

BC Geological Survey Assessment Report 42143



ASSESSMENT REPORT TITLE PAGE AND SUMMARY

**TITLE OF REPORT: SUMMARY OF EXPLORATION AND EXPANSION WORK CONDUCTED
AT COX STATION QUARRY IN THE PRECEEDING 12 MONTHS**

TOTAL COST: \$427,981.55

AUTHOR(S):

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 Dani Miller	 Alyenna Kerpan

SUBMISSION DATE: August 27, 2024

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S): Permit Q-7-68 Last Amended May 12, 2021

STATEMENT OF WORK EVENT NUMBER(S)/DATE(S) 6035485 and

YEAR OF WORK: 2023/2024

PROPERTY NAME: Cox Station Quarry (6850 Cox Rd. Abbotsford)

CLAIM NAME(S) (on which work was done):

CHAD #2 – Tenure #326103

MATRIX7 – Tenure #382073

COMMODITIES SOUGHT: Construction Aggregates

MINERAL INVENTORY MINFILE NUMBER(S), IF KNOWN: 0700104

MINING DIVISION: New Westminster (code 13)

NTS / BCGS: 92G.020

LATITUDE: 49° 8' 3"

LONGITUDE: 122° 9' 53" (at centre of work)

UTM Zone: 10U EASTING: 560930

NORTHING: 5442707

OWNER(S): Mainland Construction Material ULC

MAILING ADDRESS: 317-9525 201 St. Langley, BC V1M 4A5

OPERATOR(S) [who paid for the work]: Mainland Construction Material

MAILING ADDRESS: 317-9525 201 St. Langley, BC V1M 4A5 ULC

REPORT KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude. **Do not use abbreviations or codes**)

Predominantly (90%) massive granitic varieties, granite to granodiorite. Contains feldspar, quartz, hornblende, magnetite, and local dikes / veinlets with andesitic rock. Mohs hardness between 5 and 6. Petrographic examination indicated as minor sulfide mineralogy with pyrite identified. Iron oxide mineralogy in the form of magnetite was also identified. ARD / ML potential LOW. SSD 2640 – 2704 kg/m3. Material is generally hard, strong, and mildly tough with low porosity.

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS:

Statement of work Event #5525227, 2014

EVENT 6035485 – Physical Work 2024

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Mineral Titles Online

Mineral Claim Exploration and Development Work/Expiry Date Change

Confirmation

Recorder: MAINLAND SAND & GRAVEL ULC (132475) Submitter: MAINLAND SAND & GRAVEL ULC (132475)
Recorded: 2024/AUG/27 Effective: 2024/AUG/27
D/E Date: 2024/AUG/27

Confirmation

If you have not yet submitted your report for this work program, your physical work report is due in 30 days. The Exploration and Development Work/Expiry Date Change event number is required with your report submission. **Please attach a copy of this confirmation page to your report.** Contact Mineral Titles Branch for more information.

Event Number: 6035485

Work Type: Physical Work
Physical Items: Drilling, Labour, Machinery and equipment, Reclamation

Work Start Date: 2023/JUL/14

Work Stop Date: 2024/JUL/13

Total Value of Work: \$ 407822.52

Mine Permit No: Q-7-68

Summary of the work value:

Title Number	Claim Name	Issue Date	Good To Date	New Good To Date	# of Days Forward	Area in Ha	Applied Work Value
313783	COX 2	1992/OCT/08	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
326102	CHAD #1	1994/JUN/08	2024/OCT/08	2034/JUL/13	3565	50.00	\$ 9761.64
326103	CHAD #2	1994/JUN/08	2024/OCT/08	2034/JUL/13	3565	150.00	\$ 29284.93
326104	COX 1	1994/JUN/08	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
381023	MATRIX 1	2000/OCT/04	2024/OCT/08	2034/JUL/13	3565	500.00	\$ 97616.44
381024	MATRIX 2	2000/OCT/04	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
381025	MATRIX 3	2000/OCT/04	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
381026	MATRIX 4	2000/OCT/04	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382071	MATRIX 5	2000/OCT/31	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382072	MATRIX 6	2000/OCT/31	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382073	MATRIX 7	2000/OCT/31	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82

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382074	MATRIX 8	2000/OCT/31	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382075	MATRIX 9	2000/OCT/31	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382076	MATRIX 10	2000/OCT/31	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382077	MATRIX 11	2000/OCT/31	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382078	MATRIX 12	2000/OCT/31	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382118	MATRIX 13	2000/NOV/01	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382119	MATRIX 14	2000/NOV/01	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382120	MATRIX 15	2000/NOV/01	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82
382121	MATRIX 16	2000/NOV/01	2024/OCT/08	2034/JUL/13	3565	25.00	\$ 4880.82

Financial Summary:

Total applied work value:219636.95

Please print this page for your records.

The event was successfully saved.

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TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (in metric units)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
GEOCHEMICAL (number of samples analysed for ...)			
Soil			
Silt			
Rock	22	CHAD #2	14,419.48
Other			
DRILLING (total metres, number of holes, size, storage location)			
Core			
Non-core	503 holes 10-50m depth total: 1790m	CHAD #2 MATRIX 7	118,616.50
RELATED TECHNICAL Sampling / Assaying			
Petrographic			
Mineralographic			
Metallurgic			
PROSPECTING (scale/area)			
PREPATORY / PHYSICAL Line/grid (km)			
Topo/Photogrammetric (scale, area)	1km2	CHAD #2	5,739.55
Legal Surveys (scale, area)			
Road, local access (km)/trail			
Trench (number/metres)			
Underground development (metres)			
Other (reclamation)		CHAD #2 MATRIX 7	289,206.02
		TOTAL COST	427,981.55

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CLAIMS MAPS

Figure 1

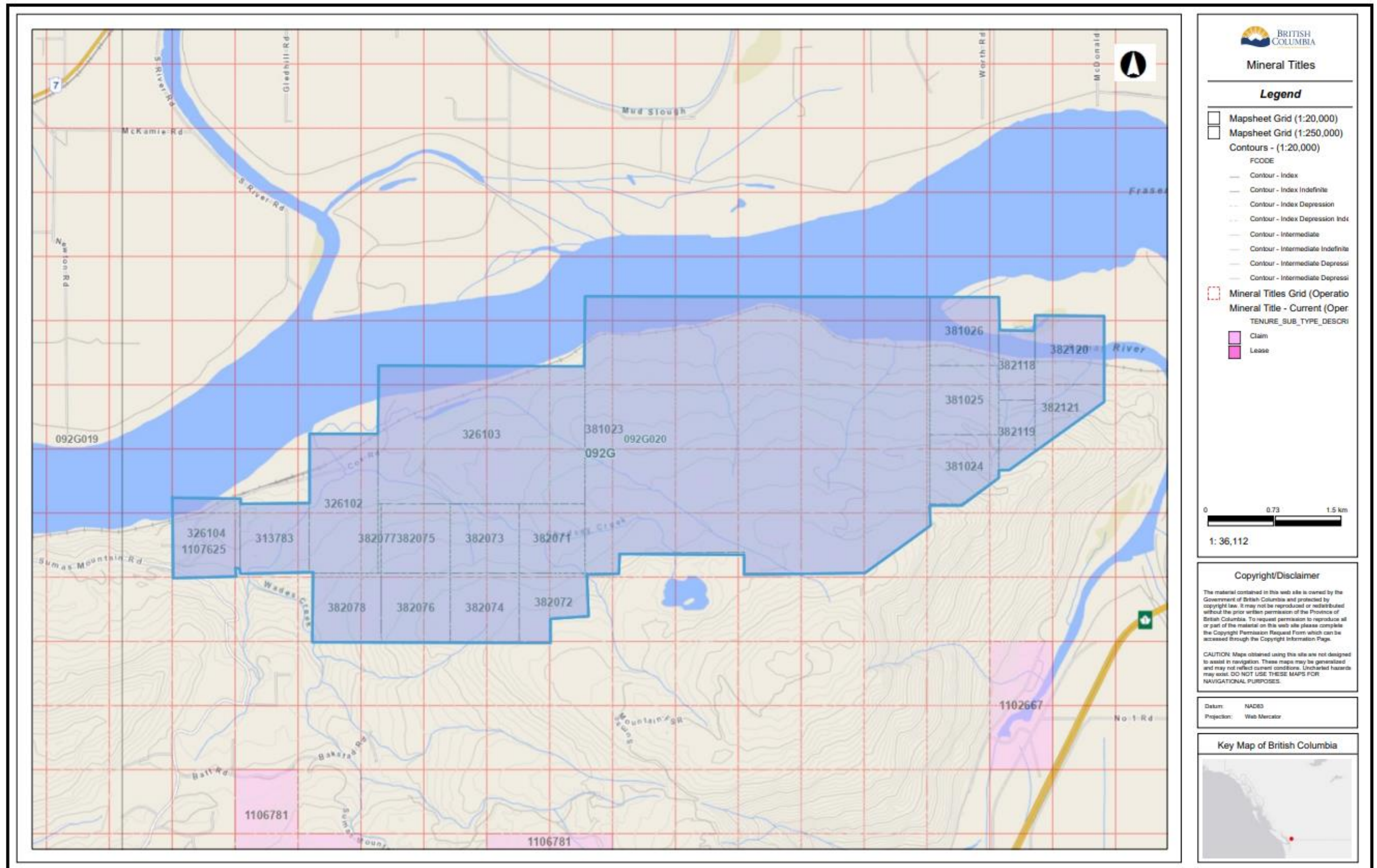


Figure 2 (Claims Maps, 1:20,000 Western Half)

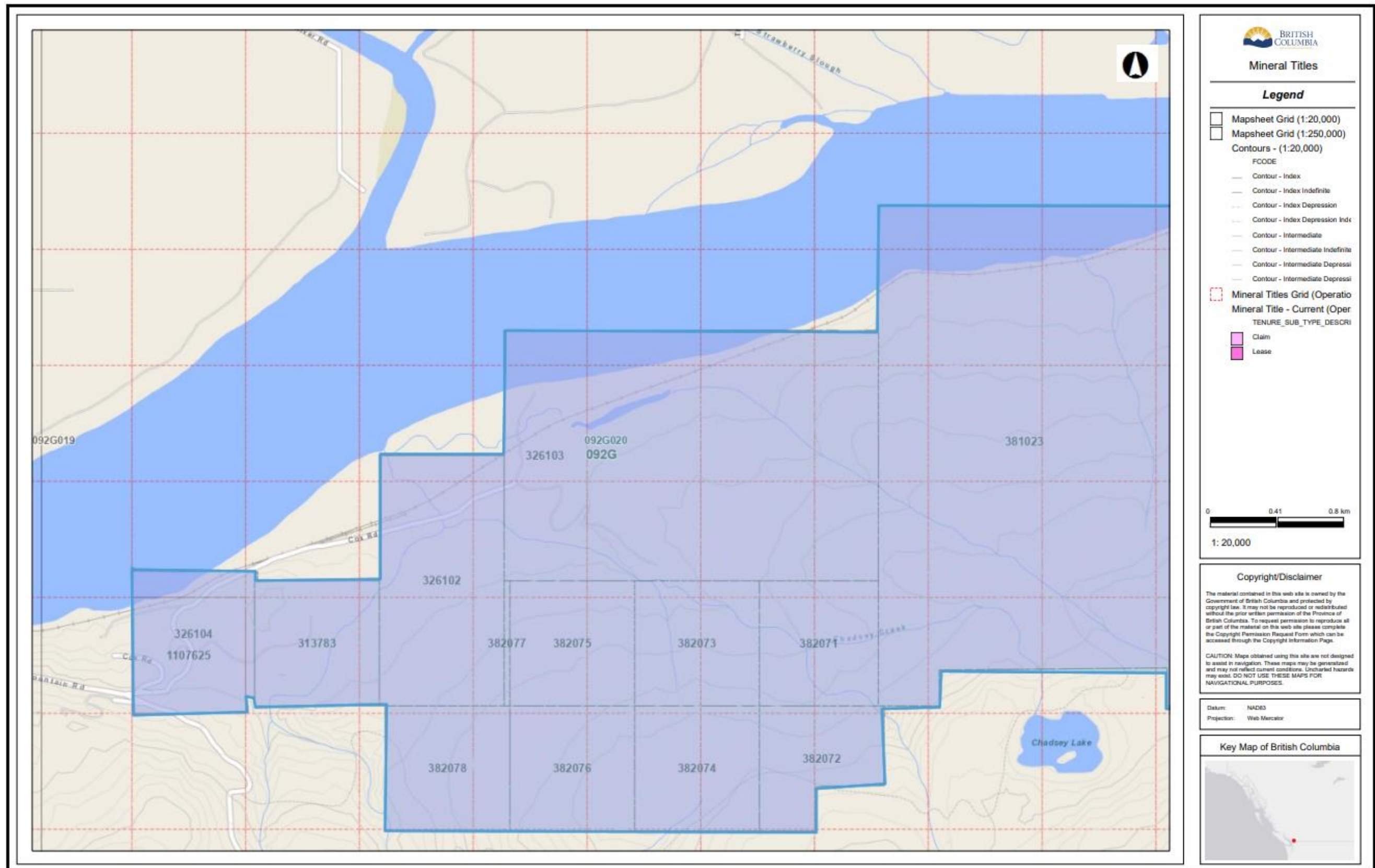
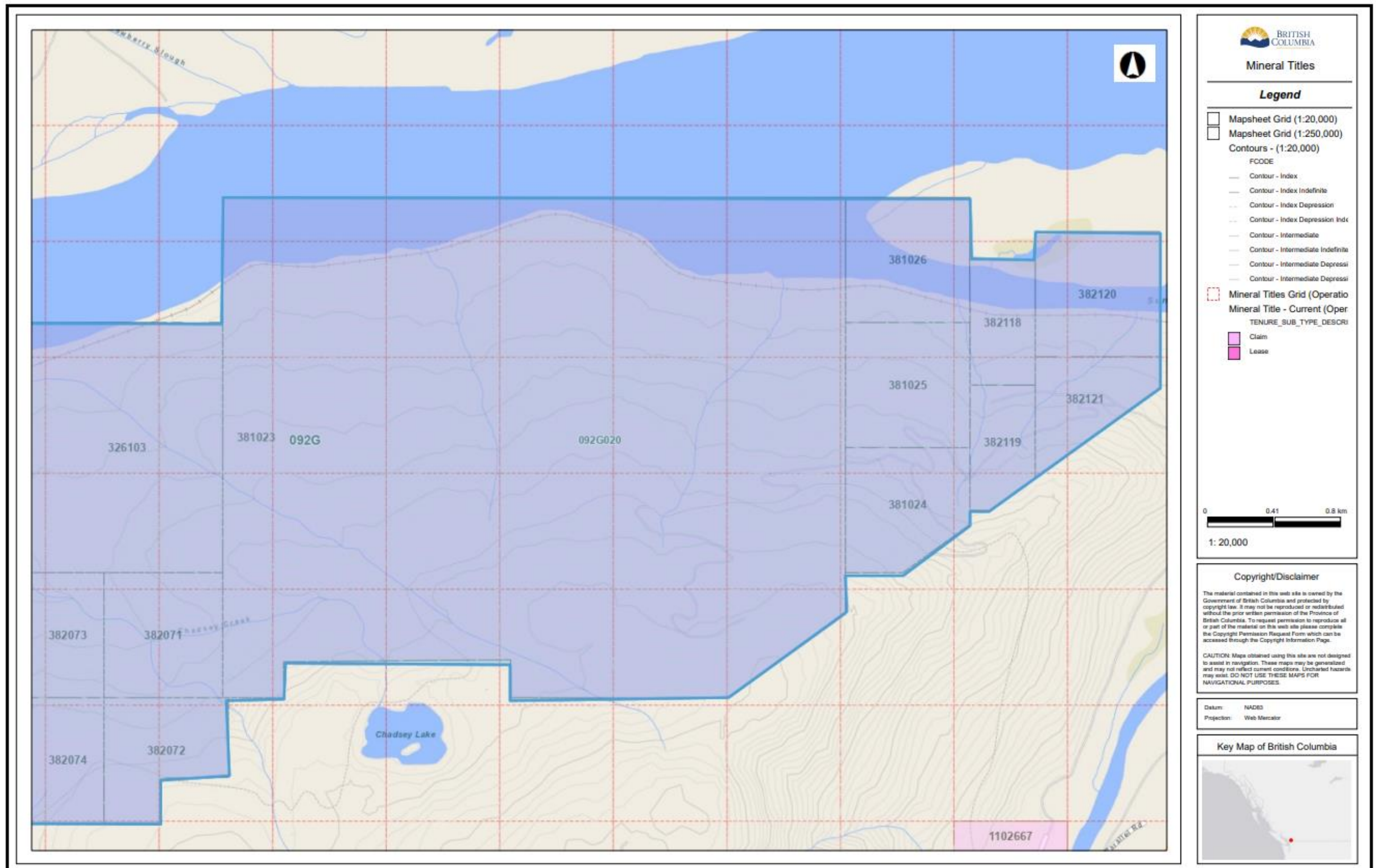
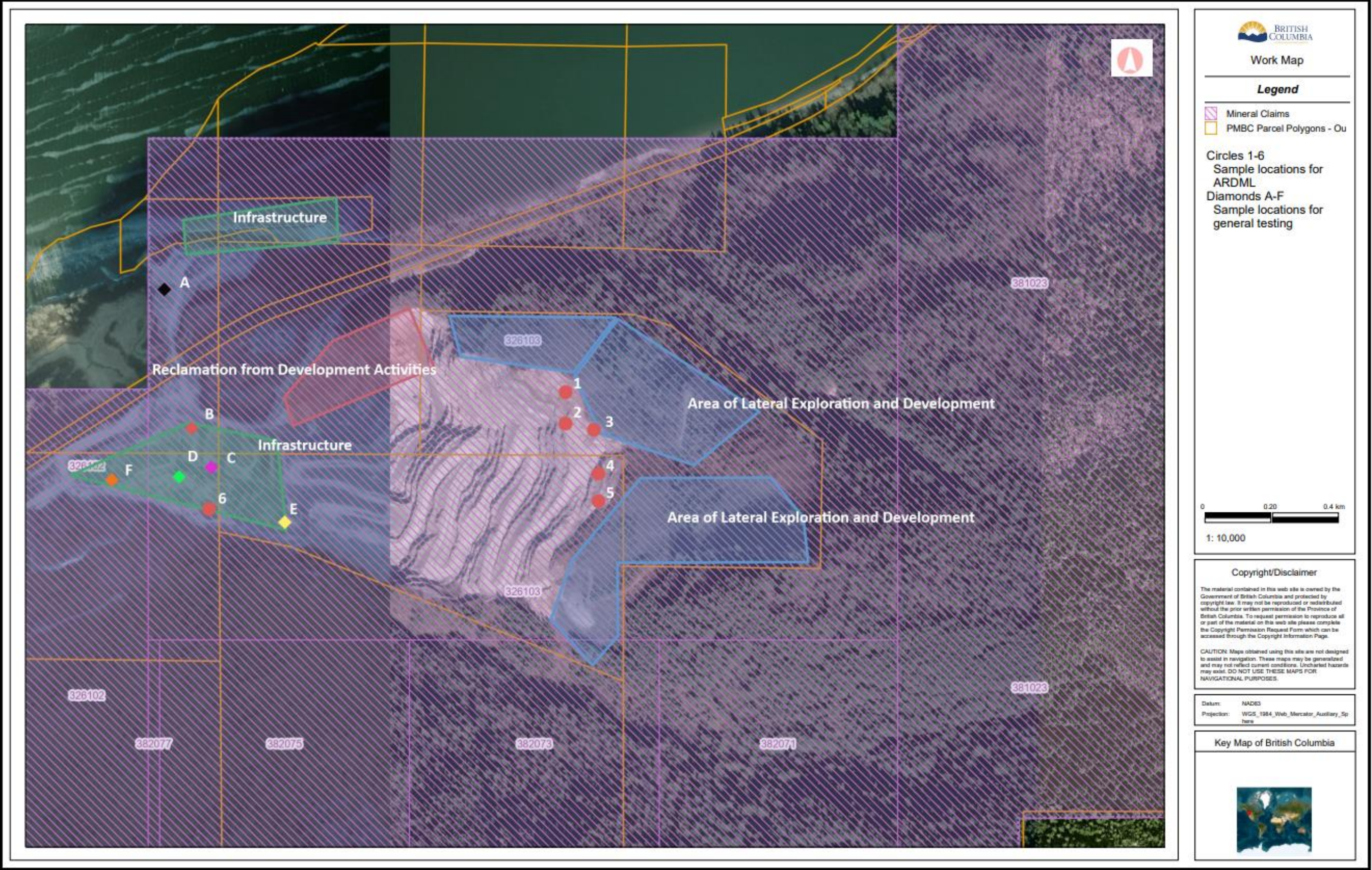


Figure 3 (Claims Maps, 1:20,000 Eastern Half)

CLAIMS LIST

Tenure Number	Claim Name	Owner	Tenure Type	Tenure Sub Type	Map Number	Issue Date	Good to Date	Status	Area (ha)
313783	COX 2	132475 (100%)	Mineral	Claim	092G	1992/oct/08	2024/oct/08	GOOD	25
326102	CHAD #1	132475 (100%)	Mineral	Claim	092G	1994/jun/08	2024/oct/08	GOOD	50
326103	CHAD #2	132475 (100%)	Mineral	Claim	092G	1994/jun/08	2024/oct/08	GOOD	150
326104	COX 1	132475 (100%)	Mineral	Claim	092G	1994/jun/8	2024/oct/08	GOOD	25
381023	MATRIX 1	132475 (100%)	Mineral	Claim	092G	2000/oct/04	2024/oct/08	GOOD	500
381024	MATRIX 2	132475 (100%)	Mineral	Claim	092G	2000/oct/04	2024/oct/08	GOOD	25
381025	MATRIX 3	132475 (100%)	Mineral	Claim	092G	2000/oct/04	2024/oct/08	GOOD	25
381026	MATRIX 4	132475 (100%)	Mineral	Claim	092G	2000/oct/04	2024/oct/08	GOOD	25
382071	MATRIX 5	132475 (100%)	Mineral	Claim	092G	2000/oct/31	2024/oct/08	GOOD	25
382072	MATRIX 6	132475 (100%)	Mineral	Claim	092G	2000/oct/31	2024/oct/08	GOOD	25
382073	MATRIX 7	132475 (100%)	Mineral	Claim	092G	2000/oct/31	2024/oct/08	GOOD	25
382074	MATRIX 8	132475 (100%)	Mineral	Claim	092G	2000/oct/31	2024/oct/08	GOOD	25
382075	MATRIX 9	132475 (100%)	Mineral	Claim	092G	2000/oct/31	2024/oct/08	GOOD	25
382076	MATRIX 10	132475 (100%)	Mineral	Claim	092G	2000/oct/31	2024/oct/08	GOOD	25
382077	MATRIX 11	132475 (100%)	Mineral	Claim	092G	2000/oct/31	2024/oct/08	GOOD	25
382078	MATRIX 12	132475 (100%)	Mineral	Claim	092G	2000/oct/31	2024/oct/08	GOOD	25
382118	MATRIX 13	132475 (100%)	Mineral	Claim	092G	2000/nov/01	2024/oct/08	GOOD	25
382119	MATRIX 14	132475 (100%)	Mineral	Claim	092G	2000/nov/01	2024/oct/08	GOOD	25
382120	MATRIX 15	132475 (100%)	Mineral	Claim	092G	2000/nov/01	2024/oct/08	GOOD	25
382121	MATRIX 16	132475 (100%)	Mineral	Claim	092G	2000/nov/01	2024/oct/08	GOOD	25
								TOTAL ha 1125	
Owner 132475 = Mainland Construction Materials #BC1013422									

Figure 4 (Detailed location of works)



Introduction

The following report pertains to Cox Station Quarry (Cox), which is operated by Mainland Construction Materials (MCM). Cox is a granite rock quarry located along the bank of the Fraser River on the Northern Slope of Sumas Mountain in Abbotsford. This Quarry is approximately 7 miles upstream of the Abbotsford Mission Bridge.

Throughout the past year, both physical and technical work has been done on the Eastern side of Cox as the quarry expands into previously undeveloped areas as indicated in figure 4. In Figure 4, blue polygons encompass areas of lateral quarry expansion (i.e. physical exploration and development) in the previous 12 months. The red polygon encompasses the area where advanced reclamation and habitat enhancement using overburden removal from the quarry expansion has occurred.

Within the previous 12 months, stripping, investigatory drilling and blasting, surveying, and road development have been completed, along with concurrent early reclamation. Stripping was done in 2023 and 2024 in preparation for the drilling and blasting. Following the stripping, 12 instances of non-production drilling and blasting occurred on October 5th, 17th, 25th, November 6th, 21st, December 7th, 9th, 13th, 21st, March 11th, and April 25th to expose cap, and sub cap rock for observation and analysis, as well as to establish working benches suitable for production drilling and blasting. Orthophoto Model Surveying was done during October and February using Propeller, which provided 4 digital models of the newly advanced areas within the quarry. Geochemical testing was completed through February and March, 2024. During this time, 22 samples were taken for general testing and Acid Rock Drainage / Metal Leaching testing to allow for a thorough analysis of the quality and environmental impact of each area and product.

LOCATION, PHYSIOGRAPHY, ACCESS, INFRASTRUCTURE:

Sumas Mountain, a 4 km x 14 km structure rising from Sumas Prairie in the Central Fraser Valley, demonstrates a large amount of geological diversity. It features up thrust metamorphic and sedimentary beds on its southern flank, and intrusive igneous formations in the north. The major structural trend in the region is NE – SW parallel to the overall pattern of the Coast Mountains. Cox is located on the northern side of the mountain along the Fraser River. [1]

Cox is accessed by gravel road, rail, inclusive of two sidings, and deep water (Fraser) river, though the majority (approximately ninety-eight percent) of product is shipped to various distribution yards along the river via tug and barge. MCM has a total of 4 distribution yards along the Fraser River which are supplied by Cox.

Infrastructure at Cox includes a 2000+ TPH crushing plant, constructed in 2017, a matched speed barge loadout facility capable of holding 4, 4000T barges, mechanical, electrical and fabrication shops as well as ancillary office space. Cox is serviced by BCHydro, and all crushing equipment is fully electric, making it one of the lowest carbon-intensity gravel sources in the Lower Mainland.

FIGURE 5 (1:20,000 Index Map – Western portion)

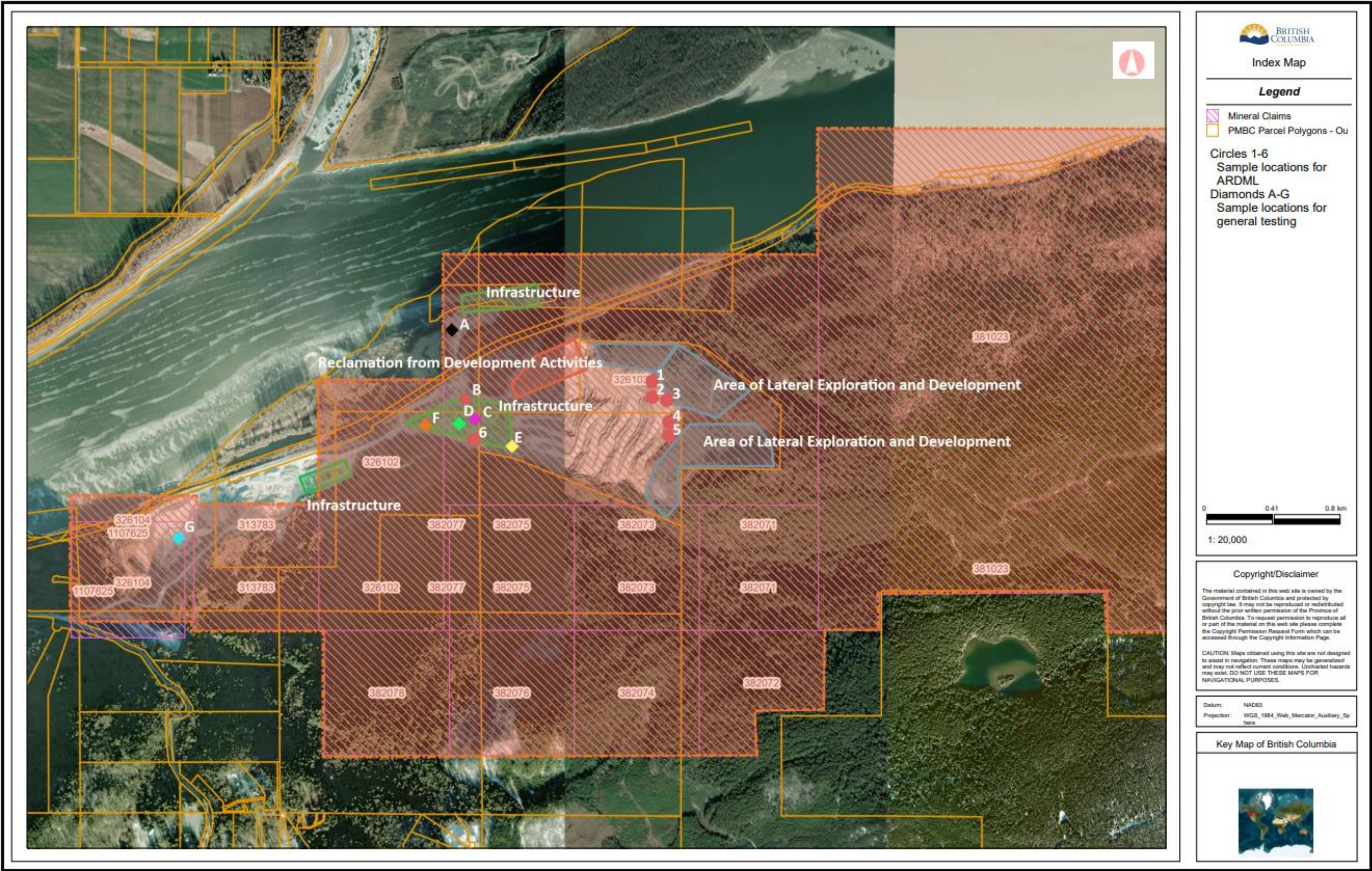
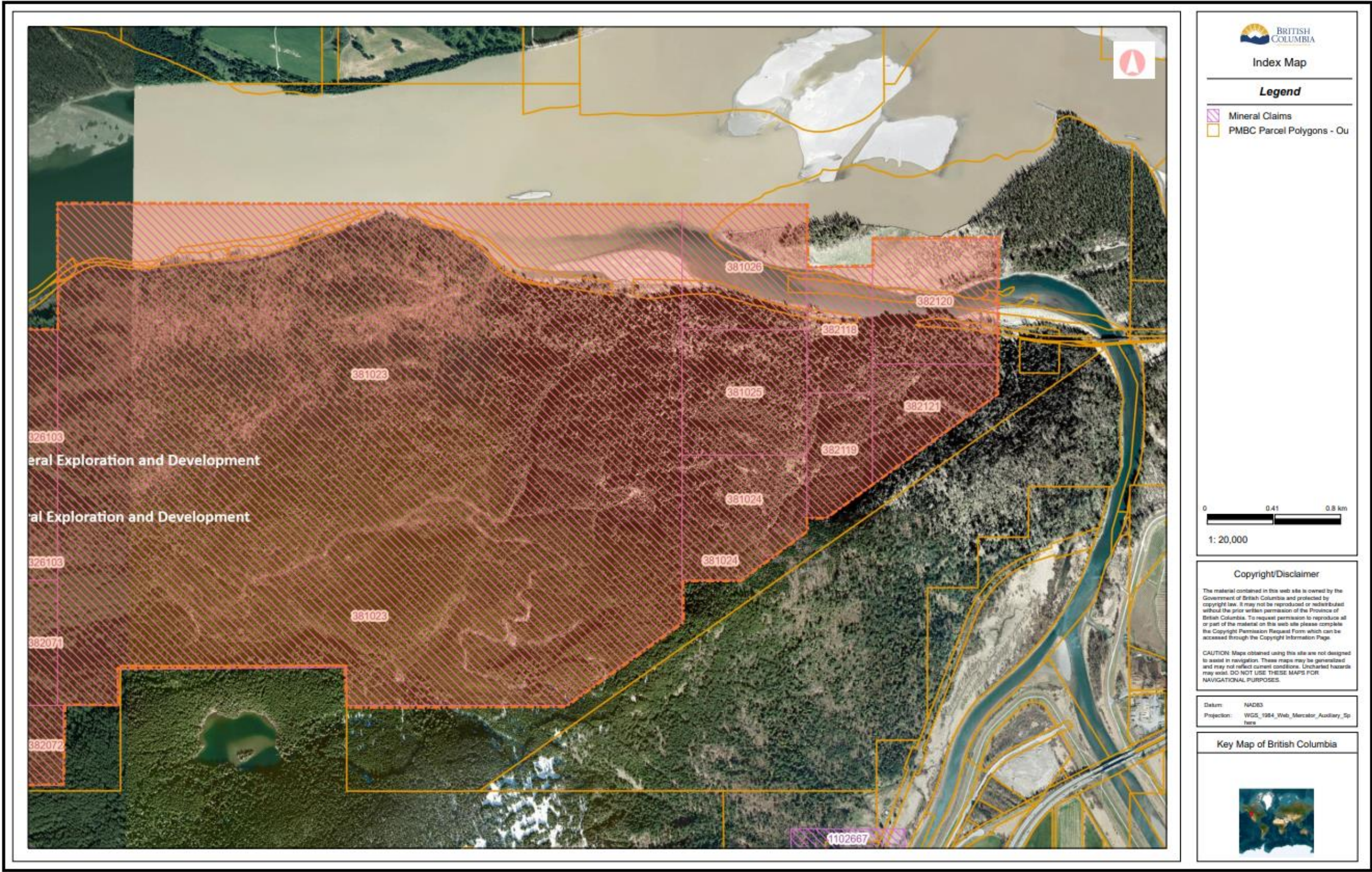


FIGURE 6 (1:20,000 Index Map– Eastern portion)



HISTORY & ECONOMIC IMPACT:

Cox was opened and accessed by CN Rail in the 1950's before being purchased by Mainland Sand and Gravel (Now Mainland Construction Materials ULC), in the early 1980's. During MCM's tenure at Cox, the production and sales of the quarry have significantly increased. The current production rate of Cox is 2-3 million tonnes per year, which leads to an estimated 30-40 years' worth of reserves within the permitted mine boundary. Cox is one of the largest single suppliers of construction aggregates in British Columbia.

GEOLOGY:

Due to its location, Cox extracts primarily cretaceous granitic bedrock with Mohs hardness between 5 and 6. The material is generally hard, strong, and mildly tough with low porosity. The granite found therein is a part of the Coast Plutonic Complex, a 60 to 200 km wide rock body which features numerous intrusive events in to pre-existing rock from mid Jurassic to mid Cretaceous and in Oligocene to Miocene time. The granite is orange, very coarsely crystalline (0.5-10mm) with 60-70% orange K-spar, <10% quartz, and 20% mafic minerals (biotite, hornblende) with light green epidote on fracture surfaces. Cox Station granite is partially overlain by Pleistocene Glacial Deposits, including the Vashon and Sumas drifts [1]. This is vastly different to the surrounding areas due to the geological diversity in the area.

Geological Map of Sumas Mountain Area

Modern Sediments

- 1 Landfill
- 2 Peat
- 3 Silt and clay
- 4 Sand and silt
- 5 Gravel and sand

Ice Age Sediments

- 6 Silt and clay
- 7 Sand
- 8 Gravel and sand
- 9 Till
- 10 Steepland sediments

Bedrock

- 11 Volcanic rock
- 12 Sandstone
- 13 Granitic rock
- 14 Foliated sedimentary and volcanic rock

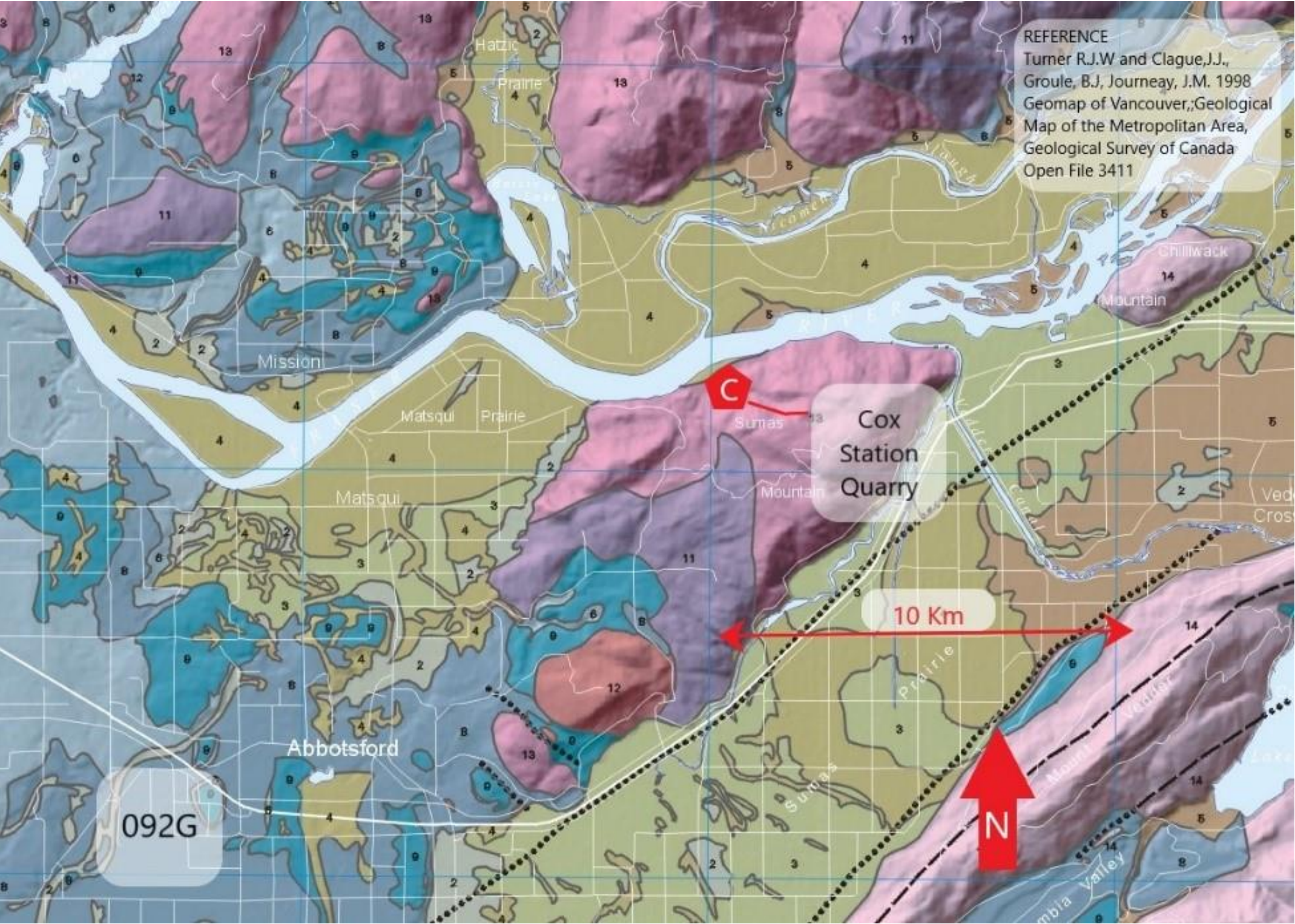


Figure 6 [2] This map was taken from a publicly available online source based on detailed work conducted by Robert J.W. Turner, John J. Clague, Bertrand J. Groulx, and J. Murray Journeay in 1998. As construction aggregate is more dependent on location than lithology, further study is not warranted.

OBJECTIVE

Cox produces 2,000,000 – 3,000,000 tonnes of product each year for customers across the lower mainland. The materials produced and sold from Cox are used in asphalt, concrete, base gravels, rip rap, sports fields, and other general construction. To keep up with this demand, the quarry must be continuously expanding, and the materials produced must be hard, durable, and free of deleterious materials such as sulfide minerals. This requires ongoing annual testing, and pre mining analysis of newly expanded areas, to ensure these goals are met. The following work has been completed within the last 12 months, and all testing is done to meet not only customer standards, but also standards set by Canadian Standards Association (CSA), American Society for Testing and Materials (ASTM), and Ministry of Transport (MoT).

RESULTS

Acid Rock Drainage / Metal Leaching (Appendix A) testing was done by Metro Testing and Engineering on samples taken from the quarry and quarry workings during 2023. While these tests did confirm that there is a trace of sulphide mineralogy in some of the sampled areas, there is low risk of ARD/ML. General Testing (Appendix B) occurs on a minimum annual basis. In 2023 and 2024, general testing was contracted to Metro Testing and Engineering and Kontur Geotechnical Consultants. The tests done for Cox in 2023 included:

- Clay Lumps (CSA A23.2-3A/ASTM C142)
- Micro-deval Test (CSA A23.2-29A/ASTM D6928)
- Freeze & Thaw (CSA A23.2-)
- Petrographic (CSA A23.2-15A/ASTM C295)
- Soil Resistivity (ASTM G57)
- Durability Index (ASTM D3744)
- LA Abrasion (ASTM C131)
- Specific Gravity (ASTM C136)
- Absorption (ASTM D1557)
- Sulfate Soundness (ASTM C88)
- Lightweight Particles (ASTM C123)
- Density and Absorption (ASTM C127/ASTM C128)
- Uncompacted Voids in Fine (ASTM D1252)
- Sand Equivalent (ASTM D2419)
- Atterberg Limits (ASTM D4318)

The testing done concluded that while some undesirable materials are present within the quarry, the location and amount cause there to be little concern and no impact on the quality of the product. The tests also confirmed that the granite, granodiorite, and andesitic rocks present continue to be sound, durable, and chemically stable for construction aggregates. Cox was found to be in compliance with ASTM, CSA, and MoT for all tests.

Stripping, Drilling, and Blasting (Appendix C) was done in approximately 20ha in the Eastern Portion of the quarry. This work has allowed access to new areas that were previously undisturbed. Road development was needed to allow for equipment access to said new areas.

Surveying (Appendix D) is done at minimum quarterly by our Propeller system. This has produced digital terrain models that guide expansion, road design, and bench planning. In the previous 12 months, four models were created which aided in quarry expansion, road design / layout and bench planning.

Reclamation Significant earth moving, and reclamation has been required over the previous 12 months as the quarry has been working towards accessing approximately 11,000,000 M3 of undeveloped resources on the northeastern edge of the property. The work remains ongoing however, to date has included moving native material overlain by a temporary overburden stockpile at an elevation of 200m to the Northeast flank where it is being placed as the first stage of habitat enhancement for the adjacent wetland at an elevation close to sea level. The area of reclamation has been determined to be exhausted as further deepening of the quarry is hampered by high potential for water inflow.

DISCUSSION

Investigation of resource quality at Cox quarry is predominantly led by third party, geological and materials engineers. The locations of the samples are selected to represent the geological variety / units identified by the geotechnical professionals. Sample collection is dictated by ASTM standards (D75/D75M-19) and, MOTi standards (T-04/2013). In 2023 / 2024 samples were taken at the working face, to characterize the deposit on the advancing edge, as well as from stockpiles of crushed materials, representing the resultant product which is a blend of more advanced and well-studied areas, blended with the newly opened faces.

The elevations these samples were taken from ranges between 160m and 190m (face samples) as well as between 5m and 15m (stockpile / blended product samples). Exact locations and methods can be found in the report located in Appendix A. The samples consisted of granitic varieties, as is standard with the production of Cox. General testing was conducted on samples collected using the following procedures.

Sample preparation was done using ASTM E877-08, ASTM C128, ASTM C142, ASTM C295, ASTM C535, ASTM C1252, ASTM D3744, ASTM D7428, ASTM G57, CSA A23.2-24A, ASTM C88, ASTM C123, ASTM C127, ASTM C131, ASTM D2419, ASTM D4791, and ASTM D5821.

Over 14 hectares were added to the working quarry in the previous year. Pioneering drilling (for access and material analysis) was predominantly contracted to Kemano Construction as the in-house production drill is too large (10 ¾" head). The drill used in this process was a Ranger DX800 with a 3.0-5.0-inch hole diameter. In late 2023, there were 10 instances of drilling and blasting for the purpose of pioneering with between 15 and 45 holes being drilled each time to varying depths. The specifics of each instance are included in Appendix C. In 2024, there have been two instances of drilling and blasting for pioneering with 5 and 33 holes being drilled. The specifics of each instance are included in Appendix C. Small-scale blasting followed to facilitate expansion and expose new material for examination, quality testing and ultimately, working bench establishment.

MCM utilizes a drone and Propeller/Trimble that flies over the desired area taking photos that can be combined to produce digital terrain models. Surveying is done quarterly to ensure efficient use of the

space within mining boundaries, inform road and bench design, ensure that mining stays within the boundaries, and to examine the feasibility of quarry expansion in consideration of difficult to access terrain features.

Advancing the mine on the NE and SE flanks has required the relocation of significant volumes of overburden. As 2023 was a slower production year, this was seen as an ideal period to advance the north and south flanks as equipment was available for the large amount of bulk earthwork necessary. Roughly 95,000 m³ of overburden was moved over a 6-month period included in the report. Also, as mining deepening to the west has been truncated due to potential for water ingress, this area was identified as available for early closure. This area is also adjacent to an undisturbed backwater. Historically this backwater was isolated from the Fraser River by the construction of the CN rail line which resulted in a perched culvert and limited hydraulic connectivity. It also featured a flashy hydraulic profile due to the steep, low-overburden cliffs and talus slope directly adjacent. Placement of the overburden materials adjacent to the blackwater will promote a softer hydraulic curve by partially retaining and slowing the runoff of precipitation.

This reclamation work was completed using various internal and externally rented equipment. The internal equipment used included 2013 CAT 775G, 2008 CAT 775F, 2004 CAT D6R LGP, 2021 CAT 352, 2016 CAT 352F, 2021 Komatsu MH400-5, 2008 CAT 740, 2013 Komatsu WA900-3EO, 2022 CAT 775G, 2013 CAT 775F, 2021 CAT 992, 2014 CAT 998K, Komatsu PC228, CAT D9N, and 2014 CAT 349EL. The externally rented equipment included pumps to dewater the work area. Equipment costs and hours are detailed in appendix E.

INTERPRETATION

All of the completed work and testing has determined that expansion into the areas to the North Eastern and South Eastern side of the current quarry is both feasible and profitable. The trace presence of sulfide mineralogy in the cap rock will not impact the quality and soundness of the material produced which allows those areas to be mined without need for concern.

The digital terrain models produced by Propeller allowed for efficient expansion and road development in the areas of interest. This was done through stripping, drilling, and blasting work in late 2023 and early 2024. This also helped to ensure that expansion is both feasible and profitable.

CONCLUSION

Over the past year, a total of \$427,981.55 was spent on the continued development and expansion of Cox. The work done included geochemical testing, surveying, stripping, drilling and blasting, and reclamation work. The geochemical testing was done to ensure the quality of material within the mountain through strength, durability, and reactivity. All samples were found to be in compliance with industry standards. Surveying was conducted on a quarterly basis to have up to date and accurate digital aerial images of the work area. This helped to facilitate mine expansion and road work. Drilling and blasting were done as needed to expand the work area of the quarry to previously untouched areas. There was a total of 12 instances of this work being completed in the past year. Reclamation work was done to move dirt to its

final resting place after it had previously been moved to allow for work in the area it had occupied. This was done as time permitted.

References

- [1] D. Huntley, PhD, GSC and D. Thompson, P Geo, Fraser Valley Geotour:, https://mineralsed.ca/site/assets/files/3451/sumasfieldguide_final_draft_24-10-13srs.pdf (accessed Jun. 25, 2024).
- [2] “Vancouver-geomap,” CGEN Archive, <https://www.cgenarchive.org/vancouver-geomap.html> (accessed Jun. 20, 2024).

Statement Of Qualifications

Assembled by: Dani C. Miller, ASCT – Environmental, CPESC, former lab manager for CCIL certified in-house lab. 13 years with Mainland Construction Materials, 18 years construction aggregate experience.

Alyenna Kerpan, Engineering Co-op Student – Chemical and Biological engineering three years, UBCV

Field Supervisor: Mine Manager: Neil Taylor, 40 years mining and construction experience

Each technical report within this summary report has been signed by the overseeing Professional Engineer on behalf of their company. The companies selected to perform the assay work each have decades of in-house experience and follow ASTM of CSA testing standards. Each laboratory utilized maintains appropriate laboratory accreditation including but not limited to CCIL / CSA and OQM

APPENDIX A



Mainland Construction Materials (MCM)
9512 – 194A Street
Surrey, B.C.
V4N 4G5

Attention: Simranjot Singh, Quality Manager
<Simranjot.Singh@mainlandcm.com>



19 – 3275 McCallum Rd, Abbotsford, BC V2S 7W8
t: 804.866.8585 f: 1.888.855.9733

Our Project File: VE44807
August 24, 2023

Henry H. Xu, Ph.D., P.Eng.
Henryxu@metrotesting.ca

RE: Report - ARD/ML Testing and Assessment of Rock/Aggregate Samples
Annual QC & Compliance Program --- Year 2023
Source: Cox Station Quarry, 6850 Cox Road, Abbotsford, BC

1. INTRODUCTION

As requested, a representative of Metro Testing & Engineering (Abbotsford) has visited the above quarry site on June 06, 2023 for sampling to access acid rock drainage (ARD) and metal leaching (ML) potential. Multiple rock/aggregate samples were collected with the assistance of the Client. The assessment of the sample materials included mineral identification, acid-base accounting (ABA), Shake Flask Extraction (SFE), and metal analysis.

This report summarizes the test results.

2. SAMPLING AND SITE REVIEW

The quarry is currently producing rip rap, and crushed gravels for various applications such as aggregates of concrete, asphalt and backfill, etc. Most mining activities remain in the east side of the site. A review of the area geology indicates that the quarry is comprised predominantly of massive granitic varieties and localized volcanic rocks (seams).

According to Client, MCM's plan for this site is to mine bench 185 north to south primarily; also mining sink and bench zero intermittently, and bench 170 to be mined sporadically.

The samples were obtained from various locations, including stockpiles of rip rap, recently blasted materials from the quarry face, and the stockpile of crushed materials near the crushing plant. While overburden, fractured, and/ weathered rock is present, the material will not be used as part of the production for the current operations according to MCM's representative.

Sample IDs with descriptions of locations and GPS coordinates are summarized in Table 1. Site conditions and approximate locations are shown in Appendix A1 and A2.



Table 1: Summary of Materials					
Sample ID	Material Type	Source/Bench	GPS Coordinates N	GPS Coordinates W	Intended Use
VE44807-L01	Rock segments	Bench 0 Elevation: ~12m	49°08'06.12"	122°10'02.28"	Aggregate /backfill/ rip rap
VE44807-L02	Rock segments	Bench 0 Elevation: ~9m	49°08'07.33"	122°10'02.53"	
VE44807-L03	Rock segments	Bench 0, Sink. Elevation: ~8m	49°08'05.42"	122°09'44.31"	
VE43807-L04	Rock segments	Bench 185 Elevation: ~172m	49°07'57.82"	122°09'44.31"	
VE44807-L05	Rock segments	Bench 180 Elevation: ~182.6m	49°07'59.287"	122°09'45.125"	
VE44807-L06	40mm minus clear crush	Production stockpile Elevation: ~12.3m	49°07'55.068"	122°10'23.471"	

3. METHODOLOGY

3.1 Mineral Identification

Rock fragments from the samples were examined in general accordance with CSA Test Method, focusing on sulfidic mineralogy, if any. Mineralogy within each rock type was identified, as well as general mechanical properties of the material. The purpose of this examination was to identify mineralogy of the rock types that are known to contribute to ARD/ML in each of the samples.

3.2 ARD/ML Testing

Acid rock drainage forms when sulphide minerals in rocks are exposed to oxidizing conditions in coal and metal mining, highway construction, and other large scale of excavations. After being exposed to air and water, oxidation of metal sulphides within the surrounding rock and overburden generates acidity. Colonies of bacteria can greatly accelerate the decomposition of the metal ions.¹

To evaluate the potential of ARD/ML, acid-base accounting (ABA) testing as noted in the Government of BC Technical Circular T-04/2013² was completed.

The solid phase metals were determined by Aqua Regia Digestion with ICP-MS finish. The digestion is done by using combinations of HNO₃ and HCl. After sample digestion, the solution is analysed by inductively coupled plasma-mass spectrometry (ICP-MS). This testing, also referred to as additional static testing, gives an indication of the materials potential to leach metals into solution. Interpretation of this data can also be used to support the ABA test results. The laboratory analysis was carried out by our partner laboratory.

Interpretation of ABA Data

Acid-base accounting (ABA) is based on the premise that the propensity for a site to produce acid rock drainage can be predicted quantitatively by determining the total amount of acidic and alkaline material a site can potentially produce. The maximum potential acidity (MPA) is calculated using the Total Sulfur value (S%) or the calculated Sulphide value, which is material potentially convertible to sulfuric acid. The neutralization potential (NP) is determined by treating and heating the sample with standardized hydrochloric acid. The net



neutralization potential (NNP) is calculated by subtracting the MPA from the NP, resulting in a positive or negative number.

A negative NNP indicates that acid generation is possible; a positive number indicates that the sample material is most likely not an acid producer. The NP/MPA ratio is also used to evaluate a sample's acid generating potential. The following scenarios are detailed in Technical Circular T-04/13:

- **Scenario 1** - If the ratio is <1 , the sample could be an acid generator (high potential) and is deemed unsuitable.
- **Scenario 2** - If the ratio is <2 but >1 , this indicates uncertainty and additional testing/analysis is required
- **Scenario 3** - if the sample's ratio is >2 , the sample has a low potential being an acid generator.

The paste pH test, which accompanies the acid-base accounting test, indicates immediately whether the rock is acid or alkaline. Acid generation may have already begun if the pH is significantly acidic.

The Fizz Rating test is another aspect of the acid-base accounting testing. This test is performed by adding 1 to 2 drops of 25% HCl to a prepared sample. The "fizz" is rated on a scale from 0 to 3; 0 being no reaction, 1 slight reaction, 2 moderate reaction, and 3 strong reaction. There should be a correlation between the NP and the Fizz Rating; for example with a Fizz Rating of 3 we should see a positive NP. With a Fizz Rating of 0, there should be a very low positive or even a negative NP.³⁻⁴

In general, sulfide-rich and carbonate-poor materials are expected to have a high potential for acid production. In contrast, alkaline-rich materials (such as limestone), even with significant sulphide mineralogy, often produce alkaline conditions in water.

Interpretation of SFE Data

In addition to solid phase metal analysis, MEND Shake flask extraction (SFE) test was conducted on selected samples. Similar to toxicity characteristic leaching procedure (TCLP), after extraction, the sub-sample of leachate was submitted for analyses of metals by ICP-MS. This procedure is considered an additional component of static testing when required and is typical used to determine the presence of easily soluble mineral components.³The recommended procedure is for samples to be shaken for 24 hours, at a 3:1 water to solids ratio by weight. Gentle agitation is provided to ensure continuous exposure of all surfaces and mixing of the rinse solution.

In this program, the typical BC standards/criteria were used for comparison when evaluating the potential of metal leaching from the material. Please note that the intention of the above comparison is not to perform an environmental impact assessment as specific use and application of material is unknown.

4. TEST RESULTS AND DISCUSSION

4.1 Mineral Identification

Table 2 summarizes the samples obtained from the quarry, including a brief description of major and accessory minerals observed.

During examination of the samples non to trace of sulphide mineralogy were identified. The mineral identified was pyrite. Iron oxide mineralogy in the form of magnetite was identified but this form of iron mineralogy is not known to contribute to acid rock drainage. From a mineralogical perspective the risk of ARD/ML is considered low.



Table 2: Mineral Identification		
No	Sample ID	Description of Rock Samples
1	VE44807-L01	Granite, coarse grained, fresh, w/ significant amount of K-feldspar, lesser of plagioclase feldspar, quartz, and hornblende. No sulfide mineralogy identified. pinkish/pale with black speckles.
2	VE44807-L02	Granite, coarse grained, fresh, containing plagioclase feldspar, pyroxene and hornblende; no sulfide mineralogy identified, greenish gray with speckles.
3	VE44807-L03	Coarse grained, trace of sulfide mineralogy identified.
4	VE43807-L04	Granite, coarse grained, fresh. Minor sulfide mineralogy identified. Mohs hardness of >5.5, greenish gray with black speckles.
5	VE44807-L05	Similar to L-03. no sulfide mineralogy identified.
6	VE44807-L06	A mixture, trace of sulfide minerals noted.

4.2 ARD/ML Potential

The samples were evaluated using acid-base accounting analysis (ABA) and metals. The results are summarized in Table 3. A certified copy of the analysis is attached in Appendix A3.

Table 3: Summary of Acid-Base Accounting Data							
Sample ID	S %	MPA t CaCO ₃ /1000t	NP t CaCO ₃ /1000t	NNP t CaCO ₃ /1000t	NP/MPA ratio	Paste pH	Fizz Rating
VE44807-L01	0.03	<0.3	7.6	7.6	N/A (≠/25.3)	8.7	0
VE44807-L02	0.03	<0.3	5.2	5.2	N/A (≠/17.3)	8.7	0
VE44807-L03	0.05	0.3	9.0	8.7	28.8	8.9	0
VE43807-L04	0.26	2.8	13.4	10.6	4.8	8.7	1
VE44807-L05	0.03	<0.3	10.2	10.2	N/A (≠/34)	8.8	0
VE44807-L06	0.13	0.6	15.2	14.6	24.3	8.8	1

Note: MPA = 31.25 x S% (sulphide) and NNP=NP-MPA

The acid-base accounting (ABA) test results for the samples show that the NNP values are ranged from 5.2 to 14.6 tCaCO₃/1000t rock. The positive NNP values indicate that the rock materials are not likely to be acid producers.

Total sulphur contents are low for all samples. The NP/MPA ratios ranged from 4.8 to 28.8. Note, numbers in brackets were calculated for reference when sulphide sulphur is less than detection limit. The ratios are ALL larger than 2, indicating that the materials do not likely have a potential of generating acid. The paste pH values for the samples were 8.7- 8.9. The values show an alkaline condition and indicate an absence of acid rock generation, if any. All samples had fizz ratings of 0-1, indicating mostly no reaction with hydrochloric acid, but slight reaction for Samples L-04 and 06, respectively.

A review of "Metals by Aqua Regia Digestion and ICP-MS finish" indicates that the data, including calcium and sulphur concentration support the above findings in terms of NP and soluble sulphur. The data can be



used as benchmark or reference for future expansion and Quality Control. See attached certificate for reference (Appendix A3).

Based on the static analysis completed, it is our opinion that the rock materials represented by samples are unlikely to have a potential for acid rock generation. The present round of testing did not show potential or active acid production/metal leaching.

4.3 SFE Test & Data Interpretation

Based on sample review, SFE test was conducted on three samples: VE44807-L01,03 and 05.

Interpretation of SFE data for ML potential can be referenced with the letter Metro's Environmental Division (Appendix B). Results are summarized as below:

- The conformance to BC Hazardous Waste Regulation Leachate Quality Standards.
- When compared to BC Water Quality Guidelines (WQG), there are comments/exceedance of several metals (Al, Cu and Zn) over long-term or short-term average WQG, but mostly less than 10x the WQGs except for aluminum. Therefore, *except for elevated concentrations of dissolved aluminium for tested samples*, ML potential is considered low in general.

It is understood that subject to project requirements, different criterion may be applicable for a specific project.

5. CONCLUSIONS AND RECOMMENDATIONS

A review of the mineral examinations and static testing (ABA) as completed in this program indicates that the sample materials *do not* have a potential of acid rock generation. Regarding metal leaching (ML) potential, except for aluminium, SFE data showed the conformance to typical standards/criteria showing low potential in general. Sample materials extracted from & representing the quarry site are suitable for intended applications.

If the materials from the source quarry are consistent then no further testing in terms of ARD potential should be necessary for present operations. However, the material should be monitored on an on-going basis for sulphide mineralogy. If an increase in sulphide mineralogy is noted, then the material should be re-evaluated for acid rock drainage/metal leaching performance.

(Left blank purposely below)



Metro File No. VE44807

Page 6 of 8

I trust this report meets your needs. Should you have any questions, please contact the office.

Metro Testing & Engineering Ltd.
(Abbotsford)

Yours truly,
Per;

Reviewed by:

Henry H. Xu Ph.D., P.Eng.
Sr. Materials Engineer

Vivian Ferrera, P.Geo.
Senior Geoscientist

References:

1. USGS Open-file Report 2005-1148, Acid-rock drainage at Skytop, Center County, Pennsylvania, 2004.
2. Government of BC, Evaluating the Potential for Acid Rock Drainage and Metal Leaching at quarries, Rock Cut Sites and from Stockpiled Rock or Talus Materials used by the MOTI Technical Circular T-04/2013.
3. Guidelines for Metal Leaching and Acid Rock Drainage in British Columbia, Ministry of Energy and Mines, and Ministry of Environment, 1998.
4. US Environmental Protection Agency, Technical Report, Acid Mine Drainage Prediction, Dec 1994.

Use of Report & Limitations:

Metro Testing & Engineering (Abbotsford) prepared the foregoing report for the exclusive use and information of **Mainland Construction Materials**. The information and data were collected and compiled in accordance with the general level of care and skill normally exercised by geoscience and engineering professionals practising under similar circumstances. The testing/investigation was limited to the scope of work specifically addressed in the report. Any use by a third party of the foregoing report, or any reliance upon or decisions made by a third party based upon them is the sole responsibility of such third parties. Metro accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on the foregoing report. All documentation contained in the foregoing report has been prepared in accordance with the requirements in the TC T-04/2013.

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Appendix A

A1 Photos- Site Condition and/ Aggregate Sampling



Photo #1 Overview of active quarry face (L2)



Photo #2 Close-view, quarry face (L1)



Photo #3 Close up, newly blasted rock



Photo #4 50 mm Clear Crush



A2 Approx. Sampling Locations



A3 ARD/ML- Test Data/Certificates

Appendix B Interpretation of SFE Analytical Data

CERTIFICATE OF ANALYSIS • COVER PAGE

Appendix A3



CLIENT INFORMATION	
Client:	Metro Testing & Engineering Ltd.
Project Manager:	Henry Xu
Mailing Address	3275 McCallum Rd, Suite 18 Abbotsford, BC, V2S 7W8
Contact No:	(604) 855-8568

PROJECT INFORMATION	
Project Name:	VE44087
Project Number:	N/A

RESULTS	
Reported To:	1 Henry Xu (henryxu@metrotesting.ca)
	2
	3
	4
Date Reported:	Version-1: Monday, July 31, 2023

INVOICE	
Submitted To:	1 Henry Xu (henryxu@metrotesting.ca)
	2 Shari David (sdavid@metrotesting.ca)
	3
	4
Client PO No:	
Global Invoice No:	ARD2354-0723A
Date Submitted:	July 31, 2023

COMPANY INFORMATION	
Legal Name:	Global ARD Testing Services Inc.
Mailing Address:	6891 Antrim Avenue Burnaby, BC V5J 4M5
Contact No:	Main: (604) 428-2730 Alternate: (604) 603-1359

REPORTING	
Global Project No:	2354
Report Version:	1
Pages (Including Cover):	4
Report Title:	COA x6 VE44087 Samples (rec'd 27-Jun23)
Analysis Reviewed By:	Prab Bhatia (Pbhatia@globalardtesting.com)
Position:	Project Manager
Report Certified By:	Prab Bhatia
Signature:	

NOTES	
All samples and pulps are stored at no charge for 90 days past reporting date.	
Please contact the lab if you would like to continue storage past 90 days.	
Storage charges will apply.	



CERTIFICATE OF ANALYSIS • SAMPLE DETAILS

PAGE: 2 of 4
 GLOBAL PROJECT NO: 2354
 CLIENT: Metro Testing & Engineering Ltd.
 PROJECT NAME: VE44087
 PROJECT NO: N/A
 REPORT VERSION: 1

SAMPLE RECEIPT INFO	
Date Samples Received:	Tuesday, June 27, 2023
No of Samples Received:	6
Samples Received By:	Prab

ANALYTICAL INSTRUCTIONS	
From:	as per email Confirmation
Date:	Tuesday, June 27, 2023

S. No.	Sample ID	Sample Description	Condition (Wet/Dry)	Wt. of Sample Rec'd (kg)	Global Notes (if any)
1	VE44087-L01	Tailing	Dry	0.56	
2	VE44087-L02	Tailing	Dry	0.75	
3	VE44087-L03	Tailing	Dry	0.59	
4	VE44087-L04	Tailing	Dry	0.58	
5	VE44087-L05	Tailing	Dry	0.70	
6	VE44087-L06	Tailing	Dry	0.61	

Total wt of sample rec'd (kg): 3.77

		Sequential Leach											
S. No.	Sample ID	Paste pH	Fizz Rating	Total Inorganic C	CaCO ₃ Equivalents ¹	Total Sulphur	Sulphate Sulphur	Sulphide Sulphur	Non-Extractable Sulphur ²	AP ³	Modified ABA NP	NNP ⁴	NPR ⁵
Units:		pH Units		wt %	kg CaCO ₃ /tonne	wt %	wt %	wt %	wt %		kg CaCO ₃ /tonne		
Reported Detection Limit:		0.1		0.02	1.7	0.01	0.01	0.01	0.01	0.3	0.5		
1	VE44087-L01	8.7	None	0.12	10.0	0.03	<0.01	<0.01	0.03	<0.3	7.6	7.6	N/A
2	VE44087-L02	8.7	None	0.06	5.0	0.03	<0.01	<0.01	0.03	<0.3	5.2	5.2	N/A
3	VE44087-L03	8.9	None	0.16	13.3	0.05	<0.01	0.01	0.04	0.3	9.0	8.7	28.8
4	VE44087-L04	8.7	Slight	0.13	10.8	0.26	<0.01	0.09	0.17	2.8	13.4	10.6	4.8
5	VE44087-L05	8.8	None	0.12	10.0	0.03	<0.01	<0.01	0.03	<0.3	10.2	10.2	N/A
6	VE44087-L06	8.8	Slight	0.25	20.8	0.13	<0.01	0.02	0.11	0.6	15.2	14.6	24.3
QUALITY ASSURANCE / QUALITY CONTROL													
Pulp Replicates:													
%RPD													
Reference Material Analysis:													
Reference Material		1) NBM-1 2) KZK-1		KZK-1		LECO ORE	RTS-3a	KZK-1			1) NBM-1 (Slight) 2) NBM-1 (Moderate)		
Ref. Material Certified Value		1) 8.45 2) 8.80		0.92		0.82	1.10	0.37			1) 46.6 2) 52.3		
Reference Material Results		1) 8.30 2) N/A		0.87		0.84	1.02	0.37			1) 44.8 2) N/A		
Acceptance Range:		90% - 110%		80% - 120%		90% - 110%	90% - 110%	90% - 110%			90% - 110%		
Method Blank Analysis:													
Method Blank Results				<0.02		<0.01	<0.01	<0.01					
GLOBAL SOP NO/METHOD:		ARD-005	ARD-005	HClO ₄ Leach CO ₂ Coulometer	Calc.	LECO	ARD-013 HCl/HNO ₃ leach	(Seq.	Calc.	Calc.	ARD-005	Calc.	Calc.

NOTES:
Job No: 20230717

Date of Analysis (24 h): July 18, 2023
pH of DI water used (pH units): 5.78
EC of DI water used ($\mu\text{S}/\text{cm}$): 0.82

METHODS:

Total Inorganic Carbon (TIC): HClO_4 leach, evolved CO_2 analysed by CO_2 Coulometer.

ABBREVIATIONS:

R = Rep = Replicate (a replicate is a sub-sample scooped from a single pulp sample bag produced per client sample)
D = Dup = Duplicate (a duplicate is 2nd sub-pulp sample bag produced by processing a 2nd split of the client sample. A duplicate pulp sample is prepared only at client request.
EC = Electric Conductivity
NP = Neutralization Potential
Calc. = Calculation
IND = Indeterminate
COA = Certificate Of Analysis
N/A = Not Applicable
NR = Not Reported

CALCULATIONS:

- ⁺¹ CaCO₃ Equivalents: Is based on TIC (Total Inorganic Carbon)
⁺² Non-Extractable Sulphur: Total sulphur - (sulphate sulphur + sulphide sulphur)
⁺³ AP (Acid Potential): Sulphide-sulphur x 31.25
⁺⁴ NNP (Net Neutralization Potential): NP - AP
⁺⁵ NPR (Neutralization Potential Ratio): NP/AP

REFERENCES:

Sample Preparation: ASTM E877-08; MEND Report 1.20.1, Version 0 (2009)

ABA: Air-dried, jaw-crushed, split by riffing and pulverized to 85% passing 200 mesh (75 μm).

Modified ABA (Sobek) NP: MEND Acid Rock Drainage Prediction Manual. MEND Project 1.16.1b (pages 6.2-11 to 17). March 1991.

Paste pH / Fizz Rating: Sobek, A.A., Schuller, W.A., Freeman, J.B. and Smith, B.M.: US EPA-600/2-78-054 (1978).

Sulphur Speciation: Sequential HCl and HNO₃ leach. The S extracted is determined by analysing the extract for SO₄ using UV-Vis Spectrophotometer (STD Method 4500-SO42- E).

CERTIFICATE OF ANALYSIS • METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

PAGE: 4 of 4
GLOBAL PROJECT NO: 2354
CLIENT: Metro Testing & Engineering Ltd.
PROJECT NAME: VE44087
PROJECT NO: N/A
REPORT VERSION: 1

S. No.	Sample ID	Method	Silver	Aluminum	Arsenic	Gold	Boron	Barium	Beryllium	Bismuth	Calcium	Cadmium	Cerium	Cobalt	Chromium	Cesium	Copper	Iron	Gallium	Germanium	Hafnium	Mercury	Indium	Potassium	Lanthanum	Lithium	Magnesium	Manganese	
		Analyte	(Ag)	(Al)	(As)	(Au)	(B)	(Ba)	(Be)	(Bi)	(Ca)	(Cd)	(Ce)	(Co)	(Cr)	(Cs)	(Cu)	(Fe)	(Ga)	(Ge)	(Hf)	(Hg)	(In)	(K)	(La)	(Li)	(Mg)	(Mn)	
		Unit	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	ppm	ppm	ppm	%	ppm	ppm	%	ppm	
		MDL	0.01	0.01	0.1	0.0005	10	10	0.05	0.01	0.01	0.01	0.02	0.1	1	0.05	0.2	0.05	0.05	0.05	0.02	0.005	0.005	0.01	0.2	0.1	0.01	5	
Sample Type																													
1	VE44087-L01	Pulp	<0.01	0.87	0.7	<0.0005	<10	56	0.20	<0.01	0.52	0.01	9.24	3.5	59	0.06	1.7	1.69	4.19	0.07	0.15	<0.005	0.005	0.06	5.5	0.9	0.44	414	
2	VE44087-L02	Pulp	<0.01	0.81	0.3	<0.0005	<10	62	0.17	<0.01	0.47	0.01	8.99	3.3	64	0.06	1.2	1.59	4.00	0.08	0.18	<0.005	<0.005	0.05	5.4	0.7	0.38	417	
3	VE44087-L03	Pulp	<0.01	0.84	0.5	<0.0005	<10	55	0.20	<0.01	0.60	0.02	9.84	3.5	64	0.07	5.6	1.67	4.27	0.07	0.19	<0.005	0.008	0.06	5.8	1.0	0.43	477	
4	VE44087-L04	Pulp	<0.01	1.45	0.4	<0.0005	<10	94	0.17	0.03	0.86	0.03	9.77	6.0	64	<0.05	12.1	2.64	5.35	0.07	0.14	<0.005	0.010	0.05	5.5	1.3	0.86	877	
5	VE44087-L05	Pulp	<0.01	1.22	<0.1	<0.0005	<10	88	0.09	<0.01	0.80	<0.01	11.79	6.2	65	0.05	1.2	2.77	5.10	0.10	0.15	<0.005	0.007	0.01	6.7	1.1	0.74	463	
6	VE44087-L06	Pulp	0.06	1.41	1.0	0.0018	<10	67	0.18	0.02	1.02	0.02	10.00	6.8	62	0.12	21.5	3.09	5.73	0.09	0.18	<0.005	0.011	0.03	5.7	1.4	0.94	772	
QUALITY ASSURANCE / QUALITY CONTROL																													
Pulp Replicates																													
5	VE44087-L05	Pulp	<0.01	1.22	<0.1	<0.0005	<10	88	0.09	<0.01	0.80	<0.01	11.79	6.2	65	0.05	1.2	2.77	5.10	0.10	0.15	<0.005	0.007	0.01	6.7	1.1	0.74	463	
5R	VE44087-L05 (Rep)	Pulp	<0.01	1.19	0.2	<0.0005	<10	85	0.09	<0.01	0.78	<0.01	11.90	6.4	64	<0.05	1.2	2.74	5.15	0.09	0.15	<0.005	0.007	0.01	6.7	1.1	0.73	455	
%RPD			2%				3%	0%		3%			-1%	-3%	2%		0%	1%	-1%	11%	0%		0%	0%	0%	0%	1%	2%	
Reference Material																													
STD OREAS 601C			50.78	0.670	389.7	0.991	<10	490	0.60	21.23	0.79	2.76	34.7	4.60	15.0	1.38	1171.0	1.84	3.85	0.10	0.98	0.226	0.493	0.260	18.6	7.50	0.090	213	
True Value STD OREAS 601C			50.41	0.663	378.2		<10		0.59	21.32	0.78	2.70	34.7	4.27	14.7	1.32	1157.6	1.84	3.86	0.08	0.97	0.216	0.497	0.254	17.3	7.56	0.084	213	
% Difference			1%	1%	3%				2%	0%	1%	2%	0%	8%	2%	4%	1%	0%	0%	20%	1%	5%	-1%	3%	8%	-1%	7%	0%	
Method Blank:																													
Method Blank			<0.01	<0.01	<0.1	<0.0005	<10	<10	<0.05	<0.01	<0.01	<0.01	<0.02	<0.1	<1	<0.05	<0.2	<0.01	<0.05	<0.05	<0.02	<0.005	<0.005	<0.01	<0.2	<0.1	<0.01	<5	

Notes:

Job No: YVR2310753

Analytical Methods (IMS-130):

A 0.5 g of pulp sample is leached in hot (95°C) 3:1 aqua regia digestion followed by ICP Mass Spec analysis.

Gold determinations by this method are semi-quantitative due to the small sample weight used (0.5 g).

Refractory and graphitic samples can limit Au solubility.

Abbreviations:

R / Rep = Replicate (a replicate is a sub-sample scooped from a single sample bag produced per client sample)

D / Dup = Duplicate (a duplicate is 2nd sub-sample bag produced by processing a second split of the original client sample received)

MDL = Measurable Detection Limit

COA: Certificate Of Analysis.

IND = Indeterminate

NR: Not reported in COA

On Certified Reference Material and Tolerance:

Any one element in a run reporting outside tolerance limits does not constitute failure of the standard.

As per Certificate of Analysis (COA): All values indicated are Certified. Values indicated in green are indicative only.

NR = Not Reported (in the Certificate Of Analysis).



CERTIFICATE OF ANALYSIS • METALS RESULTS BY AQUA REGIA DIGEST & ICP-MS ANALYSIS ON SOLIDS

PAGE: 4 of 4
GLOBAL PROJECT NO: 2354
CLIENT: Metro Testing & Engineering Ltd.
PROJECT NAME: VE44087
PROJECT NO: N/A
REPORT VERSION: 1

		Method																										
S. No.	Sample ID	Analyte Unit MDL	Molybdenum (Mo) ppm 0.05	Sodium (Na) % 0.01	Niobium (Nb) ppm 0.05	Nickel (Ni) ppm 0.2	Phosphorous (P) ppm 10	Lead (Pb) ppm 0.2	Rubidium (Rb) ppm 0.1	Rhenium (Re) ppm 0.001	Sulphur (S) % 0.01	Antimony (Sb) ppm 0.05	Scandium (Sc) ppm 0.1	Selenium (Se) ppm 0.2	Tin (Sn) ppm 0.2	Stronium (Sr) ppm 0.2	Tantalum (Ta) ppm 0.01	Tellurium (Te) ppm 0.01	Thorium (Th) ppm 0.2	Titanium (Ti) % 0.005	Thallium (Tl) ppm 0.02	Uranium (U) ppm 0.05	Vandium (V) ppm 1	Tungsten (W) ppm 0.05	Yttrium (Y) ppm 0.05	Zinc (Zn) ppm 1	Zirconium (Zr) ppm 0.5	
		Sample Type																										
1	VE44087-L01	Pulp	0.37	0.06	0.42	1.8	419	0.8	2.5	<0.001	<0.01	<0.05	2.1	<0.2	0.4	18.8	<0.01	<0.01	2.1	0.097	<0.02	0.27	25	0.26	7.53	28	3.5	
2	VE44087-L02	Pulp	0.40	0.06	0.42	1.7	370	0.8	1.9	<0.001	<0.01	<0.05	1.9	<0.2	0.4	17.7	<0.01	<0.01	2.5	0.081	<0.02	0.35	24	0.34	7.22	20	4.3	
3	VE44087-L03	Pulp	0.77	0.06	0.48	1.8	383	1.0	2.5	<0.001	0.03	<0.05	3.1	<0.2	0.4	23.7	0.01	<0.01	2.7	0.084	<0.02	0.45	27	0.39	9.19	27	4	
4	VE44087-L04	Pulp	0.31	0.08	0.25	1.6	768	0.4	1.7	<0.001	0.26	<0.05	4.0	<0.2	0.3	31.4	<0.01	0.02	2.0	0.094	<0.02	0.31	46	0.32	9.23	45	3	
5	VE44087-L05	Pulp	0.53	0.08	0.27	1.4	1053	0.4	0.5	<0.001	<0.01	<0.05	3.0	<0.2	0.4	28.6	<0.01	<0.01	1.8	0.116	<0.02	0.27	49	0.37	8.76	26	2.9	
6	VE44087-L06	Pulp	0.37	0.07	0.18	1.5	927	0.5	1.1	<0.001	0.10	<0.05	4.5	<0.2	0.3	29.4	<0.01	0.02	1.4	0.115	<0.02	0.23	67	0.35	8.60	40	3.4	
QUALITY ASSURANCE / QUALITY CONTR																												
Pulp Replicates																												
5	VE44087-L05	Pulp	0.53	0.08	0.27	1.4	1053	0.4	0.5	<0.001	<0.01	<0.05	3	<0.2	0.4	28.6	<0.01	<0.01	1.8	0.116	<0.02	0.27	49	0.37	8.76	26	2.9	
5R	VE44087-L05 (Rep)	Pulp	0.49	0.08	0.23	1.5	1043	0.3	0.5	<0.001	<0.01	<0.05	2.9	<0.2	0.4	28.5	<0.01	<0.01	1.8	0.109	<0.02	0.27	48	0.36	8.93	25	2.8	
		%RPD	8%	0%	16%	-7%	1%	29%	0%				3%		0%	0%			0%	6%		0%	2%	3%	-2%	4%	4%	
Reference Material																												
STD OREAS 601C			3.34	0.04	0.48	6.5	242	249.3	12.5	<0.001	0.95	30.13	1.00	7.5	1.70	36.4	<0.01	7.19	6.4	0.011	1.21	2.14	5.00	1.17	5.07	385	34.5	
True Value STD OREAS 601C			3.35	0.05	<1	6.0	243	248.1	12.4	<0.001	0.91	29.73	1.03	8.0	1.587	36.3	<0.05	7.22	6.1	0.010	1.20	2.04	4.75	1.16	5.10	380.6	33.5	
% Difference			0%	-24%		8%	-1%	0%	1%		5%	1%	-3%	-6%	7%	0%		0%	4%	15%	1%	5%	5%	0%	-1%	1%	3%	
Method Blank:																												
Method Blank			<0.05	<0.01	<0.05	<0.2	<10	<0.2	<0.1	<0.001	<0.01	<0.05	<0.1	<0.2	<0.2	<0.2	<0.01	<0.01	<0.2	<0.005	<0.02	<0.05	<1	<0.05	<0.05	<1	<0.5	

Metro Testing & Engineering Ltd.
 3275 McCallum Rd #20
 Abbotsford BC
 V2S 7W7

Attention: Mr. Hanfeng (Henry) Xu, Ph.D., P.Eng.

RE: Summary of Shake Flask Extraction Data, , for Samples Sourced from Cox Station Quarry, Abbotsford, BC

Metro Testing & Engineering Ltd. (Metro) is pleased to provide a summary of certain analytical data for three aggregate samples (VE44087-L01, VE44087-L03 and VE44087-L05). The subject samples were collected by others from a quarry/pit at Cox Station Quarry, Abbotsford, BC, and were intended to represent a reasonable volume of the subject material (SM). We understand the SM was proposed as a potential construction material on various projects in BC, as managed by Mainland Sand & Gravel (the Client).

The subject samples were delivered under a chain of custody to ALS Environmental Laboratories (Burnaby, BC), a suitably accredited lab, for analysis of metals by industry standard Shake Flask Extraction (SFE) procedure. The analytical data were compared to the BC Hazardous Waste Regulation (HWR)¹ Leachate Quality standards and the BC Approved Water Quality Guidelines (WQGs)² for Aquatic Life.

The analytical results are summarized below:

Sample	Parameters	Results vs. HWR	Results vs. WQGs			
			Long-Term	Short-Term	10x Long-Term	10x Short-Term
VE44087-L01	Aluminium	NS	>AS	>AS	>AS	>AS
	Copper	<AS	DL>AS	<AS	<AS	<AS
	Zinc	<AS	DL>AS	<AS	<AS	<AS
	Remaining Metals	<AS or NS	<AS	<AS	<AS	<AS
Notes: 1. WQG varies with temperature, hardness, pH, and dissolved organic carbon (DOC); Temperature assumed to be 15°C; and DOC assumed to range from 0.05 to 20 mg/L; Consult BC WQGs for further information. 2. <AS, means result(s) less than referenced guideline; >AS (green high-lighted), means result(s) greater than the WQG but less than 10x the WQG; >AS (red high-lighted), means result(s) exceed 10x the WQG; 3. DL>AS (blue high-lighted), means detection limit exceeds referenced guideline hence the result is indeterminate. 4. NS, means no standard/guideline. 5. Metals means those regulated heavy metals routinely tested by accredited labs.						

¹ British Columbia Hazardous Waste Regulation; (BC Reg 63/88 including amendments up to BC Reg 64/2021); Dated 11 March 2021; BC Ministry of Environment and Climate Change Strategy, Victoria, British Columbia.

² British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary; Water Quality Guideline Series WQG-20; Dated 2021; BC Ministry of Environment and Climate Change Strategy, Victoria, British Columbia.



We note that:

- All results for tested metals were less than HWR standards.
- All determinant results for tested metals were less than WQG criteria except for aluminium.
- The subject sample was reported to have a pH of 9.08. (Note: excessive SM volumes placed near or in seasonal/constant contact with natural waterbodies/wetland could produce an effluent that exceeds HWR Schedule 1.2 pH limit of 8.5 for discharge to storm drains and to the environment.)

Sample	Parameters	Results vs. HWR	Results vs. WQGs			
			Long-Term	Short-Term	10x Long-Term	10x Short-Term
VE44087-L03	Aluminium	NS	>AS	>AS	>AS	>AS
	Copper	<AS	DL>AS	<AS	<AS	<AS
	Zinc	<AS	DL>AS	<AS	<AS	<AS
	Remaining Metals	<AS or NS	<AS	<AS	<AS	<AS
Notes: 1. WQG varies with temperature, hardness, pH, and dissolved organic carbon (DOC); Temperature assumed to be 15°C; and DOC assumed to range from 0.05 to 20 mg/L; Consult BC WQGs for further information. 2. <AS, means result(s) less than referenced guideline; >AS (green high-lighted), means result(s) greater than the WQG but less than 10x the WQG; >AS (red high-lighted), means result(s) exceed 10x the WQG; 3. DL>AS (blue high-lighted), means detection limit exceeds referenced guideline hence the result is indeterminate. 4. NS, means no standard/guideline. 5. Metals means those regulated heavy metals routinely tested by accredited labs.						

We note that:

- All results for tested metals were less than HWR standards.
- All determinant results for tested metals were less than WQG criteria except for aluminium.
- The subject sample was reported to have a pH of 9.13. (Note: excessive SM volumes placed near or in seasonal/constant contact with natural waterbodies/wetland could produce an effluent that exceeds HWR Schedule 1.2 pH limit of 8.5 for discharge to storm drains and to the environment.)



Sample	Parameters	Results vs. HWR	Results vs. WQGs			
			Long-Term	Short-Term	10x Long-Term	10x Short-Term
VE44087-L05	Aluminium	NS	>AS	>AS	>AS	>AS
	Copper	<AS	DL>AS	<AS	<AS	<AS
	Zinc	<AS	DL>AS	<AS	<AS	<AS
	Remaining Metals	<AS or NS	<AS	<AS	<AS	<AS
Notes: 1. WQG varies with temperature, hardness, pH, and dissolved organic carbon (DOC); Temperature assumed to be 15°C; and DOC assumed to range from 0.05 to 20 mg/L; Consult BC WQGs for further information. 2. <AS, means result(s) less than referenced guideline; >AS (green high-lighted), means result(s) greater than the WQG but less than 10x the WQG; >AS (red high-lighted), means result(s) exceed 10x the WQG; 3. DL>AS (blue high-lighted), means detection limit exceeds referenced guideline hence the result is indeterminate. 4. NS, means no standard/guideline. 5. Metals means those regulated heavy metals routinely tested by accredited labs.						

We note that:

- All results for tested metals were less than HWR standards.
- All determinant results for tested metals were less than WQG criteria except for aluminium.
- The subject sample was reported to have a pH of 9.22. (Note: excessive SM volumes placed near or in seasonal/constant contact with natural waterbodies/wetland could produce an effluent that exceeds HWR Schedule 1.2 pH limit of 8.5 for discharge to storm drains and to the environment.)

Analytical results are presented in Table 1A, B, C, Attachment 1. The laboratory documents are presented in Attachment 2.

If SM is to be placed within 10 metres of riparian areas or other areas with similarly sensitive receptors, or if site/geology conditions change or governing legislation/regulations change, Metro should be contacted for further professional advice.

Within 12 months from the date of this letter report, the analytical results herein may be used in conjunction with other recommended assessment to gauge the suitability of the SM for the proposed usage. Assessment of the various projects' environmental conditions/compatibility relative to SM usage was not undertaken; this assessment was outside the scope of Metro's work.

Please note that municipal bylaws, Federal/Provincial requirements, or Indigenous treaty/non-treaty requirements regarding environmental management/notifications may apply; the Client is responsible for meeting such requirements. Updating the Client on such requirements was outside the scope of Metro's work.



Project No.: VT44067
Summary of Shake Flask Extraction Data
Page 4

If you have any questions regarding this matter, please feel free to contact the undersigned at 604-436-9111 or via email at enviro@metrotesting.ca.

Respectfully submitted,

Metro Testing & Engineering Ltd.
EGBC Permit to Practice Number 1000648

Prepared By:

Reviewed By:

For:


John Wu, M.Sc. EIT
Jr. - Int. Environmental Scientist

Per


Michael Guthrie, P. Eng
Senior Environmental Engineer
10 Aug 2023



Attachments:

1. Table 1A, B, C – Shake Flask Extraction Analytical Data
2. Laboratory Documents

Attachments

Attachment 1

Metro Testing & Engineering Ltd
Summary of Shake Flask Extraction Data
Cox Station Quarry, Abbotsford, BC

Table 1A - Shake Flask Extraction Analytical Data³

Project No.: VE44087
August 2023

Sample No.	Leachate Quality Standards ¹	BC Approved WQG Long-term Average ² (see Column A)	BC Approved WQG Short-term Maximum ² (see Column B)	Column A Calculated ⁵ Long-term WQG ²	Column B Calculated ⁵ Short-term WQG ²	10x Long- term WQG ²	10x Short- term WQG ²	VE44087-L01
Date Tested								19-Jun-2023
Lab Sample ID								VA23B4700-001
pH (Lab)								9.08
Hardness								13.60
Parameter								
Dissolved Metals								
Aluminum	NS	pH<6.5 = 1000*e[1.6-3.327(median pH)+0.402(median pH)2] pH≥6.5 = 50	pH<6.5 = 1000*e[1.209-2.426(pH)+0.286(pH)2] pH≥6.5 = 100	50	100	500	1,000	2480
Antimony	NS	NS	NS	-	-	-	-	<0.1
Arsenic	2,500	5	5	-	-	50	50	1.7
Barium	100,000	NS	NS	-	-	-	-	34
Beryllium	NS	NS	NS	-	-	-	-	<0.5
Bismuth	NS	NS	NS	-	-	-	-	<0.5
Boron	500,000	1,200	1,200	-	-	12,000	12,000	<10
Cadmium	500	WQG = e[0.736 × ln(H) - 4.943]	WQG = e[1.03 × ln(H) - 5.274]	0.05	0.08	0.49	0.75	<0.05
Calcium	NS	NS	NS	-	-	-	-	4670
Chromium, hexavalent ⁴	-	NS	NS	-	-	-	-	-
Chromium, total	5,000	NS	NS	-	-	-	-	<0.5
Chromium, trivalent ⁴	-	NS	NS	-	-	-	-	-
Cobalt	NS	4	110	-	-	40	1,100	0.22
Copper	100,000	BLM ³	BLM ³	0.9	4.8	9	48	<1
Iron	NS	NS	1,000	-	-	-	10,000	711
Lead	5,000	Hs8 = NS H>8 = 3.31 + e[1.273 ln (H) - 4.704]	Hs8 = 3 H>8 = e[1.273 ln (H) -1.460]	3.56	6.44	35.6	64.4	0.17
Lithium	NS	NS	NS	-	-	-	-	<5
Magnesium	NS	NS	NS	-	-	-	-	481
Manganese	NS	WQG = (0.0044*H+0.605)*1000	WQG = (0.01102*H+0.54)*1000	665	690	6,648	6,899	36.4
Mercury	100	NS	WQG = 0.0001 / (MeHg/total Hg)	-	-	-	-	<0.05
Molybdenum	NS	1,000	2,000	-	-	10,000	20,000	2.62
Nickel	NS	NS	NS	25	-	-	-	<0.5
Phosphorus	NS	NS	NS	-	-	-	-	<300
Potassium	NS	NS	NS	-	-	-	-	1740
Selenium	1,000	WQG = 2 Alert = 1	NS	-	-	10	-	<0.5
Silicon	NS	NS	NS	-	-	-	-	8210
Silver	5,000	Hs100 = 0.05 H>100 = 1.5	Hs100 = 0.1 H>100 = 3.0	0.05	0.1	0.5	1	<0.05
Sodium	NS	NS	NS	-	-	-	-	7510
Strontium	NS	NS	NS	-	-	-	-	11
Sulphur	NS	NS	NS	-	-	-	-	<500
Thallium	NS	NS	NS	-	-	-	-	<0.1
Tin	NS	NS	NS	-	-	-	-	<0.5
Titanium	NS	NS	NS	-	-	-	-	29
Uranium	10,000	NS	NS	-	-	-	-	0.116
Vanadium	NS	NS	NS	-	-	-	-	3
Zinc	500,000	Hs90 = 7.5 H>100 = 7.5 + 0.75 (H - 90)	Hs90 = 33 H>100 = 33 + 0.75 (H - 90)	7.5	33	75	330	<10

Notes:

1. B.C. Hazardous Waste Regulation; (BC Reg 63/88 including amendments up to BC Reg 64/2021); Dated 11 March 2021; BC Ministry of Environment and Climate Change Strategy, Victoria, British Columbia.
2. B.C. Ministry of Environment and Climate Change Strategy. 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C.
3. All units are in µg/L unless otherwise specified.
4. Total chromium data used to demonstrate compliance.
5. Standard calculated using BC BLM software, consult BC WQGs for further information.
6. Calculated based on B.C. Ministry of Environment and Climate Change Strategy. 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C.
7. DL denotes Laboratory detection limit.
8. "<" denotes Less than laboratory detection limit
9. "-" denotes Not analyzed
10. NS denotes No standard
11. N/A denotes Not applicable
12. NC denotes Not calculated
13. H denotes water hardness in mg/L CaCO₃

Definitions

bold, underlined, and blue concentrations exceed the WQG.

bold, underlined, and red concentrations exceed 10x the WQG.

Yellow shaded concentrations exceed the Leachate Quality Standards.

Table 1B - Shake Flask Extraction Analytical Data¹

Sample No.	Leachate Quality Standards ¹	BC Approved WQG Long-term Average ² (see Column A)	BC Approved WQG Short-term Maximum ² (see Column B)	Column A Calculated ⁶ Long-term WQG ²	Column B Calculated ⁶ Short-term WQG ²	10x Long- term WQG ²	10x Short- term WQG ²	VE44087-L03
Date Tested								19-Jun-2023
Lab Sample ID								VA23B4700-002
pH (Lab)								9.13
Hardness								14.40
Parameter								
Dissolved Metals								
Aluminum	NS	pH<6.5 = 1000*e[1.6-3.327/(median pH)+0.402(median pH)[2] pH≥6.5 = 50	pH<6.5 = 1000*e[1.209-2.426(pH)+0.286(pH)[2] pH≥6.5 = 100	50	100	500	1,000	2140
Antimony	NS	NS	NS	-	-	-	-	<0.1
Arsenic	2,500	5	5	-	-	50	50	1
Barium	100,000	NS	NS	-	-	-	-	18.8
Beryllium	NS	NS	NS	-	-	-	-	<0.5
Bismuth	NS	NS	NS	-	-	-	-	<0.5
Boron	500,000	1,200	1,200	-	-	12,000	12,000	<10
Cadmium	500	WQG = e[0.736 × ln(H) – 4.943]	WQG = e[1.03 × ln(H) – 5.274]	0.05	0.08	0.51	0.80	<0.05
Calcium	NS	NS	NS	-	-	-	-	5020
Chromium, hexavalent ⁴	-	NS	NS	-	-	-	-	-
Chromium, total	5,000	NS	NS	-	-	-	-	<0.5
Chromium, trivalent ⁴	-	NS	NS	-	-	-	-	-
Cobalt	NS	4	110	-	-	40	1,100	0.18
Copper	100,000	BLM ⁵	BLM ⁵	0.9	4.8	9	48	≤1
Iron	NS	NS	1,000	-	-	-	10,000	587
Lead	5,000	Hs8 = NS H>8 = 3.31 + e[1.273 ln (H) - 4.704]	Hs8 = 3 H>8 = e[1.273 ln (H) -1.460]	3.58	6.93	35.8	69.3	0.17
Lithium	NS	NS	NS	-	-	-	-	<5
Magnesium	NS	NS	NS	-	-	-	-	464
Manganese	NS	WQG = (0.0044*H+0.605)*1000	WQG = (0.01102*H+0.54)*1000	668	699	6,684	6,987	24.5
Mercury	100	NS	WQG = 0.0001 / (MeHg/total Hg)	-	-	-	-	<0.05
Molybdenum	NS	1,000	2,000	-	-	10,000	20,000	0.89
Nickel	NS	NS	NS	25	-	-	-	<0.5
Phosphorus	NS	NS	NS	-	-	-	-	<300
Potassium	NS	NS	NS	-	-	-	-	1640
Selenium	1,000	WQG = 2 Alert = 1	NS	-	-	10	-	<0.5
Silicon	NS	NS	NS	-	-	-	-	7720
Silver	5,000	Hs100 = 0.05 H>100 = 1.5	Hs100 = 0.1 H>100 = 3.0	0.05	0.1	0.5	1	<0.05
Sodium	NS	NS	NS	-	-	-	-	6620
Strontium	NS	NS	NS	-	-	-	-	13.9
Sulphur	NS	NS	NS	-	-	-	-	<500
Thallium	NS	NS	NS	-	-	-	-	<0.1
Tin	NS	NS	NS	-	-	-	-	<0.5
Titanium	NS	NS	NS	-	-	-	-	26
Uranium	10,000	NS	NS	-	-	-	-	0.335
Vanadium	NS	NS	NS	-	-	-	-	4.2
Zinc	500,000	Hs90 = 7.5 H>100 = 7.5 + 0.75 (H - 90)	Hs90 = 33 H>100 = 33 + 0.75 (H - 90)	7.5	33	75	330	≤10

Notes:

1. B.C. Hazardous Waste Regulation; (BC Reg 63/86 including amendments up to BC Reg 64/2021); Dated 11 March 2021; BC Ministry of Environment and Climate Change Strategy, Victoria, British Columbia.
2. B.C. Ministry of Environment and Climate Change Strategy. 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C.
3. All units are in µg/L, unless otherwise specified.
4. Total chromium data used to demonstrate compliance.
5. Standard calculated using BC BLM software, consult BC WQGs for further information.
6. Calculated based on B.C. Ministry of Environment and Climate Change Strategy. 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C.
7. DL denotes Laboratory detection limit.
8. "<" denotes Less than laboratory detection limit
9. "-" denotes Not analyzed
10. NS denotes No standard
11. N/A denotes Not applicable
12. NC denotes Not calculated
13. H denotes water hardness in mg/L CaCO₃.

Definitions

Bold, underlined, and blue concentrations exceed the WQG.

Bold, underlined, and red concentrations exceed 10x the WQG.

Yellow shaded concentrations exceed the Leachate Quality Standards.

Table 1C - Shake Flask Extraction Analytical Data³

Sample No.	Leachate Quality Standards ¹	BC Approved WQG Long-term Average ² (see Column A)	BC Approved WQG Short-term Maximum ² (see Column B)	Column A Calculated ⁶ Long-term WQG ²	Column B Calculated ⁶ Short-term WQG ²	10x Long- term WQG ⁷	10x Short- term WQG ⁷	VE44087-L05
Date Tested								19-Jun-2023
Lab Sample ID								VA23B4700-003
pH (Lab)								9.22
Hardness								15.40
Parameter								
Dissolved Metals								
Aluminum	NS	pH<6.5 = 1000*e[1.6-3.327(median pH)+0.402(median pH)2] pH≥6.5 = 50	pH<6.5 = 1000*e[1.209-2.426(pH)+0.286(pH)2] pH≥6.5 = 100	50	100	500	1,000	2110
Antimony	NS	NS	NS	-	-	-	-	<0.1
Arsenic	2,500	5	5	-	-	50	50	<1
Barium	100,000	NS	NS	-	-	-	-	9.3
Beryllium	NS	NS	NS	-	-	-	-	<0.5
Bismuth	NS	NS	NS	-	-	-	-	<0.5
Boron	500,000	1,200	1,200	-	-	12,000	12,000	<10
Cadmium	500	WQG = e[(0.736 × ln(H) – 4.943)]	WQG = e[(1.03 × ln(H) – 5.274)]	0.05	0.09	0.53	0.86	<0.05
Calcium	NS	NS	NS	-	-	-	-	5140
Chromium, hexavalent ⁴	-	NS	NS	-	-	-	-	-
Chromium, total	5,000	NS	NS	-	-	-	-	<0.5
Chromium, trivalent ⁴	-	NS	NS	-	-	-	-	-
Cobalt	NS	4	110	-	-	40	1,100	0.22
Copper	100,000	BLM ⁵	BLM ⁵	0.9	4.8	9	48	<1
Iron	NS	NS	1,000	-	-	-	10,000	586
Lead	5,000	Hs8 = NS H>8 = 3.31 + e[1.273 ln (H) - 4.704]	Hs8 = 3 H>8 = e[1.273 ln (H) -1.460]	3.60	7.54	36.0	75.4	<0.1
Lithium	NS	NS	NS	-	-	-	-	<5
Magnesium	NS	NS	NS	-	-	-	-	619
Manganese	NS	WQG = (0.0044*H+0.605)*1000	WQG = (0.01102*H+0.54)*1000	673	710	6,728	7,097	18.8
Mercury	100	NS	WQG = 0.0001 / (MeHg/total Hg)	-	-	-	-	<0.05
Molybdenum	NS	1,000	2,000	-	-	10,000	20,000	0.25
Nickel	NS	NS	NS	25	-	-	-	<0.5
Phosphorus	NS	NS	NS	-	-	-	-	<300
Potassium	NS	NS	NS	-	-	-	-	268
Selenium	1,000	WQG = 2 Alert = 1	NS	-	-	10	-	<0.5
Silicon	NS	NS	NS	-	-	-	-	7180
Silver	5,000	Hs100 = 0.05 H>100 = 1.5	Hs100 = 0.1 H>100 = 3.0	0.05	0.1	0.5	1	<0.05
Sodium	NS	NS	NS	-	-	-	-	12200
Strontium	NS	NS	NS	-	-	-	-	17.8
Sulphur	NS	NS	NS	-	-	-	-	<500
Thallium	NS	NS	NS	-	-	-	-	<0.1
Tin	NS	NS	NS	-	-	-	-	<0.5
Titanium	NS	NS	NS	-	-	-	-	54
Uranium	10,000	NS	NS	-	-	-	-	0.142
Vanadium	NS	NS	NS	-	-	-	-	5.6
Zinc	500,000	Hs90 = 7.5 H>100 = 7.5 + 0.75 (H - 90)	Hs90 = 33 H>100 = 33 + 0.75 (H - 90)	7.5	33	75	330	<10

Notes:

1. B.C. Hazardous Waste Regulation; (BC Reg 63/88 including amendments up to BC Reg 64/2021); Dated 11 March 2021; BC Ministry of Environment and Climate Change Strategy, Victoria, British Columbia.
2. B.C. Ministry of Environment and Climate Change Strategy. 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C.
3. All units are in µg/L unless otherwise specified.
4. Total chromium data used to demonstrate compliance.
5. Standard calculated using BC BLM software, consult BC WQGs for further information.
6. Calculated based on B.C. Ministry of Environment and Climate Change Strategy. 2021. B.C. Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture - Guideline Summary. Water Quality Guideline Series, WQG-20. Prov. B.C., Victoria B.C.
7. DL denotes Laboratory detection limit.
8. "<" denotes Less than laboratory detection limit
9. "-*" denotes Not analyzed
10. NS denotes No standard
11. N/A denotes Not applicable
12. NC denotes Not calculated
13. H denotes water hardness in mg/L CaCO₃.

Definitions

Bold, underlined, and blue concentrations exceed the WQG.

Bold, underlined, and red concentrations exceed 10x the WQG.

Yellow shaded concentrations exceed the Leachate Quality Standards.

Attachment 2

CERTIFICATE OF ANALYSIS

Work Order	: VA23B4700	Page	: 1 of 4
Client	: Metro Testing & Engineering Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Henry Xu	Account Manager	: Sneha Sansare
Address	: 401-6741 Cariboo Rd. Burnaby BC Canada V3N 4A3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ---	Telephone	: +1 604 253 4188
Project	: VE44087/Cox	Date Samples Received	: 27-Jun-2023 10:45
PO	: ---	Date Analysis Commenced	: 06-Jul-2023
C-O-C number	: ---	Issue Date	: 13-Jul-2023 16:52
Sampler	: ---		
Site	: ---		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Inorganics, Burnaby, British Columbia

Page : 2 of 4
Work Order : VA23B4700
Client : Metro Testing & Engineering Ltd.
Project : VE44087/Cox



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

Unit	Description
%	percent
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Accreditation

Accreditation	Description	Laboratory	Address
A	CALA ISO/IEC 17025:2017	VA ALS Environmental - Vancouver	8081 Lougheed Highway, Burnaby, BC

Applicable accreditations are indicated in the Method/Lab column as superscripts.



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID		VE44087-L01	VE44087-L03	VE44087-L05	----	----
(Matrix: Soil/Solid)					Client sampling date / time		19-Jun-2023 00:00	19-Jun-2023 00:00	19-Jun-2023 00:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B4700-001	VA23B4700-002	VA23B4700-003	Result	Result	Result	----
Physical Tests											
Moisture	----	E144/VA	A	0.25	%	0.41	<0.25	0.26	----	----	----
pH	----	E116/VA		0.10	pH units	9.08	9.13	9.22	----	----	----
Leachable Metals											
Aluminum, leachable	7429-90-5	E446/VA	A	0.0050	mg/L	2.48	2.14	2.11	----	----	----
Antimony, leachable	7440-36-0	E446/VA	A	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----	----
Arsenic, leachable	7440-38-2	E446/VA	A	0.0010	mg/L	0.0017	0.0010	<0.0010	----	----	----
Barium, leachable	7440-39-3	E446/VA	A	0.0010	mg/L	0.0340	0.0188	0.0093	----	----	----
Beryllium, leachable	7440-41-7	E446/VA	A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----	----
Bismuth, leachable	7440-69-9	E446/VA	A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----	----
Boron, leachable	7440-42-8	E446/VA	A	0.010	mg/L	<0.010	<0.010	<0.010	----	----	----
Cadmium, leachable	7440-43-9	E446/VA	A	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----	----
Calcium, leachable	7440-70-2	E446/VA	A	0.10	mg/L	4.67	5.02	5.14	----	----	----
Chromium, leachable	7440-47-3	E446/VA	A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----	----
Cobalt, leachable	7440-48-4	E446/VA	A	0.00010	mg/L	0.00022	0.00018	0.00022	----	----	----
Copper, leachable	7440-50-8	E446/VA	A	0.0010	mg/L	<0.0010	<0.0010	<0.0010	----	----	----
Hardness (as CaCO3), dissolved	----	E446/VA		0.60	mg/L	13.6	14.4	15.4	----	----	----
Iron, leachable	7439-89-6	E446/VA	A	0.030	mg/L	0.711	0.587	0.586	----	----	----
Lead, leachable	7439-92-1	E446/VA	A	0.00010	mg/L	0.00017	0.00017	<0.00010	----	----	----
Lithium, leachable	7439-93-2	E446/VA	A	0.0050	mg/L	<0.0050	<0.0050	<0.0050	----	----	----
Magnesium, leachable	7439-95-4	E446/VA	A	0.050	mg/L	0.481	0.464	0.619	----	----	----
Manganese, leachable	7439-96-5	E446/VA	A	0.00050	mg/L	0.0364	0.0245	0.0188	----	----	----
Mercury, leachable	7439-97-6	E515/VA	A	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----	----
Molybdenum, leachable	7439-98-7	E446/VA	A	0.00010	mg/L	0.00262	0.00089	0.00025	----	----	----
Nickel, leachable	7440-02-0	E446/VA	A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----	----
Phosphorus, leachable	7723-14-0	E446/VA	A	0.30	mg/L	<0.30	<0.30	<0.30	----	----	----
Potassium, leachable	7440-09-7	E446/VA	A	0.050	mg/L	1.74	1.64	0.268	----	----	----
Selenium, leachable	7782-49-2	E446/VA	A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----	----
Silicon, leachable	7440-21-3	E446/VA	A	0.050	mg/L	8.21	7.72	7.18	----	----	----
Silver, leachable	7440-22-4	E446/VA	A	0.000050	mg/L	<0.000050	<0.000050	<0.000050	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid						Client sample ID	VE44087-L01	VE44087-L03	VE44087-L05	----	----
(Matrix: Soil/Solid)											
						Client sampling date / time	19-Jun-2023 00:00	19-Jun-2023 00:00	19-Jun-2023 00:00	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23B4700-001	VA23B4700-002	VA23B4700-003	-----	-----		
					Result	Result	Result	----	----		
Leachable Metals											
Sodium, leachable	7440-23-5	E446/VA	A	0.050	mg/L	7.51	6.62	12.2	----	----	
Strontium, leachable	7440-24-6	E446/VA	A	0.00050	mg/L	0.0110	0.0139	0.0178	----	----	
Sulfur, leachable	7704-34-9	E446/VA		0.50	mg/L	<0.50	<0.50	<0.50	----	----	
Thallium, leachable	7440-28-0	E446/VA	A	0.00010	mg/L	<0.00010	<0.00010	<0.00010	----	----	
Tin, leachable	7440-31-5	E446/VA	A	0.00050	mg/L	<0.00050	<0.00050	<0.00050	----	----	
Titanium, leachable	7440-32-6	E446/VA		0.010	mg/L	0.029	0.026	0.054	----	----	
Uranium, leachable	7440-61-1	E446/VA	A	0.000010	mg/L	0.000116	0.000335	0.000142	----	----	
Vanadium, leachable	7440-62-2	E446/VA	A	0.0010	mg/L	0.0030	0.0042	0.0056	----	----	
Zinc, leachable	7440-66-6	E446/VA	A	0.010	mg/L	<0.010	<0.010	<0.010	----	----	

Please refer to the General Comments section for an explanation of any result qualifiers detected.
Please refer to the Accreditation section for an explanation of analyte accreditations.

QUALITY CONTROL REPORT

Work Order	: VA23B4700	Page	: 1 of 10
Client	: Metro Testing & Engineering Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Henry Xu	Account Manager	: Sneha Sansare
Address	: 401-6741 Cariboo Rd. Burnaby BC Canada V3N 4A3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: VE44087/Cox	Date Samples Received	: 27-Jun-2023 10:45
PO	: ---	Date Analysis Commenced	: 06-Jul-2023
C-O-C number	: ---	Issue Date	: 13-Jul-2023 15:42
Sampler	: ---		
Site	: ---		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	Position	Laboratory Department
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Tracy Harley	Supervisor - Water Quality Instrumentation	Vancouver Inorganics, Burnaby, British Columbia

Page : 2 of 10
Work Order : VA23B4700
Client : Metro Testing & Engineering Ltd.
Project : VE44087/Cox



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include 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 predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
= Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

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Page : 3 of 10
 Work Order : VA23B4700
 Client : Metro Testing & Engineering Ltd.
 Project : VE44087/Cox



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1025723)											
VA23B4699-001	Anonymous	Moisture	----	E144	0.25	%	0.30	0.25	0.05	Diff <2x LOR	----
Physical Tests (QC Lot: 1033584)											
FJ2301630-001	Anonymous	pH	----	E116	0.10	pH units	8.04	8.20	1.97%	5%	----
Leachable Metals (QC Lot: 1033583)											
FJ2301630-001	Anonymous	Mercury, leachable	7439-97-6	E515	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----
Leachable Metals (QC Lot: 1033585)											
FJ2301630-001	Anonymous	Aluminum, leachable	7429-90-5	E446	0.0050	mg/L	0.0388	0.0827	72.3%	30%	DUP-H
		Antimony, leachable	7440-36-0	E446	0.00010	mg/L	0.00379	0.00386	1.80%	30%	----
		Arsenic, leachable	7440-38-2	E446	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Barium, leachable	7440-39-3	E446	0.0010	mg/L	0.0356	0.0358	0.462%	30%	----
		Beryllium, leachable	7440-41-7	E446	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Bismuth, leachable	7440-69-9	E446	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Boron, leachable	7440-42-8	E446	0.010	mg/L	0.107	0.090	17.2%	30%	----
		Cadmium, leachable	7440-43-9	E446	0.000050	mg/L	0.000142	0.000078	0.000063	Diff <2x LOR	----
		Calcium, leachable	7440-70-2	E446	0.10	mg/L	56.2	21.7	88.5%	30%	DUP-H
		Chromium, leachable	7440-47-3	E446	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Cobalt, leachable	7440-48-4	E446	0.00010	mg/L	0.00112	0.00052	72.6%	30%	DUP-H
		Copper, leachable	7440-50-8	E446	0.0010	mg/L	<0.0010	<0.0010	0	Diff <2x LOR	----
		Iron, leachable	7439-89-6	E446	0.030	mg/L	<0.030	<0.030	0	Diff <2x LOR	----
		Lead, leachable	7439-92-1	E446	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Lithium, leachable	7439-93-2	E446	0.0050	mg/L	0.0869	0.0670	25.8%	30%	----
		Magnesium, leachable	7439-95-4	E446	0.050	mg/L	8.68	3.80	78.3%	30%	DUP-H
		Manganese, leachable	7439-96-5	E446	0.00050	mg/L	0.00421	# 0.00180	0.00241	Diff <2x LOR	DUP-H
		Molybdenum, leachable	7439-98-7	E446	0.00010	mg/L	0.0233	0.0204	13.0%	30%	----
		Nickel, leachable	7440-02-0	E446	0.00050	mg/L	0.00284	# 0.00136	0.00148	Diff <2x LOR	DUP-H
		Phosphorus, leachable	7723-14-0	E446	0.30	mg/L	<0.30	<0.30	0	Diff <2x LOR	----
		Potassium, leachable	7440-09-7	E446	0.050	mg/L	2.31	1.95	16.8%	30%	----
		Selenium, leachable	7782-49-2	E446	0.00050	mg/L	0.0188	0.0158	17.8%	30%	----
		Silicon, leachable	7440-21-3	E446	0.050	mg/L	0.541	0.614	12.7%	40%	----
		Silver, leachable	7440-22-4	E446	0.000050	mg/L	<0.000050	<0.000050	0	Diff <2x LOR	----

Page : 4 of 10
 Work Order : VA23B4700
 Client : Metro Testing & Engineering Ltd.
 Project : VE44087/Cox



Sub-Matrix: Soil/Solid					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Leachable Metals (QC Lot: 1033585) - continued											
FJ2301630-001	Anonymous	Sodium, leachable	7440-23-5	E446	0.050	mg/L	133	119	11.4%	30%	----
		Strontium, leachable	7440-24-6	E446	0.00050	mg/L	0.0452	0.0184	84.2%	30%	DUP-H
		Sulfur, leachable	7704-34-9	E446	0.50	mg/L	93.5	66.9	33.2%	30%	DUP-H
		Thallium, leachable	7440-28-0	E446	0.00010	mg/L	<0.00010	<0.00010	0	Diff <2x LOR	----
		Tin, leachable	7440-31-5	E446	0.00050	mg/L	<0.00050	<0.00050	0	Diff <2x LOR	----
		Titanium, leachable	7440-32-6	E446	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----
		Uranium, leachable	7440-61-1	E446	0.000010	mg/L	0.00463	0.00341	30.4%	30%	DUP-H
		Vanadium, leachable	7440-62-2	E446	0.0010	mg/L	<0.0010	0.0012	0.0002	Diff <2x LOR	----
		Zinc, leachable	7440-66-6	E446	0.010	mg/L	<0.010	<0.010	0	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

Page : 5 of 10
 Work Order : VA23B4700
 Client : Metro Testing & Engineering Ltd.
 Project : VE44087/Cox



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1025723)						
Moisture	---	E144	0.25	%	<0.25	---
Leachable Metals (QCLot: 1033583)						
Mercury, leachable	7439-97-6	E515	0.00005	mg/L	<0.000050	---
Leachable Metals (QCLot: 1033585)						
Aluminum, leachable	7429-90-5	E446	0.005	mg/L	<0.0050	---
Antimony, leachable	7440-36-0	E446	0.0001	mg/L	<0.00010	---
Arsenic, leachable	7440-38-2	E446	0.001	mg/L	<0.0010	---
Barium, leachable	7440-39-3	E446	0.001	mg/L	<0.0010	---
Beryllium, leachable	7440-41-7	E446	0.0005	mg/L	<0.00050	---
Bismuth, leachable	7440-69-9	E446	0.0005	mg/L	<0.00050	---
Boron, leachable	7440-42-8	E446	0.01	mg/L	<0.010	---
Cadmium, leachable	7440-43-9	E446	0.00005	mg/L	<0.000050	---
Calcium, leachable	7440-70-2	E446	0.1	mg/L	<0.10	---
Chromium, leachable	7440-47-3	E446	0.0005	mg/L	<0.00050	---
Cobalt, leachable	7440-48-4	E446	0.0001	mg/L	<0.00010	---
Copper, leachable	7440-50-8	E446	0.001	mg/L	<0.0010	---
Iron, leachable	7439-89-6	E446	0.03	mg/L	<0.030	---
Lead, leachable	7439-92-1	E446	0.0001	mg/L	<0.00010	---
Lithium, leachable	7439-93-2	E446	0.005	mg/L	<0.0050	---
Magnesium, leachable	7439-95-4	E446	0.05	mg/L	<0.050	---
Manganese, leachable	7439-96-5	E446	0.0005	mg/L	<0.00050	---
Molybdenum, leachable	7439-98-7	E446	0.0001	mg/L	<0.00010	---
Nickel, leachable	7440-02-0	E446	0.0005	mg/L	<0.00050	---
Phosphorus, leachable	7723-14-0	E446	0.3	mg/L	<0.30	---
Potassium, leachable	7440-09-7	E446	0.05	mg/L	<0.050	---
Selenium, leachable	7782-49-2	E446	0.0005	mg/L	<0.00050	---
Silicon, leachable	7440-21-3	E446	0.05	mg/L	<0.050	---
Silver, leachable	7440-22-4	E446	0.00005	mg/L	<0.000050	---
Sodium, leachable	7440-23-5	E446	0.05	mg/L	<0.050	---
Strontium, leachable	7440-24-6	E446	0.0005	mg/L	<0.00050	---
Sulfur, leachable	7704-34-9	E446	0.5	mg/L	<0.50	---
Thallium, leachable	7440-28-0	E446	0.0001	mg/L	<0.00010	---

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Sub-Matrix: **Soil/Solid**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
Leachable Metals (QCLot: 1033585) - continued						
Tin, leachable	7440-31-5	E446	0.0005	mg/L	<0.00050	----
Titanium, leachable	7440-32-6	E446	0.01	mg/L	<0.010	----
Uranium, leachable	7440-61-1	E446	0.00001	mg/L	<0.000010	----
Vanadium, leachable	7440-62-2	E446	0.001	mg/L	<0.0010	----
Zinc, leachable	7440-66-6	E446	0.01	mg/L	<0.010	----

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Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1025723)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Physical Tests (QCLot: 1033584)									
pH	----	E116	----	pH units	7.04 pH units	99.3	95.0	105	----
Leachable Metals (QCLot: 1033583)									
Mercury, leachable	7439-97-6	E515	0.00005	mg/L	0.0005 mg/L	98.1	50.0	130	----
Leachable Metals (QCLot: 1033585)									
Aluminum, leachable	7429-90-5	E446	0.005	mg/L	0.2 mg/L	100	70.0	130	----
Antimony, leachable	7440-36-0	E446	0.0001	mg/L	0.1 mg/L	94.1	70.0	130	----
Arsenic, leachable	7440-38-2	E446	0.001	mg/L	0.1 mg/L	106	70.0	130	----
Barium, leachable	7440-39-3	E446	0.001	mg/L	0.025 mg/L	102	70.0	130	----
Beryllium, leachable	7440-41-7	E446	0.0005	mg/L	0.01 mg/L	95.3	70.0	130	----
Bismuth, leachable	7440-69-9	E446	0.0005	mg/L	0.1 mg/L	89.2	50.0	130	----
Boron, leachable	7440-42-8	E446	0.01	mg/L	0.1 mg/L	91.8	70.0	130	----
Cadmium, leachable	7440-43-9	E446	0.00005	mg/L	0.01 mg/L	99.4	70.0	130	----
Calcium, leachable	7440-70-2	E446	0.1	mg/L	5 mg/L	97.3	70.0	130	----
Chromium, leachable	7440-47-3	E446	0.0005	mg/L	0.025 mg/L	102	70.0	130	----
Cobalt, leachable	7440-48-4	E446	0.0001	mg/L	0.025 mg/L	98.7	70.0	130	----
Copper, leachable	7440-50-8	E446	0.001	mg/L	0.025 mg/L	96.4	70.0	130	----
Iron, leachable	7439-89-6	E446	0.03	mg/L	0.1 mg/L	98.0	70.0	130	----
Lead, leachable	7439-92-1	E446	0.0001	mg/L	0.05 mg/L	94.6	70.0	130	----
Lithium, leachable	7439-93-2	E446	0.005	mg/L	0.025 mg/L	95.9	70.0	130	----
Magnesium, leachable	7439-95-4	E446	0.05	mg/L	5 mg/L	102	70.0	130	----
Manganese, leachable	7439-96-5	E446	0.0005	mg/L	0.025 mg/L	97.2	70.0	130	----
Molybdenum, leachable	7439-98-7	E446	0.0001	mg/L	0.025 mg/L	94.7	70.0	130	----
Nickel, leachable	7440-02-0	E446	0.0005	mg/L	0.05 mg/L	97.0	70.0	130	----
Phosphorus, leachable	7723-14-0	E446	0.3	mg/L	1 mg/L	95.8	70.0	130	----
Potassium, leachable	7440-09-7	E446	0.05	mg/L	5 mg/L	100	70.0	130	----
Selenium, leachable	7782-49-2	E446	0.0005	mg/L	0.1 mg/L	106	70.0	130	----
Silicon, leachable	7440-21-3	E446	0.05	mg/L	1 mg/L	99.5	70.0	130	----
Silver, leachable	7440-22-4	E446	0.00005	mg/L	0.01 mg/L	88.7	50.0	130	----
Sodium, leachable	7440-23-5	E446	0.05	mg/L	5 mg/L	102	70.0	130	----
Strontium, leachable	7440-24-6	E446	0.0005	mg/L	0.025 mg/L	97.9	70.0	130	----



Sub-Matrix: Soil/Solid

Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Leachable Metals (QCLot: 1033585) - continued									
Sulfur, leachable	7704-34-9	E446	0.5	mg/L	5 mg/L	92.0	70.0	130	----
Thallium, leachable	7440-28-0	E446	0.0001	mg/L	0.11 mg/L	86.9	70.0	130	----
Tin, leachable	7440-31-5	E446	0.0005	mg/L	0.05 mg/L	90.9	50.0	130	----
Titanium, leachable	7440-32-6	E446	0.01	mg/L	0.025 mg/L	93.2	50.0	130	----
Uranium, leachable	7440-61-1	E446	0.00001	mg/L	0.0005 mg/L	93.5	70.0	130	----
Vanadium, leachable	7440-62-2	E446	0.001	mg/L	0.05 mg/L	101	70.0	130	----
Zinc, leachable	7440-66-6	E446	0.01	mg/L	0.05 mg/L	104	70.0	130	----

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 Project : VE44087/Cox



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level $\geq 1 \times$ spike level.

Sub-Matrix: Soil/Solid

Sub-Matrix: Soil/Solid					Matrix Spike (MS) Report					
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Spike		Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	Target	MS	Low	High	
Leachable Metals (QCLot: 1033583)										
FJ2301630-004	Anonymous	Mercury, leachable	7439-97-6	E515	0.000098 mg/L	0.0001 mg/L	98.2	70.0	130	----
Leachable Metals (QCLot: 1033585)										
FJ2301630-004	Anonymous	Aluminum, leachable	7429-90-5	E446	0.201 mg/L	0.2 mg/L	100	70.0	130	----
		Antimony, leachable	7440-36-0	E446	0.0195 mg/L	0.02 mg/L	97.5	70.0	130	----
		Arsenic, leachable	7440-38-2	E446	0.0205 mg/L	0.02 mg/L	102	70.0	130	----
		Barium, leachable	7440-39-3	E446	ND mg/L	0.02 mg/L	ND	70.0	130	----
		Beryllium, leachable	7440-41-7	E446	0.0400 mg/L	0.04 mg/L	100.0	70.0	130	----
		Bismuth, leachable	7440-69-9	E446	0.00908 mg/L	0.01 mg/L	90.8	70.0	130	----
		Boron, leachable	7440-42-8	E446	0.098 mg/L	0.1 mg/L	98.6	70.0	130	----
		Cadmium, leachable	7440-43-9	E446	0.00409 mg/L	0.004 mg/L	102	70.0	130	----
		Calcium, leachable	7440-70-2	E446	ND mg/L	4 mg/L	ND	70.0	130	----
		Chromium, leachable	7440-47-3	E446	0.0412 mg/L	0.04 mg/L	103	70.0	130	----
		Cobalt, leachable	7440-48-4	E446	0.0202 mg/L	0.02 mg/L	101	70.0	130	----
		Copper, leachable	7440-50-8	E446	0.0200 mg/L	0.02 mg/L	100	70.0	130	----
		Iron, leachable	7439-89-6	E446	2.06 mg/L	2 mg/L	103	70.0	130	----
		Lead, leachable	7439-92-1	E446	0.0192 mg/L	0.02 mg/L	96.2	70.0	130	----
		Lithium, leachable	7439-93-2	E446	0.100 mg/L	0.1 mg/L	100	70.0	130	----
		Magnesium, leachable	7439-95-4	E446	ND mg/L	1 mg/L	ND	70.0	130	----
		Manganese, leachable	7439-96-5	E446	0.0191 mg/L	0.02 mg/L	95.7	70.0	130	----
		Molybdenum, leachable	7439-98-7	E446	0.0198 mg/L	0.02 mg/L	99.0	70.0	130	----
		Nickel, leachable	7440-02-0	E446	0.0397 mg/L	0.04 mg/L	99.3	70.0	130	----
		Phosphorus, leachable	7723-14-0	E446	9.52 mg/L	10 mg/L	95.2	70.0	130	----
		Potassium, leachable	7440-09-7	E446	3.98 mg/L	4 mg/L	99.6	70.0	130	----
		Selenium, leachable	7782-49-2	E446	0.0423 mg/L	0.04 mg/L	106	70.0	130	----
		Silicon, leachable	7440-21-3	E446	9.66 mg/L	10 mg/L	96.6	70.0	130	----
		Silver, leachable	7440-22-4	E446	0.00405 mg/L	0.004 mg/L	101	70.0	130	----
		Sodium, leachable	7440-23-5	E446	ND mg/L	2 mg/L	ND	70.0	130	----
		Strontium, leachable	7440-24-6	E446	0.0222 mg/L	0.02 mg/L	111	70.0	130	----
		Sulfur, leachable	7704-34-9	E446	20.2 mg/L	20 mg/L	101	70.0	130	----
		Thallium, leachable	7440-28-0	E446	0.00372 mg/L	0.004 mg/L	93.0	70.0	130	----
		Tin, leachable	7440-31-5	E446	0.0193 mg/L	0.02 mg/L	96.7	70.0	130	----



Sub-Matrix: Soil/Solid					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
Leachable Metals (QCLot: 1033585) - continued										
FJ2301630-004	Anonymous	Titanium, leachable	7440-32-6	E446	0.040 mg/L	0.04 mg/L	99.4	70.0	130	----
		Uranium, leachable	7440-61-1	E446	0.00386 mg/L	0.004 mg/L	96.6	70.0	130	----
		Vanadium, leachable	7440-62-2	E446	0.103 mg/L	0.1 mg/L	103	70.0	130	----
		Zinc, leachable	7440-66-6	E446	0.416 mg/L	0.4 mg/L	104	70.0	130	----

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA23B4700	Page	: 1 of 7
Client	: Metro Testing & Engineering Ltd.	Laboratory	: ALS Environmental - Vancouver
Contact	: Henry Xu	Account Manager	: Sneha Sansare
Address	: 401-6741 Cariboo Rd. Burnaby BC Canada V3N 4A3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: VE44087/Cox	Date Samples Received	: 27-Jun-2023 10:45
PO	: ----	Issue Date	: 13-Jul-2023 15:40
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer		
No. of samples received	: 3		
No. of samples analysed	: 3		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

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Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Leachable Metals	Anonymous	Anonymous	Aluminum, leachable	7429-90-5	E446	72.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Leachable Metals	Anonymous	Anonymous	Calcium, leachable	7440-70-2	E446	88.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Leachable Metals	Anonymous	Anonymous	Cobalt, leachable	7440-48-4	E446	72.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Leachable Metals	Anonymous	Anonymous	Magnesium, leachable	7439-95-4	E446	78.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Leachable Metals	Anonymous	Anonymous	Manganese, leachable	7439-96-5	E446	0.00241 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Leachable Metals	Anonymous	Anonymous	Nickel, leachable	7440-02-0	E446	0.00148 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Leachable Metals	Anonymous	Anonymous	Strontium, leachable	7440-24-6	E446	84.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Leachable Metals	Anonymous	Anonymous	Sulfur, leachable	7704-34-9	E446	33.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Leachable Metals	Anonymous	Anonymous	Uranium, leachable	7440-61-1	E446	30.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.

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Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and/or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid** Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Leachable Metals : Mercury by CVAAS (Shakeflask, 3:1 Ratio with Water)										
LDPE bag VE44087-L01	E515	19-Jun-2023	11-Jul-2023	28 days	23 days	✓	13-Jul-2023	5 days	1 days	✓
Leachable Metals : Mercury by CVAAS (Shakeflask, 3:1 Ratio with Water)										
LDPE bag VE44087-L03	E515	19-Jun-2023	11-Jul-2023	28 days	23 days	✓	13-Jul-2023	5 days	1 days	✓
Leachable Metals : Mercury by CVAAS (Shakeflask, 3:1 Ratio with Water)										
LDPE bag VE44087-L05	E515	19-Jun-2023	11-Jul-2023	28 days	23 days	✓	13-Jul-2023	5 days	1 days	✓
Leachable Metals : Metals by CRC ICPMS (Shakeflask, 3:1 Ratio with Water)										
LDPE bag VE44087-L01	E446	19-Jun-2023	11-Jul-2023	180 days	23 days	✓	13-Jul-2023	157 days	2 days	✓
Leachable Metals : Metals by CRC ICPMS (Shakeflask, 3:1 Ratio with Water)										
LDPE bag VE44087-L03	E446	19-Jun-2023	11-Jul-2023	180 days	23 days	✓	13-Jul-2023	157 days	2 days	✓
Leachable Metals : Metals by CRC ICPMS (Shakeflask, 3:1 Ratio with Water)										
LDPE bag VE44087-L05	E446	19-Jun-2023	11-Jul-2023	180 days	23 days	✓	13-Jul-2023	157 days	2 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag VE44087-L01	E144	19-Jun-2023	---	---	---		06-Jul-2023	---	---	

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Matrix: **Soil/Solid**

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag VE44087-L03	E144	19-Jun-2023	----	----	----		06-Jul-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag VE44087-L05	E144	19-Jun-2023	----	----	----		06-Jul-2023	----	----	
Physical Tests : pH by Electrode (Shakeflask, 3:1 Ratio with Water)										
LDPE bag VE44087-L01	E116	19-Jun-2023	11-Jul-2023	30 days	23 days	✓	13-Jul-2023	7 days	2 days	✓
Physical Tests : pH by Electrode (Shakeflask, 3:1 Ratio with Water)										
LDPE bag VE44087-L03	E116	19-Jun-2023	11-Jul-2023	30 days	23 days	✓	13-Jul-2023	7 days	2 days	✓
Physical Tests : pH by Electrode (Shakeflask, 3:1 Ratio with Water)										
LDPE bag VE44087-L05	E116	19-Jun-2023	11-Jul-2023	30 days	23 days	✓	13-Jul-2023	7 days	2 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

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 Project : VE44087/Cox



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	Method	QC Lot #	QC	Regular	Actual	Expected	Evaluation
Laboratory Duplicates (DUP)							
Mercury by CVAAS (Shakeflask, 3:1 Ratio with Water)	E515	1033583	1	18	5.5	5.0	✔
Metals by CRC ICPMS (Shakeflask, 3:1 Ratio with Water)	E446	1033585	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	1025723	1	7	14.2	5.0	✔
pH by Electrode (Shakeflask, 3:1 Ratio with Water)	E116	1033584	1	18	5.5	5.0	✔
Laboratory Control Samples (LCS)							
Mercury by CVAAS (Shakeflask, 3:1 Ratio with Water)	E515	1033583	1	18	5.5	5.0	✔
Metals by CRC ICPMS (Shakeflask, 3:1 Ratio with Water)	E446	1033585	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	1025723	1	7	14.2	5.0	✔
pH by Electrode (Shakeflask, 3:1 Ratio with Water)	E116	1033584	1	18	5.5	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (Shakeflask, 3:1 Ratio with Water)	E515	1033583	1	18	5.5	5.0	✔
Metals by CRC ICPMS (Shakeflask, 3:1 Ratio with Water)	E446	1033585	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	1025723	1	7	14.2	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (Shakeflask, 3:1 Ratio with Water)	E515	1033583	1	18	5.5	5.0	✔
Metals by CRC ICPMS (Shakeflask, 3:1 Ratio with Water)	E446	1033585	1	18	5.5	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Electrode (Shakeflask, 3:1 Ratio with Water)	E116 ALS Environmental - Vancouver	Soil/Solid	MEND (mod)/APHA 4500-H (mod)	pH is determined by potentiometric measurement with a pH electrode, and is conducted at ambient laboratory temperature (normally 20 ± 5°C) on an extract from a soil sample that has been added in a 3:1 ratio of deionized water to soil, then leached and the extract filtered prior to analysis. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 ALS Environmental - Vancouver	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals by CRC ICPMS (Shakeflask, 3:1 Ratio with Water)	E446 ALS Environmental - Vancouver	Soil/Solid	BC MINISTRY OF ENERGY AND MINES/EPA 6020B (mod)	A sample is extracted with water at a 3:1 liquid to solid ratio for 24 hours, then filtered through a 0.45 micron membrane filter. Analysis is by Collision/Reaction Cell ICPMS. This extraction is an empirical procedure with pre-defined characteristics. Recovery of some elements (Ag, Bi, and Sn) by this method can be variable due to the neutral pH of the extraction fluid, and therefore the LCS DQOs has been established at 50-130% for these elements.
Mercury by CVAAS (Shakeflask, 3:1 Ratio with Water)	E515 ALS Environmental - Vancouver	Soil/Solid	BC MINISTRY OF ENERGY AND MINES/EPA 1631E (mod)	A sample is extracted with water at a 3:1 liquid to solid ratio for 24 hours, then filtered through a 0.45 micron membrane filter. Analysis is by CVAAS. This extraction is an empirical procedure with pre-defined characteristics. Recovery of mercury can be variable due to the neutral pH of the extraction fluid, and therefore the LCS DQO has been established at 50-130%.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Shakeflask Leachate Preparation (3:1 Ratio with Water)	EP446 ALS Environmental - Vancouver	Soil/Solid	BC MINISTRY OF ENERGY AND MINES	A sample is extracted with water at a 3:1 liquid to solids ratio for 24 hours, then filtered through a 0.45 micron membrane filter.

APPENDIX B

Sample locations for material testing other than ARD/ ML

(locations of ARD/ML samples are listed in the ARD/ML report)

Sample type	Location	On Figures 4 and 5
9mm minus	Northing: 5442517.22 m Easting: 560276.66 m Elevation: 13.08 m	D
19mm minus	Northing: 5442532.61 m Easting: 560332.41 m Elevation: 13.16 m	C
75mm minus	Northing: 5442530.77 m Easting: 560360.41 m Elevation: 13.37 m	C
8" minus	Northing: 5442426.98 m Easting: 560486.98 m Elevation: 40.12 m	E
40mm clear	Northing: 5442472.18 m Easting: 560337.38 m Elevation: 12.63 m	F
63mm clear	Northing: 5442472.18 m Easting: 560337.38 m Elevation: 12.63 m	F
25mm clear	Northing: 5442500.76 m Easting: 560149.01 m Elevation: 11.04 m	F
3"x8"	Northing: 5442681.49 m Easting: 560297.13 m Elevation: 9.32 m	B
4"x10"	Northing: 5442681.49 m Easting: 560297.13 m Elevation: 9.32 m	B
9mm wash clear	Northing: 5442219.20 m Easting: 559337.51 m Elevation: 12.14 m	G
12mm wash clear	Northing: 5442212.58 m Easting: 559356.85 m Elevation: 12.12 m	G
20mm wash clear	Northing: 5442220.62 m Easting: 559351.68 m Elevation: 12.09 m	G
Asphalt Sand	Northing: 5442228.11 m Easting: 559259.03 m Elevation: 13.40 m	G

Washed Sand	Northing: 5442166.80 m Easting: 559246.19 m Elevation: 12.27 m	G
Turf Field Sand	Northing: 5442183.57 m Easting: 559217.24 m Elevation: 12.45 m	G
Shipping Samples	Northing: 5442648.17 m Easting: 560225.24 m Elevation: 9.04 m	B
Rip Rap	Northing: 5442884.56 m Easting: 560257.54 m Elevation: 7.52 m	A



**SOUNDNESS OF AGGREGATE BY USE OF SODIUM SULFATE
OR MAGNESIUM SULFATE (COARSE)
ASTM C88**



TO: Winvan Paving Ltd.
220 Edworthy Way
New Westminster, BC
V3L 5G5

ATTN: Mr. William Threlfall
william.threlfall@mainlandcm.com

Test No.: 2
Date: January 26, 2024
Project No.: K-241230-03
Date Sampled: 12-Jan-24
Sampled by: AP
Date Tested: 25-Jan-24
Tested by: David Martin

This test has been completed to estimate the soundness of the tested aggregate when subjected to weathering action. This is accomplished by repeated immersion in saturated solutions of sodium or magnesium sulfate followed by oven drying to partially or completely dehydrate the salt precipitated in permeable pore spaces.

Coarse Portion

Material	Source	Sieve Size (mm)		% Loss	Weighted % Loss
		Passing	Retained		
9.5mm MF	Cox Quarry	9.5	4.75	0.9	0.9

Sample Weighted Loss (%): **0.9**

MoT Specified Limit, Superpave Mixes (%): **15 max.**

MMCD Specified Limit (%): **15 max.**

Comments:

Solution used: Magnesium Sulfate-Crystalline Form ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$)
Solution Specific Gravity: 1.300 Temperature: 21°C. Number of Cycles - 5.

Per:

David Martin
Laboratory Technician

Reviewed by:

Tatyana Tsvetkova PEng
Laboratory Manager | Materials Engineer

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**SOUNDNESS OF AGGREGATE BY USE OF SODIUM SULFATE
OR MAGNESIUM SULFATE (FINE)
ASTM C88**



TO: Winvan Paving Ltd.
220 Edworthy Way
New Westminster, BC
V3L 5G5

Report No.: 3
Date: 26-Jan-24
Project No.: K-241230-03
Date Sampled: 17-Jan-23
Sampled by: MZ
Date Tested: 26-Jan-24
Tested by: David Martin

ATTN: Mr. William Threlfall
william.threlfall@mainlandcm.com

This test has been completed to estimate the soundness of the tested aggregate when subjected to weathering action. This is accomplished by repeated immersion in saturated solutions of sodium or magnesium sulfate followed by oven drying to partially or completely dehydrate the salt precipitated in permeable pore spaces.

Fine Aggregate Portion

Material	Source	Sieve Size (mm)		Tested Mass (gr)	Percent Loss
		Passing	Retained		
9.5mm MF (Fine Portion)	Cox Quarry (Abbotsford)	4.75	2.36	100.0	1.5
		2.36	1.18	100.0	2.6
		1.18	0.600	100.0	5.2
		0.600	0.300	100.0	4.8

Average Loss (%): **3.5**
MoT Specified Limit, Superpave Mixes (%): **15 max**
MMCD Specified Limit, Paving Aggregate, Fine Portion (%): **18 max**

Per:

David Martin
Laboratory Technician

Reviewed by:

Tatyana Tsvetkova PEng
Laboratory Manager | Materials Engineer

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**LIGHTWEIGHT PARTICLES IN AGGREGATE
ASTM C123**


TO: Mainland Construction Materials ULC 220 Edworthy Way New Westminster, B.C. V3L 5G5 ATTN: Mr. William Threlfall William.Threlfall@mainlandcm.com	Report No.: 1 Date: 26-Jan-24 Project No.: K-241230-03 Date Sampled: 12-Jan-24 Sampled by: Client Date Tested: 25-Jan-24 Tested by: Nikolay Tsvetkov
--	---

This test method covers the determination of the percentage of lightweight particles in aggregate by means of sink-float separation in a heavy liquid of suitable specific gravity. A heavy liquid with a specific gravity of 2.0 is used to separate particles which may be classified as coal or lignite (porous aggregate particles in research activities or petrographic analyses).

Material	Source	Weights (gr)		SG	Light Weight (%)
		Sample	Floating Pieces		
9.5mm MF	Cox Quarry	3874.60	0.00	Heavy Liquid 2.0 (typ.)	None

 Lightweight Particles (%): None

 MoT Specified Limit (%): None

 MMCD Specified Limit (%): None

Comments:

Per:

 Nikolay Tsvetkov
Laboratory Technician

Reviewed by:

 Tatyana Tsvetkova, PEng
Laboratory Manager | Materials Engineer

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**RESISTANCE TO DEGRADATION OF SMALL SIZE COARSE
AGGREGATE BY ABRASION AND IMPACT IN THE LOSS
ANGELES MACHINE
ASTM C131**



To: **Mainland Construction Materials ULC**
220 Edworthy Way
New Westminster, B.C.
V3L 5G5

Date: 22-Jan-24
Project No.: K-241230-03
Test No.: 1

Attn: Mr. William Threlfall
William.Threlfall@mainlandm.com

SAMPLE DATA		TEST DATA	
Supplier:	Mainland Sand & Gravel	Number of Revolutions:	500
Sample Source:	Cox Quarry	Number of Spheres:	11
Sample Type:	20mm Clear Crush	Mass of Spheres:	4592.1g
Date Sampled:	12-Jan-24	Mass of Sample Tested:	5000.1 g
Date Received:	12-Jan-24	Grading Category:	B
Date Tested:	18-Jan-24	Conducted By:	Nikolay Tsvetkov

SAMPLE DATA					Table 1 Grading of Test Samples				
Sieve Sizes		Tested Sample	After 500 Revolutions		A	B	C	D	
					12 Balls	11 Balls	8 Balls	6 Balls	
					5000+/- 25 g	4580+/- 25 g	3300+/- 20 g	2500+/-15	
Passing	Retained	(Grams)	+1.7mm (Grams)	-1.7mm (Grams)	ASTM C131, Table 1: Suggested Gradings of Test Samples				
					(Grams)	(Grams)	(Grams)	(Grams)	
37.5 mm - 25.0 mm					1250+/-25				
25.0 mm - 19.0 mm					1250+/-25				
19.0 mm - 12.5 mm		2500.1			1250+/-10				2500+/-10
12.5 mm - 9.5 mm		2500.0			1250+/-10				2500+/-10
9.5 mm - 6.3 mm							2500+/-10		
6.3 mm - 4.75 mm							2500+/-10		
4.75 mm - 2.36 mm									
Total:		5000.1	4480.7	519.4	5000+/-10	5000+/-10	5000+/-10	5000+/-10	

Loss at 500 Revolutions, %	10.4	Applicable Requirements		
		Standard	Section	Max Limit
		MMCD	32 12 16	25 max

Laboratory Comments:

Based on the test result, the LA Abrasion loss meets MMCD specification requirements for paving aggregates.

Done by:

Nikolay Tsvetkov
Laboratory Technician

Reviewed by:

Tatyana Tsvetkova, PEng
Laboratory Manager / Pavement Engineer

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CLAY LUMPS AND FRIABLE PARTICLES IN AGGREGATES ASTM C142/C142M



TO: Winvan Paving Ltd.
220 Edworthy Way
New Westminster, BC
V3L 5G5

ATTN: William Threlfall
william.threlfall@mainlandcm.com

Report No.: 1
Date: 26-Jan-24
Project No.: K-241230-03
Date Sampled: 15-Jan-24
Sampled by: Client
Date Tested: 22-Jan-24
Tested by: TT

This test method covers the approximate determination of clay lumps and friable particles in aggregates. This test is performed by wet sieving aggregate size fractions over specified sieves. The mass percentage of material lost as a result of wet sieving is reported as the percent of clay lumps and friable particles.

Material	Fraction	Seive Size (mm)		Total, gr	Clay Lumps, %
		Passing	Retained		
9.5mm MF	Coarse Portion	12.50	4.75	3000.5	0.02
9.5mm MF	Fine Portion	4.75	1.18	349.7	0.03

Weighted Loss (%):	0.05
MoT Specified Limit (%):	max. 1%
MMCD Specified Limit (%):	max. 1%

Comments:

Percent of Clay Balls and Friable particles was found to be 0.1% which meets MoT requirements of max. 1% by mass for Superpave and Marshall mixes.

Per:

Andrey Pachshenko ASCT
Materials and Pavements Technologist

Reviewed by:

Tatyana Tsvetkova PEng
Laboratory Manager | Materials Engineer

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**SAND EQUIVALENT VALUE OF SOILS AND
FINE AGGREGATE**
ASTM D2419


TO: Winvan Paving Ltd.
220 Edworthy Way
New Westminster, BC
V3L 5G5

ATTN: William Threlfall
william.threlfall@mainlandcm.com

Report No.: 1
Project No.: K-241230-03
Source: Cox Quarry
Date Sampled: 15-Jan-24
Sampled by: Client
Date Tested: 22-Jan-24
Tested by: Nikolay Tsvetkov

This test has been completed to indicate, under standard conditions, the relative proportions of clay-size or plastic fines and dust in granular soils and fine aggregates that pass the 4.75-mm (No.4) sieve. The term "sand equivalent" expresses the concept that most granular soils and some fine aggregates are mixed of desirable coarse particles, sand-size particles, and generally undesirable clay or plastic fines and dust.

Material	Description	Test Data			Average SE, %
		Trial No.1	Trial No.2	Trial No.3	
9.5mm MF	Clay Height, mm	181.3	156.3	160.0	
	Sedimentation	20 min	20 min	20 min	
	Sand Height, mm	99.0	90.0	91.4	
	Sand Equivalent	54.6	57.6	57.1	56.4

Sand Equivalent (%): **56.4**

MoT Specified Limits for Superpave/Marshall Mixes (%): **45/40 min**

MMCD Specified Limit for More Than 30 ESALs Superpave Mixes (%): **50 min**

MMCD Specified Limit for Superpave/Marshall Mixes (%): **45/40 min**

Comments:

Based on three-trial average, Sand Equivalent (SE) value was found to be 56.4% which meets MoT and MMCD Specification requirements for paving aggregates.

Per:

Nikolay Tsvetkov
Laboratory Technician

Reviewed by:

Tatyana Tsvetkova PEng
Laboratory Manager | Materials Engineer

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**DENSITY, RELATIVE DENSITY (SPECIFIC GRAVITY), AND
ABSORPTION OF COARSE AGGREGATE
ASTM C127**



TO: Winvan Paving Ltd. (A Division of Mainland Construction ULC) 220 Edworthy Way New Westminster, BC. V3I 5G5 ATTN: William Threlfall William.Threlfall@mainlandcm.com	Report No.: 1 Date: 20-Jan-24 Project No.: K-241230-03 Date Sampled: 12-Jan-24 Sampled by: Client Date Tested: 18-Jan-24 Tested by: Nikolay Tsvetkov
---	---

This test has been completed to estimate the average density of coarse aggregate particles. Relative density is the characteristic generally used for calculation of the volume occupied by the aggregate due to water absorbed in the pore spaces within the particles, compared to the dry condition, when it is deemed that the aggregate has been in contact with water.

Coarse Aggregate

Product	Sample Source	Bulk Dry (kg/m ³)	Bulk SSD (kg/m ³)	Apparent (kg/m ³)	Absorption (nearest 0.01%)
20mm Clear Crush	Cox Quarry	2722	2734	2754	0.43

MoT Specified Limit, max (%): 2.0

MMCD Specified Limits for Lower Course/Upper Course, max (%): 2.00/1.75

Comments:

Based on test result, the water absorption was found to be 0.43%, which meets MoT and MMCD Specification requirements for paving aggregates.

Per:

Nikolay Tsvetkov
Laboratory Technician

Reviewed by:

Tatyana Tsvetkova PEng
Laboratory Manager | Materials Engineer

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#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W3
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

REPORT DATE: 9-Apr-24
PROJECT NO: VE46507

Attn: **SIMRANJOT SINGH**

PROJECT: 2024- ANNUAL PREQUALIFICATION TESTING
SCOPE: AGGREGATE TESTING- COX QUARRY

ASTM C128
RELATIVE DENSITY AND ABSORPTION OF FINE AGGREGATE

SAMPLE DATA

SUPPLIER	MAINLAND CONST	DATE SAMPLED:	14-Mar-24
SOURCE:	COX QUARRY	DATE RECIEVED:	14-Mar-24
SAMPLE TYPE:	ASPHALT SAND	DATE TESTED:	9-Apr-24
		TESTED BY	JR

Trial No.	Mass (g)	Relative Density Dry (Gsb)	Relative Density SSD (Gssd)	Apparent Relative Density (Gsa)	Absorption (%)
1	500.3	2.662	2.684	2.722	0.83
2	501.7	2.667	2.689	2.726	0.80
AVERAGE:		2.665	2.686	2.724	0.81

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:


Jaime Rivero
Laboratory Supervisor

Reviewed by:


Jim Hernandez, ASCT
Laboratory Manager

www.metrotesting.ca

Experience
applied



#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W5
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

Report Date: 05-Apr-24
Project No: VE46507

ATTN: **SIMRANJOT SINGH**

PROJECT: 2024- ANNUAL PREQUALIFICATION TESTING
SCOPE: AGGREGATE TESTING- COX QUARRY

CSA A23.2-3/ASTM C142
STANDARD TEST METHOD FOR CLAY LUMPS AND FRIABLE PARTICLES IN AGGREGATE

SAMPLE DATA		Test Data	
Sample I.D.		Date Sampled:	14-Mar-24
Sample Location:	COX QUARRY	Date Received:	14-Mar-24
Sample Type:	25MM CLEAR CRUSH (COARSE AGGREGATES)	Date Tested:	2-Apr-24
		Tested By:	JR

Results:

CLAY LUMPS/FRIABLE PARTICLES	0.00%
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APPLICABLE REQUIREMENTS

Standard	Section	Reference	Type	Max Limit (%)
MoTI	502	Table 502-B	Superpave, CL-1, CL-2	1/1.5*
CSA	A23.2:19	Table 12	Coarse Agg	0.3/0.5**

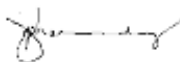
*CL-2 - other exposure

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:


Jaime Rivero
Laboratory Supervisor

Reviewed By:


Jim Hernandez ASCT
Laboratory Manager

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Experience
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#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W5
Phone: 1-888-855-9733 Fax: (604) 855-7378

To: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

TECHNICAL REPORT
Project No.: VE46507
Test Date: 2-Apr-2024
Sample #: 1
Client Ref.: 1 (Coarse)

Attention: **SIMRANJOT SINGH**

PROJECT: Aggregate Prequalification Testing -2024

SUBJECT:

ASTM C295 Standard Guide for Petrographic Examination of Aggregates for Concrete
CSA A23.2 15A Petrographic Examination of Aggregates

Sieve fraction: 25 mm clear
Date sampled: 14-Mar-2024
Date received: 14-Mar-2024
Tested by: HX

Source: Cox St. Quarry,
Abbotsford, BC

ESTIMATE PERCENT CRUSHED ($\leq$)	100%
ESTIMATE PERCENT FLAT AND ELONGATE ($<$)	1%

Rock Type	Number of particles	Weight of particles (g)	Percent of sample (%)	Petrographic		Classification	Notes
				Multiplier	Factor		
Granite (granodiorite)	-	1772.3	97.2	1	97.2	GOOD	Crushed coarse, angular, medium to coarse grained, consisting of plagioclase, lesser particles with K-spar, quartz, hornblende. Massive, fresh, hard. No fizzing w/ HCl, hard & hard & strong, with minor brittle particles, color varied: mostly greenish gray & white, pinkish red/white.
	-	50.5	2.8	3	8.3	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
				1	0.0	GOOD	
				3	0.0	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
				1	0.0	GOOD	
				3	0.0	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
				1	0.0	GOOD	
				3	0.0	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
				1	0.0	GOOD	
				3	0.0	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
Total	n/a	1822.8					
	Minimum Particle count	Minimum mass 1800g					

Petrographic Number (PN)	106
---------------------------------	------------

Comments: (1) The PN is not related to the potential of alkali-aggregate reactivity (AAR) of this aggregate when used in Portland cement concrete. AAR potential must be separately assessed.

(2) Rock types indicated by * may have potential for alkali-aggregate reaction (AAR). See CSA A23.1 and CSA A23.2 for information on the assessment of AAR in new concrete construction.

TABLE A2.1 - Suggested PN limits for aggregate quality classifications	
Product Type	PN limits
Concrete class C1, C2, F1	125 max
Other concrete classes	140 max
Shotcrete	125 max
Railroad ballast	125 max
Granular base	150 max
Select granular sub base	160 max

Per:


Henry H. Xu, P.Eng.
Sr. Materials Engineer

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request.

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#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W3
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

REPORT DATE: 05-Apr-24
PROJECT NO: VE46507

ATTN: **SIMRANJOT SINGH**

PROJECT: 2024- ANNUAL PREQUALIFICATION TESTING
SCOPE: AGGREGATE TESTING- COX QUARRY

ASTM C535
RESISTANCE TO DEGRADATION OF LARGE SIZE COARSE AGGREGATE BY ABRASION AND IMPACT IN THE LOS ANGELES MACHINE

Sample Data		Test Data	
Source	MAINLAND CONSTRUCTION	Number of Revolutions:	1000
Sample Location:	Cox Str. Quarry	Diameter of Spheres:	11
Sample Type:	63mm CLEAR CRUSH (COARSE AGGREGATE)	Mass of Spheres:	4592.9
Date Sampled:	14-Mar-24	Mass of Sample Tested:	997.4
Date Received:	14-Mar-24	Grading Category	B
Date Tested:	21-Mar-24	Tested By:	ZK

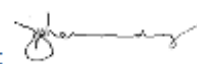
Results:

Loss at 1000 Revolutions	13.1%
--------------------------	-------

APPLICABLE REQUIREMENTS			
Standard	Section	Reference	Max Loss (%)
CSAA 23.2-04	4.2.3	Table 12	50
MoTI	211	Table 211-E	50
MMCD	02512	Upper Course	25
MMCD	02512	Lower Course	35

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per: 
Jaime Rivero
Laboratory Supervisor

Reviewed By: 
Jim Hernandez, ASCT
Laboratory Manager

www.metrotesting.ca

Experience
applied



#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W3
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

Report Date: 5-Apr-24
Project No: VE46705

ATTN: **SIMRANJOT SINGH**

Project: 2024- ANNUAL PREQUALIFICATION TESTING
Scope: AGGREGATE TESTING- COX QUARRY

ASTM C1252
UNCOMPACTED VOID CONTENT IN FINE AGGREGATE

Sample Data		Test Data	
Sample I.D.		Date Sampled:	14-Mar-24
Sample Location:	COX STN QUARRY	Date Received:	14-Mar-24
Sample Type:	ASPHALT SAND	Date Tested:	2-Apr-24

Results:

Uncompacted Void Content (Angularity)	48.5%
--	--------------

Comments: The result meets the MoTI requirement as per shown on table below

APPLICABLE REQUIREMENTS				
Standard	Section	Reference	Type	Minimum (%)
MoT	502	505.06.05	Superpave	45
			Class 1	45

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per: 
Jaime Rivero
Laboratory Supervisor

Reviewed By: 
Jaime Hernandez, AcSt
Laboratory Manager



CCIE CAR QUM
 401-6741 Carleton Rd., Burnaby, BC V5N 4A3
 t: 604.426.2111 f: 1.844.752.2638
 www.metrotesting.ca

CLIENT:

Mainland Construction Materials ULC
 317-925 201 Street Langley,
 BC, V1M 4A5

ATTENTION:

Smrarjot Singh

File No.	VE46507
Project:	ANNUAL PREQUAL
Sample ID:	63mm-4.75mm
Source:	COX QUARRY
Type of Sample:	COARSE AGGREGATES
Date Sampled:	14-Mar-24
Test No:	1
Tested by:	ZMA
Date Tested:	01-Apr-24
Report Date:	01-Apr-24

ASTM D3744 - Durability Index of Coarse Aggregate**SAMPLE DESCRIPTION**

SAMPLE TYPE: 63mm COARSE AGGREGATES (Graded portion)
 SAMPLE SOURCE: COX QUARRY
 AGGREGATE SUPPLIER: MAINLAND CONSTRUCTION

TEST DATA

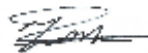
TRIAL NO.	1	2	Avg.
Procedure A			
SEDIMENTATION PERIOD, minutes	20 min	20 min	
HEIGHT OF SEDIMENT IN CYLINDER, H (in)	0.2	0.2	
DURABILITY INDEX, D _c	93	93	93

Calculations:

$$\text{Durability Index} = 30.3 + 20.8 \cot(0.29 + 0.15H), H \text{ in inches}$$

RESULT SUMMARY: Durability Index is 93, and meets the Project Requirement of not less than 35

Tested by:


 Laboratory Technologist
 Zmnako Ahmed

Reviewed by:


 Quality Supervisor/Technical Lead
 for Asphalt and Aggregate (Laboratory)

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#18 3273 McCallum Rd., Abbotsford, B.C. V2S 7W3
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

ATTN: **SIMRANJOT SINGH**

REPORT DATE: 5-Apr-24
PROJECT NO: VE46507
DATE SAMPLED: 14-Mar-24
DATE RECEIVED: 14-Mar-24
DATE TESTED: 29-Mar-24

PROJECT: 2024- ANNUAL PREQUALIFICATION TESTING
SCOPE: AGGREGATE TESTING- COX QUARRY

ASTM D7428 STANDARD TEST METHOD FOR THE RESISTANCE OF FINE AGGREGATE TO DEGRADATION BY ABRASION IN THE MICRO DEVAL APPARATUS	
Sample Data	Test Data
Sample ID	Number of Revolutions: 100±5 rpm
Sample Source: COX QUARRY	Diameter of Spheres: 9.5 mm
Sample Location: COX QUARRY	Mass of Spheres: 5000±5 grams
Sample Type: ASPHALT SAND	Mass of Sample Tested: 500.0
Aggregate Max Size	Grading Category
Run Time	Tested By:

Results:

Abrasion Loss	8.9%
----------------------	-------------

Notes Calibration Aggregate (Sutherland), % Loss : 17.6
Calibration Date: December 15, 2023
Trend Chart is available on request

Comments

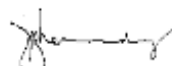
APPLICABLE REQUIREMENTS					
Standard	Section	Reference	Type	Max Loss (%)	
CSA	A23.1-09	Table 12		20	

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:


Jaime Rivero
Laboratory Supervisor

Reviewed By:


Jim Hernandez, ASCT
Laboratory Manager

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Phone: 1-888-835-9733 Fax: (604) 855-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

REPORT DATE: 5-Apr-24
PROJECT NO: VE46507
DATE SAMPLED: 14-Mar-24
DATE RECEIVED: 14-Mar-24
DATE TESTED: 29-Mar-24

ATTN: **SIMRANJOT SINGH**

PROJECT: 2024- ANNUAL PREQUALIFICATION TESTING
SCOPE: AGGREGATE TESTING- COX QUARRY

CSA A23.2.23A/ASTM D7428 STANDARD TEST METHOD FOR THE RESISTANCE OF FINE AGGREGATE TO DEGRADATION BY ABRASION IN THE MICRO DEVAL APPARATUS	
Sample Data	Test Data
Sample ID	Number of Revolutions: 100±5 rpm
Sample Source: COX QUARRY	Diameter of Spheres: 9.5 mm
Sample Location: COX QUARRY	Mass of Spheres: 5000±5 grams
Sample Type: 9mm Crushed Aggregates	Mass of Sample Tested: 500.0
Aggregate Max Size	Grading Category
Run Time	Tested By:

Results:

Abrasion Loss	8.9%
----------------------	-------------

Notes Calibration Aggregate (Sutherland), % Loss : 17.6
Calibration Date: December 15, 2023
Trend Chart is available on request

Comments

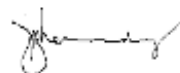
APPLICABLE REQUIREMENTS					
Standard	Section	Reference	Type	Max Loss (%)	
CSA	A23.1-09	Table 12		20	

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:


Jaime Rivero
Laboratory Supervisor

Reviewed By:


Jim Hernandez, ASCT
Laboratory Manager

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Phone: 1-888-855-9733 Fax: (604) 855-7378

TO: **Mainland Construction Materials ULC**
#317 - 9525 201 Street
Langley, BC V1M 4A5

PROJECT NO: VE46507
DATE OF REPORT: 22-Mar-24
SAMPLE I.D.: 40 mm Crushed Gravel
SAMPLE SOURCE: Cox Quarry
SAMPLE DATE: 15-Mar-24
TEST DATE: 21-Mar-24

ATTENTION: **Simranjot Singh**

ASTM G57 STANDARD TEST METHOD FOR MEASUREMENT OF SOIL RESISTIVITY (BC HYDRO SPECIFICATIONS)				
Resistivity Test Results				
Sample Type:	40 mm Clear Crushed	Cylinder diameter (d)	29.7	cm
Moisture Content	0.1%	Effective height	120.0	cm
Water Temperature:	12°C	x-sectional area of specimen, (A)	692.44	sq. cm
Void Ratio:	45%	Inner electrode spacing	68	cm
Crush Count (2-faces):	100.0%	Outer electrode spacing	26	cm
Apparatus used:	NILSSON Resistance Meter Model 400	Cylinder Factor	10.18	
Sample	State	Resistivity (Ohm - M)		
		Trial 1	Trial 2	Average
Tap Water		134	134	134
Gravel	As is (Dry)	>111,980	>111,980	>111,980
Gravel	Saturated (submerged in water)	814	814	814
Gravel	Wet (water drained from submerged state)	35,630	34,612	35,121
Gravel	Washed (cleaned, free of dust/dirt)	36,648	36,648	36,648
Specified minimum wet resistivity		3,000		

Notes:

Resistivity measuring instrument Nilsson M400 was calibrated on 03/21/2024.

The resistivity was measured in accordance with the test procedures specified in BCH's specifications (ES44-G0021).

Wet resistivity of gravel (35,121 Ohm-m) meets BC Hydro minimum requirement of 3,000 Ohm-M.

Jaime Rivero
Laboratory Supervisor

Jim Hernandez, ASCT
Laboratory Manager

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request

Experience
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#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W8
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

REPORT DATE: 26-Mar-24
PROJECT NO: VE46507

ATTN: **SIMRANJOT SINGH**

Project: 2024- ANNUAL PREQUALIFICATION TESTING
Scope: AGGREGATE TESTING- COX QUARRY

CSA A23.2-24A
STANDARD TEST METHOD FOR THE RESISTANCE OF UNCONFINED COARSE AGGREGATE TO FREEZING

Sample Data		Test Data	
Sample Supplier	MAINLAND CONSTRUCTION	Date Sampled:	14-Mar-24
Sample Location:	Cox Str. Quarry	Date Received:	14-Mar-24
Sample Type:	40mm-5mm CLEAR CRUSH (Coarse Aggregates)	Date Tested:	March 26-Apr 2, 2024
		Tested By:	JR

Material Size Retained (mm)	Suggested Weights of Test Samples	Weight of Test Fractions Before Test (g)	Weight of Test Fractions After Test (g)	%Loss of Test Fraction	Grading of Tested Fraction(%)	Weighted Percent Loss (%)
40 - 28	5000.0	5015	4821.6	3.86	48.8	1.88
28 - 20	2500.0	2502.0	2483.7	0.73	24.4	0.18
20 - 14	1250.0	1250.3	1240.2	0.81	12.2	0.10
14 - 10	1000.0	1000.3	989.3	1.10	9.7	0.11
mm - 5 mm	500.0	500.4	487.3	2.62	4.9	0.13
(-)						
TOTAL	10250.0	10268.0	10022.1	1.82	100.0	2.4

Results:

Weighted Loss to Freezing & Thawing (5 Cycles)	2.4%
--	-------------

Note:

Comments

APPLICABLE REQUIREMENTS

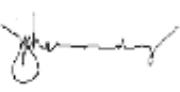
Standard	Section	Reference	Type	Max Limit (%)
CSA A23.2	24A	Table 12	Coarse	6.0
MoTI	211	Table 211E	Coarse	6.0

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:


James Rivero
Lab Supervisor

Reviewed By:


Jimmy Hernandez, AScT
Laboratory Manager




 #18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W8
 Phone: 1-888-833-9733 Fax: (604) 853-7378

TO: MAINLAND CONSTRUCTION MATERIALS ULC
 #317 - 9525 201 Street
 Langley, BC V1M 4A5

Report Date: 03-Jun-24
 Project No.: VE47270

ATTN: SIMRANJOT SINGH

PROJECT AGGREGATES PREQUAL

SCOPE MATERIALS TESTING

ASTM D 4318
 STANDARD TEST METHOD FOR LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

Sample Data		Test Data	
Sample ID		Date Sampled:	30-May-24
Sample Source	COX QUARRY	Date Received:	31-May-24
Sample Location:	ABBOTSFORD	Date Tested:	3-Jun-24
Sample Type:	19mm MINUS		

Results:

PLASTICITY INDEX	NON PLASTIC
------------------	-------------

Comments:

APPLICABLE REQUIREMENTS				
Standard	Section	Reference	Type	Requirement
MOT	202	TABLE 202B	SURFACING AGG	≤ 6
			Base	na
			Sub Base	na

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per: 
 Jaime Rivero
 Laboratory Supervisor

Reviewed By: 
 Jim Hernandez, ASCT
 Laboratory Manager

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Phone: 1-888-855-9733 Fax: (604) 855-7378

TO: MAINLAND CONSTRUCTION MATERIALS ULC
#317 - 9525 201 Street
Langley, BC V1M 4A5

Report Date: 03-Jun-24
Project No.: VE47270

ATTN: SIMRANJOT SINGH

Project: AGGREGATES PREQUAL

Scope: MATERIALS TESTING

ASTM D2419			
Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate			
Sample Data			
Sample ID		Date Sampled:	30-May-24
Sample Location:	COX QUARRY	Date Received:	31-May-24
Sample Type:	25mm MINUS (WGB)	Date Tested:	3-Jun-24

TEST DATA		TEST SPECIMEN				AVERAGE
		1	2	3	4	
A	Sand Height	3.50	3.60	3.50	3.50	
B	Clay Height	4.70	4.70	4.60	4.60	
C	Sand Equivalent	75.0%	77.0%	77.0%	77.0%	77.0%

APPLICABLE REQUIREMENTS				
Standard	Section	Reference	Type	Minimum (%)
MOT1	202	Table 202-B	HFSA	20
			BASE	40
			S-BASE	20
			BEF	20

Remarks: The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Calculations:

$$SE = \frac{A}{B} \times 100$$

Where:

SE - Sand Equivalent

A - Sand Height

B - Clay Height

Per:

Jaime Rivero
Laboratory Supervisor

Reviewed By:

Jim Hernandez, AScT
Laboratory Manager



#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W3
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

REPORT DATE: 22-May-24
PROJECT NO: VE47164
DATE SAMPLE: 21-May-24
DATE RECEIVED: 21-May-24
DATE TESTED: 21-May-24

ATTN: **SIMRANJOT SINGH**

PROJECT: AGGREGATES PREQUALIFICATION

SCOPE: MATERIALS TESTING

ASTM D6928
STANDARD TEST METHOD FOR THE RESISTANCE OF COARSE AGGREGATE TO DEGRADATION BY
ABRASION IN THE MICRO DEVAL APPARATUS

Sample Data		Test Data	
Sample Source:	COX QUARRY	Number of Revolutions:	100±5 rpm
Sample Supplier	MAINLAND CONSTRUCTION	Diameter of Spheres:	9.5 mm
Sample Location:	ABBOTSFORD	Mass of Spheres:	5000±5 grams
Sample Type:	25mm CLEAR (130025)	Mass of Sample Tested:	1500.9
Aggregate Max Siz	19 mm	Grading Category	A
Run Time	120 minutes	Tested By:	Jaime Rivero

Results:

ABRASION LOSS	4.4%
----------------------	-------------

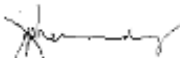
Notes Calibration Aggregate (Drain Brothers), % Loss : 13.6
Calibration Date: December 15, 2023
Trend Chart is available on request

Comments:

APPLICABLE REQUIREMENTS				
Standard	Section	Reference	Type	Max Loss (%)

The test data reported pertains to the sample provided and may not be applicable to materials from other production zones


Per: **Jaime Rivero**
Laboratory Supervisor


Reviewed By: **Jim Hernandez, ASCT**
Laboratory Manager

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TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

Report Date: 5-Apr-24
Project No: VE46705

ATTN: **SIMRANJOT SINGH**

Project: 2024- ANNUAL PREQUALIFICATION TESTING
Scope: AGGREGATE TESTING- COX QUARRY

ASTM C1252
UNCOMPACTED VOID CONTENT IN FINE AGGREGATE

Sample Data		Test Data	
Sample I.D.		Date Sampled:	14-Mar-24
Sample Location:	COX STN QUARRY	Date Received:	14-Mar-24
Sample Type:	ASPHALT SAND	Date Tested:	2-Apr-24

Results:

Uncompacted Void Content (Angularity)	48.5%
--	--------------

Comments: The result meets the MoTI requirement as per shown on table below

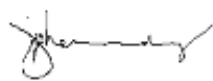
APPLICABLE REQUIREMENTS				
Standard	Section	Reference	Type	Minimum (%)
MoT	502	505.06.05	Superpave	45
			Class 1	45

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:


Jaime Rivero
Laboratory Supervisor

Reviewed By:


Jaime Hernandez, AcSt
Laboratory Manager

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Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

Report Date: 05-Apr-24
Project No: VE46507

ATTN: **SIMRANJOT SINGH**

PROJECT: 2024- ANNUAL PREQUALIFICATION TESTING
SCOPE: AGGREGATE TESTING- COX QUARRY

CSA A23.2-3/ASTM C142
STANDARD TEST METHOD FOR CLAY LUMPS AND FRIABLE PARTICLES IN AGGREGATE

SAMPLE DATA	Test Data
Sample I.D.	Date Sampled: 14-Mar-24
Sample Location: COX QUARRY	Date Received: 14-Mar-24
Sample Type: 25MM CLEAR CRUSH (COARSE AGGREGATES)	Date Tested: 2-Apr-24
	Tested By: JR

Results:

CLAY LUMPS/FRIABLE PARTICLES	0.00%
-------------------------------------	--------------

APPLICABLE REQUIREMENTS

Standard	Section	Reference	Type	Max Limit (%)
MoTI	502	Table 502-B	Superpave, CL-1, CL-2	1/1.5*
CSA	A23.2:19	Table 12	Coarse Agg	0.3/0.5**

CL-2 ** - other exposure

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per: 
Jaime Rivero
Laboratory Supervisor

Reviewed By: 
Jim Hernandez AScT
Laboratory Manager

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TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

REPORT DATE: 26-Mar-24
PROJECT NO: VE46507

ATTN: **SIMRANJOT SINGH**

Project: 2024- ANNUAL PREQUALIFICATION TESTING
Scope: AGGREGATE TESTING- COX QUARRY

CSA A23.2-24A
STANDARD TEST METHOD FOR THE RESISTANCE OF UNCONFINED COARSE AGGREGATE TO FREEZING

Sample Data		Test Data	
Sample Supplier	MAINLAND CONSTRUCTION	Date Sampled:	14-Mar-24
Sample Location:	Cox Stn. Quarry	Date Received:	14-Mar-24
Sample Type:	40mm-5mm CLEAR CRUSH (Coarse Aggregates)	Date Tested:	March 26-Apr 2, 2024
		Tested By:	JH

Material Size Retained (mm)	Suggested Weights of Test Samples	Weight of Test Fractions Before Test (g)	Weight of Test Fractions After Test (g)	%Loss of Test Fraction	Grading of Tested Fraction(%)	Weighted Percent Loss (%)
40 - 28	5000.0	5015	4821.6	3.86	48.8	1.88
28 - 20	2500.0	2502.0	2483.7	0.73	24.4	0.18
20 - 14	1250.0	1250.3	1240.2	0.81	12.2	0.10
14 - 10	1000.0	1000.3	989.3	1.10	9.7	0.11
mm - 5 mm	500.0	500.4	487.3	2.62	4.9	0.13
(-)						
TOTAL	10250.0	10268.0	10022.1	1.82	100.0	2.4

Results:

Weighted Loss to Freezing & Thawing (5 Cycles)	2.4%
--	-------------

Note:

Comments

APPLICABLE REQUIREMENTS

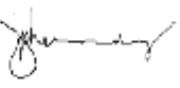
Standard	Section	Reference	Type	Max Limit (%)
CSA A23.2	24A	Table 12	Coarse	6.0
MoTI	211	Table 211E	Coarse	6.0

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:


James Rivero
Lab Supervisor

Reviewed By:


Jimmy Hernandez, AScT
Laboratory Manager

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To: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4K6

TECHNICAL REPORT

Project No.: VE46507
Test Date: 2-Apr-2024
Sample #: 1
Client Ref.: 1 (Coarse)

Attention: **SIMRANJOT SINGH**

PROJECT: Aggregate Prequalification Testing -2024

SUBJECT:

ASTM C295 Standard Guide for Petrographic Examination of Aggregates for Concrete
CSA A23.2 15A Petrographic Examination of Aggregates

Sieve fraction: 25 mm clear
Date sampled: 14-Mar-2024
Date received: 14-Mar-2024
Tested by: HX

Source: Cox St. Quarry,
Abbotsford, BC

ESTIMATE PERCENT CRUSHED (s)	100%
ESTIMATE PERCENT FLAT AND ELONGATE (<)	1%

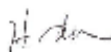
Rock Type	Number of particles	Weight of particles (g)	Percent of sample (%)	Petrographic Multiplier	Petrographic Factor	Classification	Notes
Granite (granodiorite)	-	1772.3	97.2	1	97.2	GOOD	Crushed coarse, angular, medium to coarse grained, consisting of plagioclase, lesser particles with K-spar, quartz, hornblende. Massive, fresh, hard. No fizzing w/ HCl, hard & hard & strong, with minor brittle particles, color varied: mostly greenish gray & white, pinkish red/white.
	-	50.5	2.8	3	8.3	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
				1	0.0	GOOD	
				3	0.0	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
				1	0.0	GOOD	
				3	0.0	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
				1	0.0	GOOD	
				3	0.0	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
				1	0.0	GOOD	
				3	0.0	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
				1	0.0	GOOD	
				3	0.0	FAIR	
				6	0.0	POOR	
				10	0.0	DELETERIOUS	
Total	n/a	1822.8					
	Minimum Particle count	Minimum mass 1800g					

Petrographic Number (PN) 106

Comments: (1) The PN is not related to the potential of alkali-aggregate reactivity (AAR) of this aggregate when used in Portland cement concrete. AAR potential must be separately assessed.

(2) Rock types indicated by * may have potential for alkali-aggregate reaction (AAR). See CSA A23.1 and CSA A23.2 for information on the assessment of AAR in new concrete construction.

TABLE A2.1 - Suggested PN limits for aggregate quality classifications	
Product type	PN limits
Concrete class C1, C2, F1	125 max
Other concrete classes	140 max
Shotcrete	125 max
Railroad ballast	125 max
Granular base	150 max
Select granular sub base	160 max

Per: 
Henry H. Xu, P.Eng.
Sr. Materials Engineer

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#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W8
Phone: 1-888-855-9733 Fax: (604) 855-7378

TO: **Mainland Construction Materials ULC**
#317 - 9525 201 Street
Langley, BC V1M 4A5

PROJECT NO: VE46507
DATE OF REPORT: 22-Mar-24
SAMPLE I.D.: 40 mm Crushed Gravel
SAMPLE SOURCE: Cox Quarry
SAMPLE DATE: 15-Mar-24
TEST DATE: 21-Mar-24

ATTENTION: **Simranjot Singh**

ASTM G57 STANDARD TEST METHOD FOR MEASUREMENT OF SOIL RESISTIVITY (BC HYDRO SPECIFICATIONS)				
Resistivity Test Results				
Sample Type:	40 mm Clear Crushed	Cylinder diameter (d)	29.7	cm
Moisture Content	0.1%	Effective height	120.0	cm
Water Temperature:	12°C	x-sectional area of specimen, (A)	692.44	sq. cm
Void Ratio:	45%	Inner electrode spacing	68	cm
Crush Count (2-faces):	100.0%	Outer electrode spacing	26	cm
Apparatus used:	NILSSON Resistance Meter Model 400	Cylinder Factor	10.18	
Sample	State	Resistivity (Ohm - M)		
		Trial 1	Trial 2	Average
Tap Water		134	134	134
Gravel	As is (Dry)	>111,980	>111,980	>111,980
Gravel	Saturated (submerged in water)	814	814	814
Gravel	Wet (water drained from submerged state)	35,630	34,612	35,121
Gravel	Washed (cleaned, free of dust/dirt)	36,648	36,648	36,648
Specified minimum wet resistivity		3,000		

Notes:

Resistivity measuring instrument Nilsson M400 was calibrated on 03/21/2024.

The resistivity was measured in accordance with the test procedures specified in BCH's specifications (ES44-G0021).

Wet resistivity of gravel (35,121 Ohm-m) meets BC Hydro minimum requirement of 3,000 Ohm-M.

Jaime Rivero
Laboratory Supervisor

Jim Hernandez, AScT
Laboratory Manager

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of test results is provided only on written request

Experience
applied



COX QUARRY
 401-6741 Caribou Rd., Burnaby, BC V5N 4A3
 t: 604.436.2111 f: 604.752.2595
 www.metrotesting.ca

CLIENT:

Mainland Construction Materials ULC
 317-925 201 Street Langley,
 BC, V1M 4A5

ATTENTION:

Smranjot Singh

File No.	VE46507
Project:	ANNUAL PREQUAL
Sample ID:	63mm-4.75mm
Source:	COX QUARRY
Type of Sample:	COARSE AGGREGATES
Date Sampled:	14-Mar-24
Test No:	1
Tested by:	ZMA
Date Tested:	01-Apr-24
Report Date:	01-Apr-24

ASTM D3744 - Durability Index of Coarse Aggregate**SAMPLE DESCRIPTION**

SAMPLE TYPE: 63mm COARSE AGGREGATES (Graded portion)
 SAMPLE SOURCE: COX QUARRY
 AGGREGATE SUPPLIER: MAINLAND CONSTRUCTION

TEST DATA

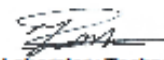
TRIAL NO.	1	2	Avg.
Procedure A			
SEDIMENTATION PERIOD, minutes	20 min	20 min	
HEIGHT OF SEDIMENT IN CYLINDER, H (in)	0.2	0.2	
DURABILITY INDEX, D_c	93	93	93

Calculations:

$$\text{Durability Index} = 30.3 + 20.8 \cot(0.29 + 0.15H), H \text{ in Inches}$$

RESULT SUMMARY: Durability Index is 93, and meets the Project Requirement of not less than 35

Tested by:


 Laboratory Technologist
 Zmnako Ahmed

Reviewed by:


 Quality Supervisor/Technical Lead
 for Asphalt and Aggregate (Laboratory)

Reporting of these test results constitutes a testing service only.
 Engineering interpretation or evaluation of test results is provided only on written request.

metrotesting.ca

Experience
 applied



#18 3273 McCallum Rd., Abbotsford, B.C. V2S 7W3
Phone: 1-888-855-9733 Fax: (604) 855-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

REPORT DATE: 05-Apr-24
PROJECT NO: VE46507

ATTN: **SIMRANJOT SINGH**

PROJECT: 2024- ANNUAL PREQUALIFICATION TESTING

SCOPE: AGGREGATE TESTING- COX QUARRY

ASTM C535
RESISTANCE TO DEGRADATION OF LARGE SIZE COARSE AGGREGATE BY ABRASION AND IMPACT IN THE LOS ANGELES MACHINE

Sample Data		Test Data	
Source	MAINLAND CONSTRUCTION	Number of Revolutions:	1000
Sample Location:	Cox Stn. Quarry	Diameter of Spheres:	11
Sample Type:	63mm CLEAR CRUSH (COARSE AGGREGATE)	Mass of Spheres:	4592.9
Date Sampled:	14-Mar-24	Mass of Sample Tested:	997.4
Date Received:	14-Mar-24	Grading Category	B
Date Tested:	21-Mar-24	Tested By:	ZK

Results:

Loss at 1000 Revolutions	13.1%
--------------------------	-------

APPLICABLE REQUIREMENTS			
Standard	Section	Reference	Max Loss (%)
CSAA 23.2-04	4.2.3	Table 12	50
MoT1	211	Table 211-E	50
MMCD	02512	Upper Course	25
MMCD	02512	Lower Course	35

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:


Jaime Rivero
Laboratory Supervisor

Reviewed By:


Jim Hernandez, ASCT
Laboratory Manager

www.metrotesting.ca

Experience
applied



#18 3275 McCellum Rd., Abbotsford, B.C. V2S 7W3
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

REPORT DATE: 9-Apr-24
PROJECT NO: VE46507

Attn: **SIMRANJOT SINGH**

PROJECT: 2024- ANNUAL PREQUALIFICATION TESTING
SCOPE: AGGREGATE TESTING- COX QUARRY

ASTM C128
RELATIVE DENSITY AND ABSORPTION OF FINE AGGREGATE

SAMPLE DATA

SUPPLIER	MAINLAND CONST	DATE SAMPLED:	14-Mar-24
SOURCE:	COX QUARRY	DATE RECIEVED:	14-Mar-24
SAMPLE TYPE:	ASPHALT SAND	DATE TESTED:	9-Apr-24
		TESTED BY	JR

Trial No.	Mass (g)	Relative Density Dry (Gsb)	Relative Density SSD (Gssd)	Apparent Relative Density (Gsa)	Absorption (%)
1	500.3	2.662	2.684	2.722	0.83
2	501.7	2.667	2.689	2.726	0.80
AVERAGE:		2.665	2.686	2.724	0.81

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:

Jaime Rivera
Laboratory Supervisor

Reviewed by:

Jim Hernandez, ASCT
Laboratory Manager

www.metrotesting.ca

Experience
applied



CCIL CAR
#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W3
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

Report Date: 5-Apr-24
Project No: VE46705

ATTN: **SIMRANJOT SINGH**

Project: 2024- ANNUAL PREQUALIFICATION TESTING
Scope: AGGREGATE TESTING- COX QUARRY

ASTM C1252
UNCOMPACTED VOID CONTENT IN FINE AGGREGATE

Sample Data		Test Data	
Sample I.D.		Date Sampled:	14-Mar-24
Sample Location:	COX STN QUARRY	Date Received:	14-Mar-24
Sample Type:	ASPHALT SAND	Date Tested:	2-Apr-24

Results:

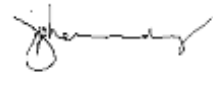
Uncompacted Void Content (Angularity)	48.5%
---------------------------------------	-------

Comments: The result meets the MoTI requirement as per shown on table below

APPLICABLE REQUIREMENTS				
Standard	Section	Reference	Type	Minimum (%)
MoT	502	505.06.05	Superpave	45
			Class 1	45

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per: 
Jaime Rivero
Laboratory Supervisor

Reviewed By: 
Jaime Hernandez, AcSt
Laboratory Manager

www.metrotesting.ca

Experience
applied



#18 3275 McCallum Rd., Abbotsford, B.C. V2S 7W3
Phone: 1-888-833-9733 Fax: (604) 833-7378

TO: **MAINLAND CONSTRUCTION MATERIALS ULC**
7412 GILLEY AVENUE
BURNABY, BC V5J 4X6

REPORT DATE: 5-Apr-24
PROJECT NO: VE46507
DATE SAMPLED: 14-Mar-24
DATE RECEIVED: 14-Mar-24
DATE TESTED: 29-Mar-24

ATTN: **SIMRANJOT SINGH**

PROJECT: 2024- ANNUAL PREQUALIFICATION TESTING
SCOPE: AGGREGATE TESTING- COX QUARRY

ASTM D7428 STANDARD TEST METHOD FOR THE RESISTANCE OF FINE AGGREGATE TO DEGRADATION BY ABRASION IN THE MICRO DEVAL APPARATUS			
Sample Data		Test Data	
Sample ID		Number of Revolutions:	100±5 rpm
Sample Source	COX QUARRY	Diameter of Spheres:	9.5 mm
Sample Location:	COX QUARRY	Mass of Spheres:	5000±5 grams
Sample Type:	ASPHALT SAND	Mass of Sample Tested:	500.0
Aggregate Max Size		Grading Category	
Run Time		Tested By:	

Results:

Abrasion Loss	8.9%
----------------------	-------------

Notes Calibration Aggregate (Sutherland), % Loss : 17.6
Calibration Date: December 15, 2023
Trend Chart is available on request

Comments

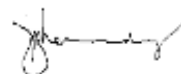
APPLICABLE REQUIREMENTS					
Standard	Section	Reference	Type	Max Loss (%)	
CSA	A23.1-09	Table 12		20	

The test data reported pertains to the sample provided, and may not be applicable to materials from other production zones

Per:


Jaime Rivero
Laboratory Supervisor

Reviewed By:


Jim Hernandez, ASCT
Laboratory Manager

www.metrotesting.ca

Experience
Applied

APPENDIX C

BLAST LOG: IMGT		Blast # <u>23-78</u>	Date: <u>Oct 25/23</u>	Time: <u>11:00 AM</u>	Weather: <u>Sunny</u>	Ceiling: <u>Clear</u>	Wind: <u>—</u>
Permit # <u>02-7-58</u>		Pre-BLAST Signoff: <u>—</u>		Avg. Collar: <u>—</u> FT		Explosive Used: <u>—</u>	
Blasters: <u>Dylan Dell'oca</u>		Site / Face review by: <u>—</u>		Stemming Used: <u>Aug</u>		# Boosters: <u>26</u>	
Cert No: <u>1484784</u>		Drill Log from: <u>—</u>		Design PF: <u>—</u>		Delays: <u>26</u>	
Exp. Supplier: <u>Dyno Nobel</u>		Equipment within 200M minimum clearing radius: <u>—</u>		Free Face: <u>Y</u> <u>N</u>		Blasts AMFO: <u>8</u>	
Mime Manager OK to load shot: <u>—</u>		X Spacing (M) <u>—</u>		X Depth of hole (M) <u>—</u>		X Number of holes <u>—</u>	
Tonnes of rock: (SA x M) <u>—</u>		Burden (M) <u>—</u>		X 2.75 (density) = <u>—</u>		Tonnes <u>—</u>	
Latitude: <u>—</u>		Longitude: <u>—</u>		Blast Map: <u>—</u>		☐ Show ☐ North ☐ Tie ins ☐ Plan view ☐ Cross Section ☐ Faults	
Blast Math: <u>—</u>		# holes = <u>26</u>		Delay between rows = <u>25</u>		Delay between holes = <u>25</u>	
Sum of delays first to last hole = <u>650</u>		Closest Structure: <u>—</u>		Seismo location: <u>—</u>		Seismo to blast (M): <u>—</u>	
AS LOADED PF		AS LOADED PF		AS LOADED PF		AS LOADED PF	
AS LOADED - NOTE adjustments (clearing zone etc)		AS LOADED - NOTE adjustments (clearing zone etc)		AS LOADED - NOTE adjustments (clearing zone etc)		AS LOADED - NOTE adjustments (clearing zone etc)	
Post Blast COMMENTS - (Circle if yes, X if no if yes, Describe)		Misfire <u>X</u>		Premature Detonation <u>X</u>		Fly Rock <u>X</u>	
OTHER: <u>—</u>		On Site Damage <u>X</u>		Off Site Damage <u>—</u>		Public Complaint <u>—</u>	
BLASTERS SIGNATURE: <u>Dylan Dell'oca</u>		BLASTERS SIGNATURE: <u>—</u>		BLASTERS SIGNATURE: <u>—</u>		BLASTERS SIGNATURE: <u>—</u>	

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1150-00-00-6000-613
 PLANT: 1127 - ABBOTSFORD
 SOLD TO: 26721 - MAINLAND
 SHIP TO: 26738 - COX

COX QUARRY

COX BLAST # #23-78

CUSTOMER PO: 12405

DELIVERY DATE: Oct 25/23

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BUH
QD51420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
QD51425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D3			10 or CAS
QD51430016	BLASTEX 3X16(75X400) 40LB/18.2KG	D3			CAS
QD43050030	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D3			EA
D544030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2		1	EA
D544050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
D544060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
D544080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1		26	EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SP0350	TROJAN* SPARTAN 350G 49/CS	D3		26	EA
SP0450	TROJAN* SPARTAN 450G 36/CS	D3			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS

QR787	TITAN SME	101	NO EMULSION	KG
SOX008	OXIDIZER SOLUTION TITAN SME	101	Boulder shot	KG
SJF084	TITAN SME FUEL PHASE	101		KG
TR027	L-4	101		KG

SKID STEER HRS (\$5556)

(Same as SHOT HOURS)

FREIGHT / KM (\$5301)

(TO BE CHARGED)

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS

(SAME AS SKID STEER)

LMS - MAN HOURS

(1 HR - STANDARD)

LMS - KILOMETERS

50

(50 KM - STANDARD)

100

100

100

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1150-00-00-6000-613
 PLANT: 1127 - ABBOTSFORD
 SOLD TO: 26721 - MAINLAND
 SHIP TO: 26738 - COX

COX QUARRY

COX BLAST # 23-83B

CUSTOMER PO: _____

DELIVERY DATE: Nov. 21/23

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	UOM
QD51420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
QD51425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D3			LB OF CAS
QD51430016	BLASTEX 3X16(75X400) 40LB/18.2KG	D3			CAS
QD43050030	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D3			EA
D544030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2		1	EA
D544050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
D544060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
D544080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1		46	EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1		35	EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1		50	EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1		1	SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SP0350	TROJAN* SPARTAN 350G 49/CS	D3		41	EA
SP0450	TROJAN* SPARTAN 450G 36/CS	D3		87	EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS					
QR757	TITAN SME	101	Boulder shot		KG
SOX008	OXIDIZER SOLUTION TITAN SME	101			KG
SJF034	TITAN SME FUEL PHASE	101			KG
TR027	L-4	101			KG

SKID STEER HRS (55556) 1182 HRS 100

(SAME AS SHOT HOURS)

FREIGHT / KM (55801) (TO BE CHARGED) 100

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS (SAME AS SKID STEER) 100

LMS - MAN HOURS (1 HR - STANDARD) 100

LMS - KILOMETERS 50 (50 KM - STANDARD) 100

170 BOPW WIDENING BENTLEY

DRILLING LOG- COX		Drill Days	
Driller:		Date: NOV 14	TUES
Spacing	Ideal: 18	Start: 5 8	X
Burden		Finish: 1 16	
Depth	52	Date: NOV 15	WED
Subdrill	5	Start: 4 30	5
Material + SG		Finish: 9 30	
Free Face	YES	Date:	
Elevation	NO	Start:	
Notes:		Finish:	



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A															
B															
C															
D															
E															
F															

BLAST LOG: COX		Blast # <u>23-88B</u>	Date: <u>Dec. 07/23</u>	Time: <u>10:30 AM</u>	Weather: <u>Rain</u>	Ceiling: <u>Low</u>	Wind: <u>0</u>
Permit # <u>007-68</u>		Pre-BLAST Signoff:		Avg. Collier: <u>3</u> ft		Explosive Used:	
Blasters: <u>Lydon Dell Oca</u>		Site / Face review by: <u>Boulders</u>		Stemming Used: <u>1" Clear</u>		ANFO KG: _____	
Cert No: <u>489789</u>		Drill Log from: <u>Kerran</u>		Design PF: <u>✓</u>		MALUSION KG: _____	
Exp. Supplier: <u>Dyno Nobel</u>		Equipment within 200M minimum clearing radius:		Free Face: <u>Y N</u>		BAGS AMFO: _____	
Mine Manager OK to load shot:				CHUS: <u>13</u>		OTHER: _____	
Tonnes of rock: <u>150 X MG</u>		Burden (M)	X Spacing (M)	X Depth of hole (M)	X Number of holes	X 2.67 (density) = _____ Tonnes	
Latitude: _____							
Longitude: _____							
Blast Map		☐ Show ☒ North ☐ Tie ins ☐ Plan view ☐ Cross Section ☐ Faults					
Blast Math:							
# holes = <u>66</u>							
Delay between rows = <u>0</u>							
Delay between holes = <u>25</u>							
Sum of delays first to last hole = _____							
Closest Structure:							
Seismo Location:							
Seismo to blast (M):							
AS LOADED PF							
AS LOADED - NOTE adjustments (clearing zone etc)							
Post Blast COMMENTS - (Circle if yes, X if no if yes, describe)		Misfire _____ Premature Detonation _____ Fly Rock _____ On Site Damage _____ Off Site Damage _____ Public Complaint _____ OTHER: <u>little fly rock from boulders expected</u>					
BLASTERS SIGNATURE: _____							

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1150-00-00-6000-613

PLANT: 1127 - ABBOTSFORD

SOLD TO: 26721 - MAINLAND

SHIP TO: 26738 - COX

COX QUARRYCOX BLAST # #23-888

CUSTOMER PO: _____

DELIVERY DATE: Dec 7/23

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BUH
QD51420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
QD51425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D3			EA OF CAS
QD51430016	BLASTEX 3X16(75X400) 40LB/18.2KG	D3			CAS
QD48050080	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D3			EA
DS44030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2		1	EA
DS44050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
DS44060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
DS44080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1		69	EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SP0350	TROJAN* SPARTAN 350G 49/CS	D3			EA
SP0450	TROJAN* SPARTAN 450G 36/CS	D3			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA
	Dyno TX			1 BOX	

CREATING TITAN SME - COMPONENTS					
QR787	TITAN SME	101	No Emulsion	N/A	KG
50X008	OXIDIZER SOLUTION TITAN SME	101	Boulder		KG
SJF034	TITAN SME FUEL PHASE	101			KG
TR027	L-4	101			KG

SKID STEER HRS (\$5556)

(same as SHOT HOURS)

100

FREIGHT / KM (\$5301)

(TO BE CHARGED)

100

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS

(SAME AS SKID STEER)

100

LMS - MAN HOURS

(1 HR - STANDARD)

100

LMS - KILOMETERS

50

(50 KM - STANDARD)

100

BLAST LOG: COX		Blast #	23 - 8973	Date:	Dec 08/23	Time:	1:58 pm	Weather:	cloudy / Rain	Ceiling:	Low	Wind:	2
Permit # 02-7-008		Pre-BLAST Signoff:		Avg. Collar:		Explosive Used:		# Boosters:		Detonators:			
Blasters: Dylan Del'Orca		Site / Face review by: Dylan Del'Orca		H = 7		ANFO kg: 0		Delays:		9m 57			
Cert No: 489784		Drill log from: Kwanano		Stemming Used: 1/2 Clear		EMULSION kg: 0				12m 57			
Exp. Supplier: Dydo Nobel		Equipment within 200M minimum clearing radius:		Free Face: Y		BAGS ANFO: 0				18m			
Mine Manager OK to load shot:						CHUBS: 23				24m			
						OTHER: 0				Nobel or Digidet (Circle one)			
Tonnes of rock: (30 x ms) Burden (M)		X Spacing (M)	X Depth of hole (M)	X Number of holes	X 2.67 (density) =	Tonnes							
Latitude: 11°N													
Longitude: 117°W													
Blast Map		→ Show → > North > Tie Ins > Plan view > Cross Section > Faults											
Blast Math:													
# holes = 57													
Delay between rows = 0													
Delay between holes = 25													
Sum of delays first to last hole =													
Closest Structure:		1											
Trough trucks													
Seismo Location:													
Seismo to blast (M):													
On Report													
AS LOADED PF													
AS LOADED - NOTE adjustments (clearing zone etc)													
Post Blast COMMENTS — (Circle if yes, X if no if yes, Describe) Misfire Premature Detonation Fly Rock On Site Damage Off Site Damage Public Complaint OTHER: _____													
BLASTERS SIGNATURE: _____													

C:\Users\jfontan\AppData\Local\Microsoft\Windows\iNetCache\Content.Outlook\6FRT81WP\010100 - MSO Blast Log COX 2023.docx

1150-00-00-6000-613
 PLANT: 1127 - ABBOTSFORD
 SOLD TO: 26721 - MAINLAND
 SHIP TO: 26738 - COX

COX QUARRY

COX BLAST # 23-89B

DELIVERY DATE: Dec. 08/23

CUSTOMER PO: _____

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BUN
QD51420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
QD51425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D3			18.1 CAS
QD51430016	BLASTEX 3X16(75X400) 40LB/18.2KG	D3			CAS
QD43050030	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D3			EA
D544030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2		1	EA
D544050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
D544060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
D544080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1		57	EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SPO350	TROJAN* SPARTAN 350G 49/CS	D3			EA
SPO450	TROJAN* SPARTAN 450G 36/CS	D3			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA
	<u>4 Dyno TX 2 1/2 x 16 (65 x 400)</u>			2	cases

CREATING TITAN SME - COMPONENTS

QR787	TITAN SME	101	KG
SOX008	OXIDIZER SOLUTION TITAN SME	101	KG
SIF034	TITAN SME FUEL PHASE	101	KG
TR027	L-4	101	KG

SKID STEER HRS (\$5556)

(SAME AS SHOT HOURS)

FREIGHT / KM (\$5302)

(TO BE CHARGED)

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS

(SAME AS SKID STEER)

LMS - MAN HOURS

(1 HR - STANDARD)

LMS - KILOMETERS

50

(50 KM - STANDARD)

100

100

100

100

100

BLAST LOG: COX		Blast #	Date:	Time:	Weather:	Celling:	Wind:
Permit # 02-7-08	23-91	Dec 13/23	11:08	Cloudy	Low	0	
Blaster: Dylan Dell'Acqua	Pre-BLAST Signoff:	Avg. Collar: 18 ft	Explosive Used:	# Boogers:	Detonators:		
Cert No: 469789	Site / Face review by Dylan Dell'Acqua	Stemming Used: Cuttings	EMUSION NO: 580	Delays: 15	12m 15		
Exp. Supplier: Dyno Nobel	Drill Log from Kewanee	Free Face: 8 ft	BASS AMFO:	CHUS:	14m		
	Equipment within 200M minimum clearing radius:				24m		
	Mine Manager OK to load shot:				None or (circle det)		
Tonnes of rock: 90 x m3	Burden (M): 10	X Spacing (M): 10	X Depth of hole (M): 25	X Number of holes: 15	X 2.67 (density) =	Tonnes	
Latitude: N/A	Longitude: N/A	→ Show → → North → Tie Ins → Plan view → Cross Section → Faults					
Blast Map	100 → 75 → 50 → 25 → 0 ← 0 ← 0 ← 0 ← 0 ← 0 209 184 159 134 109 ← 0 ← 0 ← 0 ← 0 ← 0 318 293 268 243 218 ← 0 ← 0 ← 0 ← 0 ← 0 Rip Rap Shot 18' Collar 25' Deep 7' of Powder						
Blast Math:	# holes = 15 Delay between rows = 109 Delay between holes = 25 Sum of delays first to last hole = 318						
Closest Structure:	54Rd						
Seignior Location:	Bottom corner 2						
Seising to blast (M):	N/A						
AS LOADED PF	✓						
AS LOADED - NOTE adjustments (clearing zone etc)							
Post Blast COMMENTS - (Circle if yes, X if no if yes, Describe) Miscfire ☒ Premature Detonation ☒ Fly Rock ☒ On Site Damage ☒ Off Site Damage ☒ Public Complaint ☒ OTHER: ☒							
BLASTERS SIGNATURE: [Signature]							

1150-00-00-8000-813
 PLANT: 1127 - ABBOTSFORD
 SOLD TO: 26721 - MAINLAND
 SHIP TO: 26736 - COX

COX QUARRY

COX BLAST # #23-91

CUSTOMER PO:

DELIVERY DATE: DCC 13/23

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BUH
QD51420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
QD51428016	BLASTEX 2 1/4 X16 (65X400) 40LB/18.1 KG	D3			EA OF CAS
QD51430016	BLASTEX 3X16(75X400) 40LB/18.2KG	D3			CAS
QD43050030	BLASTGEL 1070 5 X 30 (125MMX13.5KG)	D3			EA
DS44080A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2		15	EA
DS44050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
DS44060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
DS44080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1			EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT/24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2		2-Bolls	EA
SP0350	TROJAN* SPARTAN 350G 48/CS	D3		15	EA
SP0450	TROJAN* SPARTAN 450G 36/CS	D3			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS

QR787	TITAN SME	101		590	KG
SOX008	OXIDIZER SOLUTION TITAN SME	101			KG
SJF034	TITAN SME FUEL PHASE	101			KG
TR027	L-4	101			KG

SKID STEER HRS (SS556) 1.5 hrs

(same as SHOT HOURS)

FREIGHT / KM (SS801) (TO BE CHARGED) 100

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS (SAME AS SKID STEER) 100

LMS - MAN HOURS (1 HR - STANDARD) 100

LMS - KILOMETERS 50 (50 KM - STANDARD) 100

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1150-00-00-6000-613
 PLANT: 1127 - ABBOTSFORD
 SOLD TO: 26721 - MAINLAND
 SHIP TO: 26786 - COX

COX QUARRY

COX BLAST # #23-94

CUSTOMER PO:

DELIVERY DATE: Dec 21/23

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BU
QD51420016	BLASTEX 2X16(50X400) 40LB/18KG	D8			CAS
QD51425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D8			UN BY CAS
QD51480016	BLASTEX 3X16(75X400) 40LB/18.2KG	D8			CAS
QD43060080	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D3			EA
DS44030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2			EA
DS44050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2		20	EA
DS44060A	DIGISHOT DETONATOR 60FT/18.3M 53/CS	D2			EA
DS44080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1			EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SP0350	TROJAN* SPARTAN 350G 48/CS	D8		20	EA
SP0450	TROJAN* SPARTAN 450G 36/CS	D8			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42 SLB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS

QR787	TITAN SME	101	1490	KG
SOX008	OXIDIZER SOLUTION TITAN SME	101		KG
SJF034	TITAN SME FUEL PHASE	101		KG
TR027	L-4	101		KG

SKID STEER HRS (55556) 1.5 hrs

(same as SHOT HOURS)

FREIGHT / KM (55301) [TO BE CHARGED] 100

LMS - INTERVAL USE ONLY

LMS - SHOT HOURS (SAME AS SKID STEER) 100

LMS - MAN HOURS (1 HR - STANDARD) 100

LMS - KILOMETERS 50 [50 KM - STANDARD] 100

BLAST LOG: COX				Blast #	Date	Time	Weather:	Cloud	Rain	Wind:	Detonators:
Permit # 007-68				23-93	Dec 21/23	10:15	Cloud + Rain	Low	0		
Blaster: <u>Dejia Delluca</u>				Pre-Blast Signoff: <u>Track Cut</u>		Avg. Collar: <u>7</u>		Explosive Used:		# Boosters:	
Cert No: <u>489259</u>				Site / <u>Remediation</u> <u>Track Cut</u>		Stemming Used: <u>2" Clear</u>		ANFO KG: <u>1100</u>		Delays:	
Exp. Supplier: <u>Dyno Nobel</u>				Drill Log from <u>Dejia Delluca</u>		Free Face: <u>Y (N)</u>		EMULSION KG: <u>1100</u>		24m	
Equipment within 200M minimum clearing radius:				Design PF: <u>✓</u>		OTHER: <u>CHUS</u>		Blasts ANFO: <u>1100</u>		Normal or (circle one)	
Mine Manager OK to load shot:				X Spacing (M) <u>1.2</u>		X Depth of hole (M) <u>4.0</u>		X Number of holes <u>40</u>		X 2.67 (density) = <u>40</u> Tonnes	
Tonnes of rock: (96 x M3) <u>1.2</u>				Latitude: <u>✓</u>		Longitude: <u>✓</u>		Blast Map: <u>→ Show →</u>			
				→ North		→ Tie ins		→ Plan view			
				→ Cross Section		→ Faults					
Blast Math:				# holes = <u>40</u>		Delay between rows = <u>48</u>		Delay between holes = <u>17.25</u>		Sum of delays first to last hole = <u>815</u>	
Closest Structure: <u>GPR</u>				Seismo Location: <u>GPR</u>		Seismo to blast (M): <u>on Report</u>		AS LOADED PF: <u>✓</u>		AS LOADED - NOTE adjustments (clearing zone etc)	
Post Blast COMMENTS - (Circle if yes, X if no if yes, Describe)				Misfire		Premature Detonation		Fly Rock		On Site Damage	
OTHER: <u>Trend shot only relief is up</u>				X		✓		X		Public Complaint	
BLASTERS SIGNATURE: <u>Dejia Delluca</u>											

uphill → down hill

Rock

17 59 104 143 185 227 264 311 353 395 437 474 511 553 595 637 679 721 763 805

42 84 126 168 210 252 294 336 378 420 462 504 546 588 630 672 714 756 798

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1150-00-00-6000-613
 PLANT: 1127 - ABBOTSFORD
 SOLD TO: 26721 - MAINLAND
 SHIP TO: 26738 - COX

COX QUARRYCOX BLAST # 23-93DELIVERY DATE: Dec 21/23

CUSTOMER PO:

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BU
QD51420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
QD51425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D3			CAS
QD51430016	BLASTEX 3X16(75X400) 40LB/18.2KG	D3			CAS
QD43050030	BLASTGEL 1070 5 X 30 (125MMX13.5KG)	D3			EA
DS44030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2		40	EA
DS44050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
DS44060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
DS44080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1			EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SPO350	TROJAN* SPARTAN 350G 48/CS	D3		40	EA
SPO450	TROJAN* SPARTAN 450G 36/CS	D3			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS

QR787	TITAN SME	101	100	KG
SOX008	OXIDIZER SOLUTION TITAN SME	101		KG
SJP034	TITAN SME FUEL PHASE	101		KG
TR027	L-4	101		KG

SKID STEER HRS (SS556) 1.5 hrs

100

(same as SHOT HOURS)

FREIGHT / KM (SS301) (TO BE CHARGED)

100

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS (SAME AS SKID STEER)

100

LMS - MAN HOURS (1 HR - STANDARD)

100

LMS - KILOMETERS 50 (50 KM - STANDARD)

100

BLAST LOG: COX		Blast # 23-808	Date: Nov. 06/23	Time: 3:00	Weather: Rain/Cloud	Ceiling: Low	Wind: 0
Permit # 02-7-68	Pre-BLAST Signoff: Boulders	Avg. Collar: 3-4		Explosive Used:		# Boosters: 49	
Blast: Dylan Dell'Oca	Site/Fabrication by: Prostitt	Stemming Used: 1/2" clear		AMFO KG: 0		Delays: 49	
Cert No: 464789	Equipment within 200M minimum clearing radius:	Free face: 7 ft		EMULSION KG: 0		Detonators: 49	
Exp. Supplier: Dyno Nobel	Mine Manager OK to load shot: LJA	Boulders		BADS AMFO: 0		18m 49	
Tonnes of rock: 55 x ms	Burden (M) 1.2	X Spacing (M) 1.2	X Depth of hole (M) 1.2	X Number of holes 49	X 2.67 (density) = 13	or Dig-det (Circle one)	
Latitude: _____	Longitude: _____						
Blast Map	→ Show →						
	→ North						
	→ Tie Ins						
	→ Plan view						
	→ Cross Section						
	→ Faults						
Blast Math:	# holes = 49						
Delay between rows = 2.5							
Delay between holes = 2.5							
Sum of delays first to last hole = 1200							
Closest Structure: Train tracks							
Seismo Location:							
Seismo to blast (M):							
AS LOADED PF							
AS LOADED - NOTE adjustments (clearing zone etc)							
Post Blast COMMENTS — (Circle if yes, X if no if yes, Describe) Misfire Premature Detonation Fly Rock On Site Damage Off Site Damage Public Complaint OTHER: _____ BLASTERS SIGNATURE: _____							

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1150-00-00-6000-613

PLAN T: 1127 - ABBOTSFORD

SOLD TO: 26721 - MAINLAND

SHIP TO: 26738 - COX

COX QUARRY

COX BLAST # #23-80BCUSTOMER PO: 12457 NTDELIVERY DATE: Nov 6/23

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BU
Q051420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
Q051425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D3			1/2 OF CAS
Q051430016	BLASTEX 3X16(75X400) 40LB/18.2KG	D3		2 Cases	CAS
Q043050080	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D3			EA
D544030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2		1	EA
D544050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
D544060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
D544080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1		49	EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SP0350	TROJAN* SPARTAN 350G 49/CS	D3		49	EA
SP0450	TROJAN* SPARTAN 450G 36/CS	D3			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS

QR767	TITAN SME	101	No Emulsion	KG
SOX008	OXIDIZER SOLUTION TITAN SME	101	boulder shot	KG
SJF034	TITAN SME FUEL PHASE	101		KG
TR027	L-4	101		KG

SKID STEER HRS (\$5556)

(SAME AS SHOT HOURS)

100

FREIGHT / KM (\$5301)

(TO BE CHARGED)

100

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS

(SAME AS SKID STEER)

100

LMS - MAN HOURS

(1 HR - STANDARD)

100

LMS - KILOMETERS

50

(50 KM - STANDARD)

100

BLAST LOG: COX Permit # 02-7-68 Manager: N Taylor Exp. Supplier: Dylis Nodel Blaster: Dylan Dyll Cox Cert #: 102442		Blast # 23-76B Date: 12/12 Time: 4:10 PM Weather: Cloudy/Rain Ceiling: Overcast Wind: 0 (INSEW/Speed)	
Hole Status: 30 # Holes Loaded: 30 # Holes Abandoned: 0 # Lines: 0 # Holes Deactivated: 0		Collars: BOULDER Stemming Used: Rags Free Face: Y n	
Explosive Used: ANFO ANFO KID: 9 EMULSION KID: 9 BASF ANFO: 9 CHUR: 9 OTHER:		# Boosters: 30 Delays: 30 Detonators: 31 9m: 1 12m: 31 18m: 1 24m: 1	
Detonation Method (circle): Electric (Wireless) Electronic		Tonnes of rock (150 x m3) Burden (m) X Spacing (m) X Depth of hole (m) X Number of holes X 2.67 (tonnes per m³) = Tonnes	
Latitude: N/A Longitude: N/A Blast Map: Show > North > Tie Ins > Plan View > Cross Section > Faults			
Blast Math: # holes = 30 Delay between rows = 0 Delay between holes = 2.5 Sum of delays first to last hole = 72.5			
Closest Structure: Trees & rocks			
Seismo Location: N/A			
Seismo to blast (Meters): N/A			
Recorded us/m/s: N/A			
Con db:			
Post Blast COMMENTS – (Circle if yes, X if no if yes, Describe) Misfire Premature Detonation Fly Rock On Site Damage Off Site Damage Public Complaint Mine Manager: X SIGNATURE: <i>[Signature]</i>			

MSEG Blast Log COX 2017 NO LEGEND print page 1 - 2 normal/m/m/ADMIN/Forms/MSD Blast Log COX 2017 NO LEGEND print page 1 - 2 normal/y.docx

1150-00-00-6000-613

PLANT: 1127 - ABBOTSFORD

SOLD TO: 26721 - MAINLAND

SHIP TO: 26738 - COX

COX QUARRYCOX BLAST # **#23-76B**CUSTOMER PO: **Cox #23-76B**DELIVERY DATE: **Oct 17/23**

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BUIn
QDS1420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
QDS1425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D3			CAS
QDS1430016	BLASTEX 3X16(75X400) 40LB/18.2KG	D3		1 CASE	CAS
QD43050030	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D3			EA
D544030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2		1	EA
D544050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
D544060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
D544080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1		31	EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SP0350	TROJAN* SPARTAN 350G 48/CS	D3		30	EA
SP0450	TROJAN* SPARTAN 450G 36/CS	D3			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS

QR787	TITAN SME	101		KG
SOX008	OXIDIZER SOLUTION TITAN SME	101		KG
SJF034	TITAN SME FUEL PHASE	101		KG
TR027	L-4	101		KG

SKID STEER HRS (\$5556)

(Same as SHOT HOURS)

100

FREIGHT / KM (\$5301)

(TO BE CHARGED)

100

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS

(SAME AS SKID STEER)

100

LMS - MAN HOURS

(1 HR - STANDARD)

100

LMS - KILOMETERS

50

(50 KM - STANDARD)

100

BLAST LOG: COX		Blast #	Date	Time	Weather	Ceiling	Wind
Permit # 02-7-68	Manager: M Taylor	23-720	08.05/23	3:40pm	Sunny	Open	0
Exp. Supplier: Dyna Nobel	Blaster: Dylan Dill Cox	Hole Status: 34	Collars: 0	Explosive Used: 0	EMULSION KGE: 0	Detonators: 1	Detonation Method (circle): Electric
Cert #: 102442	# Holes Abandoned: 0	# Holes Loaded: 0	Stemming Used: Regs	SAES AMFO: 0	CHUS: 12	Delays: 34	Wireless
	# Liners: 0	Free Face: Y N	Other: 0	Other: 0	Other: 0	Other: 0	Electronic
Tonnes of rock: 358 X MS	Burden (M)	X Spacing (M)	X Depth of hole (M)	X Number of holes	X 2.67 (tonnes per M³) =	Tonnes	
Latitude: _____	Longitude: _____						
Blast Map: → Show → North → Tie Ins → Plan View → Cross Section → Faults	Blast Math: # holes = 34 Delay between rows = 0 Delay between holes = 10.5 Sum of delays first to last hole = 357						
Closest Structure: 675	Seismo Location:						
Seismo to blast (Meters):	Recorded US/mv/s						
Com db	Post Blast COMMENTS - (Circle if yes, X if no if yes, Describe)	Milfire ☒ Premature Detonation ☒ Fly Rock ☒ On Site Damage ☒ Off Site Damage ☒ Public Complaint ☒					
Mine Manager:	SIGNATURE: <i>[Signature]</i>						

MSG Blast Log COX 2017 NO LEGEND print page 1 - 2 normally/MS/ADMIN/Forms/MSG Blast Log COX 2017 NO LEGEND print page 1 - 2 normally /cox

1150-00-00-6000-613
 PLANT: 1127 - ABBOTSFORD
 SOLD TO: 26721 - MAINLAND
 SHIP TO: 26788 - COX

COX QUARRY

COX BLAST # 23-728

CUSTOMER PO: COX #23-728

DELIVERY DATE: Oct 5/23

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BUH
QD51420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
QD51425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D8			EA OF CAS
QD51430016	BLASTEX 3X16(75X400) 40LB/18.2KG	- D8	23FE2351	2-cases	CAS
QD49050080	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D3			EA
D544030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	- D2	11542251	1	EA
D544050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
D544060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
D544080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF429	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	- D1	065022W1	34	EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			EA
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SP0350	TROJAN* SPARTAN 350G 48/CS	- D3	015E2151	34	EA
SP0450	TROJAN* SPARTAN 450G 36/CS	D3			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS					
QR787	TITAN SME	101	No Emulsion	1	KG
SOX008	OXIDIZER SOLUTION TITAN SME	101	Barbiter Shot	1	KG
SJF034	TITAN SME FUEL PHASE	101		1	KG
TR027	L-4	101		1	KG

SKID STEER HRS (55556)

(same as SHOT HOURS)

FREIGHT / KM (55801)

(TO BE CHARGED)

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS

(SAME AS SKID STEER)

LMS - MAN HOURS

(1 HR - STANDARD)

LMS - KILOMETERS

50

(50 KM - STANDARD)

100

100

100

100

100

BLAST LOG: COX Permit # 24-14 Blast: Dylan Dell'Occa Cert No: 484784 Exp. Supplier: Dyna Nobel	Blast # 24-14 Date: Mar. 11/24 Time: 3:40pm Pre-BLAST Signoff: Site / Face review by: Dylan Dell'Occa Drill Log from: Greg Equipment within 200M minimum clearing radius: Mine Manager OK to load shot:	Weather: (Precip/Temps) Cloud/Rain Explosive Used: ANFO KG: 1740 EMULSION KG: 1740 BAGS ANFO: / CHUBS: / OTHER: /	Wind: (NSEW/Speed) Low # Boosters: 5 Delays: /	Detonators: 9m: / 12m: / 18m: / 24m: 5 None or Dig-deg (Circle one)
Tonnes of rock: (90 x m3) Burden (M) 16 X Spacing (M) 18 X Depth of hole (M) 45 X Number of holes 5 X 2.67 (density) = Tonnes Latitude: _____ Longitude: _____ Blast Map → Show → > North > Tie Ins > Plan view > Cross Section > Faults Blast Math: # holes = 5 Delay between rows = 166 Delay between holes = 25, 17 Sum of delays first to last hole = 177 		Closest Structure: G410 Seismo Location: G410 Seismo to blast (M): on Report AS LOADED PF: ✓ AS LOADED - NOTE adjustments (clearing zone etc) Post Blast COMMENTS - (Circle if yes, x if no if yes, describe) Misfire X Premature Detonation X Fly Rock X On Site Damage X Off Site Damage X Public Complaint X OTHER: BLASTERS SIGNATURE:		

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1150-00-00-6000-613
 PLANT: 1127 - ABBOTSFORD
 SOLD TO: 26721 - MAINLAND
 SHIP TO: 26738 - COX

COX QUARRY

COX BLAST# #24-14DELIVERY DATE: Mar 17/24

CUSTOMER PO:

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	Unit
QD81420016	BLASTEX 2X16(50X400) 40LB/18KG	D8			CAS
QD81425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D8			EA
QD51430016	BLASTEX 5X16(75X400) 40LB/18.2KG	D8			CAS
QD43050030	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D8			EA
D544030A	DIGISHOT DETONATOR 30FT/9.1M 84/CS	D2			EA
D544050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2			EA
D544060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
D544080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2		5	EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF428	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1			EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT 24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY38820	NONEL*EZTL 38MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, D.50MM, CU 1000FT 2/CS	D2			EA
SP0350	TROJAN* SPARTAN 350G 48/CS	D8			EA
SP0450	TROJAN* SPARTAN 450G 36/CS	D8		5	EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY38820	NONEL*EZTL DELAYS 38MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS

QR787	TITAN SME	101	1790	KG
SOX008	OXIDIZER SOLUTION TITAN SME	101		KG
SIF034	TITAN SME FUEL PHASE	101		KG
TR027	L-4	101		KG

SKID STEER HRS (55556) 1.5 hrs

(ENTER IN SHOT HOURS)

FREIGHT / KM (55301) (TO BE CHARGED) 100

LMS - INTERVAL USE ONLY

LMS - SHOT HOURS (SAME AS SKID STEER) 100

LMS - MAN HOURS (1 HR - STANDARD) 100

LMS - KILOMETERS 50 (50 KM - STANDARD) 100

BLAST LOG: COX Permit # 24-28	Blast # 24-28	Date: Apr. 25/24	Time: 2:00 PM	Weather: (Precip/Temp) Rain	Ceiling: Low	Wind: (NGSW/Speed) 0
Blaster: Dylan Dell'Occa Cart No: 489769 Exp. Supplier: Dynam Nobel	Pre-BLAST Signoff: Site / Face review by Dylan Dell'Occa Drill Log from Verano Design PF ✓ Equipment within 200M minimum clearing radius:		Weather: (Precip/Temp) Rain		Explosive Used: ANFO KG: 4414 EMULSION KG: 4414 BAGS ANFO: 4414 CHUBS: 4414 OTHER: 4414	# Boasters: 51 Delays: 51 Detonators: 51 9m 12m 18m 24m None or (Sig-det) (Circle one)
Mine Manager OK to load shot:		Tonnes of rock: (SS x M3) Burden (M) 10 X Spacing (M) 10 X Depth of hole (M) 10 X Number of holes 33 X 2.67 (density) = 867 Tonnes				
Latitude: Longitude:		Blast Map → Show → → North → Tie ins → Plan view → Cross Section → Faults				
Blast Math: # holes = 33 Delay between rows = 1.04 Delay between holes = 1.517 Sum of delays first to last hole = 5.87		Closest Structure: X-Mas Star Seismo Location: GYRO Seismo to blast (M): On Report AS LOADED PF ✓ AS LOADED - NOTE adjustments (clearing zone etc)				
Post Blast COMMENTS - (Circle if yes, X if no if yes, describe) OTHER:		On Site Damage X Off Site Damage X Fly Rock X Premature Detonation X Misfire X Public Complaint X BLASTERS SIGNATURE: <i>Dylan Dell'Occa</i>				

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1150-00-00-6000-613
PLANT: 1127 - ASBOTSFORD
SOLD TO: 26721 - MAINLAND
SHIP TO: 26736 - COX

COX QUARRYCOX BLAST# #24-28DELIVERY DATE: Apr 25/24

CUSTOMER PO:

MATERIAL	DESCRIPTION	SLOC	BATCH	QUANTITY	BU
QD51420016	BLASTEX 2X16(50X400) 40LB/18KG	D3			CAS
QD51425016	BLASTEX 2 1/2 X16 (65X400) 40LB/18.1 KG	D3			EA
QD51430016	BLASTEX 3X16(75X400) 40LB/18.2KG	D3		27	CAS
QD43050030	BLASTGEL 1070 5 X 30 (125MMX13.6KG)	D3			EA
DS44030A	DIGISHOT DETONATOR 30FT/9.1M 24/CS	D2			EA
DS44050A	DIGISHOT DETONATOR 50FT/15.2 60/CS	D2		51	EA
DS44060A	DIGISHOT DETONATOR 60FT/18.3M 52/CS	D2			EA
DS44080A	DIGISHOT DETONATOR 80FT/24.4M 40/CS	D2			EA
DZAF216	NONEL*EZDET 25/500 16FT/4.9M 90/180CS	D1			EA
DZAF224	NONEL*EZDET 25/500 24FT/7M 70/140CS	D1			EA
DZAF428	NONEL*EZDET 25/500 30FT/9M 120/CS	D1			EA
DZAF440	NONEL*EZDET 25/500 40FT/12.2M 120/CS	D1			EA
DZAF460	NONEL*EZDET 25/500 60FT/18.3M 90/CS	D1			EA
DZAF480	NONEL*EZDET 25/500 80FT/24.4M 40/CS	D1			EA
DZAF4M0	NONEL*EZDET 25/500 100FT/30.5M 40/CS	D1			EA
DY17820	NONEL*EZTL 17MS 20FT/6M 75/150CS	D1			EA
DY33820	NONEL*EZTL 33MS 20FT/6M 75/150CS	D1			EA
DY42820	NONEL*EZTL 42MS 20FT/6M 75/150CS	D1			EA
DY80820	NONEL*EZTL 100MS 20FT/6M 75/150 YEL	D1			EA
DJ25025	NONEL*LEADLINE 2500FT/762M 2/CS	D1			SP
DR14420	NONEL*MS500 20FT/6.1M 180/CS	D1			EA
DJ00500	NONEL*STARTER 500FT/152.4M 8/CS	D1			EA
R71000	SURFACE WIRE, 0.60MM, CU 1000FT 2/CS	D2			EA
SPO350	TROJAN* SPARTAN 350G 49/CS	D3		51	EA
SPO450	TROJAN* SPARTAN 450G 36/CS	D3			EA
DN231420016E	UNIMAX 2 X 16(50X400)TS EC 42.5LB/19.3KG				CAS
DY33820	NONEL*EZTL DELAYS 33MS 20FT/6M 75/150CS	D1			EA

CREATING TITAN SME - COMPONENTS

QR787	TITAN SME	101	NO EMULSION	///	KG
SOX008	OXIDIZER SOLUTION TITAN SME	101			KG
SIF034	TITAN SME FUEL PHASE	101			KG
TR027	L-4	101			KG

SKID STEER HRS (SS556) 1.5 hrs

(same as SHOT HOURS)

FREIGHT / KM (SS801)

(TO BE CHARGED)

100

100

LMS - INTERNAL USE ONLY

LMS - SHOT HOURS

(SAME AS SKID STEER)

100

LMS - MAN HOURS

(1 HR - STANDARD)

100

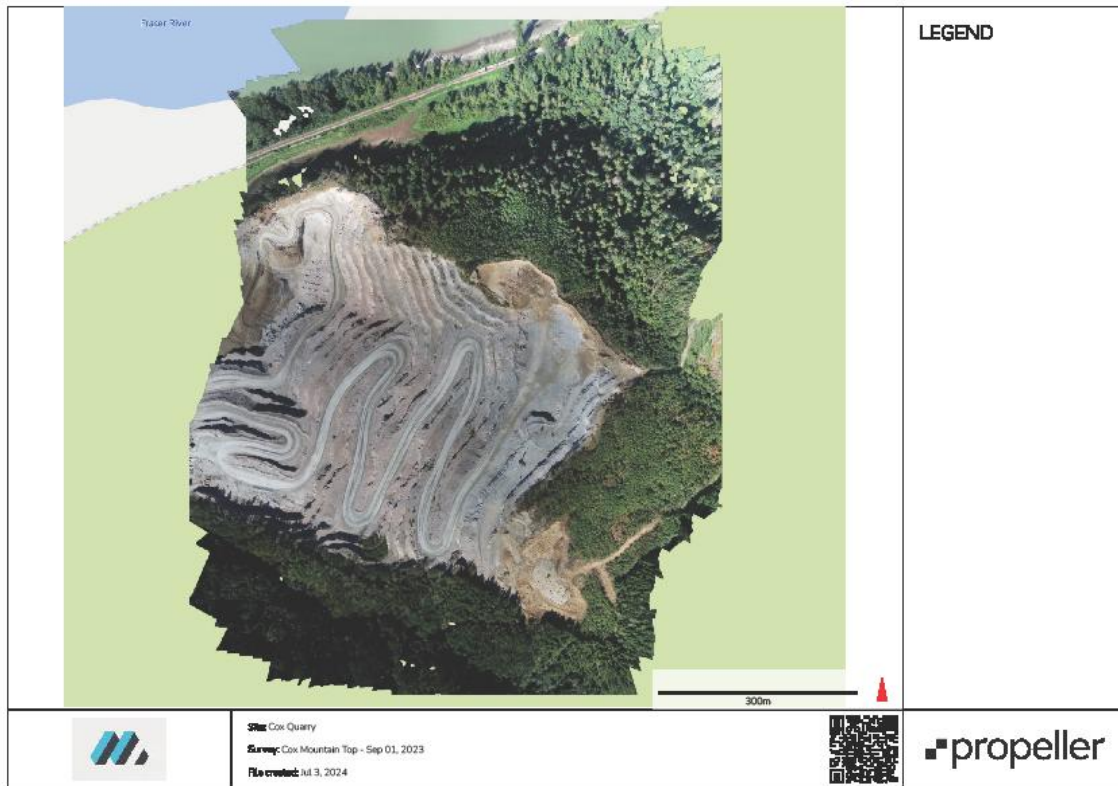
LMS - KILOMETERS

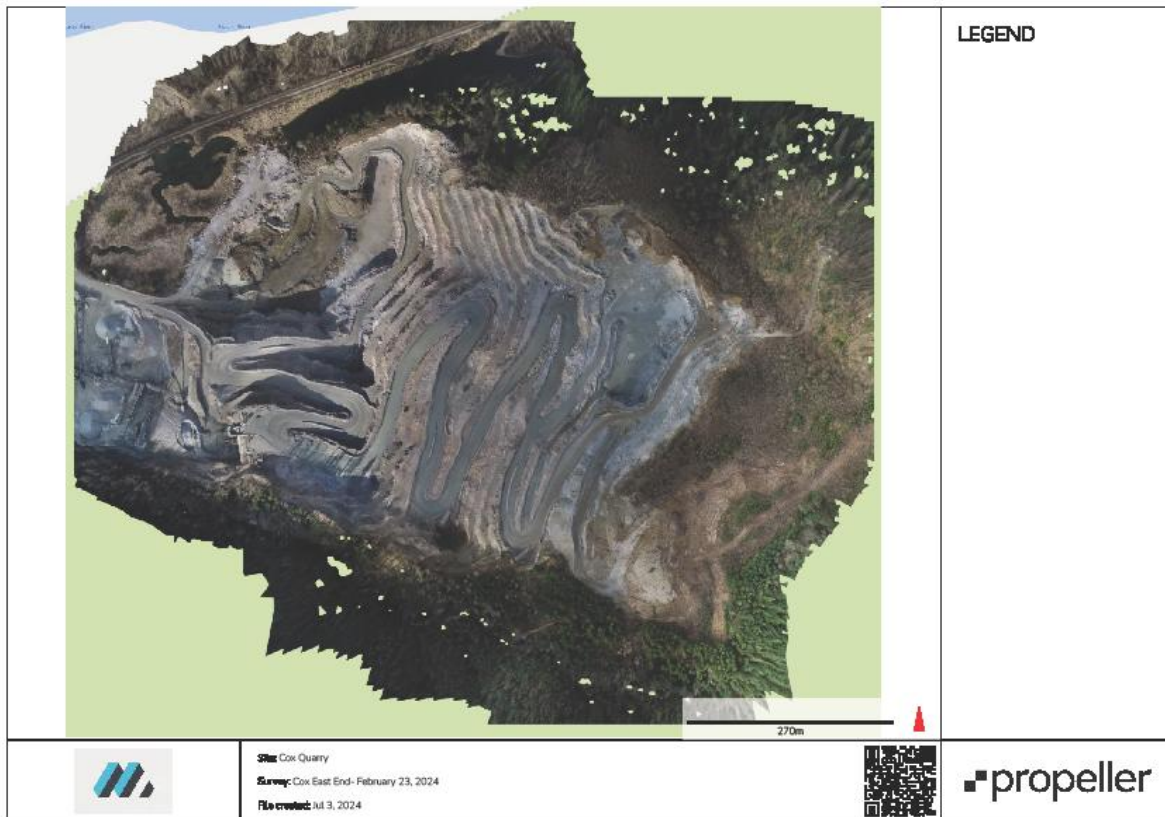
50

(50 KM - STANDARD)

100

APPENDIX D





APPENDIX E

East Land Development Costs						
Dates: July 2023 - June 2024						
COST BY MONTH	FEES-Testing	Stripping / clearing for Road Work	Overburden removal (includes rentals)	Overburden removal Wages	Drilling and Blasting	Surveying
July			45,070.23	7,560.11		
Aug	6,280.10		57,194.33	12,212.86		4,459.55
Sept			50,489.33	15,905.36		
Oct			32,678.61	7,198.46	2,126.13	1,280.00
Nov			10,389.07	1,793.32	15,478.85	
Dec		10,799.10	30,665.33	6,252.40	76,752.00	
Jan						
Feb	3,039.02					
Mar					11,811.82	
Apr	4,301.13				12,447.71	
May						
Jun	324.45	970.52				
July	474.78					
Totals	14,419.48	11,769.62	226,513.90	50,922.50	118,616.50	5,739.55
OVERALL:	427,981.55					

Testing Fees			
Dates: September 2023-August 2024			
Date	Company	Description	Amount
09/05/2023	Metro Testing + Engineering	ARDML:	
		Site Review and Sampling	\$297.50
		Vehicle Charge	\$45.00
		Testing and Interpretation	\$4,850.00
		Additional sample for ABA testing and reporting	\$450.00
		Disposal, Environmental Fee, and Administration	\$338.55
		GST 5%	\$299.05
02/05/2024		General Testing:	

	Kontur Geotechnical Consultants Inc.	Coarse: ASTM C88	\$450.00
		Coarse: ASTM C127	\$210.00
		Coarse: ASTM C131	\$550.00
		Fine: ASTM C88	\$450.00
		Fine: ASTM C128	\$250.00
		Fine: ASTM D2419	\$270.00
		Review and Summary Letter	\$630.00
		Environment Disposal Fee	\$84.30
		GST 5%	\$144.72
04/30/2024	Metro Testing + Engineering	General Testing:	
		Coarse: ASTM C295	\$700.00
		Coarse: CSA A23.2- 24A	\$750.00
		Coarse: ASTM C535	\$450.00
		Coarse: ASTM C142	\$100.00
		Coarse: ASTM G57	\$817.00
		Coarse: ASTM D3744	\$330.00
		Fine: ASTM D7428	\$375.00
		Fine: ASTM C1252	\$165.00
		Fine: ASTM C127	\$140.00
		Rock Prep	\$150.00
		Disposal, Environmental Fee, and Administration	\$119.31
		GST 5%	\$204.82
06/01/2024	Metro Testing + Engineering	General Testing:	
		Coarse: ASTM D6928	\$300.00
		Disposal, Environmental Fee, and Administration	\$9.00
		GST 5%	\$15.45
07/01/2024	Metro Testing + Engineering	General Testing:	
		Sand: ASTM D2419	\$264.00
		ASTM D4318	\$175.00
		Environmental and Administration Fee	\$13.17
		GST 5%	\$22.61
Total		\$14,419.48	

Stripping and clearing Costs			
Dates:2023-2024			
Date	Area	Type of Cost	Cost
12/2023	East End	Labor	\$1,860.58
		Overtime	\$470.02
		Equipment Rental internal	\$8468.50
06/2024	Cox Quarry	Equipment Rental internal	\$0.00
		Supplies	\$282.34
	East End	Labor	\$509.64
		Overtime	\$178.54
Total		\$11,769.62	

External Equipment Rentals		Dewatering reclamation area	
Dates: July 2023 – June 2024			
Date	Supplier	Description	Amount
07/31/23	Canadian Dewatering	CD150 Pump rental	5124.23
08/25/23	Canadian Dewatering	CD150 Pump rental	5370.33
09/30/23	Canadian Dewatering	CD 150 Pump rental	5370.33
10/24/23	Canadian Dewatering	CD150 Pump rental	5321.11
11/27/23	Canadian Dewatering	CD150 Pump rental	4929.06
11/30/23	Canadian Dewatering	Repairs to pump	7642.48
12/22/23	Canadian Dewatering	CD150 Pump rental	3421.86
Total		\$37,179.40	

Internal Equipment Rentals		Overburden movement			
Dates: July 2023 – June 2024					
Date	Trans #	Description	Hours	Rate / Hour \$	Total \$
07/14/23	6957	2013 CAT 775G Rock Truck	6.5	180	1170
07/14/23	6958	2022 CAT 775G Haul Truck	6.5	180	1170
07/14/23	6959	2013 CAT 775G Rock Truck	7	180	1260
07/14/23	6960	2008 CAT 775F Rock Truck	6.5	180	1170
07/14/23	6961	2004 CAT D6R LGP	8	142	1136
07/14/23	6962	2022 CAT 775G Rigid Frame Haul Truck	7	180	1260
07/14/23	6963	2021 CAT 352	4	210	840
07/21/23	13280	2013 CAT 775G Rock Truck	8	180	1440
07/21/23	13281	2016 CAT 352F Hydraulic Excavator	6.5	210	1365

07/21/23	13282	2021 Komatsu MH400-5 Articulated Truck	2	147	294
07/21/23	13283	2022 CAT 775G Haul Truck	7.5	180	1350
07/21/23	13284	2008 CAT 740 Water Truck	9	161	1449
07/21/23	13285	2013 Komatsu WA900-3EO	1	475	475
07/21/23	13286	2004 CAT D6R LGP	8	142	1136
07/21/23	13287	2022 CAT 775G Rigid Frame Haul Truck	8	180	1440
07/21/23	13288	2021 CAT 352	10	210	2100
07/21/23	13289	2013 CAT 775G Rock Truck	8	180	1440
07/21/23	13290	2013 CAT 775F Rock Truck	15.5	180	2790
07/26/23	18171	2022 CAT 775G Rigid Frame Haul Truck	2	180	360
07/26/23	18172	2021 CAT 352	3	210	630
07/26/23	18173	2013 CAT 775G Rock Truck	3	180	540
07/26/23	18174	2013 CAT 775G Rock Truck	3	180	540
07/26/23	18175	2021 CAT 992 Wheel Loader	2	475	950
07/26/23	18176	2013 CAT 775F Rock Truck	3	180	540
07/26/23	18177	2022 CAT 775G Haul Truck	0.5	180	90
07/26/23	18178	2014 CAT 988K Wheel Loader	5.5	247	1358.50
07/27/23	20211	2013 CAT 775G Rock Truck	0.5	180	90
07/27/23	20212	2013 CAT 775G Rock Truck	0.5	180	90
07/27/23	20213	2021 CAT 992 Wheel Loader	0.5	475	237.50
07/27/23	20214	2021 CAT 352	7	210	1470
07/27/23	20215	2013 CAT 775F Rock Truck	0.5	180	90
07/27/23	20216	2022 CAT 775G Rigid Frame Haul Truck	0.5	180	90
07/27/23	20217	2022 CAT 775G Haul Truck	0.5	180	90
07/28/23	24261	2008 CAT 775F Rock Truck	12.5	180	2250
07/28/23	24262	2016 CAT 352F Hydraulic Excavator	34.5	210	7,245
08/03/23	1251	2016 CAT 352F Hydraulic Excavator	5	210	1050
08/04/23	2535	2021 CAT 992 Wheel Loader	7	475	3325
08/04/23	2536	2008 CAT 775F Rock Truck	7	180	1260
08/04/23	2537	2013 CAT 775G Rock Truck	7	180	1260
08/04/23	2538	2022 CAT 775G Rigid Frame Haul Truck	7	180	1260
08/04/23	2539	2021 CAT 352	5	210	1050
08/04/23	2540	2013 CAT 775G Rock Truck	7	180	1260
08/04/23	2541	2004 CAT D6R LGP	8	142	1136
08/04/23	2542	2022 CAT 775G Haul Truck	7	180	1260
08/04/23	2543	2008 CAT 740 Water Truck + Klein Water Tank Model K-800	8	161	1288
08/15/23	10950	2016 CAT 352F Hydraulic Excavator	2	210	420
08/15/23	10951	2021 CAT 352	3	210	630

08/16/23	13324	2016 CAT 352F Hydraulic Excavator	3.5	210	735
08/16/23	13325	2014 CAT 988K Wheel Loader	2	247	494
08/21/23	22913	2011 CAT 980H Wheel Loader	1	102	102
08/22/23	21357	2013 Komatsu WA900-3EO	2	475	950
08/24/23	22914	CAT D9N Track Dozer	10	504	5040
08/24/23	22915	2021 CAT 352	2.5	210	525
08/25/23	22916	2013 CAT 775G Rock Truck	7	180	1260
08/25/23	22917	2008 CAT 775F Rock Truck	6.5	180	1170
08/25/23	22918	2021 CAT 992 Wheel Loader	8	475	3800
08/25/23	22919	2021 CAT 352	5	210	1050
08/25/23	22920	2013 CAT 775G Rock Truck	7	180	1260
08/25/23	22921	20085 CAT 740 Water Truck + Klein Water Tank Model K-800	8	161	1288
08/25/23	22922	2022 CAT 775G Haul Truck	6.5	180	1170
08/25/23	22923	2022 CAT 775G Rigid Frame Haul Truck	7	180	1260
08/25/23	22924	2004 CAT D6R LGP	8	142	1136
08/25/23	22925	2013 CAT 775F Rock Truck	8	180	1440
08/25/23	26652	2013 Komatsu WA900-3EO	13	475	6175
08/25/23	26653	2016 CAT 352F Hydraulic Excavator	21	210	4410
08/28/23	495	2021 CAT 352	9	210	1890
08/29/23	496	2021 CAT 352	7	210	1470
09/01/23	1850	2013 CAT 775G Rock Truck	7	180	1260
09/01/23	1851	2021 CAT 992 Wheel Loader	8	475	3800
09/01/23	1852	2013 CAT 775F Rock Truck	7	180	1260
09/01/23	1853	2018 Komatsu HM 400-5 Articulating Dump Truck	2	147	294
09/01/23	1854	2004 CAT D6R LGP	7	142	994
09/01/23	1855	2008 CAT 740 Water Truck	2	161	322
09/06/23	5720	Komatsu PC228 Excavator & BR3288 Hammer Van-Ed	4	262	1048
09/07/23	7162	2021 CAT 352	8	210	1680
09/14/23	12157	2021 CAT 352	5	210	1050
09/15/23	12158	2021 CAT 992 Wheel Loader	6	475	2850
09/15/23	12159	2022 CAT 775G Rigid Frame Haul Truck	6.5	180	1170
09/15/23	12160	2021 CAT 352	6	210	1260
09/15/23	12161	2013 CAT 775G Rock Truck	8	180	1440
09/15/23	12162	2008 CAT 775F Rock Truck	5.5	180	990
09/15/23	12163	2004 CAT D6R LGP	6	142	852
09/15/23	12164	2013 CAT 775G Rock Truck	5.5	180	990

09/15/23	12165	2022 CAT 775G Haul Truck	5.5	180	990
09/15/23	12166	2008 CAT 740 Water Truck	4	161	644
09/18/23	17760	2021 CAT 352	3	210	630
09/22/23	18906	2014 CAT 988K Wheel Loader	5.5	247	1358.50
09/22/23	18907	2008 CAT 775F Rock Truck	6.5	180	1170
09/22/23	18909	2021 CAT 992 Wheel Loader	6	475	2850
09/22/23	18911	2022 CAT 775G Haul Truck	6	180	1080
09/22/23	18912	2013 CAT 775G Rock Truck	7	180	1260
09/27/23	22971	2021 CAT 352	6.5	210	1365
09/28/23	24572	2021 CAT 352	4	210	840
09/28/23	24573	Komatsu PC228 Ex. & BR3288 Hmr Van-Ed	9	262	2358
09/29/23	24574	2022 CAT 775G Haul Truck	4.5	180	810
09/29/23	24575	97 CAT 140H MOTOR GRADER	3	155	465
09/29/23	24577	2021 CAT 992 Wheel Loader	4	475	1900
09/29/23	24578	2014 CAT 998K Wheel Loader	4.5	247	1111.50
09/29/23	24581	2021 CAT 352	2	210	420
09/29/23	24582	2013 CAT 775F Rock Truck	5	180	900
09/29/23	27582	2014 CAT 998K Wheel Loader	11	247	2717
10/10/23	8476	2014 CAT 988K Wheel Loader	1	247	247
10/13/23	9579	2021 CAT 352	4	210	840
10/16/23	13858	2021 CAT 352	3	210	630
10/17/23	13859	2021 CAT 352	3	210	630
10/18/23	13860	2021 CAT 352	4	210	840
10/19/23	14814	2008 CAT 775F Rock Truck	2	180	360
10/19/23	14815	2022 CAT 775G Rock Truck	5	180	900
10/19/23	14816	2021 CAT 992 Wheel Loader	4.5	475	2137.50
10/19/23	14817	2022 CAT 775G Rock Truck	6	180	1080
10/19/23	14818	2013 CAT 775G Rock Truck	7	180	1260
10/19/23	14819	2014 CAT 988K Wheel Loader	5	247	1235
10/19/23	14820	2021 CAT 352	8	210	1680
10/19/23	14821	2013 CAT 775G Rock Truck	4.5	180	810
10/26/23	20742	2022 CAT 775G Haul Truck	5	180	900
10/26/23	20743	2013 Komatsu WA900-3EO	5	475	2375
10/26/23	20744	2021 CAT 992 Wheel Loader	6	475	2850
10/26/23	20746	2013 CAT 775G Rock Truck	4	180	720
10/26/23	20747	2021 CAT 352	8	210	1680
10/26/23	20748	2013 CAT 775G Rock Truck	5	180	900
10/27/23	10	2021 CAT 352	11	210	2310
10/20/23	2130	2021 CAT 452	10	210	2100

11/09/23	11389	2014 CAT 349EL	2	210	420
11/17/23	15785	2016 CAT 352F Hydraulic Excavator	6	210	1260
11/21/23	19806	2016 CAT 352F Hydraulic Excavator	7	210	1470
11/27/23	21611	2016 CAT 352F Hydraulic Excavator	3	210	630
11/27/23	21612	2021 CAT 352	8	210	1680
12/01/23	1547	2021 CAT 352	3	210	630
12/05/23	5023	2021 CAT 352	.5	210	105
12/08/23	5777	2021 CAT 992 Wheel Loader	8	475	3800
12/08/23	5778	2022 CAT 775G Haul Truck	8	180	1440
12/08/23	5779	2014 CAT 988K Wheel Loader	8	247	1976
12/08/23	5780	2013 CAT 775G Rock Truck	7	180	1260
12/08/23	5781	2022 CAT 775G Rigid Frame Haul Truck	7	180	1260
12/08/23	5782	2013 CAT 775F Rock Truck	8	180	1440
12/11/23	9972	2013 CAT 775G Rock Truck	7	180	1260
12/11/23	9973	2013 CAT 775G Rock Truck	5	180	900
12/11/23	9974	2004 CAT D6R LGP	5	142	710
12/11/23	9975	2021 CAT 992 Wheel Loader	8	475	3800
12/11/23	9976	2022 CAT 775G Haul Truck	8	180	1440
12/18/23	10963	2021 CAT 352	7	210	1470
Total		\$189,334.50			

Wages and Benefits – Exploration / mine development only						
Name	Hours	Days	Rate	OT Hours	OT Rate	Subtotal
Berezan, Jaden	24.5	3.4	59.79	3	83.62	\$1,715.72
Dusenbury, Brian	27.5	3.6	60.54	1	83.61	\$1,748.46
Goode, Daniel	30.5	4.4	61.46	4.5	86.77	\$2,265.13
Jones, Casey	3.5	0.4	64.38	0	-	\$225.33
Kindred, Joshua	43	5.4	61.35	0.5	83.62	\$2,679.87
Mattush, Jason	68	8.9	60.51	3	83.62	\$4,365.50
McCormick, Steven	144	21.8	59.83	30.5	83.60	\$11,165.84
McLaughlin, Ashley	57.5	7.6	63.12	3	89.35	\$3,897.65

McMorran, Randall	65	8.6	60.22	3.5	86.53	\$4,217.45
Nerheim, Kyle	14	2	62.66	2	83.63	\$1,044.54
Opper, James	66.5	8.9	59.58	4.5	83.43	\$4,337.81
Peters, Darren	57	7.2	59.95	0.5	83.64	\$3,459.11
Railton, Ian	32	5.1	65.72	8.5	92.35	\$2,888.00
Smith, Parker	43.5	5.6	60.23	1	88.01	\$2,708.05
Svensson, Karl	30	3.8	59.96	0	-	\$1,798.69
Vernon, Richard	35	4.6	63.61	2	89.43	\$2,405.32
Total						\$50,922.50

External Drilling by Kemano – Used for expansion and investigation only	
Dates: 12/15/2023-01/31/2024	
Date	Cost
12/15/2023	\$10,015.65
01/15/2024	\$6,384.00
01/15/2024	\$14,092.19
01/31/2024	\$22,874.15
Total	\$53,365.99

Blasting Costs	Blasting of cap rock, new roads – exploration and expansion only.				
Dates:					
Date	Blast #	Cost	Additional Material	Additional Cost	subtotal
10/05/2023	23-72B	\$543.13	2 cases blastex 3x16	\$127.10	\$670.23
10/17/2023	23-76B	\$488.51	1 case blastex 3x16	\$63.55	\$552.06
10/25/2025	23-78	\$903.84	-	\$0.00	\$903.84
11/06/2023	23-80B	\$1,358.41	2 cases blastex 3x16	\$127.10	\$1,485.51
11/21/2023	23-83B	\$3,977.69	-	\$0.00	\$3,977.69
12/07/2023	23-88B	\$4,617.79	1 box Dyno tx	\$63.55	\$4,681.34
12/08/2023	23-89B	\$5,146.56	2 cases Dyno tx 2 1/2x16	\$130.46	\$5,277.02

12/13/2023	23-91	\$5,998.19	-	\$0.00	\$5,998.19
12/21/2023	23-93	\$7,690.72	-	\$0.00	\$7,690.72
12/21/2023	23-94	\$9,754.39	-	\$0.00	\$9,754.39
03/11/2024	24-14	\$10,095.97	-	\$0.00	\$10,095.97
04/25/2024	24-28	\$12,447.71	27 cases blastex 3x16	\$1,715.85	\$14,163.56
Total				\$65,250.52	

Surveying costs		Portion = % Exploration survey vs total survey
Date	Company	Cost
08/2023	Internal (MCM)	\$4,459.55
10/27/2023	Lucas GeoMatics	\$1,280.00
Total		\$5,739.55