limits.

Table 6: Hazardous Constituents Controlled Under Leachate Test and Regulated Limits (for water samples)

No.	Hazardous Constituents	Concentration (mg/L)*
1	Arsenic	2.500
2	Barium	100.000

3	Boron	500.000
4	Cadmium	0.500
5	Chromium	5.000
6	Cyanide	20.000
7	Lead	5.00
8	Mercury	0.10
9	Nitrate	4500.00
10	Nitrate + Nitrite	1000.00
11	Nitrite	320.00
12	Selenium	1.00

* As determined in accordance with *Method 1311, Toxicity Characteristic Leaching Procedure*, July 1992, in *Test Methods for Evaluating Solid Waste, Volume 1C: Laboratory Manual, Physical/Chemical Methods*, Third Edition, SW-846, November 1986, published by the United States Environmental Protection Agency

4.4 Asbestos Sampling Program

Bulk samples consisting of insulation materials were obtained from sampling locations 49 (pipe insulation on boiler) & 50 (fibrous material obtained from beneath pot-like containers located on a bench in the Mill Dry Room). Both samples were tested for asbestos fibres by the analytical laboratory. Both results were negative for asbestos fibres.

4.5 Lead-based Paint Sampling Program

Structures built before 1960 probably do contain lead-based paint; however; if a structure was built after 1980, there is no need for concern about lead levels in interior paint, but there may be lead in the paint used on the exterior. There is no need for any concern about leaded paint in structures built after 1992, because all consumer paints produced in Canada and the United States of America by that time were virtually lead-free. Since the mill complex pre-dates 1980, there is a possibility of the presence of lead-based paints.

Chipping and flaking interior paint was observed in the mill complex. Paint chip samples were obtained from sampling locations 44, 45, 46, 47 & 48. Four of the samples (obtained from locations 45, 46, 47 & 48) were tested on site with a field test kit, which is a reliable indicator of the presence or absence of lead, with each result being negative for lead content. Since the site assessors did not have an additional test unit to field test the paint chip sample obtained from the ball mill, this paint chip sample was submitted to an accredited laboratory to be tested for lead. The analytical analysis concluded that the sample obtained from the ball mill had a lead concentration (6820ppm) that exceeded the recommended United States Environmental Protection Agency (EPA) lead-based paint guideline (747-K-00-001, 2000) of 5000ppm or 0.5% by weight. Therefore, based upon the guideline established by the EPA, the sample submitted for laboratory analysis did contain lead-based paint.

5.0 CONCLUSIONS & RECOMMENDATIONS

The purpose of the Phase 2 ESA conducted at the mill complex of the Mount Nansen Mine site was to sample and characterize relevant materials related to the previous mining

process at the site. The majority of the materials sampled were solids (consisting of sediment/slake/slurries/powders contained in several above-ground tanks, screens, floor and rubber containers). The solids were primarily tested for cyanide and heavy metals. Additional samples consisted of water samples (also tested for cyanide and heavy metals), bulk samples (consisting of fibrous materials tested for asbestos fibres) and paint chip samples (tested for lead content).

5.1 Handling & Disposal Options

As would be expected, the sediment and water samples analyzed show chemical concentrations above environmental standards and/or guidelines that reflect the earlier activities at the site and while these are potentially problematic, they can be managed through possible on-site containment or disposal at a licensed facility. Based upon the results of the sediment and water sampling program, the following recommendations are presented:

1. The sediment could be containerized and transported off-site to a licensed landfill such as the Silverberry Secure Landfill and the Northern Rockies Landfill operated by CCS Landfill Services along the Alaska Highway. The estimated volume of sediment is 200m^3. Disposal at this facility would require a toxicity characteristic leaching procedure (TCLP) test prior to disposal. Landfill disposal criteria for CCS are included in Annex F and a summary is shown in Table 7. The analytical laboratory is currently holding the sediment samples until further notification from KWEC or the Client and it may be possible that the samples may be suitable for TCLP testing. Some substantial costs are associated with transportation and disposal; however, this option removes the contaminants of concern from the site and eliminates future liability to the Yukon Government.

Table 7: CCS Landfill Disposal Criteria (for sediment samples)

No.	Hazardous Constituents	Concentration (mg/L)*
1	Arsenic	2.5
2	Barium	100.0
3	Boron	500.0
4	Cadmium	0.5
5	Chromium	5.0
6	Copper	100.0
7	Cyanide	20.0
8	Fluoride	150.0
9	Lead	5.0
10	Mercury	0.1
11	Selenium	1.0
12	Silver	5.0
13	Zinc	500.0
14	pH	≥2, ≤12.5

2. It may be possible that the hazardous waste currently at Mount Nansen Mine site could be disposed using the Yukon Department of Environment's annual special waste collection. The Department ships special wastes out of the Yukon once a

year. Yukon Environment pays for collecting and transporting the wastes, while the generator of the wastes is responsible for the disposal costs. This service is available to special waste generators in all Yukon communities. Costs vary, depending on the type and volume of special wastes to be collected. The collection is usually held each year in the fall. For more information, please, contact the Environmental Programs Branch.

3. Disposal of the sediment in the tailings pond, if permissible by Yukon Environment. The sample results indicate that 12 of the sediment samples had results that were below the highest concentrations currently in the tailings pond; however, 5 of these 12 samples are likely industrial chemicals, not milling waste sediments, and should be disposed at a licensed disposal facility. Additional evaluation may be required to determine disposal compliance in the tailings pond, since the information provided to KWEC did not include complete prior reporting. This would be the most economical option available and it would also not substantially increase the requirement for care and maintenance.

4. Conducting on-site treatment to address contaminants of concern to facilitate on-site disposal. This is somewhat more costly than option 2 but it is still an economical option with similar benefits to option 2.

5. Apply for a license to operate a special waste landfill at the Mount Nansen Mine site and subsequent containment of the sediment at the engineered landfill, which would need to be designed and constructed. This option would result in significant additional cost to the Client and it also does not eliminate future liability, since the contaminants will still be on-site. The approval process, and design and construction of the engineered landfill, will require significant time to complete, which will delay the demolition of the mill buildings.

6. Transporting contact water to a deepwell disposal facility in British Columbia. This would require approval from the Director. Deepwell disposal means the technology of placing fluids deep underground, in porous formations of rocks, through wells or other similar conveyance systems. The fluids may be water, wastewater or water mixed with chemicals. Confirmatory water sampling will be required to test for relevant parameters.

   A waste fluid is suitable for disposal in a Class 1b well if a representative sample of that waste meets the following criteria:

   - has a pH between 6.0 and 9.0[1];
   - has a flash point greater than 61 degC[2] or has a non-halogenated organic fraction of less than 10 per cent by mass (100 000 mg/kg)[3] unless:
   - is an untreatable sand or crude oil / water emulsion[4], or
   - is an antifreeze or dehydration fluid that contains greater than 60% water by mass[5];
   - has heavy metal concentrations at or below the levels specified in Schedule 1[5]; and
   - has a total combined concentration of halogenated organic compounds of less than 100 mg/kg[6];
   - does not meet surface water discharge criteria[7]; and

- has a PCB concentration of less than 50 mg/kg[8].

Notes:
[1] Limitation to avoid significant corrosion and possible wellbore integrity problems.
[2] Flash point greater than 61 degC identifies non-flammable liquids. Flammable liquids are restricted from Class 1b disposal due to less stringent monitoring and operational restrictions.
[3] Considered to be of sufficient heat value to make incineration or recycling economically feasible.
[4] Return to the subsurface (i.e. origin) considered a prudent waste management option.
[5] These are common fluids within the oil and gas industry for which recycling is considered economically feasible up to a water content of 60 per cent by mass, but otherwise are not practical or feasible to segregate for alternative management.
[6] Limitation based on Alberta AUEB Guide G-51. Restrictions recognize less stringent operational and monitoring requirements for Class 1b wells. Operators should be aware that high concentrations of halogenated organic compounds in produced crude oil can cause processing and refining problems.
[7] Treatment and return to the surface or watershed is the preferred waste management option as treatment technologies are standard, well established, and water conservation principles strongly apply.
[8] Limitation based on federal environmental regulations.

Classification of wastes using the aforementioned criteria may result in wastes that are classified as hazardous and wastes that are classified as non-hazardous, under the BC Hazardous Waste Regulation (HWReg), being deemed acceptable for deepwell disposal. Given that Section 37 of the HWReg contained a prohibition on the underground injection of hazardous wastes, any authorization of deepwell disposal of these wastes will require an exemption from Section 37. This may be in the form of:

- a substitution of requirements under Section 2(10) of the HWReg,
- an application for change in requirements under Section 51 of the HWReg,
- compliance with Sections 7(1) of the Oil and Gas Waste Regulation, for disposal of produced fluids and well completion and workover fluids, or
- compliance with Sections 7(1) or 7(5) of the Oil and Gas Waste Regulation for disposal of acid gas.

Schedule 1: Heavy Metals Criteria

The following concentrations of heavy metals are based on land disposal prohibitions from Alberta Environment. Waste fluids above these levels, when disposed by subsurface injection, must be through an approved Class 1a disposal well.

Metal	Concentration (mg/kg)
Arsenic	500
Beryllium	100
Cadmium	100
Chromium	500
Lead	500
Mercury	20
Nickel	500
Selenium	200
Silver	100
Thallium	200
Uranium	100

7. Relocate contaminated sediment and water to a treatment facility such as the one operated by Miller Environmental, Winnipeg, Manitoba. This option would mean significant costs in transportation but treatment costs would be potentially less than disposal at a landfill. The benefit of this option is that the water is treated and reduces environmental impact. Treatment and return to the surface or watershed is the preferred waste management option as treatment technologies are standard, well established and water conservation principles strongly apply. This option also eliminates future liability to the Yukon Government.

8. Develop a Remedial Action Plan (RAP) that details disposal/treatment/management options, health and safety considerations, and costs associated with each option.

9. Issuing an RFP to solicit tenders from qualified environmental contractors. The contractors would be required to present a technical proposal that illustrates their proposed methodology to handle and manage the waste at the Mount Nansen Mine site.

10. The sulphur dioxide (SO_2) tank at the mine site was investigated by the site assessor. The tank was in good condition, still pressurized and contained a nominal amount of gas (0.08L according to the digital display of the volume gauge). Information provided by the Client indicates that the SO_2 was used as part of the cyanide destruction system. Perhaps it is possible that the tank can still be utilized for on-site cyanide treatment, if feasible.

Alternatively, if the Client intends to remove the tank from the site, it is recommended that a qualified mechanical tradesperson is retained to determine the volume of gas in the tank and to reclaim the contents of the tank in a responsible manner. The mechanical professional may also be able to evaluate the tank for potential resale. If the Yukon Government intends to decommission the tank, a qualified contractor should be retained to responsibly dispose of the tank. Tanks are generally disposed at a licensed metal salvage facility.

11. There are some industrial chemicals still being stored on site. Generally, identification of the chemicals is necessary to manifest the chemicals being disposed, as per TDG regulations. Sampling and on-site information was able to confirm the presence of Borax, which was used during the mill process, but the exact identification of other industrial chemicals could not be conducted based upon the information available and the analytical data. Additional testing will be required, although ALS Laboratory Group has indicated that precise identification is often difficult. Accurate identification could be further compromised if the chemicals were mixed.

    Miller Environmental, a licensed southern disposal facility, also operates an analytical laboratory, where they regularly conduct testing to identify chemicals, which affects the selected disposal stream. Perhaps, the submission of representative samples to Miller Environmental, or a similarly equipped licensed disposal facility, will better elucidate the transportation and disposal requirements for the industrial chemicals, since an organization such as Miller Environmental is regularly involved in the transportation and disposal of industrial chemicals.

The results of the laboratory analysis also confirmed the presence of lead-based paint in the area of the ball mill. Lead dust in lead-based paints is released when it is disturbed or when it is chipping and flaking. The lead that is released during disturbance facilitates the ingestion of this toxic metal into the body and can cause serious health conditions. Lead poisoning can cause anemia and it can also damage the brain and nervous system, resulting in learning disabilities. The risks are greater for children than for adults, because children's growing bodies are able to absorb lead more easily. Even small amounts of dust containing lead are dangerous to infants and children. Lead taken in by mothers-to-be can also pose a danger to the health of unborn children.

Lead-based paint in buildings is a serious health hazard when it is chipping or flaking, or if it is within the reach of children who might chew on it. The Client has confirmed that the ball mills are intended for salvage and sale. Therefore, it is recommended that the lead-based paint in the area of the ball mill is removed following very specific guidelines, as detailed in the following:

- Seal the work area(s)
- Workers should wear protective clothing and shoes as well as respirators designed to avoid inhaling (high efficiency particulate absorption (HEPA) respirators)
- Workers are not allowed to eat, drink or smoke in the work area
- Standard dry sanding and dry scraping methods create airborne dust and are not acceptable. Remove loose and flaking paint by wet methods such as spraying the surface with water, gently scraping off the loose paint, and collecting debris (on a disposable drop cloth).

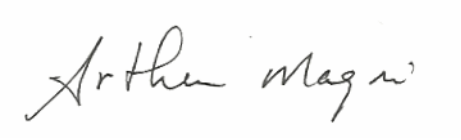
- Carefully collect construction debris into plastic bags and seal for disposal according to local ordinances. Remove plastic sheeting by rolling or folding inward.
- Schedule final cleanup and removal of plastic bags at least one day after work is complete to allow any airborne dust to settle. Clean up the entire area using a special vacuum cleaner with a HEPA filter. This is a special type of vacuum cleaner that removes small lead particles from surfaces and keeps them inside the vacuum cleaner. After vacuuming, wet wash the area with a TSP solution and vacuum with a HEPA vacuum.
- Dispose clothing worn in the room after working. Work clothing should not be worn in other areas of the house and workers should shower and wash hair after finishing work.
- Test work areas for lead dust contamination after final clean-up

6.0 CLOSURE

The conclusions presented in this report were based on the scope of work outlined for the purpose of the investigation, and were prepared in accordance with accepted environmental principles and practices. However, as with any environmental site assessment, the intent is to identify areas of potential concern and not to eliminate potential environmental concerns that were beyond the scope of work.

The observations made at the site do not apply to areas that could not be observed or beyond the scope of work. In addition, other materials or compounds not investigated or addressed, or beyond the scope of work could be present at the site. If other chemical parameters are identified as an environmental concern, KWEC must be notified to assess whether modification to any part of this report should be conducted. If you have any questions or concerns regarding the findings, conclusions or recommendations presented herein, please contact the undersigned.

Prepared by:



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annex a

hazardous materials inventory

MOUNT NANSEN MINE SITE
PHASE 2 ESA—HAZARDOUS MATERIALS INVENTORY
Project No. K1013-002-08
Building Identification/No. Mill Facility

No.	Substance Name	Physical State			No. of Containers	Vol. of Container		Product Sampled			Location[1]	Hazardous Waste		Total Volume/Mass (estimated)[2]		Comments
		S	L	G		Measurement	Unit	Y	N	Sample ID	Description	Y	N	Measure-ment	Unit	
1.	*Mixture containing high level of cyanide*	✓			1	200	m^3	✓		MN1	1	✓		4.2 (scale) 17 (ice)	m^3	Carbon-in-pulp (CIP) process tank no. 1 (6000mmØ x 7600mm) with 100-150mm of rusty, yellow/black scale and 600mm of ice underlain by 150mm of sediment. The sample was taken near the centre of the tank. CIP is a technique for recovery of gold which has been liberated into a cyanide solution as part of the gold cyanidation process, a gold extraction technique. Cyanide was added here as part of the mill process. This tank was also used during the water treatment process for stripping of ammonia. Parameters exceeding Yukon CSR soil standards: Sb (76/40), Ag (62.7/40)[3] Parameters exceeding CCME soil quality guidelines: Cyanide (155/8.0), Sb (76/40), As (71/12), Cu (909/91), Ni (66/50), Ag (62.7/40) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
2.	*Scale mixture*	✓						✓		MNT1-6 FLOOR	1A-6A					A composite sample was obtained, consisting of samples of floor material beside CIP tanks 1-6. Parameters exceeding Yukon CSR soil standards: Sb (834/40), Ag (52.9/40) Parameters exceeding CCME soil quality guidelines: Cyanide (55.4/8.0), Sb (832/40), As (5350/12), Cd (60.2/22), Cu (1500/91), Pb (2950/600), Ag (52.9/40), Zn (3550/360)
3.	*Mixture containing high level of cyanide*	✓			1	200	m^3	✓		MN2	2	✓		40	m^3	CIP above-ground tank no 2 with black/grey granular sludge material, some blue specks (900-1200mm) on tank bottom. Sample obtained from tank bottom near tank centre. Parameters exceeding Yukon CSR soil standards: Sb (446/40), Ag (79.9/40) Parameters exceeding CCME soil quality guidelines: pH (8.61/8), Cyanide (203/8.0), Sb (446/40), As (3390/12), Cd (28.8/22), Cr (206/87), Cu (3560/91), Pb (2180/600), Ag (79.9/40), Zn (2070/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
4.	*Mixture containing high level of cyanide*	✓			1	200	m^3	✓		MN3	3	✓		4 (scale) 17 (ice)	m^3	Carbon-in-pulp process tank no 3 (6000mmØ x 7600mm); 100-150mm of scale on tank bottom overlain by 600mm of ice; thin scale along sidewall; sample obtained from tank base. Cyanide was added here as part of the mill process. This tank was also used during the water treatment process for stripping of ammonia. Parameters exceeding Yukon CSR soil standards: Sb (86/40) Parameters exceeding CCME soil quality guidelines: Cyanide (192/8.0), Sb (86/40), As (98/12), Cu (478/91), Ni (60/50) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
5.	*Scale mixture*	✓			1	200	m^3	✓		MN4	4			40	m^3	CIP tank no. 4 with black/grey granular sludge material (900-1200mm) on tank bottom. . Sample was obtained from tank bottom near tank centre. Parameters exceeding Yukon CSR soil standards: Sb (493/40), Ag (58.5/40) Parameters exceeding CCME soil quality guidelines: pH (8.83/8), Cyanide (94.2/8.0), Sb (493/40), As (3660/12), Cd (30.1/22), Cu (1930/91), Pb (1840/600), Ag (58.5/40), Zn (2380/360)
6.	*Mixture containing high level of cyanide*	✓			1	200	m^3	✓		MN5	5	✓		1 (scale) 17 (ice)	m^3	Carbon-in-pulp process tank no. 5 (6000mmØ x 7600mm). The tank contained 50mm of rusty scale around the inner ring of the tank with 600mm of ice underneath the substance. The sample was taken near the centre of tank. This tank was also used during the water treatment process for stripping of ammonia. Parameters exceeding CCME soil quality guidelines: Cyanide (168/8.0), As (31/12), Cu (465/91), Ni (68/50), Se (10/3.9) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
7.	*Mixture containing high level of cyanide*	✓			1	200	m^3	✓		MN6	6	✓		20 (scale) 2 (ice)	m^3	Carbon-in-leach (CIL) agitator tank no 6 (6000mmØ x 7000mm) containing white scale and a granular substance similar to carbon; 150-600mm of product on the floor and sidewall and 300mm of ice towards the centre (from leaking roof). An opening in the tank sidewall permitted access into the tank. Parameters exceeding Yukon CSR soil standards: SAD cyanide (558/500), Sb (108/40), Ag (46.7/40) Parameters exceeding CCME soil quality guidelines: pH (8.55/8), Cyanide (558/8.0), Sb (108/40), As (1040/12), Cd (65.3/22), Cu (1080/91), Ag (46.7/40), Zn (2320/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
8.	*Unknown*	✓			1			✓		MN7	7			0.3	m^3	Trash screen; material is 50-100mm thick. The carbon was removed by screening, across the carbon screen, allowing the liquid and finely ground ore to pass through easily, and retaining the carbon on the screen. Parameters exceeding Yukon CSR soil standards: Sb (224/40), Ag (45.9/40) Parameters exceeding CCME soil quality guidelines: Cyanide (89.2/8.0), Sb (224/40), As (1790/12), Cu (719/91), Pb (862/600), Ag (45.9/40), Zn (1550/360)
9.	*NA*				1						8					Safety screen (2400 x 1200mm) but no screen found.
10.	*Unknown*	✓			1			✓		MN9	9			0.03	m^3	Loaded carbon screen (600 x 1800mm); 25mm of material on the screen. Parameters exceeding Yukon CSR soil standards: Sb (587/40), Ag (44.8/40) Parameters exceeding CCME soil quality guidelines: Cyanide (91.2/8.0), Sb (587/40), As (5150/12), Cd (36.2/22), Cu (679/91), Pb (2110/600), Ag (44.8/40), Zn (2850/360)
11.	*Mixture containing high level of cyanide*	✓			1			✓		MN10	10	✓		0.03	m^3	Carbon sizing screen (600 x 1800mm); 25mm of material (mostly carbon in appearance) on the screen. Parameters exceeding Yukon CSR soil standards: WAD cyanide (142/100) Parameters exceeding CCME soil quality guidelines: pH (9.51/8), Cyanide (392/8.0), As (626/12), Cd (35.2/22), Cu (585/91), Ni (53.4/50), Zn (2320/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
12.	*Scale mixture*	✓			1	21.2	m^3	✓		MN11	11			1.4	m^3	Tank was used during water treatment (R1). It is likely that this tank was used for cyanide and arsenic removal. Dimensions of tank were 3000mmØ x 3000mm. Tank contained light brown fine powder on tank bottom (200mm). Sample obtained from tank bottom. Parameters exceeding CCME soil quality guidelines: Cyanide (9/8.0), As (97/12), Cr (131/87), Cu (3610/91), Ni (55/50), Zn (426/360)
13.	*Mixture containing high level of cyanide*	✓			1	21.2	m^3	✓		MN12	12	✓		6.4	m^3	Tank used during water treatment (R2). It is likely that this tank was used for cyanide and arsenic removal. Dimensions of tank were 3000mmØ x 3000mm. Grey and white sediment contained in tank (900mm); thin layer of scale along sidewall. Sample obtained from tank bottom. This sample contained a very high concentration of copper. Parameters exceeding Yukon CSR soil standards: Ag (74.6/40) Parameters exceeding CCME soil quality guidelines: Cyanide (163/8.0), As (321/12), Cu (10500/91), Ag (74.6/40), Zn (566/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
14.	*Mixture containing high level of*	✓			1	21	m^3	✓		MN13	13	✓		6.4	m^3	Tank used during water treatment (R3). It is likely that this tank was used for cyanide and arsenic removal. Dimensions of tank were 3000mmØ x 3000mm. Grey and white sediment contained in tank (900mm). Sample obtained from tank bottom. This sample contained a very high concentration of copper.

	cyanide															Parameters exceeding Yukon CSR soil standards: Sb (113/40), Ag (135/40) Parameters exceeding CCME soil quality guidelines: Cyanide (173/8.0), Sb (113/40), As (49/12), Cu (29900/91), Ni (125/50), Ag (135/40), Zn (575/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
15.	*Scale mixture*	✓			1	16.3	m^3	✓		MN13A	13A			2.7	m^3	Smaller tank near tank 13 (R3). Dimensions of tank were 2400mmØ x 3600mm. 600mm of fine light brown powder on tank base; sample obtained from tank base. The tank is located near the door leading to the clarifier building. The tank was not originally identified in RFP # AAMB-07-002. Parameters exceeding CCME soil quality guidelines: pH (8.39/8), Cyanide (11.4/8.0), As (84/12), Cu (1230/91), Zn (572/360)
16.	*Scale mixture*	✓			1	1	m^3	✓		MN14	14			0.1	m^3	Green feeder tank (900mmØ x 1500mm) for tank 11 (R1) used during water treatment. 50mm of sediment on tank bottom and 10mm of scale along tank sidewall. Sample was obtained from tank base. This sample contained a very high concentration of copper. Parameters exceeding Yukon CSR soil standards: Se (608/10), Sb (185/40) Parameters exceeding CCME soil quality guidelines: pH (4.01/6), Cyanide (16.2/8.0), Sb (185/40), As (1780/12), Cd (146/22), Cr (214/87), Cu (382000/91), Pb (1220/600), Ni (62/50), Se (608/3.9)
17.	*Contact water*		✓		1	0.8	m^3	✓		MN14A W	14A			0.1	m^3	Second plastic feeder tank for tank 11. Dimensions of the tank were 900mmØ x 1200mm. There was a thin layer of scale along sidewall; bottom of tank consisted of ice and sediment (100mm). The ice was sampled. Parameters exceeding Yukon CSR freshwater standards: SO_4 (21700/1000), Cr (0.423/0.090), Cu (228/0.090), Pb (1.65/0.160), Ag (0.0224/0.015) Parameters exceeding CCME freshwater quality guidelines: pH (3.06/6.5-9.0), SAD cyanide (0.0865/0.005), Al (5.8 /0.005-0.100), Cu (228/0.004), Fe (473/0.300), Pb (1.65/0.007), Ag (0.0224/0.0001), Zn (1.8/0.030)
18.	*Scale mixture*	✓			1	0.8	m^3	✓		MN15	15			0.1	m^3	White plastic feeder tank for tank 12 (R2) used during water treatment. Dimensions of tank were 900mmØ x 1200mm. Tank contained thin layer of scale on sidewall and 50mm of white powder and lime-like scale on the bottom of the tank. Sample obtained from tank bottom. Parameters exceeding Yukon CSR soil standards: Ag (81.3/40) Parameters exceeding CCME soil quality guidelines: Cyanide (29.4/8.0), As (45.9/12), Cu (1560/91), Ag (81.3/40), Zn (830/360)
19.	*Scale mixture*	✓			1	1	m^3	✓		MN16	16			0.1	m^3	White plastic feeder tank (900mmØ x 1500mm) for tank 13 (R3). Contained yellow and black gravel-like substance with some ferrifloc and some brown sand (100mm on tank bottom). Sample obtained from tank bottom. Parameters exceeding CCME soil quality guidelines: pH (1.85/6), Cyanide (18/8.0), As (88.3/12), Cu (216/91)
20.	*Mixture containing high level of cyanide*	✓			1	5	m^3	✓		M17	17	✓		1	m^3	Blue tank (1800mmØ x 2000mm) of unknown function. 200-450mm of white and rusty granular powder along tank bottom. Parameters exceeding Yukon CSR soil standards: Sb (414/40), Ag (98/40) Parameters exceeding CCME soil quality guidelines: Cyanide (212/8.0), Sb (414/40), As (3090/12), Cd (35.4/22), Cu (5180/91), Pb (2140/600), Ag (98/40), Zn (2640/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
21.	*Mixture containing high level of cyanide*	✓			1	30	m^3	✓		MN18	18	✓		0.5	m^3	New grey carbon tank (2000mm x 2000mm x 2400mm); 100mm of product with appearance of carbon throughout bottom of tank. Parameters exceeding Yukon CSR soil standards: Sb (69/40), Ag (63.2/40) Parameters exceeding CCME soil quality guidelines: Cyanide (335/8.0), Sb (69/40), As (807/12), Cd (36.2/22), Cu (1930/91), Ni (55/50), Ag (63.2/40), Zn (2150/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
22.	*NA*				1				✓		19			Nil		Loaded carbon tank containing very thin grey layer of scale (3mm thick); sample could not be obtained due to lack of material.
23.	*NA*				1				✓		20			Nil		Strip tank (empty) with very thin scale; sample could not be obtained due to lack of material.
24.	*Mixture containing high level of cyanide*	✓			1			✓		MN21	21	✓		0.1		Strip tank (1800mmØ) that contained a very thin layer of scale material. A sample was obtained from the bottom of the tank cone. Size of tank is unknown. Parameters exceeding Yukon CSR soil standards: SAD cyanide (550/500), Sb (101/40), Ag (67.8/40) Parameters exceeding Yukon CSR soil standards: pH (10/8), Cyanide (550/8.0), Sb (101/40), As (1250/12), Cd (51.6/22), Cr (145/87) Cu (652/91), Pb (1260/600), Ag (67.8/40), Zn (3170/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
25.	*Mixture containing high level of cyanide*	✓			1			✓		M22	22	✓		2	m^3	New/reactivated/stripped carbon storage tank (cone-shaped) with 900mmØ at top tapering to 600mmØ at the bottom. Contained black and white granular material (carbon). Tank contained 600-900mm of granular material. Parameters exceeding Yukon CSR soil standards: Sb (45/40), Ag (44.7/40) Parameters exceeding CCME soil quality guidelines: Cyanide (101/8.0), Sb (45/40), As (405/12), Cu (1100/91), Pb (1050/600), Ni (64/50), Ag (44.7/40), Zn (506/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
26.	*Scale mixture*	✓			1	18	m^3	✓		MN23	23			0.2 (scale) 4 (ice)	m^3	Barren electrolyte heater/holding tank (3000mmØ x 2400mm). Tank bottom consisted of 600mm of ice (no sludge). 12mm of scale throughout tank; scale was sampled. Cyanide and NaOH was added here during the mill process. Parameters exceeding Yukon CSR soil standards: Sb (57/40), Mo (52.3/40) Parameters exceeding CCME soil quality guidelines: pH (10.9/8), Cyanide (93.4/8.0), Sb (57/40), As (244(12), Cr (536/87), Cu (239/91) Mo (52.3/40), Ni (298/50), Zn (5790/360)
27.	*Scale mixture*	✓			1			✓		MN24	24					Eductor water thickener tank. Size of tank is unknown. Parameters exceeding Yukon CSR soil standards: Sb (312/40), Ag (62.6/40) Parameters exceeding CCME soil quality guidelines: Cyanide (73.9/8.0), Sb (312/40), As (2070/12), Cd (56.1/22), Cu (398/91), Pb (1530/600), Ag (62.6/40), Zn (3380/360)
28.	*Contact water*		✓		1			✓		TW3	24					Ice sample from centre of eductor water thickener tank 24; ice was 600mm thick. Size of tank is unknown. Parameters exceeding CCME freshwater quality guidelines: Ammonia (0.077/0.019), SAD cyanide (0.009/0.005), As (0.0116/0.005), Cd (0.00043/0.000017), Cu (0.0852/0.004), Fe (5.16/0.300), Pb (0.0121/0.007), Ag (0.00206/0.0001), Zn (0.0633/0.030)
29.	*Mixture containing high level of cyanide*	✓			1	1.8	m^3	✓		MN24A	24A	✓		0.5	m^3	Mixing cyanide pump for eductor water thickener consisting of brown and white shale approximately 250mm thick and some fine powder. Tank had dimensions of 1200 x 1200 x 1200mm. Parameters exceeding Yukon CSR soil standards: SAD cyanide (1400/500), Sb (666/40), Ag (90.2/40) Parameters exceeding CCME soil quality guidelines: pH (8.41/8), Cyanide (151/8.0), Sb (287/40), As (2270/12), Cu (1490/91), Pb (1160/600), Zn (1580/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
30.	*Mixture containing high level of*	✓						✓		24A WOOD CHIPS OUTSIDE	24A	✓				Sampling of wood chips on floor outside of eductor water thickener tank 24. Parameters exceeding Yukon CSR soil standards: Sb (287/40)

	cyanide									T.						Parameters exceeding CCME soil quality guidelines: pH (8.62/8.0), Cyanide (1400/8.0), Sb (666/40), As (3860/12), Cd (42.2/22), Cu (1560/91), Pb (3600/600), Ni (54.4/50), Ag (90.2/40), Zn (2670/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
31.	*NA*				1				✓		25			Nil		Acid wash tank (empty) containing a very thin scale layer. Assessor could not scrape enough material in tank to comprise a sample. The bottom valve was open.
32.	*Industrial chemical mixture*	✓			1			✓		MN26	26			0.02	m^3	Acid storage in chamber constructed of wood studs and clear plastic (1200 x 1200 x 2400mm). The storage area previously contained drums that were pumped into tank 25 (acid wash tank). 10mm layer of white and yellow powder on floor. Powder was sampled. The sample had very low pH. Parameters exceeding Yukon CSR soil standards: Ag (61.6/40) Parameters exceeding CCME soil quality guidelines: pH (2.3/6), As (39/12), Cu (194/91), Ag (61.6/40)
33.	*Scale mixture*	✓			1	50	m^3	✓		MN28	28			3	m^3	Large blue clarifier tank (3600mmØ x 4800mm) with hopper (2400 x 2400 x 2400mm). Sample obtained from tank base consisted of brown, grey, white granular scale mixture (300mm on tank bottom). Clean water is passing through top of tank. Parameters exceeding Yukon CSR soil standards: Sb (61/40) Parameters exceeding CCME soil quality guidelines: pH (8.51/8), Cyanide (17.5/8.0), Sb (61/40), As (179/12), Cu (3440/91), Zn (426/360)
34.	*Scale mixture*	✓			1	3.2	m^3	✓		MN29	29			0.8	m^3	Agitator mix tank (1800 x 1500 x 1200mm) in clarifier building; 300mm of coarse red rusty scale substance on tank bottom; sample taken from tank base. There were also two blue agitator mix for use in water treatment. Parameters exceeding Yukon CSR soil standards: Sb (56/40) Parameters exceeding CCME soil quality guidelines: Cyanide (27.8/8.0), Sb (56/40), As (40/12), Cr (181/87), Cu (686/91), Ni (54/50)
35.	*NA*				1	1300	L		✓		30			Nil		White plastic Percol mix tank (900mmØ x 1500mm); very thin brown scale on tank bottom but not enough material to sample.
36.	*Scale mixture*	✓			1	5.4	m^3	✓		MN31	31			1	m^3	Grey carbon column tank (1200mmØ x 4800mm) with hopper. Grey and black mixture possibly containing carbon located in tank (1200mm of material in hopper); sample obtained from bottom of hopper. Parameters exceeding Yukon CSR soil standards: Mo (331/40), Ni (1510/500), Ag (90.2/40) Parameters exceeding CCME soil quality guidelines: Cyanide (70.5/8.0), As (47.4/12), Cr (1810/87), Cu (2320/91), Mo (331/40), Ni (1510/50), Ag (90.2/40)
37.	*Mixture containing high level of cyanide*	✓			1	5.4	m^3	✓		MN32	32	✓		1	m^3	Carbon column tank (1200mmØ x 4800mm) with hopper similar to tank 31. 1200mm of material in hopper; sample obtained from bottom of hopper. Parameters exceeding Yukon CSR soil standards: Mo (70.8/40), Ag (55/40) Parameters exceeding CCME soil quality guidelines: Cyanide (295/8.0), As (50.6/12), Cr (350/87), Cu (2940/91), Mo (70.8/40), Ni (281/50), Ag (55/40), Zn (440/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
38.	*Mixture containing high level of cyanide* *Contact Water*	✓			1	165	m^3	✓		MN33, MN33 W	33	✓ (MN33)		25 (scale) 50 (ice) 50 (snow)	m^3	Thickener tank (10000mmØ x 2100mm). The tank was located outside of and adjacent to the mill facility (near the end of the process). The tank contained >300mm of sediment overlain by 600mm of ice overlain by 300-900mm of snow. The sediment sample (MN33) was obtained near catwalk entry from the sidewall by the building; an ice sample (MN33 W) was obtained near the centre of the tank. Flocculant was added at the cyclones splitter box before passing to the thickener tank. Parameters exceeding Yukon CSR soil standards: Sb (493/40), Ag (56.9/40) Parameters exceeding CCME soil quality guidelines: pH (8.15/8), Cyanide (147/8.0), Sb (493/40), As (3740/12), Cd (31.6/22), Cu (527/91), Pb (1900/600), Ag (56.9/40), Zn (2520/360) Parameters exceeding Yukon CSR freshwater quality guidelines: As (0.569/0.050), Cu (0.13/0.090), Pb (0.41/0.160), Ag (0.0625/0.015) Parameters exceeding CCME freshwater quality guidelines: SAD cyanide (0.199/0.005), Al (1.54 /0.005-0.100), As (0.569/0.005), Cd (0.00729/0.000017), Cu (0.13/0.004), Fe (13.8/0.300), Pb (0.41/0.007), Ag (0.0625/0.0001), Zn (0.555/0.030) Considered a hazardous waste because the mixture (contained in sample MN33 only) is a substance containing cyanide in a concentration >100mg/kg.
39.	Borax	✓			1	135	L	✓		MN34A	34A		✓	70	L	Contained in grey garbage can in the refinery area and flux storage; container was half full and labelled "Borax" in handwriting; contained white powder. The laboratory analysis confirmed a basic substance that would be consistent with Borax. Parameters exceeding CCME soil quality guidelines: pH (9.55/8), As (13/12)
40.	*Industrial chemical mixture*	✓			1	135	L	✓		MN34-B	34B			70	L	Contained in grey garbage can in the refinery area and flux storage; container was half full and contained a fine white powder similar to the substance observed in 34A. However, the acidic content of the sample is not consistent with the physical properties of Borax. It may be possible that this is a mixture that may contain Borax. Precise identification is unknown. Parameters exceeding CCME soil quality guidelines: pH (4.82/6)
41.	*Industrial chemical*	✓			1	135	L	✓		MN34C	34C			70	L	Contained in grey garbage can in the refinery area and flux storage; container was half full and labelled "Silica Sand" in handwriting; contained white substance. However, the testing laboratory confirmed that the sample had a very high concentration of sodium (≈40 000ppm) and this combined with the high pH of 11.3, the samples physical characteristics and a related MSDS at the mill facility is indicative of sodium hydroxide (NaOH). Nevertheless, the laboratory also indicated that a test to accurately identify the substance was not easily available. NaOH was used during cyanide destruction. Parameters exceeding CCME soil quality guidelines: pH (11.3/8)
42.	*Industrial chemical*	✓			1	25	L	✓		MN35	35			12	L	Pail containing oily waste, as identified in RFP # AAMB-07-002, was not present at this location. A half-full pail containing a blue copper sulphate-like substance was identified. However, the sample contained relatively low concentration of copper that is inconsistent with copper sulphate. Precise identification is unknown. Parameters exceeding CCME soil quality guidelines: pH (2.34/6), Cyanide (13.9/8.0), As (14.1/12), Cr (549/87), Cu (320/91)
43.	Floor Dry	✓			1	25	kg		✓		35		✓	25	kg	There was also a garbage can at location 35 containing a bag identified as Floor Dry; substance consisted of grey pellets consistent with Floor Dry.
44.	*Unknown*	✓			1	25	m^3		✓		36	✓		1	m^3	Wooden line mix tank 36 (3600mmØ x 2400mm) with two line agitators for mixing. Material with appearance of lime was 25mm thick on 20% of tank sidewall with 75mm of lime of tank base. Lime was used as a neutralizing chemical in the mill process. Material was sampled but sample was lost in transport.
45.	*Mixture containing high level of cyanide*	✓			1			✓		MN37	37	✓				Cyanide mix tank (green) with 1000mm of material consisting of white powder in the tank. Sample was obtained from the top through the hopper. This sample contained the highest concentration of cyanide. Size of tank is unknown. Parameters exceeding Yukon CSR soil standards: SAD cyanide (3340/500), Ag (45/40) Parameters exceeding CCME soil quality guidelines: pH (10/8), Cyanide (3340/8.0), As (301/12), Cu (135/91), Ag (45/40) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
46.	*Scale mixture*	✓			1	6	m^3	✓		37A FEED PUMP	37A			1	m^3	Cyclone feed pumps consisting of a square green tank (2000 x 1200 x 2000mm); 250mm of white scale in tank bottom. Cyanide and lime were added at the ball mill prior to the cyclone feed pumps in the mill process. Parameters exceeding CCME soil quality guidelines: Cyanide (55.7/8.0), As (250/12), Cu (135/91), Ag (45/40)

47.	*Mixture containing high level of cyanide*	✓			1	1.3	m^3	✓		MN38 MN	38	✓		0.3	m^3	Square valve body tank leading to thickener tank 33 (1200 x 900 x 1200mm). The tank is located between the agitator tank and the high rate thickening tank. The tank contained 250mm of product. Parameters exceeding Yukon CSR soil standards: Sb (497/40), Ag (53.1/40) Parameters exceeding CCME soil quality guidelines: Cyanide (122/8.0), Sb (497/40), As (3430/12), Cd (33.1/22), Cu (583/91), Pb (1810/600), Ag (53.1/40), Zn (2600/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
48.	*Mixture containing high level of cyanide* *Contact water*	✓			1	90	m^3	✓		MN39, MN39 W	39	✓ (MN 39)		7 (scale) 11 (ice)	m^3	Green cyanide destruction tank (4800mmØ x 4800mm); 25mm of scale along sidewall; bottom of tank consisted of 300mm of sediment (green, yellow, brown and dark white in colour) overlain by 600mm of ice; sample MN39 obtained from side of tank near entry point of catwalk; ice sample (MN39 W) obtained near centre of tank. The tank has concrete secondary containment. $CuSO_4$ and SO_2 were added in the tank during the mill process. Parameters exceeding Yukon CSR soil standards: WAD cyanide (145/100), SAD cyanide (1810/500), Sb (367/40), Ag (76.5/40) Parameters exceeding CCME soil quality guidelines: Cyanide (1810/8.0), Sb (367/40), As (3580/12), Cd (29.6/22), Cu (253/91), Pb (2680/600), Ag (76.5/40), Zn (2050/360) Parameters exceeding Yukon CSR freshwater quality guidelines: As (0.676/0.200), Cu (0.195/0.090), Pb (0.629/0.160) Parameters exceeding CCME freshwater quality guidelines: Ammonia (3.18/0.019), SAD cyanide (0.377/0.005), Al (0.996/0.005-0.100), As (0.676/0.005), Cd (0.00509/0.000017), Cu (0.195/0.004), Fe (8.95/0.300), Pb (0.629/0.007), Zn (0.386/0.030) Considered a hazardous waste because the mixture (contained in sample MN39) is a substance containing cyanide in a concentration >100mg/kg.
49.	Sulphur dioxide			✓	1	85	m^3		✓		40	✓		0.08	L	Sulphur dioxide tank 40 (3000mmØ x 12000mm); tank was pressurized and a sample could not be obtained; the volume gauge indicated that the tank contained 0.08L of SO_2
50.	*Mixture containing high level of cyanide*	✓						✓		MN41	41	✓				Sample submitted from lime screw feeder adjacent to the ball mill. 75mm of lime was observed near the ball mill; it is unknown how much lime is present up the screw line. Lime was added in the ball mill during the mill process. Parameters exceeding Yukon CSR soil standards: WAD cyanide (115/100), Sb (95/40) Parameters exceeding CCME soil quality guidelines: pH (12.3/8), Cyanide (109/8.0), Sb (95/40), As (758/12), Cu (656/91), Zn (527/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
51.	*Mixture containing high level of cyanide*	✓			1	15	m^3	✓		MN DELTA CLARI P	42	✓		6	m^3	Blue, hopper-style, delta clarifier tank (2400mmØ narrowing to 100mmØ; cone shape had a height of 1500mm; tank height was 4000mm). 1500mm of material in the tank. Sample consisted of rusty granular material. Parameters exceeding Yukon CSR soil standards: SAD cyanide (1170/500), Sb (367/40), Mo (40.1/40), Se (14.4/10), Ag (71.7/40) Parameters exceeding CCME soil quality guidelines: Cyanide (1170/8.0), Sb (316/40), As (1560/12), Cd (44.6/22), Cu (53600/91), Mo (40.1/40), Ni (103/50), Se (14.4/3.9), Ag (71.7/40), Zn (1820/360) Considered a hazardous waste because the mixture is a substance containing cyanide in a concentration >100mg/kg.
52.	*Scale mixture*	✓			1	8.4	m^3	✓		FERRI FLOC TANK	43	✓		0.1	m^3	Ferrifloc tank (1800mmØ x 3300mm) containing 25mm of wet granular sludge material. Parameters exceeding CCME soil quality guidelines: pH (2.05/6), Cyanide (13.1/8.0), As (66/12), Cr (92.2/87), Cu (393/91), Ni (100/50), Zn (448/360)
53.	Lead (in paint)	✓						✓		LEAD PAINT FROM BALL MILL	44		✓			Paint chip sample was obtained from the ball mill (bearing housing).
54.	Paint chips	✓						✓			45		✓			Paint chip sample obtained from the top of the stairs leading to the ore bin was tested using a field kit. The result was negative for lead.
55.	Paint chips	✓						✓			46		✓			Paint chip sample obtained from the set of stairs adjacent to tank 24 was tested using a field kit. The result was negative for lead.
56.	Paint chips	✓						✓			47		✓			Paint chip sample obtained from the upstairs bathroom was tested using a field kit. The result was negative for lead.
57.	Paint chips	✓						✓			48		✓			Paint chip sample obtained from the warehouse mechanic shop front door was tested using a field kit. The result was negative for lead.
58.	Pipe insulation	✓			2			✓		ASB BOILER SAMPLE	49		✓			Fibrous insulation on boiler, obtained from the pipe elbow, was sampled
59.	Fibrous material	✓						✓		ASBESTOS FROM UNDER POT	50		✓			Fibrous material obtained from beneath pot-like containers located on a bench in the Mill Dry Room was tested for asbestos fibres.
60.	NA	✓			1				✓		51		✓			Sodium metabisulfite tank located adjacent to the clarifier building (outside the mill facility). The tank was empty.

LEGEND
S = solid; L = liquid; G = gas
Y = yes; N = no; NA = not applicable
Sample ID = sample identification

NOTES
1. See Drawing No. S-1 (Annex A)
2. All measurements are conservative estimates and are intended only for reference. Accurate measurement was limited by the frozen condition of the scale/sludge and the presence of ice, which affected drilling in the tanks to determine sludge/ice thickness.
3. Sample results are shown in parts per million (ppm) unless otherwise specified

annex b

photographs

Sample location 37

Hopper typical of some storage tanks

Sample location 26

Sampling location 37

Delta clarifier tank

Sample location 17

Ferrifloc tank

Sampling one of the screens

Cutting to gain access to storage tank

Sample location 32

Another view of sample location 32

Example of sediment/scale in storage tank

Sample location 33

Volume gauge on SO_2 tank

Sampling of paint chips from ball mill

Electrical manufacturer's data panel

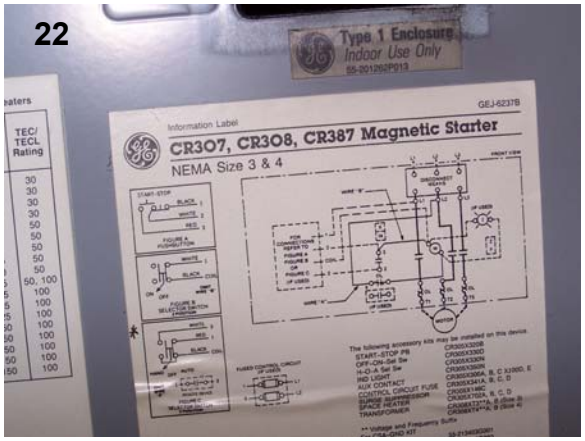
Electrical manufacturer's data panel

Electrical manufacturer's data panel

Sample location 50

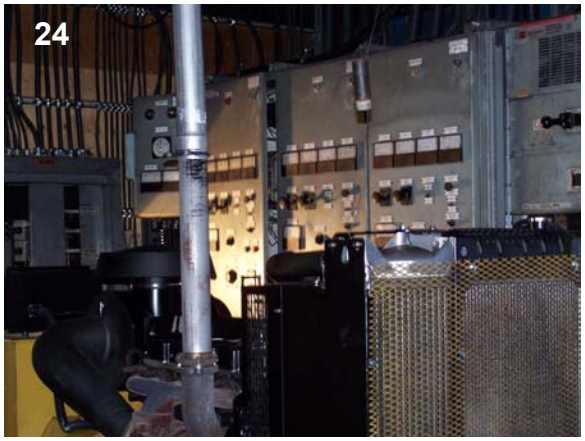
Piping insulation tested for asbestos fibres

Electrical manufacturer's data panel



Electrical manufacturer's data panel

Electrical equipment in mill complex



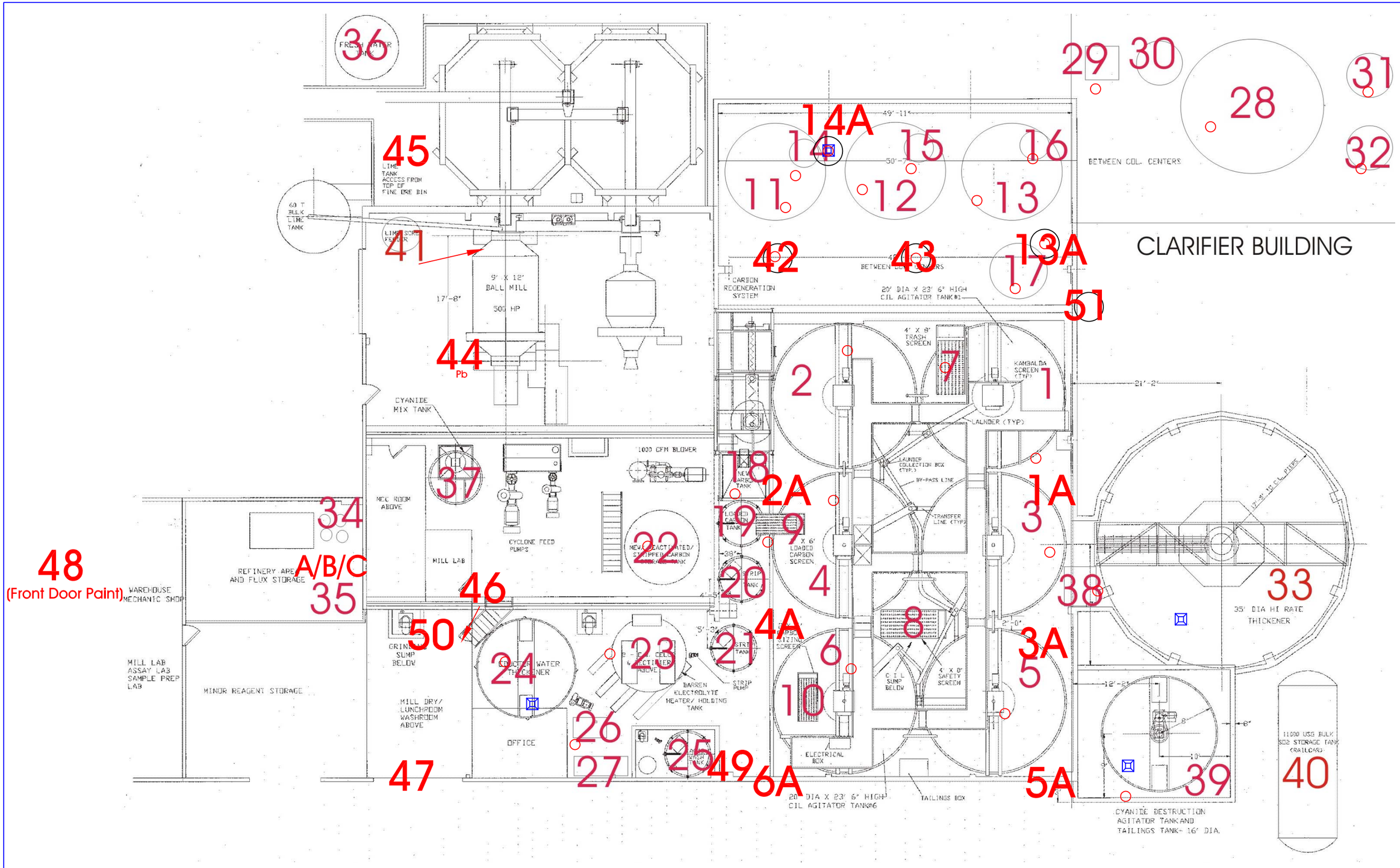
Electrical equipment in mill complex

Sample location 34

Example of sediment on floor of mill complex

annex c

drawings



Legend

- Location of water samples
- Location of sediment samples

Designed by	Checked by	Approved by - date	File name	Date	Scale
AM	DA	DA	K1013-002-08	MAY 2008	NTS

KWEC

Mount Nansen Mine, Limited Phase 2 ESA, Sampling Locations

DRAWING No.: C-1 | Edition | Sheet 1 of 1

annex d

als group laboratory report

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

ANALYTICAL REPORT

WINNIPEG ENVIRONMENTAL

ATTN: ARTHUR MAGRI

4040 MAIN STREET

WEST ST PAUL MB R4A 1A7

Reported On: 22-APR-08 05:23 PM

Lab Work Order #: **L613096** **Date Received:** **25-MAR-08**

Project P.O. #: ARTHUR MAGRI
Job Reference: MOUNT NANSEN
Legal Site Desc: MOUNT NANSEN YUKON
CofC Numbers: C083319, C083320, C083321, C083322, C083323, C083324

Other Information:

Comments: The detection limits for some metals analysis have been increased due to high levels of metals in the samples or interferences encountered during analysis.

Due to unpredictable reactions during sulphide analysis on samples with high pH, sulphide analysis was not performed on the following samples:

L613096-3,9,14,16,28,29, and 31.

Joyce Chow
General Manager, Vancouver

For any questions about this report please contact your Account Manager:

Bryan Mark

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ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID Description Sampled Date Sampled Time Client ID	L613096-5 ASBESTOS FROM UNDER POT	L613096-6 LEAD PAINT FROM BALL MILL	L613096-7 ASB BOILER SAMPLE		
BULK							
Metals	Lead (Pb) (mg/kg)			6820			
Miscellaneous-No group	Asbestos (%)		<1		<1		
	Other Fibres: Cellulose (%)		75-99		10-25		
	Other Fibres: Glass (%)				75-99		
	Other Non Fibrous: Filler (%)		1-5		1-10		

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L613096-1	L613096-2	L613096-3	L613096-4	L613096-8
	Description					
	Sampled Date	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	
	Sampled Time					
	Client ID	MN39	MN16	MN41	MN33	24A WOOD CHIPS OUTSIDE T.
SOIL						
Physical Tests	% Moisture (%)	23.7	11.3	1.84	6.34	15.6
	pH (pH)	7.43	1.85	12.3	8.15	8.62
Leachable Anions & Nutrients	Sulphide As S (mg/kg)	31	<1.0		1.52	52
Anions and Nutrients	Available Nitrate-N (mg/kg)	1.8	<0.4	102	33.6	13.8
Cyanides	Cyanide, WAD (mg/kg)	145	3.2	115	36.3	202
	Cyanide, Total (mg/kg)	1810	18.0	109	147	1400
Metals	Antimony (Sb) (mg/kg)	367	18	95	493	666
	Arsenic (As) (mg/kg)	3580	88.3	758	3740	3860
	Barium (Ba) (mg/kg)	46.6	60.2	29.7	62.1	95.4
	Beryllium (Be) (mg/kg)	<0.50	<0.50	<1.0	<0.50	<0.50
	Cadmium (Cd) (mg/kg)	29.6	<1.5	7.3	31.6	42.2
	Chromium (Cr) (mg/kg)	32.6	37.1	14.6	9.7	61.3
	Cobalt (Co) (mg/kg)	4.3	11.8	<4.0	6.3	3.2
	Copper (Cu) (mg/kg)	253	216	656	527	1560
	Lead (Pb) (mg/kg)	2680	188	471	1900	3600
	Mercury (Hg) (mg/kg)	0.504	0.080	0.071	0.267	1.45
	Molybdenum (Mo) (mg/kg)	6.1	10.7	11.4	<4.0	24.1
	Nickel (Ni) (mg/kg)	<5.0	49.3	<10	<5.0	54.4
	Selenium (Se) (mg/kg)	<2.0	<2.0	<4.0	<2.0	<2.0
	Silver (Ag) (mg/kg)	76.5	7.1	26.5	56.9	90.2
	Tin (Sn) (mg/kg)	<5.0	8.2	<10	<5.0	14.3
	Vanadium (V) (mg/kg)	21.2	15.1	9.5	13.6	11.1
	Zinc (Zn) (mg/kg)	2050	73.3	527	2520	2670
Anions and Nutrients	Available Ammonium-N (mg/kg)	49.0	28.4	11.4	7.6	13.8

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L613096-9 Description: Sampled Date: 20-MAR-08 Sampled Time: Client ID: MN21	L613096-10 20-MAR-08 MN4	L613096-11 20-MAR-08 MN7	L613096-12 20-MAR-08 MN2	L613096-13 20-MAR-08 MN24A
SOIL						
Physical Tests	% Moisture (%)	17.4	5.45	5.15	6.10	2.35
	pH (pH)	10.0	8.83	7.16	8.61	8.41
Leachable Anions & Nutrients	Sulphide As S (mg/kg)		0.57	2.6	0.52	2.12
Anions and Nutrients	Available Nitrate-N (mg/kg)	10.3	148	16.0	37.8	6.3
Cyanides	Cyanide, WAD (mg/kg)	122	22.4	26.1	76.1	71.2
	Cyanide, Total (mg/kg)	550	94.2	89.2	203	151
Metals	Antimony (Sb) (mg/kg)	101	493	224	446	287
	Arsenic (As) (mg/kg)	1250	3660	1790	3390	2270
	Barium (Ba) (mg/kg)	41.7	77.5	51.9	82.8	64.5
	Beryllium (Be) (mg/kg)	<1.0	<0.50	<0.50	<0.50	<1.0
	Cadmium (Cd) (mg/kg)	51.6	30.1	21.6	28.8	14.9
	Chromium (Cr) (mg/kg)	145	6.3	10.3	206	61.1
	Cobalt (Co) (mg/kg)	8.9	6.4	3.7	9.0	4.8
	Copper (Cu) (mg/kg)	652	1930	719	3560	1490
	Lead (Pb) (mg/kg)	1260	1840	862	2180	1160
	Mercury (Hg) (mg/kg)	2.61	0.249	0.327	0.377	0.264
	Molybdenum (Mo) (mg/kg)	22.5	<4.0	9.6	8.5	19.3
	Nickel (Ni) (mg/kg)	85	13.9	7.4	38.1	28
	Selenium (Se) (mg/kg)	<6.0	<2.0	<2.0	<3.0	<4.0
	Silver (Ag) (mg/kg)	67.8	58.5	45.9	79.9	34.1
	Tin (Sn) (mg/kg)	<10	<5.0	<5.0	<5.0	<10
	Vanadium (V) (mg/kg)	8.5	15.3	11.1	12.4	9.0
	Zinc (Zn) (mg/kg)	3170	2380	1550	2070	1580
Anions and Nutrients	Available Ammonium-N (mg/kg)	4.7	4.4	390	18.7	3.1

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L613096-14	L613096-15	L613096-16	L613096-17	L613096-18
	Description					
	Sampled Date	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08
	Sampled Time					
	Client ID	MN37	FERI FLOC TANK	MN34C	MN38 MN	M17
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	47.7	18.3	14.2	2.43	2.70
	pH (pH)	10.0	2.05	11.3	7.85	7.79
Leachable Anions & Nutrients	Sulphide As S (mg/kg)		<1.5		1.23	1.46
Anions and Nutrients	Available Nitrate-N (mg/kg)	35.3	0.9	<0.4	15.0	154
Cyanides	Cyanide, WAD (mg/kg)	1100	10.6	<3.0	42.7	31.0
	Cyanide, Total (mg/kg)	3340	13.1	<3.0	122	212
Metals	Antimony (Sb) (mg/kg)	<20	<20	<20	497	414
	Arsenic (As) (mg/kg)	301	66	<10	3430	3090
	Barium (Ba) (mg/kg)	3.5	17.1	<2.0	110	217
	Beryllium (Be) (mg/kg)	<1.0	<1.0	<1.0	<0.50	0.57
	Cadmium (Cd) (mg/kg)	2.3	2.1	<1.0	33.1	35.4
	Chromium (Cr) (mg/kg)	7.5	92.2	<4.0	13.3	16.5
	Cobalt (Co) (mg/kg)	<4.0	33.6	<4.0	6.4	5.9
	Copper (Cu) (mg/kg)	135	393	2.3	583	5180
	Lead (Pb) (mg/kg)	<60	62	<60	1810	2140
	Mercury (Hg) (mg/kg)	<0.050	0.058	<0.050	0.268	0.638
	Molybdenum (Mo) (mg/kg)	<8.0	14.6	<8.0	<4.0	4.4
	Nickel (Ni) (mg/kg)	<10	100	<10	<5.0	8.6
	Selenium (Se) (mg/kg)	<4.0	<5.0	<6.0	<2.0	<4.0
	Silver (Ag) (mg/kg)	45.0	16.5	5.8	53.1	98.0
	Tin (Sn) (mg/kg)	<10	13	<10	<5.0	<5.0
	Vanadium (V) (mg/kg)	<4.0	4.6	<4.0	14.9	21.2
	Zinc (Zn) (mg/kg)	179	448	<2.0	2600	2640
Anions and Nutrients	Available Ammonium-N (mg/kg)	6.1	774	<0.8	12.0	15.0

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L613096-19	L613096-20	L613096-21	L613096-22	L613096-23
	Description					
	Sampled Date	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08
	Sampled Time					
	Client ID	M22	MN DELTA CLARI P.	MN29	MN26	MN34-B
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	18.3	5.35	4.68	36.2	0.17
	pH (pH)	7.89	7.60	7.46	2.30	4.82
Leachable Anions & Nutrients	Sulphide As S (mg/kg)	1.29	1.21	<0.20	0.33	<0.20
Anions and Nutrients	Available Nitrate-N (mg/kg)	43.3	31.0	25.4	0.7	34.6
Cyanides	Cyanide, WAD (mg/kg)	26.6	65.5	<3.0	<3.0	<3.0
	Cyanide, Total (mg/kg)	101	1170	27.8	3.0	<3.0
Metals	Antimony (Sb) (mg/kg)	45	316	56	<30	<10
	Arsenic (As) (mg/kg)	405	1560	40	39	<5.0
	Barium (Ba) (mg/kg)	462	61.4	101	4.9	1.6
	Beryllium (Be) (mg/kg)	<2.0	<1.0	<2.0	<1.5	<0.50
	Cadmium (Cd) (mg/kg)	4.2	44.6	<3.0	<3.0	<0.50
	Chromium (Cr) (mg/kg)	65.8	149	181	24.7	<2.0
	Cobalt (Co) (mg/kg)	10.3	17.0	32.7	<6.0	<2.0
	Copper (Cu) (mg/kg)	1100	53600	686	194	7.7
	Lead (Pb) (mg/kg)	1050	217	<120	138	<30
	Mercury (Hg) (mg/kg)	0.406	3.20	0.064	0.068	<0.050
	Molybdenum (Mo) (mg/kg)	17	40.1	20	<12	<4.0
	Nickel (Ni) (mg/kg)	64	103	54	17	<5.0
	Selenium (Se) (mg/kg)	<8.0	14.4	<8.0	<6.0	<2.0
	Silver (Ag) (mg/kg)	44.7	71.7	8.8	61.6	4.5
	Tin (Sn) (mg/kg)	<20	18	<20	<15	<5.0
	Vanadium (V) (mg/kg)	152	<4.0	<8.0	<6.0	<2.0
	Zinc (Zn) (mg/kg)	506	1820	52.5	66.2	7.9
Anions and Nutrients	Available Ammonium-N (mg/kg)	5.1	72.6	16.7	632	<0.8

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L613096-24 Description: Sampled Date: 20-MAR-08 Sampled Time: Client ID: MN13A	L613096-25 20-MAR-08 MN35	L613096-26 20-MAR-08 MN24	L613096-27 20-MAR-08 MN6	L613096-28 20-MAR-08 MN23
SOIL						
Physical Tests	% Moisture (%)	10.9	5.39	4.44	19.4	28.2
	pH (pH)	8.39	2.34	7.83	8.55	10.9
Leachable Anions & Nutrients	Sulphide As S (mg/kg)	<0.20	<0.20	<0.20	15.9	
Anions and Nutrients	Available Nitrate-N (mg/kg)	134	<0.4	68.8	3.0	<0.4
Cyanides	Cyanide, WAD (mg/kg)	4.3	6.1	38.5	82.4	28.5
	Cyanide, Total (mg/kg)	11.4	13.9	73.9	558	93.4
Metals	Antimony (Sb) (mg/kg)	<30	<10	312	108	57
	Arsenic (As) (mg/kg)	84	14.1	2070	1040	244
	Barium (Ba) (mg/kg)	63.5	15.4	132	54.9	143
	Beryllium (Be) (mg/kg)	<1.5	<0.50	<0.50	<1.0	<1.0
	Cadmium (Cd) (mg/kg)	8.3	1.57	56.1	65.3	20.4
	Chromium (Cr) (mg/kg)	17.9	549	32.1	84.4	536
	Cobalt (Co) (mg/kg)	7.3	<2.0	2.9	6.7	<4.0
	Copper (Cu) (mg/kg)	1230	320	398	1080	239
	Lead (Pb) (mg/kg)	<90	<30	1530	506	360
	Mercury (Hg) (mg/kg)	<0.050	0.083	1.55	1.02	0.436
	Molybdenum (Mo) (mg/kg)	<12	<4.0	4.1	8.1	52.3
	Nickel (Ni) (mg/kg)	<15	7.7	22.5	44	298
	Selenium (Se) (mg/kg)	<6.0	<2.0	<2.0	<6.0	<4.0
	Silver (Ag) (mg/kg)	8.0	9.6	62.6	46.7	36.2
	Tin (Sn) (mg/kg)	<15	<5.0	<5.0	<10	<10
	Vanadium (V) (mg/kg)	<6.0	56.2	12.8	<4.0	<4.0
	Zinc (Zn) (mg/kg)	572	34.3	3380	2320	5790
Anions and Nutrients	Available Ammonium-N (mg/kg)	103	6.1	8.0	26.0	13.0

ALS LABORATORY GROUP ANALYTICAL REPORT

		Sample ID	L613096-29	L613096-30	L613096-31	L613096-32	L613096-33
		Description					
		Sampled Date	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08
		Sampled Time					
		Client ID	MN10	MN9	MN34A	MN18	MN28
Grouping	**Analyte**						
SOIL							
Physical Tests	% Moisture (%)		17.8	5.47	33.1	16.6	3.79
	pH (pH)		9.51	7.73	9.55	7.64	8.51
Leachable Anions & Nutrients	Sulphide As S (mg/kg)			1.08		<2.0	0.27
Anions and Nutrients	Available Nitrate-N (mg/kg)		111	9.9	16.7	4.2	28.8
Cyanides	Cyanide, WAD (mg/kg)		142	22.2	<3.0	68.2	6.1
	Cyanide, Total (mg/kg)		392	91.2	<3.0	335	17.5
Metals	Antimony (Sb) (mg/kg)		35	587	<20	69	61
	Arsenic (As) (mg/kg)		626	5150	13	807	179
	Barium (Ba) (mg/kg)		44.5	42.9	<2.0	101	129
	Beryllium (Be) (mg/kg)		<0.50	<0.50	<1.0	<1.0	<1.5
	Cadmium (Cd) (mg/kg)		35.2	36.2	<1.0	36.2	10.3
	Chromium (Cr) (mg/kg)		37.1	13.0	<4.0	49.8	<6.0
	Cobalt (Co) (mg/kg)		2.7	9.9	<4.0	<4.0	17.5
	Copper (Cu) (mg/kg)		585	679	4.7	1930	3440
	Lead (Pb) (mg/kg)		487	2110	<60	559	106
	Mercury (Hg) (mg/kg)		0.942	0.351	<0.050	0.755	0.074
	Molybdenum (Mo) (mg/kg)		<4.0	<4.0	<8.0	11.5	<12
	Nickel (Ni) (mg/kg)		53.4	7.4	<10	55	27
	Selenium (Se) (mg/kg)		<2.0	<2.0	<4.0	<5.0	<6.0
	Silver (Ag) (mg/kg)		36.7	44.8	12.9	63.2	10.2
	Tin (Sn) (mg/kg)		<5.0	<5.0	<10	12	<15
	Vanadium (V) (mg/kg)		5.3	10.4	<4.0	<4.0	<6.0
	Zinc (Zn) (mg/kg)		2320	2850	11.9	2150	426
Anions and Nutrients	Available Ammonium-N (mg/kg)		2.6	71.0	<0.8	39.7	3.0

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L613096-34	L613096-35	L613096-36	L613096-37	L613096-38
	Description					
	Sampled Date	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08
	Sampled Time					
	Client ID	MNT1-6 FLOOR	MN1	MN11	MN14	MN32
Grouping	**Analyte**					
SOIL						
Physical Tests	% Moisture (%)	2.10	2.81	1.56	14.5	21.3
	pH (pH)	6.87	7.69	7.74	4.01	7.31
Leachable Anions & Nutrients	Sulphide As S (mg/kg)	0.63	1.47	0.22	6.2	<0.20
Anions and Nutrients	Available Nitrate-N (mg/kg)	10.6	4.9	5.5	<0.4	2.0
Cyanides	Cyanide, WAD (mg/kg)	7.4	20.3	4.8	4.6	78.8
	Cyanide, Total (mg/kg)	55.4	155	9.0	16.2	295
Metals	Antimony (Sb) (mg/kg)	834	76	36	185	17
	Arsenic (As) (mg/kg)	5350	71	97	1780	50.6
	Barium (Ba) (mg/kg)	60.3	51.9	142	37.1	83.8
	Beryllium (Be) (mg/kg)	0.78	<2.0	<1.5	<4.0	<0.50
	Cadmium (Cd) (mg/kg)	60.2	<3.0	12.6	146	4.33
	Chromium (Cr) (mg/kg)	35.3	47.4	131	214	350
	Cobalt (Co) (mg/kg)	7.2	30.1	19.6	<16	14.4
	Copper (Cu) (mg/kg)	1500	909	3610	382000	2940
	Lead (Pb) (mg/kg)	2950	<120	105	1220	<30
	Mercury (Hg) (mg/kg)	0.651	0.304	0.075	0.074	0.268
	Molybdenum (Mo) (mg/kg)	18.1	<16	23	<32	70.8
	Nickel (Ni) (mg/kg)	14.3	66	55	62	281
	Selenium (Se) (mg/kg)	<2.0	<8.0	<6.0	608	<3.0
	Silver (Ag) (mg/kg)	52.9	62.7	20.0	34	55.0
	Tin (Sn) (mg/kg)	<5.0	<20	<15	191	23.6
	Vanadium (V) (mg/kg)	15.8	<8.0	<6.0	<16	3.6
	Zinc (Zn) (mg/kg)	3550	85.3	426	164	440
Anions and Nutrients	Available Ammonium-N (mg/kg)	46.9	9.5	59.1	194	111

ALS LABORATORY GROUP ANALYTICAL REPORT

		Sample ID	L613096-39	L613096-40	L613096-41	L613096-42	L613096-43
		Description					
		Sampled Date	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08
		Sampled Time					
		Client ID	MN12	MN3	MN31	MN5	MN13
Grouping	**Analyte**						
SOIL							
Physical Tests	% Moisture (%)		5.71	3.51	19.6	3.00	34.2
	pH (pH)		7.79	7.79	6.96	7.49	7.63
Leachable Anions & Nutrients	Sulphide As S (mg/kg)		0.34	1.79	<0.20	0.90	<0.49
Anions and Nutrients	Available Nitrate-N (mg/kg)		118	11.8	11.9	2.4	123
Cyanides	Cyanide, WAD (mg/kg)		46.9	9.6	37.8	18.4	16.1
	Cyanide, Total (mg/kg)		163	192	70.5	168	173
Metals	Antimony (Sb) (mg/kg)		34	86	16	40	113
	Arsenic (As) (mg/kg)		321	98	47.4	31	49
	Barium (Ba) (mg/kg)		27.6	41.1	107	36.8	46.0
	Beryllium (Be) (mg/kg)		<1.0	<1.5	<0.50	<2.0	<1.5
	Cadmium (Cd) (mg/kg)		12.8	<2.0	2.07	4.7	<1.5
	Chromium (Cr) (mg/kg)		37.6	79.7	1810	86.7	12.9
	Cobalt (Co) (mg/kg)		8.5	35.7	26.1	34.1	34.0
	Copper (Cu) (mg/kg)		10500	478	2320	465	29900
	Lead (Pb) (mg/kg)		174	<90	114	<120	<90
	Mercury (Hg) (mg/kg)		0.324	0.229	0.189	0.203	0.333
	Molybdenum (Mo) (mg/kg)		24.7	25	331	16	16
	Nickel (Ni) (mg/kg)		49	60	1510	68	125
	Selenium (Se) (mg/kg)		<4.0	<6.0	<2.0	10.0	<6.0
	Silver (Ag) (mg/kg)		74.6	25.4	90.2	30.1	135
	Tin (Sn) (mg/kg)		<10	<15	26.2	<20	<15
	Vanadium (V) (mg/kg)		<4.0	8.2	8.3	<8.0	17.3
	Zinc (Zn) (mg/kg)		566	189	278	55.5	575
Anions and Nutrients	Available Ammonium-N (mg/kg)		226	6.5	129	9.9	17.4

ALS LABORATORY GROUP ANALYTICAL REPORT

		Sample ID	L613096-44	L613096-49			
		Description					
		Sampled Date	20-MAR-08				
		Sampled Time					
		Client ID	MN15	37A FEED PUMP			
Grouping	**Analyte**						
SOIL							
Physical Tests	% Moisture (%)		1.42	1.50			
	pH (pH)		7.45	7.69			
Leachable Anions & Nutrients	Sulphide As S (mg/kg)		0.39	1.09			
Anions and Nutrients	Available Nitrate-N (mg/kg)		27.3	3.9			
Cyanides	Cyanide, WAD (mg/kg)		13.1	5.7			
	Cyanide, Total (mg/kg)		29.4	55.7			
Metals	Antimony (Sb) (mg/kg)		<10	32			
	Arsenic (As) (mg/kg)		45.9	250			
	Barium (Ba) (mg/kg)		23.0	45.3			
	Beryllium (Be) (mg/kg)		<0.50	<1.5			
	Cadmium (Cd) (mg/kg)		3.13	2.0			
	Chromium (Cr) (mg/kg)		15.7	15.9			
	Cobalt (Co) (mg/kg)		2.5	<6.0			
	Copper (Cu) (mg/kg)		1560	89.4			
	Lead (Pb) (mg/kg)		118	203			
	Mercury (Hg) (mg/kg)		0.121	<0.050			
	Molybdenum (Mo) (mg/kg)		9.6	<12			
	Nickel (Ni) (mg/kg)		10.0	<15			
	Selenium (Se) (mg/kg)		<2.0	<6.0			
	Silver (Ag) (mg/kg)		81.3	13.2			
	Tin (Sn) (mg/kg)		<5.0	<15			
	Vanadium (V) (mg/kg)		4.2	<6.0			
	Zinc (Zn) (mg/kg)		830	141			
Anions and Nutrients	Available Ammonium-N (mg/kg)		31.9	3.4			

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L613096-45	L613096-46	L613096-47	L613096-48	
	Description					
	Sampled Date	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	
	Sampled Time					
	Client ID	MN39 W	MN33 W	MN 14 A W	TW3	
Grouping	**Analyte**					
WATER						
Physical Tests	Hardness (as CaCO3) (mg/L)	476	306	485	348	
	Conductivity (uS/cm)	913	603	31000	648	
	pH (pH)	7.49	7.99	3.05	8.00	
	Total Dissolved Solids (mg/L)	668	395	34100	408	
Anions and Nutrients	Ammonia as N (mg/L)	3.18	0.100	1.94	0.077	
	Alkalinity, Total (as CaCO3) (mg/L)	202	161	<2.0	203	
	Bromide (Br) (mg/L)	<0.050	<0.050	<25	<0.050	
	Chloride (Cl) (mg/L)	15.0	16.3	<250	16.8	
	Fluoride (F) (mg/L)	0.180	0.144	<10	0.162	
	Sulfate (SO4) (mg/L)	292	133	21700	124	
	Nitrate (as N) (mg/L)	0.263	0.441	<2.5	0.193	
	Nitrite (as N) (mg/L)	0.0134	0.0020	<0.50	0.0034	
	Total Kjeldahl Nitrogen (mg/L)	22.3	1.42	4.02	0.852	
Cyanides	Cyanide, Weak Acid Diss (mg/L)	0.0099	0.0210	0.0265	<0.0050	
	Cyanide, Total (mg/L)	0.377	0.199	0.0865	0.0090	
Total Metals	Aluminum (Al)-Total (mg/L)	0.996	1.54	5.8	0.056	
	Antimony (Sb)-Total (mg/L)	0.0826	0.0820	<0.050	0.0028	
	Arsenic (As)-Total (mg/L)	0.676	0.569	<0.10	0.0116	
	Barium (Ba)-Total (mg/L)	0.069	0.109	<0.20	0.045	
	Beryllium (Be)-Total (mg/L)	<0.0050	<0.0050	<0.050	<0.0050	
	Boron (B)-Total (mg/L)	<0.10	<0.10	<1.0	<0.10	
	Cadmium (Cd)-Total (mg/L)	0.00509	0.00729	0.0133	0.00043	
	Calcium (Ca)-Total (mg/L)	122	101	128	101	
	Chromium (Cr)-Total (mg/L)	0.0088	0.0193	0.423	0.0036	
	Cobalt (Co)-Total (mg/L)	0.0015	0.0034	<0.050	<0.0010	
	Copper (Cu)-Total (mg/L)	0.195	0.130	228	0.0852	
	Iron (Fe)-Total (mg/L)	8.95	13.8	473	5.16	
	Lead (Pb)-Total (mg/L)	0.629	0.410	1.65	0.0121	
	Lithium (Li)-Total (mg/L)	<0.050	<0.050	<0.50	<0.050	
	Magnesium (Mg)-Total (mg/L)	41.7	12.9	40.0	23.4	
	Manganese (Mn)-Total (mg/L)	0.630	0.675	4.65	0.228	
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Molybdenum (Mo)-Total (mg/L)	0.0022	0.0032	<0.10	0.0021	
	Nickel (Ni)-Total (mg/L)	<0.010	<0.010	<0.50	<0.010	
	Selenium (Se)-Total (mg/L)	<0.0020	<0.0020	<0.10	<0.0020	
	Silver (Ag)-Total (mg/L)	0.0102	0.0625	0.0224	0.00206	
	Sodium (Na)-Total (mg/L)	10.7	10.7	10400	10.4	
	Thallium (Tl)-Total (mg/L)	<0.00040	<0.00040	<0.020	<0.00040	

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L613096-45	L613096-46	L613096-47	L613096-48	
	Description					
	Sampled Date	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	
	Sampled Time					
	Client ID	MN39 W	MN33 W	MN 14 A W	TW3	
Grouping	**Analyte**					
WATER						
Total Metals	Titanium (Ti)-Total (mg/L)	<0.050	<0.050	<0.50	<0.050	
	Uranium (U)-Total (mg/L)	0.00345	0.00292	<0.020	0.00357	
	Vanadium (V)-Total (mg/L)	<0.030	<0.030	<0.30	<0.030	
	Zinc (Zn)-Total (mg/L)	0.386	0.555	1.80	0.0633	

Reference Information

Additional Comments for Sample Listed:

Samplenum	Matrix	Report Remarks	Sample Comments
L613096-5	Bulk	Note: No asbestos fibres were observed.	
L613096-7	Bulk	Note: No asbestos fibres were observed.	

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 "Determination of Anions by IC

This analysis is carried out using procedures adapted from APHA Method 4110 "Determination of Anions by Ion Chromatography" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Anions routinely determined by this method include: bromide, chloride, fluoride, nitrate, nitrite and sulphate.

ASBESTOS-WP	Bulk	Bulk Asbestos Content	NIOSH 9002-Polarized Light Microscopy

Bulk samples are examined under a stereoscopic microscope. Individual fibers or fibre bundles are mounted in refractive index liquids and are observed under a polarized light microscope with a special dispersion staining objective. The dispersion staining colours are compared to reference samples of known asbestiforms.

Polarized microscopy is not a definitive technique for negative results for non-friable organically bound material (i.e.floor tiles).

CN-T-H2SO4-COL-VA	Soil	Total Cyanide in Soils	EPA SW-846, 9010

This analysis is carried out in accordance with U.S. EPA Method 9010 (Publ. # SW-846 3rd ed., Washington, DC 20460) Specifically, subsamples are distilled using an acid reflux distillation. Liberated hydrogen cyanide gas is trapped in a weak NaOH solution. The extracts are then analysed colorimetrically.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN "Cyanide"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-WAD-COL-VA	Soil	WAD Cyanide in Soils	ALSEV INHOUSE METHOD

Weak acid dissociable (WAD) cyanide in sediments are determined by acid-reflux distillation of subsamples. Liberated hydrogen cyanide gas is trapped in a weak NaOH solution. The extracts are then analysed colorimetrically.

CN-WAD-MID-COL-VA	Water	Weak Acid Cyanide by Colormetric	APHA 4500-CN "Cyanide"

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-CSR-CVAFS-VA	Soil	CVAFS Hg in Soil by CSR SALM	BCMELP CSR SALM Method 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

HG-TOT-CSR-CVAFS-VA	Water	Total Mercury in Water by CVAFS (CSR)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-CSR-FULL-ICP-VA	Soil	Metals in Soil by ICPOES (CSR SALM)	BCMELP CSR SALM METHOD 8

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve, and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-TOT-CSR-ICP-VA	Water	Total Metals in Water by ICPOES (CSR)	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
MET-TOT-CSR-MS-VA	Water	Total Metals in Water by ICPMS (CSR)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MOISTURE-VA	Soil	% Moisture	ASTM METHOD D2794-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

NH3-SIE-VA	Water	Ammonia by SIE	APHA 4500-NH3 "Nitrogen (Ammonia)"

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

NH4-AVAIL-SK	Soil	Available Ammonium-N	CSSS (1993) METHODS 4.2, 4.4

Ammonium (NH4-N) is extracted from the soil using 2 N KCl. Ammonium in the extract is mixed with hypochlorite to form indophenol blue and determined colorimetrically by auto analysis at 660 nm.

Reference:
Carter, Martin R., Soil Sampling and Methods of Analysis, Can Soc. Soil Sci. methodS 4.2 and 4.4

NO3-AVAIL-SK	Soil	Available Nitrate-N	CSSS (1993) 4.3

Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution.
Nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is measured at colorimetrically at 520nm.

Reference:
Carter, Martin. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1993) method 4.3

PB-HIGH-ED	Bulk	Lead (Pb)	EPA 200.7
PH-1:2-VA	Soil	CSR pH by 1:2 Water Leach	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the BC WLAP method: pH, Electrometric, Soil and Sediment. The procedure involves mixing the dried (at <60°C) and seived (10 mesh/2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

S2-NAOH-VA	Soil	Sediment S2 (NaOH leach) by Colour	ALSEV IN-HOUSE METHOD

This analysis is carried out on a leachable basis. The procedure involves shaking a subsample for 20 minutes with a sodium hydroxide solution in a one to seven ratio. The leachate is filtered and Zinc acetate is added to an aliquot of filtrate and analyzed colorimetrically using methylene blue.

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 Gravimetric

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total dissolved solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-COL-VA	Water	Total Kjeldahl Nitrogen by Auto. Colour	APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total kjeldahl nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.

TKN-SIE-VA	Water	Total Kjeldahl Nitrogen by SIE	APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total kjeldahl nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

** Laboratory Methods employed follow in-house procedures, which are generally based on nationally or internationally accepted methodologies.
The last two letters of the above ALS Test Code column indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location	Laboratory Definition Code	Laboratory Location
ED	ALS LABORATORY GROUP - EDMONTON, ALBERTA, CANADA	SK	ALS LABORATORY GROUP - SASKATOON, SASKATCHEWAN, CANADA

Reference Information

Methods Listed (if applicable):

ALS Test Code	Matrix	Test Description	Analytical Method Reference(Based On)
VA		ALS LABORATORY GROUP - VANCOUVER, BC, CANADA	WP ALS LABORATORY GROUP - WINNIPEG, MANITOBA, CANADA

GLOSSARY OF REPORT TERMS
Surr - A surrogate is an organic compound that is similar to the target analyte(s) in chemical composition and behavior but not normally detected in enviromental samples. Prior to sample processing, samples are fortified with one or more surrogate compounds.
The reported surrogate recovery value provides a measure of method efficiency.
mg/kg (units) - unit of concentration based on mass, parts per million
mg/L (units) - unit of concentration based on volume, parts per million
N/A - Result not available. Refer to qualifier code and definition for explanation

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Although test results are generated under strict QA/QC protocols, any unsigned test reports, faxes, or emails are considered preliminary.

ALS Laboratory Group has an extensive QA/QC program where all analytical data reported is analyzed using approved referenced procedures followed by checks and reviews by senior managers and quality assurance personnel. However, since the results are obtained from chemical measurements and thus cannot be guaranteed, ALS Laboratory Group assumes no liability for the use or interpretation of the results.

annex e

summary of analytical results (table e-1)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	**TABLE E-1: RESULTS OF ANALYSIS**																		
2	Sample ID	MN1	MNT1-6 FLOOR	MN2	MN3	MN4	MN5	MN6	MN7	MN9	MN10	MN11	MN12	MN13	MN13A	MN14	MN15	MN16	M17
3	Sample Location (See Drawing No. C-1)	1	1A-6A	2	3	4	5	6	7	9	10	11	12	13	13A	14	15	16	17
4	Sample Location Description	Large tank adjacent to CIL tank 2	Floor samples in area containing CIL agitator tanks	Large tank next to CIL agitator tank 1	Large tank in CIL agitator area	Large tank near CIL agitator tank 6	Carbon-in-pulp process tank	CIL agitator tank 6	Trash screen at CIL agitator tank 1	Carbon screen at tank next to CIL tank 6	Carbon screen at CIL agitator tank 6	Tank R1 used during water treatment	Tank R2 used during water treatment	Tank R3 used during water treatment	Smaller tank near tank 13 (R3)	Feeder tank for tank 11 (R1)	Feeder tank for tank R2	White plastic feeder tank for tank 13	Blue tank near water treatment tank R3
5	Date Sampled	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08
6	Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00
7	ALS Sample ID	L613096-35	L613096-34	L613096-12	L613096-40	L613096-10	L613096-42	L613096-27	L613096-11	L613096-30	L613096-29	L613096-36	L613096-39	L613096-43	L613096-24	L613096-37	L613096-44	L613096-2	L613096-18
8	Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
9																			
10	**Physical Tests**																		
11	% Moisture	2.81	2.1	6.1	3.51	5.45	3	19.4	5.15	5.47	17.8	1.56	5.71	34.2	10.9	14.5	1.42	11.3	2.7
12	Hardness (as $CaCO_3$)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	Conductivity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	pH	7.69	6.87	**8.61**	7.79	**8.83**	7.49	**8.55**	7.16	7.73	**9.51**	7.74	7.79	7.63	**8.39**	**4.01**	7.45	**1.85**	7.79
15	Total Dissolved Solids	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16																			
17	**Leachable Anions & Nutrients**																		
18	Sulphide (as S)	1.47	0.63	0.52	1.79	0.57	0.9	15.9	2.6	1.08	-	0.22	0.34	<0.49	<0.20	6.2	0.39	<1.0	1.46
19																			
20	**Anions and Nutrients**																		
21	Ammonia (as N)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Available Nitrate-N	4.9	10.6	37.8	11.8	148	2.4	3	16	9.9	111	5.5	118	123	134	<0.4	27.3	<0.4	154
23	Alkalinity, Total (as $CaCO_3$)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Bromide (Br)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Chloride (Cl)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	Fluoride (F)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	Sulfate (SO_4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	Nitrate (as N)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Nitrite (as N)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	Total Kjeldahl Nitrogen	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31																			
32	**Cyanides**																		
33	Cyanide, WAD	20.3	7.4	76.1	9.6	22.4	18.4	82.4	26.1	22.2	142	4.8	46.9	16.1	4.3	4.6	13.1	3.2	31
34	Cyanide, Weak Acid Diss	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	Cyanide, Total	**155**	55.4	**203**	**192**	94.2	**168**	**558**	89.2	91.2	**392**	9	**163**	**173**	11.4	16.2	29.4	18	**212**
36																			
37	**Metals**																		
38	Antimony (Sb)	76	834	446	86	493	40	108	224	587	35	36	34	113	<30	185	<10	18	414
39	Arsenic (As)	71	5350	3390	98	3660	31	1040	1790	5150	626	97	321	49	84	1780	45.9	88.3	3090
40	Barium (Ba)	51.9	60.3	82.8	41.1	77.5	36.8	54.9	51.9	42.9	44.5	142	27.6	46	63.5	37.1	23	60.2	217
41	Beryllium (Be)	<2.0	0.78	<0.50	<1.5	<0.50	<2.0	<1.0	<0.50	<0.50	<0.50	<1.5	<1.0	<1.5	<1.5	<4.0	<0.50	<0.50	0.57
42	Cadmium (Cd)	<3.0	60.2	28.8	<2.0	30.1	4.7	65.3	21.6	36.2	35.2	12.6	12.8	<1.5	8.3	146	3.13	<1.5	35.4
43	Chromium (Cr)	47.4	35.3	206	79.7	6.3	86.7	84.4	10.3	13	37.1	131	37.6	12.9	17.9	214	15.7	37.1	16.5
44	Cobalt (Co)	30.1	7.2	9	35.7	6.4	34.1	6.7	3.7	9.9	2.7	19.6	8.5	34	7.3	<16	2.5	11.8	5.9
45	Copper (Cu)	909	1500	3560	478	1930	465	1080	719	679	585	3610	10500	29900	1230	382000	1560	216	5180
46	Lead (Pb)	<120	2950	2180	<90	1840	<120	506	862	2110	487	105	174	<90	<90	1220	118	188	2140
47	Mercury (Hg)	0.304	0.651	0.377	0.229	0.249	0.203	1.02	0.327	0.351	0.942	0.075	0.324	0.333	<0.050	0.074	0.121	0.08	0.638
48	Molybdenum (Mo)	<16	18.1	8.5	25	<4.0	16	8.1	9.6	<4.0	<4.0	23	24.7	16	<12	<32	9.6	10.7	4.4
49	Nickel (Ni)	66	14.3	38.1	60	13.9	68	44	7.4	7.4	53.4	55	49	125	<15	62	10	49.3	8.6
50	Selenium (Se)	<8.0	<2.0	<3.0	<6.0	<2.0	10	<6.0	<2.0	<2.0	<2.0	<6.0	<4.0	<6.0	<6.0	608	<2.0	<2.0	<4.0
51	Silver (Ag)	62.7	52.9	79.9	25.4	58.5	30.1	46.7	45.9	44.8	36.7	20	74.6	135	8	34	81.3	7.1	98
52	Tin (Sn)	<20	<5.0	<5.0	<15	<5.0	<20	<10	<5.0	<5.0	<5.0	<15	<10	<15	<15	191	<5.0	8.2	<5.0
53	Vanadium (V)	<8.0	15.8	12.4	8.2	15.3	<8.0	<4.0	11.1	10.4	5.3	<6.0	<4.0	17.3	<6.0	<16	4.2	15.1	21.2
54	Zinc (Zn)	85.3	3550	2070	189	2380	55.5	2320	1550	2850	2320	426	566	575	572	164	830	73.3	2640
55																			
56	**Total Metals**																		
57	Aluminum (Al)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58	Antimony (Sb)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
59	Arsenic (As)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	Barium (Ba)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61	Beryllium (Be)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
62	Boron (B)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	Cadmium (Cd)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64	Calcium (Ca)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
65	Chromium (Cr)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66	Cobalt (Co)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
67	Copper (Cu)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68	Iron (Fe)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	Lead (Pb)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	Lithium (Li)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71	Magnesium (Mg)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
72	Manganese (Mn)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	Mercury (Hg)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	Molybdenum (Mo)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	Nickel (Ni)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76	Selenium (Se)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77	Silver (Ag)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
78	Sodium (Na)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79	Thallium (Tl)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80	Titanium (Ti)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81	Uranium (U)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82	Vanadium (V)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83	Zinc (Zn)-Total	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84																			
85	**XNo class**																		
86	Asbestos	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87	Other Fibres: Cellulose	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
88	Other Fibres: Glass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	Other Non Fibrous: Filler	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	Available Ammonium-N	9.5	46.9	18.7	6.5	4.4	9.9	26	390	71	2.6	59.1	226	17.4	103	194	31.9	28.4	15

91

92 **NOTES:**

93 1. All soil values reported in mg/kg unless otherwise indicated

94 2. All water values reported in mg/L unless otherwise indicated

95 3. Result exceeds Yukon CSR industrial standard for industrial sites

96 4. Result exceeds Yukon CSR commercial standard for industrial sites

97 5. Result exceeds CCME environmental soil guideline for industrial sites or freshwater quality guideline

98 6. CSR = Contaminated Sites Regulation

99 7. CCME = Canadian Council of Ministers of the Environment

100 8. Result exceeds tailings baseline results, CANMET Mining & Minerals Science Laboratories, Mount Nansen Tailings Stability, Report 02-011(CR), June 2002 (highest results were used for comparison, as indicated in bold)

101 CCME environmental guideline

102 CCME environmental guideline

103 11. Interim guideline

104 guideline does not consider indirect effects

105 combining the guidelines of inorganic mercury

106 13. **100** Result ≥100mg/kg for cyanide, or substances containing cyanide, identifying hazardous wastes and hazardous recyclable materials as published in the *Interprovincial Movement of Hazardous Waste and Hazardous Recyclable*

	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1																					
2	MN18	MN21	M22	MN23	MN24	MN24A	24A WOOD CHIPS OUTSIDE T.	MN26	MN28	MN29	MN31	MN32	MN33	MN34A	MN34-B	MN34C	MN35	MN37	37A FEED PUMP	MN38 MN	MN39
3	18	21	22	23	24	24A	24A	26	28	29	31	32	33	34A	34B	34C	35	37	37A	38	39
4	New grey carbon tank	Strip tank	New reactivated / stripped carbon tank	Barren electrolyte heater/holding tank	Eductor water thickener tank	Mixing cyanide pump for eductor water thickener tank	Wood chips adjacent to eductor water thickener tank 24	Acid storage chamber	Large clarifier tank	Agitator mix tank in clarifier building	Grey carbon column tank	Carbon column tank in clarifier building	Hi rate thickener tank	Grey garbage can in the refinery area and flux storage	Grey garbage can in the refinery area and flux storage	Grey garbage can in the refinery area and flux storage	Container in refinery area	Cyanide mix tank	Cyclone feed pumps	Valve body tank leading to hi rate thickener tank	Cyanide destruction agitation tank
5	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08		20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08		20-MAR-08	20-MAR-08
6	00:00	00:00	00:00	00:00	00:00	00:00		00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00	00:00		00:00	00:00
7	L613096-32	L613096-9	L613096-19	L613096-28	L613096-26	L613096-13	L613096-8	L613096-22	L613096-33	L613096-21	L613096-41	L613096-38	L613096-4	L613096-31	L613096-23	L613096-16	L613096-25	L613096-14	L613096-49	L613096-17	L613096-1
8	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
9																					
10																					
11	16.6	17.4	18.3	28.2	4.44	2.35	15.6	36.2	3.79	4.68	19.6	21.3	6.34	33.1	0.17	14.2	5.39	47.7	1.5	2.43	23.7
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	7.64	**10**	7.89	**10.9**	7.83	**8.41**	**8.62**	**2.3**	**8.51**	7.46	6.96	7.31	**8.15**	**9.55**	**4.82**	**11.3**	**2.34**	**10**	7.69	7.85	7.43
15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16																					
17																					
18	<2.0	-	1.29	-	<0.20	2.12	52	0.33	0.27	<0.20	<0.20	<0.20	1.52	-	<0.20	-	<0.20	-	1.09	1.23	31
19																					
20																					
21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	4.2	10.3	43.3	<0.4	68.8	6.3	13.8	0.7	28.8	25.4	11.9	2	33.6	16.7	34.6	<0.4	<0.4	35.3	3.9	15	1.8
23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
28	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
31																					
32																					
33	68.2	122	26.6	28.5	38.5	71.2	202	<3.0	6.1	<3.0	37.8	78.8	36.3	<3.0	<3.0	<3.0	6.1	1100	5.7	42.7	145
34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
35	**335**	**550**	**101**	93.4	73.9	**151**	**1400**	3	17.5	27.8	70.5	**295**	**147**	<3.0	<3.0	<3.0	13.9	**3340**	55.7	**122**	**1810**
36																					
37																					
38	69	101	45	57	312	287	666	<30	61	56	16	17	493	<20	<10	<20	<10	<20	32	497	367
39	807	1250	405	244	2070	2270	3860	39	179	40	47.4	50.6	3740	13	<5.0	<10	14.1	301	250	3430	3580
40	101	41.7	462	143	132	64.5	95.4	4.9	129	101	107	83.8	62.1	<2.0	1.6	<2.0	15.4	3.5	45.3	110	46.6
41	<1.0	<1.0	<2.0	<1.0	<0.50	<1.0	<0.50	<1.5	<1.5	<2.0	<0.50	<0.50	<0.50	<1.0	<0.50	<1.0	<0.50	<1.0	<1.5	<0.50	<0.50
42	36.2	51.6	4.2	20.4	56.1	14.9	42.2	<3.0	10.3	<3.0	2.07	4.33	31.6	<1.0	<0.50	<1.0	1.57	2.3	2	33.1	29.6
43	49.8	145	65.8	536	32.1	61.1	61.3	24.7	<6.0	181	1810	350	9.7	<4.0	<2.0	<4.0	549	7.5	15.9	13.3	32.6
44	<4.0	8.9	10.3	<4.0	2.9	4.8	3.2	<6.0	17.5	32.7	26.1	14.4	6.3	<4.0	<2.0	<4.0	<2.0	<4.0	<6.0	6.4	4.3
45	1930	652	1100	239	398	1490	1580	194	3440	686	2320	2940	527	4.7	7.7	2.3	320	135	89.4	583	253
46	559	1260	1050	360	1530	1160	3600	138	106	<120	114	<30	1900	<60	<30	<60	<30	<60	203	1810	2680
47	0.755	2.61	0.406	0.436	1.55	0.264	1.45	0.068	0.074	0.064	0.189	0.268	0.267	<0.050	<0.050	<0.050	0.083	<0.050	<0.050	0.268	0.504
48	11.5	22.5	17	52.3	4.1	19.3	24.1	<12	<12	20	331	70.8	<4.0	<8.0	<4.0	<8.0	<4.0	<8.0	<12	<4.0	6.1
49	55	85	64	298	22.5	28	54.4	17	27	54	1510	281	<5.0	<10	<5.0	<10	7.7	<10	<15	<5.0	<5.0
50	<5.0	<6.0	<8.0	<4.0	<2.0	<4.0	<2.0	<6.0	<6.0	<8.0	<2.0	<3.0	<2.0	<4.0	<2.0	<6.0	<2.0	<4.0	<6.0	<2.0	<2.0
51	63.2	67.8	44.7	36.2	62.6	34.1	90.2	61.6	10.2	8.8	90.2	55	56.9	12.9	4.5	5.8	9.6	45	13.2	53.1	76.5
52	12	<10	<20	<10	<5.0	<10	14.3	<15	<15	<20	26.2	23.6	<5.0	<10	<5.0	<10	<5.0	<10	<15	<5.0	<5.0
53	<4.0	8.5	152	<4.0	12.8	9	11.1	<6.0	<6.0	<8.0	8.3	3.6	13.6	<4.0	<2.0	<4.0	56.2	<4.0	<6.0	14.9	21.2
54	2150	3170	506	5790	3380	1580	2670	66.2	426	52.5	278	440	2520	11.9	7.9	<2.0	34.3	179	141	2600	2050
55																					
56																					
57	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
81	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
82	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84																					
85																					
86	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
88	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	39.7	4.7	5.1	13	8	3.1	13.8	632	3	16.7	129	111	7.6	<0.8	<0.8	<0.8	6.1	6.1	3.4	12	49
91																					
92																					
93																					
94																					
95																					
96																					
97																					
98																					
99																					
100																					
101																					
102																					
103																					
104																					
105																					
106																					

	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH
1																				
2	MN41	MN DELTA CLARI P.	FERI FLOC TANK	LEAD PAINT FROM BALL MILL	ASB BOILER SAMPLE	ASBESTOS FROM UNDER POT	TW3	MN 14 A W	MN33 W	MN39 W	Yukon CSR *Schedule 1: Generic Numerical Soil Standards* for Industrial Sites (µg/g)	Yukon CSR *Schedule 3: Generic Numerical Water Standards* for Freshwater Aquatic Life (µg/L)	1999 CCME Water Quality Guidelines for Freshwater Aquatic Life--with 2003 Update (µg/L)	1999 CCME Soil Quality Guidelines for Industrial Sites--with 2003 Update (mg/kg)	2000 EPA Guideline 747-K-00-001 for Lead Based Paint (ppm)	Mount Nansen Tailings, Oxide Silt Composite (MNOMIX)--reported June 2002 (µg/g)	Mount Nansen Tailings, Sulfidic Silt Composite (MNSMIX)--reported June 2002 (µg/g)	Mount Nansen Tailings, Oxide Clay Composite (BATCHO)--reported June 2002 (µg/g)	Mount Nansen Tailings, Sulfidic Clay Composite (BATCHS)--reported June 2002 (µg/g)	Mount Nansen Tailings, Native Sediments (9 samples)--reported June 2002 (µg/g)
3	41	42	43	44	49	50	24	14A	33	39										
4	Lime screw feeder	Delta clarifier tank	Ferrifloc tank	Paint chip sample obtained from the ball mill	Fibrous insulation on boiler	Fibrous material from beneath pot-like containers in Mill Dry Room	Eductor water thickener tank	Second feeder tank for tank 11 (R1)	Hi rate thickener tank	Cyanide destruction agitation tank										
5	20-MAR-08	20-MAR-08	20-MAR-08				20-MAR-08	20-MAR-08	20-MAR-08	20-MAR-08										
6	00:00	00:00	00:00				00:00	00:00	00:00	00:00										
7	L613096-3	L613096-20	L613096-15	L613096-6	L613096-7	L613096-5	L613096-48	L613096-47	L613096-46	L613096-45										
8	Soil	Soil	Soil	Bulk	Bulk	Bulk	Water	Water	Water	Water										
9																				
10																				
11	1.84	5.35	18.3	-	-	-	-	-	-	-	-	-	-	-	-	-				
12	-	-	-	-	-	-	348	485	306	476	-	-	-	-	-	-				
13	-	-	-	-	-	-	648	31000	603	913	-	-	-	-	-	-				
14	12.3	7.6	2.05	-	-	-	8	3.05	7.99	7.49	-	-	6.5-9.0	6-8	-	-				
15	-	-	-	-	-	-	408	34100	395	668	-	-	-	-	-	-				
16																				
17																				
18	-	1.21	<1.5	-	-	-	-	-	-	-	-	-	-	-	-	-				
19																				
20																				
21	-	-	-	-	-	-	0.077	1.94	0.1	3.18	-	3700@pH 8.0-<8.5 11300@pH 7.5-<8.0 18500@pH 7.0-<7.5 18400@pH <7.0	19	-	-	-				
22	102	31	0.9	-	-	-	-	-	-	-	-	-	-	-	-	-				
23	-	-	-	-	-	-	203	<2.0	161	202	-	-	-	-	-	-				
24	-	-	-	-	-	-	<0.050	<25	<0.050	<0.050	-	-	-	-	-	-				
25	-	-	-	-	-	-	16.8	<250	16.3	15	-	-	-	-	-	-				
26	-	-	-	-	-	-	0.162	<10	0.144	0.18	-	3000@hardness=≥ 50	-	-	-	-				
27	-	-	-	-	-	-	124	21700	133	292	-	1000mg/L	-	-	-	-				
28	-	-	-	-	-	-	0.193	<2.5	0.441	0.263	-	400mg/L	13 000 (11,12)	-	-	-				
29	-	-	-	-	-	-	0.0034	<0.50	0.002	0.0134	-	2000 (Cl≥10mg/L)	60	-	-	-				
30	-	-	-	-	-	-	0.852	4.02	1.42	22.3	-	-	-	-	-	-	-	-	-	-
31																				
32																				
33	115	65.5	10.6	-	-	-	-	-	-	-	100	-	-	-	-	-	-	-	-	-
34	-	-	-	-	-	-	<0.0050	0.0265	0.021	0.0099	-	50	-	-	-	-	-	-	-	-
35	**109**	**1170**	13.1	-	-	-	0.009	0.0865	0.199	0.377	500	-	5	8.0	-	-	-	-	-	-
36																				
37																				
38	95	316	<20	-	-	-	-	-	-	-	40	-	-	40	-	386	433	**847 ± 104**	443 ± 55	7 ± 6
39	758	1560	66	-	-	-	-	-	-	-	-	-	-	12	-	2800	2270	**4930 ± 383**	3590 ± 166	99 ± 94
40	29.7	61.4	17.1	-	-	-	-	-	-	-	2000	-	-	2000	-	-	-	-	-	-
41	<1.0	<1.0	<1.0	-	-	-	-	-	-	-	8	-	-	8	-	-	-	-	-	-
42	7.3	44.6	2.1	-	-	-	-	-	-	-	-	-	-	22	-	-	-	-	-	-
43	14.6	149	92.2	-	-	-	-	-	-	-	-	-	-	87	-	-	-	-	-	-
44	<4.0	17	33.6	-	-	-	-	-	-	-	300	-	-	300	-	-	-	-	-	-
45	656	53600	393	-	-	-	-	-	-	-	-	-	-	91	-	290	365	**483 ± 225**	356 ± 20	42 ± 62
46	471	217	62	6820	-	-	-	-	-	-	-	-	-	600	5000	1470	1800	**4510 ± 149**	2750 ± 96	49 ± 37
47	0.071	3.2	0.058	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-
48	11.4	40.1	14.6	-	-	-	-	-	-	-	40	-	-	40	-	-	-	-	-	-
49	<10	103	100	-	-	-	-	-	-	-	500	-	-	50	-	-	-	-	-	-
50	<4.0	14.4	<5.0	-	-	-	-	-	-	-	10	-	-	3.9	-	-	-	-	-	-
51	26.5	71.7	16.5	-	-	-	-	-	-	-	40	-	-	40	-	36	42	**56 ± 3**	44 ± 3	2 ± 2
52	<10	18	13	-	-	-	-	-	-	-	300	-	-	300	-	-	-	-	-	-
53	9.5	<4.0	4.6	-	-	-	-	-	-	-	-	-	-	130	-	-	-	-	-	-
54	527	1820	448	-	-	-	-	-	-	-	-	-	-	360	-	1020	1940	1590 ± 120	**1920 ± 56**	92 ± 53
55																				
56																				
57	-	-	-	-	-	-	0.056	5.8	1.54	0.996	-	-	5-100	-	-	-	-	-	-	-
58	-	-	-	-	-	-	0.0028	<0.050	0.082	0.0826	-	200	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	0.0116	<0.10	0.569	0.676	-	50	5.0	-	-	-	-	-	-	-
60	-	-	-	-	-	-	0.045	<0.20	0.109	0.069	-	10000	-	-	-	-	-	-	-	-
61	-	-	-	-	-	-	<0.0050	<0.050	<0.0050	<0.0050	-	53	-	-	-	-	-	-	-	-
62	-	-	-	-	-	-	<0.10	<1.0	<0.10	<0.10	-	-	-	-	-	-	-	-	-	-
63	-	-	-	-	-	-	0.00043	0.0133	0.00729	0.00509	-	-	0.017	-	-	-	-	-	-	-
64	-	-	-	-	-	-	101	128	101	122	-	-	-	-	-	-	-	-	-	-

	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH
65	-	-	-	-	-	-	0.0036	0.423	0.0193	0.0088	-	90	-	-	-	-	-	-	-	-
66	-	-	-	-	-	-	<0.0010	<0.050	0.0034	0.0015	-	9	-	-	-	-	-	-	-	-
67	-	-	-	-	-	-	0.0852	228	0.13	0.195	-	90@hardness≥200	4@hardness >180	-	-	-	-	-	-	-
68	-	-	-	-	-	-	5.16	473	13.8	8.95	-	-	300	-	-	-	-	-	-	-
69	-	-	-	-	-	-	0.0121	1.65	0.41	0.629	-	160@hardness≥300	7@hardness >180	-	-	-	-	-	-	-
70	-	-	-	-	-	-	<0.050	<0.50	<0.050	<0.050	-	-	-	-	-	-	-	-	-	-
71	-	-	-	-	-	-	23.4	40	12.9	41.7	-	-	-	-	-	-	-	-	-	-
72	-	-	-	-	-	-	0.228	4.65	0.675	0.63	-	-	-	-	-	-	-	-	-	-
73	-	-	-	-	-	-	<0.00020	<0.00020	<0.00020	<0.00020	-	1	0.030 (13)	-	-	-	-	-	-	-
74	-	-	-	-	-	-	0.0021	<0.10	0.0032	0.0022	-	10000	73 (11)	-	-	-	-	-	-	-
75	-	-	-	-	-	-	<0.010	<0.50	<0.010	<0.010	-	1500@hardness≥ 180	150@hardness >180	-	-	-	-	-	-	-
76	-	-	-	-	-	-	<0.0020	<0.10	<0.0020	<0.0020	-	10	1.0	-	-	-	-	-	-	-
77	-	-	-	-	-	-	0.00206	0.0224	0.0625	0.0102	-	15@hardness>100	0.1	-	-	-	-	-	-	-
78	-	-	-	-	-	-	10.4	10400	10.7	10.7	-	-	-	-	-	-	-	-	-	-
79	-	-	-	-	-	-	<0.00040	<0.020	<0.00040	<0.00040	-	3	0.8	-	-	-	-	-	-	-
80	-	-	-	-	-	-	<0.050	<0.50	<0.050	<0.050	-	1000	-	-	-	-	-	-	-	-
81	-	-	-	-	-	-	0.00357	<0.020	0.00292	0.00345	-	3000	-	-	-	-	-	-	-	-
82	-	-	-	-	-	-	<0.030	<0.30	<0.030	<0.030	-	-	-	-	-	-	-	-	-	-
83	-	-	-	-	-	-	0.0633	1.8	0.555	0.386	-	-	30	-	-	-	-	-	-	-
84																				
85																				
86	-	-	-	-	<1	<1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87	-	-	-	-	10/25/2008	75-99	-	-	-	-	-	-	-	-	-	-	-	-	-	-
88	-	-	-	-	75-99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	-	-	-	-	1/10/2008	1/5/2008	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	11.4	72.6	774	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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annex f

ccs landfill disposal criteria

British Columbia Solid Waste Acceptance Protocol

CCS Landfill Services, a division of CCS Inc., owns/operates two landfills in Northeastern British Columbia: **Silverberry Secure Landfill** located at km 11 on the Beatton Airport Road (Mile 73 Alaska Highway) and **Northern Rockies Landfill** located at Mile 285 Alaska Highway. Silverberry landfill is able to dispose of select Hazardous and Non Hazardous wastes. The Northern Rockies landfill is limited to non hazardous waste for direct disposal, however, CCS holds a treatment permit that allows us to accept hazardous waste for treatment below 3% total hydrocarbons and ultimately, disposal in our Northern Rockies landfill.

Acceptable Wastes (No Free Liquids)

1. Absorbents
2. Cement (crushed returns dry)
3. Contaminated Debris and Soil with:
    - Chemical/Solvent
    - Drilling Mud-Gel Chem, Invert, KCL, K2SO4.
    - Crude Oil/Condensate
    - Mercury/Metals
    - Pesticide/Herbicide
    - Produced/Salt Water
    - Sulphur
4. Sand
    - Non radio active frac sand
    - Produced sand
5. Incinerator Ash
6. Sludge (no free liquids) from
    - Flare Pit
    - Hydrocarbon
    - Lime
    - Process
    - Sulphur

***Waste must be dry and stackable as per the Paint Filter Test Criteria**

Prohibited Wastes

1. Liquids

2. PCB Wastes
3. Oil Filters
4. Containers with free liquids or waste materials containing free liquids.
5. Empty waste containers unless they are crushed, shredded or similarly reduced in volume to the maximum practical extent.
6. Wastes as defined by
    - Schedule 3 and Table 1 Schedule 4 (exemption for this clause); the BTEX number is combined in totals not leachable as per clause 9 (**Silverberry only**)
    - Wastes exhibiting characteristics in Classes 1 to 9 under TDG Clear Language Edition (excluding Class 4 UN 3175 Solids Containing Flammable Liquid and Class 9, Section 2.43 (b) (iv) and (v)) (**Silverberry only**)

Landfill Disposal Criteria

The following is a list of landfill disposal criteria that may be required on the description, origin, and history of the solid waste.

- Analytical data provided must support the solid waste classification
- Analytical data provided must be current (no older that 1 calendar year)
- It is the responsibility of the waste generator to determine the characteristics of the waste.

CCS Landfill Disposal Criteria

The following abbreviated list of compounds is found in Schedule 4 of the British Columbia Hazardous Waste Regulation and in the specific operating permit for each landfill. The regulatory levels are the maximum allowable concentrations. Any waste that exceeds these levels will not be approved for direct disposal at our landfills. For a copy of the complete table, refer to Schedule 4 of the Hazardous Waste Regulation.

Constituents	**Regulatory Levels**	**Constituents**	**Regulatory Levels**
BTEX:	**mg/kg**	**Organics**	**mg/l**
Total combined Concentration (**Silverberry only**)	1000	Aldicarb	0.9
		Aldrin + Dieldrin	0.07
		Carbaryl / 1-Naphthyl-N-methyl Cabamate	9.0
		Carbon Tetrachloride	0.5
		Chlordane	5.0
		Diazinon	2.0
		DDT	3.0
		2, 4D	10.0
Leachable	**mg/l**		
Benzene	0.5		
Ethylbenzene	0.24		
Tolulene	2.4		
Xylenes	30.0		
(**Northern Rockies only**)			
Metals:	**mg/l**	Heptachlor +	

Arsenic	2.5	Heptachlor epoxide	0.3
Barium	100.0	Lindane	0.4
Boron	500.0	Methoxychlor	90.0
Cadmium	0.5	Nitrate + Nitrite	1000.0
Chromium	5.0	Nitrilotriacetic acid	
Copper	100.0	(NTA)	5.0
Fluorides	150.0	Parathion	5.0
Lead	5.0	Pentachlorophenol	3.0
Mercury	0.1	Tetrachlorophenol 2,3,6	0.1
Selenium	1.0	2, 4, 5-T	8.0
Silver	5.0	Trihalomethanes	35.0
Uranium	10.0		
Zinc	500.0		

Miscellaneous	**mg/l**	**Other**
Cyanide	20.0	pH > or = 2 , < or = 12.5
Phenol	100.0	No free liquids

Note: Not all regulated compounds are listed above. Refer to the BC Hazardous Waste Regulation and the TDG Clear Language Regulation for the complete list.

CCS Landfill Analytical Requirements

The following analytical requirements are required for specific waste streams identified below;

Analysis Required	**Abbreviation**
Flashpoint	**Fp**
BTEX Northern Rockies	**BTEX NR (leachable TCLP)**
BTEX Silverberry	**BTEX SB (total)**
Dependant on disposal facility	
Leachable metals	**LM (SWEP modified)**
Paint filter	**Pf**
pH	**pH**
SWOG	**SWOG**
PAH (polycyclic aromatic Hydrocarbon)	**PAH**
Solvent Scan	**SS**

1. Absorbents **confirm with landfill staff prior to analysis**
2. Cement (crushed returns dry) **Virgin products - MSDS**
3. Contaminated Debris and Soil with:
    a. Chemical/Solvent **Fp, BTEX, LM, Pf, pH, SWOG, MSDS**
    b. Drilling Mud-Gel Chem, Invert, **Fp, BTEX, LM, Pf, pH, SWOG MSDS**
    KCL, K2SO4
    c. Crude Oil/Condensate **Fp, BTEX, LM, Pf, pH, SWOG**

d. Mercury/Metals **confirm with landfill staff prior to analysis**
e. Pesticide/Herbicide **confirm with landfill staff prior to analysis**
f. Produced/Salt Water **Fp, BTEX, LM, Pf, pH, SWOG**
g. Sulphur **confirm with landfill staff prior to analysis**

4. Sand
   a. Non radio active frac sand **Fp, BTEX, LM, Pf, pH, SWOG**
   b. Produced sand **Fp, BTEX, LM, Pf, pH, SWOG**
5. Incinerator Ash **LM, pH**
6. Sludge (no free liquids) from
   a. Flare Pit **Fp, BTEX, LM, Pf, pH, SWOG, SS, PAH**
   b. Hydrocarbon **Fp, BTEX, LM, Pf, pH, SWOG**
   c. Lime **Fp, BTEX, LM, Pf, pH**
   d. Process **confirm with landfill staff prior to analysis**
   e. Sulphur **confirm with landfill staff prior to analysis**

If there is any question as to what analytical methods required please call landfill for clarification **prior to analysis, all analysis must be approved (signed) with QA/QC.**