Public Works and Government Services Canada

Giant Mine Roaster Complex
Deconstruction Waste Audit Report-FINAL

Prepared by:
AECOM
17007 – 107th Avenue 780 486 7000 tel
Edmonton, AB, Canada T5S 1G3 780 486 7070 fax
www.aecom.com

Project Number:
60241267 (403.2)

Document Number:
003-DISO Roaster Demo-DISO-RPT-0004-Rev1_20121128-FINAL

Date:
November 28, 2012

Statement of Qualifications and Limitations

The attached Report (the "Report") has been prepared by AECOM Canada Ltd. ("Consultant") for the benefit of the client ("Client") in accordance with the agreement between Consultant and Client, including the scope of work detailed therein (the "Agreement").

The information, data, recommendations and conclusions contained in the Report (collectively, the "Information"):

- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents Consultant's professional judgement in light of the Limitations and industry standards for the preparation of similar reports;
- may be based on information provided to Consultant which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

Consultant shall be entitled to rely upon the accuracy and completeness of information that was provided to it and has no obligation to update such information. Consultant accepts no responsibility for any events or circumstances that may have occurred since the date on which the Report was prepared and, in the case of subsurface, environmental or geotechnical conditions, is not responsible for any variability in such conditions, geographically or over time.

Consultant agrees that the Report represents its professional judgement as described above and that the Information has been prepared for the specific purpose and use described in the Report and the Agreement, but Consultant makes no other representations, or any guarantees or warranties whatsoever, whether express or implied, with respect to the Report, the Information or any part thereof.

Without in any way limiting the generality of the foregoing, any estimates or opinions regarding probable construction costs or construction schedule provided by Consultant represent Consultant's professional judgement in light of its experience and the knowledge and information available to it at the time of preparation. Since Consultant has no control over market or economic conditions, prices for construction labour, equipment or materials or bidding procedures, Consultant, its directors, officers and employees are not able to, nor do they, make any representations, warranties or guarantees whatsoever, whether express or implied, with respect to such estimates or opinions, or their variance from actual construction costs or schedules, and accept no responsibility for any loss or damage arising therefrom or in any way related thereto. Persons relying on such estimates or opinions do so at their own risk.

Except (1) as agreed to in writing by Consultant and Client; (2) as required by-law; or (3) to the extent used by governmental reviewing agencies for the purpose of obtaining permits or approvals, the Report and the Information may be used and relied upon only by Client.

Consultant accepts no responsibility, and denies any liability whatsoever, to parties other than Client who may obtain access to the Report or the Information for any injury, loss or damage suffered by such parties arising from their use of, reliance upon, or decisions or actions based on the Report or any of the Information ("improper use of the Report"), except to the extent those parties have obtained the prior written consent of Consultant to use and rely upon the Report and the Information. Any injury, loss or damages arising from improper use of the Report shall be borne by the party making such use.

This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

AECOM: 2012-01-06

AECOM
17007 – 107th Avenue
Edmonton, AB, Canada T5S 1G3
www.aecom.com

780 486 7000 tel
780 486 7070 fax

November 28, 2012

David Hango, P. Eng., Project Manager
Public Works and Government Services Canada
Western Region
5th Floor Telus Plaza North
10025 Jasper Avenue
Edmonton, AB T5J 1S6

Dear Mr. Hango:

Project No: **60241267 (403.2)**
Regarding: **Giant Mine Roaster Complex**
Deconstruction Waste Audit Report

Please find attached a copy of the AECOM report titled "Giant Mine Roaster Complex Deconstruction Waste Audit Report". If you have any questions regarding this report, please contact the undersigned.

Sincerely,
AECOM Canada Ltd.

Gordon Woollett, P. Eng.
Project Manager, Environment

GW:cn
Encl.
cc:

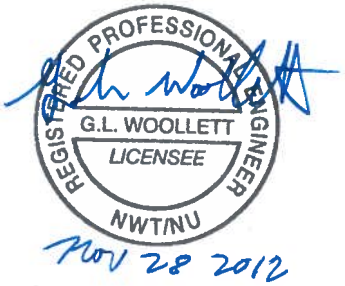
Distribution List

# of Hard Copies	PDF Required	Association / Company Name
	X	PWGSC

Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0	GW	August 17, 2012	Draft Report
1	GW	November 28, 2012	Final Report

AECOM Signatures



Report Prepared By:

Gordon Woollett, P. Eng.
Project Manager

Report Reviewed By:

Cathy Corrigan, M.Sc., P. Eng.
Senior Geological Engineer

PERMIT TO PRACTICE
AECOM CANADA LTD.
Signature
Date Nov 30/12
PERMIT NUMBER: P 639
NWT/NU Association of Professional Engineers and Geoscientists

Executive Summary

The waste audit confirmed that all surfaces in the Roaster complex contain various amounts of dust that contain arsenic. Other contaminants in the dusts included asbestos as well as sodium cyanide (Dorrco Roaster and AC Roaster Buildings).

In addition to the above, the audit identified a number of hazardous building materials and hazardous building contents, which include:

- Asbestos containing insulation coated with arsenic trioxide dusts
- Asbestos containing sprayed on wall and ceiling insulation coated with arsenic trioxide dust on a rigid transite panel used as exterior siding
- Asbestos containing pipe and process vessel insulation coated with arsenic trioxide dust
- Asbestos containing flooring products and gaskets
- Sodium cyanide containers potentially with residual quantities
- Containers of motor oil, grease, antifreeze, paint, adhesives, cleaning products
- Wooden building materials and process equipment contaminated with chemicals/mill process residues including arsenic trioxide and sodium cyanide
- Refractory brick contaminated with arsenic trioxide
- Open barrels of sodium hydroxide and bags of granular sulphur and soda ash
- Potentially PCB and mercury containing electrical and lighting equipment
- Fuel storage tanks and piping, potentially containing sludges, and residual quantities, and partially full barrels with unknown liquids
- Small quantities (<1 litre [L]) of lab chemicals (silver nitrate, potassium iodide, potassium permanganate, pH buffer solutions)
- Water coolers potentially containing chlorofluorocarbons (CFCs)/ozone depleting substances (ODS)
- Lead containing batteries, sheeting and leachable lead containing paint products

Based on the results of this assessment, a total 6,046 cubic metres (m^3) of waste are estimated to be generated from the deconstruction of the Roaster Complex. This volume includes 2,267 m^3 of non-hazardous waste, 137 m^3 for mineral waste, 57 m^3 for non-arsenic hazardous waste and 3,585 m^3 of arsenic containing wastes.

These volumes all assume that:

- Steel items such as structural steel, plate steel and tanks, and flooring materials can be cleaned of arsenic trioxide to allow the waste to be classified as a non-hazardous waste.
- All wood wastes are classified as arsenic containing hazardous waste.

Due to the contaminants that are present in these buildings, the deconstruction process will need to be completed following detailed work procedures. These procedures will need to include the following:

- Due to the presence of cyanide in two of the onsite buildings, abatement activities will need to take into consideration the potential for the generation of hydrogen cyanide if water is used in the abatement process.
- Due to the presence of widespread hazardous or potentially hazardous wastes, building deconstruction should not proceed until all hazardous or potentially hazardous materials have been removed.
- During decontamination activities, the buildings should be sealed to prevent release of airborne contaminants to the surrounding environment. Workers completing decontamination work should be supplied with the necessary personal protective equipment (PPE) to protect them from exposure. Air quality monitoring should be ongoing inside and outside the building during work that will generate airborne contaminants (dust removal and asbestos abatement). Wastes should be containerized at the source area during decontamination. The specifications should require that hazardous waste containers meet the requirements of the Transportation of Dangerous Goods Regulation (TDGR) and the Export and Import of Hazardous Waste and Hazardous Recyclable Materials Regulation.

- Arsenic trioxide dust and any other hazardous waste items contaminated with arsenic trioxide dust (such as asbestos) should be stored on-site for eventual disposal with the rest of the arsenic trioxide waste at the site.
- The exterior of any containers destined for off-site disposal or on-site storage should be cleaned to remove residual amounts of cyanide, asbestos and arsenic for safe handling purposes.
- Non soluble arsenic containing mineral wastes remaining from ore processing activities, including residual semi-processed ore materials located in process vessels, tanks and piping, water located in floor sumps, and calcine should be disposed of in the tailings ponds.
- Due to potential residual contamination on any of the non-hazardous materials and liability associated with ownership transfer, salvage of materials should not be allowed.
- Decontamination of non-hazardous materials should be done to the extent that it meets the applicable criteria for classification as non-hazardous waste by vacuuming, wiping, or other means deemed adequate prior to storage, with confirmatory testing as necessary.
- The Roaster Complex decontamination and deconstruction work will require the establishment of temporary storage areas since the deconstruction of the Roaster Complex is scheduled to occur prior to the construction of the non-hazardous waste landfill. The different waste streams should be segregated for storage. Hazardous waste storage areas should have restricted access with signage at all possible access points identifying the area as containing hazardous waste. A detailed inventory should be maintained and the information stored on-site. The areas should be inspected on, at minimum, a monthly basis.

Table of Contents

Appendices

1. Introduction

1.1 Scope of Work

Public Works and Government Services Canada has retained AECOM Canada Ltd. (AECOM) and, as a sub-consultant, Golder Associates Ltd. (Golder), to complete a deconstruction audit and prepare deconstruction specifications and drawings for the group of buildings known as the Roaster Complex at the Giant Mine Site, in Yellowknife, NT. The main objectives of the project include the following:

- Prepare a comprehensive work plan and health and safety plan
- Conduct a deconstruction audit including a designated substances survey
- Prepare Class “B” (substantive) cost estimates
- Prepare 50%, 90%, 99% and Issued for Tender Design Specifications and Drawings
- Attend a bidders tour
- Prepare Class “A” cost estimates
- Assist with project tendering

This Waste Audit report defines the different waste streams as well as estimates the quantities of hazardous and non-hazardous wastes that will be generated when the Roaster Complex buildings are demolished.

1.2 Background

Giant Mine has an inventory of over 100 buildings which require deconstruction as part of the Giant Mine remediation program. The existing buildings were constructed between the 1940s and 1990s in various areas of the mine property. Currently, a Site Stabilization Program is being developed to support the Giant Mine Remediation plan. Included in this program is the deconstruction of the buildings referred to as the Roaster Complex. The Roaster Complex is located within the C-Shaft area of the Giant Mine site. The purpose of the buildings within the complex was to process the ore concentrates in roasters. The roasting process produced a gold containing iron oxide calcine (which was further processed to remove the gold) as well as arsenic trioxide and sulphur dioxide exhaust gages. The gases passed through the Cottrell electrostatic precipitator as well as a baghouse for dust removal. The Roaster Complex includes the following structures, which are shown in Figures 1 and 2 in Appendix A:

- Mill Pipe Shop/AC Roaster Building
- Cottrell Precipitator Building
- Roaster Stack and Roaster Stack Fan House
- Calcine Plant
- Dorrco Roaster Building
- Silo Load-Out and Weight Scale
- Bag House
- Exterior Flue Network

The Giant Mine Roaster Complex buildings had been previously identified as being contaminated with large amounts of arsenic trioxide dust and asbestos containing materials to differing levels, and as containing other hazardous materials. A waste audit was required to obtain a detailed inventory of hazardous and non-hazardous materials associated with these facilities to support development of a deconstruction tender package. This waste audit process includes: a survey of all structures including walls, floors, and ceiling coverings, construction materials, and any items stored inside the buildings; measuring the dimensions of surfaces, counting the quantity of like materials to obtain volume estimates of the structures and all contents; and recording types and volumes of chemicals, oils, fuel, products, mineral wastes, steel structures, pipe, equipment parts, wood, glass, batteries, and other material noted on site.

It is understood that during recent inspections of the Roaster Complex, deteriorating structural elements and building envelopes were identified. The deteriorating condition of the exterior cladding, structural members, and insulation materials, was allowing precipitation to enter the buildings and quicken the rate of deterioration. Other hazards identified included damaged and/or missing catwalks, as well as numerous tripping hazards. Due to the declining conditions of this infrastructure and the hazardous materials associated with it, the Roaster Complex was identified as being a significant risk to the environment and to humans (falling cladding, partial building collapse, arsenic and asbestos exposure to workers or the public).

1.3 Summary of Existing Reports

A number of assessments and previous reports have been completed on the buildings located as part of the Roaster Complex. AECOM and Golder have completed work associated with structural deconstruction and waste audits as part of the Giant Mine Remediation preliminary design. Included below is a list of previous reports and assessments completed on the Roaster Complex.

- Asbestos Assessment at the Giant Yellowknife Mine for Royal Oak Mines Inc., Arctic Environmental Services Ltd., 1996
- Site Inspection of Roaster Exhaust Stack for Royal Oak – Giant Mine, Yellowknife, NT, Ferguson Simek Clark, December 1997
- Prioritization of Demolition Sequence for Site Remediation of Miramar Giant Mine, Yellowknife, NT, GAIA Contractors, March 2001
- An Examination of Arsenic Contamination in the Roaster and Gas Handling Complex at the Giant Mill, North West Consulting Limited, 2003
- Structural Inspections, Giant Mine-Various Buildings, Yellowknife, NT, PWGSC, December 2007
- Flue Structural assessment letter, AECOM, March 2010
- Roaster Flue Emergency Response Plan, Golder, September 2011
- Roaster Flue Specification and Drawing package, AECOM, April 2011
- Comprehensive Work Plan and Safety Plan – Roaster Complex Demolition Audit, Golder Associates, March 2012
- Occupational Hygiene Assessment During the Roaster Complex Demolition Audit Investigation, Golder Associates April 2012

1.4 Limitations

The purpose of the waste survey was to identify and quantify hazardous and non-hazardous materials located in each Roaster Complex building as well as to estimate the volume of wastes that would be generated during the deconstruction of the structures. The volumes identified in this report should be considered as a rough order of magnitude volume estimate; there is also the potential that additional hazardous materials are present in the buildings that were not identified and therefore not discussed in this report. Due to the cold temperatures (approximately -20 degrees Celsius [^{0}C]), the duration of the daily inspection activities was limited. All assessment activities followed the work procedures outlined in the Golder prepared health and safety plan titled, “Comprehensive Work Plan and Safety Plan – Roaster Complex and Demo Audit, March 2012”. To support this assessment work, a three stage decontamination unit was installed on the east side of the AC Roaster Building.

Due to potential safety concerns relating to the structural condition of some of the staircases and elevated catwalks, not all areas of the AC Roaster and Dorrco Roaster buildings were accessible to the field assessment team. Due to safety concerns related to the structural condition of the Roaster Stack, detailed inspections were not completed within a 10 metre (m) radius of the stack; therefore no assessments were completed on the interior of the fan house building. The field team was also not equipped with man-lifts or ladders; therefore, beyond visual inspection, no assessment activities were completed in areas beyond arms reach.

2. Regulatory Framework

2.1 Current Regulatory Regime

The Giant Mine property is located on lands administered by the Government of the Northwest Territories (GNWT); however, the property has been transferred to the federal department of Aboriginal Affairs and Northern Development Canada (AANDC). Due to their shared responsibilities AANDC and GNWT are co-proponents of the Giant Mine Remediation Plan. Currently the mine operates following the NWT Mine Health and Safety Act. The NWT Workers Safety Compensation Commission (WSCC) is the regulatory agency that enforces the Mine Health and Safety Act (through the GNWT Mines Inspector). In addition, federally operated facilities are required to follow the Canada Labour Code Part II - Occupational Health and Safety, specifically in areas related to hazardous materials and asbestos.

2.2 Waste Classification Criteria

The decontamination and deconstruction of the Roaster Complex will generate wastes. Methods for handling wastes will be consistent with the Waste Management Plan prepared for the Water License application for the Site stabilization project. Specifically, wastes will be handled, stored, and transported in a manner that complies with all applicable regulatory requirements. In particular, the standards for non-hazardous and hazardous waste handling, storage, transport and disposal are set by the following legislation and guidelines:

- **Asbestos** – Materials containing asbestos greater than one percent (1%) by weight are considered asbestos containing materials in accordance with the Northwest Territories *Guideline for the Management of Waste Asbestos, September 1998*. Disposal of asbestos waste is governed by the *Environmental Protection Act – R.S.N.W.T. 1988, c. E-7, Guideline for the General Management of Hazardous Waste in the NWT* and the *Guideline for the Management of Asbestos Waste*. Further information relating to the classification, removal and disposal of asbestos materials is presented in the GNWT Public Works and Services Department publication "General Guidelines for Asbestos Removal and Disposal" and the WSCC Northwest Territories "Codes of Practice for Asbestos Abatement".
- **Mercury Containing Equipment** – Disposal of mercury waste falls under the *NWT Environmental Protection Act 1988* and the *Guideline for the General Management of Hazardous Wastes in the NWT*. According to the *General Safety Regulations* of the Northwest Territories, special precautions are required during demolition activities to monitor that worker exposure to mercury does not exceed the limits outlined in the regulations. Mercury is commonly found in pressure regulated valves, switches, controls, thermostats, high intensity lamps and fluorescent light tubes.
- **Ozone Depleting Substances** – The federal legislation for the use and disposal of ozone depleting substances (ODS) is the *Canadian Environmental Protection Act, Ozone Depleting Substances Regulations, 1998*. The Northwest Territories guideline related to ODS is the *Guideline for Ozone Depleting Substance, 1998*.
- **Polychlorinated Biphenyl (PCB) Containing Equipment** – According to the *Canadian Environmental Protection Act*, equipment and paints containing PCBs with a concentration of greater than 50 parts per million (ppm) are considered to be PCB containing. PCB containing items need to be treated as hazardous wastes and will require disposal at an approved location.
- **Lead Materials and Lead Amended Paints** – In the NWT, disposal of lead waste falls under the *NWT Environmental Protection Act – R.S.N.W.T.1988* c. E-7, Guidelines *for the General Management of Hazardous Wastes in the NWT and Guideline for the Management of Waste Lead and Lead Paint*, with the use of a total lead concentration as the criteria for classification as hazardous waste. Waste disposal regulations for all other jurisdictions in Canada dictate that waste with leachable lead concentrations greater than 5 milligrams per litre (mg/L) is classified as hazardous waste, with the Toxicity Characteristic Leaching Procedure (TCLP) test as

the preferred evaluation method. AECOM completed an evaluation of disposal methods utilized on other northern remediation projects as well as legislation throughout North America related to the disposal of materials painted with lead amended paints. This evaluation recommends that TCLP method to determine leachable levels of lead be utilized as the governing criteria for determining if materials should be considered as hazardous or not at the Giant Mine site.

- **Non-Hazardous Wastes** – Non-hazardous wastes consist of solid waste that, when disposed of in a landfill or re-used, is not expected to undergo physical, chemical or biological changes to an extent as to produce substances that may cause an adverse effect. Non-hazardous wastes at the Giant Mine site consist of decontaminated demolition debris, scrap metal, glass, concrete, fibreglass insulation and paper products.

2.3 Waste Disposal Guidelines

The following documents were used to identify waste disposal requirements for the Giant Mine site.

- **Guideline for Industrial Waste Discharges in the NWT**

  The purpose of this guideline is to establish standards that can be followed in the discharge of waste into municipal systems (including landfills). The guideline is intended to:

  - Provide direction for the management and discharge of industrial wastes
  - Protect the environment
  - Protect municipal infrastructure, such as sewage systems and solid waste modified landfills, from immediate and long term environmental problems
  - Protect workers and the public from improper industrial waste discharge

  Schedule IV attached to this guideline presents maximum leachable standards for solid wastes placed in landfills in the NWT. The NWT standard for leachable arsenic is 2.5 mg/L.

- **Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid Waste Sites in the Northwest Territories**

  The purpose of this document is to guide planners, designers, operators and regulators of modified landfill facilities in the Northwest Territories. The guidelines are intended to be applied at municipal solid waste sites to ensure the protection of public health and the environment. Items include facility planning, regulatory requirements, surface and groundwater monitoring, design, operation and closure of solid waste facilities. The guidelines do not provide details on the design, construction or operation of a non-hazardous landfill that will not be utilized for municipal solid waste.

- **Indian and Northern Affairs Canada (INAC), Northern Affairs Organization Contaminated Sites Program, Abandoned Military Site Remediation Protocol (AMSRP), March 2009**

  The purpose of this document is to provide sufficient background information to understand the environmental issues present at the sites included in the INAC Contaminated Sites Program and to describe the guiding principles for their assessment and remediation. Sections specific to this waste audit and the deconstruction tender package relate to site debris and demolition waste classification, and buildings/structures inventory.

3. Methodology

The Giant Mine Remediation Program includes the demolition of all on-site buildings, the collection of all surface debris, as well as the disposal of recovered wastes in a facility to be constructed on the property. The Remediation Program will have specific requirements for disposal of arsenic trioxide wastes, non-arsenic containing hazardous waste, tailings and process waste, and non-hazardous waste. The Roaster Complex Deconstruction, which is occurring in advance of the overall site Remediation Program, must comply with the future remediation objectives. Therefore, the waste audit was completed with the goal of identifying waste types according to their ultimate remedial requirements under the overall Giant Mine Remediation Plan. Based on this, the following waste streams were identified:

- **Arsenic-containing hazardous waste:** arsenic trioxide dust, material with leachable arsenic concentrations, and any other hazardous waste item contaminated with arsenic trioxide dust (such as asbestos) or materials that cannot be cleaned to remove arsenic trioxide dust will be stored on site for eventual disposal with the rest of the arsenic trioxide waste at the site
- **Non-arsenic containing hazardous waste:** other hazardous waste items will be shipped off site during the Roaster Complex deconstruction work for disposal at a licensed facility
- **Mineral waste:** wastes remaining from ore processing activities that, although not chemically inert are compositionally similar to the ore itself or tailings and do not contain soluble arsenic levels in excess of the leachate criterion
- **Non-hazardous waste:** Non-arsenic containing inert waste that is expected to be disposed of in an on-site engineered non-hazardous waste landfill

The waste audit consisted of the following two primary tasks:

- Identification of hazardous materials, with collection of samples as required
- Quantification of waste according to type and ultimate disposal requirements

The hazardous materials assessment component of the audit was completed by a three person field team from Golder and the quantification survey was completed by personnel from AECOM. The field portion of the waste audit was completed from March 14 to 23, 2012. A separate report detailing the hazardous materials identified during the audit has been prepared by Golder and is included in Appendix B. Information from the Golder report has been used to generate the overall waste inventory and volumes that are discussed in this report and will be used for the tender package.

To determine waste volumes:

- Where possible, measurements were collected of the dimensions of building components and process equipment
- For smaller waste items, equipment and debris, volumes were visually estimated
- Types and volumes of chemicals or other hazardous wastes were recorded
- Like materials were tracked
- Overall volumes of like materials were calculated

4. Building Descriptions

4.1 General

The Roaster Complex has been inoperable and not maintained for many years. It is currently not energized but an electrical source is available within 500 m of the complex. There is no water supply to the complex. The following sections describe the construction of each building included in the Roaster Complex and key hazardous materials information. A detailed inventory of the hazardous materials identified in each building is provided in Appendix B and D.

4.2 Exterior Roaster Flues

The exterior roaster flues include the complex exterior pipe network between the Baghouse Building, Cottrell Building, AC Roaster Building and the brick exhaust stack. Exterior flues are also located on the west side of the Cottrell and Baghouse buildings. With the exception of the Baghouse Flue, the majority of the flues are 1.8 m diameter elevated steel pipe wrapped in asbestos-containing insulation. The steel and wooden frames used to support the elevated flues are in poor structural condition. Some of the flues themselves are corroded and in poor structural condition. The abandoned flues from the AC Roaster and Cottrell Roaster are reported to be partially full of arsenic trioxide dust.

The Baghouse Flue was replaced in the last 20 years and is in relatively good condition. It is comprised of a fibreglass pipe wrapped in insulation and metal siding. This flue is reported to contain only residual amounts of arsenic trioxide dust.

4.3 Baghouse Building

The Baghouse building is a Robertson style steel frame building, double walled, with metal siding and concrete foundation. The approximate dimensions are 10 m x 15 m x 9 m high. The walls and roof of this building are not insulated with an asbestos containing insulation. Located inside the building is the baghouse unit which includes 2400 - 3 m tall fabric filter bags located inside an insulated steel box structure. The unit is approximately 8.5 m x 10 m x 4.5 m high. The unit is equipped with four bottom hoppers, a shaking mechanism and discharge plenums. The exterior surface of the baghouse unit is insulated with asbestos (including chrysotile and amosite) containing insulation. Arsenic trioxide dusts have been identified on all interior surfaces, within the baghouse bags, and in all associated ducts.

4.4 Cottrell Precipitator Building

The Cottrell Precipitator building is a steel frame, multi-level structure with rigid transite board exterior siding. The transite board siding is coated with a spray applied asbestos insulation. Background reports indicated that crocidolite has been identified in the exterior wall insulation in the south end of the building. Approximate dimensions of the building are 28.5 m x 17.5 m x 9 m high. This building contains the Cottrell electrostatic precipitator. The precipitator unit contains approximately 8,400 rods (4 m lengths) that are coated with arsenic trioxide scale. The exterior surface of the precipitator unit, bottom hoppers, and large interior air ducts are coated with asbestos containing insulation. The spray applied insulation on the precipitator unit, as well as on the exterior walls, has been coated with a penetrating encapsulant; therefore, arsenic trioxide dust is co-mingled with asbestos containing insulation since it is expected that insulation would have been coated with trioxide dust at the time the encapsulant was applied.

Electrical rooms located on the upper floor of the building contain potentially PCB containing transformers. These transformers are located inside steel cages.

4.5 Dorrco Roaster Building

The building is a steel frame, multi-level structure, with rigid transite board siding and roofing, and approximate dimensions of 30 m x 25 m x 12 m high. As identified on other buildings, the exterior wall panels have been coated with a spray applied asbestos containing insulation. The spray applied insulation has been coated with a penetrating encapsulant; therefore, arsenic trioxide dust is co-mingled with asbestos containing insulation. The spray applied cellulose insulation located on the underside of the building's ceiling is in poor condition and insulation debris is scattered throughout the building. Sodium cyanide was also stored and used in the building and all surfaces in the building are coated with dust containing arsenic and potentially asbestos and cyanide. Equipment inside this building includes ball mill, roasters, abandoned flues and cyclones. The exterior surface of the roaster units and exhaust gas flues is coated with asbestos containing parging. Other asbestos products identified include pipe insulation, cement board and gaskets. The abandoned flues inside the building were observed to be partially filled with arsenic trioxide.

The upper floors in this building are constructed with steel plates. A structural evaluation of the building in 2008 noted that sections of the catwalks were corroded and may be unsafe, with the third floor particularly corroded.

4.6 AC Roaster Building

The building is a multi-level wood structure with concrete floor and foundation, pitch felt roof, with approximate dimensions of 18 m wide x 70 m long x 10 m high. Asbestos is present in the exterior paper siding; however, the wooden building walls and roof are not insulated. The floor of the building is concrete; however, the raised floor portion at the south end of the building is comprised of a thin concrete cap overlying the calcine bed from the former horizontal hearth roaster. The remains of a pipe rack and corridor that were once connected to the Mill Building are present at the south end of the building and require removal.

Equipment present in the building includes, but is not limited to: a pipe machine, carbon plant leach tanks, a carbon stripping plant, the roaster feed slurry tank, a high pressure water tank, cyanide process area and electro-twinning cell. Open barrels of sodium hydroxide were noted in the building. Insulation around piping located around the building perimeter is asbestos containing and is in poor condition, having fallen on the ground, interior building, and equipment surfaces. Dust containing arsenic trioxide and potentially sodium cyanide is present on the floor and on structures throughout. Portions of the exhaust flue network from the former AC Roaster have been abandoned inside the building. The flues are wrapped with an asbestos containing insulation and contain arsenic trioxide dusts.

Due to potential safety concerns, some of the wooden staircases were not used during the 2012 inspection which made some sections of the building inaccessible.

4.7 Calcine Plant

The Calcine Plant is a steel frame, multi-level structure with rigid transite board siding and roofing. The building is U shaped, with sections of the following dimensions: 12.9 m x 5.3 m x 5.2 m high; 22.4 m x 9.9 x 6.3 m high and 23.9 m x 15.3 m x 11 m high. The exterior transite board walls and roof have been coated with a spray applied asbestos containing insulation. The building has a concrete floor, except below a 12 m diameter wooden thickener tank located in the northwest corner of the building. A 24 m long rotary kiln is located in the central portion of building. An interior inspection of the kiln could not be completed; however, small quantities of soluble arsenic process waste were observed on the interior wall of the kiln. An above ground fuel storage tank (approximately 1500 L) that supplied fuel to the kiln is present and is expected to contain residual fuel and sludge. Delamination of the spray applied insulation on the walls and ceiling is occurring, resulting in asbestos containing insulation debris scattered throughout the building. All surfaces in the building are heavily coated with soluble arsenic process residues and arsenic trioxide dust that is co-mingled with asbestos fibres. Other asbestos containing materials

include pipe insulation, rigid cement board, insulated ducts, mechanical process equipment insulation, and vermiculite containing wall insulation.

4.8 Arsenic Silo

The Silo is a 425 m^3 capacity bolted steel tank, 7.3 m in diameter and 20 m high. A screw auger transferred material from the silo to the adjacent Scale House. A control room as well as material handling equipment are located below the cone at the base of the Silo.

4.9 Weight Scale House

The building consists of a pre-fabricated steel structure, on a concrete foundation, with approximate dimensions of 21.9 m x 7.1 m x 6 m tall. The metal structure does not have asbestos containing insulation. The interior of the building was snow-covered during the 2012 assessment so no inspection for the presence of arsenic trioxide dust could be completed.

4.10 Roaster Stack

The Stack is a brick structure, approximately 45.7 m high, with a 4.9 m diameter base. It is understood that portions of the steel collar have fallen off the top and have landed on the roof of the adjacent Fan House. Background reports indicate that the stack is constructed of an exterior brick chimney with an interior acid proof brick lining. Arsenic trioxide dusts are reported have accumulated at the base of the stack, forming a pile approximately 2.75 m high. Due to potential safety concerns, no assessment activities were completed within a 10 m radius of the stack.

4.11 Fan House

The building is steel frame with rigid transite board siding and roofing, and a concrete floor. The approximate dimensions are 9 m x 8 m x 5 m high. The exterior flues connect into this building; therefore, the building potentially contains arsenic trioxide dust. Due its close proximity to the Roaster Stack, this building was not entered so no assessment of the interior was completed.

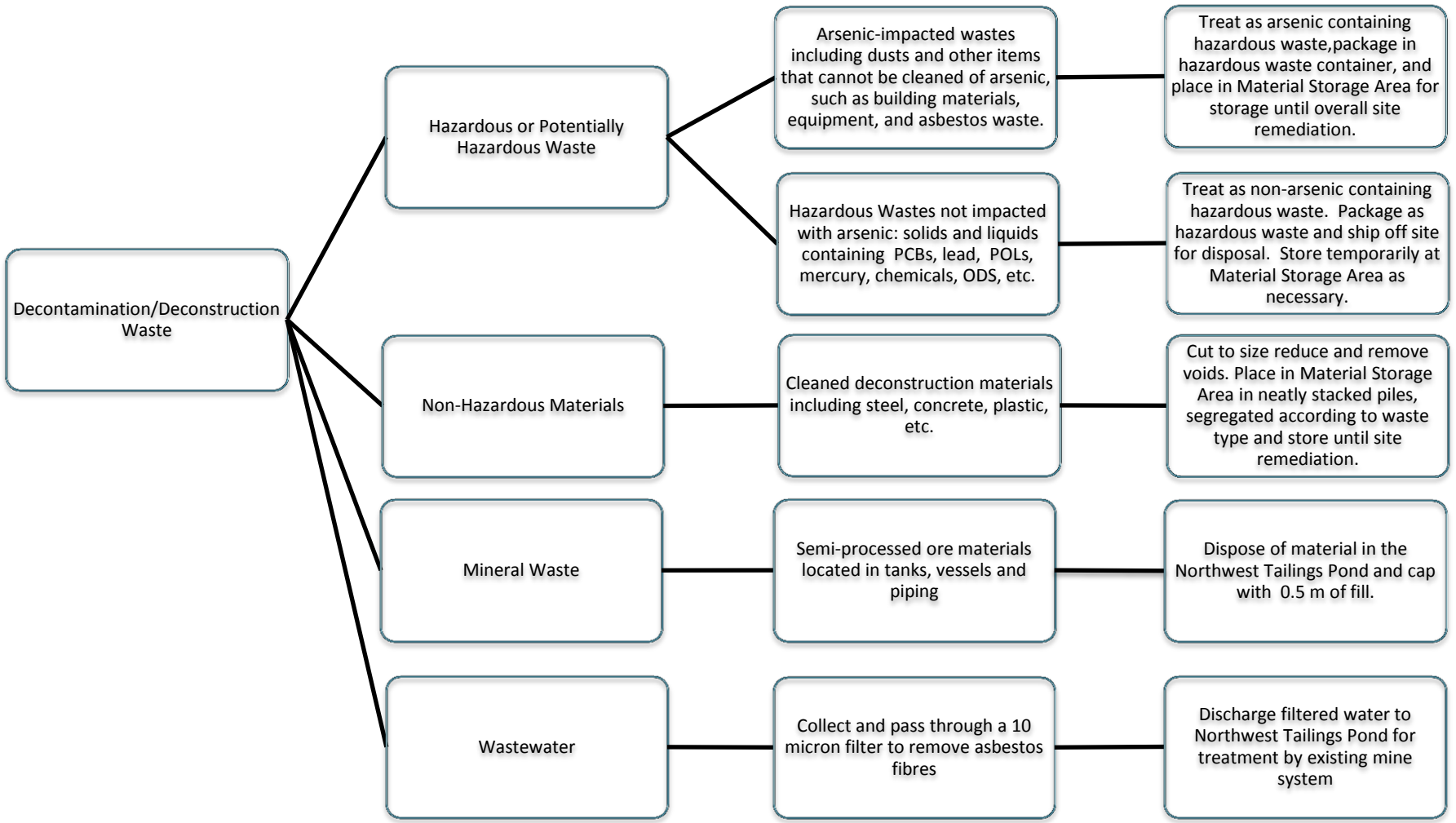
5. Identification of Waste Streams

5.1 Assessment Activities

During March 14 to 23, 2012 a survey of the buildings located in the Roaster Complex was completed by an AECOM /Golder field team. The purpose of the survey was to identify and quantify hazardous materials located in each Roaster Complex building as well as to estimate the volume of wastes that would be generated during the demolition of the structures. Due to the cold temperatures (approximately -20 ^{0}C), the duration of the daily assessment activities, as well as the amount of building material decontamination trials that could be completed, was limited. All assessment activities followed the work procedures outlined in the Golder prepared health and safety plan titled, “Comprehensive Work Plan and Safety Plan – Roaster Complex and Demo Audit, March 2012”. To support this assessment work, a three stage decontamination unit was installed on the east side of the AC Roaster Building.

Based on the results of the field inspection, the Roaster Complex decontamination and deconstruction work will generate four primary waste streams: hazardous or potentially hazardous wastes, non-hazardous materials, mineral waste, and wastewater. Diagram 1 on the following page illustrates the division of the waste into the four waste streams. During the inspection, the field team observed that essentially all interior surfaces in all the roaster buildings are coated with various amounts of arsenic trioxide dust and/or asbestos fibres. In some areas, sodium cyanide dusts are also present. As a result, in order to separate the wastes into their respective waste stream, all waste materials need to be abated of arsenic trioxide, asbestos and/or cyanide containing materials. Photographs of the various waste materials observed during the field survey are presented in Appendix C.

Diagram 1 Deconstruction Waste Streams



5.2 Hazardous or Potentially Hazardous Wastes

Hazardous or potentially hazardous wastes will be generated during building decontamination. The following hazardous or potentially hazardous materials have been identified in the Roaster Complex:

- Arsenic trioxide dust
- Asbestos containing insulation coated with arsenic trioxide dusts
- Asbestos containing wall and ceiling insulation, exterior siding coated with arsenic trioxide dust
- Asbestos containing pipe and process vessel insulation coated with arsenic trioxide dust
- Asbestos containing floor products coated with arsenic trioxide dust
- Sodium cyanide dusts co-mingled with arsenic trioxide dusts
- Wooden building materials and process equipment contaminated with sodium cyanide and/or arsenic trioxide
- Arsenic trioxide contaminated refractory brick
- PPE coated with asbestos and arsenic trioxide dusts
- Asbestos containing gaskets
- Sodium cyanide containers potentially containing residual quantities
- Containers of motor oil and grease
- Cans of paint and spray paint
- De-greasers and miscellaneous cleaning products
- Cans of glue/adhesives
- Mercury containing control valves
- Mercury containing light tubes
- Dielectric fluids in transformers (potentially PCB containing)
- PCB containing light ballasts
- Fuel storage tanks and piping, potentially containing sludges, residual quantities
- Granular sulphur
- Barrels of sodium hydroxide
- Barrels of penetrating asbestos encapsulate
- Antifreeze
- Small quantities of lab chemicals (silver nitrate, potassium iodide, potassium permanganate, pH buffer solutions)
- Citrex cleaner
- Partially full barrels of unknown liquids, not labeled
- Water coolers potentially containing chlorofluorocarbons (CFCs)/ozone depleting substances (ODS)
- Batteries in emergency lighting
- Lead acid batteries
- Leachable lead items such as lead sheeting and items painted with leachable lead amended paint
- Process waste with soluble arsenic

5.3 Non-Hazardous Materials

Non-hazardous building materials and equipment will be generated during building deconstruction. The following non-hazardous items have been identified in the Roaster Complex:

- Structural steel
- Plastics materials
- Steel piping, machinery, tanks and spare parts
- Steel exterior siding
- Glass
- Rubber hose and gaskets
- Electrical panels and wiring
- Furniture
- Paper products
- Fibreglass insulation
- Concrete (raised pads on floor slabs)
- Tools
- Scrap metals/pipe/pipe fittings

Due to potential residual contamination on any of these items, and liability associated with ownership transfer, AECOM understands that AANDC does not want to allow for salvage of materials.

Non-hazardous materials should be stored on-site for eventual disposal with other non-hazardous waste generated from remediation activities in the proposed on-site landfill. A discussion of proposed waste storage locations for both non-hazardous and arsenic/asbestos containing wastes is presented in Section 6.0.

5.4 Mineral Waste

The Roaster Complex contains some mineral wastes remaining from ore processing activities including: residual semi-processed ore materials located in process vessels; residuals located in the carbon-in-pulp leach tanks; scale located on tanks, piping and in process thickeners and water located in floor sumps. This material is chemically similar to the ore itself or the tailings; therefore disposal of this material is recommended in one of the tailings ponds. However, some of the semi-processed waste is contaminated with arsenic trioxide due to its presence in the roaster complex and/or contains soluble arsenic levels. Only semi-processed waste that does not have soluble arsenic (arsenic trioxide) will be considered as mineral waste.

5.5 Wastewater

Wash, or wastewater, refers to any water used in the decontamination/hazardous material abatement process to control or remove arsenic trioxide, sodium cyanide and asbestos contaminated dust, or to clean fuel or oil containing equipment, tanks and lines. Any water required for such use should be taken from the Polishing Pond located near the Effluent Treatment Plant. No fresh water from local surface water bodies should be used. Note that water use in buildings containing sodium cyanide may generate hydrogen cyanide gas.

Any water used for decontamination or dust control should be collected for treatment, as it is expected to contain asbestos fibres, arsenic, and potentially hydrocarbons for specific decontamination activities. Treatment will include passing through a 10 micron filter to remove asbestos fibres, and treating to remove hydrocarbons where required. Treated water should then be discharged to the Northwest Tailings Pond where it will be passed through the current mine treatment system for removal of arsenic and other metal contaminants.

6. Hazardous Waste Inventory

The following subsections provide more detail regarding the various types of wastes that were identified during the completion of the hazardous waste assessment. Due to snow coverage at the time of the inspection, no dust samples were collected inside the weight scale building. No interior dust samples were collected inside the Fan House due to safety concerns relating to the Roaster Stack.

Loose Dusts

Based on field observations, it is assumed that loose dust located in the Roaster Complex buildings will consist of, but not be limited to, the following materials:

- Waste mine rock dust
- Process residual dust
- Arsenic trioxide
- Asbestos containing materials and fibres
- Sodium cyanide
- Sodium hydroxide
- Flakes of paint
- Other process chemicals
- Rusts and corroded metals

Dusts were observed on all exposed surfaces located inside the buildings including floors, walls, structural support members, process equipment, piping, tanks, vessels, roof trusses, window frames, staircases, etc. Dusts were also identified in control rooms, on furnishings, inside storage cabinets as well as inside electrical cabinets/equipment. Photographs of the typical surfaces coated with dust are presented in many of the photograph included in Appendix C, but Photos 1, 2, 9, 17 and 18 in particular. As indicated in the analytical summary tables presented in Appendix B, dust products that contained leachable (soluble) levels of arsenic above the NWT standard of 2.5 mg/L were identified in the following buildings:

- AC Roaster
- Calcine Building
- Dorrco Roaster
- Cottrell Precipitator
- Baghouse
- Silo Control Room

Due to leachable arsenic levels identified in the dust in the above noted buildings, suspected arsenic in dust at the Fan house and Roaster Stack, and observations regarding asbestos debris, all dust is to be treated as arsenic containing hazardous waste. Where scale and residuals cannot be removed from piping/vessels, the entire vessels should be containerized and treated as arsenic-containing hazardous waste, or mineral waste, as appropriate.

Bulk Materials located in Piping and Vessels

During the inspection, various amounts of residual mineral process wastes/pipe scale were identified on ore process equipment, in piping and in tanks. Various examples of the materials included:

- Process residuals and chemical scale on wooden tanks were observed near the Carbon in Pulp tanks in the AC Roaster Building, Photos 5 and 6
- The precipitator rods located in the Cottrell building are heavily coated with arsenic scale - Photo 11
- Residual process ore wastes were noted inside vessels and piping - Photos 15 and 16

The identified residual semi-processed waste is classified as either mineral waste, or arsenic-containing hazardous waste, depending on the soluble arsenic concentrations of samples.

Stained/Saturated Wood Products

During the inspection, various wood products were identified that had been stained from on-site processes. The stained wood included: tanks and associated structural supports, elevated wooden platforms and floors (joists and flooring), catwalks, staircases and exterior walls. Photographs of the stained wood products are presented in Appendix C, Photos 3, 4, 5, 6 and 12.

During the completion of the hazardous materials survey, attempts were made to clean dust covered wood and steel products in the AC Roaster Building. The purpose of this test was to determine if interior surfaces could be sufficiently cleaned to allow the dust covered material to be disposed of as a non-hazardous waste product. Due to the cold interior temperatures (approx. $<-20^0$C), the field team was unsuccessful in removing dust using wetted surface wipes as they froze to the object surfaces.

Samples of a dust covered wooden sill located in an exterior wall and a stained wooden tank located in the AC Roaster Building were recovered and analyzed for leachable metals using the TCLP method. As indicated in the hazardous material summary tables found in the Golder report in Appendix B, the leachate test results for the wooden exterior wall and storage tank were 16.2 mg/L and 313 mg/L respectively. Based on these preliminary leachable arsenic results, all wood materials (tanks, interior floors, exterior walls, structural building members, etc.) should be disposed of as an arsenic containing hazardous waste.

Hazardous Building Materials

- Asbestos containing items

  Analytical testing confirmed the presence of asbestos in the following building elements:

  - Exterior paper siding on the AC Roaster Building and the soffits of the Fan House.
  - Exterior transite panels on the exterior walls of the Fan House, Calcine, Dorrco Roaster and Cottrell buildings. The interior surfaces of the exterior walls were typically treated with a spray applied asbestos containing insulation; the asbestos type was typically chrysotile, but amosite and crocidolite were also identified.
  - Insulation lining all exterior surfaces of the baghouse assembly located inside the Baghouse Building.
  - Insulation on walls and bottom hoppers of the precipitator unit and on the large air feed and exhaust ducts inside the Cottrell Precipitator Building.
  - Pipe insulation, which was commonly in very poor shape, having fallen off the pipes onto the floor surface below.
  - The exterior flue network located on the east and west sides of the Cottrell Precipitator building (previous assessments).
  - Numerous process vessels, roaster, exhaust ducts, piping, flooring materials and gaskets.
  - Vermiculite insulation (potentially asbestos-containing) in one wall of the Calcine Building.

  Photographs 7 to 10 present some of the asbestos containing materials. There were no asbestos containing insulation materials identified in the walls of the Bag House or Weight Scale buildings. Numerous other asbestos containing materials were identified in the Roaster buildings including:

  - Exterior wall and roof panels
  - Pipe insulation
  - Gaskets
  - Exterior paper siding

- Flooring materials
- Vermiculite wall insulation
- Wall texture
- Electrical insulation

Due to the leachable arsenic levels identified in the dust in all the Roaster Complex buildings as well the wide-spread use of encapsulants in these buildings, the asbestos containing materials are potentially co-mingled with leachable arsenic. In consideration of the difficulty of cleaning the asbestos containing materials of arsenic trioxide dusts, it is recommended that all asbestos containing items be handled and disposed of as an arsenic containing waste, with the exception of asbestos containing items that have been enclosed within equipment

- Chemicals

  Various chemicals were identified during the hazardous material survey. These chemicals consisted of:

  - Laboratory chemicals (<1 L silver nitrate, potassium iodide, potassium permanganate) - Photo 12
  - Bags of soda ash
  - Small quantities of paints, solvents, adhesives and cleaners located in cabinets - Photo 19
  - Partially full 205 L barrels of antifreeze - Photo 20
  - 205 L barrels of asbestos encapsulant - Photo 21
  - Open and partially full 205 L barrels of sodium hydroxide - Photo 22
  - 25 kilogram (kg) bags of granular sulphur - Photo 29
  - Empty sodium cyanide barrels, potentially containing residual quantities - Photo 30

  It is recommended that the containers containing chemicals be cleaned to remove residual asbestos fibres as well as dusts potentially containing arsenic and/or cyanide. After cleaning, the containers will need to be repackaged and removed from the site as a non-arsenic containing hazardous waste.

- Painted Products

  No paint products were identified to be amended with PCBs at concentrations greater than 50 milligrams per kilogram (mg/kg) and the only painted item identified that contained lead amended paints with a leachable concentration exceeding 5 mg/L was identified in the Baghouse (green door/trim).

- Lead

  Lead sheeting was observed around the windows located on the Cottrell, Dorrco, Fan House and Calcine buildings. Small quantities of lead containing batteries are also present in the emergency light fixtures located throughout the Roaster buildings. All lead should be removed prior to the demolition of the structures and disposed of as a non-arsenic containing hazardous waste.

- PCBs

  PCBs are potentially located in the oils located in the switch gear/transformer oils in the electrical rooms. All electrical equipment, including ballasts which are suspect to contain PCBs will need to be removed prior to building demolition. Photographs of potential PCB containing electrical equipment is presented in Photos 23 and 24. It is recommended that all equipment identified to contain PCBs be cleaned to remove residual asbestos fibres as well as dusts potentially containing arsenic and/or cyanide. After cleaning, the PCB containing equipment will need to be removed and disposed offsite as a non-arsenic containing hazardous waste.

- Mercury

  A number of potentially mercury containing control devices, chart recorders and thermostats were identified during the hazardous material inspection. Mercury containing lights (fluorescent light tubes and high intensity

bulbs) were also noted. The buildings that were identified to contain mercury included the Baghouse, Calcine Plant, Dorrco Roaster, and Cottrell Precipitator. It should be noted that spilled mercury was observed on the concrete floor in the Dorrco Roaster. Cleanup and removal of the spilled mercury will need to be completed prior to the removal of other waste and dust materials located in the control room. All mercury containing devices should be removed prior to the deconstruction of the building. Photos presenting some of the mercury containing equipment are presented in Photo 27 and 28 in Appendix C.

It is recommended that all items that are identified to contain mercury be cleaned to remove residual asbestos fibres as well as dusts potentially containing arsenic and/or cyanide. After cleaning, the mercury containing items should be handled and disposed of as a non-arsenic containing hazardous waste.

- ODS

  During the recent inspection, a number of potential ozone depleting substances (ODS) were identified in water coolers. It is recommended that all refrigerants in these buildings be removed from the refrigeration equipment prior to the demolition of the structures. In the event the refrigerant cannot be removed, it is recommended that the equipment identified to contain ODS be cleaned to remove residual asbestos fibres as well as dusts potentially containing arsenic and/or cyanide. After cleaning, the entire piece of equipment or the ODS will need to be removed by a certified contractor and treated as a non-arsenic containing hazardous waste.

- Petroleum, Oils and Lubricants (POLs)

  Miscellaneous containers with small volumes (<20L) of petroleum products, oils or lubricants were observed in the majority of the on-site structures. In some buildings, unlabelled containers with suspected oil and lubricant contents were observed (Photo 20). Based on site observations, it is expected that some of the process equipment will also contain compressor oils/hydraulic fluids (e.g. AC Roaster Compressor Room, Cottrell Precipitator). Located in the Calcine building is an aboveground fuel storage tank (approx. capacity - 1500 L) which supplied fuel to the rotary kiln. Prior to the demolition of this storage tank, the contractor will be required to inert the tank and remove residual amounts of fuel/sludge. The above ground tank is presented in Photo 25. Photo 26 shows the compressor which potentially contains oil.

  It is recommended that all containers that are identified to contain petroleum products be cleaned to remove residual asbestos fibres as well as dusts potentially containing arsenic and/or cyanide or the contents be transferred into a new container. After removal from the buildings, the POL items should be handled and disposed of as a non-arsenic containing hazardous waste.

- Radioactive Materials

  Smoke detectors were observed in the AC Roaster Building. These detectors as well as any detectors identified in the other buildings need to be removed prior to the demolition of the building and disposed of according to territorial regulations.

7. Waste Volumes

An estimate of waste volumes is necessary to determine the required sizing of waste storage areas, the number and type of containers needed for transport of non-arsenic containing hazardous waste off site for disposal, the number and size of containers to hold the waste for storage until the on-site disposal during the Giant Mine Remediation Program, and to use in the design of on-site containment structures. Because of their differing disposal requirements, separate volumes were identified for arsenic-containing hazardous waste, non-arsenic containing hazardous waste, mineral waste, and non-hazardous waste.

Table D1 in Appendix D presents a summary of the estimated non-hazardous, mineral, and hazardous wastes that would be generated from the deconstruction of the Roaster Complex. The hazardous wastes have been further divided into arsenic containing and non-arsenic containing. Further details of the wastes that would be generated in each building are provided in Tables D1a through D1h. Table D2 in Appendix D presents a summary of various building components and quantities identified in each building. The volumes presented in these tables represent the in place volume and do not take into account the volume the waste would take up once the waste is removed from its current location and repackaged. These volumes all assume that:

- Steel items such as structural steel, plate steel and tanks, and flooring materials can be cleaned of arsenic trioxide to allow the waste to be classified as a non-hazardous waste
- All wood wastes are classified as arsenic containing hazardous waste

Table E1 in Appendix E presents a summary of the destined waste disposal requirements for each identified waste stream in each building. The volume of arsenic impacted wastes destined for disposal has considered the ease with which materials may be cleaned to remove arsenic contaminants. During the decontamination program, it is expected that some materials will be easily cleaned of contaminants (e.g. structural steel); these items have been considered as non-hazardous waste. However, the removal of arsenic trioxide dust off rigid transite board with a spray applied asbestos insulation and from the interior surfaces of process piping and equipment will be difficult, if not impossible; for items such as these, it is expected that the waste item will not be cleaned and will be managed as an arsenic containing waste.

As indicated in Table D1, a total 6,046 cubic metres (m^3) of waste are estimated to be generated from the deconstruction of the Roaster Complex. This volume includes 2,267 m^3 of non-hazardous waste, 137 m^3 for mineral waste, 57 m^3 for non-arsenic hazardous waste and 3,585 m^3 of arsenic containing hazardous waste.

8. Summary and Recommendations

To fit in to design intents of the larger Giant Mine Remediation Program, the decontamination and deconstruction of the Roaster Complex will require that waste be segregated according to these types: arsenic-containing hazardous waste, to be containerized and stored for eventual disposal with arsenic trioxide waste on site; non-arsenic containing hazardous waste, to be shipped off site for disposal at a licensed hazardous waste facility; mineral waste, to be disposed of as tailings; and non-hazardous waste, to be stored on site for eventual disposal in an on-site non-hazardous waste facility.

Temporary storage areas will need to be established to store waste generated from the Roaster Complex decontamination and deconstruction until it is disposed of as part of the overall site Remediation Program. Hazardous waste storage will need to be in secure containers that will withstand weather conditions for several years, and storage areas should have restricted access with signage at all possible access points identifying the area as containing hazardous waste. A detailed inventory should be maintained and the information stored on site. The areas should be inspected on, at minimum, a monthly basis. Non-arsenic containing hazardous waste will be containerized in a manner that complies with TDG, for shipment and disposal off site. Any wastewater generated from decontamination activities will need to be collected, treated to remove asbestos fibres and hydrocarbons as necessary, and discharged to the Northwest Tailings Pond for further treatment within the existing mine water treatment system.

Due to the contaminants that are present in these buildings, the decontamination and deconstruction processes will need to be completed following specific work procedures in a stepwise manner. Arsenic-containing dust, admixed with asbestos debris, and in two buildings, cyanide, is present on virtually all surfaces inside the buildings. Asbestos, typically coated with arsenic dust, is present in essentially all buildings. Because of these two issues, decontamination must proceed prior to building deconstruction. During decontamination activities, the buildings will need to be sealed to prevent release of airborne contaminants to the surrounding environment. Workers completing decontamination work should be supplied with the necessary personal protective equipment (PPE) to protect them from exposure. Air quality monitoring should be ongoing inside and outside the building during work that will generate airborne contaminants (dust removal and asbestos abatement). Decontamination procedures and worker PPE for buildings that contain cyanide will need to account for the potential generation of cyanide gas with the use of water.

All surfaces inside the building, including equipment and debris, should be cleaned during decontamination by vacuuming, wiping, or other means deemed adequate. Decontamination of equipment and building materials should be done, if possible, to the extent that it meets the applicable criteria for classification as non-hazardous waste, with confirmatory testing as necessary. Arsenic-containing hazardous waste and non-arsenic containing hazardous waste should be containerized at the source area during decontamination. The exterior of waste containers should be cleaned to remove residual amounts of cyanide, asbestos and arsenic prior to removal from the source area.

The mineral wastes remaining from ore processing activities that are located in process vessels, tanks and piping should be disposed of in the tailings ponds.

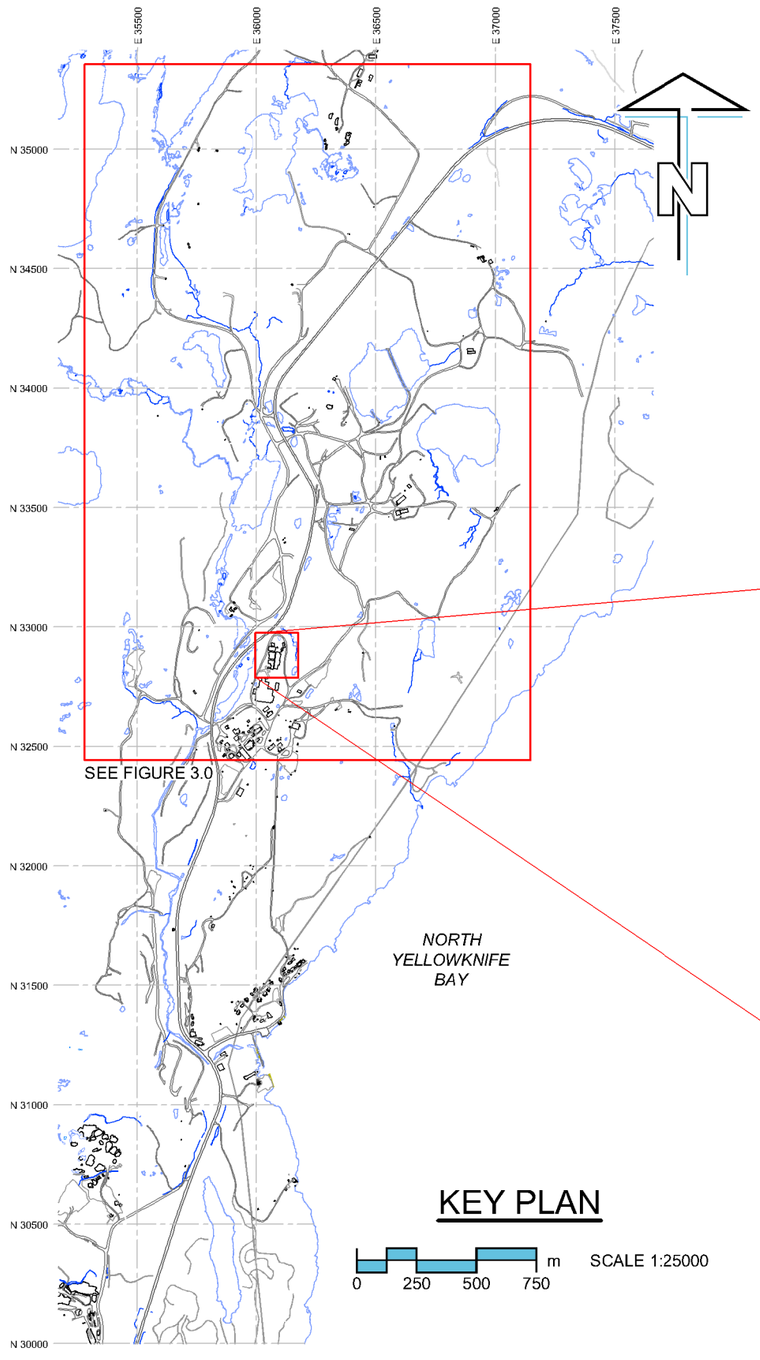
The complete removal of hazardous materials from some of the construction materials, and within process equipment and piping, may not be possible. For items such as these, it is expected that the equipment or materials will be cut as required, containerized, and managed as arsenic containing waste, or mineral waste, as appropriate.

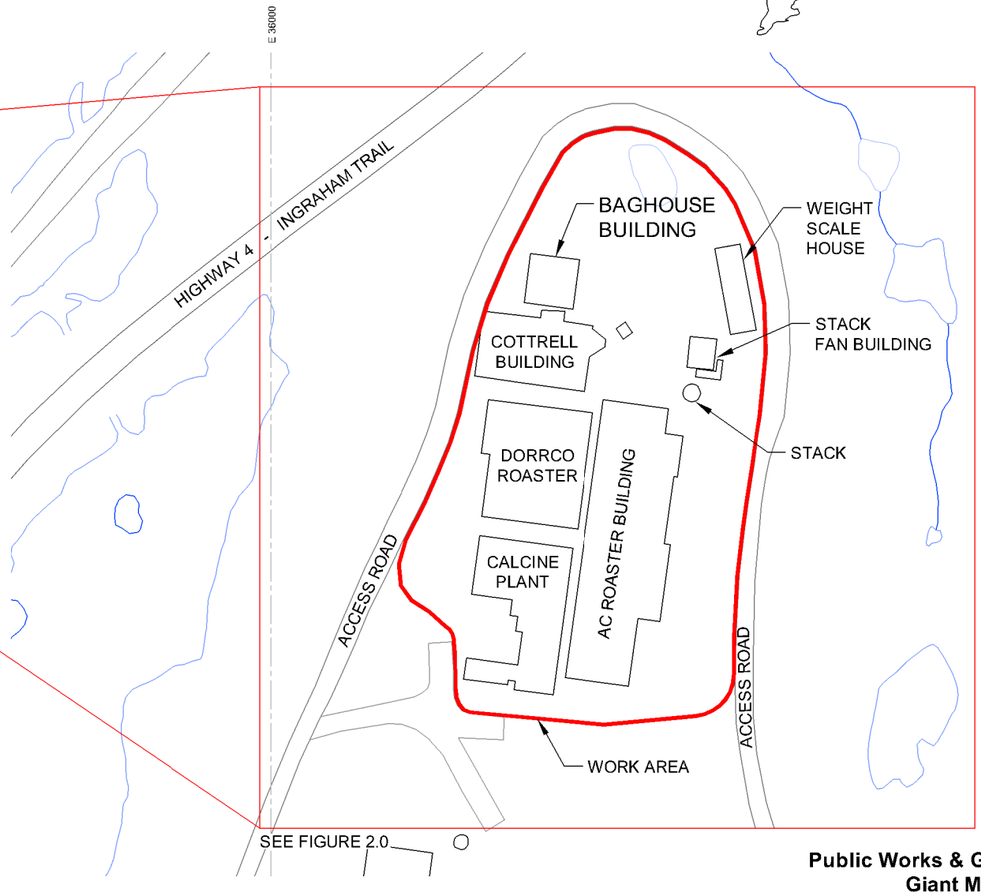
Due to potential residual contamination on any of the non-hazardous materials and liability associated with ownership transfer, salvage of materials should not be allowed. Non-hazardous waste from deconstruction should be size-reduced only to the extent necessary for transport and storage. It should be stacked and stored in a tidy condition.

As indicated in Table D1, a total 6,046 m^3 of waste are estimated to be generated from the deconstruction of the Roaster Complex. This volume includes 2,267 m^3 of non-hazardous waste, 137 m^3 for mineral waste, 57 m^3 for non-arsenic hazardous waste and 3,585 m^3 of arsenic containing hazardous waste.

Appendix A

Figures





KEY PLAN

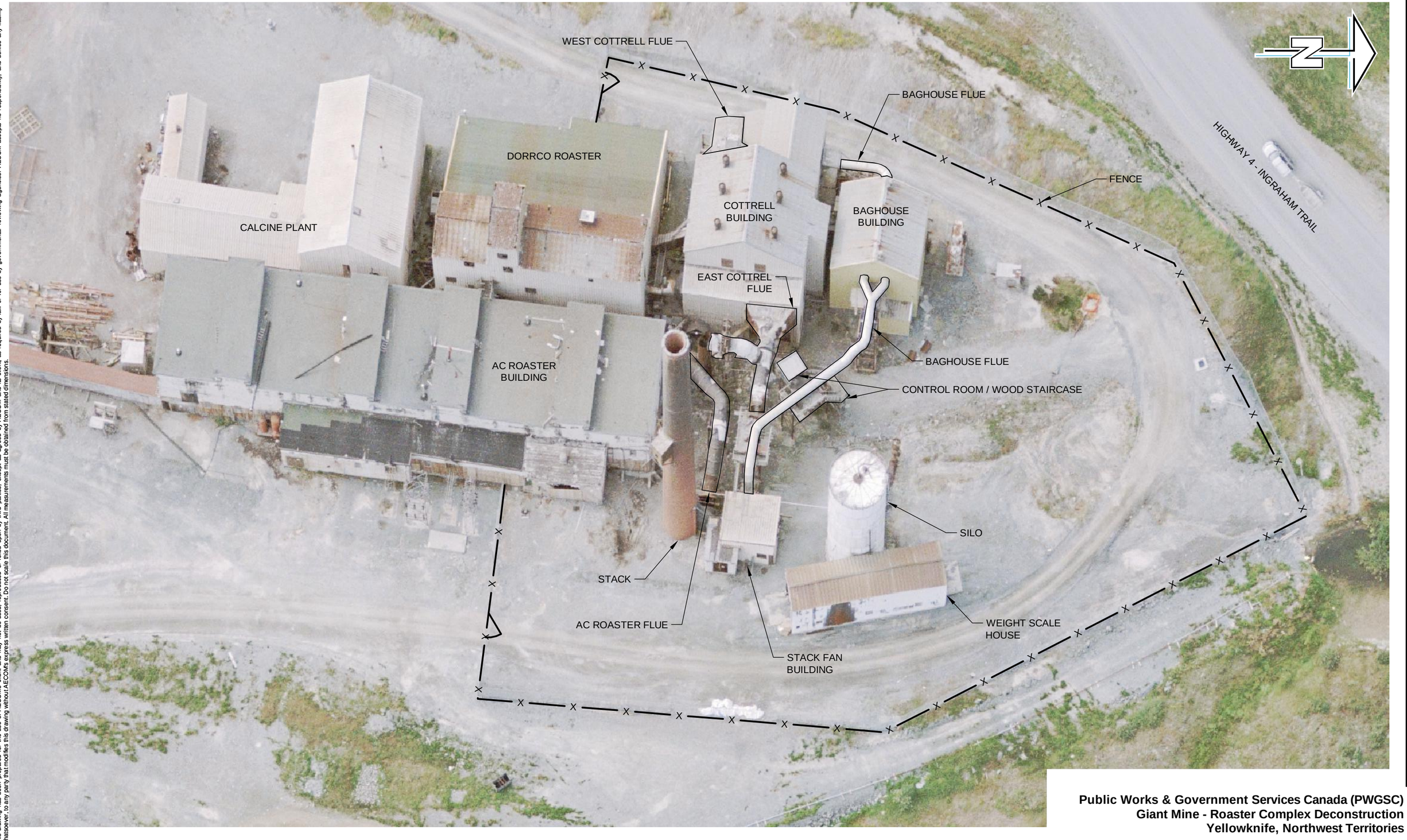
0 250 500 750 m SCALE 1:25000

0 15 30 45 m SCALE 1:1500

Public Works & Government Services Canada (PWGSC)
Giant Mine - Roaster Complex Deconstruction
Yellowknife, Northwest Territories

AECOM

Site Location Plan
Figure 1.0



0 5 10 15 m SCALE 1:500

Public Works & Government Services Canada (PWGSC)
Giant Mine - Roaster Complex Deconstruction
Yellowknife, Northwest Territories

AECOM

Overall Site Plan
Figure 2.0

Appendix B

Golder Associates Hazardous Building Materials Assessment Report

REPORT

A world of capabilities delivered locally

July 13, 2012

REPORT ON

Hazardous Building Materials Assessment Report - Roaster Complex - Giant Mine Site

Submitted to:
AECOM
17203-103 Avenue
Edmonton, AB T5S 1J4
Phone: (780) 486-7920
Fax: (780) 488-2121
Email: Gordon.Woollett@aecom.com
Attention: Mr. Gordon Wollett

Project Number: 11-1375-0244/1000
AECOM Doc. No.: 003-DISO Roaster Demo-DISO-RPT-0003-Rev0_20120713
Golder Doc. No.: 193

Distribution:

1 Copy - AECOM

2 Copies - Golder Associates Ltd.

Golder Associates

Study Limitations

Golder Associates Ltd. (Golder) has prepared this document in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practising under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this document. No warranty, express or implied, is made.

This document, including all text, data, tables, plans, figures, drawings and other documents contained herein, has been prepared by Golder for the sole benefit of AECOM. It represents Golder's professional judgement based on the knowledge and information available at the time of completion. Golder is not responsible for any unauthorized use or modification of this document. All third parties relying on this document do so at their own risk.

The factual data, interpretations, suggestions, recommendations and opinions expressed in this document pertain to the specific project, site conditions, design objective, development and purpose described to Golder by AECOM, and are not applicable to any other project or site location. In order to properly understand the factual data, interpretations, suggestions, recommendations and opinions expressed in this document, reference must be made to the entire document.

This document, including all text, data, tables, plans, figures, drawings and other documents contained herein, as well as all electronic media prepared by Golder are considered its professional work product and shall remain the copyright property of Golder. AECOM may make copies of the document in such quantities as are reasonably necessary for those parties conducting business specifically related to the subject of this document or in support of or in response to regulatory inquiries and proceedings. Electronic media is susceptible to unauthorized modification, deterioration and incompatibility and therefore no party can rely solely on the electronic media versions of this document.

Table of Contents

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) is pleased to provide AECOM (the Client) with this report detailing our findings associated with the Hazardous Building Materials Investigation and Demolition Audit. The Investigation was conducted in support of the Public Works and Government Services Canada, Terms of Reference (TOR) for the Demolition Audit and Engineering Specifications/Tender Documents for the Roaster Complex Demolition. The Roaster Complex is located on the Giant Mine Site (the Site), located north of Yellowknife, Northwest Territories. The field work was conducted by Richard Mathieson, EHS Project Manager, Tom Janiszewski and Jibran Qurashi, EHS Technologists from March 14 to March 22, 2012, under the Technical Direction of Andrew Grant, Associate/Senior Project Manager.

2.0 BACKGROUND

Golder assisted the Client in the Demolition Audit process by conducting a hazardous building materials investigation and the associated sampling within accessible areas of the Roaster Complex. The assessment was requested to qualify designated substances including but not limited to identifying the presence of arsenic and arsenic contaminated building materials, asbestos-containing materials (ACM), cyanide, lead-based paints on building surfaces, miscellaneous lead materials, mercury in equipment and fixtures, PCBs, radioactive building components, and ozone-depleting substances (ODS).

Prior to the assessment, the Roaster Complex was known to be contaminated with arsenic trioxide and asbestos-containing materials; therefore, at the request of the Client, Golder developed a Comprehensive Work Plan and Safety Plan (Document Number: 003-DISO Roaster Demo-DISO-PSP-0001Rev1_20120131) prior to entering the Roaster Complex. This document was prepared to meet the legislated requirements outlined in the Northwest Territories Safety Act and within the Canadian Labour Code when working with arsenic and asbestos. The plan detailed the required engineering, administrative, and personal protective equipment that was to be used during the Hazardous Building Materials Assessment and Demolition Audit to protect workers from exposures to arsenic and asbestos. Upon completion of the investigation, Golder prepared an Occupational Hygiene Assessment Report (Document Number 003-DISO Roaster Demo DISO-PSP-0001-Rev-1_20120131); this report detailed the events of the assessment, worker exposures, and decontamination activities.

3.0 SCOPE OF WORK

Golder's scope of work for this phase of the project included the following:

- Conducting semi-destructive sampling of potential hazardous building materials within the Roaster Complex to qualify any designated substances including but not limited to identifying the presence of arsenic and arsenic contaminated building materials, asbestos-containing materials (ACM), cyanide, lead-based paints and glazes on building surfaces, miscellaneous lead materials, mercury in equipment and fixtures, PCBs, radioactive building components, and ozone-depleting substances (ODS); and
- Generating a Hazardous Building Materials Report detailing our findings and recommendations.

4.0 ASSESSMENT AND SAMPLE COLLECTION METHODS

Hazardous building materials within the Roaster Complex identified during the assessment were documented, sampled, and locations were detailed. Building materials similar to materials sampled in previous locations and during previous assessments were visually referenced. The assessment was conducted on a building-by-building basis. Digital photographs of all sample locations, visually referenced materials, and suspected hazardous building materials were collected on Site. As per discussion with the Client, Golder did not quantify identified hazardous building materials located within the Roaster Complex. Areas of the Roaster Complex assessed included the following buildings:

- AC Roaster;
- Dorrco Roaster;
- Calcine Plant;
- Scale House;
- Fan House (exterior only);
- Cotrell Building;
- Baghouse; and
- Silo Building.

The Flue Network, Roaster Stack, and Interior of the Fan House were not included in the investigation due to safety concerns with the Flue Network and the Roaster Stack.

Only reasonably accessible areas were included in the assessment, generally inaccessible areas (e.g., above fixed ceilings, behind walls, inside confined spaces, below snow cover, areas of visible building structure damage) or areas requiring special equipment to reach (e.g., working from heights) were not assessed due to health and safety concerns. However, attempts were made to visually assess these areas in order to obtain reasonably available information. In addition, electrical equipment and the interior of mechanical equipment (i.e. interior of the roasters, tanks, vessels, and flues) were not fully assessed; however assumptions were made as to the presence of hazardous materials present within these items.

During the assessment many limitations were encountered due to snow cover and sub zero temperatures. Roofs and some elevated platforms within the buildings were inaccessible due to the unknown structural integrity of the portions of the building as many of the roofs had holes and or were missing panels.

4.1 Arsenic Dust and Arsenic Contaminated Building Materials

Arsenic in Dust (total As)

In order to assist in evaluating the concentration of arsenic particulates within the dust /debris located throughout the Roaster Complex bulk samples of dust/debris were collected for arsenic analysis. Upon completion of the testing, all arsenic samples were sent to ALS Laboratories, an independent American Industrial Hygiene Association (AIHA) accredited laboratory for analysis. Bulk Samples were analyzed based on the United States Environmental Protection Agency (EPA) 200.2/6020A.

Leachable Arsenic (Metals)

In order to assist in evaluating the disposal requirements for the dust/debris and building components within the Roaster Complex, bulk samples were collected and submitted for leachable arsenic and leachable metals (at the request of the Client) following Toxicity Characteristic Leaching Procedures (TCLP). Bulk samples of dust/debris and waste materials were submitted to ALS laboratories and analyzed for leachable metals in general accordance with the EPA Method SW846, Methods 1311 and 6020.

4.2 Asbestos-Containing Materials

As directed by the Client, systematic sampling of identified and accessible suspect asbestos-containing materials (ACMs) was conducted within accessible areas of the buildings. Work was conducted in accordance with the standards outlined by the Northwest Territories Public Works and Services, General Guidelines Asbestos Removal and Disposal and the National Institute for Occupational Safety and Health (NIOSH).

The assessment evaluated the type, extent, and condition of ACM within accessible areas throughout the Roaster Complex. The systems that were reviewed as part of the assessment included, but were not limited to:

- Structural - systems including fireproofing on: beams, open and solid webbed joist systems, Q-deck;
- Mechanical - systems insulation including: hot water and steam system, condensate system, chilled water system, glycol system, domestic hot and cold water, emergency generator exhaust, boiler units, heat exchangers, asbestos cement piping; and
- Architectural - systems including: texture coats, sheet flooring, vinyl floor tile, acoustical spray-applied materials, condensation control applications, ceiling tile, wall board, window caulking, drywall joint compound, and asbestos sheet products.

Samples were submitted to the International Asbestos Testing Laboratory Inc. (IATL) and analyzed for asbestos type and percentage content using Polarized Light Microscopy (PLM) and dispersion staining techniques in accordance with EPA methodologies and dispersion staining techniques (EPA 600/R-93/116).

4.3 Cyanide Contaminated Debris

At the request of the Client sampling of debris was conducted for analysis for total and free cyanide content. Samples were submitted to ALS laboratories for analysis following an adapted method from the Ontario ministry of environment CN-E3015.

4.4 Lead-Containing Materials

Systematic bulk sampling of suspect lead-amended paints was conducted as part of the assessment. Previous sampling of paints on the Site have found that concentrations of lead in most paints are above the lead-amended paint criteria of 600 parts per million (0.06%) by weight; as such, bulk samples of paint were collected for TCLP analysis to assist in evaluating disposal criteria. The bulk samples of paint were submitted to ALS laboratories and analyzed for leachable lead in general accordance with the EPA Method SW846, Methods 1311 and 6020.

Miscellaneous lead-containing materials such as lead acid batteries, lead sheeting on roof drains, and lead packing in cast drain lines were documented when observed.

4.5 Polychlorinated Biphenyls (PCBs)

A review of accessible fluorescent and high intensity discharge (HID) light ballasts was completed to evaluate the potential presence of PCBs. The presence of PCBs was evaluated by gathering label information such as the manufacturer, model numbers, serial numbers, and date codes where available. This information was compared to the criteria found in the Environment Canada Report EPS 2/CC/2 (revised) August 1991, *Identification of Lamp Ballasts Containing PCBs* to assess their likelihood of containing PCBs. As Directed by the Client, Golder did not sample suspect PCB-containing dielectric fluid located within de-energized transformers and other electrical equipment, Golder understands that a PCB-containing equipment inventory had been previously completed by others.

4.6 Mercury in Equipment and Fixtures

A visual inspection of electrical and mechanical equipment installed in the accessible areas of the Roaster Complex was completed. Mercury-containing switches, thermostats, light fixture bulbs and tubes, chart recorders, and pressure-sensing devices were documented when observed.

4.7 Radioactive Building Components

A visual review of electrical and mechanical equipment was conducted to evaluate the presence of radioactive materials. Radioactive building components such as smoke detectors were documented when observed.

4.8 Ozone Depleting Substances (ODS)

A visual inspection of items or systems typically containing ODS such as refrigeration and air conditioning units was completed to evaluate the presence of ODS such as R-11, R-12 and R-22. The presence of ODS's was evaluated by gathering label information such as the manufacturer, model numbers, serial numbers, and date codes.

5.0 REGULATIONS AND GUIDELINES

The regulations, codes and guidelines relevant to hazardous building materials include the following:

- Northwest Territories Asbestos Safety Regulation (current edition);
- Northwest Territories Guideline for the Management of Waste Asbestos (current edition);
- Northwest Territories Guideline for the Management of Waste Lead and Lead Paint (current edition); and
- Guidelines for the General Management of Hazardous Waste in the NWT (current edition).

5.1 Northwest Territories Asbestos Safety Regulation

The Northwest Territories Asbestos Safety Regulation outlines the duties of an employer to protect workers handling materials that are known to contain asbestos. Parts 3 and 4 specifically outline limitations on the use of asbestos in buildings, which are summarized as follows:

- No person shall use crocidolite in any process; and
- No person shall apply, by spraying, insulation materials containing asbestos.

Parts 5 and 6 outline employer responsibilities when conducting an asbestos process. An asbestos process means the handling of materials containing asbestos and includes, but is not limited to, the following:

- Repair or maintenance of materials;
- Cleaning or disposal of materials; and
- Storage or conveyance of materials.

5.2 Northwest Territories Guideline for the Management of Waste Asbestos

The Northwest Territories Guideline for the Management of Waste Asbestos outlines the responsibilities of all parties involved in the management of waste asbestos. Waste asbestos is considered a contaminant under the *Environmental Protection Act* (EPA) of the NWT and must be managed as a hazardous waste. Part 3 of the Northwest Territories Guideline for the Management of Waste Asbestos provides guidance in employing asbestos waste management techniques including prevention, storage, transportation, abatement, and disposal.

5.3 Northwest Territories Guideline for the Management of Waste Lead and Lead Paint

Lead-amended paint is a potential concern both as a source of direct exposure (inhalation or ingestion of dust or paint chips), and as a contributor to lead in interior dust and exterior soil. A risk assessment of potential occupational exposure to lead must consider not only the presence of lead (any amount) but also the activity or impact of activity on the paints containing lead. Section 1.1 of Northwest Territories Guideline for the Management of Waste Lead and Lead Paint defines lead amended paint as structural coatings containing greater than 600 parts per million (0.06% by weight) lead.

Part 3 of the Northwest Territories Guideline for the Management of Waste Lead provides guidance in employing lead waste management techniques including prevention, storage, transportation, and disposal. Section 3.6 details disposal requirements for leaded paint and requires that lead amended paints be transported to a registered hazardous waste disposal facility, or a lead or metals foundry.

5.4 Guideline for the General Management of Hazardous Waste in the Northwest Territories

The Guideline for the General Management of Hazardous Waste in the Northwest Territories outlines responsibilities of all parties involved in the management of hazardous waste. The guideline defines a hazardous waste as a contaminant which is a dangerous good that is no longer used for its original purpose and is intended for recycling, treatment, disposal, or storage. Part 3 of the Guideline for the General Management of Hazardous Waste in the Northwest Territories outlines storage and registration requirements of hazardous waste within the NWT.

Part 4 of the Guideline for the General Management of Hazardous Waste in the Northwest Territories provides guidance in employing lead waste management techniques including prevention, treatment or disposal, and alternative management methods.

5.5 Other Guidelines

PCBs are used as a dielectric fluid in electrical equipment such as transformers. The use of capacitors in fluorescent lamp ballasts was common up to 1980. The Federal Chlorobiphenyls Regulation, SOR/91-152 prohibits the use of PCBs in this electrical equipment installed after July 1, 1980. The Federal Chlorobiphenyls Regulation, SOR/92-507, also outlines the handling, storage and disposal of PCBs and PCB-containing equipment. PCB content of ballasts can be determined through referencing the Environment Canada Report EPS 2/CC/2 (revised) August 1991, *Identification of Lamp Ballasts Containing PCBs*.

Radioactive material found in smoke detectors is regulated under the Atomic Energy Control Act (August 1997), Atomic Energy Control Regulations (with Amendments to August 27, 1992). Americium can be found in smoke detectors and is used to detect the presence of smoke or heat.

In 1994, the federal government filed the Ozone-Depleting Substances Regulations to amend controls on production and consumption of chlorofluorocarbons (CFC), halons, tetrachloride and methyl-chloroform. The Federal Halocarbon Regulations, effective July 1, 1999, was filed to ensure uniformity with respect to the release, recovery and recycling of ODS and their halocarbon alternatives in refrigeration and air conditioning. The Canadian Environmental Protection Act (1999), Ozone-Depleting Substances Regulations, 1998, controls the import, manufacture, use, sale, and export of ODS. The regulation also requires that permits be obtained to import or export used, recovered, recycled, and reclaimed ODS.

6.0 RESULTS AND DISCUSSION

6.1 Arsenic Dust and Arsenic Contaminated Building Materials

A total of 22 bulk samples of dust/debris were collected from the Roaster Complex in order to assist in evaluating the concentration of arsenic throughout the Roaster Complex. The results of total arsenic ranged from 8,620 to 260,000 milligrams per kilogram (0.86% to 26% by weight).

At the request of the Client the bulk dust/debris samples were also analyzed for leachable metals content following a TCLP. One sample of wood collected from a tank in the AC Roaster Building and one piece of wood from the AC Roaster structure was also submitted for leachable metals analysis.

The Laboratory Certificate of Analysis is included in Appendix A. Sample locations, photographs, and results are detailed within Appendix B: Building Specific Appendices.

6.2 Asbestos-Containing Materials

A total of 54 samples of building materials suspected of containing asbestos were collected and submitted for analysis from the Roaster Complex. Amosite, Chrysotile, and Crocidolite asbestos was identified to be present in various building materials throughout the Roaster Complex including but not limited to:

- Interior/exterior cement panels, siding, and roofing;
- Spray applied insulation;
- Mechanical insulation (pipes, vessels, roasters, ducts etc.);
- Concrete skim coat (levelling compound);
- Floor tiles;
- Mechanical gaskets;
- Wall texture;
- Exterior paper siding;
- Cement panel paper backing;
- Interior cement panels; and
- Electrical insulators.

In addition to the above mentioned materials, numerous samples of debris located throughout the roaster Complex were identified to contain asbestos. The asbestos-containing mechanical insulation and spray-applied insulation located throughout the various buildings was observed to be in poor condition with large quantities of insulation materials delaminating onto various pieces of equipment and the floors of the buildings. The Laboratory Certificate of Analysis is included in Appendix A. Sample locations, photographs, and results are detailed within Appendix B: Building Specific Appendices.

6.3 Cyanide Contaminated Debris

One sample of debris collected from the north wooden tank located in the AC Roaster building was collected to screen for potential cyanide contamination on the Site. The sample was found to contain 1.7 mg/kg total cyanide while free cyanide was below the analytical detection limit of <0.050.

6.4 Lead-Containing Materials

Lead in Paint

In order to assist in evaluating disposal requirements for painted or coated surfaces, a total of 25 bulk paint samples were collected and submitted for leachable lead analysis from the Roaster Complex. One of the 25 samples from a door on the Baghouse was found to contain concentrations of leachable lead greater than 5.0 mg/L (Site criteria). The Laboratory Certificate of Analysis is included in Appendix A. Sample locations, photographs, and results are detailed within Appendix B: Building Specific Appendices.

Lead in Equipment

Emergency light fixtures with lead-acid batteries were identified to be mounted to the walls throughout the various buildings of the Roaster Complex.

Lead sheeting was observed to be located on the exterior and interior of the buildings with asbestos siding located throughout the Roaster Complex. The lead sheeting was observed to be located around window frames and penetration in the buildings. Locations and photographs are detailed within Appendix B: Building Specific Appendices.

6.5 Polychlorinated Biphenyls (PCBs)

Fluorescent light ballasts were not inspected for the presence of PCBs, as a known lighting upgrade has occurred in the past, however due the age of the Site, PCB-containing ballasts may be present in some of the light fixtures that may not have been upgraded. Locations and photographs are detailed within Appendix B: Building Specific Appendices.

Transformers and electrical components were not sampled for the presence of PCBs. A known round up and removal of PCBs from the equipment on Site has occurred, the removal of all PCB oil from transformers and electrical components could not be verified by Golder. Locations and photographs of suspected PCB-containing equipment are detailed within Appendix B.

6.6 Mercury in Equipment

Mercury-containing fluorescent light tubes, thermostat bulbs, and chart recorder units were identified in locations throughout the Roaster Complex. Mercury-containing equipment was observed to be intact throughout the Roaster Complex with the exception of the chart recorders located within the Dorrco Roaster Control Room, these units were observed to be cracked with visible mercury spilled on the floor. Locations and photographs are detailed within Appendix B: Building Specific Appendices.

6.7 Radioactive Building Components

Smoke detectors suspected to contain radioactive substances (Americium) were observed in the electrical rooms located within the AC Roaster Building. Locations and photographs are detailed within Appendix B: Building Specific Appendices.

6.8 Ozone Depleting Substances in Equipment (ODS)

Refrigeration units suspected of containing ODS were observed to be located within water coolers located within the Dorrco Roaster and Cottrell Buildings during the assessment. Locations and photographs are detailed within Appendix B: Building Specific Appendices.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Arsenic Dust and Arsenic Contaminated Building Materials

Debris/dust and building components throughout the Roaster Complex were identified to have significant concentrations of total arsenic. Additionally a large portion of the samples collected had leachable concentrations of arsenic above the leachable criteria of 2.5 mg/L provided to Golder by the Client as the Site's arsenic disposal criteria. Removal work should be completed by adequately trained and knowledgeable workers. Throughout the abatement activities, appropriate air monitoring and inspections should be conducted by a qualified Environmental Consultant to document that contamination is contained and arsenic is disposed of appropriately.

7.2 Asbestos-Containing Materials

Asbestos-containing materials were positively identified in various locations throughout the Roaster Complex as detailed in Appendix B. Prior to demolition work, the asbestos-containing materials that may be impacted must be removed. Removal work should be completed by adequately trained and knowledgeable workers. Throughout the abatement activities, appropriate air monitoring and inspections should be conducted by a qualified Environmental Consultant to document that contamination is contained and asbestos-containing materials are disposed of appropriately.

Asbestos waste must be disposed of in accordance with the Northwest Territories Guideline for the Management of Waste Asbestos. Building materials containing <1% asbestos by weight or trace amounts are not considered to be asbestos waste, however these materials may still have potential to expose workers to asbestos fibres during demolition activities.

7.3 Cyanide Contaminated Debris

Sampling of debris from a tank has confirmed the presence of cyanide at detectible concentrations within the AC roaster Building. Further sampling of debris from the Roaster Complex should be conducted to further evaluate the potential worker exposure hazards during the demolition process and disposal requirements of the contaminated materials.

7.4 Lead-Containing Materials

If lead-containing surfaces are to be impacted by demolition activities, safe work procedures must be developed. Unless otherwise stated, all painted surfaces throughout the buildings at the Giant Mine Site are presumed to be above the lead-amended paint criteria of 600 parts per million (0.06% by weight) lead and should be handled and disposed of as outlined within the Northwest Territories Guideline for the Management of Waste Lead.

7.5 Polychlorinated Biphenyls (PCBs)

While Golder understands that a lighting upgrade has previously occurred at the Site, PCB-containing fluorescent light ballasts are suspected to be present in various locations throughout the Roster Complex. Prior to their disposal, the ballasts should be inspected for the presence of PCBs and ballasts identified to contain PCB's must be properly removed and disposed of. Disposal of the ballasts must be conducted in accordance with federal and territorial regulations.

While Golder understands a PCB-cleanup initiative has occurred on the site in the past, it could not be verified which equipment has had PCB-containing oil removed and the effectiveness of the cleaning as new Oil can become contaminated with PCBs. Thus Golder recommends once equipment is removed that all oils be tested for PCB content prior to their disposal.

Additionally, Golder recommends further sampling of the wire insulation and transformers for PCB content. This equipment is located within the electrical panels and MCC rooms throughout the Roaster Complex. Once the panels are removed and or disassembled, sampling can be conducted for PCB content prior to disposal.

7.6 Mercury in Equipment

The tubes, bulbs, and equipment found to contain mercury should be removed from the building prior to demolition activities and be kept separate from all other waste to prevent damage. Mercury vapour-containing light tubes pose no risk to workers or occupants provided they remain intact and undisturbed. Bulk mercury identified to be leaking from chart recorders should be remediated prior to demolition. Mercury-containing materials should be disposed of in accordance with the Guideline for the General Management of Hazardous Waste in the Northwest Territories.

7.7 Radioactive Building Components

Smoke detectors suspected to contain radioactive substances (Americium) were observed in the electrical rooms located within the AC Roaster Building. Smoke detectors containing radioactive materials must be removed, recycled and/or disposed of prior to demolition. Removal and disposal must be conducted in accordance with the Nuclear Safety and Control Act (S.C. 1997), Nuclear Substances and Radiation Device Regulation SOR/2000-207.

7.8 Ozone Depleting Substances in Equipment (ODS)

Refrigeration units suspected of containing ODS were observed to be located within water coolers throughout the Dorrco Roaster and Cottrell buildings during the assessment. Prior to demolition work, the equipment with ozone depleting substances must be collected and separated for disposal or recycling.

8.0 ASSESSMENT LIMITATIONS

This report is based on data and information collected during the site visits conducted by Golder from March 14 to March 22, 2012 and is based solely on site conditions encountered at the time of the assessment and data obtained by Golder as described in this report. Any use of this document or the findings, conclusions or recommendations provided in this report by any person other than AECOM is at the sole risk of such user.

The conclusions and recommendations contained in this assessment report are based upon professional opinions with regard to the subject matter. These opinions are in accordance with currently accepted environmental assessment standards and practices applicable to these locations and are subject to the following inherent limitations:

The data and findings presented in this report are valid as of the dates of the investigations. The passage of time, manifestation of latent conditions or occurrence of future events may warrant further exploration at the properties, analysis of the data, and re-evaluation of the findings, observations, and conclusions expressed in this report. No assurance is made regarding changes in conditions or practices subsequent to the time of the investigation. It was beyond the scope of this assessment to conduct a risk assessment and the potential health risks that may be associated with asbestos exposure for building occupants.

The data reported and the findings, observations and conclusions expressed in this report are limited by the Scope of Work. The Scope of Work was defined by the request of the Client, the time and budgetary constraints imposed by the Client, and availability of access to the property.

Because of the limitations stated above, the findings, observations and conclusions expressed by Golder in this report are not, and must not be, considered an opinion concerning compliance of any past or present owner or operator of the site with any federal, provincial or local laws or regulations.

No warranty or guarantee, whether expressed or implied, is made with respect to the data or the reported findings, observations, and conclusions, which are based solely upon site conditions in existence at the time of investigation.

Golder's assessment reports present professional opinions and findings of a scientific and technical nature. While attempts were made to relate the data and findings to applicable environmental laws and regulations, the report shall not be construed to offer legal opinion or representations as to the requirements of, nor compliance with, environmental laws, rules, regulations or policies of federal, provincial, or local governmental agencies. Any use of the assessment report constitutes acceptance of the limits of Golder's liability.

Golder's liability extends only to its client and not to other parties who may obtain this assessment report. Issues raised by the report must be reviewed by appropriate legal counsel.

9.0 CLOSURE

We trust the information presented in this report meets your requirements. If you have any questions please contact the undersigned at (780) 483-3499. Thank you for the opportunity to be of service. We look forward to working with you again in the future.

GOLDER ASSOCIATES LTD.

Richard Mathieson, BAEM, OHST
EHS Project Manager

Andrew Grant, P.Eng., EP, CRSP
Associate, Senior EHS Project Manager

RM/AG/nu/rs

o:\final\2009\1427\09-1427-0006\3. correspondence\2 issued documents\word\phase 2\doc 193 rep 0713_12\003-diso roaster demo-diso-rpt-0003-rev0_20120713.docx

APPENDIX A

Laboratory Certificates of Analysis

July 13, 2012
Project No. 11-1375-0244/1000
Doc. No. 193

Golder Associates

GOLDER ASSOCIATES LTD
ATTN: Richard Mathieson
300 - 10525 170 St NW
Edmonton AB T5P 4W2

Date Received: 26-MAR-12
Report Date: 06-JUL-12 11:59 (MT)
Version: FINAL REV. 2

Client Phone: 780-483-3499

Certificate of Analysis

Lab Work Order #: L1127558

Project P.O. #: 11 1375 0244
Job Reference: 11 1375 0244
C of C Numbers: 10-200120, 10-200121
Legal Site Desc:

Comments:

06-JUL-12: Revised Report: Revised for Client Sample ID's -14 and -16

Shannon Luchka
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-1 1-D-BAGHOUSE (WEST)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	235000		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	6490		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-2 2-D-BAGHOUSE (EAST)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	260000		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		29-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	3400		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	11.5		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-2 2-D-BAGHOUSE (EAST)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-3 3-D-BAGHOUSE (FLOOR TRAP)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	146000		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	550		0.20	mg/L		30-MAR-12	R2344941
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-4 4-D-COTTRELL (BEAMAT STAIRS)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	39700		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	510		0.20	mg/L		30-MAR-12	R2344941
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-4 4-D-COTTRELL (BEAMAT STAIRS)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	22.2		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-5 5-D-COTTRELL (BOX BETWEEN PRECIP)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	31200		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	165		0.20	mg/L		28-MAR-12	R2343782
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	0.066		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	1.32		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	13.7		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	8.2		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-6 6-D-CALCINE (SOUTH PLATFORM)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	11500		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-6 6-D-CALCINE (SOUTH PLATFORM)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	267		0.20	mg/L		30-MAR-12	R2344941
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	0.120		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	10.5		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-7 7-D-CALCINE (DIRT BELOW THICKENER)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	9140		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	4.73		0.20	mg/L		29-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	0.316		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	0.79		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	52.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-7 7-D-CALCINE (DIRT BELOW THICKENER)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
L1127558-8 8-D-CALCINE (AT FURNACE)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	9510		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	280		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	0.083		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-9 9-D-CALCINE (NORTH OLD EQUIPMENT STAND)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	8920		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	15.5		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	0.250		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	0.73		0.50	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-9 9-D-CALCINE (NORTH OLD EQUIPMENT STAND)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	25.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-10 10-D-CALCINE (SW EQUIPMENT)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	8620		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	186		0.20	mg/L		28-MAR-12	R2343782
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-11 11-D-CALCINE (DRUM)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	10600		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	35.9		0.20	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-11 11-D-CALCINE (DRUM)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	0.223		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	0.76		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	17.5		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-12 12-D-AC ROASTER (2ND LEVEL BEAM)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	57200		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	447		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	14.5		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	0.66		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	29.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-13 13-D-AC ROASTER (CONCRETE PAD SOUTH)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-13 13-D-AC ROASTER (CONCRETE PAD SOUTH)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	51900		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	5.08		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	7.9		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-14 14-D-AC ROASTER (NORTHWOOD TANK)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	53500		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	1.09		0.20	mg/L		28-MAR-12	R2343782
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	2.07		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-14 14-D-AC ROASTER (NORTHWOOD TANK)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-15 15-D-AC ROASTER (FOUNDATION DUST)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	14600		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	1.40		0.20	mg/L		28-MAR-12	R2343782
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	18.3		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	1.39		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-16 16-D-AC ROASTER (CLEANED WOOD)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	16.2		0.20	mg/L		28-MAR-12	R2343782
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-16 16-D-AC ROASTER (CLEANED WOOD)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	11.9		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-17 17-D-AC ROASTER (NORTH TANK)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	313		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	0.59		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-18 18-D-AC ROASTER (BASE METAL TANK)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	53800		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	0.46		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-18 18-D-AC ROASTER (BASE METAL TANK)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	0.66		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-19 19-D-D. ROASTER (DUST ON WOOD PLANK)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	79700		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	0.80		0.20	mg/L		28-MAR-12	R2343782
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	0.52		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	9.6		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-20 20-D-D. ROASTER (FLOOR BELOW R-2)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-20 20-D-D. ROASTER (FLOOR BELOW R-2)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Metals in Soil by ICPMS							
Arsenic (As)	20900		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	25.3		0.20	mg/L		28-MAR-12	R2343782
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	1.42		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	5.5		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-21 21-D-D. ROASTER (PUMP AT BASE TANK)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	16400		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	0.68		0.20	mg/L		28-MAR-12	R2343782
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-21 21-D-D. ROASTER (PUMP AT BASE TANK)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	12.2		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-22 22-D-D. ROASTER (HANDRAILS)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	31900		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	7.81		0.20	mg/L		28-MAR-12	R2343782
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	0.066		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	1.31		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	18.2		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-23 23-D-SILO (FLOOR)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	132000		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	2020		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127558-23 23-D-SILO (FLOOR)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
TCLP Leachable Metals							
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782
L1127558-24 24-D-COTTRELL (WEST END)							
Sampled By: RM/TJ on 21-MAR-12							
Matrix: DUST							
Single Metal in Soil by ICPMS							
Metals in Soil by ICPMS							
Arsenic (As)	49600		0.20	mg/kg		02-APR-12	R2345926
TCLP Leachable Metals							
Leachable Mercury (Hg), TCLP							
Mercury (Hg)-Leachable	<0.010		0.010	mg/L		28-MAR-12	R2343736
TCLP Leachable Metals							
Silver (Ag)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Arsenic (As)	639		0.20	mg/L		30-MAR-12	R2344505
Boron (B)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Barium (Ba)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Beryllium (Be)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Cadmium (Cd)	<0.050		0.050	mg/L		28-MAR-12	R2343782
Cobalt (Co)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Chromium (Cr)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Copper (Cu)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Iron (Fe)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Nickel (Ni)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Lead (Pb)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Antimony (Sb)	13.7		5.0	mg/L		28-MAR-12	R2343782
Selenium (Se)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Thallium (Tl)	<0.50		0.50	mg/L		28-MAR-12	R2343782
Uranium (U)	<0.20		0.20	mg/L		28-MAR-12	R2343782
Vanadium (V)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zinc (Zn)	<5.0		5.0	mg/L		28-MAR-12	R2343782
Zirconium (Zr)	<5.0		5.0	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ETL-METAL-TCLP-ED	Waste	TCLP Leachable Metals	EPA SW846 Methods 1311 and 6020
HG-TCLP-CVAA-ED	Waste	Leachable Mercury (Hg), TCLP	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE
MET-200.2-MS-ED	Soil	Metals in Soil by ICPMS	EPA 200.2/6020A

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA

Chain of Custody Numbers:

10-200120 10-200121

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
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.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1127558 Report Date: 06-JUL-12

Client: GOLDER ASSOCIATES LTD
300 - 10525 170 St NW
Edmonton AB T5P 4W2
Contact: Richard Mathieson

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
MET-200.2-MS-ED	Soil							
Batch R2345926								
WG1449999-3 CRM		**TILL-1_SOIL**						
Arsenic (As)			104.4		%		80-120	30-MAR-12
WG1449999-4 CRM		**PACS-2_SOIL**						
Arsenic (As)			107.9		%		80-120	30-MAR-12
WG1449999-8 CRM		**2702_SOIL**						
Arsenic (As)			92.2		%		80-120	30-MAR-12
WG1449999-5 DUP		**L1127558-18**						
Arsenic (As)		53800	51800		mg/kg	3.7	30	02-APR-12
WG1449999-6 DUP		**L1127558-24**						
Arsenic (As)		49600	48100		mg/kg	3.0	30	02-APR-12
WG1449999-1 MB								
Arsenic (As)			0.36	B	mg/kg		0.2	30-MAR-12
WG1449999-2 MB								
Arsenic (As)			0.30	B	mg/kg		0.2	30-MAR-12
WG1449999-9 MB								
Arsenic (As)			0.39	B	mg/kg		0.2	30-MAR-12
ETL-METAL-TCLP-ED	Waste							
Batch R2343782								
WG1448875-2 DUP		**L1127558-23**						
Silver (Ag)		<0.50	<0.50	RPD-NA	mg/L	N/A	25	28-MAR-12
Boron (B)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-MAR-12
Barium (Ba)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-MAR-12
Beryllium (Be)		<0.50	<0.50	RPD-NA	mg/L	N/A	25	28-MAR-12
Cadmium (Cd)		<0.050	<0.050	RPD-NA	mg/L	N/A	25	28-MAR-12
Cobalt (Co)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-MAR-12
Chromium (Cr)		<0.50	<0.50	RPD-NA	mg/L	N/A	25	28-MAR-12
Copper (Cu)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-MAR-12
Iron (Fe)		<5.0	<5.0	RPD-NA	mg/L	N/A	26	28-MAR-12
Nickel (Ni)		<0.50	<0.50	RPD-NA	mg/L	N/A	26	28-MAR-12
Lead (Pb)		<0.50	<0.50	RPD-NA	mg/L	N/A	26	28-MAR-12
Antimony (Sb)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-MAR-12
Selenium (Se)		<0.20	<0.20	RPD-NA	mg/L	N/A	25	28-MAR-12
Thallium (Tl)		<0.50	<0.50	RPD-NA	mg/L	N/A	25	28-MAR-12
Uranium (U)		<0.20	<0.20	RPD-NA	mg/L	N/A	25	28-MAR-12
Vanadium (V)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-MAR-12
Zinc (Zn)		<5.0	<5.0	RPD-NA	mg/L	N/A	26	28-MAR-12

Quality Control Report

Workorder: L1127558 Report Date: 06-JUL-12

Client: GOLDER ASSOCIATES LTD
300 - 10525 170 St NW
Edmonton AB T5P 4W2

Contact: Richard Mathieson

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
ETL-METAL-TCLP-ED	Waste							
Batch R2343782								
WG1448875-2 DUP		**L1127558-23**						
Zirconium (Zr)		<5.0	<5.0	RPD-NA	mg/L	N/A	25	28-MAR-12
WG1448875-1 MB								
Silver (Ag)			<0.50		mg/L		0.5	28-MAR-12
Arsenic (As)			<0.20		mg/L		0.2	28-MAR-12
Boron (B)			<5.0		mg/L		5	28-MAR-12
Barium (Ba)			<5.0		mg/L		5	28-MAR-12
Beryllium (Be)			<0.50		mg/L		0.5	28-MAR-12
Cadmium (Cd)			<0.050		mg/L		0.05	28-MAR-12
Cobalt (Co)			<5.0		mg/L		5	28-MAR-12
Chromium (Cr)			<0.50		mg/L		0.5	28-MAR-12
Copper (Cu)			<5.0		mg/L		5	28-MAR-12
Iron (Fe)			<5.0		mg/L		5	28-MAR-12
Nickel (Ni)			<0.50		mg/L		0.5	28-MAR-12
Lead (Pb)			<0.50		mg/L		0.5	28-MAR-12
Antimony (Sb)			<5.0		mg/L		5	28-MAR-12
Selenium (Se)			<0.20		mg/L		0.2	28-MAR-12
Thallium (Tl)			<0.50		mg/L		0.5	28-MAR-12
Uranium (U)			<0.20		mg/L		0.2	28-MAR-12
Vanadium (V)			<5.0		mg/L		5	28-MAR-12
Zinc (Zn)			<5.0		mg/L		5	28-MAR-12
Zirconium (Zr)			<5.0		mg/L		5	28-MAR-12
Batch R2344505								
WG1448875-2 DUP		**L1127558-23**						
Arsenic (As)		2020	1460	DUP-H	mg/L	33	25	30-MAR-12
HG-TCLP-CVAA-ED	Waste							
Batch R2343736								
WG1448875-2 DUP		**L1127558-23**						
Mercury (Hg)-Leachable		<0.010	<0.010	RPD-NA	mg/L	N/A	20	28-MAR-12
WG1448875-1 MB								
Mercury (Hg)-Leachable			<0.010		mg/L		0.01	28-MAR-12

Quality Control Report

Workorder: L1127558 Report Date: 06-JUL-12

Client: GOLDER ASSOCIATES LTD
300 - 10525 170 St NW
Edmonton AB T5P 4W2
Contact: Richard Mathieson

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
B	Method Blank exceeds ALS DQO. All associated sample results are at least 5 times greater than blank levels and are considered reliable.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

10-200120

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 2

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Golder Associates Ltd.	Standard: X Other (specify):		X	Regular (Standard Turnaround Times - Business Days)
Contact:	Richard Mathieson	Select: PDF X Excel X Digital Fax			Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	# 200, 10525-170 ST	Email 1: rmathieson@golder.com			Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Edmonton, AB. T5P 4W2	Email 2: tjaniszewski@golder.com			Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	780 403 3499 Fax: 780-403-3449	dmarshall@golder.com		Analysis Request	
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) Yes or No	Job #: 11375 0244			
Company:	Same	PO / AFE: 11375 0244			
Contact:	Account Receivable	LSD:			
Address:					
Phone:		Quote #:			
Lab Work Order #		ALS Contact: Shannon Lo	Sampler: RM/TJ		

Sample #		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TCLP	Number of Containers
	1-D - Baghouse (west)	21/Mar/12		Dust	X	1
	2-D - Baghouse (east)	21/Mar/12		Dust	X	1
	3-D - Baghouse (Floor trap)	21/Mar/12		Dust	X	1
	4-D - Cottrell (Bramat Stairs)	21/Mar/12		Dust	X	1
	5-D - Cottrell (Box between Precip)	21/Mar/12		Dust	X	1
	6-D - Cottrell Calcine (SouthPal farm)	21/Mar/12		Dust	X	1
	7-D - Calcine (Dirt below thickener)	21/Mar/12		Dust	X	1
	8-D - Calcine (at Furnace)	21/Mar/12		Dust	X	1
	9-D - Calcine (North - old equipment stand)	21/Mar/12		Dust	X	1
	10-D - Calcine (SW Equipment)	21/Mar/12		Dust	X	1
	~~12-D~~ 11-D AC Roaster Calcine (~~SW Equipment~~)	21/Mar/12		Dust	X	1
	~~13-D~~ 12-D AC Roaster (2nd Level Beam)	21/Mar/12		Dust	X	1

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Please ~~AA~~ Date all invoices April 1/ or Later

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	March 23/12	11:00				°C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY — GENF 18.01 Front

10- 200121

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Golder Associates Ltd.	Standard: X	Other (specify):	X	Regular (Standard Turnaround Times - Business Days)
Contact:	Richard Mathieson	Select: PDF X	Excel X Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	# 300, 10525 - 170 ST	Email 1:	rmathieson@golder.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Edmonton, AB T5P 4W2	Email 2:	tjaniszewski@golder.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	780 483 3499 Fax: 780 423 3115 74		rupshall@golder.com	Analysis Request	
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	11 1375 0244		
Company:	Same	PO / AFE:	11 1375 0244		
Contact:	Accounts Recievable	LSD:			
Address:					
Phone:		Quote #:			
Lab Work Order # (la		ALS Contact:	Shannon Lo	Sampler:	RM / TS

Sample #		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	TCLP	Number of Containers
	13-D - AC Roaster (concrete Pad South)	21/Mar/12		Dust	X	1
	14-D - AC Roaster (North wood tank)	21/Mar/12		Dust	X	1
	15-D - AC Roaster (Foundation Dust)	21/Mar/12		Dust	X	1
	16-D - AC Roaster (cleanal wood)	21/Mar/12		wood	X	1
	17-D - AC Roaster (North tank)	21/Mar/12		wood	X	1
	18-D - AC Roaster (Base metal tank)	21/Mar/12		Dust	X	1
	19-D - D. Roaster (Dust on wood Plank)	21/Mar/12		Dust	X	1
	20-D - D. Roaster (Floor below R-2)	21/Mar/12		Dust	X	1
	21-D - D. Roaster (Pump at base tank)	21/Mar/12		Dust	X	1
	22-D - D. Roaster (handrails)	21/Mar/12		Dust	X	1
	23-D - 5.10 (Floor)	21/Mar/12		Dust	X	1
	24-D - Cottrell (west end)	21/Mar/12		Dust	X	1

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Please mark all invoices April 1, 2012 or Later

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
RMathieson	March 23/12	11:00				°C				

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608628 **Description / Location:** Grey Insulation
Client No.: 1 Baghouse; Main Level; On West Bag Vessel

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	None Detected	None Detected	35

Lab No.: 4608629 **Description / Location:** Grey Insulation
Client No.: 2 Baghouse; Main Level; On East Bag Vessel

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
60	Chrysotile	5	Fibrous Glass	35

Lab No.: 4608630 **Description / Location:** Grey Insulation
Client No.: 3 Baghouse;Second Level;On West Bag Vessel

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC Trace	Amosite	40	Fibrous Glass	60

Lab No.: 4608631 **Description / Location:** Grey Insulation
Client No.: 4 Baghouse;Second Level;On East Bag Vessel

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC Trace	Amosite	40	Fibrous Glass	60

Accreditations: NIST-NVLAP No. 101165-0 NY-DOH No. 11021 AIHA-LAP, LLC No. 100188

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Approved By:

Date: 4/4/2012

Frank E. Ehrenfeld, III
Laboratory Director

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608632 **Description / Location:** Grey Insulation
Client No.: 5 Cotrell; Main Level; North Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
75	Chrysotile	None Detected	None Detected	25

Lab No.: 4608633 **Description / Location:** Brown/White Insulation
Client No.: 6 Cotrell; Main Level; East Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	None Detected	None Detected	35

Lab No.: 4608634 **Description / Location:** Blue/Grey Insulation
Client No.: 7 Cotrell; Main Level; South Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
90	Crocidolite	None Detected	None Detected	10

Lab No.: 4608635 **Description / Location:** Grey Insulation
Client No.: 8 Cotrell; Main Level; West Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
80	Chrysotile	None Detected	None Detected	20

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608636 **Description / Location:** Grey Insulation
Client No.: 9 Cotrell; Main Level; North Precip Hopper

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
40	Chrysotile	None Detected	None Detected	60

Lab No.: 4608637 **Description / Location:** Grey/Brown/Tan Insulation
Client No.: 10 Cotrell; Main Level; South Precip Hopper

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
50	Chrysotile	20	Fibrous Glass	30

Lab No.: 4608638 **Description / Location:** Grey Insulation
Client No.: 11 Cotrell; Main Level; South Ducting Unit

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	None Detected	None Detected	35

Lab No.: 4608639 **Description / Location:** White/Black Wall Cover
Client No.: 12 Cotrell;Main Level;On Elec.RmOuterWalls

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
45	Chrysotile	None Detected	None Detected	55

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608640 **Description / Location:** Grey Fibrous; Cotrell;Main Level
Client No.: 13 BehindTransiteBoardLining InteriorWalls

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
85	Chrysotile	None Detected	None Detected	15

Lab No.: 4608641 **Description / Location:** Grey Transite; Cotrell;Main Level
Client No.: 14 Lining Interior Walls Of Elec.Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
25	Chrysotile	None Detected	None Detected	75

Lab No.: 4608642 **Description / Location:** Grey Floor Tile; Cotrell;Main Level
Client No.: 15 On Floor Of Control Room/Office

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 1.2	Chrysotile	None Detected	None Detected	PC 98.8

Lab No.: 4608643 **Description / Location:** Grey Insulation; Cotrell;Main Level
Client No.: 16 On Vertical Pipeing Adj. To Stairwell

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
70	Chrysotile	20	Cellulose	10

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608644 **Description / Location:** Grey Insulation; Cotrell; Upper Deck
Client No.: 17 On 4" Piping

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	20	Cellulose	15

Lab No.: 4608645 **Description / Location:** Grey Insulation; Cotrell; Upper Deck
Client No.: 18 On South Pipe Headers From Precip Units

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	None Detected	None Detected	35

Lab No.: 4608646 **Description / Location:** Grey Insulation; Cotrell; Upper Deck
Client No.: 19 On North Pipe Headers From Precip Units

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	None Detected	None Detected	35

Lab No.: 4608647 **Description / Location:** Grey Transite; Cotrell; Exterior
Client No.: 20 On Exterior Perimeter Walls

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
20	Chrysotile	None Detected	None Detected	80

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608648 **Description / Location:** Grey Transite; Calcine; Exterior
Client No.: 21 On Exterior Perimeter Walls

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
25	Chrysotile	None Detected	None Detected	75

Lab No.: 4608649 **Description / Location:** Grey Insulation
Client No.: 22 Calcine; CA-05

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
80	Amosite	None Detected	None Detected	20

Lab No.: 4608650 **Description / Location:** Grey Insulation
Client No.: 23 Calcine; Ground; CA-A6; On Fan Blower

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	None Detected	None Detected	35

Lab No.: 4608651 **Description / Location:** Brown/Grey Insulation
Client No.: 24 Calcine; Second Level; CA-7

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	None Detected	None Detected	35

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608652 **Description / Location:** Grey Insulation
Client No.: 25 Calcine; Main Floor; CA-01 Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
75	Amosite	None Detected	None Detected	25

Lab No.: 4608653 **Description / Location:** White Cementitious; Calcine
Client No.: 26 CA-03;On The Door Furnace Of Trommel

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 4608654 **Description / Location:** Tan Brick; Calcine
Client No.: 27 Main Level; Instrumenatation Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 4608654 **Description / Location:** Grey Mortar **Layer No.:** 2
Client No.: 27 Main Level; Instrumenatation Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608655 **Description / Location:** Red/Grey Gasket; Calcine
Client No.: 28 SouthMain Level;On Trommel Furnace Door

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
90	Chrysotile	None Detected	None Detected	10

Lab No.: 4608656 **Description / Location:** White Insulation; Calcine
Client No.: 29 Main; West Area North Wing

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
15	Amosite	None Detected	None Detected	PC 82.9
PC 2.1	Chrysotile			

Lab No.: 4608657 **Description / Location:** Off-White Insulation
Client No.: 30 Calcine; Main; West Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
80	Amosite	None Detected	None Detected	20

Lab No.: 4608658 **Description / Location:** Off-White Insulation; AC Roaster
Client No.: 31 Second Level;Perimeter WallPipeNorth End

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
85	Chrysotile	None Detected	None Detected	15

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608659 **Description / Location:** Grey Gasket; AC Roaster
Client No.: 32 Main Level;Within South End Of Roaster

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
85	Chrysotile	None Detected	None Detected	15

Lab No.: 4608660 **Description / Location:** Grey Cementitious; AC Roaster
Client No.: 33 Main;Within South End Of Roaster

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Lab No.: 4608661 **Description / Location:** Grey/Brown Insulation; AC Roaster
Client No.: 34 Second Level;Old Flue-North Process Pipe

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
60	Chrysotile	None Detected	None Detected	40

Lab No.: 4608662 **Description / Location:** Tan Brick; AC Roaster
Client No.: 35 Main Level;Loose RefractoryBrickOn Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608663 **Description / Location:** Grey Paper; AC Roaster
Client No.: 36 Main Level;Behind Transite,Generator Rm

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
85	Chrysotile	None Detected	None Detected	15

Lab No.: 4608664 **Description / Location:** Grey Transite; AC Roaster
Client No.: 37 Main Level; Within Generator Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
25	Chrysotile	None Detected	None Detected	75

Lab No.: 4608665 **Description / Location:** Dk.Brown Floor Material
Client No.: 38 AC Roaster;Main Level; Electrical Room

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 1.6	Chrysotile	None Detected	None Detected	PC 98.4

Lab No.: 4608666 **Description / Location:** Black/White Fibrous
Client No.: 39 AC Roaster;MainLevel;ExteriorPaperSiding

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
60	Chrysotile	None Detected	None Detected	40

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608667 **Description / Location:** Grey Insulation
Client No.: 40 D Roaster;Basement;DebrisOnFloor

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	75	Fibrous Glass	25

Lab No.: 4608668 **Description / Location:** Grey Insulation
Client No.: 41 D Roaster; Second Level; Within Ceiling

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	75	Fibrous Glass	25

Lab No.: 4608669 **Description / Location:** Grey Fibrous; D Roaster
Client No.: 42 Main Level; Outside Control Room In MCC

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
60	Chrysotile	None Detected	None Detected	40

Lab No.: 4608670 **Description / Location:** Grey Insulation; D Roaster
Client No.: 43 Second Level; Flue Pipe Network

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
60	Chrysotile	None Detected	None Detected	40

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608671 **Description / Location:** Grey/Off-White Insulation
Client No.: 44 D Roaster; Second Level

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	Trace	Fibrous Glass	35

Lab No.: 4608672 **Description / Location:** Grey Insulation
Client No.: 45 D Roaster; Main Level; North Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
75	Chrysotile	None Detected	None Detected	25

Lab No.: 4608673 **Description / Location:** Dk.Grey Gasket; D Roaster
Client No.: 46 Third Level;Loose Gasket On SulphurFloor

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	None Detected	None Detected	35

Lab No.: 4608674 **Description / Location:** Grey Insulation
Client No.: 47 D Roaster; Second Level; Roaster 1

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
65	Chrysotile	5	Fibrous Glass	35

Accreditations: NIST-NVLAP No. 101165-0 NY-DOH No. 11021 AIHA-LAP, LLC No. 100188

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608675 **Description / Location:** Grey Insulation
Client No.: 48 D Roaster; Basement; East Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
75	Chrysotile	None Detected	None Detected	25

Lab No.: 4608676 **Description / Location:** Grey Insulation
Client No.: 49 D Roaster; Main Level; South Wall

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
75	Chrysotile	None Detected	None Detected	25

Lab No.: 4608677 **Description / Location:** Grey Transite; D Roaster
Client No.: 50 Basement; Compressor Room/Exterior

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
25	Chrysotile	None Detected	None Detected	75

Lab No.: 4608678 **Description / Location:** Brown Brick; D Roaster
Client No.: 51 Second Level;Roaster 2(LooseAdj.ToUnit)

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

IATL International Asbestos Testing Laboratories

9000 Commerce Parkway Suite B Mt. Laurel, NJ 08054
Telephone: 856-231-9449 Fax: 856-231-9818

CERTIFICATE OF ANALYSIS

Client: Golder Associates Ltd.
#300 10525-170 Street
Edmonton AB T5P4W2

Report Date: 4/4/2012
Report No.: 268361
Project: Giant Nine Roaster
Project No.: 11-1375-0244

BULK SAMPLE ANALYSIS SUMMARY

Lab No.: 4608679 **Description / Location:** Tan/White Insulation
Client No.: 52 D Roaster;Main Level; Adjacent To Office

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
80	Chrysotile	None Detected	None Detected	20

Lab No.: 4608680 **Description / Location:** Grey Transite
Client No.: 53 Silo; Main Level; Window Sill

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
25	Chrysotile	None Detected	None Detected	75

Lab No.: 4608681 **Description / Location:** Grey Floor Tile
Client No.: 54 Silo; Main Level

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
PC 1.7	Chrysotile	None Detected	None Detected	PC 98.3

Lab No.: 4608681 **Description / Location:** Tan Mastic **Layer No.:** 2
Client No.: 54 Silo; Main Level

% Asbestos	Type	% Non-Asbestos Fibrous Material	Type	% Non-Fibrous Material
None Detected	None Detected	None Detected	None Detected	100

Accreditations: **NIST-NVLAP No. 101165-0** **NY-DOH No. 11021** **AIHA-LAP, LLC No. 100188**

Analytical Method: EPA 600/R-93/116, by Polarized Light Microscopy

Comments: Quantification at <0.25% by volume is possible with this method. (PC) Indicates Stratified Point Count Method performed. (PC-Trace) means that asbestos was detected but is not quantifiable under the Point Counting regimen. Analysis includes all distinct separable layers in accordance with EPA 600 Method. If not reported or otherwise noted, layer is either not present or the client has specifically requested that it not be analyzed (ex. analyze until positive instructions). Small asbestos fibers may be missed by PLM due to resolution limitations of the optical microscope. Therefore, PLM is not consistently reliable in detecting asbestos in non-friable organically bound (NOB) materials. Quantitative transmission electron microscopy (TEM) is currently the only method that can pronounce materials as non-asbestos containing.

Analysis Performed By: B. Hargrove

Date: 4/4/2012

GOLDER ASSOCIATES LTD
ATTN: Richard Mathieson
300 - 10525 170 St NW
Edmonton AB T5P 4W2

Date Received: 30-MAR-12
Report Date: 20-APR-12 11:33 (MT)
Version: FINAL

Client Phone: 780-483-3499

Certificate of Analysis

Lab Work Order #:	**L1129686**
Project P.O. #:	111375 0244
Job Reference:	111375 0244
C of C Numbers:	10-200144
Legal Site Desc:	GIANT MINE

Shannon Luchka
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1129686-1 AC ROASTER TANK DEBRIS (NORTHTANK)							
Sampled By: RM on 21-MAR-12 @ 09:00							
Matrix: BULK/SOIL							
Miscellaneous Parameters							
Cyanide, Free	<0.050		0.050	mg/kg	04-APR-12	05-APR-12	R2351591
Moisture	1.50		0.25	%		04-APR-12	R2346892
Cyanide, Total	1.70		0.050	mg/kg	11-APR-12	12-APR-12	R2350152

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CN-FREE-NAOH-CFA-VA	Soil	Free Cyanide in soil by CFA	ONMOE CN-E3015/ASTM 7237

This analysis is carried out using procedures adapted from the Ontario Ministry of Environment CN-E3015 and ASTM Method 7237 "Free Cyanide with Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection". Free cyanide is determined by rotary extraction of the soil with 0.04M Sodium Hydroxide, followed by in-line gas diffusion at pH 6 with final determination by colourimetric analysis.

CN-T-NAOH-CFA-VA	Soil	Total Cyanide in soil by CFA	ONMOE CN-E3015/ISO 14403:2002

This analysis is carried out using procedures adapted from the Ontario Ministry of Environment CN-E3015 and ISO Method 14403:2002 "Determination of Total Cyanide using Flow Analysis (FIA and CFA)". Total or strong acid dissociable (SAD) cyanide is determined by rotary extraction of the soil with 0.04M Sodium Hydroxide, followed by in-line UV digestion along with sample distillation and final determination by colourimetric analysis.

MOISTURE-VA	Soil	Moisture content	ASTM D2974-00 Method A

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

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-200144

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
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.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1129686 Report Date: 20-APR-12

Client: GOLDER ASSOCIATES LTD
300 - 10525 170 St NW
Edmonton AB T5P 4W2
Contact: Richard Mathieson

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CN-FREE-NAOH-CFA-VA	Soil							
Batch R2351591								
WG1452465-3 DUP		**L1129686-1**						
Cyanide, Free		<0.050	<0.050	RPD-NA	mg/kg	N/A	20	10-APR-12
WG1452465-2 LCS								
Cyanide, Free			95.0		%		80-120	10-APR-12
WG1452465-1 MB								
Cyanide, Free			<0.050		mg/kg		0.05	10-APR-12
CN-T-NAOH-CFA-VA	Soil							
Batch R2350152								
WG1455032-3 DUP		**L1129686-1**						
Cyanide, Total		1.70	1.57		mg/kg	7.8	20	12-APR-12
WG1455032-2 LCS								
Cyanide, Total			87.2	G	%		90-110	12-APR-12
WG1455032-1 MB								
Cyanide, Total			<0.050		mg/kg		0.05	12-APR-12

Quality Control Report

Workorder: L1129686 Report Date: 20-APR-12

Client: GOLDER ASSOCIATES LTD
300 - 10525 170 St NW
Edmonton AB T5P 4W2
Contact: Richard Mathieson

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
G	QC result did not meet ALS DQO. Refer to narrative comments for further information.
RPD-NA	Relative Percent Difference Not Available due to result(s) being less than detection limit.

Quality Control Report

Workorder: L1129686 Report Date: 20-APR-12

Client: GOLDER ASSOCIATES LTD
300 - 10525 170 St NW
Edmonton AB T5P 4W2
Contact: Richard Mathieson

Hold Time Exceedances:

ALS Product Description	Sample ID	Sampling Date	Date Processed	Rec. HT	Actual HT	Units	Qualifier
Cyanides							
Total Cyanide in soil by CFA							
	1	21-MAR-12 09:00	11-APR-12 10:44	14	21	days	EHT

Legend & Qualifier Definitions:

EHTR-FM:	Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended.
EHTR:	Exceeded ALS recommended hold time prior to sample receipt.
EHTL:	Exceeded ALS recommended hold time prior to analysis. Sample was received less than 24 hours prior to expiry.
EHT:	Exceeded ALS recommended hold time prior to analysis.
Rec. HT:	ALS recommended hold time (see units).

Notes*:
Where actual sampling date is not provided to ALS, the date (& time) of receipt is used for calculation purposes.
Where actual sampling time is not provided to ALS, the earlier of 12 noon on the sampling date or the time (& date) of receipt is used for calculation purposes. Samples for L1129686 were received on 30-MAR-12 14:16.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

ALS Environmental

Chain of Custody / Analyt
Canada Toll Free: 1
www.alsgloba

1111296 86-COFC

10- 200144

Page 1 of 1

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company:	Golder Associates Ltd.	Standard:	Other (specify):	Regular (Standard Turnaround Times - Business Days)
Contact:	Richard Mathieson	Select: PDF	Excel Digital Fax	X Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	#300-10525 170 ST. Edmonton, AB T5P 4W2	Email 1:	rmathieson@golder.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2:	janiszewski@golder.com. nuphall@golder.com	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	403 349 9	Fax:	780 483 1574	

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	11375 0244.
Company:		PO / AFE:	11375 0244.
Contact:	Accounts Receivable	LSD:	Giant Mine
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L1129686	ALS Contact:	Shannon L
		Sampler:	RM.

Analysis Request
(Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total Cyanide	Free Cyanide	Number of Containers
	-AC Roaster Tank Debris (11.5 kg Min)	21/Mar/12	9:00	Bulk Soil	X	X	1

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Results by April 10th is possible.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	Mar 21	5:00		Mar/12	14:16	°C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

GOLDER ASSOCIATES LTD
ATTN: Richard Mathieson
300 - 10525 170 St NW
Edmonton AB T5P 4W2

Date Received: 26-MAR-12
Report Date: 29-MAR-12 15:17 (MT)
Version: FINAL

Client Phone: 780-483-3499

Certificate of Analysis

Lab Work Order #: L1127607

Project P.O. #: 11 1375 0244
Job Reference: 11 1375 0244
C of C Numbers: 10-200125, 10-200126, 10-200127
Legal Site Desc:

Shannon Luchka
Senior Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127607-1 1-PB-BAGHOUSE - YELLOW ON GREEN Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-2 2-PB-BAGHOUSE - SILVER ON RED Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-3 3-PB-BAGHOUSE-YELLOW Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-4 4-PB-BAGHOUSE-RED Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-5 5-PB-BAGHOUSE-RED Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-6 6-PB-BAGHOUSE-GREEN Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	10.7		0.50	mg/L		28-MAR-12	R2343782
L1127607-7 7-PB-COTTRELL-GREY Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-8 8-PB-COTTRELL-GREY/BROWN Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-9 9-PB-COTTRELL-YELLOW Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-10 10-PB-AC ROASTER-WHITE Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters** Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127607-11 11-PB-AC ROASTER-GREY Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	0.60		0.50	mg/L		28-MAR-12	R2343782
L1127607-12 12-PB-AC ROASTER-GREY ON RED Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-13 13-PB-AC ROASTER-GREEN Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-14 14-PB-AC ROASTER-YELLOW Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-15 15-PB-AC ROASTER-GREEN Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-16 16-PB-AC ROASTER-YELLOW ON GREEN Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	0.56		0.50	mg/L		28-MAR-12	R2343782
L1127607-17 17-PB-D. ROASTER-GREY Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	2.56		0.50	mg/L		28-MAR-12	R2343782
L1127607-18 18-PB-D. ROASTER-GREY Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	<0.50		0.50	mg/L		28-MAR-12	R2343782
L1127607-19 19-PB-D. ROASTER-YELLOW ON RED Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	1.28		0.50	mg/L		28-MAR-12	R2343782
L1127607-20 20-PB-D. ROASTER-RED Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	0.84		0.50	mg/L		28-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1127607-21 21-PB-D. ROASTER-YELLOW Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	0.58		0.50	mg/L		29-MAR-12	R2343782
L1127607-22 22-PB-D. ROASTER-GREY Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	<0.50		0.50	mg/L		29-MAR-12	R2343782
L1127607-23 23-PB-SILO-GREY Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	<0.50		0.50	mg/L		29-MAR-12	R2343782
L1127607-24 24-PB-SILO-WHITE ON YELLOW Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	<0.50		0.50	mg/L		29-MAR-12	R2343782
L1127607-25 25-PB-SCALE HOUSE -WHITE/YELLOW Sampled By: RM/TJ on 21-MAR-12 Matrix: PAINT **Miscellaneous Parameters**							
Lead (Pb)-Leachable	<0.50		0.50	mg/L		29-MAR-12	R2343782

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
PB-TCLP-ED	Waste	Leachable Lead (Pb), TCLP	SW 846 -1311/6020-ICPMS on TCLP Leachate

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA

Chain of Custody Numbers:

10-200125 10-200126 10-200127

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.
mg/kg - milligrams per kilogram based on dry weight of sample
mg/kg wwt - milligrams per kilogram based on wet weight of sample
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight
mg/L - unit of concentration based on volume, parts per million.
< - Less than.
D.L. - The reporting limit.
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.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Quality Control Report

Workorder: L1127607 Report Date: 29-MAR-12

Client: GOLDER ASSOCIATES LTD
300 - 10525 170 St NW
Edmonton AB T5P 4W2
Contact: Richard Mathieson

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
PB-TCLP-ED	Waste							
Batch R2343782								
WG1448875-1 MB								
Lead (Pb)-Leachable			<0.50		mg/L		0.5	28-MAR-12

Quality Control Report

Workorder: L1127607 Report Date: 29-MAR-12

Client: GOLDER ASSOCIATES LTD
300 - 10525 170 St NW
Edmonton AB T5P 4W2
Contact: Richard Mathieson

Legend:

Limit	ALS Control Limit (Data Quality Objectives)
DUP	Duplicate
RPD	Relative Percent Difference
N/A	Not Available
LCS	Laboratory Control Sample
SRM	Standard Reference Material
MS	Matrix Spike
MSD	Matrix Spike Duplicate
ADE	Average Desorption Efficiency
MB	Method Blank
IRM	Internal Reference Material
CRM	Certified Reference Material
CCV	Continuing Calibration Verification
CVS	Calibration Verification Standard
LCSD	Laboratory Control Sample Duplicate

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.

10-200125

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 3

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company:	Golder Associates Ltd.	Standard: X	Other (specify):	X Regular (Standard Turnaround Times - Business Days)
Contact:	Richard Mathieson	Select: PDF X	Excel X Digital Fax	Priority (2-4 Business Days) - 50% surcharge - Contact ALS to confirm TAT
Address:	# 300, 10525 - 170 ST. Edmonton, AB T5P 4W2.	Email 1:	rmathieson@golder.com	Emergency (1-2 Business Days) - 100% Surcharge - Contact ALS to confirm TAT
Phone:	780-483 3499. Fax: 780 483-1574	Email 2:	tjaniszewski@golder.com nupshall@golder.com	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**		**Analysis Request**
	Copy of Invoice with Report? (circle) Yes or No	Job #:	11137501244.	(Indicate Filtered or Preserved, F/P)
Company:	Same.	PO / AFE:	11137501244	
Contact:	Accounts Recievable.	LSD:		
Address:				
Phone:		Quote #:		
Lab Work Orde		ALS Contact: Shannon L.	Sampler: RM/TJS.	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Leachable Lead	Number of Containers
	1-Pb - Baghouse - Yellow on Green	21/Mar/12		Paint	X	
	2-Pb - Baghouse - Silver on Red	21/Mar/12		Paint	X	
	3-Pb - Baghouse - Yellow	21/Mar/12		Paint	X	
	4-Pb - Baghouse - Red	21/Mar/12		Paint	X	
	5-Pb - Baghouse - Red	21/Mar/12		Paint	X	
	6-Pb - Baghouse - Green	21/Mar/12.		Paint	X	
	7-Pb - ~~Baghouse~~ Cottrell - Grey	21/Mar/12		Paint	X	
	8-Pb - ~~Baghouse~~ Cottrell - Grey/brown	21/Mar/12.		Paint	X	
	9-Pb - Cottrell - Yellow	21/Mar/12.		Paint	X	
	10-Pb - AC Roaster - White	21/March/12		Paint	X	
	11-Pb - AC Roaster - Grey	21/Mar/12		Paint	X	
	12-Pb - AC Roaster - Grey on Red.	21/Mar/12		Paint	X	

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Please Date All Invoices After April 1, 2012 (or Later).

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
RM	March 27/12	11:00				°C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

10-200126

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To	**Report Format / Distribution**
Company: Golder Associates Ltd.	Standard: X Other (specify):
Contact: Richard Mathieson.	Select: PDF X Excel Digital Fax
Address: # 300, 10525 - 170 Street. Edmonton, AB.	Email 1: rmathieson@golder.com
Phone: 780-403 3499 Fax: 780-4031574	Email 2: tjaniszewski@golder.com. awhite@golder.com
Invoice To Same as Report ? (circle) Yes or No (If No, provide details)	**Client / Project Information**
Copy of Invoice with Report? (circle) Yes or No	Job #: 11137-0244
Company:	PO / AFE: 11137-0244
Contact: Accounts Receivable	LSD:
Address:	
Phone:	Quote #:
Lab Work Order	ALS Contact: Shannon Sampler: RM/TS

Service Request: (Rush subject to availability - Contact ALS to confirm TAT)

- X Regular (Standard Turnaround Times - Business Days)
- Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
- Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
- Same Day or Weekend Emergency - Contact ALS to confirm TAT

Analysis Request
(Indicate Filtered or Preserved, F/P)

Sample #		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Leachable Lead	Number of Containers
	13Pb - AC Roaster - Green	21/Mar/12.		Paint	X	1
	14Pb - AC Roaster - Yellow	21/Mar/12.		Paint	X	1
	15Pb - AC Roaster. - Green	21/Mar/12.		Paint.	X	1
	16Pb - AC Roaster - Yellow on Green.	21/Mar/12		Paint.	X	1
	17Pb - D. Roaster - Grey	21/Mar/12		Paint.	X	1
	18Pb - D Roaster. - Grey	21/Mar/12.		Paint.	X	1
	19Pb - D. Roaster. - ~~Grey~~ Yellow on Red	21/Mar/12		Paint.	X	1
	20Pb. - D. Roaster - Red.	21/Mar/12.		Paint.	X	1
	21Pb - D. Roaster - Yellow	21/Mar/12.		Paint	X	1
	22Pb - D. Roaster - Grey	21/Mar/12		Paint.	X	1
	23Pb - Silo - Grey.	21/Mar/12		Paint.	X	1
	24Pb - Silo - White on Yellow.	21 Mar 12.		Paint	X	1

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Please date all invoices After April 1/2012 thanks

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
RMathieson	March 23/12	11:00				°C				

10 - 200127

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 3 of 3

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Golder Associates Ltd	Standard: ✓	Other (specify):	X	Regular (Standard Turnaround Times - Business Days)
Contact:	Richard Mathieson.	Select: PDF ✓	Excel ✓ Digital Fax		Priority (2-4 Business Days) - 50% surcharge - Contact ALS to confirm TAT
Address:	#300, 105 25 170 ST. Edmonton, AB	Email 1:	rmathieson@golder.com		Emergency (1-2 Business Days) - 100% Surcharge - Contact ALS to confirm TAT
		Email 2:	tjaniszewski@golder.com. dmarshall@golder.com.		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	780 423 3459 Fax: 780 423 1574			Analysis Request	
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	11 137T 0244.		
Company:		PO / AFE:	11 137T 0244		
Contact:	Accounts Recievable	LSD:			
Address:					
Phone:		Quote #:			
Lab Work Order		ALS Contact:	Shannon L.	Sampler:	RM / TJ.

Sample #		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Leachable Lead	Number of Containers
	25Pb - Scale house - white/yellow	(21/Mar/12)		Paint	X	1

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Please Date All Invoices After April 1 2012

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
RM	Mar 23/12	11:00				°C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

APPENDIX B

Building Specific Appendices

July 13, 2012
Project No. 11-1375-0244/1000
Doc. No. 193

Golder Associates

CALCINE PLANT

Arsenic Contamination	Sample #	Photo ID	(mg/kg)[1] [4]	Leachate (mg/L)[2]	Locations	Comments
Dust on Platform	06-D	02	11,500	267	Middle Platform of Kiln Furnace (Trommel)	—
Dust and Dirt	07-D	03	9,140	4.73	Dirt Floor Below Thickener	—
Dust from Furnace	08-D	04	9,510	280	South End of Building from Inside Furnace	—
Dust on Equipment Stand	09-D	05	8,920	280	North End of Building on Old Equipment Stand	—
Dust on Equipment	10-D	06	8,620	186	Southwest of Building on Old Equipment	—
Dust on Drum Frame	11-D	07	10,600	35.9	Second Level on Calcine Drum Frame	—
Asbestos Containing Materials	**Sample #[3]**	**Photo ID**	**% Asbestos[3]**		**Locations**	**Comments [3] [4]**
Exterior Cement Board Panels	21	08	25% Chrysotile		On Exterior Walls	Located on Exterior Walls and Roof Throughout the Building. Exterior wall panels also contain spray applied insulation on the inside of the building.
Spray Applied Insulation - Debris	22	09	80% Amosite		Ceiling Insulation	Located on the Underside of the Asbestos-Containing Ceiling Panels. Delaminating has occurred throughout the Building and Asbestos-Containing Insulation Debris is visible on equipment throughout the Building.
Mechanical Insulation	23	10	65% Chrysotile		On Fan Blower Ground Level	Typical Mechanical Insulation Located throughout the Building on the Various Pieces of Equipment
Mechanical Insulation	24	11	65% Chrysotile		CA-7 - Second Level	
Spray Applied Wall Insulation	25	12	75% Chrysotile		Southwest Wing North Wall	Located on the backside of the asbestos-containing cement board wall panels. Material is delaminating and visible debris is located throughout the building.
Refractory	26	13	None Detected		On The Door Furnace of Trommel	—
Block and Mortar	27	14	None Detected		Instrumentation Room	—
Woven Gasket	28	15	90% Chrysotile		On Trommel Furnace Door	Gaskets located on equipment throughout the building are assumed to contain asbestos.
Pipe Insulation	29	16	80% Amosite		West Area North Wing	Typical Pipe Insulation Materials. Pipe Insulation is located throughout the building, typically around the perimeter walls.
Spray Applied Wall Insulation	30	17	85% Chrysotile		West Wall	Located on the backside of the asbestos-containing cement board wall panels. Material is delaminating and visible debris is located throughout the building.
Cement Board Panels with Paper Backing	VR-13/14	18	25% (panels) and 80% (paper) Chrysotile		Instrumentation/Control Room	Located on the Walls and Ceiling within the Control Room.
Vermiculite Wall Cavity Fill	VR-13/14	19	Suspected to Contain Asbestos		Second Level Dry Room/Washroom	Vermiculite wall cavity fill was not sampled and is assumed to be contaminated with the spray applied wall insulation.
Lead in Paint	**Sample #**	**Photo ID**	**Leachable (mg/L)[6]**		**Locations**	**Comments**
No Painted Surfaces Sampled	—	—	—		—	Minimal or no paint remains on the equipment and structural steel.
Lead in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Condition**
Lead Sheeting	Bulk	20	Window Sheeting		Located around Windows	Sheeting is suspected around roof vents and penetrations etc.
PCBs in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Condition**
Fluorescent Light Ballasts	—	—	Ballasts		Located Throughout the Building	Suspected PCB-Containing. Light fixtures were not opened.
Mercury in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Condition**
Fluorescent Light Tubes	—	—	Light Tube		Located Throughout the Building	—
Circle Chart Recorders	—	21	Data Recorder		Located on MCC within the Control Room	Visually intact with no visible mercury leakage.
Radioactive Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Condition**
None Observed During the Assessment	—	—	—		—	—
ODS Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Condition**
None Observed During the Assessment	—	—	—		—	—

GENERAL NOTES
1. Arsenic Contaminated Dust - Dust containing >50 milligrams per kilogram.
2. Leachable Arsenic in Dust - Bulk sample with TCLP >2.5 milligrams per litre (mg/L).
3. Asbestos Waste - Material contains >1% asbestos by weight.
4. Highlighted Field - Sample results above specified criteria.
5. VR - Visually Referenced to a Previous Sample Collected
6. Leachable Lead - Coated substrate with TCLP >5 milligrams per litre (mg/L).

GENERAL BUILDING NOTES	
a.	Large quantities of delaminating and damaged asbestos-containing insulation is located throughout the building. All surfaces should be considered contaminated with asbestos and dust with significant concentrations of arsenic.
BUILDING LIMITATIONS	
b.	Interiors of mechanical equipment and vessels (thickener etc.) were not assessed.

Photograph 1: Calcine Building (Three Visible Phases/Buildings). Asbestos-Containing Exterior Siding and Roofing is Visible.

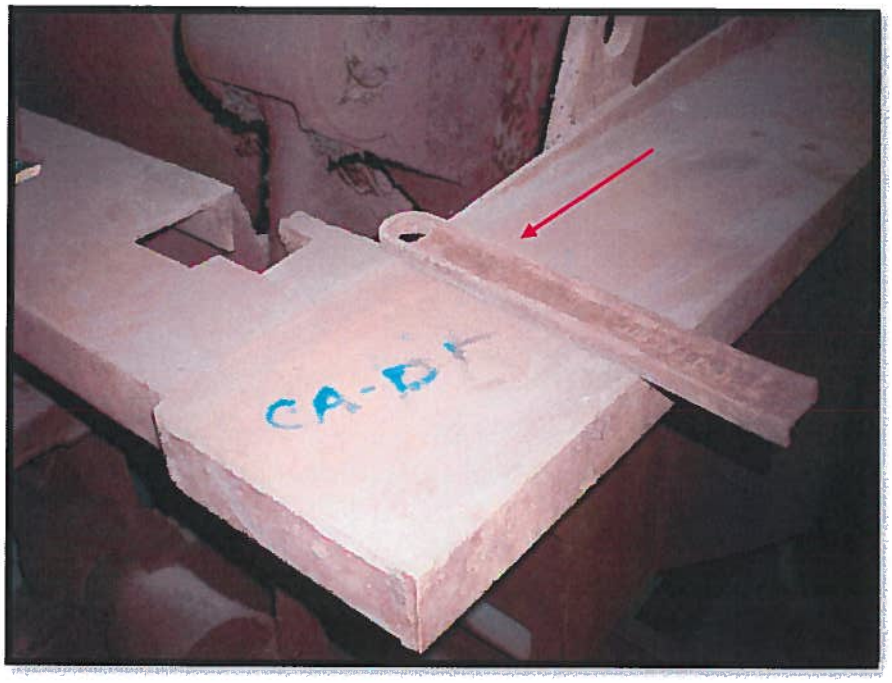
Photograph 2: Dust Sample Location – Middle Platform Kiln Furnace (Sample 06-D).

Photograph 3: Dust Sample Location – Dirt below the Thickener (Sample 07-D).

Photograph 4: Dust Sample Location – Dust from Kiln Furnace (Sample 08-D).

Photograph 5: Dust Sample Location – North End of Building on Old Equipment Stand (Sample 09-D).

Photograph 6: Dust Sample Location – Southeast Wing of Building at Beneath Equipment (Sample 10-D).



Photograph 7: Dust Sample Location – Second Level Calcine Drum (Sample 11-D).

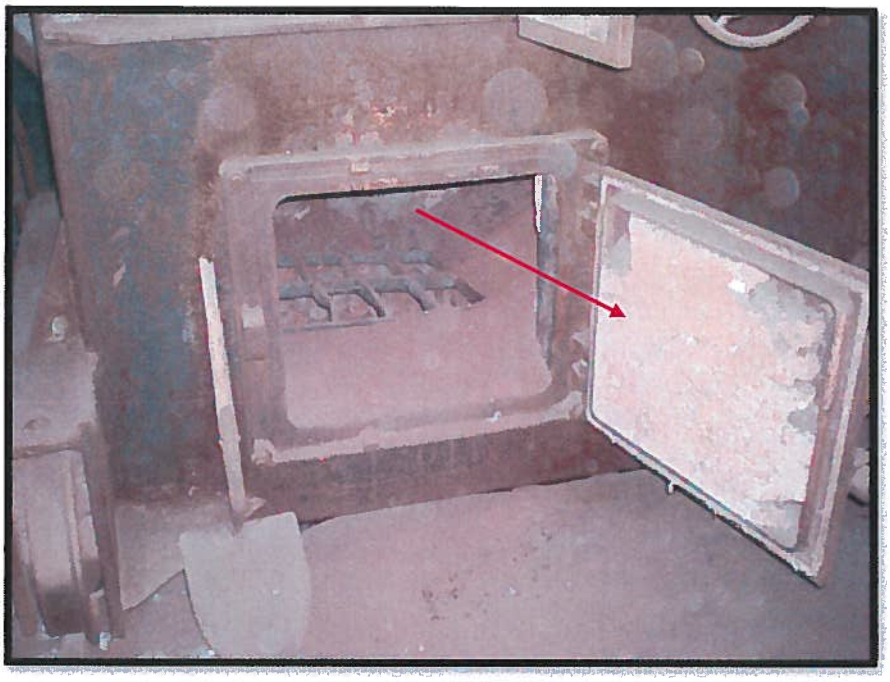
Photograph 8: Asbestos-Containing Exterior Wall Panels (Sample 21).

Photograph 9: Spray Applied Ceiling Insulation Debris on Table (Sample 09).

Photograph 10: Asbestos-Containing Mechanical Insulation on Equipment on Fan/Blower Unit North End (Sample 10) with suspect Asbestos-Containing Gasket Materials.

Photograph 11: Asbestos-Containing Mechanical Insulation (Sample 24).

Photograph 12: Spray Applied Asbestos-Containing Wall Insulation (Sample 25).



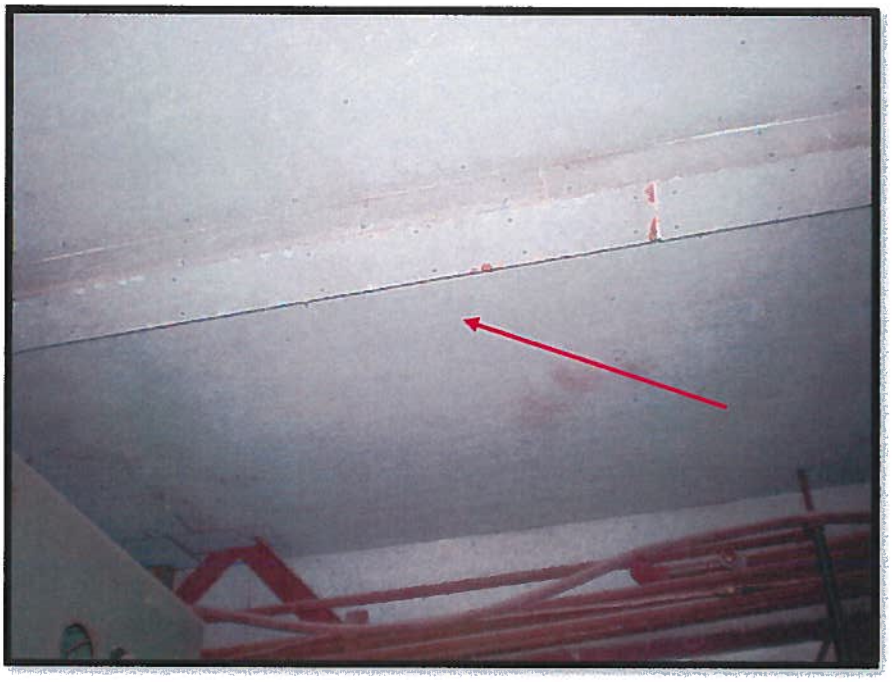
Photograph 13: Refractory on Furnace Door (Asbestos not Detected), (Sample 26).

Photograph 14: Block and Mortar on Control Room (Asbestos not Detected), (Sample 27).

Photograph 15: Asbestos-Containing Gasket on Furnace Door (Sample 28).

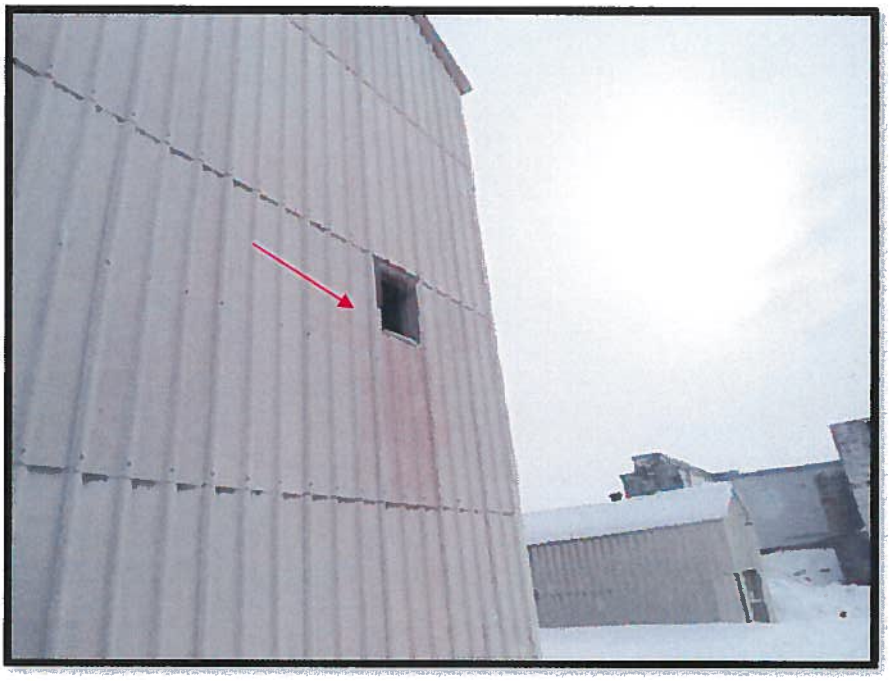
Photograph 16: Asbestos-Containing Pipe-Insulation (Sample 30).

Photograph 17: Spray Applied Wall Insulation (Sample 30).

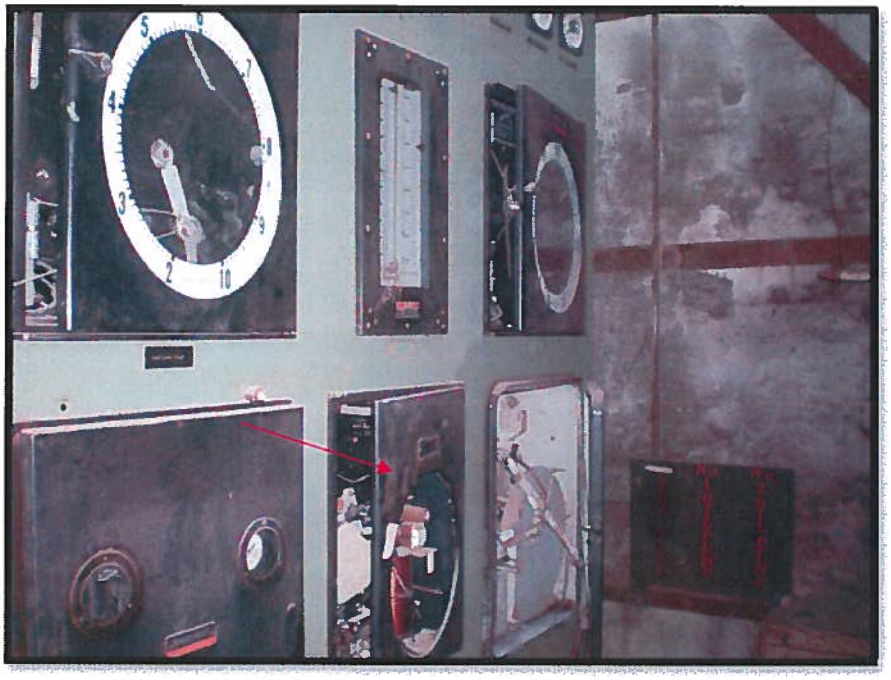


Photograph 18: Asbestos-Containing Cement Board Paneling on Asbestos Paper (Visually Referenced).

Photograph 19: Suspect Asbestos-Containing Vermiculite (not Sampled, Assumed to be contaminated with Asbestos).



Photograph 20: Lead Sheeting Located on Building Windows and Openings.



Photograph 21: Chart Recorders inside the Control Room with Mercury.

o:\final\2009\1427\09-1427-0006\3. correspondence\2 issued documents\word\phase 2\doc 193 rep 0713_12\appendix b\calcine building photos.docx

DORRCO ROASTER

Arsenic Contamination	Sample #	Photo ID	(mg/kg)[1]	Leachable (mg/L)[2]	Locations	Comments
Dust on Wood Planks	19-D	02	79,700	0.60	Dust on Wood Plank/Main Level	—
Dust on Ground Floor	20-D	03	20,900	25	Ground Below Roaster #2/Basement Level	—
Dust on Pump	21-D	04	16,400	0.68	Pump below Sulphur tank/Main Level	—
Dust on Handrails	22-D	05	31,900	7.81	Handrails/Main Level	—
Asbestos Containing Materials	**Sample #[5]**	**Photo ID**	**% Asbestos[3]**		**Locations**	**Comments[a]**
Insulation Debris	40	06	None Detected		Debris on Basement Level	Debris from ceiling insulation.
Spray Applied Insulation	41	07	None Detected		Ceiling of Building	Large Portions of the Ceiling Insulation has Delaminated from the metal roof panels and is scattered throughout the building.
Wall Texture	42	08	60% Chrysotile		Inside Electrical Room at the Control Room	—
Spray Applied Insulation	45	09/10	75% Chrysotile		North Wall	Asbestos-Containing Insulation is located throughout the building on the exterior walls. Insulation materials are in poor condition and delaminating from the walls. Debris is scattered throughout the building.
Spray Applied Insulation	48	09/10	75% Amosite		East Wall	
Spray Applied Insulation	49	09/10	75% Chrysotile		South Wall	
Flue-Pipe Insulation	43	11	60% Chrysotile		Flue-Pipe Network Insulation	All insulated mechanical equipment associated with the flues is assumed to contain asbestos (visually similar materials).
Roaster Insulation	44	12	65% Chrysotile		Roaster 2	Insulation is in poor condition with debris located on the gratings.
Gasket	46	13	65% Chrysotile		Loose Gasket on Sulphur Floor	Loose Gaskets are located throughout the building. Gaskets on Equipment throughout the building should be assumed to contain asbestos.
Roaster Insulation	47	14	65% Chrysotile		Roaster 1	Insulation is in poor condition with debris located on the gratings.
Cement Board Panels	50	15/21	25% Chrysotile		Compressor Room/Exterior	Panels located on the exterior and are also located exterior of Control Room.
Refractory Bricks	51	16	None Detected		Roaster 2 (Loose Adjacent to Unit)	—
Refractory Bricks	—	17/18	Suspected ACM		Bricks Inside Roasters 1 and 2	Area not Accessed (Confined Space).
Pipe-Run Insulation	52	09/19	80%		Located Throughout the Building	Pipe-run and fitting insulation is located throughout the building with numerous lines running along the perimeter walls.
Cyclones on Flue Network	VR-43	20	60% Chrysotile		Adjacent to Roasters	All insulated mechanical equipment associated with the flues is assumed to contain asbestos (visually similar materials).
Cement Board Panels	VR-21	21	25% Chrysotile		Adjacent to Office	Located on Control Room and Exterior of the Building.
Paper Siding	VR-39	21	60% Chrysotile		South Exterior Wall	Paper is Located on the South Exterior Porch.
Flue Piping	VR-43	22	60% Chrysotile		North Wall	Flue network leaving the roaster from the north wall to the Cotrell Building, assumed to contain asbestos.
Electrical Insulators	—	—	Suspected ACM		Electrical Room Behind the Control Room	Electrical equipment not opened.
Lead in Paint	**Sample #**	**Photo ID**	**Leachable (mg/L)[6]**		**Locations**	**Comments**
Grey on Green Paint on Wall	17-Pb	23	2.56		Control Room Walls and Panels	—
Grey Paint on Roaster	18-Pb	24	<0.5		Base of Roaster #02	—
Yellow over Red Paint	19-Pb	25	1.28		Basement Stairs	—
Red Paint on Steel	20-Pb	26	0.84		Structural Steel	—
Yellow Paint on Metal Handrail	21-Pb	27	0.58		Handrails are Located Throughout the Building.	—
Grey Paint on Column	22-Pb	28	<0.5		Structural Steel	—
Lead in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Sheeting	Bulk	29	Lead Sheeting Around Windows		Exterior Windows/Control Room Windows	Lead Sheeting is also suspected to be located around openings on the roof.
Emergency Lighting	Batteries	30	Emergency Light Batteries		Located Throughout the Building	—
PCBs in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Fluorescent Light Ballasts	Tubes	—	PCB-Containing Ballasts		Located Throughout the Building	Suspected PCB-Containing. Light fixtures were not opened.
Mercury in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Fluorescent Light Tubes	—	—	Light Tube		Located Throughout the Building	—
Circle Chart Recorders	Liquid	31/32/33	Liquid Mercury in Recorder		Multiple units in the Control Room	Visible mercury located on the floor beneath the MCC in the Control Room.
Radioactive Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Observed During the Assessment	—	—	—		—	—
ODS Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Water Fountain	—	34	ODS in Refrigerant		Control Room	—

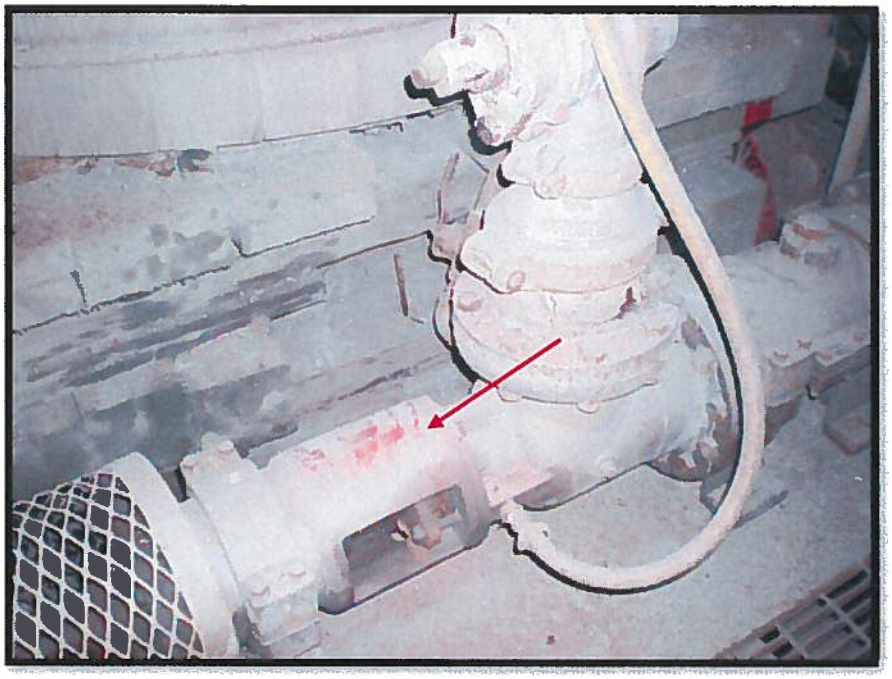
GENERAL NOTES
1. Arsenic Contaminated Dust - Dust containing >50 milligrams per kilogram.
2. Leachable Arsenic in Dust - Bulk sample with TCLP >2.5 milligrams per litre (mg/L).
3. Asbestos Waste - Material contains >1% asbestos by weight.
4. Highlighted Field - Sample results above specified criteria.
5. VR - Visually Referenced to a Previous Sample Collected
6. Leachable Lead - Coated substrate with TCLP >5 milligrams per litre (mg/L).

GENERAL BUILDING NOTES	
a.	Large quantities of delaminating and damaged asbestos-containing insulation is located throughout the building. All surfaces should be considered contaminated with asbestos and dust with significant concentrations of arsenic.
BUILDING LIMITATIONS	
b.	Roof and Confined Spaces Not Accessed.

Photograph 1: Exterior of Dorrco Roaster (North and West Walls), with typical Asbestos-Containing Exterior Panels.

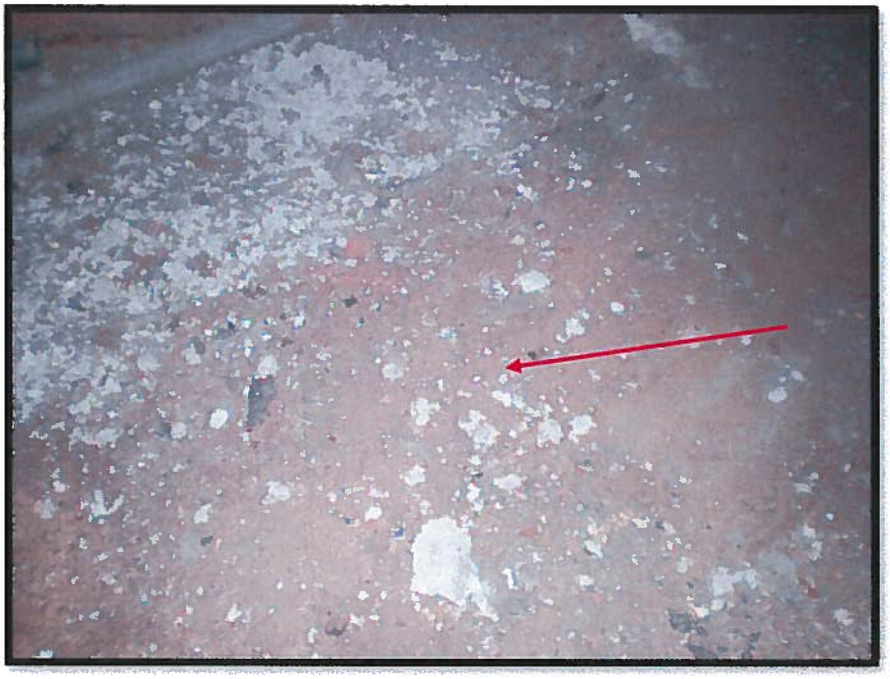
Photograph 2: Dust Sample Location – Wood Plank on Decking, Main Level (Sample 19-D).

Photograph 3: Dust Sample Location – Basement Level, Beneath Roaster #2 (Sample 20-D).



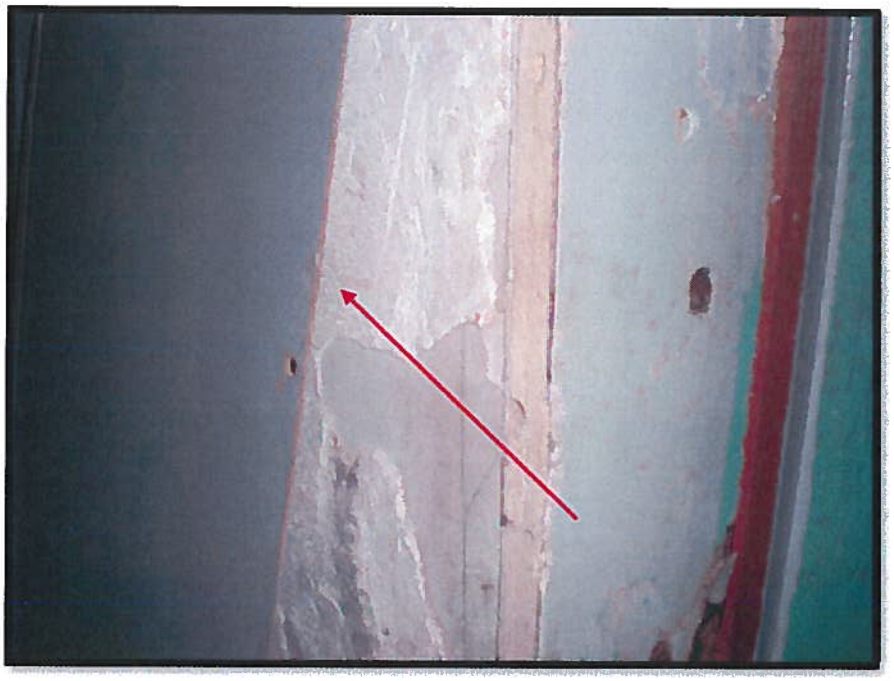
Photograph 4: Dust Sample Location – Main Level, On Pump (Sample 21-D).

Photograph 5: Dust Sample Location – Main Level, Handrails (Sample 22-D).

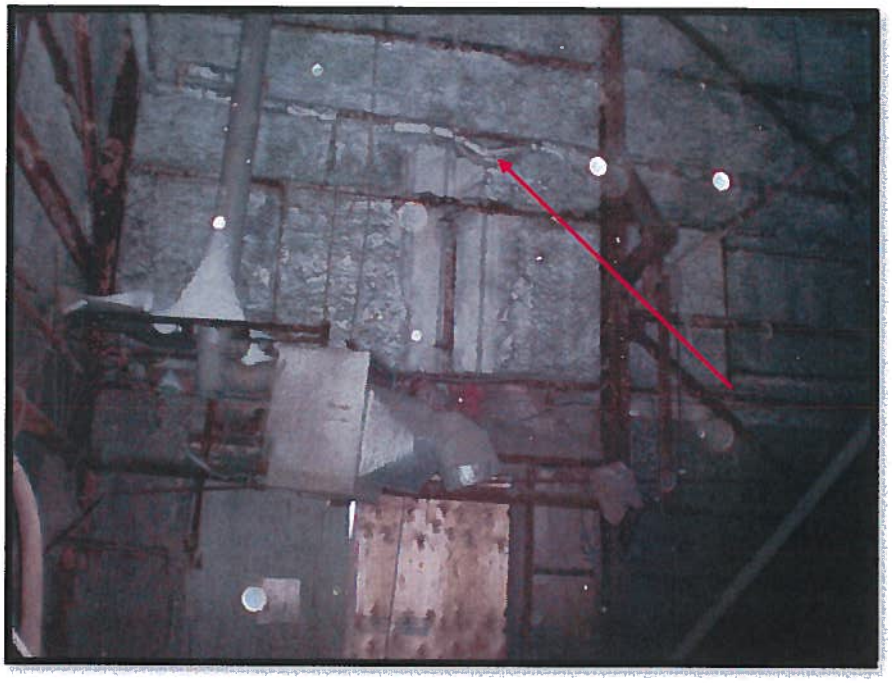


Photograph 6: Non-Asbestos Insulation Debris on Basement Level, Suspected to be From the Ceiling (Sample 40).

Photograph 7: Delaminating Ceiling Insulation Materials, Non-Asbestos (Sample 31).



Photograph 8: Asbestos-Containing Wall located within Electrical Room Behind Control Room (Sample 08).

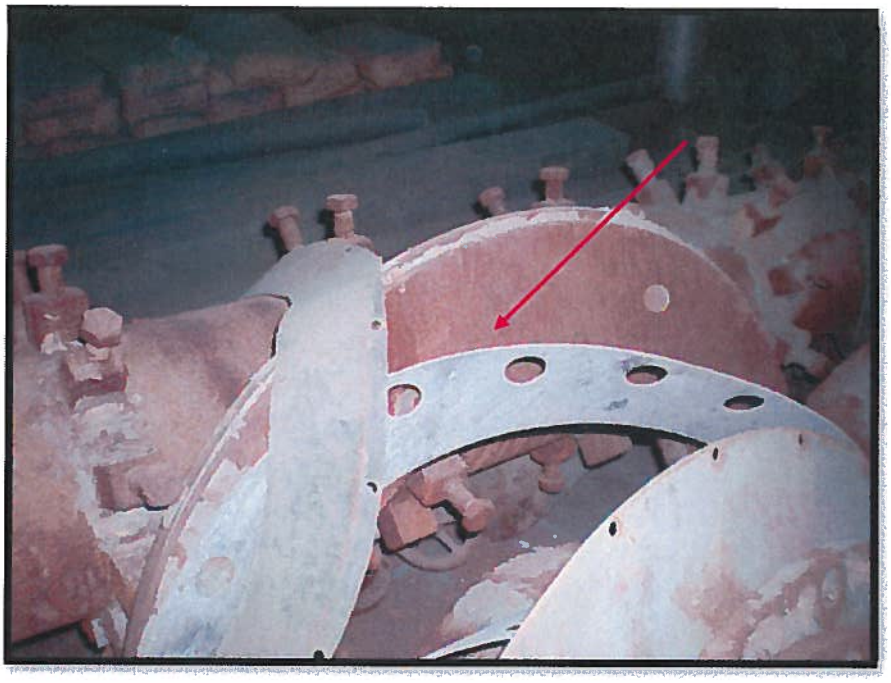


Photograph 9: Typical Asbestos-Containing Spray-Applied Wall Insulation and Asbestos Containing Pipe Insulation on the West Perimeter Wall (Red Arrow).

Photograph 10: Typical Asbestos-Containing Spray-Applied Wall Insulation.

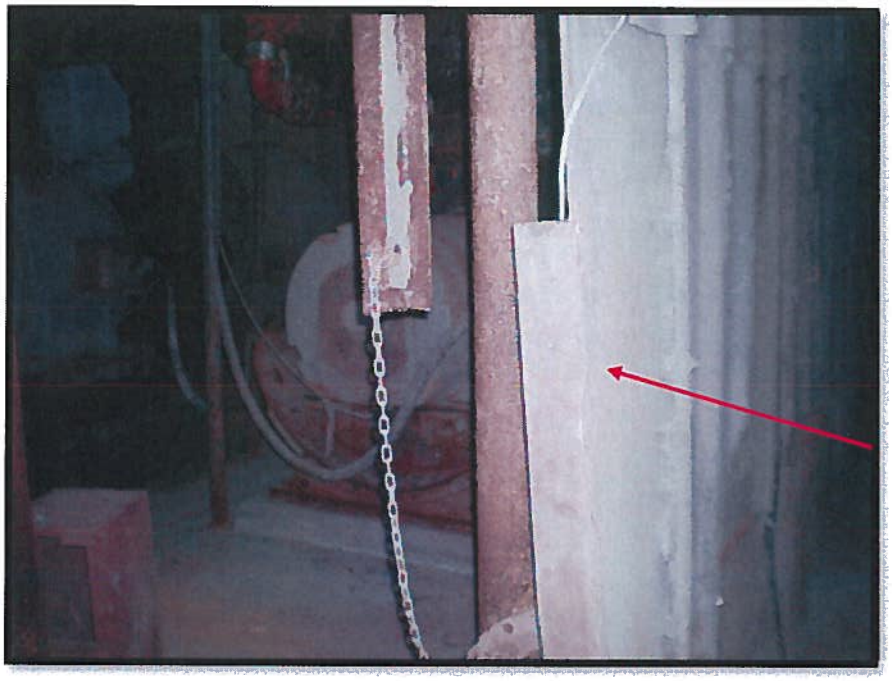
Photograph 10: Asbestos-Containing Insulation on Flue Piping located Throughout the Building (Sample 43).

Photograph 12: Asbestos-Containing Insulation on Roaster #02 (Sample 44).



Photograph 13: Asbestos-Containing Gasket Materials, Loose and Located on Piping throughout the Building (Sample 46).

Photograph 14: Asbestos-Containing Insulation Roaster #01 (Sample 47).

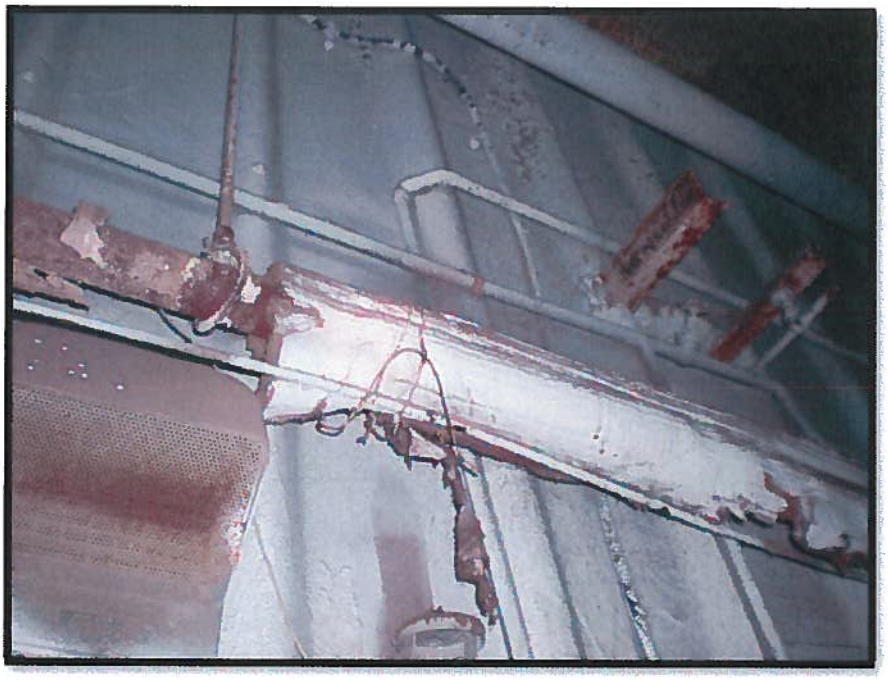


Photograph 15: Asbestos-Containing Cement Board, Basement Level Pump Room (Sample 50).

Photograph 16: Loose Refractory Bricks, (Asbestos not Detected), Adjacent Roaster #01 (Sample 51).

Photograph 17: Suspect Asbestos-Containing Refractory Bricks and Linings (not accessible).

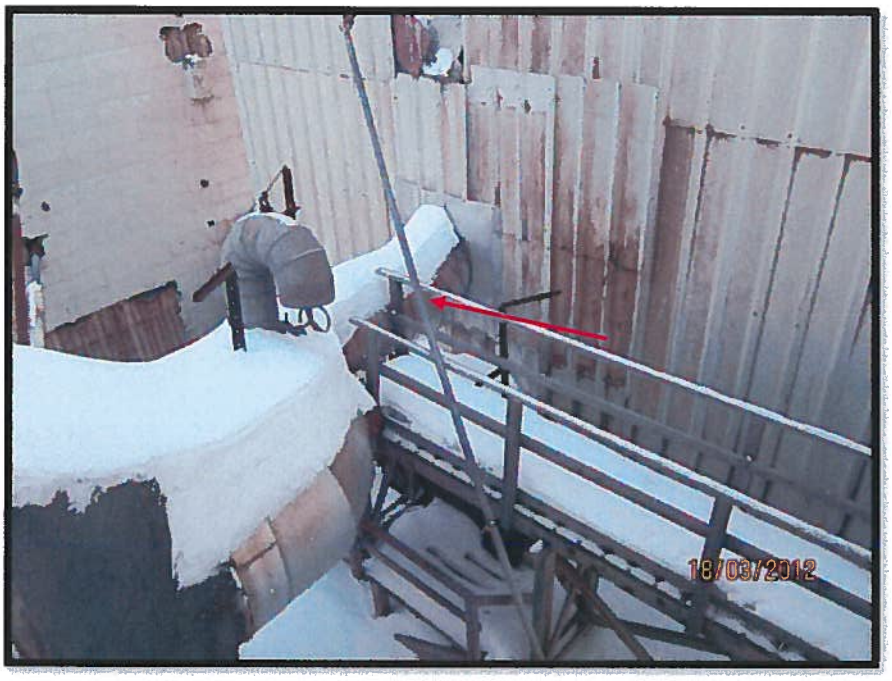
Photograph 18: Suspect Asbestos-Containing Refractory Bricks and Linings (not accessible).



Photograph 19: Asbestos-Containing Pipe-Run Insulation (Sample 52).

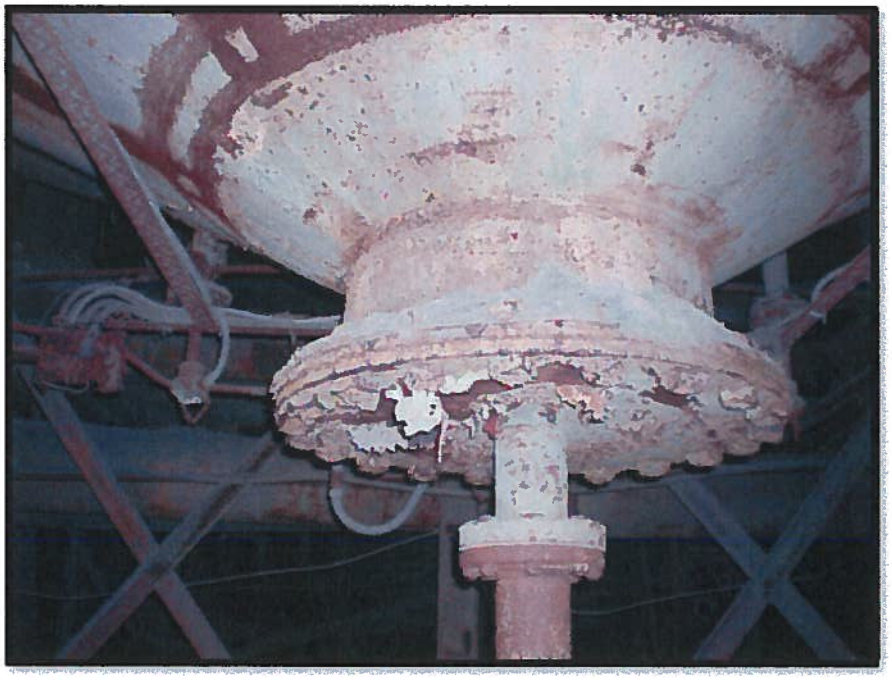
Photograph 20: Typical Mechanical Insulation on Flue Network Cyclones (Visually Referenced, Sample 43).

Photograph 21: Asbestos-Containing Paper Siding and Cement Panels Located on the South Wall of the Building (Visually Referenced).



Photograph 22: Asbestos-Contaning Insulation on Flue Leaving Dorrco to the Cottrell Building (Visually Referenced).

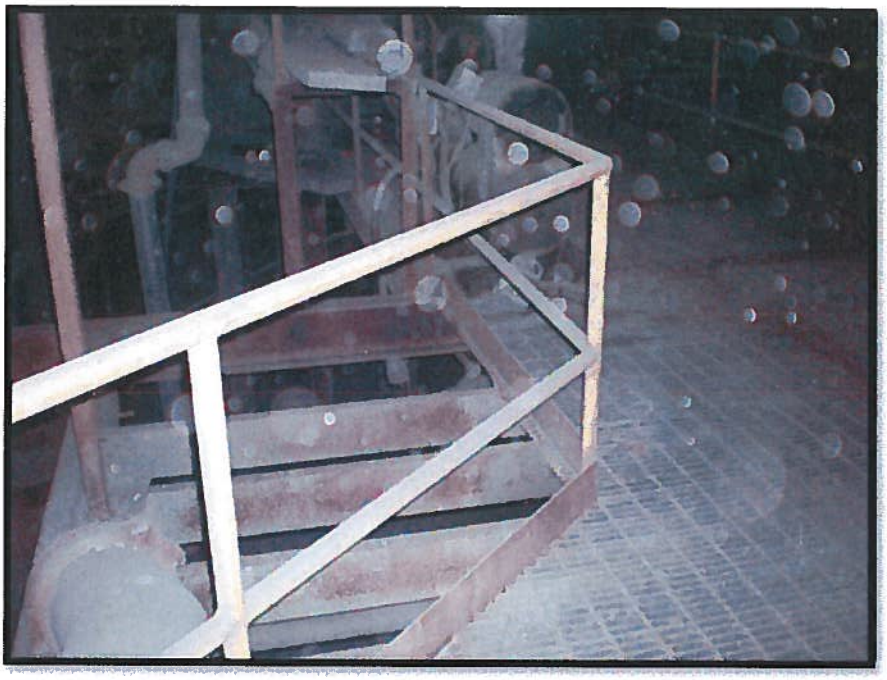
Photograph 23: Grey Paint in Control Room (Sample 17-Pb).



Photograph 24: Grey Pain on Base of Roaster #02 (Sample 18-Pb).

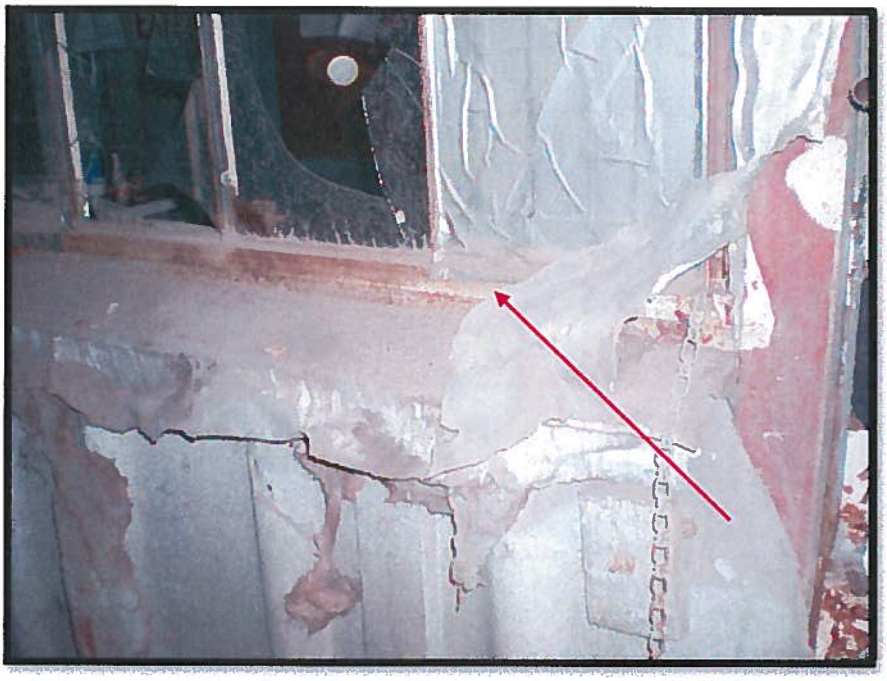
Photograph 25: Yellow Paint over Red on Basement Stairs (Sample 19-Pb).

Photograph 26: Red Paint on Structural Steel (Sample 20-Pb).



Photograph 27: Yellow Paint on Handrails (Sample 21-Pb).

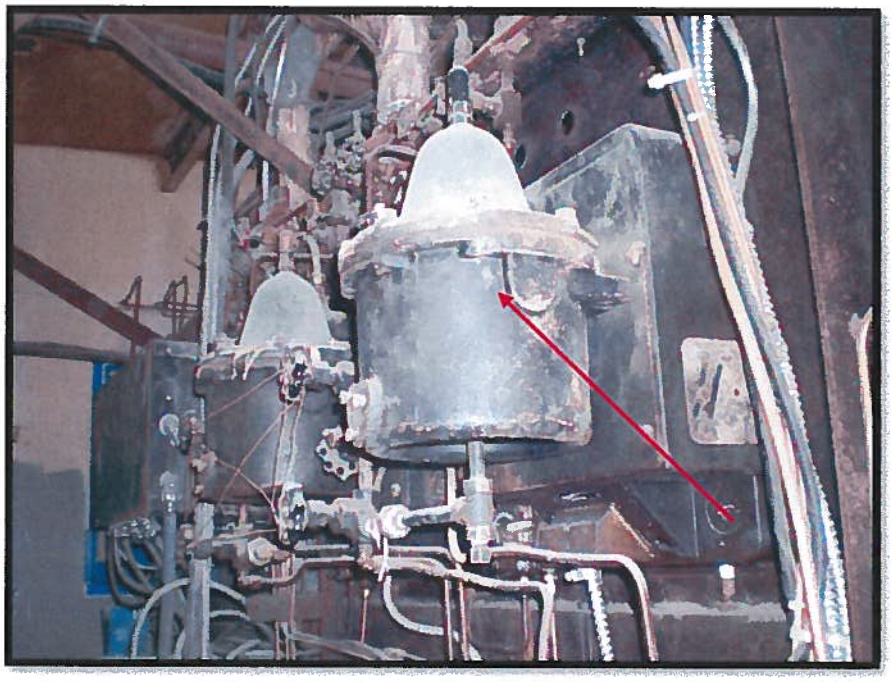
Photograph 28: Grey Paint on Structural Steel (Sample 22-Pb).



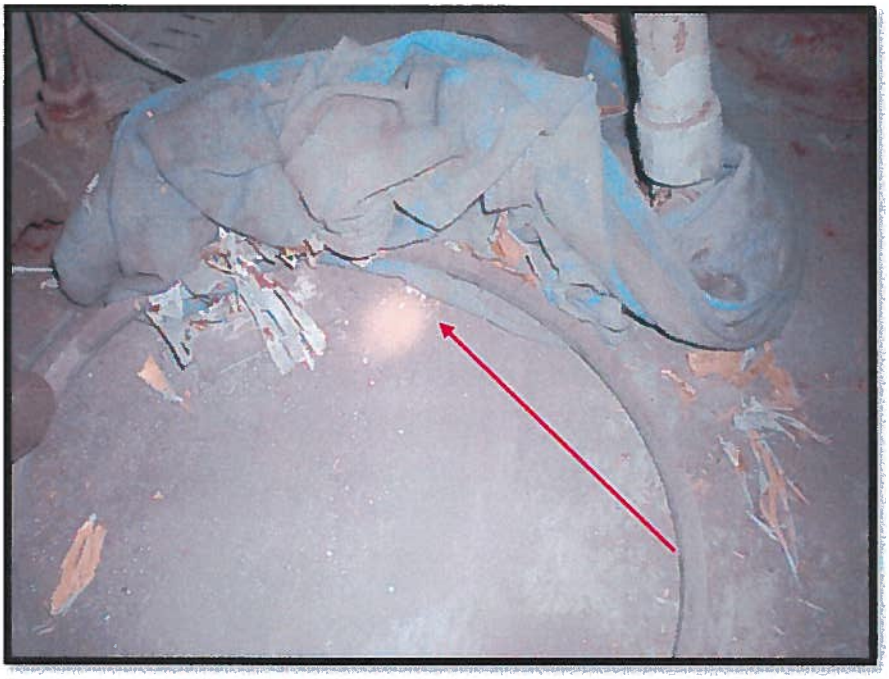
Photograph 29: Lead Sheeting around Window Sills and on the Control Room and Building Exterior.

Photograph 30: Emergency Light Fixture with Lead-Acid Batteries.

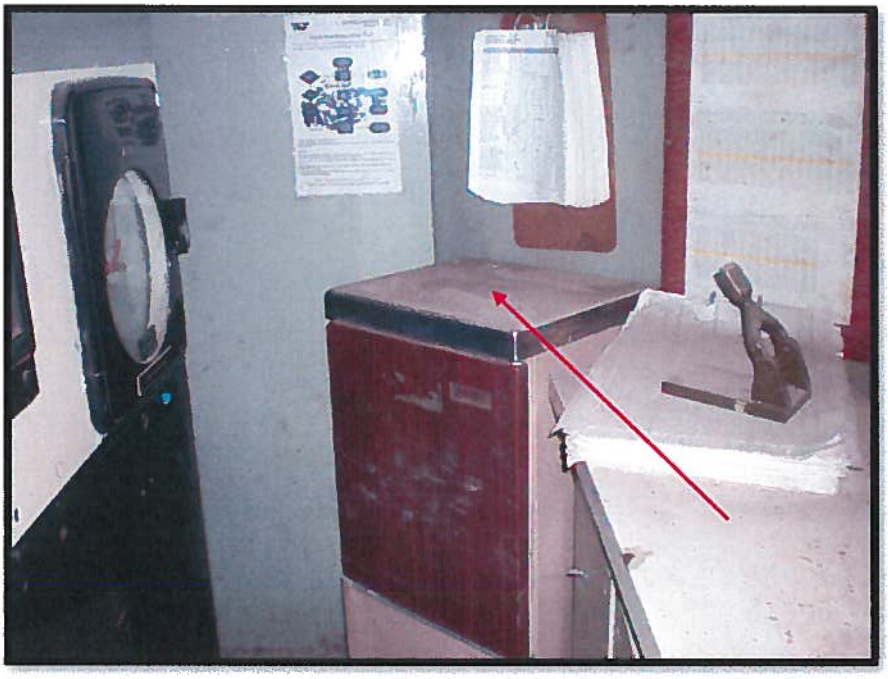
Photograph 31: Chart Recorders Inside the Control Room with Mercury Reservoirs.



Photograph 32: Circle Chart Recorders inside the Control Room with Mercury Reservoirs.



Photograph 33: Visible Mercury Droplets located on the Floor Behind the MCC in the Control Room.



Photograph 34: Refrigerated Water Fountain with ODS Located in Control Room.

BAGHOUSE BUILDING

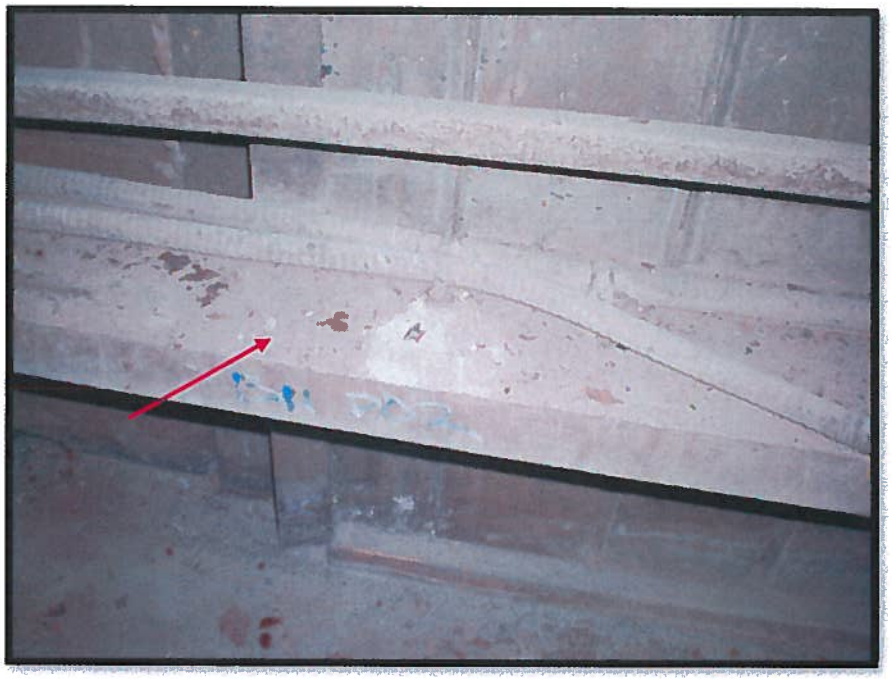
Arsenic Contamination	Sample #	Photo ID	(mg/kg)[1][4]	Leachable (mg/L)[2]	Locations	Comments
Dust on Floor (West)	01-D	02	235,000	6,490	Metal Siding, Horizontal Ledge, West Wall	—
Dust on Floor (East)	02-D	03	260,000	3,400	Metal Siding, Horizontal Ledge, East Wall	—
Dust on Floor (East Floor Trap)	03-D	04	146,000	550	Floor Trap Drain adjacent to the East Wall	—
Filtration Bags and Debris	—	05	—	—	Second Level Inside Bag Compartment	Materials not Sampled (Confined Space).
Asbestos Containing Materials	**Sample #**	**Photo ID**	**% Asbestos [3]**		**Locations**	**Comments [a] [b]**
Parging Cement and Insulation	1	06/07	65% Chrysotile		Ground Level on Hopper (West)	Insulation is located on the hoppers throughout the ground level and was observed to consist of multiple layers. Hoppers are damaged and insulation debris was observed on the floor.
Parging Cement and Insulation	2	06/07	60% Chrysotile		Ground Level on Hopper (East)	
Parging Cement and Insulation	3	08	Trace Amounts of Amosite		Second Level on Bag Compartment (West)	Insulation was observed to be located on the bag compartment wall from the Ground Level up to the Roof. Golder did not access to top of the Bag Compartments.
Parging Cement and Insulation	4	08	Trace Amounts of Amosite		Second Level on Bag Compartment (East)	
Lead in Paint	**Sample #**	**Photo ID**	**Leachable (mg/L)[5]**		**Locations**	**Comments**
Yellow on Green on Steel	01-Pb	09	<0.5		Stairs and Railings	—
Silver on Red On Steel	02-Pb	10	<0.5		Structural Steel	—
Yellow Paint on Concrete	03-Pb	10	<0.5		Concrete Floor Lips	—
Red on Concrete	04-Pb	11	<0.5		Concrete Floor	—
Red on Wood	05-Pb	12	<0.5		Wood Door at South Entrance	—
Green on Wood	06-Pb	13	10.7		Wood Door at North Entrance	Green Paint was observed on the door at the North Entrance.
Lead in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Observed During the Assessment	—	—	—		—	—
PCBs in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Fluorescent Light Ballasts	—	15	Ballasts		Located Throughout the Building	—
Mercury in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Fluorescent Light Tubes	—	15	Light Tube		Located Throughout the Building	—
Circular Chart Data Recorder	—	13	Foxboro Unit		Located on West Wall of Building/Main Floor	Appears intact, no visible signs of leakage.
Radioactive Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Observed During the Assessment	—	—	—		—	—
ODS Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Observed During the Assessment	—	—	—		—	—

GENERAL NOTES
1. Arsenic Contaminated Dust - Dust containing >50 milligrams per kilogram.
2. Leachable Arsenic in Dust - Bulk sample with TCLP >2.5 milligrams per litre (mg/L).
3. Asbestos Waste - Material contains >1% asbestos by weight.
4. Highlighted Field - Sample results above specified criteria.
5. Leachable Lead - Coated substrate with TCLP >5 milligrams per litre (mg/L).

GENERAL BUILDING NOTES	
a.	Significant quantities of delaminating and damaged asbestos-containing insulation is located throughout the building. All surfaces should be considered contaminated with asbestos and dust with significant concentrations of arsenic.
BUILDING LIMITATIONS	
b.	Top of the filter bag compartments not assessed, limited access via fixed ladder. Interiors of equipment was not assessed.

Photograph 1: Exterior of Baghouse (East Wall).

Photograph 2: Dust Sample Location (Sample 01-D).



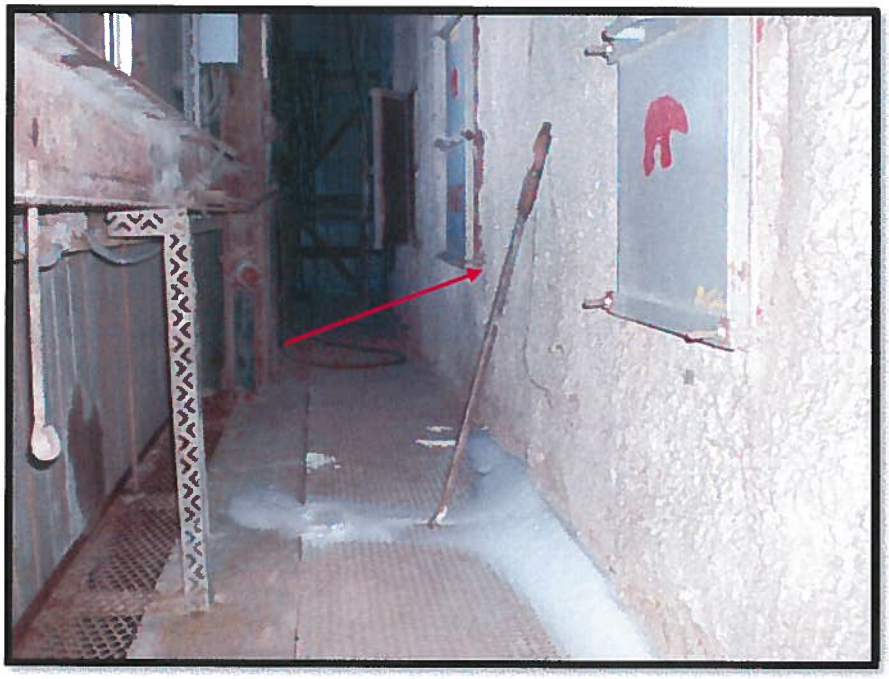
Photograph 3: Dust Sample Location (Sample 02-D).

Photograph 4: Dust Sample Location (Sample 03-D).

Photograph 5: Inside Baghouse Compartments (Suspect Arsenic Contaminated Debris and Filter Bags).

Photograph 6: Asbestos-Containing Insulation on Hoppers (Sample 1 and 2).

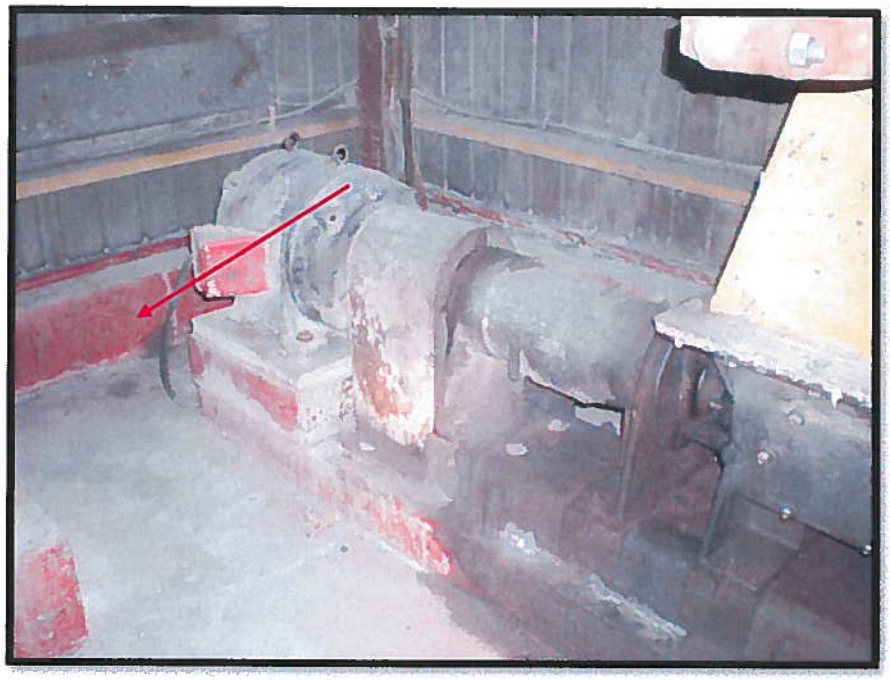
Photograph 7: Asbestos-Containing Insulation on Hoppers (Samples 1 and 2) with Minor Amounts of Insulation Debris on the Ground.



Photograph 8: Asbestos-Containing Insulation on Bag Compartment Walls (Samples 3 and 4).

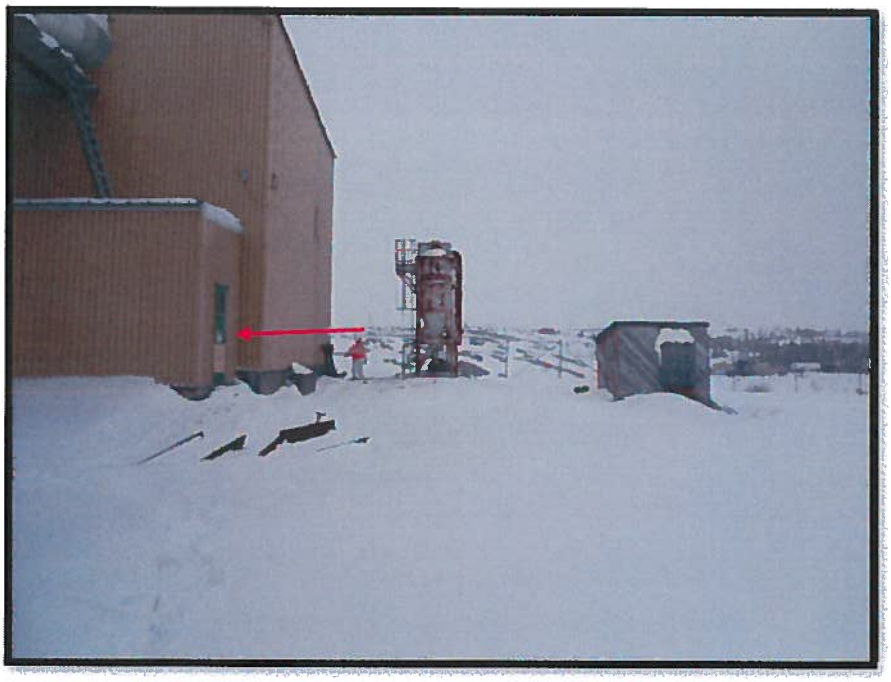
Photograph 9: Yellow over Green Paint on Stairway (Sample 01-Pb).

Photograph 10: Silver over Red Paint on Structural Steel and Yellow Paint on Concrete (Samples 02-Pb and 03-Pb).

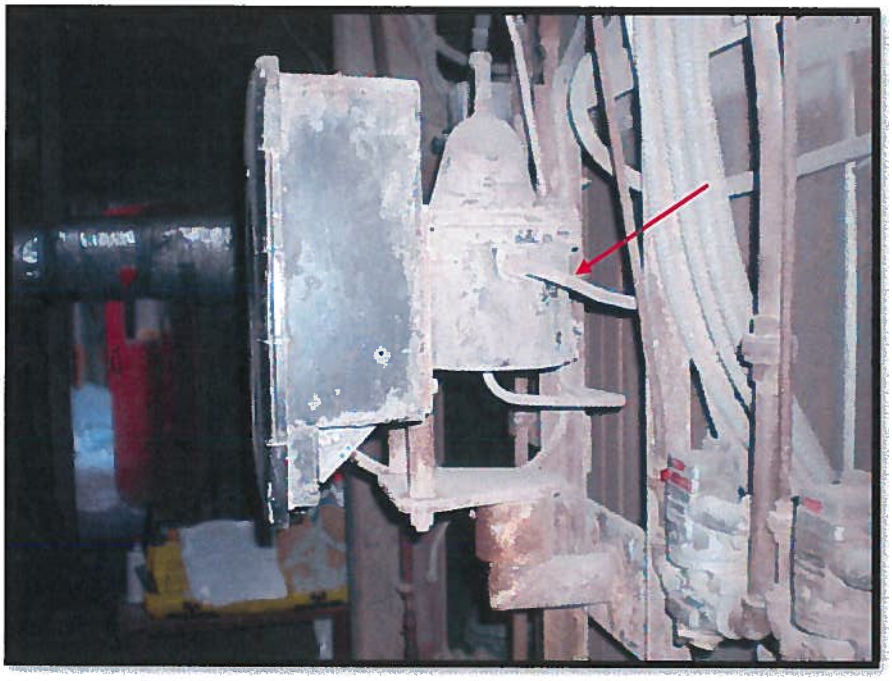


Photograph 11: Red Paint on Concrete Floor (Sample 04-Pb).

Photograph 12: Red Paint on Wood Door (Sample 05-Pb).



Photograph 13: Green Paint on Door (Sample 06-Pb).



Photograph 14: Suspect Mercury-Containing Circular Chart Recorder.

Photograph 15: Typical Fluorescent Light Fixture with Mercury-Vapour Tubes and Suspect PCB-Containing Ballasts.

SILO BUILDING

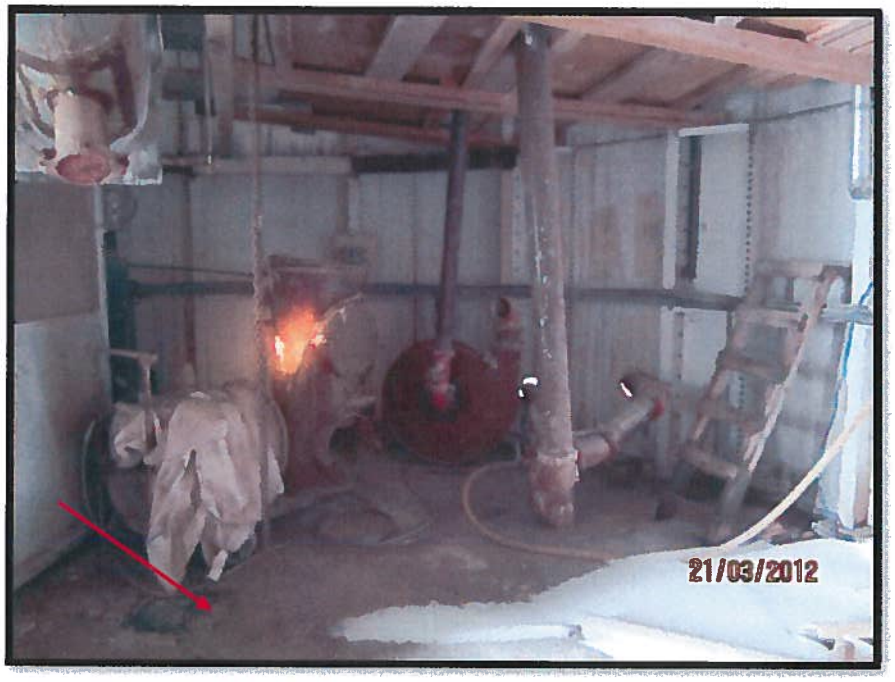
Arsenic Contamination	Sample #	Photo ID	(mg/kg)[1], [4]	Leachable (mg/L)[2]	Locations	Comments [a]
Dust on Floor	23-D	02	132,000	2.020	Floor of Silo Adjacent to the Office	—
Asbestos Containing Materials	**Sample #**	**Photo ID**	**% Asbestos [3]**		**Locations**	**Comments**
Cement Board - Grey	53	03	25% Chrysotile		Control Room/Office Windows	—
12"x12" Floor Tiles	54	04	1.7% Chrysotile		Control Room/Office	—
Electrical Insulators	—	05	Suspected ACM		—	Electrical equipment not opened.
Lead in Paint	**Sample #**	**Photo ID**	**Leachable (mg/L) [5]**		**Locations**	**Comments**
Grey Paint	23-Pb	06	<0.5		Office/Control Room	—
White on Yellow/Tan on Metal	24-Pb	07	<0.5		Silo Exterior Paint	—
Lead in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Observed During the Assessment	—	—	—		—	—
PCBs in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Fluorescent Light Ballasts	—	—	Ballasts		Located Throughout the Building	—
Mercury in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Fluorescent Light Tubes	—	—	Light Tubes		Located Throughout the Building	—
Radioactive Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Suspected in Debris Observed	—	—	—		—	—
ODS Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Suspected in Debris Observed	—	—	—		—	—

GENERAL NOTES
1. Arsenic Contaminated Dust - Dust containing >50 milligrams per kilogram.
2. Leachable Arsenic in Dust - Bulk sample with TCLP >2.5 milligrams per litre (mg/L).
3. Asbestos Waste - Material contains >1% asbestos by weight.
4. Highlighted Field - Sample results above specified criteria.
5. Leachable Lead - Coated substrate with TCLP >5 milligrams per litre (mg/L).

BUILDING LIMITATIONS	
a.	Could not assess the interior of the hopper.

SILO BUILDING
SITE PHOTOGRAPHS

Photograph 1: Silo Located Adjacent to the Weight Scale Building.

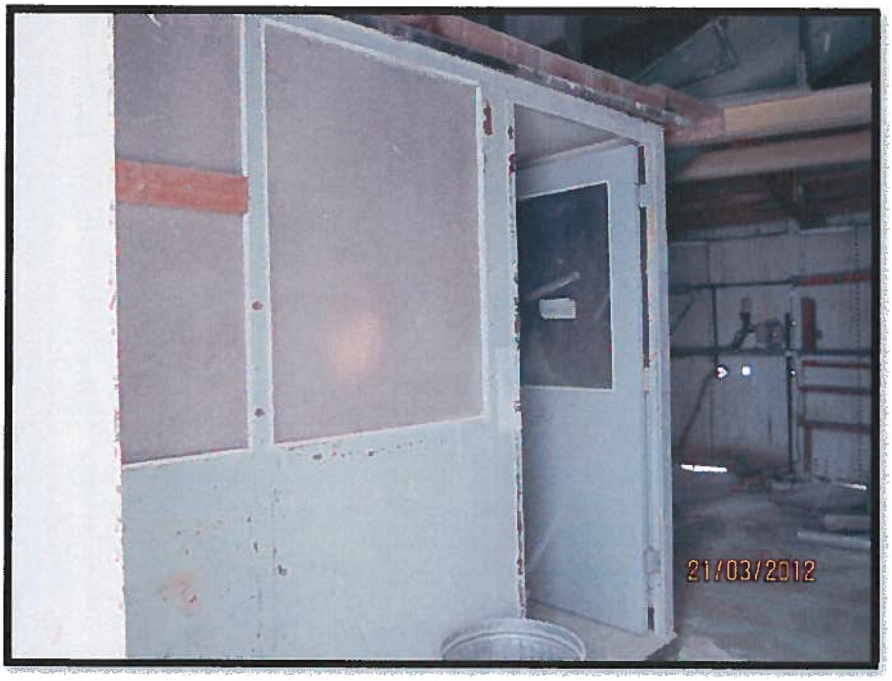


Photograph 2: Dust Sample Location (Sample 23-D).

Photograph 3: Asbestos-Containing Cement Board Panels On Office (Sample 53).

Photograph 4: Asbestos-Containing Floor Tiles in Office (Sample 54).

Photograph 5: Suspect Asbestos-Containing Insulators within the Electrical Equipment.



Photograph 6: Grey Paint on Metal Control Room (Sample 23-Pb).

Photograph 7: White over Yellow Paint on Silo (Sample 24-Pb).

o:\final\2009\1427\09-1427-0006\3. correspondence\2 issued documents\word\phase 2\doc 193 rep 0713_12\appendix b\silo building photos.docx

FAN HOUSE BUILDING

Arsenic Contamination	Sample #	Photo ID	(mg/kg)	Leachable (mg/L)	Locations	Comments [a]
No Access	---	---	---	---	---	---
Asbestos Containing Materials	**Sample #[3]**	**Photo ID**	**% Asbestos [1], [2]**		**Locations**	**Comments**
Paper Siding	VR-39	01	60% Chrysotile		Exterior Walls	Paper is located around roof line only.
Cement Board Panels	VR-50	02	25% Chrysotile		Exterior Walls and roof	---
Lead in Paint	**Sample #**	**Photo ID**	**Leachable (mg/L)**		**Locations**	**Comments**
No Access	---	---	---	---	---	---
Lead in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Sheeting	Bulk	03	Lead Sheeting Around Windows		Exterior Windows	Lead Sheeting is also suspected to be located around openings on the roof.
PCBs in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
No Access	---	---	---		---	---
Mercury in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
No Access	---	---	---		---	---
Radioactive Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
No Access	---	---	---		---	---
ODS Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
No Access	---	---	---		---	---

GENERAL NOTES
1. Asbestos Waste - Material contains >1% asbestos by weight.
2. Highlighted Field - Sample results above specified criteria.
3. VR - Visually Referenced to a Previous Sample Collected

BUILDING LIMITATIONS	
a.	Building was partially located in control zone set up around the stack (limited access to outside of the building). Could not assess the interior of the Building.

FAN HOUSE BUILDING
SITE PHOTOGRAPHS

Photograph 1: Asbestos-Containing Cement Board Panels On Building Exterior (Visually Referenced).

Photograph 2: Asbestos-Containing Exterior Siding Paper (Visually Referenced).

Photograph 3: Lead Sheeting around Exterior Window Frames.

o:\final\2009\1427\09-1427-0006\3. correspondence\2 issued documents\word\phase 2\doc 193 rep 0713_12\appendix b\fan house building photos.docx

11-1375-0244/1000
AECOM Doc. No. 003-DISO Roaster Demo-DISO-RPT-0003-Rev0_20120713
Golder Doc. No. 193

AC ROASTER BUILDING

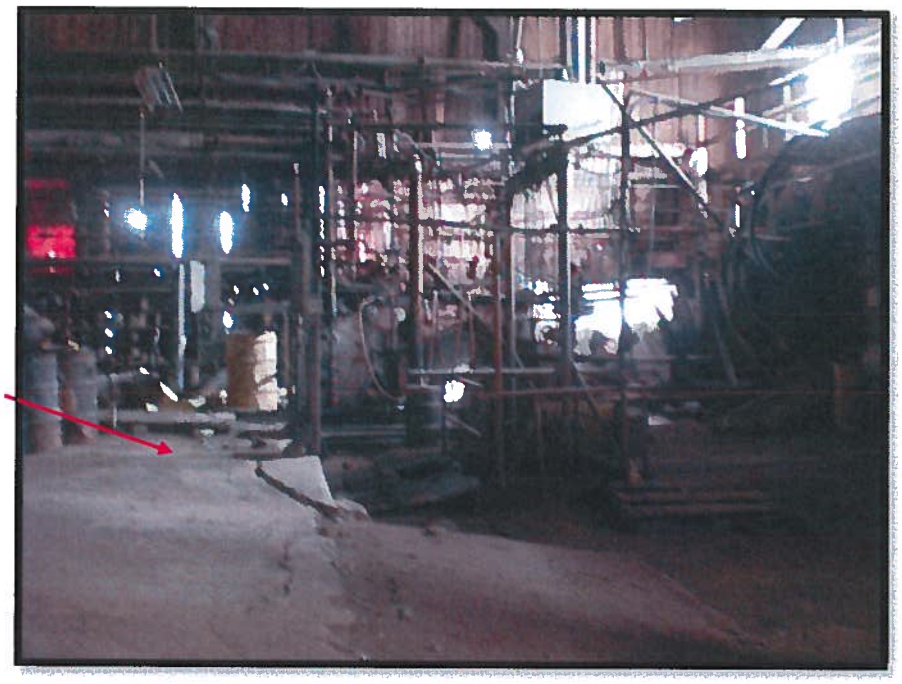
Arsenic Contamination	Sample #	Photo ID	(mg/kg)[1] [4]	Leachable (mg/L)[2]	Locations	Comments
Dust on Beam	12-D	02	57,200	447	Metal Structure on Second Level Control Area	—
Dust on Concrete Floor	13-D	03	51,900	5.08	Dust on Concrete Pad (Floor), South End of Building	—
Process Dust	14-D	04	53,500	1.09	Contents of the North Wooden Tank	—
Dust on Floor	15-D	05	14,600	1.40	Below the Concrete Foundation adjacent to the East Entrance	—
Cleaned Wood Structure (Bulk Wood)	16-D	06	NA	16.20	Wood Collected from East Wall	Cleaned by Client.
North Tank Wood Structure (Bulk Wood)	17-D	07	NA	313.00	North Wood Tank	—
Dust on Metal Structure	18-D	08	53,800	0.46	Base of the North Metal Tank (Exterior of Tank)	—
Asbestos Containing Materials	**Sample #**	**Photo ID**	**% Asbestos[3]**		**Locations**	**Comments**
Pipe-Run Insulation	31	09	85% Chrysotile		Perimeter Wall Pipe at the North end of the Building	All insulated mechanical piping along the perimeter walls is assumed to contain asbestos (visually similar materials).
Mechanical Pipe Gasket	32	10	85% Chrysotile		Loose gasket within Old Shelving Units on the South end of the Building	Loose gaskets were observed within various shelving units throughout the Building. All mechanical gaskets (loose and installed) should be assumed to contain asbestos.
Concrete Block	33	—	None Detected		Elevated concrete pad for Roaster Tanks	—
Flue-Pipe Insulation	34	11	60% Chrysotile		Flue-Pipe Network - North Process Pipe	All insulated mechanical equipment associated with the flues is assumed to contain asbestos (visually similar materials).
Refractory Brick	35	—	None Detected		Loose Refractory Brick along the West Wall	—
Wall Paper	36	12	85% Chrysotile		Generator Room	Located behind the asbestos-containing cement board wall panels lining the Generator Room.
Cement Board	37	13	25% Chrysotile		Generator Room	On exterior and interior perimeter walls of the Generator Room.
Floor Coating Material	38	14	1.6% Chrysotile		Electrical Room	Skim coat on concrete flooring structure.
Paper Siding	39	15	60% Chrysotile		Exterior Paper Siding	Paper is located along the perimeter walls of the Building.
Electrical Insulators	—	16	Suspected ACM		Within the Electrical Room	Electrical equipment not sampled.
Lead in Paint	**Sample #**	**Photo ID**	**Leachable (mg/L)[5]**		**Locations**	**Comments**
White Paint on Interior Cement Board	10-Pb	—	<0.5		On Walls of Compressor Room	—
Grey Paint on Metal	11-Pb	—	0.6		On Large Metal Tank within Main AC Roaster Area	—
Grey on Red Paint on Concrete	12-Pb	—	<0.5		On Floor of the Compressor Room	—
Green Paint on Wood	13-Pb	—	<0.5		On Exterior Wooden Door	—
Yellow Paint on Wood	14-Pb	—	<0.5		Wooden Handrails and Barriers throughout	—
Green Paint on Wood	15-Pb	—	<0.5		Wooden Stairwell Handrails throughout	—
Yellow on Green Paint on Wood	16-Pb	—	0.56		Wooden Handrails and Barriers throughout	—
Lead in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Emergency Lighting	Batteries	17	Emergency Light Batteries		Located Throughout the Building	—
PCBs in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Fluorescent Light Ballasts	---	18	Ballasts		Located Throughout the Building	Suspected PCB-Containing. Light fixtures were not opened.
Electrical Transformers	—	19	Transformers		Within the Electrical Room	Suspected PCB-Containing Oil within Transformers
Mercury in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Fluorescent Light Tubes	—	—	Light Tube		Located Throughout the Building	—
Thermostat Tilt Switch Bulbs	Liquid	20	Liquid Mercury in Bulb		Located Throughout the Building	—
Radioactive Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Smoke Detector	---	21	—		Electrical Rooms	—
ODS Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Suspected in Debris Observed	—	—	—		—	—

GENERAL NOTES
1. Arsenic Contaminated Dust - Dust containing >50 milligrams per kilogram.
2. Leachable Arsenic in Dust - Bulk sample with TCLP >2.5 milligrams per litre (mg/L).
3. Asbestos Waste - Material contains >1% asbestos by weight.
4. Highlighted Field - Sample results above specified criteria.
5. Leachable Lead - Coated substrate with TCLP >5 milligrams per litre (mg/L).

	GENERAL BUILDING NOTES
a.	Large quantities of delaminating and damaged asbestos-containing insulation is located on the North end of the building, adjacent to the Flue-Pipe Network. All surfaces should be considered contaminated with asbestos and dust with significant concentrations of arsenic.
	BUILDING LIMITATIONS
b.	Interiors of mechanical equipment and tanks were not assessed.
c.	Roof not accessed.

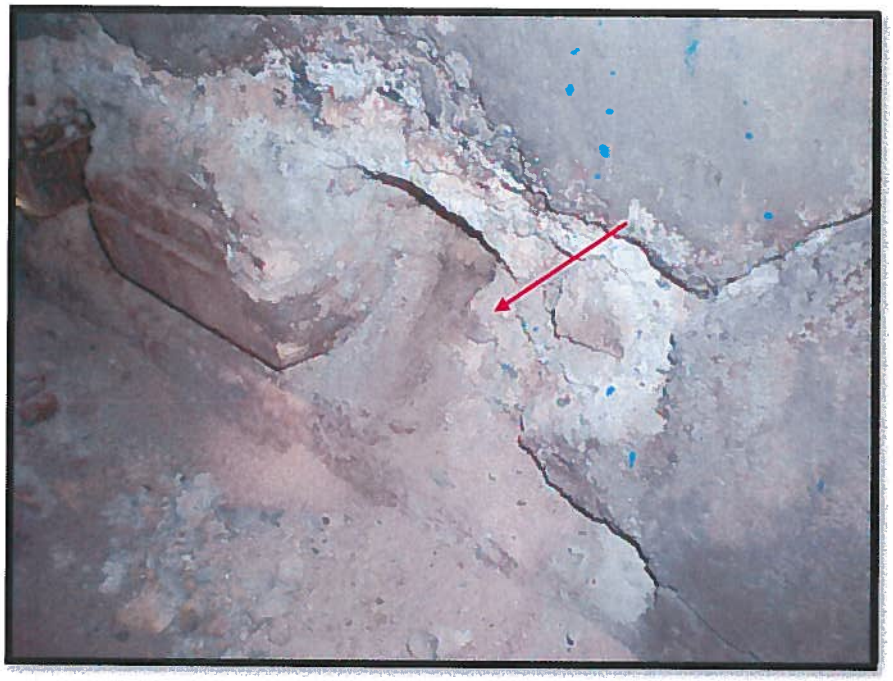
Photograph 1: Exterior View of AC Roaster Building.

Photograph 2: Dust on Wooden Beam Sample Location (Sample 12-D).

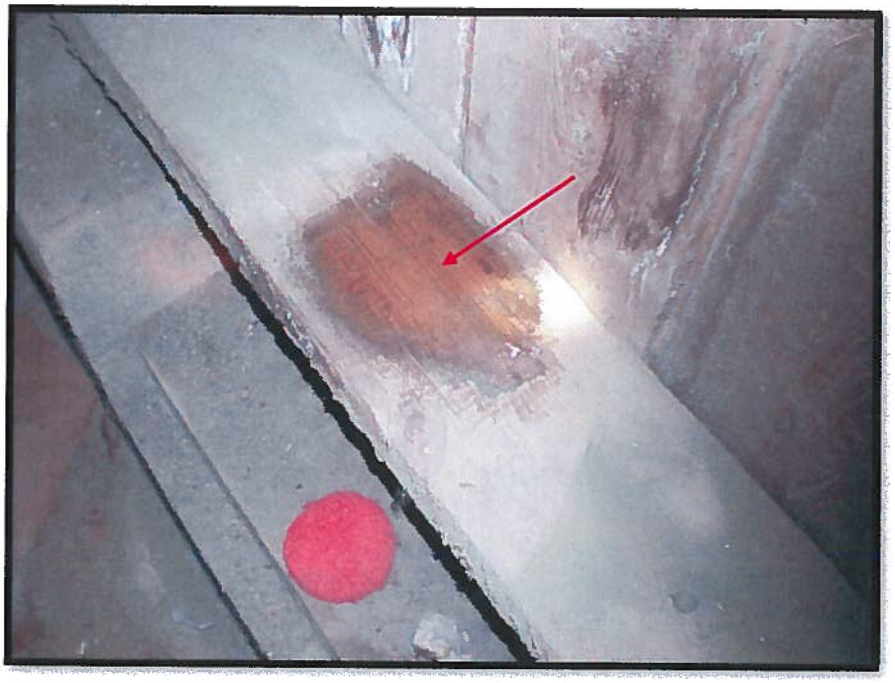


Photograph 3: Dust on Concrete Pad/Floor South End of Building (Sample 13-D).

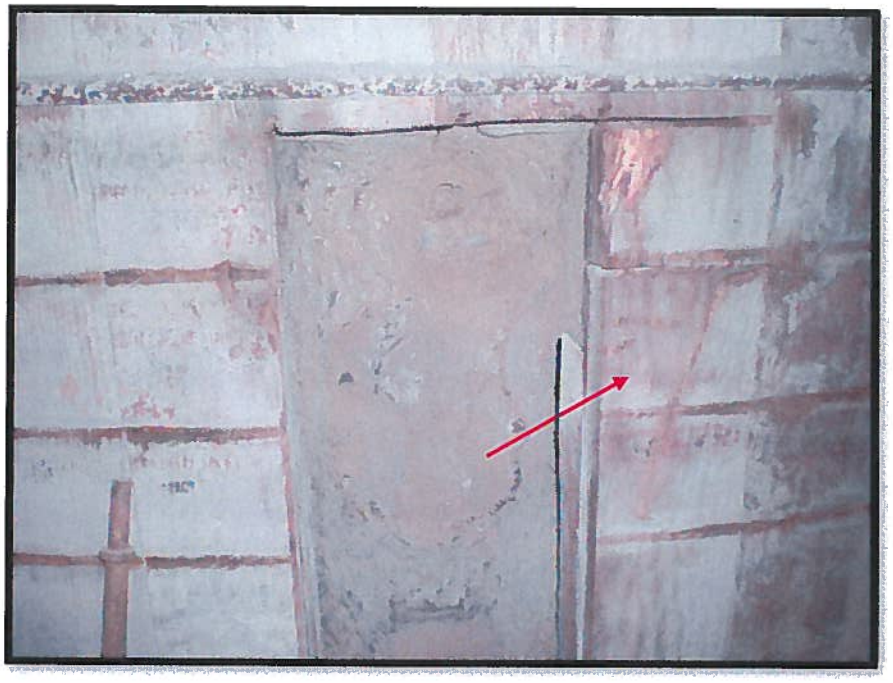
Photograph 4: Process Dust within North Tank (Sample 14-D).



Photograph 5: Dust beneath Concrete Foundation (Sample 15-D).



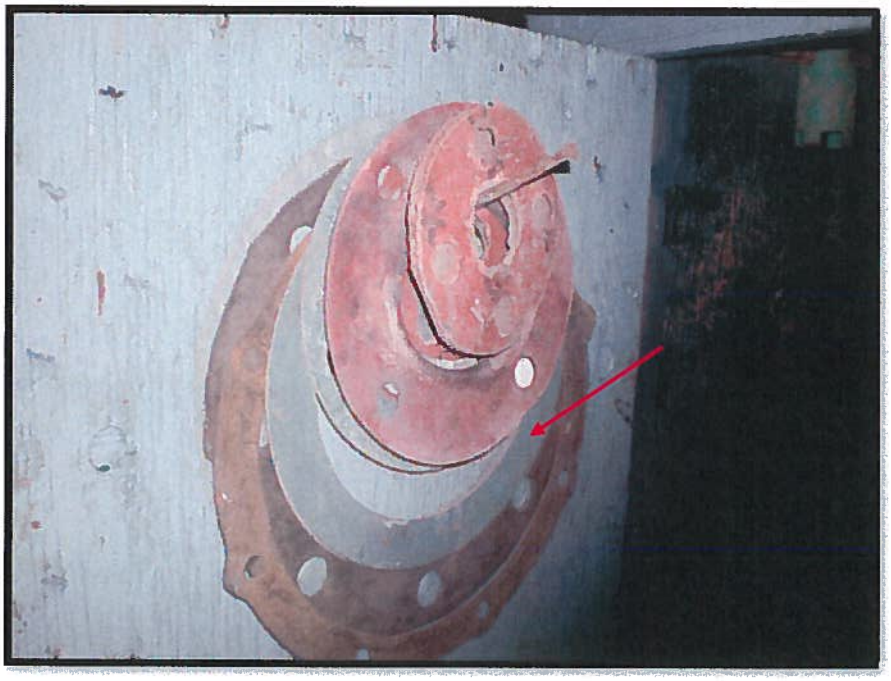
Photograph 6: Cleaning Procedure Trial Area, Clean Wood Sample Location (Sample 16-D).



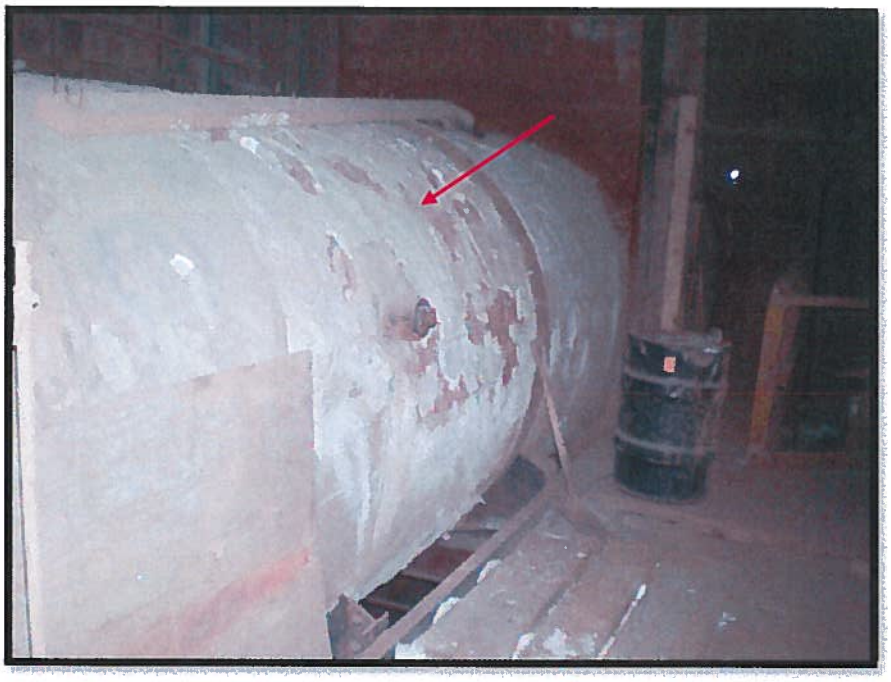
Photograph 7: North Tank Wood Structure (Sample 17-D).

Photograph 8: Dust on Metal Tank Base Sample Location (Sample 18-D).

Photograph 9: Asbestos-Containing Pipe-Run Insulation along Perimeter Walls (Sample 31).

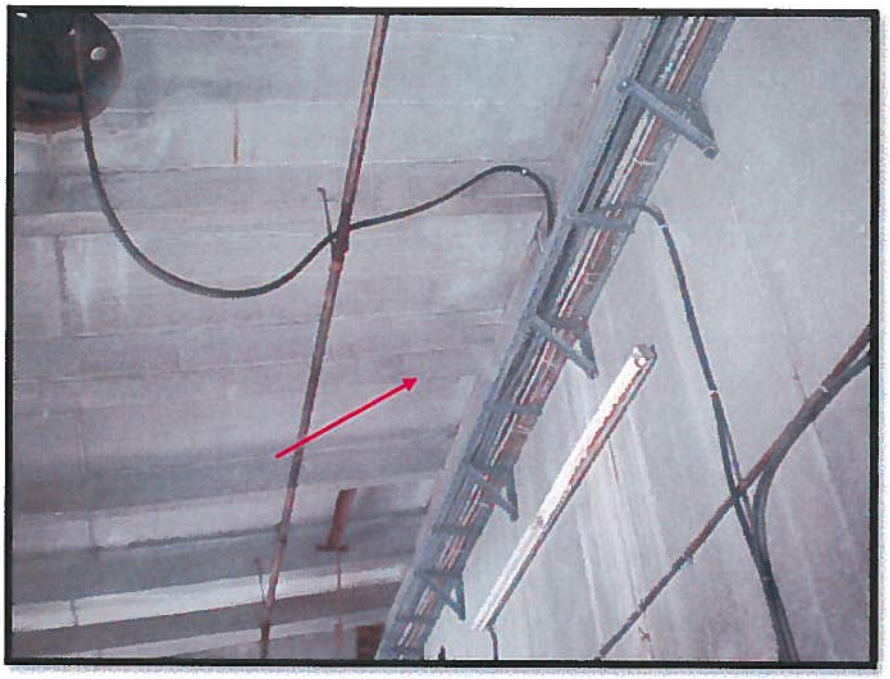


Photograph 10: Loose Asbestos-Containing Mechanical Pipe Gaskets (Sample 32).

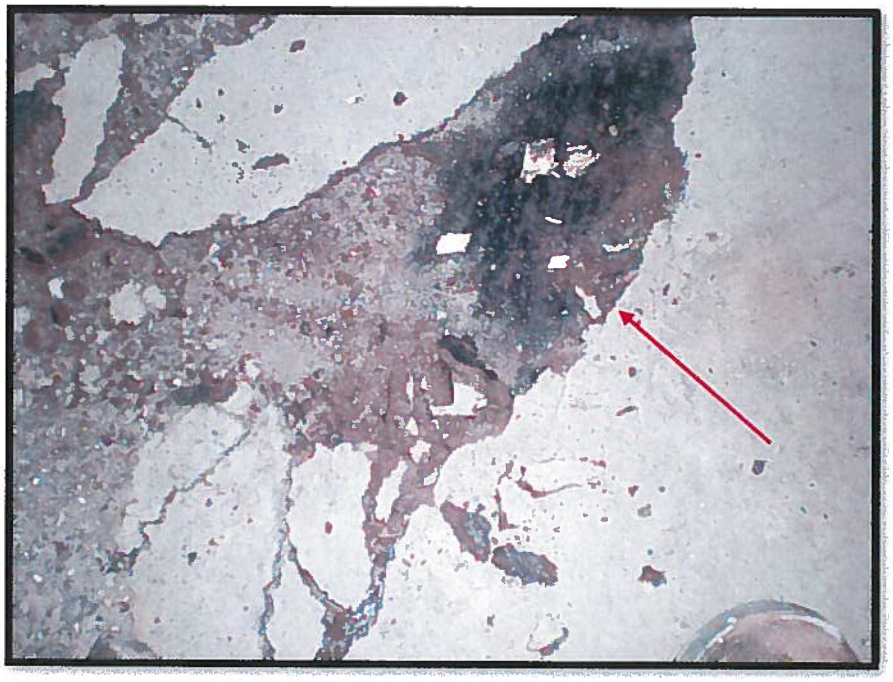


Photograph 11: Asbestos-Containing Flue-Pipe Insulation (Sample 34).

Photograph 12: Asbestos-Containing Paper Beneath Transite Wall Panels, Generator Room (Sample 36).

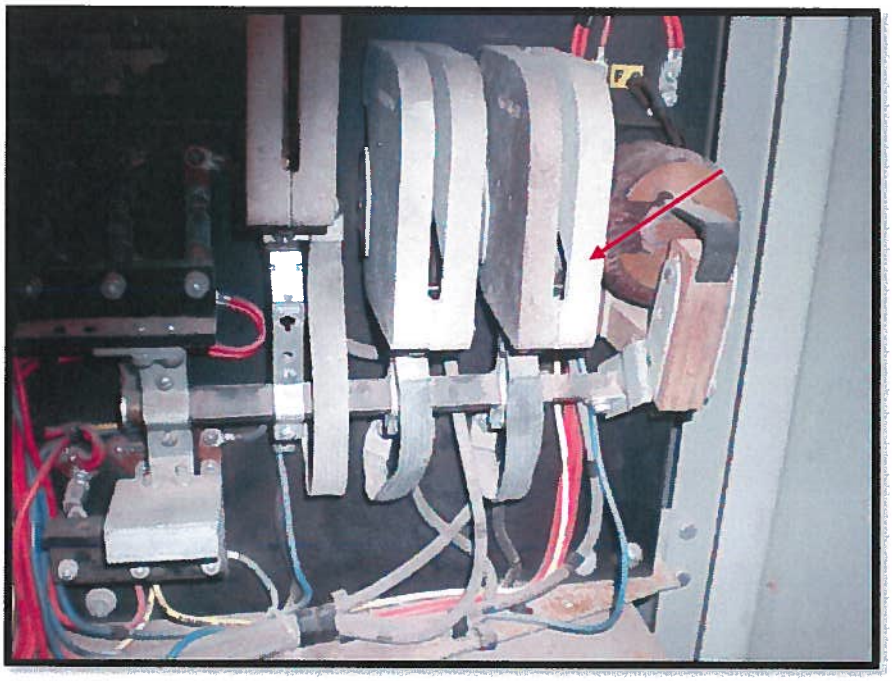


Photograph 13: Asbestos-Containing Transite Wall Panels, Generator Room (Sample 37).

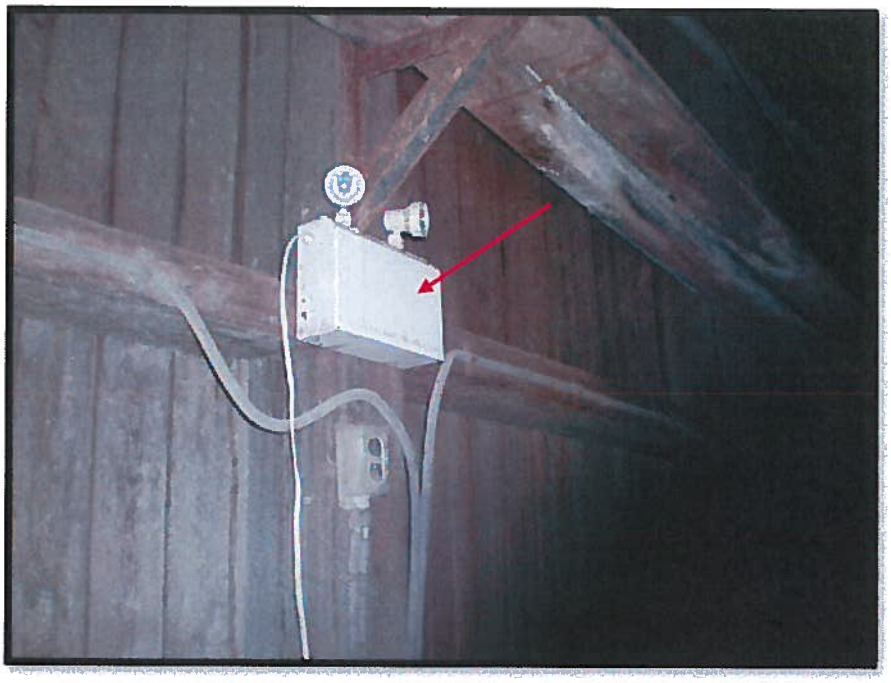


Photograph 14: Asbestos-Containing Floor Coating, Electrical Room (Sample 38).

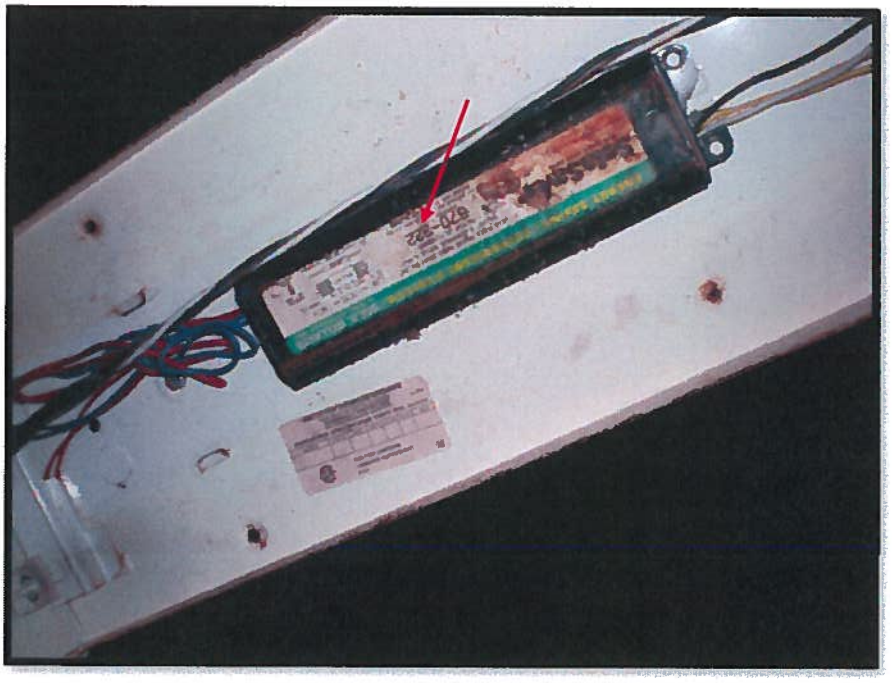
Photograph 15: Asbestos-Containing Exterior Siding Paper (Sample 39).



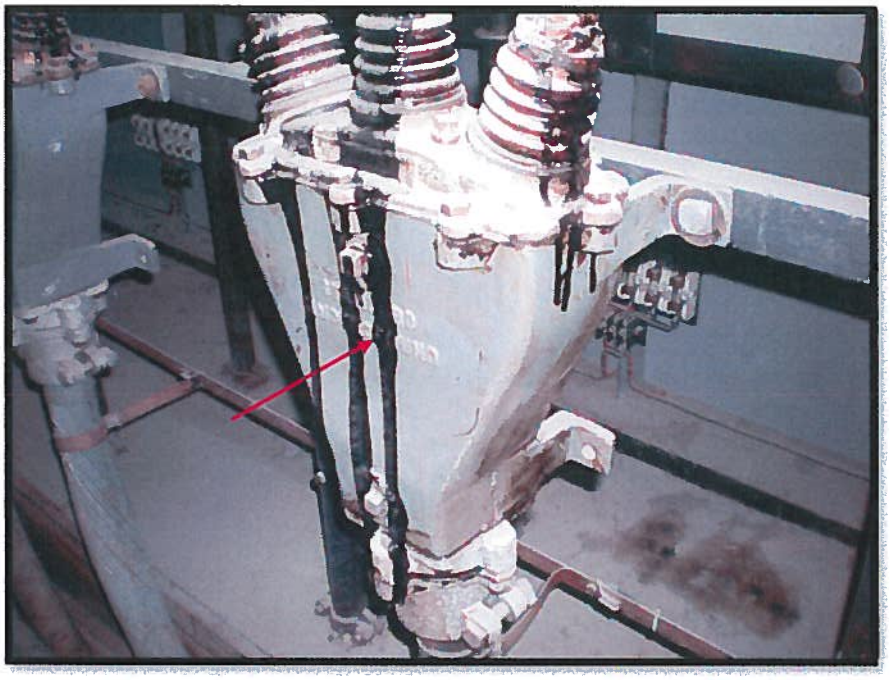
Photograph 16: Suspect Asbestos-Containing Electrical Insulators within Equipment and Panels.



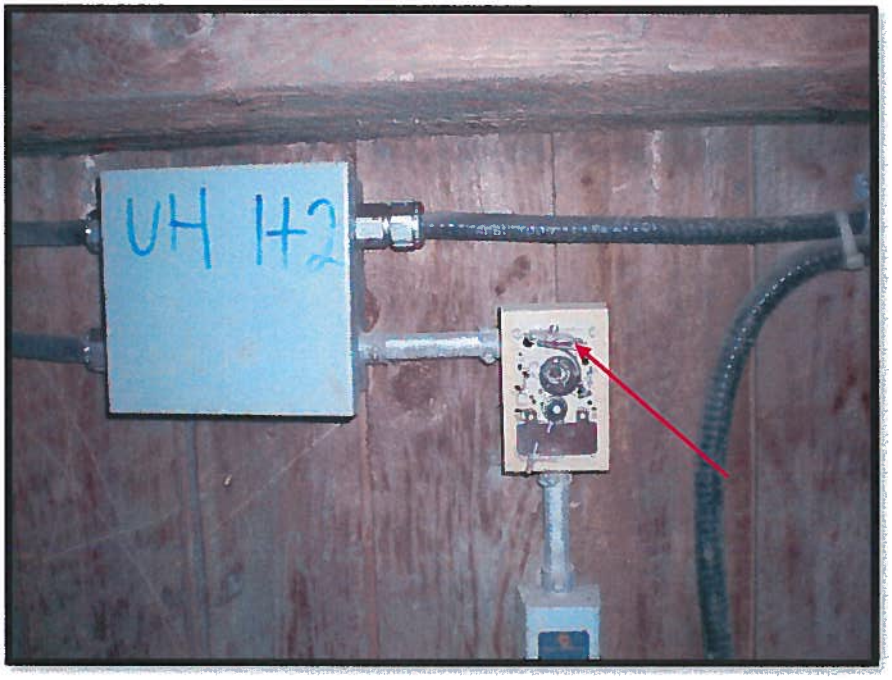
Photograph 17: Suspect Lead-Acid Batteries within Emergency Light Fixtures.



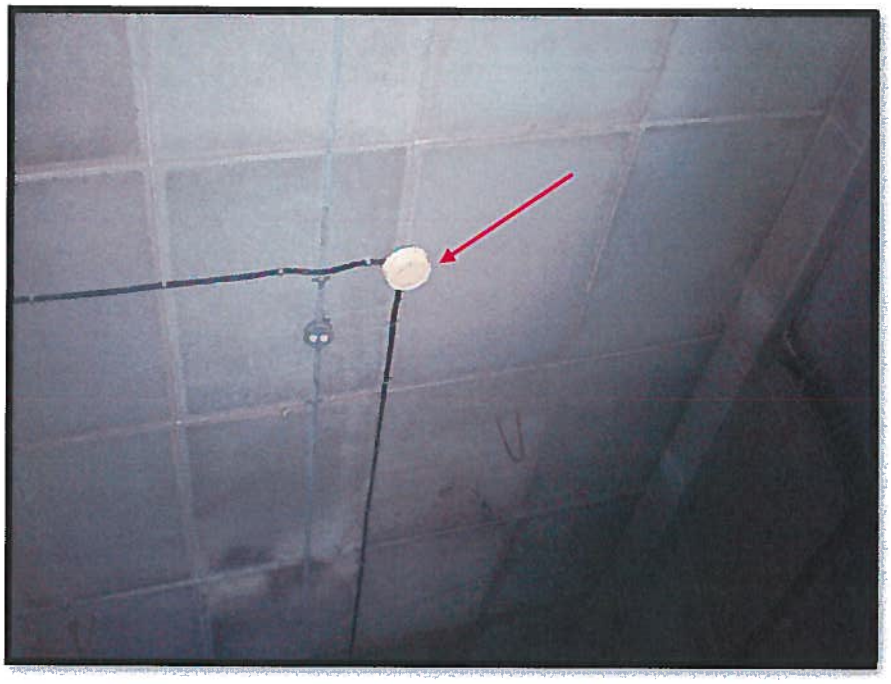
Photograph 18: Suspect PCB-Containing Fluorescent Light Ballast.



Photograph 19: Suspect PCB-Containing Oil within Transformer Units.



Photograph 20: Mercury-Containing Thermostat Bulbs.



Photograph 21: Suspect Radioactive Components within Ceiling Smoke Detector.

o:\fina\2009\1427\09-1427-0006\3. correspondence\2 issued documents\word\phase 2\doc 193 rep 0713_12\appendix b\ac roaster photos rm.docx

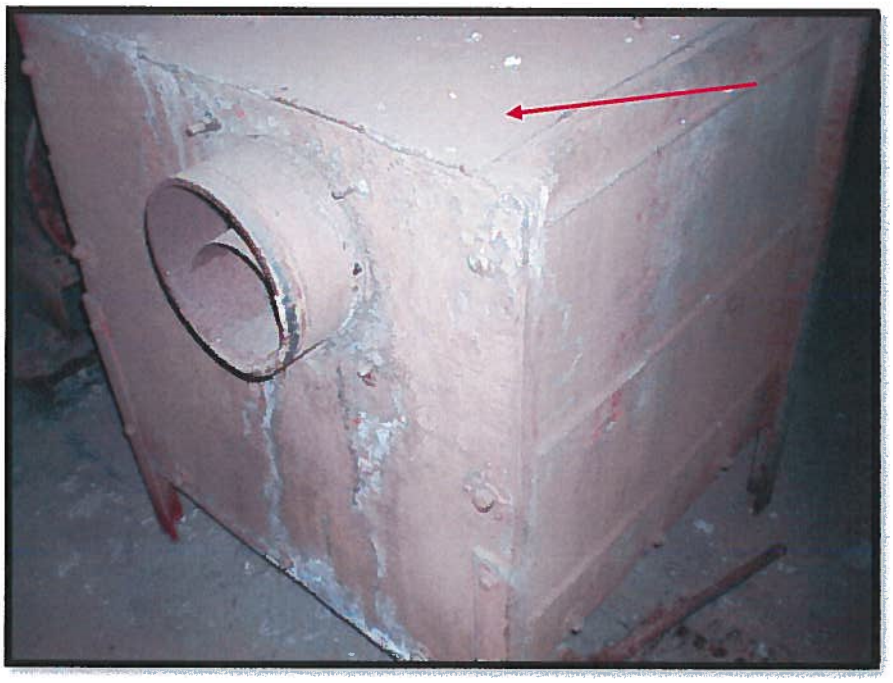
COTTRELL BUILDING

Arsenic Contamination	Sample #	Photo ID	(mg/kg)[1][4]	Leachable (mg/L)[2][4]	Locations	Comments
Dust on Metal Structure	04-D	01	39,700	510	Main Level Stairwell	—
Dust on Metal Control Box	05-D	02	312,000	165	Main Level, East Precipitator Unit Control Box	—
Asbestos Containing Materials	**Sample #**	**Photo ID**	**% Asbestos[3]**		**Locations**	**Comments[4][5]**
Spray Applied Wall Insulation	5	03	75% Chrysotile		Along the North Wall	Insulation present on walls from floor to ceiling, hard outer encapsulant coating.
Spray Applied Wall Insulation	6	04	65% Chrysotile		Along the East Wall	
Spray Applied Wall Insulation	7	05	90% Crocidolite		Along the South Wall	Crocidolite insulation suspected to be installed separately as an addition, hard outer encapsulant coating.
Spray Applied Wall Insulation	8	06	80% Chrysotile		Along the West Wall	Insulation present on walls from floor to ceiling, hard outer encapsulant coating.
Parging Insulation	9	07	40% Chrysotile		On the North Precipitator Vessel	All Precipitator Unit insulation is assumed to contain asbestos.
Parging Insulation	10	08	50% Chrysotile		On the South Precipitator Vessel	
Parging Insulation	11	09	65% Chrysotile		On the Ducting Unit along the South Wall	All Duct Parging insulation is assumed to contain asbestos.
Wall Paper	12	10	45% Chrysotile		Electrical Room	Behind Cement Board Wall Panels, Exterior Wall of Electrical Room
Wall Paper	13	—	85% Chrysotile		Electrical Room	Behind Cement Board lining Interior Walls of Electrical Room
Interior Cement Board	14	11	25% Chrysotile		Electrical Room	Lining Interior Walls of Electrical Room.
Floor Tile	15	12	1.2% Chrysotile		Control Room/Office	Off-White Floor Tile with Grey Streaks on the Floor of the Control Room
Straight Run Insulation	16	13	70% Chrysotile		Main Level	On Vertical Piping Adjacent to Stairwell, All insulated mechanical piping along the perimeter walls is assumed to contain asbestos (visually similar materials).
Straight Run Insulation	17	14	65% Chrysotile		Main Level	On 4" Mechanical Piping throughout the Building. All insulated mechanical piping is assumed to contain asbestos (visually similar materials).
Pipe Insulation	18	15	65% Chrysotile		Upper Mezzanine Level	On the Pipe Header from the North Precipitator Unit.
Pipe Insulation	19	16	65% Chrysotile		Upper Mezzanine Level	On the Pipe Header from the South Precipitator Unit.
Exterior Cement Board	20	17	20% Chrysotile		Building Exterior	On Exterior Perimeter Walls of the Building.
Mechanical Gaskets	VR-32	18	Suspected to Contain Asbestos		On Mechanical Piping Throughout	—
Lead in Paint	**Sample #**	**Photo ID**	**Leachable (mg/L)[5]**		**Locations**	**Comments**
Grey Paint on Metal	07-Pb	—	<0.5		Control Room/Office Door	—
Grey on Brown Paint on Metal	08-Pb	—	<0.5		On Structural Steel Throughout	—
Yellow Paint on Metal	09-Pb	—	<0.5		On Precipitator Units	—
Lead in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Sheeting	Bulk	19	Lead Sheeting Around Windows		Exterior Windows	Lead Sheeting is also suspected to be located around openings on the roof.
Emergency Lighting	Batteries	20	Emergency Light Batteries		Located Throughout the Building	—
PCBs in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Electrical Transformers	—	21	Transformers		Upper Mezzanine Level	Suspected PCB-Containing Oil within Transformers.
Fluorescent Light Ballasts	—	22	Ballasts		Located Throughout the Building	Suspected PCB-Containing. Light fixtures were not opened.
Mercury in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Fluorescent Light Tubes	—	22	Light Tube		Located Throughout the Building	—
Bailey Unit	—	—	Electrical Equipment		Upper Mezzanine Level	Suspect Mercury-Containing Material within Electrical Equipment.
Radioactive Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Suspected in Debris Observed	—	—	—		—	—
ODS Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
Water Fountain	—	23	ODS in Refrigerant		Control Room	—

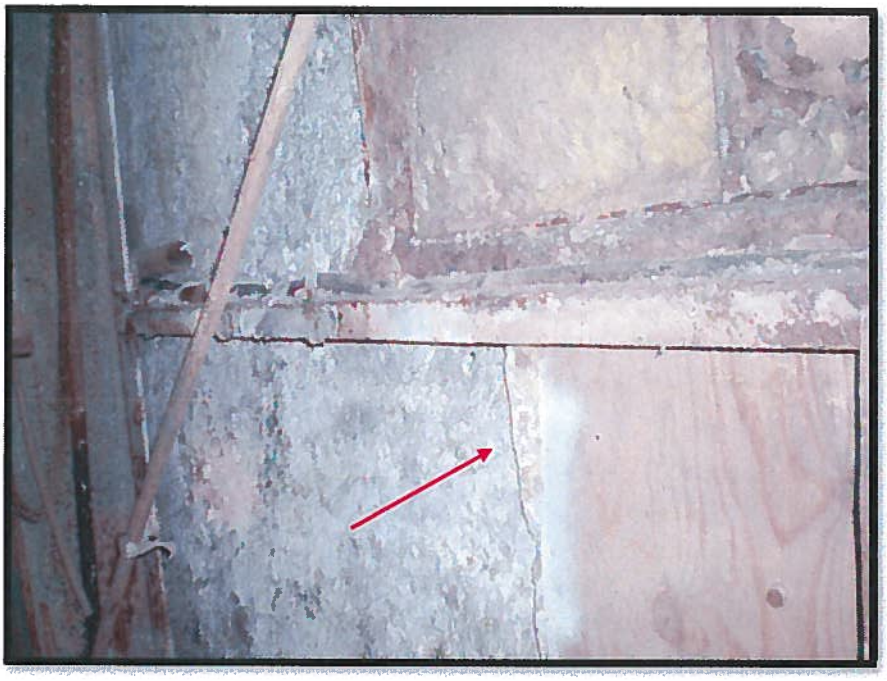
GENERAL NOTES
1. Arsenic Contaminated Dust - Dust containing >50 milligrams per kilogram.
2. Leachable Arsenic in Dust - Bulk sample with TCLP >2.5 milligrams per litre (mg/L).
3. Asbestos Waste - Material contains >1% asbestos by weight.
4. Highlighted Field - Sample results above specified criteria.
5. Leachable Lead - Coated substrate with TCLP >5 milligrams per litre (mg/L).

GENERAL BUILDING NOTES	
a.	Large quantities of delaminating and damaged asbestos-containing insulation is located throughout the building. All surfaces should be considered contaminated with asbestos and dust with significant concentrations of arsenic.
BUILDING LIMITATIONS	
b.	Roof Not Accessed.

Photograph 1: Dust Sample Location on Metal Structure (Sample 04-D).



Photograph 2: Dust Sample Location on Control Box (Sample 05-D).



Photograph 3: Asbestos-Containing Spray-Applied Wall Insulation, North Wall (Sample 05).

Photograph 4: Asbestos-Containing Spray-Applied Wall Insulation, East Wall (Sample 06).

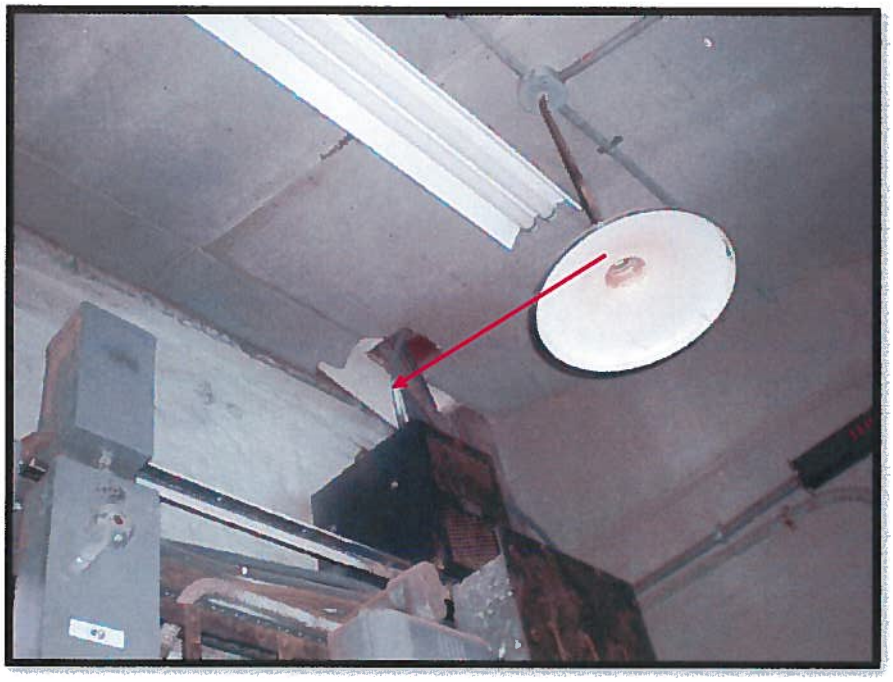
Photograph 5: Asbestos-Containing Spray-Applied Wall Insulation, South Wall (Sample 07).

Photograph 6: Asbestos-Containing Spray-Applied Wall Insulation, West Wall (Sample 08).

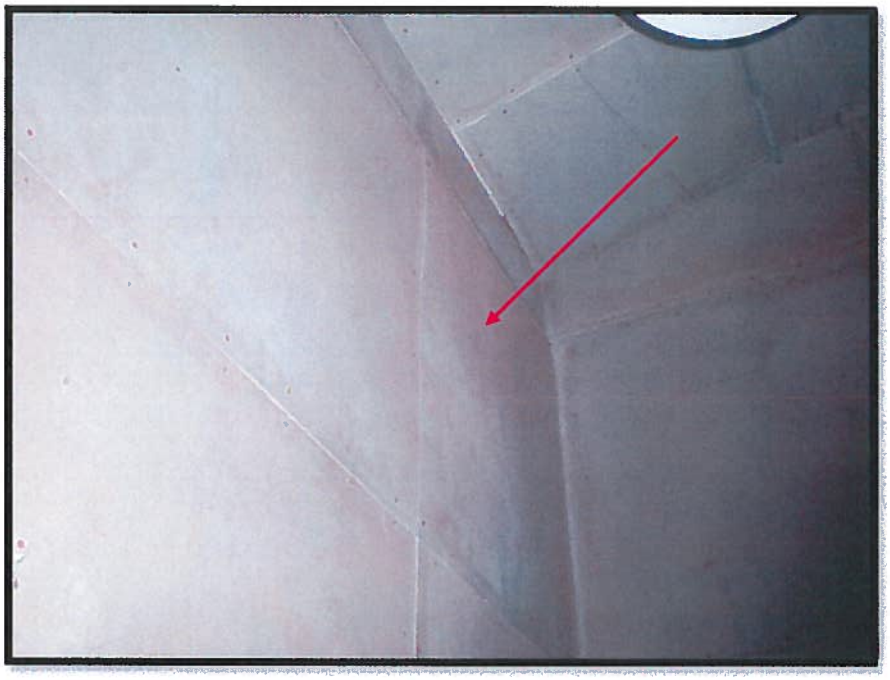
Photograph 7: Asbestos-Containing Precipitator Vessel Insulation, North Vessel (Sample 09).

Photograph 8: Asbestos-Containing Precipitator Vessel Insulation, South Vessel (Sample 10).

Photograph 9: Asbestos-Containing Duct Parging Insulation (Sample 11).



Photograph 10: Asbestos-Containing Wall Paper behind Transite Board in Electrical Room (Sample 12).



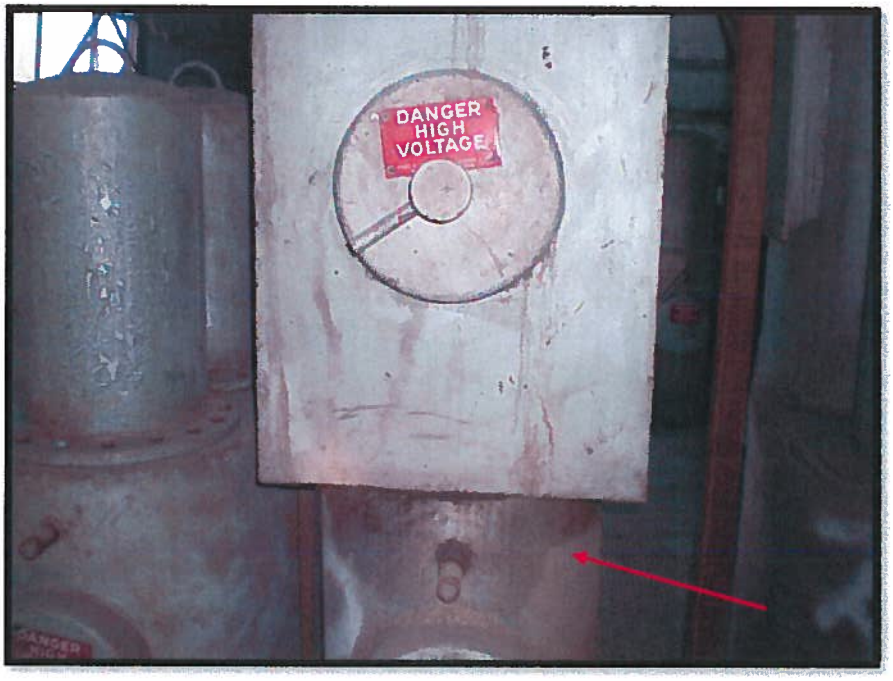
Photograph 11: Asbestos-Containing Transite Wall Panels lining the Electrical Room (Sample 14).

Photograph 12: Asbestos-Containing Floor Tiles within Control Room/Office (Sample 15).

Photograph 13: Asbestos-Containing Pipe-Run Insulation Adjacent to Stairwell (Sample 16).

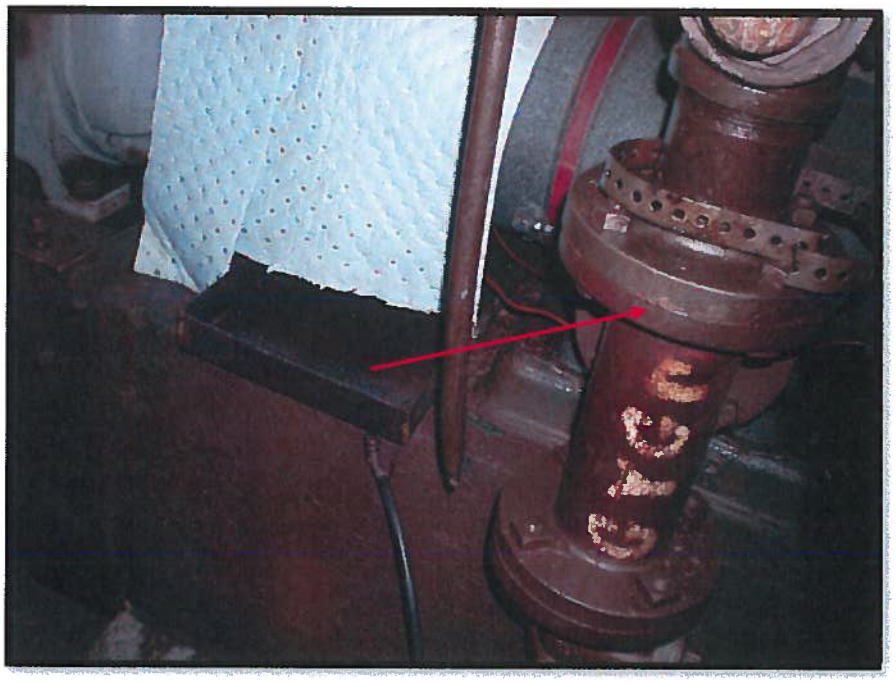
Photograph 14: Asbestos-Containing 4" Pipe-Run Insulation (Sample 17).

Photograph 15: Asbestos-Containing Pipe-Insulation on North Precipitator Unit Header (Sample 18).



Photograph 16: Asbestos-Containing Pipe-Insulation on South Precipitator Unit Header (Sample 19).

Photograph 17: Asbestos-Containing Exterior Transite Wall Panelling (Sample 20).

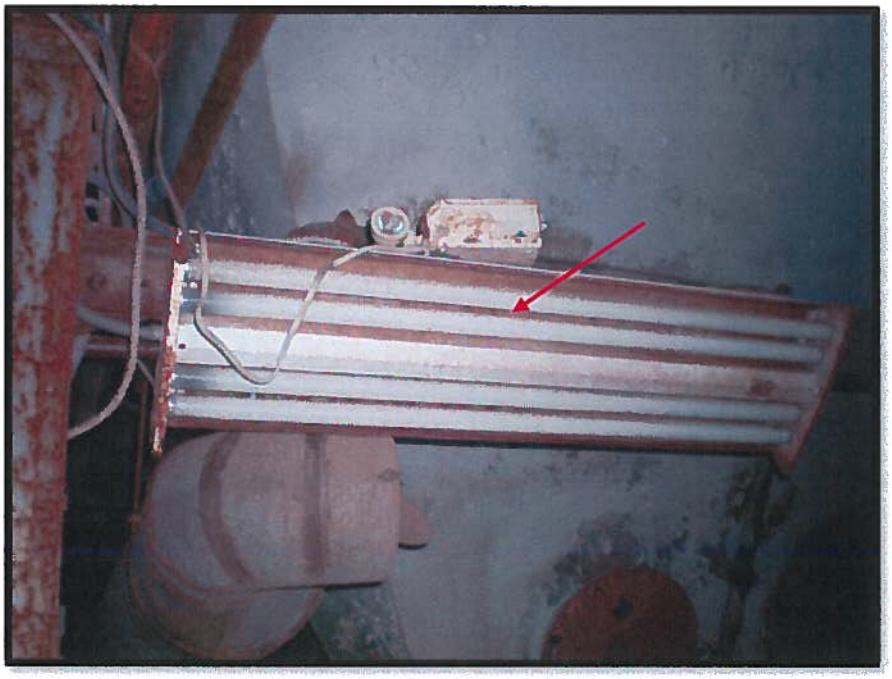


Photograph 18: Suspect Asbestos-Containing Mechanical Gaskets (Visually Referenced).

Photograph 19: Lead Sheeting around Exterior Windows.

Photograph 20: Suspect Lead-Acid Batteries within Emergency Light Fixtures.

Photograph 21: Suspect PCB-Containing Oil within Transformer Unit, Upper Mezzanine Level.



Photograph 22: Suspected Mercury-Containing Fluorescent Light Tubes and PCB-Containing Fluorescent Light Ballasts.

Photograph 23: Suspected ODS within Water Cooler.

o:\final\2009\1427\09-1427-0006\3. correspondence\2 issued documents\word\phase 2\doc 193 rep 0713_12\appendix b\cottrell building photos rm.docx

WEIGHT SCALE BUILDING

Arsenic Contamination	Sample #	Photo ID	(mg/kg)	Leachable (mg/L)	Locations	Comments [a]
Dust Beneath Snow and Rocks	—	—	—		—	Building Used for Loading Arsenic, Dust Suspected on Ground Beneath Rock and Snow.
Asbestos Containing Materials	**Sample #**	**Photo ID**	**% Asbestos**		**Locations**	**Comments**
None Suspected in Areas Observed	—	—	—		—	—
Lead in Paint	**Sample #**	**Photo ID**	**Leachable (mg/L) [1]**		**Locations**	**Comments**
White on Yellow	25-Pb		<0.5		Exterior Walls of Building Structure	—
Lead in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Suspected in Areas Observed	—	—	—		—	—
PCBs in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Suspected in Areas Observed	—	—	—		—	—
Mercury in Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Suspected in Areas Observed	—	—	—		—	—
Radioactive Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Suspected in Areas Observed	—	—	—		—	—
ODS Equipment	**Type**	**Photo ID**	**Description**		**Locations**	**Comments**
None Suspected in Areas Observed	—	—	—		—	—

GENERAL NOTES	
1. Leachable Lead - Coated substrate with TCLP >5 milligrams per litre (mg/L).	

GENERAL BUILDING NOTES	
a.	Open ended building with exposed steel structure and metal siding. Floor of the building covered with snow at the time of the assessment.

WEIGHT SCALE BUILDING
SITE PHOTOGRAPHS

Photograph 1: Exterior View of the Weight Scale Building.

o:\final\2009\1427\09-1427-0006\3. correspondence\2 issued documents\word\phase 2\doc 193 rep 0713_12\appendix b\weight scale building photos.docx

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

Africa	+ 27 11 254 4800
Asia	+ 852 2562 3658
Australasia	+ 61 3 8862 3500
Europe	+ 356 21 42 30 20
North America	+ 1 800 275 3281
South America	+ 55 21 3095 9500

solutions@golder.com
www.golder.com

Golder Associates Ltd.
500 - 4260 Still Creek Drive
Burnaby, British Columbia, V5C 6C6
Canada
T: +1 (604) 296 4200
F: +1 (780) 483 1574

Golder Associates

Appendix C

Building Photographs

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No.	Date:
1	

Direction Photo Taken:

Description:

Dorrco Roaster Building

Tanks and process piping showing typical coating of dust in Dorrco Roaster Building

Photo No.	Date:
2	

Direction Photo Taken:

Description:

Cottrell Precipitator Building

Typical coating of dust in on equipment in Cottrell Precipitator Building

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine - Roaster Complex	Yellowknife, NT	60241267

Photo No.	Date:
3	

Direction Photo Taken:

Description:

Calcine Building

Staining in wooden timbers supporting thickener tank in Calcine Building

Photo No.	Date:
4	

Direction Photo Taken:

Description:

AC Roaster Building

Staining of 2nd level floor boards and floor joists in AC Roaster Building

PHOTOGRAPHIC LOG

Site Name: Giant Mine - Roaster Complex	Site Location: Yellowknife, NT	Project No. 60241267

Photo No. 5	Date:

Direction Photo Taken:

Description:

AC Roaster Building

Contents of CIP tank, White scale on tank as well as on concrete floor

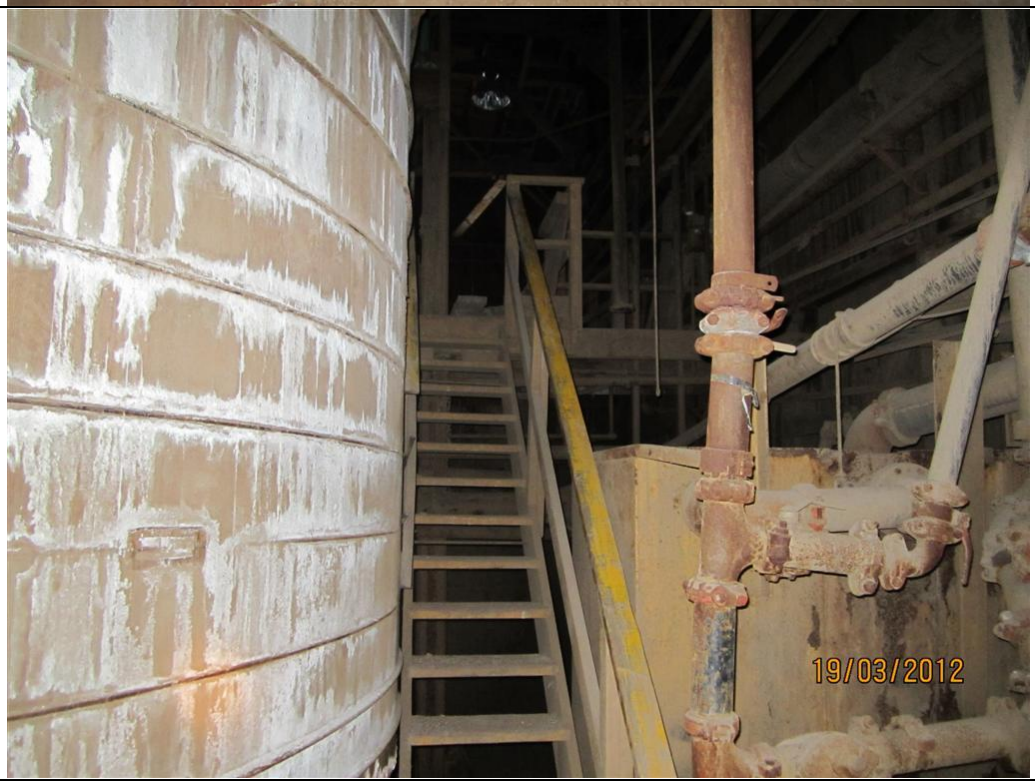
Photo No. 6	Date:

Direction Photo Taken:

Description:

AC Roaster Building

Staining on wooden tank, typical dust on process equipment in AC Roaster Building



PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No.	Date:
7	

Direction Photo Taken:

Description:

Calcine Building

Dust covered spare parts in Calcine Building, exterior transite panels coated with spray applied asbestos insulation.

Photo No.	Date:
8	

Direction Photo Taken:

Description:

Calcine Building

Underside of roof in Calcine Building. Delamination of sprayed on asbestos insulation is occurring, asbestos insulation debris is visible on equipment throughout building

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No.	Date:
9	

Direction Photo Taken:

Description:

Dorrco Roaster Building

Exterior asbestos insulated wall panels coated with a spray applied asbestos insulation on the interior surfaces. Delamination of sprayed on asbestos insulation is occurring, asbestos insulation debris is visible on equipment throughout building

Photo No.	Date:
10	

Direction Photo Taken:

Description:

Cottrell Precipitator Building

Interior insulated duct work and exterior asbestos insulated wall panels coated with a spray applied asbestos insulation on the interior surfaces, encapsulant coating on some wall surfaces.

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No. 11	**Date:**
Direction Photo Taken:	
Description: Cottrell Precipitator Building Arsenic scale on precipitator rods	

Photo No. 12	**Date:**
Direction Photo Taken:	
Description: AC Roaster Building Stained wood (floor, 2nd level floor joists) in cyanide process area	

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No.	Date:
13	

Direction Photo Taken:

Description:

AC Roaster Building

Process Residuals coating tank and equipment

Photo No.	Date:
14	

Direction Photo Taken:

Description:

Cottrell Precipitator Building

Scale on base of precipitator hopper and on concrete floor

PHOTOGRAPHIC LOG

Site Name: Giant Mine – Roaster Complex	Site Location: Yellowknife, NT	Project No. 60241267

Photo No. 15	Date:	
Direction Photo Taken:		
Description: Dorrco Roaster Building Arsenic Trioxide dust located in abandoned exhaust flue network		

Photo No. 16	Date:	
Direction Photo Taken:		
Description: Dorrco Roaster Building Typical scale located inside process piping		

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No.	Date:
17	

Direction Photo Taken:

Description:

AC Roaster Building

Cleaning of dust of steel process piping

Photo No.	Date:
18	

Direction Photo Taken:

Description:

AC Roaster Building

Cleaning of dust off exterior walls

PHOTOGRAPHIC LOG

Site Name: Giant Mine – Roaster Complex	Site Location: Yellowknife, NT	Project No. 60241267

Photo No. 19	Date:

Direction Photo Taken:

Description:

Cottrell Precipitator Building

Cabinet of miscellaneous paints, solvents and adhesives

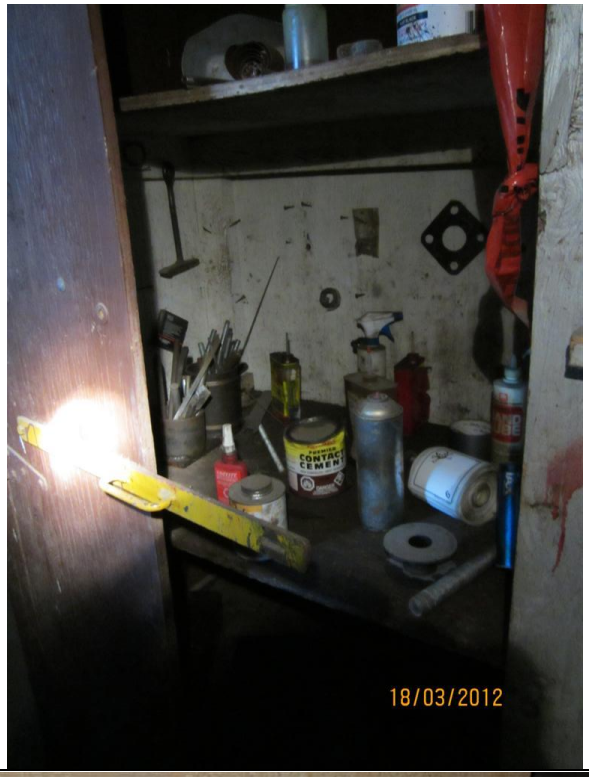


Photo No. 20	Date:

Direction Photo Taken:

Description:

AC Roaster Building

Open pails of unidentified oils

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No.	Date:
21	

Direction Photo Taken:

Description:

AC Roaster Building

Barrels of asbestos encapsulant

Photo No.	Date:
22	

Direction Photo Taken:

Description:

AC Roaster Building

Open barrel of sodium hydroxide

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No. 23	**Date:**

Direction Photo Taken:

Description:

Cottrell Precipitator Building

Electrical Transformer – 3rd floor level

Photo No. 24	**Date:**

Direction Photo Taken:

Description:

AC Roaster Building

Suspect PCB containing electrical equipment

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No. 25	**Date:**

Direction Photo Taken:

Description:

Calcine Plant

Interior fuel storage tank

Photo No. 26	**Date:**

Direction Photo Taken:

Description:

AC Roaster Building

Compressor equipment, potentially containing oils and lubricants

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No. 27	**Date:**

Direction Photo Taken:

Description:

Dorrco Roaster Control Room

Mercury containing equipment in control room

Photo No. 28	**Date:**

Direction Photo Taken:

Description:

Dorrco Roaster Control Room

Spilled mercury and dust/debris located on control room floor

PHOTOGRAPHIC LOG

Site Name:	Site Location:	Project No.
Giant Mine – Roaster Complex	Yellowknife, NT	60241267

Photo No.	Date:
29	

Direction Photo Taken:

Description:

Dorrco Roaster

Storage of granular sulphur

Photo No.	Date:
30	

Direction Photo Taken:

Description:

AC Roaster Building

Suspect empty sodium cyanide barrels, potentially containing residual amounts of product

Appendix D

Summary of Waste Volumes

Table D1
Giant Mine Roaster Deconstruction - Summary of Waste Volumes (All Structures)

Building Name		Waste Streams															Total Volume
		Non-Hazardous Waste			Mineral Waste	Hazardous Waste											
						Non-arsenic containing materials							Arsenic containing materials				
		General Demolition Debris	Steel/metal products	Total non-hazardous		Oils & Liquids	PCB containing materials	Chemicals/ Mercury containing materials	Lead containing materials	PCB Amended Paint	Leachable Lead amended paint	Total	Asbestos	Wood with leachable arsenic	Misc. materials impacted with arsenic	Total	
110	AC Roaster	353	55	408	127	7	3.5	9	0	0	0	19	130	564	255	950	1503
134	Cottrell	106	297	403	0	4	5.0	1	1	0	0	11	243	2	106	351	765
143	Dorrco Roaster	315	392	707	10	4	0.5	14	1	0	0	20	218	154	282	653	1389
148	Fan House and Stack	15	20	35	0	0	0.6	1	1	0	0	2	9	0	430	439	476
160	Silo and Weigh Scale	6	37	43	0	0	0.6	0	0	0	0	1	1	0	19	20	64
162	Calcine	129	318	447	0	1	0.6	1	1	0	0	3	415	50	160	625	1075
167	Baghouse	21	103	124	0	1	0.5	0	0	0	1	2	240	4	142	386	513
-	Exterior Flues	35	65	100	0	0	0.3	0	0	0	0	0	50	50	61	161	261
TOTALS		980	1,287	2,267	137	16	11.6	25	4	0	1	57	1,306	824	1,455	3,585	6,046

Notes:

Volume is an estimate of current inplace volume
All quantities expressed in m^3
All wood materials are assumed to contain leachable arsenic
Volume of non-arsenic containing materials assumes material can be cleaned to remove residual amounts of arsenic, cyanide and asbestos
Volume of PCB containing items includes volume of object that PCBs are located in (i.e. entire transformer)
Volume of leachable lead items includes the volume of the substrate that the paint is applied to

Table D1a
C Shaft - Building 110 AC Roaster Building
Giant Mine Roaster Deconstruction - Summary of Waste Volumes

Wood structure, built up roof, concrete floor, single level, small elevated platforms

Dimensions

Location	Building No.	Building Name	Length (m)	Width (m)	Perimeter (m)	Height Estimated (m)	Surface Area Walls
Roaster	110	Mill Pipe Shop	70.4	17.6	188	12	2296

Summary of Building Components - Volume Estimates

				Dimensions							Waste Streams													
											Non-Hazardous Waste			Mineral Waste	Hazardous Waste									
															Non-arsenic containing materials							Arsenic containing materials				
Building	Component	Major Subcomponent	Construction	Quantity	Width (m)	Length (m)	Height (m)	Surface Area (m^2)	Thickness (m)	Volume (m^3)	General Demolition Debris	Steel/metal products	Total non-hazardous		Oils & Liquids	PCB containing materials	Chemicals/ Mercury containing materials	Lead containing materials	PCB Amended Paint	Leachable Lead amended paint	Total	Asbestos	Wood with leachable arsenic	Misc. materials impacted with arsenic	Total	Comments
C Shaft 110 Mill Pipe shop	Roof	Roofing materials	built up roof, felt and tar		17.6	70.4		1238	0.050	93	93		93								0				0	
		Roof trusses	wood timber, steel rod							27	5		5								0		22		22	All wood assumed to contain leachable arsenic
		Roof joists	wood timber							31	0		0								0		31		31	All wood assumed to contain leachable arsenic
		Roof decking	lumber		17.6	70.4		1238	0.075	93	0		0								0		93		93	All wood assumed to contain leachable arsenic
	Exterior walls	Interior columns and bracing	wood timber							26			0								0		26		26	All wood assumed to contain leachable arsenic
		Horizontal girts	wood timber							20			0								0		20		20	All wood assumed to contain leachable arsenic
		Wall Sheathing	lumber					2296	0.075	172			0								0		172		172	All wood assumed to contain leachable arsenic
		Trim/door/windows								40			0								0		40		40	All wood assumed to contain leachable arsenic
		Exterior asbestos paper siding	asbestos containing paper siding					2296	0.015	39	5		5								0	34			34	
	Interior Electrical	Light ballasts, tubes, switch gear, wire, cabinets, etc.								6			0		2	0.5	2				5	1			1	
	South End Pipe Shop Area	Supplies, gaskets, pipe, barrels, lathe, hose, brick, materials at south end, insulation, full barrels encapsulant								87	50		50		2		5				7		20	10	30	
		piping on exterior walls				62.0				50	10		10								0	10		30	40	
	Carbon Strip/Cyanide Area	wood tanks								140			0	60							0		80		80	All wood assumed to contain leachable arsenic
		steel process tanks								22		10	10	2							0			10	10	
		process piping, hose, barrels, pumps, furnaces, ducts								46	20		20	5			1				1			20	20	Open barrel of sodium hydroxide, small bottles/vials of lab chemicals
		piping on exterior walls				62.0				55	15		15	5							0	10		25	35	
		misc. steel supports/beams								40	20		20								0			20	20	
		Chemicals, oils								2			0		1		1				2				0	
		stairs, elevated floors, hand rails								60	20		20								0		20	20	40	
	North End Carbon Plant/Abandoned Flues	piping on exterior walls				62.0				55	10		10	5							0	10		30	40	
		wood tanks and steel tanks								50	10		10	20							0			20	20	
		process piping, hose, barrels, pumps,								50	10		10	20							0			20	20	
		stairs, elevated floors, hand rails	wood							45	5		5								0		40		40	
		misc. steel supports/beams								25		10	10	10							0			5	5	
		abandoned roaster flues	insulated contain arsenic trioxide							85	10	5	15								0	40		30	70	Insulated steel pipe contains arsenic trioxide dust
	Exterior Transformer/Compressor Compound	Light ballasts, tubes, switch gear, wire, cabinets, transforemers, oil swithches, exterior electrical compound, transite panelling, asbestos containing flooring								115	60	20	80		2	3					5	20		10	30	Asbestos transite panels used for siding in electrical rooms
	Pipe way connection to Mill	Pipe rack, steel pipe, wire, insulation								30	10	10	20								0	5		5	10	
Building 110 C Shaft AC Roaster Building										**1503**	353	55	**408**	**127**	7	3.5	8.5	0	0	0	**19**	130	564	255	**950**	

Notes:

All interior surfaces are coated with arsenic trioxide dusts
Cyanide dusts
Concrete slab left in place
Arsenic trioxide dust in flues is considered as arsenic trioxide impacted waste not mineral waste

Table D1b
C Shaft 134 Cottrell
Giant Mine Roaster Deconstruction - Summary of Waste Volumes

Steel structure, concrete floor
Rigid transite panels used for exterior siding and roofing
Two levels in building
Interior spray insulation applied directly to exterior transite panels

Dimensions

Location	Building No.	Building Name	Length (m)	Width (m)	Perimeter (m)	Avg. Height	Wall Surface Area	Roof Surface Area
Cottrell	134	Cottrell	27.7	16.5	94.4	10.0	944.0	641.4

Summary of Building Components - Volume Estimates

				Dimensions							Waste Streams												
											Non-Hazardous Waste			Mineral Waste	Hazardous Waste								
															Non-arsenic containing materials							Arsenic containing materials				
Building	Component	Major Subcomponent	Construction	Quantity	Width (m)	Length (m)	Height (m)	Surface Area (m^2)	Thickness (m)	Volume (m^3)	General Demolition Debris	Steel/metal products	Total non-hazardous		Oils & Liquids	PCB containing materials	Chemicals/ Mercury containing materials	Lead containing materials	PCB Amended Paint	Leachable Lead amended paint	Total	Asbestos	Wood with leachable arsenic	Misc. materials impacted with arsenic	Total	Comments
C Shaft 134 Cottrell	Roof	Metal roofing						641	0.025	17	4	12	16								0			1	1	
		Structural steel (berms, purlin and cross bracing)								21		20	20								0			1	1	
	Exterior walls	Asbestos siding with spray on insulation						944	0.075	73			0								0	71		2	73	
		Structural steel (columns, girts)								25	4	20	24								0			1	1	
		Trim/door/windows/glass								7	3		3					1			1		2	1	3	lead sheeting around windows
	Electrical	Light ballasts, tubes, switch gear, wire, transformers, emergency light batteries, mercury controls								42	15	10	25		0.5	5	1				7			10	10	fluorescent light tubes and ballasts located in building, 3 electrical transformers on 3rd level, mercury containing equipment
	Mechanical and interior structural	hoppers, process equipment								25	10	10	20								0			5	5	
		furniture, parts, supplies								26	20		20		0.5						1			5	5	small containers of paints, cleaners, solvents, adhesives, oil
		piping and insulation								50		20	20								0	20		10	30	
		pumps, fans and motors								8	5		5								0			3	3	
		steel floors, railings, stair case, interior building partion walls and doors, floors, electrical rooms								80	10	60	70								0			10	10	
		Precipiator assembly and internal rods, supporting columns, asbesstos insulation on exterior						753.0	0.100	193	10	75	85		3						3	75		30	105	hydraulic oil in shaking assembly, heavy build up of scale reported inside precipitator unit
		interior ducts, not insulated								25	10	10	20								0			5	5	
		ducts/flues and piping with spray on insulation						770.0	0.100	147		50	50								0	77		20	97	
	Exterior Dry Bilding	Misc. contents of trailer								27	15	10	25								0			2	2	
	Building 134 C Shaft Cottrell Precipitator									**765**	106	297	**403**	**0**	4	5	1	1	0	0	**11**	243	2	106	**351**	

Notes:

All interior surfaces are coated with arsenic trioxide dusts
No cyanide dusts
Concrete slab left in place
Arsenic trioxide dust in flues is considered as arsenic trioxide impacted waste not mineral waste

Table D1c
C Shaft - Building 143 Dorrco Roaster
Giant Mine Roaster Deconstruction - Summary of Waste Volumes

Steel structure, concrete floor, multi levels
Bottom and 2nd level cover entire building, 3rd and 4th level consist of small platforms and catwalks
Rigid transite panels used for exterior siding and roofing
Interior spray asbestos insulation applied directly to exterior transite panels on walls
Non asbestos insulation spray applied on underside of roof panels

Dimensions

Location	Building No.	Building Name	Length (m)	Width (m)	Perimeter (m)	Avg. Height (m)	Wall Area (m^2)	Roof Surface Area (m^2)	Floor Area (m^2)
Roaster	143	Dorrco Roaster- bottom level	29.4	24.7	108	12	1277	1932	726
		2nd level	29.4	24.7					726
		3rd level	Approx. 1/4 of 2nd level						182
		4th level	Approx. 1/4 of 3rd level						45

Summary of Building Components - Volume Estimates

				Dimensions							Waste Streams													
											Non-Hazardous Waste			Mineral Waste	Hazardous Waste									
															Non-arsenic containing materials							Arsenic containing materials				
Building	Component	Major Subcomponent	Construction	Quantity	Width (m)	Length (m)	Height (m)	Surface Area (m^2)	Thickness (m)	Volume (m^3)	General Demolition Debris	Steel/metal products	Total non-hazardous		Oils & Liquids	PCB containing materials	Chemicals/ Mercury containing materials	Lead containing materials	PCB Amended Paint	Leachable Lead amended paint	Total	Asbestos	Wood with leachable arsenic	Misc. materials impacted with arsenic	Total	Comments
C Shaft 143 Dorrco	Roof	Metal roofing						1932	0.050	97		97	97								0				0	Assumed metal cladding can be cleaned of arsenic trioxide dust
		Ceiling insulation						1932	0.050	97			0								0			97	97	Poor condition, falling off roof, insulation debris located throughout building, coated with arsenic dust
		Structural Steel								20		20	20								0				0	
	Exterior walls	Asbestos siding with spray on insulation						1277	0.075	96			0								0	96			96	
		Structural steel (columns, girts)								30		30	30								0				0	
		Trim/door/windows								10	5		5					1			1		4		4	lead sheeting, batteries
	Electrical	Light ballasts, tubes, switch gear, wire, emergency light batteries, mercury controls								37	10	5	15			0.5	1				2			20	20	fluorescent light tubes and ballasts located in building, mercury containing equipment
	Interior mechanical	furniture, parts, supplies								20	20		20								0				0	
		piping and insulation								100	40	20	60								0			40	40	
		pumps, ball mill, fans and motors								100	40	20	60								0			40	40	
		steel floors, railings, stair case, interior building partion walls and doors, floors, interior columns, steel tanks								300	50	200	250								0			50	50	
		insulated roaster vessels and ducts								230	100		100								0	100		30	130	Asbestos insulated roaster, ducts, cyclones and piping, includes arsenic trioxide dust in flues
		Control room/ equipment								26	20		20								0	1		5	6	
		Electrical Room								31	30		30								0	1			1	
		Wood tanks and supports								155			0	5							0		150		150	Wood assumed to contain leachable arsenic
		2nd level process equipment								16			0	2	2		2				4	10			10	open pails of oils, bagged sulphur, potential ODS in water chiller
		3 rd levels								18			0	2	1		10				11	5			5	bagged sulphur
		4th level								8			0	1	1		1				2	5			5	open pails of oils, bagged sulphur
Building 143 C Shaft Dorrco Roaster										**1389**	315	392	**707**	**10**	4	0.5	14.0	1	0	0	**20**	218	154	282	**653**	

Notes:

All interior surfaces are coated with arsenic trioxide dusts
Cyanide dusts
Concrete slab left in place
Arsenic trioxide dust in flues is considered as arsenic trioxide impacted waste not mineral waste

Table D1d
C Shaft - Building 148 Stack and Fan House
Giant Mine Roaster Deconstruction - Summary of Waste Volumes

Interior inspection of fan house has not been completed
Fan House - steel frame, transite siding and roofing, concrete slab, single level
Stack - 150' brick stack

Dimensions

Location	Building No.	Building Name	Length (m)	Width (m)	Perimeter (m)	Wall Height	Wall Surface Area	Roof Area	Stack diameter (I.D.) top	Stack diameter (O.D.) base	Stack Wall Thickness
Roaster	148	fan house	9.3	6.7	32.0	4.9	156.8	62.2			
Roaster	148	fan house, east extension	3.0	4.0	10.0	3.0	30.0	12.0			
Stack	-	Stack	45.7						2.7	4.9	0.4

Summary of Building Components - Volume Estimates

				Dimensions							Waste Streams													
											Non-Hazardous Waste			Mineral Waste	Hazardous Waste									
															Non-arsenic containing materials							Arsenic containing materials				
Building	Component	Major Subcomponent	Construction	Quantity	Width (m)	Length (m)	Height (m)	Surface Area (m^2)	Thickness (m)	Volume (m^3)	General Demolition Debris	Steel/metal products	Total non-hazardous		Oils & Liquids	PCB containing materials	Chemicals/ Mercury containing materials	Lead containing materials	PCB Amended Paint	Leachable Lead amended paint	Total	Asbestos	Wood with leachable arsenic	Misc. materials impacted with arsenic	Total	Comments
C Shaft 148 Fan House	Roof	Transite roof panels						74	0.020	2			0								0	2			2	
		Steel roof trusses								5	1	3	4								0			1	1	
		asbestos paper siding in soffits								1			0								0	1			1	
	Exterior walls	Steel frame								8	1	6	7								0			1	1	
		Transite panels						186.8	0.020	6			0								0	6			6	
		Trim/door/windows								0	1		1					1			1			1	1	lead sheeting around windows
	Electrical	Light ballasts, tubes, switch gear, wire								5	1		1			0.3	0.3				1				0	fluorescent light tubes and ballasts located in building
	Interior	fans and motors								3	1	1	2								0			1	1	
		dust on floor								1			0								0			1	1	
Roaster Stack	Stack	brick, 2 layers					45.7	1090.0	0.380	414														414	414	Assumed all bricks contain arsenic trioxide which can not be removed
	Attachments	exterior ladder, control room, platform, electrical wire, lights, upper collar								25	10	10	20			0.3	0.3							5	5	
	Contents	Dust								6														6	6	2.7 m of dust in bottom of stack, Northwest Consulting report
	Building 148 C Shaft Fan House and Stack									**476**	15	20	**35**	**0**	0	0.6	0.6	1	0	0	**2**	9	0	430	**439**	

Notes:
All interior surfaces are coated with arsenic trioxide dusts
No cyanide dusts
Concrete slab left in place
Inspection of building interior not completed due to safety concerns
Arsenic trioxide dust in building are considered as arsenic trioxide impacted waste not mineral waste

Table D1e
C Shaft - Building 160 Arsenic Silo and Weight Scale
Giant Mine Roaster Deconstruction - Summary of Waste Volumes

Weigh Scale - concrete floor, steel prefab building, potentially two wall layers (interior and exterior)
Silo - Steel plates bolted together, control room located below bottom cone of silo

Dimensions

Location	Building No.	Building Name	Length (m)	Width (m)	Wall Perimeter (m)	Silo Radius	Building Height	Wall Surface Area	Roof Surface Area	Silo height
Roaster	160	Weight Scale Building and Silo	21.9	7.2	58.3	3.7	6.1	355.2	210.0	20.1

Summary of Building Components - Volume Estimates

				Dimensions							Waste Streams														
											Non-Hazardous Waste			Mineral Waste	Hazardous Waste										
															Non-arsenic containing materials							Arsenic containing materials				
Building	Component	Major Subcomponent	Construction	Quantity	Width (m)	Length (m)	Height (m)	Surface Area (m^2)	Thickness (m)	Volume (m^3)	General Demolition Debris	Steel/metal products	Total non-hazardous		Oils & Liquids	PCB containing materials	Chemicals/ Mercury containing materials	Lead containing materials	PCB Amended Paint	Leachable Lead amended paint	Total	Asbestos	Wood with leachable arsenic	Misc. materials impacted with arsenic	Total	Comments
C Shaft 160 Weigh Scale Building	Roof	Metal Roofing materials	Sheet metal					210	0.020	4		4	4								0				0	
		metal support structure	steel							3		3	3								0				0	
	Exterior walls	metal siding	Sheet metal					355	0.020	7		7	7								0				0	
		metal support structure	steel							5		5	5								0				0	
	Contents	Interior Contents (Stairs hand rails, catwalk, windows, lighting, electrical, wire, misc.)	steel, wood							5	3	3	6			0.3	0.3				1			5	5	
C Shaft 160 Silo	Silo Walls, roof, floor	Metal exterior of silo	metal					546.1	0.020	11		11	11								0			1	1	Silo constructed of bolted panels, approx. 8' x 4'
		exterior, ladder, piping, auger, rails, wire	misc.							5	2	2	4								0			1	1	
	Interior	Support columns	steel							2		2	2								0				0	
		Control room, contents, pumps, motors, equipment, hose, electrical gear, wood, pipe	misc.							11	1		1			0.3					0			10	10	fluorescent light tubes and ballasts located in silo
		Floor tiles, transite board in control room windows						10.0		1			0								0	1			1	
		Silo Contents and dust on silo floor near control room								2			0								0			2	2	cone contains 8-10 drums, volume from Northwest Consulting Report
	Building 160 C Shaft Silo and Loadout									**56**	6	37	**43**	**0**	0	0.6	0.3	0	0	0	**1**	1	0	19	**20**	

Notes:

All interior surfaces are coated with arsenic trioxide dusts
No cyanide dusts
Concrete slab left in place
Arsenic trioxide dusts in silo and weigh scale building is considered as arsenic trioxide impacted waste not mineral waste

Table D1f
C Shaft 162 - Calcine
Giant Mine Roaster Deconstruction - Summary of Waste Volumes
Steel building, steel frame, rigid transite panel walls and roof with spray applied insulation on interior, concrete floor
2nd level in north wing

Dimensions

Location	Building No.	Building Name	Length (m)	Width (m)	Perimeter (m)	Avg. Height	Surface Area	Roof Surface Area
Calcine bldg	162	south wing	12.9	5.3	31.1	5.2	161.7	90.9
Calcine bldg	162	north wing	23.9	15.3	68.5	11.0	753.3	486.6
Calcine bldg	162	rotary kiln bldg	22.4	9.9	59.3	6.3	373.6	294.9
					TOTALS		1288.6	872.5

Summary of Building Components - Volume Estimates

				Dimensions							Waste Streams														
											Non-Hazardous Waste			Mineral Waste	Hazardous Waste										
															Non-arsenic containing materials							Arsenic containing materials				
Building	Component	Major Subcomponent	Construction	Quantity	Width (m)	Length (m)	Height (m)	Surface Area (m^2)	Thickness (m)	Volume (m^3)	General Demolition Debris	Steel/metal products	Total non-hazardous		Oils & Liquids	PCB containing materials	Chemicals/ Mercury containing materials	Lead containing materials	PCB Amended Paint	Leachable Lead amended paint	Total	Asbestos	Wood with leachable arsenic	Misc. materials impacted with arsenic	Total	Comments
C Shaft 162 Calcine	Roof Area	Asbestos transite siding with spray on insulation						875	0.075	66			0								0	66			66	
		Structural steel (berms, purlin)								29		24	24								0			5	5	
	All Exterior walls	Asbestos siding with spray on insulation						1300	0.075	293			0								0	293			293	
		Structural steel (columns, girts)								59		54	54								0			5	5	
		Trim/door/windows	metal and wood							8	7		7					1			1				0	
	South wing	equipment, gears, parts, misc. steel								13	10		10								0			3	3	
		dust on surfaces								2			0								0			2	2	
		piping								10	5		5								0	2		3	5	
	Rotary kiln Bldg.	Rotary Kiln, supports and drive mechanism	steel, 2m dia.							104	10	80	90								0	1		13	14	Assumed to contain residual amounts of mineral waste
		Control room	brick and mortar							7			0								0	2		5	7	Assumed that materials can not be cleaned, asbestos backing
		conveyor/chain belt								9	2	5	7								0			2	2	
		Light ballasts, tubes, switch gear, wire, emergency light batteries, mercury controls								8	2		2			0.3	0.3				1			5	5	
		fuel tank and piping								6		5	5		1						1				0	
		stair cases, interior building partion walls and doors								10	3	5	8								0			2	2	
		dust on surfaces								5			0								0			5	5	
		misc. parts and equipment on floor	steel, rubber, etc.							30	10	10	20								0			10	10	
		piping and insulation								16	5	5	10								0	3		3	6	
	North Wing	Ducts, blowers and insulation								63		10	10								0	36		17	53	
		Piping and insulation								30		10	10								0	10		10	20	
		Wooden thickener and agitator tanks with supports								55			0								0		50	5	55	
		Misc. steel tanks/hoppers, debris on floor								40	10	20	30								0			10	10	
		dust on surfaces								20											0			20	20	
		2nd level, drum filter, platforms, piping								29	10	15	25								0			4	4	
		2nd level washroom	vermiculite in wall cavity							16	10		10								0	3		3	6	
		Light ballasts, tubes, switch gear, wire, emergency light batteries								16	5	5	10			0.3	0.3				1			5	5	
		hoppers, process equipment, misc. equipment on floor								30	10	10	20								0			10	10	
		pumps, fans and motors								23	10	10	20								0			3	3	
		steel floors, railings, stair cases, interior building partion walls and doors,								80	20	50	70								0			10	10	
										1074	129	318	**447**	**0**	1	1	1	1	0	0	**3**	415	50	160	**625**	

Notes:

All interior surfaces are coated with arsenic trioxide dusts
No cyanide dusts
Concrete slab left in place

Table D1g
C Shaft 167 - Baghouse
Giant Mine Roaster Deconstruction - Summary of Waste Volumes

Steel building, steel frame sheet metal siding, fiberglass insulation, concrete floor
2nd level consists of catwalks around baghouse unit

Dimensions

Location	Building No.	Building Name	Length (m)	Width (m)	Perimeter (m)	Height (m)	Wall Surface Area	Roof Surface Area
Roaster	167	Bag House	15.0	10.0	50.0	9.1	455.0	210.0

Summary of Building Components - Volume Estimates

				Dimensions							Waste Streams													
											Non-Hazardous Waste			Mineral Waste	Hazardous Waste									
															Non-arsenic containing materials							Arsenic containing materials				
Building	Component	Major Subcomponent	Construction	Quantity	Width (m)	Length (m)	Height (m)	Surface Area (m^2)	Thickness (m)	Volume (m^3)	General Demolition Debris	Steel/metal products	Total non-hazardous		Oils & Liquids	PCB containing materials	Chemicals/ Mercury containing materials	Lead containing materials	PCB Amended Paint	Leachable Lead amended paint	Total	Asbestos	Wood with leachable arsenic	Misc. materials impacted with arsenic	Total	Comments
C Shaft 167 Baghouse	Roof	Exterior metal roof materials	metal roofing					210.0	0.015	4		4	4								0				0	
		Roof structural members (beams and purlins)								6		6	6								0				0	
		Insulation						210.0	0.010	3			0								0			3	3	Roof not inspected, insulation assumed to be present and can not be cleaned of arsenic trioxide dust
		interior metal siding						210.0	0.015	4		4	4								0				0	
	Exterior walls	Exterior metal siding						455.0	0.015	9		9	9								0				0	
		Columns and girts, cross bracing								8		8	8								0				0	
		Trim/door/windows	paint including metal and wood substrate							3	2		2							1	1				0	North, green painted door and frame contains leachable lead
		Insulation						455.0	0.010	7			0								0			7	7	Assumed insulation can not be cleaned of arsenic trioxide dust
		Interior metal wall siding						455.0	0.015	9		9	9								0				0	
	Electrical	Light ballasts, tubes, switch gear, wire, controls								8	3		3			0.5	0.3				1			5	5	fluorescent light tubes and ballasts located in building, asbestos insulators in electrical equipment, mercury containg controls, assumed non all electrical equipment can not be cleaned
	Mechanical	tank, supports and piping								2		2	2								0				0	
		piping and insulation								10		5	5								0			5	5	
		fans and motors								4	1	1	2								0			2	2	
	Baghouse Structure/unit	dust collection bags and dust								105	5		5								0			100	100	Includes dust collection bags as well as all arsenic trioxide dusts in unit
		spray on insulation						800.0	0.1	240			0								0	240			240	Based on surface area of baghouse unit
		interior ducts								10		5	5								0			5	5	Assumed ducts contain residual amounts of arsenic trioxide
		steel structure (sheet metal and supports)						400.0	0.015	17		15	15								0			2	2	
	Interior	stairs, catwalks								15		10	10								0			5	5	
		wood siding, pallets								4			0								0		4		4	
		misc. steel equipment/parts								10		6	6								0			4	4	
		hose/airlines								4			0								0			4	4	
		interior columns								5		5	5								0				0	
		grease drums								1			0		0.5						1				0	
	Exterior	Exterior hopper and piping to north								25	10	15	25								0				0	
	Roaster Baghouse									**512**	21	103	**124**	**0**	0.5	0.5	0.3	0	0	1	**2**	240	4	142	**386**	

Notes:
All interior surfaces are coated with arsenic trioxide dusts
No cyanide dusts
Concrete slab left in place
Arsenic trioxide dust in flues is considered as arsenic trioxide impacted waste not mineral waste

Table D1h
C Shaft - Exterior Flue Network
Giant Mine Roaster Deconstruction - Summary of Waste Volumes

Summary of Building Components - Volume Estimates

				Dimensions					Waste Streams													
									Non-Hazardous Waste			Mineral Waste	Hazardous Waste										
													Non-arsenic containing materials							Arsenic containing materials				
Building	Component	Major Subcomponent	Construction	Quantity	Width (m)	Length (m)	Height (m)	Volume (m^3)	General Demolition Debris	Steel/metal products	Total non-hazardous		Oils & Liquids	PCB containing materials	Chemicals/ Mercury containing materials	Lead containing materials	PCB Amended Paint	Leachable Lead amended paint	Total	Asbestos	Wood with leachable arsenic	Misc. materials impacted with arsenic	Total	Comments
Exterior Flues	Fiberglass flue	Flue	Fiberglass pipe and sheet metal siding					26	20	5	25								0			1	1	Flue contains minimal amounts of arsenic trixode dusts
		Control room and stairs, electrical equipment, wire	misc.					70	10		10			0.3					0.3		50	10	60	
		structural supports	steel					10		5	5								0			5	5	
	AC and Dorrco Roaster Flues	Flues	steel					55		30	30								0			25	25	Flues contain large quantity of arsenic trioxide dust
		Asbestos insulation	rockwool and asbestos wrap					40											0	40			40	
		structural supports	steel					25		20	20								0			5	5	
	Flues on West side of Roaster buildings	Flue	steel					25	5	5	10								0			15	15	Arsenic trioxide dusts left in abandoned flue network
		Asbestos insulation	rockwool and asbestos wrap					10			0								0	10			10	
	Exterior Flue Network							**261**	35	65	**100**	**0**	0	0.3	0.0	0	0	0	**0.3**	50	50	61	**161**	

Notes:
All interior surfaces are coated with arsenic trioxide dusts
No cyanide dusts
Concrete slab left in place

Appendix D2 – Deconstruction Inventory Table

Structure		Description	Hazardous Waste Material and Mineral Waste	Building Components	Estimated Volume (m^3)			
					Non- Hazardous Waste	Arsenic Hazardous Waste	Non-Arsenic Hazardous Waste	Mineral Waste
Silo and Weight Scale Building	**Weight Scale**	Pre-fab steel structure approximately (21.9 m x 7.1 m x 6 m high). Concrete floor	No known hazardous building materials; all surfaces assumed to be coated with arsenic trioxide dusts.	Steel frame with sheet metal siding, concrete floor, elevated platform/staircase, wood and steel, electrical controls, wiring and lighting	25 m^3	Arsenic trioxide transfer equipment, wood, arsenic trioxide dust coating interior surfaces and remaining in auger 5 m^3	Small quantities of mercury and PCB containing materials <0.5 m^3	-
	Silo	7.3 m diameter, 20 m tall, bolted steel tank Control room, pumps, material transfer equipment located at base of Silo	8 to10 barrels of arsenic trioxide dusts located in base of silo. Auger and all material transfer piping/hose to be emptied of arsenic trioxide dusts. Asbestos containing transite panels and floor tiles in control room. All surfaces coated with arsenic trioxide dusts. Potential asbestos, mercury and PCB containing items in electrical and lighting equipment and insulators.	Steel silo, control room, electrical equipment, pumps. Structural steel supports, steel piping, Electrical equipment, Other: wood, auger, pumps, pipe, hose, interior walls.	18 m^3	Arsenic trioxide dusts in silo and control room at base of silo. Asbestos materials in control room and in equipment. 15 m^3	Small quantities of mercury and PCB containing materials in electrical and lighting equipment <0.5 m^3	-
Fan House	**Fan House Building**	Steel frame building, covered with rigid transite board siding. Interior inspection has not been completed.	Building potentially contains arsenic trioxide dusts. Asbestos containing transite board used for exterior siding Potential asbestos, mercury and PCB containing items in electrical and lighting equipment. Lead sheeting around windows Asbestos paper siding in soffits	Steel frame, asbestos transite panels, windows, ducts, fan, electrical equipment	15 m^3	All interior surfaces assumed coated with arsenic trioxide dusts, asbestos containing siding 14 m^3	Asbestos and PCBs in electrical and lighting equipment, lead sheeting around windows 2 m^3	-

Structure		Description	Hazardous Waste Material and Mineral Waste	Building Components	Estimated Volume (m^3)			
					Non- Hazardous Waste	Arsenic Hazardous Waste	Non-Arsenic Hazardous Waste	Mineral Waste
Roaster Stack	**Stack**	Brick structure, 46 m tall, 4.9 m diameter at base, 3.5 m diameter at top of stack. Portions of collar on top of stack have fallen off, condition of upper courses of bricks is unknown	Arsenic trioxide dusts have accumulated inside stack, 2.8 m high pile located at base. Interior surfaces of stack coated with arsenic trioxide dusts	Brick, steel ladder, cage, platform, electrical equipment	20 m^3	Bricks coated with arsenic trioxide dusts, dust remaining in stack 425 m^3	Asbestos and PCBs in electrical and lighting equipment <1m^3	-
Baghouse	**Building Shell**	Baghouse Building Robertson style steel frame building. Sheet metal walls and roof, concrete floor. Approximate building dimensions: 15 m x 10 m x 9 m high. Catwalks located around perimeter of baghouse unit.	All interior surfaces coated with arsenic trioxide dusts. Green painted wood on north man door and trim contains lead at leachable levels.	Structural steel Metal siding, fibreglass insulation, doors, windows	41 m^3	Arsenic trioxide impacted insulation 10 m^3	Leachable lead amended paint and substrate 1 m^3	-
Baghouse	**Building Interior and baghouse unit**		Parging cement on hoppers; baghouse unit contains asbestos. Potential asbestos, mercury and PCB containing items in electrical and lighting equipment. Partially full barrel of grease left in building Baghouse, hoppers, augers ducts and bags to be emptied and cleaned of arsenic trioxide dusts. Potential mercury containing Bailey unit.	Metal baghouse unit and ducts, structural supports, steel augers, insulation, Steel catwalks, stairs Piping, airlines Mechanical equipment and pumps Electrical equipment Baghouse bags Exterior steel hoppers	83 m^3	Asbestos insulation mixed with arsenic trioxide dust, arsenic trioxide dusts on all exterior wall surfaces and structural members, dust inside baghouse unit 376 m^3	Grease; mercury; asbestos and PCBs in electrical and lighting equipment <2 m^3	-

Structure		Description	Hazardous Waste Material and Mineral Waste	Building Components	Estimated Volume (m^3)			
					Non- Hazardous Waste	Arsenic Hazardous Waste	Non-Arsenic Hazardous Waste	Mineral Waste
Exterior Roaster Flues	**Exterior Roaster Flues**	Main exterior roaster flues are 1.8 m diameter steel flues, elevated above grade. Flues run between AC Roaster to Fan House and from Cottrell to Fanhouse. Flues wrapped with rockwool and asbestos insulation and coated with tar. Insulation in very poor condition. Baghouse flues are 1.0 m diameter fibreglass pipe located between Baghouse and Stack. Flue is wrapped with rockwool and aluminum sheeting. Elevated control room with a wooden stair case is adjacent to this flue.	Main Roaster flues contain large quantities (potentially 30 tons) of arsenic trioxide dusts. Baghouse flue contains small quantities of arsenic trioxide. Asbestos insulation falling off ducts and lying on ground surface.	Steel and fibreglass ducts supported with structural steel frames and wooden cribbing. Insulation material, electrical and controls.	Steel flues, structural steel columns, and electrical equipment 100 m^3	Asbestos containing insulation, impacted wood waste, arsenic trioxide dust in flues, asbestos insulation on ground 161 m^3	Suspect asbestos and PCBs in electrical and lighting equipment <1 m^3	-
Cottrell Precipitator	**Building Shell**	Steel frame building with rigid transite panels installed for exterior siding. Approximate building dimensions: 28 m x 17 m x 10 m high Building consists of ground level plus 2nd level on top of precipitator unit	Spray applied asbestos (includes crocidolite and chrysotile) insulation on wall (transite panel) interior surfaces; insulation coated with encapsulant, with arsenic dust trapped within. All interior building surfaces are coated with arsenic trioxide insulation. Lead sheeting around windows	Structural steel with transite panel siding	Structural steel 63 m^3	Arsenic trioxide dusts, located on all exterior wall surfaces and on structural members and in Cottrell unit, asbestos and arsenic trioxide exterior siding 79 m^3	Lead sheeting around windows. 1 m^3	-

Structure		Description	Hazardous Waste Material and Mineral Waste	Building Components	Estimated Volume (m^3)			
					Non- Hazardous Waste	Arsenic Hazardous Waste	Non-Arsenic Hazardous Waste	Mineral Waste
Cottrell Precipitator	**Building interior and precipitator unit**	Cottrell Precipitator 2 story unit contains 8,400 rods coated with arsenic trioxide scale. Precipitator unit and hoppers have been coated with asbestos containing insulation. Control room and electrical room located in building. Building contains approximately 80 m of large air ducts (approx. 2.4 m x 2.4 m) with asbestos insulation.	Asbestos insulated piping, hoppers, precipitator unit and air ducts. Asbestos containing gaskets in building, cement board and wall paper in the electrical room, and floor tile in the control room. Batteries in emergency lights. Potential asbestos, mercury and PCB containing items in controls, electrical and lighting equipment, and in transformers. Potential ODS in water chiller. Arsenic trioxide dusts and scale on all interior surfaces, floor, unit rods, hoppers, augers, ducts, and bags; 5 tons of arsenic trioxide reported to be in precipitator unit. Hydraulic oil in precipitator shaking mechanism. Potential mercury containing Bailey unit. Floor sump containing water.	Precipitator assembly and internal rods; supporting columns. Steel floors, railings, staircase, interior partition walls. Interior ducts, flues and piping. Hoppers, process equipment, pumps, fans, and motors. Furniture, parts, misc. supplies.	Steel materials including sheet metal, hoppers, piping, flooring, stairs 340 m^3	Arsenic trioxide dust and arsenic impacted wastes, including asbestos insulation, furniture, supplies, piping, electrical equipment, wire, ducts, 272 m^3	POLs located in precipitator unit, suspect asbestos and PCBs in transformers, electrical and lighting equipment, suspected ODS in water chiller, batteries in emergency lights, Hg in Bailey unit and lights 11 m^3	-

Structure		Description	Hazardous Waste Material and Mineral Waste	Building Components	Estimated Volume (m^3)			
					Non- Hazardous Waste	Arsenic Hazardous Waste	Non-Arsenic Hazardous Waste	Mineral Waste
Calcine Building	**Calcine Building**	Steel frame building with rigid transite board siding and roof panels. U-shaped building with dimensions of 12.9 m x 5.3 m x 5.2m high; 22.4 m x 9.9 m x 6.3 m high ; and 23.9 m x 15.3 m x 11 m high. North end of the building has two floor levels. A 24 m long rotary kiln is located in central portion of building, an aboveground fuel tank is connected to kiln. A network of insulated flues and mechanical equipment/blowers/ cyclones are insulated with asbestos containing materials. 12 m diameter wooden thickener tank is located in the northwest corner of building. Used parts, equipment, supplies are scattered on the floor throughout the building.	Spray applied asbestos insulation is in poor condition delaminating throughout building, asbestos containing debris is visible on equipment throughout building. Asbestos containing pipe insulation in poor condition is located around the perimeter of the building. Wooden thickener tank and wooden supports are heavily stained and arsenic impacted. Potential asbestos, mercury and PCB containing items in controls and electrical and lighting equipment. Vermiculite insulation identified in exterior wall cavity in 2nd floor washroom. Control room walls have rigid cement board panels and paper. The kiln door has asbestos containing woven gaskets. A heavy coating of high arsenic process dusts is on all interior surfaces, in process equipment, and inside piping. Dusts also contain asbestos. Asbestos containing insulation is located on ducts and cyclones located at north end of building. Aboveground fuel storage tank and piping with residuals. Lead flashing mounted around windows.	Steel Rotary Kiln Insulated air ducts and equipment Wooden thickener tank with wooden supports 2nd level washroom 2nd level drum filter Tanks, pipe, pumps, spare parts, process equipment Steel frame building with concrete floor, dirt floor below thickener tank, wooden walkways around tank Asbestos containing insulation on walls and ceiling	Structural steel, sheet metal, pipe, process equipment, fans, motors, stairs 447 m^3	Dusts throughout building and in process and thickener tanks, arsenic impacted tank and wood supports, stained wood, asbestos insulation on pipe and flues, drum filter, electrical equipment, piping 625 m^3	Potential mercury and PCB containing electrical and lighting component, lead batteries 3 m^3	

Structure		Description	Hazardous Waste Material and Mineral Waste	Building Components	Estimated Volume (m^3)			
					Non- Hazardous Waste	Arsenic Hazardous Waste	Non-Arsenic Hazardous Waste	Mineral Waste
Dorrco Roaster	**Dorrco Roaster**	Building approximately 30 m x 25 m x12 m high. Building has small peak approximately 15 m high. Steel frame building with rigid transite board siding and roof panels. Walls have been coated with a spray applied asbestos containing insulation. Non-asbestos containing spray applied insulation applied to ceiling. Large portion of ceiling insulation has fallen off. Building contains; ball mill, 2 roaster vessels, flue network, process tanks and pumps. Multi-story building, many small non-continuous s floors interconnected with catwalks and stairs. Some floors and catwalks in poor structural condition	Cyanide stored and used in building, all surfaces coated with arsenic trioxide, asbestos and cyanide dusts. Exterior walls coated with amosite and chrysolite insulation. Asbestos containing insulation located on roaster vessels, exhaust flue network, cyclones and pipe. Pipe run insulation in poor condition. Rigid cement board containing asbestos located on exterior of building, in compressor room, electrical room, and control room. Potential lead, asbestos, mercury and PCB containing items in controls and electrical and lighting equipment. Mercury confirmed in controls, with spilled mercury on floor in control room. Lead sheeting is located around windows. Approximately 100 L of unlabeled liquids located in building (potentially oils) ODS in water chiller. Process residuals left in piping, and in process vessels. Refractory bricks inside roaster vessels potential contain asbestos materials.	Structural steel Steel floors, ladders, catwalks Steel process equipment Asbestos containing exterior siding coated with asbestos containing insulation Wood and steel process tanks, wood timbers and concrete used to support tanks Steel roaster vessels, wrapped with asbestos insulation, refractory brick located inside roasters Pipe made of steel, plastic, hose	Structural steel, steel hoppers, ball mill, plastic pipe 707 m^3	Dusts, arsenic impacted tank and wood supports, asbestos insulation on pipe and flues, electrical equipment, piping 653 m^3	Potential mercury and PCB containing electrical and lighting component, lead batteries, mercury spill in control room, POLs, granular sulphur, lead sheeting around windows 21 m^3	Residuals in process tanks and vessels 10 m^3

Structure		Description	Hazardous Waste Material and Mineral Waste	Building Components	Estimated Volume (m^3)			
					Non- Hazardous Waste	Arsenic Hazardous Waste	Non-Arsenic Hazardous Waste	Mineral Waste
AC Roaster	**AC Roaster Building Shell**	Wooden building with flat roof, wood walls and trusses. Building approximately 70 m long x 18 m wide x 12 m tall Exterior of building covered with asbestos containing paper siding Remains of covered pipe rack to Mill located off south end of building Multi-level building with numerous elevated platforms and raised concrete pad at south end.	Exterior asbestos containing paper siding Cyanide used in building. All building surfaces coated with arsenic and potentially cyanide dust. Wooden exterior walls show signs of staining. Asbestos containing pipe insulation on network of pipes installed around perimeter walls. Insulation in very poor condition, with the majority missing.	Wood frame building Wooden exterior walls, wood trusses, flat roof Interior wooden elevated platforms and staircases. Overhead heaters	Steel materials associated with building structure and roofing materials 103 m^3	All wood, including building frame, asbestos containing exterior siding 439 m^3	-	-
	East end Electrical and Compressor Rooms	Electrical and compressor rooms to main AC Roaster Building	Asbestos contain transite board on all walls and ceilings of compressor and electrical rooms; flooring in electrical room; wall paper behind sheets of transite board. Arsenic and potentially cyanide dusts on all surfaces and in abandoned flues. 2 compressors containing antifreeze/oil Potential lead, asbestos, mercury and PCB containing items in controls and electrical and lighting equipment. Partially full barrel of antifreeze Smoke detectors identified in electrical rooms. All surfaces coated with dust	Electrical panels, compressors, Exterior electrical compound	Steel pipe and fittings, compressors, electrical equipment 80 m^3	Arsenic trioxide and cyanide dusts on all surfaces and in abandoned flue network, asbestos insulation on piping and ducts, electrical equipment and wire, asbestos paneling 31 m^3	Potential mercury and PCB containing electrical and lighting component, lead batteries, compressor oil, antifreeze 5 m^3	-

Structure		Description	Hazardous Waste Material and Mineral Waste	Building Components	Estimated Volume (m^3)			
					Non- Hazardous Waste	Arsenic Hazardous Waste	Non-Arsenic Hazardous Waste	Mineral Waste
AC Roaster	**South end Pipe Shop area**	Pipe and pipe fitting storage area with floor sump. Metal lathe Empty barrel storage Air compressor Refractory bricks Hose Remains of pipe rack that extends towards Mill Building Various wastes located outside building including overpacks, barrels, used equipment, plastic and steel pipe, wood debris	Potential lead, asbestos, mercury and PCB containing items in controls and electrical and lighting equipment Barrels of asbestos encapsulant stored in area Empty sodium cyanide barrels Pipe with asbestos containing insulation mounted on perimeter walls. Asbestos containing gaskets located in parts storage area. 50 pound bags of soda ash All interior surfaces coated with dusts that contain arsenic trioxide and potentially cyanide and asbestos. Floor sump containing water	Wooden storage racks located on exterior walls Process piping, water lines. Covered pipe rack to Mill building	Steel pipe and fittings 80 m^3	Supplies, equipment and wood coated/impacted with arsenic trioxide dusts, wood, 80 m^3	Bags of soda ash, barrels of oils, barrels of asbestos encapsulant, asbestos gaskets 7 m^3	
	Carbon Strip/ Cyanide Area	Multi-level area in central portion of building	Mineral scale on process equipment and floor. Three wooden tanks, leachable levels of arsenic in wood, mineral wastes left in tanks. Potential lead, asbestos, mercury and PCB containing items in controls and electrical and lighting equipment. Open pails of unlabelled POLs Open barrel sodium hydroxide Cyanide process area	Structural steel supports, steel acid tanks, process vessels Wooden stairs and platform located above two CIP tanks. Steel piping, electro-twinning cell, electrical equipment	Piping and process equipment 80 m^3	Asbestos containing pipe insulation, wood building materials, wood tanks 210 m^3	Suspect PCB, lead, asbestos and mercury in electrical equipment, small containers of POLs, sodium hydroxide 3 m^3	Process waste in wooden tanks, process equipment and piping 72 m^3

Structure		Description	Hazardous Waste Material and Mineral Waste	Building Components	Estimated Volume (m^3)			
					Non- Hazardous Waste	Arsenic Hazardous Waste	Non-Arsenic Hazardous Waste	Mineral Waste
AC Roaster	**Abandoned Flues and Carbon Plant Area**	Flues located at north end of building, 2nd level Carbon plant located at north end of building	Abandoned flue network contains arsenic trioxide dusts. Thirty six inch ducts insulated with asbestos containing insulation Open barrel of sodium hydroxide. All interior surfaces coated with dusts that contain arsenic trioxide and potentially cyanide and asbestos. Wooden thickener tank and agitator tanks. Residual mineral wastes located in process tanks and in piping. Wood platforms/joists heavily stained with process chemicals. Potential lead, asbestos, mercury and PCB containing items in controls and electrical and lighting equipment. Lab containing small quantities of chemicals (potassium iodide, potassium permanganate, silver nitrate, pH meter buffer solutions)	Structural steel supporting flues, flues wrapped with asbestos containing insulation and partially filled with arsenic trioxide dust Structural steel supports, wood floors, stairs, platforms, steel and plastic tanks, steel and plastic piping	Structural steel, steel plate, process piping, process equipment 65 m^3	Wood building materials, handrails, floors, thickener tank contain leachable arsenic Arsenic trioxide and cyanide dusts on all surfaces and in abandoned flue network, asbestos insulation on piping and ducts, electrical equipment and wire coated with arsenic dust 190 m^3	Open barrel of sodium hydroxide, small containers of lab chemicals Potential mercury, asbestos and PCB containing electrical and lighting components 4 m^3	Mineral waste in wooden tanks and in process equipment and piping 55 m^3

Appendix E

Summary of Waste Disposal Requirements

Structure	Major Components	Waste Disposal Stream			
		Hazardous- Non-Arsenic Containing	Hazardous-Arsenic Containing	Non-Hazardous	Mineral Waste
Weight Scale	Structural steel members, metal siding, windows, electrical, equipment			X	
	Dust in building and in transfer equipment		X		
	Wood stairs, misc wood debris, product transfer equipment		X		
	Asbestos in misc electrical equipment		X		
Silo	Steel silo and structural supports			X	
	Asbestos transite boards and floor tile		X		
	Electrical equipment, potential PCBs and mercury in electrical and lighting equipment, wiring	X			
	Control room partition walls and contents			X	
	Electrical Panels and equipment			X	
	Transfer equipment		X		
	Dust in silo, control room and in transfer equipment		X		
Fan House Building	Structural steel			X	
	Rigid transite board siding, asbestos containing paper siding		X		
	Potential PCB, mercury and asbestos containing items in electrical equipment	X			
	Arsenic coated electrical and mechanical equipment		X		
	Dust in building and in piping		X		
Roaster Stack	Brick structure		X		
	Electrical equipment, potential PCBs and mercury in electrical and lighting equipment, wiring	X			
	Steel ladder and components, electrical panels			X	
	Arsenic trioxide dust inside stack		X		

Structure	Major Components	Waste Disposal Stream			
		Hazardous- Non-Arsenic Containing	Hazardous-Arsenic Containing	Non-Hazardous	Mineral Waste
Baghouse	Non-asbestos insulation		X		
	Structural steel, metal siding, staircases, catwalks			X	
	Asbestos insulation on baghouse and pipe run insulation		X		
	Steel process equipment, tanks, fans, motors, pumps and piping			X	
	Potential PCB, mercury and asbestos containing items in electrical equipment, lighting and controls	X			
	Dust coated electrical panels, wiring		X		
	Barrel of grease	X			
	Air lines, bag house bags		X		
	Arsenic trioxide dust in bag house as well as coating all interior surfaces		X		
	Leachable lead painted door/frame	X			
Exterior Roaster Flues	Structural steel			X	
	Wood stairs/platforms			X	
	Steel/fibreglass flues			X	
	Arsenic trioxide dusts in side flues		X		
	Asbestos containing flue insulation on flues and on ground surface		X		
	Aluminium wrap on Baghouse flue			X	

Structure	Major Components	Waste Disposal Stream			
		Hazardous- Non-Arsenic Containing	Hazardous-Arsenic Containing	Non-Hazardous	Mineral Waste
Exterior Roaster Flues	Steel process equipment, tanks, fans, motors, pumps and piping			X	
	Electrical equipment, wire, controls			X	
	Dust coated electrical panels, wiring		X		
	Potential PCB, mercury and asbestos containing items in electrical equipment, lighting and controls	X			
Cottrell Precipitator	Non-asbestos insulation		X		
	Structural steel, staircases, catwalks			X	
	Asbestos insulation, exterior siding, control room flooring, gaskets, insulation on precipitator unit, hoppers, ducts, pipe run insulation		X		
	Steel process equipment, tanks, fans, motors, pumps and piping			X	
	Potential PCB, mercury and asbestos containing items in electrical equipment, transformers, lighting and controls	X			
	Lead flashing on exterior	X			
	Arsenic trioxide dust on all surfaces, inside precipitator unit, scale on rods		X		
	Batteries, oils, cleaning products, adhesives, paint, ODS in water chiller	X			
Calcine Building	Structural steel, staircases, catwalks			X	
	Asbestos insulation on exterior walls, exterior siding, control room flooring, gaskets, vermiculite insulation, pipe run insulation, cyclone insulation		X		

Structure	Major Components	Waste Disposal Stream			
		Hazardous- Non-Arsenic Containing	Hazardous-Arsenic Containing	Non-Hazardous	Mineral Waste
Calcine Building	Steel process equipment, tanks, fans, motors, cyclones, pumps, spare parts, used equipment and piping			X	
	Potential PCB, mercury and asbestos containing items in electrical equipment, transformers, lighting and controls	X			
	Dust coated electrical panels, wiring		X		
	Lead flashing on exterior	X			
	Arsenic trioxide dust on all surfaces, inside precipitator unit, scale on rods		X		
	Batteries, oils	X			
	Arsenic trioxide and asbestos dust coating all interior surfaces		X		
	Dusts in process tanks, vessels, equipment and piping		X		
	Aboveground fuel tank and piping			X	
	Residual fuel and sludge in storage tank	X			
	Wood tanks and wooden supports		X		
	Rotary kiln, refractory brick, brick electrical/control room			X	
Dorrco Roaster	Structural steel, staircases, catwalks			X	
	Asbestos insulation on exterior walls, exterior siding, pipe run insulation roaster vessel. cyclone insulation, gaskets		X		
	Steel process equipment, tanks, fans, motors, roasters, pumps, spare parts, used equipment and piping			X	

Structure	Major Components	Waste Disposal Stream			
		Hazardous- Non-Arsenic Containing	Hazardous-Arsenic Containing	Non-Hazardous	Mineral Waste
Dorrco Roaster	Potential PCB, mercury and asbestos containing items in electrical equipment, transformers, lighting and controls, spilled mercury in control room, lead flashing	X			
	Dust coated electrical panels, wiring		X		
	Arsenic trioxide dusts, cyanide and asbestos dusts on all surfaces, inside roasters, abandoned ducts, piping and all interior surfaces		X		
	Batteries, oils, cleaning products, adhesives, grease, paint, ODS in water chiller, sulphur	X			
	Residuals in process tanks, vessels and piping				X
	Wood tanks and supports, handrails		X		
AC Roaster Building	Structural steel, staircases, catwalks			X	
	Wood timber structure, walls, roof, trusses, wood, tanks, stairs, platforms, handrails		X		
	Asbestos tar paper on exterior walls, pipe run insulation, gaskets, floor coverings		X		
	Steel process equipment, tanks, fans, motors, roasters, cyclones, pumps, spare parts, used equipment and piping			X	
	Potential PCB, mercury and asbestos containing items in electrical equipment, transformers, lighting and controls, spilled mercury in control room	X			
	Dust coated electrical panels and wiring		X		
	Arsenic trioxide dusts, cyanide and asbestos dusts on all surfaces, inside roasters, abandoned ducts, piping and all interior surfaces		X		

Structure	Major Components	Waste Disposal Stream			
		Hazardous- Non-Arsenic Containing	Hazardous-Arsenic Containing	Non-Hazardous	Mineral Waste
AC Roaster Building	Batteries, oils, cleaning products, adhesives, grease, paint, soda ash, smoke detectors	X			
	Mineral wastes remaining in process tanks, vessels and piping				X
	Fibreglass insulation, poly		X		
	Wood tanks and supports, handrails		X		
	Lab chemicals, sodium hydroxide, barrels of asbestos encapsulant, antifreeze, oils	X			