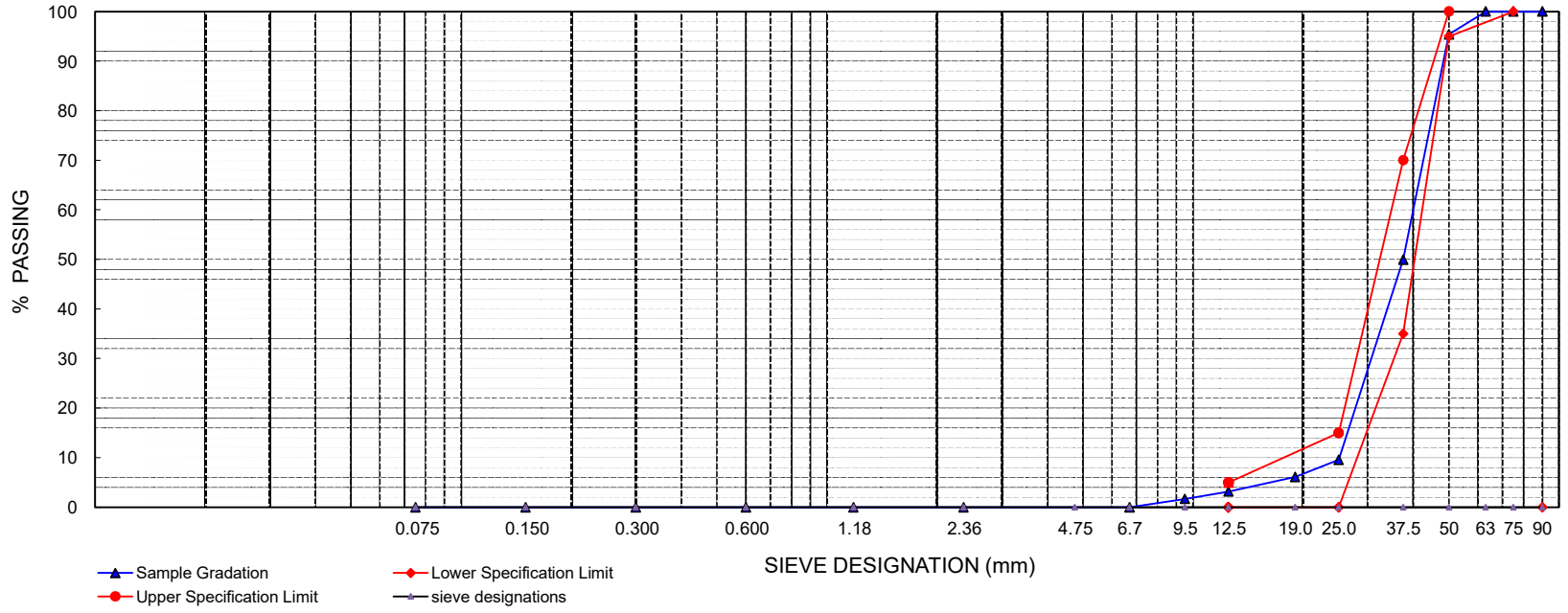
SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE
ASTM C136

Enclosure: 2
Report Date: 26 October 2018
Project No.: TB152049

Client: Hatch Ltd.
Sample Source: Diabase 1 & 2
Date Sampled: September 2018
Sampled by: Client
Sample Type: Rail Ballast Aggregate, Type 25 Fill
Specification: Section 2.2.12

Lab No: S347-18
Date Received: 04 October 2018
Date Tested: 19 October 2018
Lab Technician: KH

SIEVE SIZES (mm)	100	90.0	75.0	63	50	37.5	25.0	19	12.5	9.5	4.75	2.36	1.18	0.600	0.300	0.150	0.075
SPECIFICATIONS	100.0	100.0	100.0	100.0	95-100	35-70	0-15	-	0-5	-	-	-	-	-	-	-	-
% PASSING	100.0	100.0	100.0	100.0	95.4	49.9	9.5	6.1	3.1	1.7	0.0	-	-	-	-	-	-



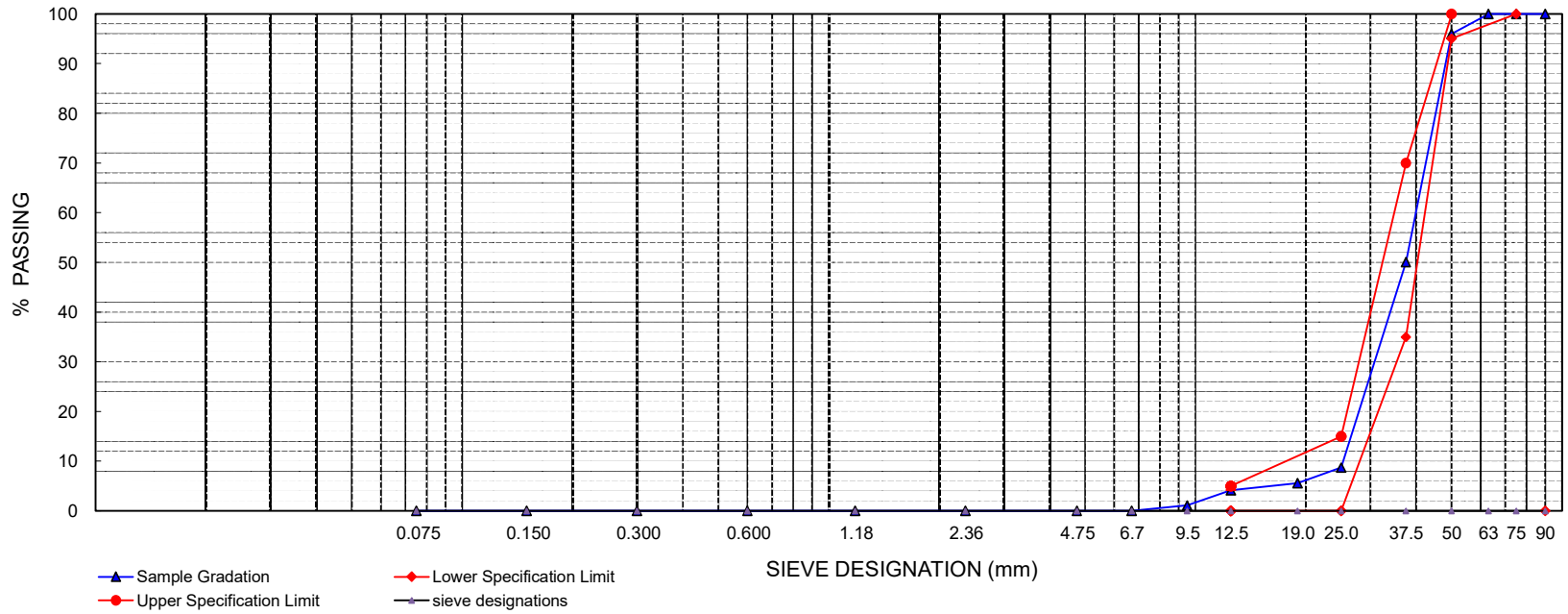
SIEVE ANALYSIS OF FINE AND COARSE AGGREGATE
ASTM C136

Enclosure: 3
Report Date: 26 October 2018
Project No.: TB152049

Client: Hatch Ltd.
Sample Source: Q1 1 & 2
Date Sampled: September 2018
Sampled by: Client
Sample Type: Rail Ballast Aggregate, Type 25 Fill
Specification: Section 2.2.12

Lab No: S348-18
Date Received: 04 October 2018
Date Tested: 19 October 2018
Lab Technician: KH

SIEVE SIZES (mm)	100	90.0	75.0	63	50	37.5	25.0	19	12.5	9.5	4.75	2.36	1.18	0.600	0.300	0.150	0.075
SPECIFICATIONS	100.0	100.0	100.0	100.0	95-100	35-70	0-15	-	0-5	-	-	-	-	-	-	-	-
% PASSING	100.0	100.0	100.0	100.0	96.0	50.1	8.7	5.6	4.1	1.1	0.0	-	-	-	-	-	-



Appendix C

Rock Strength Criteria

List of Abbreviations and Terms Used in the Borehole Reports

(Sheet 1)

General

Elevations
Elevations are referenced to datum indicated.

Depth
All depths are given in meters (feet) measured from the ground surface unless otherwise noted.

Sample Recovery
Indicates the length retained in millimeters (inches) in a split spoon sampler or percentage recovery of sample retained in the core barrel sampler.

Sample Number
Samples are numbered consecutively in the order in which they were obtained in the borehole.

Sampler Size
Dimension is in millimetres and refers to the outside diameter of the sampler.

Sample Type
The first letter describes the sampling method and the second, the shipping container.

Sampling Method

A – Split Tube	E – Auger
B – Thin Wall Tube	F – Wash
C – Piston Sampler	G – Shovel Grab Sample
D – Core Barrel	K – Slotted Sampler

Shipping Container

N – Insert (split spoon)	S – Plastic Bag
O – Tube	U – Wooden Box
P – Water Content Tin	X – Plastic & PVC Sleeve (Sonic)
Q – Jar	Y – Core Box
R – Cloth Bag	Z – Discarded

Abbreviations
N/A – Not applicable
N/E – Not encountered
N/O – Not observed

Soil

Soil Description, Label and Symbol
Soil description under the "Description" column conforms generally, but not rigorously , to the Unified Soils Classification System. For a given soil unit, defined by depth boundaries, the descriptive text constitutes the definitive soil unit description and takes precedence over both the brief label and the symbol used to graphically represent the soil unit.

Grain Size

Clay		<0.002 mm
Silt	0.002 –	0.075 mm
Sand	0.075 –	4.75 mm
Gravel	4.75 –	75 mm
Cobbles	75 –	300 mm
Boulder		>300 mm

Relative Quantities

Term	*Example*	*(%)*
Trace	Trace sand	1 – 10
Some	Some sand	10 – 20
With	With Sand	20 – 35
And	And sand	>35
Noun	Sand	>50

Standard Penetration Test (SPT)
The test is carried out in accordance with ASTM D-1586 and the 'N' value corresponds to the sum of the number of blows required by a 63.5-kg (140-lb) hammer, dropped 760 mm (30 in.), to drive a 50-mm (2-in.) diameter split tube sampler the second and third 150 mm (6 in.) of penetration.

Density (Granular Soils)

	N(SPT)
Very loose	0 – 4
Loose	4 – 10
Compact	10 – 30
Dense	30 – 50
Very dense	>50

Consistency (Cohesive Soils)

	N(SPT)
Very soft	<2
Soft	2 – 4
Firm	4 – 8
Stiff	8 – 15
Very stiff	15 – 30
Hard	>30

Plasticity/Compressibility

		Liquid Limit (%)
Low plasticity clays	Low compressibility silts	<30
Medium plasticity clays	Medium compressibility silts	30 – 50
High plasticity clays	High compressibility silts	>50

Dilatancy
None - No visible change.
Slow - Water appears slowly on surface of specimen during shaking and does not disappear or disappears slowly upon squeezing.
Rapid - Water appears quickly on the surface of specimen during shaking and disappears quickly upon squeezing.

Sensitivity

Insensitive	<2
Low	2 – 4
Medium	4 – 8
High	8 – 16
Quick	>16

List of Abbreviations and Terms Used in the Borehole Reports

(Sheet 2)

Rock

Core Recovery
Sum of lengths of rock core recovered from a core run, divided by the length of the core run and expressed as a percentage.

RQD (Rock Quality Designation)
Sum of lengths of hard, sound pieces of rock core equal to or greater than 100 mm from a core run, divided by the length of the core run and expressed as a percentage. Measured along centerline of core. Core fractured by drilling is considered intact. RQD normally quoted for N-size core.

RQD (%) Rock Quality

90	-	100	Excellent
75	-	90	Good
50	-	75	Fair
25	-	50	Poor
0	-	25	Very Poor

Grain Size

Term	***Grain Size***
Very coarse-grained	>60 mm
Coarse-grained	2 mm - 60 mm
Medium-grained	60 μm - 2 mm
Fine-grained	2 μm - 60 μm
Very fine-grained	< 2 μm

Bedding

Term	***Bed Thickness***			
Very thickly bedded		>2 m		>6.50 ft
Thickly bedded	600 mm -	2 m	2.00 -	6.50 ft
Medium bedded	200 mm -	600 mm	0.65 -	2.00 ft
Thinly bedded	60 mm -	200 mm	0.20 -	0.65 ft
Very thinly bedded	20 mm -	60 mm	0.06 -	0.20 ft
Laminated	6 mm -	20 mm	0.02 -	0.06 ft
Thinly laminated		<6 mm		<0.02 ft

Discontinuity Frequency
Expressed as the number of discontinuities per metre or discontinuities per foot. Excludes drill-induced fractures and fragmented zones.

Discontinuity Spacing

Term	***Average Spacing***			
Extremely widely spaced		>6 m		>20.00 ft
Very widely spaced	2 m -	6 m	6.50 -	20.00 ft
Widely spaced	600 mm -	2 m	2.00 -	6.50 ft
Moderately spaced	200 mm -	600 mm	0.65 -	2.00 ft
Closely spaced	60 mm -	200 mm	0.20 -	0.65 ft
Very closely spaced	20 mm -	60 mm	0.06 -	0.20 ft
Extremely closely spaced		<20 mm		<0.06 ft

Note: Excludes drill-induced fractures and fragmented rock.

Broken Zone
Zone of full diameter core of very low RQD which may include some drill-induced fractures.

Fragmented Zone
Zone where core is less than full diameter and RQD = 0.

Strength

Term	***Description***	***Unconfined Compressive Strength***	
		(MPa)	***(psi)***
Extremely weak rock	Indented by thumbnail	0.25 – 1.0	36 – 145
Very weak	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife	1.0 – 5.0	145 – 725
Weak rock	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer	5.0 – 25	725 – 3625
Medium strong rock	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with single firm blow of geological hammer to facture it	25 – 50	3625 –7250
Strong rock	Specimen requires more than one blow of geological hammer to fracture it	50 – 100	7250 – 14500
Very strong rock	Specimen requires many blows of geological hammer to fracture it	100 – 250	14500 – 36250
Extremely strong rock	Specimen can only be chipped with geological hammer	>250	>36250

Weathering

Term	***Description***
Fresh	No Visible sign of rock material weathering
Faintly weathered	Discoloration on major discontinuity surfaces.
Slightly weathered	Discoloration indicates weathering of rock material and discontinuity surfaces. All the rock material may be discolored by weathering and may be somewhat weaker than in its fresh condition.
Moderately weathered	Less than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a continuous framework or as corestones.
Highly weathered	More than half of the rock material is decomposed and/or disintegrated to a soil. Fresh or discolored rock is present either as a discontinuous framework or as corestones.
Completely weathered	All rock material is decomposed and/or disintegrated to a soil. The original mass structure is still largely intact.
Residual soil	All rock material is converted to soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soil has not been significantly transported.

Appendix D

Job Hazard Analysis

Job Hazard Analysis Form

PROJECT/TASK: 2018 Quarry Sampling Program		Department: Projects				JOB No.: 353004			
SUPERVISOR:		LOCATION:				DATE:			
JOB STEP Break the job into steps. Listing work which may be hazardous.	HAZARDS List the hazard or type of harm identified with each step.	Inherent			CONTROL MEASURE List the necessary control measures to be followed to eliminate/reduce the identified hazards.	Residual			ACTION Person who will ensure this happens
		Consequence	Likelihood	Risk Ranking		Consequence	Likelihood	Risk Ranking	Bruno Lavalée
1. Pre-job JHA Review.	Missing critical items on the JHA that can lead to an incident	3	2	5	Conduct a pre-job JHA review with Safety and critical team members. All workers will have the opportunity to identify changes needed. Any changes will be added to this document	1	1	2	Marlon Coakley/ Michael Yang/ Darren Gardiner
2. Workers to complete FLRA card in the field at location prior to starting work.	Additional hazards in the area that may not have been identified on the JHA may pose additional danger to the health and safety of workers, the environment and property	3	3	6	Look at immediate work area for hazards that may exist, not identified on the JHA. Have other workers in the group sign off on the FLHA	1	1	2	All workers

3. Access points to quarry locations that are off road	BIM does not want any tundra being disturbed any more than is necessary. Risk of Polar Bear encounters when outside of trucks Long distances to walk Exposure to cold White Out conditions	3	3	6	Polar bear monitor to travel with the group The use of snow mobiles is to be used once enough snow is present. Proper warm winter wear to be used Sat phones and digital radio use. Buddy system is important to verify presence of frost bite or other cold related concerns. Notify BIM ERT crew is working in this area	1	1	2	All workers
4. Refueling of equipment	Fuel spills Regulatory or social impacts Spills into water bodies	3	2	5	Use of duck ponds with any refueling Have spill cleanup on hand to handle more than a potential spill No refueling within 31 m of any high water mark	3	1	4	All workers
5. Extreme weather exposure when working outdoors or driving to and from location to road.	Stranded work crew in white out conditions Cold emergencies or cold injuries Mechanical equipment failure	3	3	6	BIM has a procedure that is designed for white out conditions – it would be announced on the digital radio (TOTE DIGITAL TOTE ROAD / D-10) Crew follow tote road notices. Changes will be communicated on digital and analog to take survival bags with them Crews to radio from Hatch leads Buddy system to watch out for fellow workers who may not realize they are developing frost bite. Workers to dress in arctic gear and layered clothing Proper PPE required . Equipment check list	2	1	3	All workers Marlon Coakley/ Michael Yang / Darren Gardiner

					Workers to take warm up breaks to stay warm and alert. At toolbox review weather forecast with crew and prepare accordingly				
6. Waste management	Risk of wildlife encounters due to improper waste controls Regulatory non compliance	3	2	5	Crews will collect waste daily and transport it back to camp Crews will follow BIM waste management guidelines No placing or storing of food in the back of pickup trucks	1	1	2	Hatch Geotech
7. Flying debris	Work crews can be struck by flying debris (pieces of rock) when sampling	3	3	6	Use of proper PPE when quarry sampling (Safety glasses/goggles, hard hat, gloves, safety boots) Keep 2 m away from the personnel conducting the quarry sampling	1	1	2	Hatch Geotech, Polar bear monitor
8. Ground vegetation and cultural sensitive areas	Risk of causing damage to archeological areas Destroying vegetation Sensitive wildlife and marine life areas Regulatory and reputation damage	3	3	6	Crews have been educated to watch for staked areas that are around identified archeological sites. Crews to assess each off road area before entering to ensure proper path with the least amount of impact. Crews are not to build or alter any inuksuk's or other rock formations on the tundra Permits will be required for the work Any unforeseen changes will need to be evaluated by the EHS tech and may require a work stoppage	2	2	4	Hatch Geotech

					Access to quarry locations will be by foot or by snow mobile				
9. Working around personating using hand tools	Entanglement injuries, Workers being struck by hand tools (pick axe, sledge hammer, pry bar, etc.)	3	3	6	Be aware of other personnel in the sampling area, communicate that hand tools will be used No loose clothing or drawstrings that can get pulled by the hand tools Keep 2 m away from the personnel conducting the quarry sampling	3	1	4	Hatch Geotech, Polar Bear monitor
10. Vehicle driving / mobile equipment	Ore haulers and light vehicles on the tote road, slippery road conditions and blind spots, rough terrain	3	4	7	Use tote road call out requirements Tote road and light vehicle training Follow all BIM tote road rules Be constantly aware of road conditions Drive according to road and weather conditions Vehicle pre use inspection to be performed before each use Defensive driving training Use of spotters when backing up equipment Estops to be in good working order and easily accessible	1	1	2	Hatch Geotech, EHS techs

11. Rough terrain, steep slopes and unstable formations	Risk of tripping or falling	3	3	6	FLRAs completed daily Plan route to be followed for access to quarry locations Perform site specific hazard assessments before entering the areas	2	1	3	Hatch Geotech EHS techs
12. Inadequate communications	Crew unable to gain assistance in emergency situation Crews not alerted to tote road changes, code ones or white out conditions	3	3	6	Crews are required to have : • Digital radios (Tote Road Analog and Tote Road Digital) • Monitor Tote Rd Digital at all times Use call-in system at pre-arranged times, to confirm communication system is working and crew is safe. Implement rescue plan if communication call-in/call-out failure for more than 2 hours	1	1	2	Hatch Geotech EHS techs
13. Remote Injury	Crew member injured.	3	3	6	Perform site first aid If serious injury requiring immediate evacuation declare Code 1 Emergency for EHS response	2	2	3	Hatch BIM EHS
14. Wildlife encounters	Foxes, raven and polar bears, wolves	3	2	5	Wildlife awareness training is provided A polar bear monitor is assigned to the crew Waste management guideline to be followed No feeding of wildlife Secure all small tools and PPE as foxes may carry away small articles from the site.	1	1	2	Hatch Geotech EHS techs

15. Manual lifting	Pinch point, back injuries, muscle and joint sprains and strains, Dropping load	2	3	5	Work in pairs, good FLRA reviews, Work with a buddy on heavy or awkward lifts Use proper lifting techniques Gloves to be worn Signal if load is slipping	1	1	2	Hatch Geotech EHS techs
16. Walking	Slips and trip injuries	3	2	5	Training provided for slip and trip hazards, place cards and placards around hazards, Daily site assessments conducted to identify hazards. Traction aids at all times to used.	1	1	2	Hatch Geotech Polar Bear monitor EHS techs
17. Falling objects	Potential exists for falling rocks from the quarry locations	3	2	5	Perform good FLRA Survey quarry locations for areas of increased risk of falling rocks to avoid Periodically survey the area when sampling for increased rockfall risk Wear proper PPE (hard hat)	1	1	2	Hatch Geotech EHS techs
18. Housekeeping	Potential exists for poor housekeeping causing slip/trips and other hazards	3	2	5	Daily site assessments and toolbox meetings by site supervisors BIM EHS techs to perform daily inspections				Hatch Geotech EHS techs
19. Fatigue	Potential exists for crew fatigue	2	2	4	Fit for duty confirmation required for all employees, daily FLRA reviews and BLY 3in1 reporting Micro breaks to stretch Proper rest during off shift period	1	1	2	Hatch Geotech EHS techs

20. Crossing Creeks Lakes and River Beds	Risk of cold water immersion Falling through ice or into water Potential ground erosion Slip Trip Falls				Maps will be consulted to identify areas with large bodies of water. These areas will be marked out in the GPS and routes will be planned to avoid these areas Workers will stay 3 meters from water's edge where possible If a risk of deep water, PFDs to be worn when in the 3 meter boundary An assessment of the ice condition will be required before accessing the ice surface. The ice assessment will completed by drilling through the ice to determine ice thickness. An assessment is required prior to crossing any dry or frozen creek bed Follow the Environmental Working On Ice Procedure Proper PPE Emergency shelter				Hatch Geotech EHS techs
21. Travel to remote areas on Snow Mobiles / Side By Side Can AM bikes	Collison with other Snow Mobiles / Can Am Side by side bikes or mobile equipment Steep Slopes, Uneven ground conditions, open water Equipment failure				Proper PPE BIM Training required Review of Air Photos .Review maps and Drawings. Operate equipment at a speed according to conditions and allow time to assess conditions ahead Ensure that emergency back up equipment is in place for rescue Equipment check list completed on a daily basis.				Marlon Coakley/ Michael Yang / Darren Gardiner

22. Rescue Plan	Rough terrain Further injuries to casualty during transit. Snow storm, white out conditions. Darkness Unmarked trail to/from remote work area.				The snowmobile, or side-by-side, pulling the qamutik (sled) for remote locations. When an incident in this nature has occurred, the Geotech must call a Code 1. MRT will be dispatched to the tote road access point. MRT will transport the casualty by ambulance after the casualty has been transported to the rendezvous point. All scenarios mentioned above must have a casualty attendant in communication with equipment operator. While in transition with casualty the snowmobile will have to travel at slow speeds with respect to the rough terrain. Access trail will be marked with delineators and way points stored on GPS. Have experience snowmobile operator and GPs user available to operate the snowmobile. In the event where the casualty needs to be stabilized, the medic will be required to be brought to site. always follow delineators and GPS coordinates, because tracks from track unit are unreliable, If all options mentioned above the Emergency Management Team Lead will call the Nunavut Rescue Unit, insert contact number here.				Marlon Coakley/ Michael Yag / Darren Gardiner

					Emergency Measures 24 Hour TOLL FREE **1-800-693-1666** **Emergency Services Response 24 Hours** **1-867-979-6262** Visibility (whiteout conditions) will hinder rescue time, rescuers will have to wait out the storm, or until the whiteout conditions have subsided.				

Comments:

Score	CONSEQUENCE		
	People	Plant	Environment
5 – Very High/ Catastrophic	Multiple Fatalities.	Greater than $10 Million Loss	Catastrophe, destruction of sensitive environment, worldwide attention. Likely EPA prosecution. More than 30 days delay.
4 – High/ Major	Fatality or Permanent Disabilities.	$1 Million to $10 Million Loss	Disaster, high levels of media attention, high cost of clean-up. Offsite environmental harm; more than 10 days delay.
3 – Moderate	Major Injuries – Incapacitations or requiring time of work.	$100 Thousand to $1 Million Loss	Major spills, onsite release, substantial environmental nuisance, more than 1day delay. (Leads to an additional resources call out i.e. SES).
2 – Low/ Minor	Significant Injuries – Medical Treatments, non-permanent injury.	$10 Thousand to $100 Thousand Loss	Significant spills. (Leads to a call out of Site Emergency Response Group).
1 – Very Low/ Insignificant	Minor Injuries – First Aid Treatments (cuts/bruises).	Less than $10 Thousand Loss	Low environmental impact. Minor Spills less than 80 Litres.

Score	LIKELIHOOD
5 – Almost Certain	The event is expected to occur in most circumstances. Likely to occur frequently - More than 1 per year.
4 – Likely/ Probable	The event will probably occur in most circumstances. Likely to occur several times – 1 per year.
3 – Moderate/ Occasional	The event should occur at some time. Likely to occur at some time – 1 per 5 years.
2 – Remote/ Unlikely	The event could occur at some time. Unlikely but possible. 1 per 10 years.
1 – Rare/ Very Unlikely	The event may occur only in exceptional circumstances. Assumed it may not be experienced. 1 per 100 years.

Job Hazard Analysis Attendees:

	Name	Signature	Date
Written by:	Michael Yang		Oct 15, 2018
Reviewed by:	Marlon Coakley Bruno Lavallee Darren Gardiner		Oct 15, 2018 Oct 15, 2018

Risk Rating = Consequence + Likelihood

Consequence	Risk Rating				
5	6	7	8	9	10
4	5	6	7	8	9
3	4	5	6	7	8
2	3	4	5	6	7
1	2	3	4	5	6
	1	2	3	4	5
	Likelihood				

Risk Rating - Definitions

Risk Rating	Definitions	*Action Required*
8 - 10	Intolerable	Task not to start till the risk is eliminated or reduced. Bring to the immediate attention of management. Formal assessment required. MUST reduce the risk as a matter of priority.
7	High	Bring to the immediate attention of management. Task not to start till the risk is eliminated or reduced. Further Assessment required. MUST reduce the risk as a matter of priority.
6	Significant Risk	Bring to the attention of supervision. Review risks and ensure that they are reduced to as low as reasonably practicable. To be dealt with as soon as possible, preferably before the task commences. Introduce some form of hardware to control risk.
5	Moderate Risk	Needs to be controlled but not necessarily immediately, an action plan to control the risk should be drawn up. Review effectiveness of controls. Ensure responsibilities for control are specified.
2-4	Low Risk	If practical reduce the risk. Ensure personnel are competent to do the task. Manage by routing procedure. Monitor for change

A JHA considers a variety of activities/tasks involved in a job scope and analyses the key hazards (sources of harm) and their consequences (types of harm) eg. Sources of harm – lifting a heavy pipe - manual handling. Types of harm – Back strain.

Main Points – On how to write a JHA.

1. Define the task – what is to be done.
2. Review previous JHA if any – have we done it before?
3. Identify the steps – what is to be done.
4. Identify the hazards of each step.
5. Identify who or what could be harmed.
6. Give the task a risk rating – Consequence + Frequency
7. Develop solutions to eliminate or control hazards in each step.
8. Review the risk rating after the control system has been implemented.
9. If risk rating unacceptable review the solutions till risk rating acceptable.
10. Agree who will implement the control system.
11. Document the JHA and discuss with the relevant personnel.

Hierarchy of Hazard Management – Control Measures

These steps outline what should be planned for when deciding what control measures are to be put in place. Whenever possible the highest step should be used first and then progress down the list.

1. Eliminate the hazard.
2. Substitution.
3. Reducing the frequency of a hazardous task.
4. Enclosing the hazard.
5. Additional procedures.
6. Additional supervision.
7. Additional training.
8. Instructions / information.
9. Some personal protective equipment.

Worker / Visitor review	Signature
Dean Eckert	

Appendix E

Laboratory Certification

Canadian Council of Independent Laboratories

CERTIFICATE OF CONFORMANCE

AGGREGATE LABORATORY CERTIFICATION

This is to certify that

Hatch Geotechnical Laboratory

Located at:

Niagara Falls ON

Has met the Standardization and Interlaboratory Testing Requirements of the CCIL/OSSGA AGGREGATE LABORATORY CERTIFICATION PROGRAM and has qualified under the following categories and test methods:

AGGREGATE QUALITY CONTROL LABORATORY (TYPE C)

LS-600/C-702; LS-601/C-117; LS-602/C-136; LS-607; LS-608; LS-621

AGGREGATE PHYSICAL PROPERTY LABORATORY (TYPE D)

LS-706/D698; LS-702/AASHTO T88; LS-703,704/D4318; LS-705/D854; LS-709/D2434

GIB MCINTEE, P. ENG.
CHAIRMAN, CERTIFICATION PROGRAM ADMINISTRATION COMMITTEE

May 1, 2018 - April 30, 2019

Date

GORDON H. LEAMAN, P. ENG.
PRESIDENT

Canadian Association for Laboratory Accreditation Inc.

CALA

Certificate of Accreditation

SGS Environmental Services
SGS Canada Inc.
185 Concession Street
Lakefield, Ontario

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

CANADIAN ASSOCIATION FOR LABORATORY ACCREDITATION INC.
CALA

Accreditation No.: A1999
Issued On: September 25, 2018
Accreditation Date: February 2, 2005
Expiry Date: March 25, 2021

ilac-MRA CALA

Andrew M. Adams
President & CEO

CCIL

Canadian Council of Independent Laboratories

CERTIFICATE OF CONFORMANCE

AGGREGATE LABORATORY CERTIFICATION

This is to certify that

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, A DIVISION OF WOOD CANADA LIMITED

Located at:

Burlington ON

Has met the Standardization and Interlaboratory Testing Requirements of the CCIL/OSSGA AGGREGATE LABORATORY CERTIFICATION PROGRAM and has qualified under the following categories and test methods:

AGGREGATE QUALITY CONTROL LABORATORY (TYPE C)

LS-600/C-702; LS-601/C-117; LS-602/C-136; LS-607; LS-608; LS-621

AGGREGATE PHYSICAL PROPERTY LABORATORY (TYPE D)

LS-412/CSA A23.2-2C,-4C; LS-603/C131&535; LS-604/C127; LS-605/C128; LS-606/C88; LS-609 (Petrographic Analysts: Martin Little, Amy McCulloch, Holly McNeill & Jesse Stickles); LS-610/C40; LS-613/D3042; LS-614/CSA A23.2-24A; LS-615/CSA A23.2-26A; LS-617; LS-618/D6928; LS-619/D7428; LS-620/CSA A23.2-25A; LS-706/D698; LS-702/AASHTO T88; LS-703,704/D4318; LS-705/D854; LS-709/D2434

Superpave Aggregate Consensus Properties

June 15, 2018 - April 30, 2019

GIB MCINTEE, P. ENG.
CHAIRMAN, CERTIFICATION PROGRAM ADMINISTRATION COMMITTEE

Date

GORDON H. LEAMAN, P. ENG.
PRESIDENT

Canadian Council of Independent Laboratories

CERTIFICATE OF QUALIFICATION

This is to certify that

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS
A DIVISION OF WOOD CANADA LIMITED

Located at

3450 Harvester Road, Suite 100
Burlington ON L7N 3W5

Has been examined and certified under the "QUALIFICATION CODE FOR CONCRETE TESTING LABORATORIES" CSA STANDARD A283-06 - as qualified to test concrete within the classification of

CATEGORY "II" ADVANCED CERTIFICATION

AND THE FOLLOWING ADDITIONAL TESTS:

A23.2-9A, 14A, 16A, 17A, 23A, 24A, 25A, 29A, 1B, 4B, 6B (PROCEDURE A), 3C, 8C, 10C, 13C, 21C, 23C AND ASTM C457

As defined in the standard, subject to conditions of issuance of this certificate

GIB MCINTEE, P. ENG.
CHAIRMAN, CERTIFICATION PROGRAM ADMINISTRATION COMMITTEE

April 16, 2018 – December 31, 2018

Date

GORDON H. LEAMAN, P. ENG.
PRESIDENT

CCIL

Canadian Council of Independent Laboratories

CERTIFICATE OF CONFORMANCE

ASPHALT LABORATORY CERTIFICATION

This is to certify that

WOOD ENVIRONMENT & INFRASTRUCTURE SOLUTIONS, A DIVISION OF WOOD CANADA LIMITED

Located at

Burlington ON

Has met the Standardization and Interlaboratory Testing Requirements of the

CCIL ASPHALT LABORATORY CERTIFICATION PROGRAM

and has qualified under the following categories and test methods:

ASPHALT MIX COMPLIANCE – MARSHALL & SUPERPAVE METHODS (TYPE B)

SOLVENT EXTRACTION – LS-282/D2172; IGNITION METHOD – LS-292/D6307

ASPHALT MIX DESIGN – MARSHALL & SUPERPAVE METHODS (TYPE A)

PENETRATION OF ASPHALT CEMENT RECOVERED FROM HOT MIX (TYPE E)

May 1, 2018 - April 30, 2019

Date

GIB MCINTEE, P. ENG.
CHAIRMAN, CERTIFICATION PROGRAM ADMINISTRATION COMMITTEE

GORDON H. LEAMAN, P. ENG.
PRESIDENT

Appendix F

Ballast Testing Result Guideline

f. Slags are materials formed during the metal making process by the fusion of fluxstones, coke and other metallic particles and are generally of two types; iron blast furnace slag and steel furnace slag. Iron blast furnace slag is produced during the blast furnace operation and is essentially a composition of silicates and alumino silicates of lime and other bases. Steel furnace slag is a by-product of the open hearth, electric or oxygen steel furnace and is composed primarily of oxides and silicates.

SECTION 2.4 PROPERTY REQUIREMENTS

2.4.1 PHYSICAL ANALYSIS (1991)

The methods of sampling and testing as defined by this specification are those in effect April 1985 and may be revised or altered by the individual railway company.

2.4.1.1 Method of Sampling

Field samples shall be secured in accordance with the current ASTM Methods of Sampling, designation D 75. Test samples shall be reduced from field samples by the means of ASTM C 702.

2.4.1.2 Sieve Analysis

Sieve analysis shall be made in accordance with ASTM Method of Test, designation C 136.

2.4.1.3 Material Finer Than No. 200 Sieve

Material finer than the No. 200 sieve shall be determined in accordance with the ASTM Method of Test, designation C 117.

2.4.1.4 Bulk Specific Gravity and Absorption

The bulk specific gravity and percentage of absorption shall be determined in accordance with the ASTM Method of Test, designation C 127.

2.4.1.5 Percentage of Clay Lumps and Friable Particles

The percentage of clay lumps and friable particles shall be determined in accordance with the ASTM Method of Test, designation C 142.

2.4.1.6 Resistance to Degradation

The resistance to degradation shall be determined in accordance with the ASTM Method of Test, designation C 131 or C 535 using the grading as specified in Note # 1, Table 1-2-1. Materials having gradations containing particles retained on the 1 inch sieve shall be tested by ASTM C 535. Materials having gradations with 100% passing the 1 inch sieve shall be tested by ASTM C 131.

2.4.1.7 Sodium Sulfate Soundness

Sodium Sulfate Soundness tests shall be made in accordance with the ASTM Method of Test, designation C 88.

2.4.1.8 Unit Weight

The weight per cubic foot shall be determined in accordance with the ASTM Method of Test, designation C 29.

2.4.1.9 Percent of Flat and/or Elongated Particles

The percent of flat or elongated particles shall be determined in accordance with ASTM Standard Test Method, designated D4791. The dimension ratio used in this test method shall be 1:3.

2.4.2 CHEMICAL ANALYSIS (1988)

a. No specific chemical analysis is considered essential for the evaluation of granite, traprocks or quartzite type materials provided that the materials are properly defined by applicable methods. For carbonate materials, dolomitic limestones are defined as those materials which have a magnesium carbonate ($MgCo_3$) content of 28% to 36%. Those carbonate materials indicating magnesium carbonate values above 36% shall be defined as dolomites and carbonate materials indicating magnesium carbonate values below 28% shall be defined as limestones.

b. The magnesium carbonate ($MgCo_3$) content of carbonate materials shall be tested and defined in accordance with ASTM C 25.

c. Standard Methods of Chemical Analysis of Limestone, Quick Lime and Hydrated Lime, or other test methods as may be approved and directed by the Engineer.

d. Steel furnace slags consist essentially of calcium silicates and ferrites combined with fused oxides of iron, aluminum, manganese, calcium and magnesium.

e. Steel furnace slags having a content of more than 45% calcium oxide and/or a combined composition of more than 30% of the oxides of iron and aluminum should not be used.

f. Iron blast furnace slags consist essentially of silicates and aluminosilicates of calcium and other bases.

g. Iron blast furnace slags having a content of more than 45% of the oxides of calcium or a combined composition of more than 17% of the oxides of iron and aluminum should not be used.

2.4.3 LIMITING TEST VALUES (1997)

Table 1-2-1 outlines the limiting values of testing as may be defined by the designated test specifications. The values for unit weight and bulk specific gravity are minimum values while the remainder are maximum values.

Table 1-2-1. Recommended Limiting Values of Testing for Ballast Material

Property	Ballast Material							
	Granite	Traprock	Quartzite	Limestone	Dolomitic Limestone	Blast Furnace Slag	Steel Furnace Slag	ASTM Test
Percent Material Passing No. 200 Sieve	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	C 117
Bulk Specific Gravity (See Note 2)	2.60	2.60	2.60	2.60	2.65	2.30	2.90	C 127
Absorption Percent	1.0	1.0	1.0	2.0	2.0	5.0	2.0	C 127
Clay Lumps and Friable Particles	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	C 142

Table 1-2-1. Recommended Limiting Values of Testing for Ballast Material

Property	Ballast Material							
	Granite	Traprock	Quartzite	Limestone	Dolomitic Limestone	Blast Furnace Slag	Steel Furnace Slag	ASTM Test
Degradation	35%	25%	30%	30%	30%	40%	30%	See Note 1
Soundness (Sodium Sulfate) 5 Cycles	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	C 88
Flat and/or Elongated Particles	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	D 4791

Note 1: Materials having gradations containing particles retained on the 1 inch sieve shall be tested by ASTM C 535. Materials having gradations with 100% passing the 1 inch sieve shall be tested by ASTM C 131. Use grading most representative of ballast material gradation.
Note 2: The limit for bulk specific gravity is a minimum value. Limits for the remainder of the tests are maximum values.

2.4.4 GRADATIONS (1988)

Table 1-2-2 outlines the recommended gradations to which the materials are to be processed for use as track and yard ballast. The grading of the processed ballast shall be determined with laboratory sieves having square openings conforming to ASTM specification E 11.

2.4.5 BALLAST MATERIALS FOR CONCRETE TIE TRACK INSTALLATION (1988)

The ballast materials as defined by this specification include the applicable test requirements for ballast materials for the purpose of providing support to the rail-cross tie arrangement of a concrete tie track system except that carbonate materials and slags as defined in Article 2.3.1 and gradation No. 57 as defined in Article 2.4.4 shall be excluded.

Appendix G

Summary of Findings and Results for Total Metals by ICP-MS Test

Parameter	Average Continental Crust Concentration	10x Average Continental Crust Concentration	Quarry Sample ID														
			Q1	Q5	Q24	QMR2	PQ4A	PQ4B	PQ5A	PQ5B	PQ6B	PQ12A	PQ13	PQ15A	PQ15B	PQ9A	PQ9B
Silver (µg/g)	0.075	0.75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Aluminum (µg/g)	82300	823000	76000	76000	3000	39000	2600	3700	3500	2900	3000	9000	57000	86000	69000	4000	3500
Arsenic (µg/g)	1.8	18	1.1	0.6	< 0.5	0.6	2.6	0.6	0.80	< 0.5	< 0.5	2	1.9	0.9	0.9	1.5	0.84
Barium (µg/g)	425	4250	750	650	13	150	9.3	14	16	12	12	51	270	1200	1900	18	12
Beryllium (µg/g)	3	30	1.8	2.3	0.11	1.6	0.074	0.11	0.11	0.11	0.11	0.25	2	1.9	1.2	0.11	0.10
Bismuth (µg/g)	0.0085	0.085	< 0.09	< 0.09	< 0.09	< 0.09	0.12	< 0.09	< 0.09	< 0.09	< 0.09	0.09	0.33	< 0.09	0.09	< 0.09	< 0.09
Calcium (µg/g)	41500	415000	9200	7000	360000	3700	350000	380000	360000	370000	340000	200000	1800	8500	4300	320000	360000
Cadmium (µg/g)	3	30	0.03	0.03	< 0.02	0.03	0.087	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	0.03	0.05	0.07	0.036	0.023
Cobalt (µg/g)	25	250	2.4	4.1	0.57	2	0.7	0.66	0.69	0.5	0.52	2.7	1.7	7	3.2	0.83	0.67
Chromium (µg/g)	102	1020	92	80	4.8	99	2.2	3.3	2.5	2.1	2.3	4.6	98	83	75	3.0	2.6
Copper (µg/g)	60	600	2.7	6.4	0.9	4.2	7.3	1.2	1.6	1.1	1.2	6.2	3.4	3.2	3.5	2.7	2.6
Iron (µg/g)	56300	563000	11000	16000	2100	10000	2400	2600	3000	2000	2300	5300	14000	28000	17000	2800	2300
Potassium (µg/g)	20850	208500	33000	34000	1800	20000	1600	2300	2000	1700	1900	9900	53000	41000	47000	3100	2000
Lithium (µg/g)	20	200	28	31	5	10	4.1	6	5.4	5	5	27	28	28	19	6.6	8.1
Magnesium (µg/g)	23300	233000	3700	7200	14000	4800	4600	5000	5200	17000	25000	120000	5500	9800	6400	18000	13000
Manganese (µg/g)	950	9500	230	230	72	190	91	110	140	70	68	150	130	520	240	69	130
Molybdenum (µg/g)	1.2	12	6.2	6.7	0.5	11	< 0.1	0.2	< 0.1	0.1	0.2	0.8	8.3	6.4	7.8	0.18	0.12
Sodium (µg/g)	23550	235500	33000	28000	220	9500	140	210	140	220	220	390	10000	30000	16000	150	150
Nickel (µg/g)	84	840	25	9.6	3.8	8.5	3.1	4	4.1	3.3	3	4.6	5.1	17	5.9	3.9	3.7
Phosphorus (µg/g)	1050	10500	110	280	64	85	34	110	48	40	38	130	58	400	240	76	25
Lead (µg/g)	14	140	52	24	0.91	8.8	10	1.4	2.1	0.95	0.75	4.8	22	20	28	3.1	3.4
Antimony (µg/g)	0.2	2	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8	< 0.8
Selenium (µg/g)	0.05	0.5	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7	< 0.7
Tin (µg/g)	2.3	23	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6	< 6
Strontium (µg/g)	370	3700	250	170	310	27	270	290	280	390	350	67	28	160	98	210	270
Titanium (µg/g)	5650	56500	700	1300	170	660	170	210	220	160	160	330	660	1800	1400	230	190
Thallium (µg/g)	0.85	8.5	0.65	0.48	0.06	0.28	0.042	0.03	0.032	0.03	< 0.02	0.18	0.92	0.72	0.5	0.043	0.064

Parameter	Average Continental Crust Concentration	10x Average Continental Crust Concentration	Quarry Sample ID														
			Q1	Q5	Q24	QMR2	PQ4A	PQ4B	PQ5A	PQ5B	PQ6B	PQ12A	PQ13	PQ15A	PQ15B	PQ9A	PQ9B
Uranium (µg/g)	2.7	27	3.1	2.4	0.42	2.7	0.40	0.47	0.47	0.37	0.42	1	5.2	1.9	2.2	0.52	0.49
Vanadium (µg/g)	120	1200	8	21	4	11	3.9	5	4.8	5	4	12	5	27	15	4.9	4.2
Yttrium (µg/g)	33	330	5.4	5.5	1.9	7.9	2.0	2.6	2.1	1.4	1.5	3.3	11	7.1	6.4	1.6	1.5
Zinc (µg/g)	70	700	26	35	2.8	21	37	3.2	6.6	3.5	2.7	3.8	17	59	39	14	11

Appendix H

Summary of Findings and Results for Shake Flask Extraction Test

Parameter	MMER*	CWQG (PAL)**	Sample ID														
			Q1	Q5	Q24	QMR2	PQ4A	PQ4B	PQ5A	PQ5B	PQ6B	PQ12A	PQ13	PQ15A	PQ15B	PQ9A	PQ9B
Sample weight (g)			250	250	250	250	250	250	250	250	250	250	250	250	250	250	250
Volume D.I. Water (mL)			750	750	750	750	750	750	750	750	750	750	750	750	750	750	750
Final pH			9.4	8.92	8.8	9.06	9.15	8.79	9.22	9.34	9.21	8.34	8.17	8.61	8.35	9.1	9.23
pH			9.16	8.01	8.47	9.03	8.43	8.44	8.35	8.34	8.51	9.32	7.97	7.78	7.51	8.5	8.68
Alkalinity (mg/L as CaCO3)			28	32	28	37	25	26	26	26	29	88	39	22	46	32	29
Conductivity (uS/cm)			68	79	106	126	77	81	75	81	100	272	90	50	109	118	86
Chloride (mg/L)		120	3	4	11	4	6	8	6	7	9	35	2	1	2	15	7
Sulphate (mg/L)			2	< 2	6	< 2	2	< 2	< 2	< 2	< 2	3	< 2	< 2	< 2	2	2
Mercury (mg/L)		0.000026	0.00001	0.00001	0.00001	0.00018	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	< 0.00001	< 0.00001
Silver (mg/L)		0.00025	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005	< 0.00005
Aluminum (mg/L)		0.005 - 0.1	0.771	0.420	0.196	0.445	0.266	0.235	0.254	0.149	0.128	0.026	0.448	1.06	0.389	0.184	0.122
Arsenic (mg/L)	0.15	0.005	0.0011	0.0003	< 0.0002	0.0013	< 0.0002	< 0.0002	0.0002	< 0.0002	0.0004	0.001	0.0016	0.001	0.0005	0.0002	< 0.0002
Barium (mg/L)			0.00454	0.00277	0.00151	0.00193	0.00202	0.00075	0.00211	0.00074	0.0008	0.00269	0.00194	0.00801	0.0092	0.00192	0.00265
Boron (mg/L)		1.5	0.009	0.022	0.085	0.026	0.053	0.047	0.044	0.059	0.078	0.071	0.033	0.041	0.035	0.156	0.303
Beryllium (mg/L)			0.000008	0.000017	< 0.000007	0.000012	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	< 0.000007	0.000034	0.00002	0.000015	< 0.000007	< 0.000007
Bismuth (mg/L)			< 0.000007	0.00001	< 0.000007	< 0.000007	< 0.000007	0.000032	< 0.000007	0.00002	0.000051	< 0.000007	0.000027	< 0.000007	0.000012	< 0.000007	< 0.000007
Calcium (mg/L)			3.33	4.37	11.2	3.84	9.13	10.5	9.70	7.92	8.69	9.2	4.98	0.21	7.25	11.3	8.47
Cadmium (mg/L)		0.00009	0.000003	0.000003	0.000009	0.000009	< 0.000003	0.000003	< 0.000003	0.000003	0.000021	0.000004	0.000007	0.000007	0.000003	< 0.000003	< 0.000003
Cobalt (mg/L)			0.000044	0.000034	< 0.000004	0.000069	0.000021	0.000007	0.000016	0.000109	0.000015	0.000052	0.000055	0.000099	0.000202	0.000059	0.000009
Chromium (mg/L)		0.001	0.00017	0.00015	0.00022	0.00007	0.00038	0.00035	0.00037	0.00023	0.0011	0.00011	0.00004	0.00023	0.00006	0.00017	0.00021
Copper (mg/L)	0.15	0.002	0.00038	0.00637	0.00876	0.00048	0.0003	0.00091	0.0003	0.00041	0.00097	0.0011	0.00198	0.00299	0.01076	0.0003	< 0.0002
Iron (mg/L)		0.3	0.105	0.079	0.008	0.061	< 0.007	< 0.007	< 0.007	< 0.007	0.016	0.007	0.19	0.353	0.139	< 0.007	< 0.007
Potassium (mg/L)			7.36	6.41	1.96	15.4	1.75	2.14	1.80	1.35	1.49	6.58	13.4	10.3	16.9	2.40	1.55
Lithium (mg/L)			0.0126	0.0047	0.0042	0.0061	0.0031	0.0038	0.0030	0.0024	0.003	0.0239	0.0035	0.0019	0.0013	0.0055	0.0059
Magnesium (mg/L)			0.496	1.29	4.08	1.14	1.41	1.62	1.54	3.33	4.36	22.1	1.84	0.236	1.16	5.07	3.14
Manganese (mg/L)			0.0032	0.00137	0.00002	0.00147	0.00007	0.00002	0.00003	< 0.00001	0.00005	0.00007	0.00192	0.0061	0.0074	0.00011	0.00015

Parameter	MMER*	CWQG (PAL)**	Sample ID														
			Q1	Q5	Q24	QMR2	PQ4A	PQ4B	PQ5A	PQ5B	PQ6B	PQ12A	PQ13	PQ15A	PQ15B	PQ9A	PQ9B
Molybdenum (mg/L)		0.073	0.00039	0.00174	0.00111	0.00345	0.00033	0.00156	0.00034	0.00052	0.0023	0.00301	0.00068	0.00095	0.00198	0.00056	0.00036
Sodium (mg/L)			5.96	6.07	1.24	8.84	0.88	0.96	0.89	0.84	1.15	6.1	2.68	4.41	2.57	1.58	1.21
Nickel (mg/L)	0.38	0.025	0.0001	0.0001	0.0001	0.0001	< 0.0001	0.0001	< 0.0001	0.0001	0.0001	0.0004	0.0001	0.0002	0.0001	0.0004	< 0.0001
Lead (mg/L)	0.12	0.001	0.00079	0.0001	0.00006	0.00022	0.00001	0.00002	0.00001	< 0.00001	< 0.00001	0.00002	0.00018	0.00019	0.00039	0.00001	0.00001
Antimony (mg/L)			0.0004	0.0004	0.0003	0.0004	< 0.0009	0.0003	< 0.0009	0.0003	0.0002	0.0003	0.0005	0.0005	0.0005	< 0.0009	< 0.0009
Selenium (mg/L)		0.001	< 0.00004	0.00011	0.00006	0.00049	0.00008	< 0.00004	0.00008	< 0.00004	< 0.00004	0.00009	0.00007	0.00006	0.0001	0.00014	0.00005
Tin (mg/L)			0.00022	0.00015	0.00022	0.00022	< 0.00006	0.00012	< 0.00006	0.00009	0.00051	0.00008	0.00008	0.0004	0.00033	0.00008	< 0.00006
Strontium (mg/L)			0.0153	0.00593	0.129	0.00681	0.110	0.111	0.111	0.111	0.108	0.0498	0.00497	0.00093	0.00928	0.104	0.0905
Titanium (mg/L)			0.00719	0.00332	0.00074	0.00449	< 0.00005	0.00005	0.00014	< 0.00005	0.00048	0.00006	0.00346	0.0189	0.0065	< 0.00005	< 0.00005
Thallium (mg/L)		0.0008	0.000009	< 0.000005	0.000006	0.000008	< 0.000005	< 0.000005	< 0.000005	0.000005	< 0.000005	0.000171	0.000013	0.000011	< 0.000005	0.000007	0.000023
Uranium (mg/L)		0.015	0.00963	0.00121	0.000046	0.00818	0.000042	0.000048	0.000048	0.000022	0.000035	0.000127	0.0025	0.000184	0.00161	0.000071	0.000026
Vanadium (mg/L)			0.00314	0.0037	0.00047	0.00618	0.00084	0.00065	0.00058	0.00049	0.00052	0.00198	0.00045	0.00398	0.00119	0.00054	0.00044
Tungsten (mg/L)			0.00017	0.00024	0.00004	0.00045	0.00006	0.00022	0.00008	0.00022	0.00017	0.0002	0.00074	0.00013	0.00026	0.00011	0.00005
Yttrium (mg/L)			0.000079	0.00011	0.000005	0.000163	< 0.000002	0.000003	0.000003	< 0.000002	0.000005	0.000019	0.000639	0.000139	0.000229	< 0.000002	0.000003
Zinc (mg/L)	0.6	0.007	0.002	0.002	0.002	0.002	< 0.002	0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002

* Metal and Diamond Mining Effluent Regulations

**Canadian Water Quality Guidelines for Aquatic Life

Appendix I

Potential Quarry Sample Photographs

Figure I1 – Q1 sampling location (detailed view)

Figure I2 – Q1 sampling location (general view)

Figure I3 – Q1 quarry location with scale

Figure I4 – Q4 sampling location with scale (detailed view)

Figure I5 – Q4 sampling location (general view)

Figure I6 – Q11 sampling location (detailed view) with scale

Figure I7 – Q11 sampling location (general view)

Figure I8 – QMR2 sampling location (detailed view)

Figure I9 – QMR2 sampling location (general view)

Figure I10 – PQ4B sampling location (detailed view)

Figure I11 – PQ4B sampling location (general view) with scale

Figure I12 – PQ4B sampling location (general view)

Figure I13 – PQ5B sampling location (detailed view) with scale

Figure I14 – PQ5B sampling location (general view)

Figure I15 – PQ6B sampling location (detailed view) with scale

Figure I16 – PQ6B sampling location (general view)

Figure I17 – PQ12A sampling location (detailed view) with scale

Figure I18 – PQ12A sampling location (general view)

Figure I19 – PQ13 sampling location (detailed view) with scale

Figure I120 – PQ13 sampling location (general view)

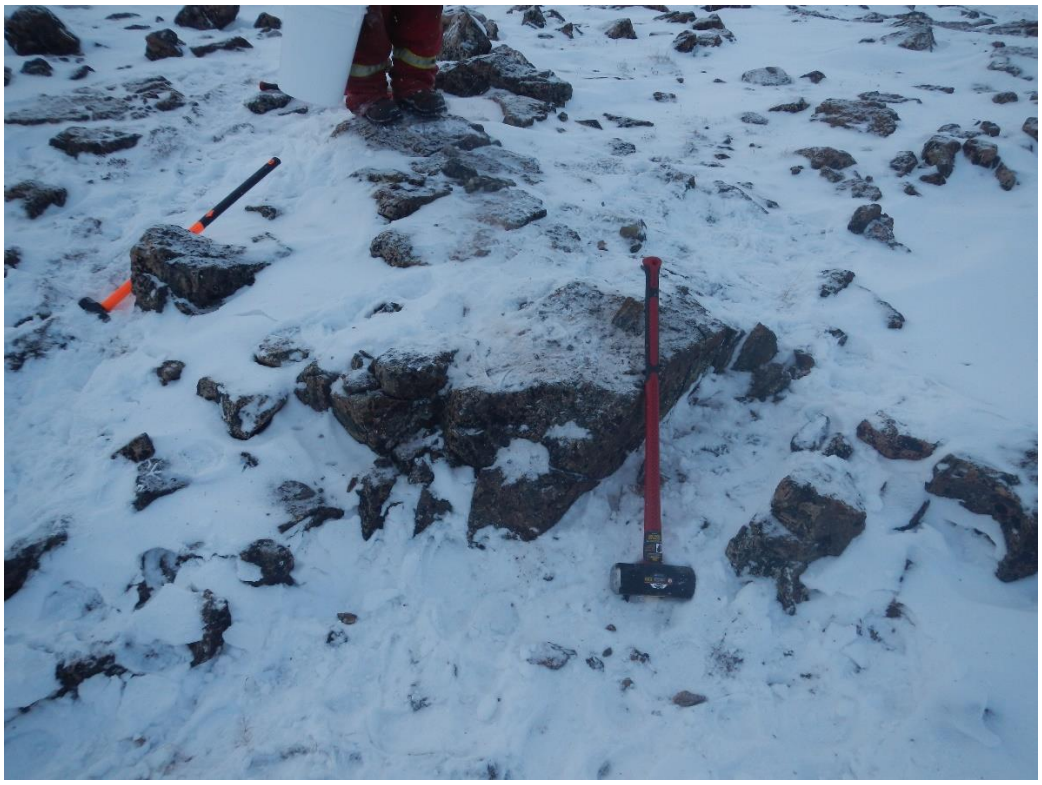


Figure I21 – PQ15A sampling location (detailed view) with scale

Figure I22 – PQ15A sampling location (general view)

Figure I23 – PQ15B sampling location (detailed view) with scale

Figure I24 – PQ15B sampling location (general view)

Figure I25 – Q5 sampling location (detailed view) with scale

Figure I26 – Q5 sampling location (general view)