

Appendix E

**Polaris Mine Operations Contaminated Soil Remediation
Close Out Report: Former Fuel Bladder Storage Area**





Gartner Lee Limited

December 31, 2003

Mr. Bruce Donald
Teck Cominco Limited
Bag 2000
Kimberley, BC V1A 3E1

Dear Mr. Donald:

**Re: 23845 – Polaris Mine Operations Contaminated Soil Remediation
Close Out Report: Former Fuel Bladder Storage Area**

BACKGROUND

The former fuel bladder storage area (shown as Area 12 in Figure 1: *Contaminated Soils Remediation Progress Plan, December 31, 2003*) is located to the east of the south end of the airstrip. The fuel storage area was used during construction of the mine facility and was decommissioned in late 1981. Anecdotal information indicated that a spill incident occurred in this area late in 1981.

The Environmental Site Assessment (ESA) conducted in 1999 and 2000 found petroleum hydrocarbon contamination within the saturated interval of the active permafrost layer, generally from 0.4 m to 0.6 m below ground level to the depth of continuous permafrost at 0.8 m to 1.0 m. The contamination was found to extend south of the fuel bladder storage area and down a south-facing slope toward the tailings line, terminating at the top of the operational landfill. Figure BLA-12-1 shows the location and results of testpits from the ESA and the preliminary boundary of the targeted area for remediation.

The depth of hydrocarbon contamination identified during the ESA testpitting at the former fuel bladder storage area ranged between 0.4 m to 0.9 m below the surface. Testpitting down the slope and adjacent to the tailings line at the operational landfill indicated that the hydrocarbon contamination extended to a depth of 1.0 m.



METHODOLOGY

Delineation

The preliminary boundary of the remedial area, as identified in the ESA, was demarcated in the field with survey stakes and the surface elevation was surveyed by SNC Lavalin. To direct the field screening sampling of soil and excavation activities, a 25 m x 25 m sampling grid was established over the former fuel bladder storage area (upper bladder excavation). A 10 m x 10 m sampling grid was established on the south-facing slope, and at the operational landfill (lower bladder excavation).

Delineation of the hydrocarbon impacted area was accomplished through screening level sampling of the surface and subsurface material in the targeted area for remediation. GLL sampled the soil in accordance with standard GLL and TCL sampling procedures and protocols.

Frozen near-surface soils (depth of 0 to 30cm) were broken up using a D10 bulldozer with a ripper tooth. Soil samples for field screening were collected by hand and deposited into a sealable polyethylene bag. Ripping of soil within the targeted area for remediation commenced April 23, 2003. Eight discrete soil samples were collected in each 25 m x 25 m grid cell over the former fuel bladder storage area.

Commencing May 3, 2003, subsurface sampling was performed in boreholes at a nominal 10m spacing along the south-facing slope and at the operational landfill. Boreholes were advanced with an air rotary quarry drill. Boreholes were drilled to a depth up to 1.5 m. Composite soil samples were collected at 0.5 m intervals of the drill returns that accumulated at the mouth of the borehole. Following the collection of each sample the surface surrounding the borehole was cleared of the drill cuttings to expose fresh snow.

To delineate hydrocarbon contamination for excavation the visual appearance and odour of the soil was used, along with field screening measurements of the concentrations of organic vapours in the soil samples. The field screening measurements were obtained using a portable photo-ionization detector (PID) to measure the concentrations of organic vapours in the headspace of the sample bags. Subsets of the samples field screened on site were sent to the analytical laboratory, Aurora Laboratory Services Ltd. (ALS) of Vancouver, BC, to verify the presence and nature of the hydrocarbon compounds. Based on results of the field screening sampling, GLL modified-relocated the area to be remediated and excavation commenced.



Excavation

On April 28, 2003 excavation of the upper fuel bladder area commenced, based on revised boundaries provided by GLL to TCL and SNC Lavalin on April 25, 2003. The ripped soil within the excavation boundaries was pushed up into a stockpile using the D10 bulldozer and loaded out into trucks with an excavator. Initially, a swath approximately 10 m wide inside the excavation limits was removed with the bucket of an excavator. The upper bladder excavation was undertaken in five lifts. Approximately 30 cm thickness of soil was removed with each lift. Screening level sampling was undertaken at the base of each lift to re-define the remedial boundary for excavation.

Excavation limits for the lower fuel bladder area were provided to TCL and SNC Lavalin on May 8, 2003. Drill results indicated that the hydrocarbon contamination extended to a depth of 1.0 m. Excavation of the lower fuel bladder area was accomplished by the removal of the upper 1 m lift using the D10 bulldozer, prior to GLL undertaking additional field screening sampling, and directing the removal of discrete areas of residual elevated hydrocarbon contaminated soil.

The limits of the excavation are shown on Figure BLA-12-2. A volume of approximately 12,500 m³ was excavated from the former fuel bladder storage area. This material was disposed of in the underground mine workings in accordance with regulatory approvals.

Confirmatory Sampling

Soil samples were collected at the excavation limits and submitted to ALS for extractable petroleum hydrocarbons (EPH) and polycyclic aromatic hydrocarbons (PAH). Composite samples were collected from 25 m x 25 m areas of the floor of the excavation and over a length of 25 m on the wall of the excavation. Additional excavation was undertaken in areas that did not meet the soil quality remediation objectives (SQROs). Upon receipt of soil results that met the SQROs the final excavation limits were surveyed and the area backfilled to inhibit erosion.

ANALYTICAL RESULTS

Analytical laboratory results for Extractable Petroleum Hydrocarbons (EPH) and Polycyclic Aromatic Hydrocarbons (PAH) are summarized in Tables BLA-12-1 and BLA 12-2 respectively, along with the approved Polaris Mine SQROs for petroleum hydrocarbons. A total of fifty three (53) remediation confirmation soil samples were submitted for the former fuel bladder storage area and returned concentrations below the SQROs: twenty nine (29) composite floors, five (5) discrete floors, fifteen (15) composite walls, and four (4) QA/QC duplicate samples. The soil quality results and the lateral limits of the excavation are shown on Figure BLA-12-2.



All confirmatory soil sample results from the former fuel bladder storage area meet the SQROs for Polaris Mine.

Quality Assurance and Quality Control (QA/QC)

QA/QC measures associated with collecting and analysing soil were implemented during the remediation of the bladder area, including submission of blind duplicates to the analytical laboratory, analysis of analytical laboratory replicates, and comparison of analytical laboratory EPH results with the portable photoionization detector (PID) organic vapour headspace measurements.

Relative percent differences (RpDs) have been calculated and compiled in Table BLA-12-3 for the analytical laboratory duplicate results and the laboratory replicate results. All of the samples returned results below the practical quantitation limit in which case the RpD value has been identified as "na" (not available) in Table BLA-12-3.

CONCLUSION

Based on confirmatory sampling, consistent with good practice and the approved site specific sampling procedures and protocols, the remediation of the former fuel bladder storage area has been completed to meet the Polaris Mine remedial targets, as documented in the approved Polaris Mine Decommissioning and Remediation Plan, March 2001.

LIMITATIONS

This report has been prepared by Gartner Lee Limited and the information in this report is intended for the use of Teck Cominco Metals Limited during the decommissioning and reclamation program currently underway at the Polaris Mine Site. Any use which a third party makes of this report, or any reliance on or decisions made on the basis of the information in this report is the responsibility of such third parties. Gartner Lee Limited accepts no responsibility for damages, if any, suffered by the third party, based on the use of or reliance on any information contained in this report.

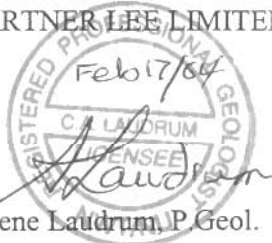
The scope of Gartner Lee Limited's work was limited to that described in this report. The confirmation of environmental conditions at the site of the remedial work is based on sampling at specific wall and floor locations within the excavation limits. Gartner Lee Limited has used judgement in the interpretation of the available information but subsurface physical and/or chemical characteristics may vary between or beyond sampling locations. Gartner Lee Limited is



not a guarantor of the environmental condition of the site but warrants only that its work was undertaken and its report prepared in a manner consistent with the level of skill and diligence normally exercised by competent environmental professionals practicing in the Nunavut Territory.

Yours very truly,

GARTNER LEE LIMITED

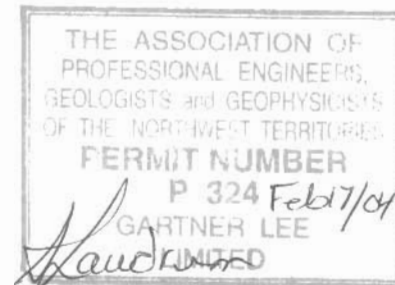


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AL:KT

ATTACHMENTS



Tables

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| Table BLA-12-2: | Former Fuel Bladder Storage Area Remediation Confirmation Soil Samples Polycyclic Aromatic Hydrocarbons (PAHs) |
| Table BLA-12-3: | Former Fuel Bladder Storage Area Quality Assurance and Quality Control Remediation Soil Samples |

Figures

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|------------------|---|
| Figure BLA-12-1: | Former Fuel Bladder Storage Area Conditions, Before Remediation (December 31, 2003) |
| Figure BLA-12-2: | Former Fuel Bladder Storage Area Conditions, After Remediation (December 31, 2003) |

Table BLA-12-1. Former Fuel Bladder Storage Area Remediation Confirmation Soil Samples – Hydrocarbons

Gartner Lee		Location		Bladder									
Parameter	Units	Sample ID	Date Sampled	Analytical Results									
			Field Screen (ppm) ^b	BLA-162-I-D	BLA-249-F-C	BLA-252-F-C	BLA-253-F-C	BLA-254-F-C	BLA-255-F-C	BLA-256-I-C	BLA-260-W-C		
				5/2/03	5/14/03	5/14/03	5/14/03	5/14/03	5/14/03	5/14/03	5/14/03		
				30	75	65	60	60	60	60	55		
Physical Tests													
Moisture	%	-		13.1	11.4	14.8	6.5	24.6	13.4	5.5	31		
Extractable Hydrocarbons													
EPH C ₁₀ -C ₁₉ ^c	mg/kg	1000 ^e		<200	617	621	385	<200	<200	913	<200		
EPH C ₁₉ -C ₃₂ ^c	mg/kg	1000 ^e		<200	<200	<200	<200	<200	<200	<200	219		
LEPH ^d	mg/kg	1000		<200	-	-	-	-	<200	-	-		
HEPH ^d	mg/kg	1000		<200	-	-	-	-	<200	-	-		

Associated ALS Analytics Files: T3179, S9893, S9892, S9797, S9214, S8818, S8240, S7847.

Notes:

Concentration exceeds the Soil Quality Remediation Objective (SQRO) for the Polaris Mine Site

" < " = less than analytical method detection limit.

" - " = no result for given parameter, or no guideline.

" na " = no field screening result .

a) The Soil Quality Remediation Objective for the Polaris Mine Site is based on the Yukon Territorial

Contaminated Sites Regulation (CSR) for Parkland Land Use .

b) Field screening measurements are based on the 'dry headspace' method using a combustible gas meter calibrated to

a hexane standard.


c) EPH stands for extractable petroleum hydrocarbon.

d) LEPH and HEPH stand for light and heavy extractable petroleum hydrocarbons.

e) LEPH/HEPH is determined by subtracting polycyclic aromatic hydrocarbons (PAH) from EPH, therefore use of the

EPH remediation objective is conservative.

Table BLA-12-1. Former Fuel Bladder Storage Area Remediation Confirmation Soil Samples - Hydrocarbons

<div></div> <div>Gartner Lee</div>		Location		Bladder							
		Sample ID	Date Sampled Field Screen (ppm) ^b	BLA-261-I-C	BLA-262-F-Q (duplicate of BLA-255-F-C)	BLA-263-I-Q (duplicate of BLA-256-I-C)	BLA-308-W-C	BLA-310-W-C	BLA-311-F-C	BLA-312-W-C	BLA-313-F-C
Parameter	Units	Polaris Mine SQROs ^a	Analytical Results								
Physical Tests											
Moisture	%	-	7.4	15.7	10.9	9.3	7.2	11.1	9.7	9.9	
Extractable Hydrocarbons											
EPH C ₁₀ -C ₁₉ ^c	mg/kg	1000 ^e	825	<200	788	633	<200	256	263	<200	
EPH C ₁₉ -C ₃₂ ^c	mg/kg	1000 ^e	<200	<200	<200	<200	<200	<200	<200	<200	
LEPH ^d	mg/kg	1000	-	<200	-	-	-	-	-	-	
HEPH ^d	mg/kg	1000	-	<200	-	-	-	-	-	-	

Associated ALS Analytics Files: T3179, S9893, S9892, S9797, S9214, S8818, S8240, S7847.

Notes:

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a) The Soil Quality Remediation Objective for the Polaris Mine Site is based on the Yukon Territorial Contaminated Sites Regulation (CSR) for Parkland Land Use.


b) Field screening measurements are based on the 'tiny headspace' method using a combustible gas meter calibrated to a hexane standard.

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Table BLA-12-1. Former Fuel Bladder Storage Area Remediation Confirmation Soil Samples - Hydrocarbons

<div>Gartner Lee</div>		Location	Bladder										
		Sample ID											
Parameter	Units	Date Sampled	Analytical Results										
		Field Screen (ppm) ^b	BLA-314-F-C	BLA-315-F-C	BLA-316-F-C	BLA-317-F-C	BLA-318-F-C	BLA-332-F-C	BLA-333-F-C	BLA-334-F-C			
Physical Tests													
Moisture	%	-	35	5/28/03	na	35	5/28/03	na	5/28/03	30	5	6/7/03	6/7/03
Extractable Hydrocarbons			9.4	10.4		8.9	11		12.7		8.3	11.3	13.5
	EPH C ₁₀ -C ₁₉ ^c	mg/kg	576	385	<200	<200	376		215		894	<200	<200
	EPH C ₁₉ -C ₃₂ ^c	mg/kg	<200	<200	<200	<200	<200		<200		<200	<200	<200
	LEPH ^d	mg/kg	-	-	<200	<200	-		-		-	-	-
	HEPH ^d	mg/kg	-	-	<200	<200	-		-		-	-	-

Associated ALS Analytics Files: T3179, S9893, S9892, S9797, S9214, S8818, S8240, S7847.

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Table BLA-12-1. Former Fuel Bladder Storage Area Remediation Confirmation Soil Samples - Hydrocarbons

 Gartner Lee	Location		Bladder							
	Sample ID	Date Sampled	BLA-336-F-C	BLA-338-F-C	BLA-339-F-C	BLA-341-W-C	BLA-342-F-C	BLA-343-F-C	BLA-344-F-C	BLA-345-W-C
Parameter	Units	Field Screen (ppm) ^b	10	0	0	0	0	24	0	0
Physical Tests			Analytical Results							
Moisture	%	-	11	7	9.9	5.6	6.2	9.2	9.9	6.2
Extractable Hydrocarbons										
EPH C ₁₀ -C ₁₉ ^c	mg/kg	1000 ^e	214	<200	<200	<200	<200	<200	296	<200
EPH C ₁₉ -C ₃₂ ^c	mg/kg	1000 ^e	<200	<200	<200	250	<200	<200	<200	<200
LEPH ^d	mg/kg	1000	-	-	-	-	-	-	-	-
HEPH ^d	mg/kg	1000	-	-	-	-	-	-	-	-

Associated ALS Analytics Files: T3179, S9893, S9892, S9797, S9214, S8818, S8240, S7847.

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EPH remediation objective is conservative.

Table BLA-12-1. Former Fuel Bladder Storage Area Remediation Confirmation Soil Samples - Hydrocarbons

Gartner Lee		Location	Bladder							
Parameter	Units	Sample ID	BLA-346-W-C	BLA-348-W-C	BLA-349-W-C	BLA-350-W-C	BLA-351-W-C	BLA-357-F-D	BLA-358-F-D	BLA-359-F-C
Physical Tests		Date Sampled	6/14/03	6/14/03	6/14/03	6/14/03	6/14/03	6/25/03	6/25/03	6/25/03
Moisture	%	Field Screen (ppm) ^b	0	0	0	0	0	10	10	0
Extractable Hydrocarbons		Polaris Mine SQROs ^a	Analytical Results							
EPH C ₁₀ -C ₁₉ ^c	mg/kg	1000 ^e	10	7.7	7.3	8.1	9	11.7	6.5	7.8
EPH C ₁₉ -C ₃₂ ^c	mg/kg	1000 ^e	<200	<200	<200	<200	<200	<200	<200	<200
LEPH ^d	mg/kg	1000	<200	<200	<200	<200	<200	<200	<200	<200
HEPH ^d	mg/kg	1000	-	<200	-	-	-	-	-	-

Associated ALS Analytics Files: T3179, S9893, S9892, S9797, S9214, S8818, S8240, S7847.

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b) Field screening measurements are based on the 'dry headspace' method using a combustible gas meter calibrated to

a hexane standard.


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EPH remediation objective is conservative.

Table BLA-12-1. Former Fuel Bladder Storage Area Remediation Confirmation Soil Samples - Hydrocarbons

<div></div> <div>Gartner Lee</div>		Location	Bladder									
			Sample ID	Date Sampled	Field Screen (ppm) ^b	Analytical Results						
Parameter	Units	Polaris Mine SOROs ^a	BLA-360-F-C	BLA-361-F-D	BLA-362-F-D	BLA-363-F-Q (duplicate of BLA-361-F-D)	BLA-364-F-Q (duplicate of BLA-344-F-C)	BLA-374-F-C	BLA-375-W-C	BLA-376-F-C		
Physical Tests			6/25/03	6/25/03	6/25/03	6/25/03	6/25/03	6/28/03	6/28/03	6/28/03		
Moisture	%	-	25	5	25	na	na	30	25	25		
Extractable Hydrocarbons												
EPH C ₁₀ -C ₁₉ ^c	mg/kg	1000 ^e	748	<200	<200	<200	<200	<200	213	<200		
EPH C ₁₉ -C ₃₂ ^c	mg/kg	1000 ^e	<200	<200	<200	<200	<200	<200	<200	<200		
LEPH ^d	mg/kg	1000	-	-	-	-	-	<200	-	-		
HEPH ^d	mg/kg	1000	-	-	-	-	-	<200	-	-		

Associated ALS Analytics Files: T3179, S9893, S9892, S9797, S9214, S8818, S8240, S7847.

Notes:

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a) The Soil Quality Remediation Objective for the Polaris Mine Site is based on the Yukon Territorial Contaminated Sites Regulation (CSR) for Portland Land Use.

b) Field screening measurements are based on the 'dry headspace' method using a combustible gas meter calibrated to a hexane standard.

c) EPH stands for extractable petroleum hydrocarbon.

d) LEPH and HEPH stand for light and heavy extractable petroleum hydrocarbons.

e) LEPH/HEPH is determined by subtracting polycyclic aromatic hydrocarbons (PAH) from EPH, therefore use of the EPH remediation objective is conservative.

Table BLA-12-1. Former Fuel Bladder Storage Area Remediation Confirmation Soil Samples - Hydrocarbons

Gartner Lee		Location	Bladder					
Parameter	Units	Sample ID	BLA-377-F-C	BLA-378-W-C	BLA-379-F-C	BLA-380-F-D	BLA-381-W-C	BLA-382-W-C
Physical Tests		Date Sampled	6/28/03	6/28/03	8/22/03	8/22/03	8/22/03	8/22/03
Moisture	%	Field Screen (ppm) ^b	25	10	10	10	15	10
		Polaris Mine SQROs ^a	Analytical Results					
Extractable Hydrocarbons								
EPH C ₁₀ -C ₁₉ ^c	mg/kg	1000 ^e	<200	<200	<200	<200	443	<200
EPH C ₁₉ -C ₃₂ ^c	mg/kg	1000 ^e	<200	221	232	<200	<200	<200
LEPH ^d	mg/kg	1000	-	-	-	-	-	-
HEPH ^d	mg/kg	1000	-	-	-	-	-	-

Associated ALS Analytics Files: T3179, S9893, S9892, S9797, S9214, S8818, S8240, S7847.

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e) LEPH/HEPH is determined by subtracting polycyclic aromatic hydrocarbons (PAH) from EPH, therefore use of the EPH remediation objective is conservative.

Table BLA-12-2. Former Fuel Bladder Storage Area Remediation Confirmation Soil Samples - Polycyclic Aromatic Hydrocarbons (PAHs)


<div></div> <div>Gartner Lee</div>		Polaris Mine	Location						Bladder			
			Remediation Objectives	ALS Sample ID Date Sampled	ALS Sample ID				BLA-316-F-C	BLA-348-W-C	BLA-374-F-C	
					BLA-162-I-D	BLA-255-F-C	BLA-262-F-Q (duplicate of BLA-255-F-C)					
Parameter	CEQG ^b	Units	Analytical Results									
Polycyclic Aromatic Hydrocarbons												
Acenaphthene	-	mg/kg	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	
Acenaphthylene	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Anthracene	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benz(a)anthracene	1 ^c	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(a)pyrene	0.7	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(b)fluoranthene	1 ^c	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(g,h,i)perylene	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(k)fluoranthene	1 ^c	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Chrysene	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Dibenz(a,h)anthracene	1 ^c	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluoranthene	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluorene	-	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Indeno(1,2,3,-c,d)pyrene	1 ^c	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Naphthalene	0.6	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Phenanthrene	5 ^c	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Pyrene	10 ^c	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	

Associated ALS Analytics Files: T3179, S9893, S9892, S9797, S9214, S8818, S8240, S7847.

Notes:

- "<" = less than analytical method detection limit.
- CEQG = Canadian Environmental Quality Guidelines for Parkland Land Use.
- This interim remediation criterion (CCME 1991) was put in place prior to the development of the soil protocol (CCME 1996). The criterion should be used until superseded by a full guideline.

Table BLA-12-3. Former Fuel Bladder Storage Area Quality Assurance and Quality Control Remediation Soil Samples

 Gartner Lee	Parameter		EPH C ₁₀ -C ₁₉		EPH C ₁₉ -C ₃₂		EPH C ₁₀ -C ₁₉			EPH C ₁₉ -C ₃₂			
	Relative Percent Difference (RpD) ^a	Duplicate ID	MDL	PQL ^b	MDL	PQL ^b	Sample EPH C ₁₀ -C ₁₉	Duplicate EPH C ₁₀ -C ₁₉	RpD ^a (%)	Sample EPH C ₁₉ -C ₃₂	Duplicate EPH C ₁₉ -C ₃₂	RpD ^a (%)	
Analytical Laboratory Duplicates													
BLA-255-F-C			200	1000	200	1000	<200	<200	na	<200	<200	na	
BLA-256-I-C		BLA-262-F-Q	200	1000	200	1000	913	<200	na	<200	<200	na	
BLA-361-F-D		BLA-263-I-Q	200	1000	200	1000	100	<200	na	<200	<200	na	
BLA-344-F-C		BLA-363-F-Q	200	1000	200	1000	296	<200	na	<200	<200	na	
		BLA-364-F-Q	200	1000	200	1000							
Analytical Laboratory Replicates													
BLA-314-F-C			200	1000	200	1000	576	524	na	<200	<200	na	
BLA-379-F-C		QC# 337956	200	1000	200	1000	<200	<200	na	232.0	223.0	na	
		QC# 351478											

Notes:

Bold RpD value is greater than or equal to 50% and the concentration of both samples are greater than the practical quantitation limit (PQL).

"na" = RpD value is not applicable because one or both results are less than the practical quantitation limit (PQL).

"." = no result for given parameter.

"<" = less than analytical method detection limit.

a) Relative Percent Difference = $RpD = (Difference/Average) \cdot 100$.

b) Practical Quantitation Limit (PQL) = $5 \cdot \text{Method Detection Limit (MDL)}$.

Appendix F

**Polaris Mine Operations Contaminated Soil Remediation
Close Out Report: Old Crusher Area**





Gartner Lee Limited

December 31, 2003

Mr. Bruce Donald
Teck Cominco Limited
Bag 2000
Kimberley, BC V1A 3E1

Dear Mr. Donald:

**Re: 23305 – Polaris Mine Operations Contaminated Soil Remediation
Close Out Report: Old Crusher Area**

BACKGROUND

The area known as the old crusher (shown as area 15 on Figure 1: *Contaminated Soils Remediation Program Plan, December 31, 2003*) was the site of the Cedar Rapids Crusher and was located at 1840E and 1270N on the mine grid. The Crusher was used to crush and process lead ore. This structure was in operation for only three years after which, the ore was shipped to the barge for direct processing. Contamination in this area was assumed to be due to wind dispersion.

METHODOLOGY

Delineation

A 20 m x 20 m sampling grid was established in the area of suspected metals contamination identified in the Environmental Site Assessment (ESA) as shown in Figure CR-15-1.

Delineation of the metals impacted area was accomplished through screening level sampling of the surface material within the sampling grid. These samples were collected by hand in accordance with standard GLL and TCL sampling procedures. On August 3, 2003, a total of 62 soil samples were collected from the area covered by the grid. Soil samples from the initial field screening were prepared and analyzed with the Niton XRF. Based on the results of screening sampling GLL modified the area to be remediated to include two zones of contamination. One sample (CR-48-I-D) collected outside of these two areas returned field screening results of lead at 1,554 mg/kg and zinc at 2,360 mg/kg. Given these relatively low field



screening results, remediation at this sample point, shown on Figure CR-15-1, was not considered necessary.

Excavation

The initial screening of the field results indicated that there were two zones of contamination. These two areas were demarcated in the field and excavated to a depth of 0.5 m. Samples were collected from the floors and walls of the excavated area on August 10, 2003. All of the samples collected after the excavation met the soil quality remediation objectives (SQROs).

The limits of the excavation together with the sample locations are located in Figure CR-15-2. The soil excavated was disposed of in the underground mine workings in accordance with regulatory approvals.

ANALYTICAL RESULTS

Analytical laboratory results for the former crusher are presented in Table CR-15-1. A total of 14 samples were submitted for this area: two (2) discrete floor, eight (8) composite walls, three (3) composite floors, and one (1) duplicate. All samples submitted returned concentrations below the Polaris Mine SQROs.

Quality Assurance and Quality Control (QA/QC)

QA/QC was performed on one analytical laboratory replicate, one analytical laboratory duplicate, and four on-site field screening duplicates. Relative percent differences (RpDs) for the duplicate and replicate results have been calculated and summarized in Table CR-15-2 providing confidence that the SQROs have been met.

The RpDs generated from the laboratory replicate results are below the site specific remediation protocol of 50% and therefore acceptable.

The RpD generated from the laboratory duplicate zinc results is above 50%, however both the sample and duplicate results were well below the SQROs, providing confidence that the confirmatory sample result is acceptable in showing the zinc concentration below the remediation target. The variance between the sample and its duplicate is likely a result of sample inhomogeneity caused by the presence of coarse ore fragments.



One on-site field screening sample and duplicate returned lead and zinc RpD's above 50%. However, the area represented by those samples was further excavated until the SQROs were met.

CONCLUSIONS

Based on confirmatory sampling, consistent with good practice and the approved site specific sampling procedures and protocols, the remediation of the old crusher area has been completed to meet the Polaris Mine remedial targets as documented in the approved Polaris Mine Decommissioning and Remediation Plan, March 2001.

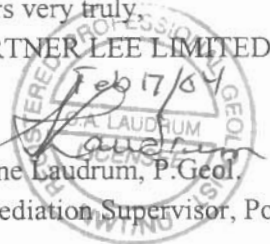
LIMITATIONS


This report has been prepared by Gartner Lee Limited and the information in this report is intended for the use of Teck Cominco Metals Limited during the decommissioning and reclamation program currently underway at the Polaris Mine Site. Any use which a third party makes of this report, or any reliance on or decisions made on the basis of the information in this report is the responsibility of such third parties. Gartner Lee Limited accepts no responsibility for damages, if any, suffered by the third party, based on the use of or reliance on any information contained in this report.

The scope of Gartner Lee Limited's work was limited to that described in this report. The confirmation of environmental conditions at the site of the remedial work is based on sampling at specific wall and floor locations within the excavation limits. Gartner Lee Limited has used judgement in the interpretation of the available information but subsurface physical and/or chemical characteristics may vary between or beyond sampling locations. Gartner Lee Limited is not a guarantor of the environmental condition of the site but warrants only that its work was undertaken and its report prepared in a manner consistent with the level of skill and diligence normally exercised by competent environmental professionals practicing in the Nunavut Territory.

Yours very truly,

GARTNER LEE LIMITED


Arlene Laudrum, P. Geol.
Remediation Supervisor, Polaris Mine Project


per
Brenda Bolton, GIT
Field Scientist



ATTACHMENTS

Tables

- Table CR-15-1: Old Crusher Area Remediation Confirmation Soil Samples – Metals
Table CR-15-2: Old Crusher Area Quality Assurance and Quality Control Remediation Soil Samples

Figures

- Figure CR-15-1: Old Crusher Area Conditions Before Remediation (December 31, 2003)
Figure CR-15-2: Old Crusher Area Conditions After Remediation (December 31, 2003)

