APPENDIX A

HMM-BH-03 Completion Diagram – BGC Engineering Inc.

DRILL HOLE #

HMM-BH-03

DRAFT

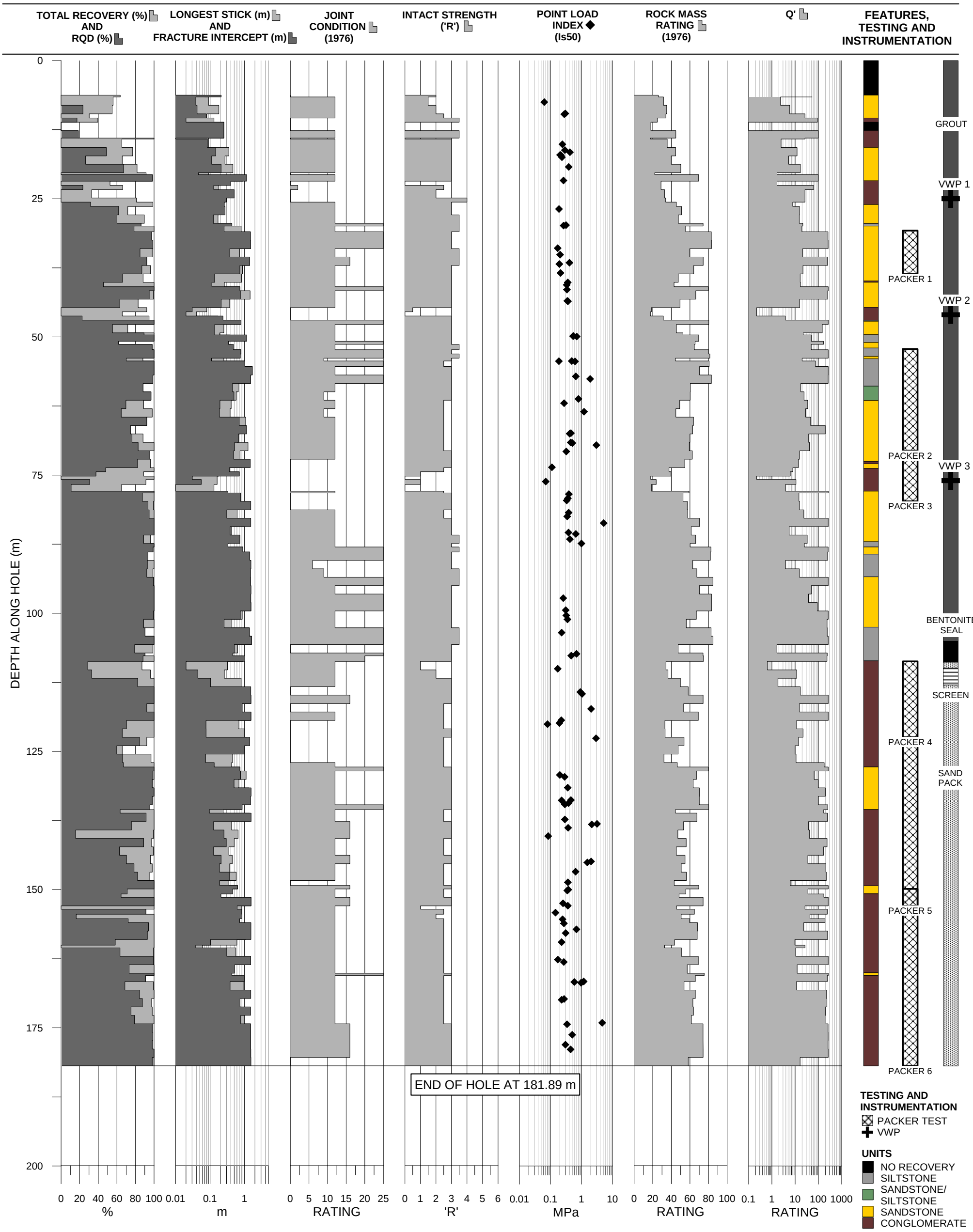
PROJECT: **TMEP - BURNABY MOUNTAIN WESTRIDGE TUNNEL SITE INVESTIGATIONS**

PROJECT NO.: **0095150-15**

LOCATION: TANK FARM/SOUTH PORTAL
COORDINATES (m): 504629E, 5457797N
COLLAR ELEVATION (m asl): 165
DATUM: NAD83
TREND (°): 000
PLUNGE (°): -90

DRILL DESIGNATION: B-80
DRILLING CONTRACTOR: GEOTECH DRILLING SERVICES LTD.
DRILLING METHOD: TRIPLE TUBE CORING
CORE DIAMETER: HQ3
FLUID: WATER
CASED TO (m): 10.7

START DATE: 11 SEPT 2014
FINISH DATE: 22 SEPT 2014
FINAL DEPTH (m): 181.89
DEPTH TO TOP OF ROCK (m): 4.8 m
LOGGED BY: MAC/CC/SG
REVIEWED BY:



NOTES:
1. ALL DEPTHS MEASURED FROM GROUND SURFACE.
2. CASING LEFT IN HOLE TO A DEPTH OF 10.67 m.

BGC ENGINEERING INC.
AN APPLIED EARTH SCIENCES COMPANY

APPENDIX B

Water Quality Results

Table B1: 2014 Water Quality Results Summary
September 12-18, 2014 Water Quality Results from AGAT Laboratories – BGC Engineering
October 11, 2014 Water Quality Results from Maxxam Analytics – Waterline Resources

Table B1: 2014 Water Quality Results Summary

Well Name	Units	CDWQG Guidelines[a]		BGC WS-1	BGC WS-2	BGC WS-3	BGC WS-4	BGC WS-5	BGC WS-6	BGC WS-7	Waterline WS-8
Date Collected		AO	MAC	12-Sep-2014	12-Sep-2014	13-Sep-2014[c]	15-Sep-2014	15-Sep-2014	17-Sep-2014	18-Sep-2014	11-Oct-14
Description				Clean water as delivered	Recirculated drilling water					Recirculated drilling water - after flushing	Post-drilling activities after 2.2 well volumes removed
General Chemistry											
Total Dissolved Solids Calculated	mg/L	500	-	18	62	77	80	78	28	20	394
Hardness (CaCO3) - Calculated	mg/L	-	-	3.1	29.3	24.6	22.2	26.5	12.7	6.2	224
Dissolved Hardness (CaCO3)	mg/L	-	-	-	-	-	-	-	-	-	85.8
pH	-	6.5-8.5	-	7.34	7.72	8.06	8.17	7.95	7.34	6.94	7.99
Conductivity (EC)	uS/cm	-	-	35	106	118	122	124	53	37	555
Turbidity	NTU	0.1	-	**2.5**	**8.6**	**543**	**921**	-	-	-	**3740**
Alkalinity, pH 4.5 (as CaCO3)	mg/L	-	-	14	53	72	70	58	23	13	129
Alkalinity, p (as CaCO3)	mg/L	-	-	<1	<1	<1	<1	<1	<1	<1	<0.50
True Colour	Col. Unit	-	-	-	-	-	-	-	-	-	70.0
Sulphate (SO4)	mg/L	500	-	0.6	3.5	1.9	3.2	15.5	0.8	0.8	136
Sulphide (S2-)	mg/L	0.05	-	-	-	-	-	-	-	-	<0.0050
Chloride (Cl)	mg/L	250	-	2.01	3.52	3.15	5.93	3.35	2.5	3.82	8.0
Fluoride (F)	mg/L	-	1.5	<0.02	0.11	0.24	0.27	0.29	<0.02	<0.02	0.340
Bicarbonate (HCO3)	mg/L	-	-	14	53	72	70	58	23	13	158
Carbonate (CO3)	mg/L	-	-	<1	<1	<1	<1	<1	<1	<1	<0.50
Hydroxide (OH)	mg/L	-	-	-	-	-	-	-	-	-	<0.50
Nitrate+Nitrite-N	mg/L	-	10	0.07	0.04	0.06	0.05	0.02	0.05	0.06	0.34
Nitrate-N	mg/L	-	10	0.07	0.038	0.046	0.046	<0.005	0.053	0.058	<0.20
Nitrite-N	mg/L	-	1	<0.005	<0.005	0.018	<0.005	0.02	<0.005	<0.005	0.307
Total Phenols (4AAP)											
Total Phenols	mg/L	-	-	<0.002	0.003	<0.002	0.003	0.003	< 0.002	< 0.002	0.0055
Total and Dissolved Phosphorus											
Phosphorus Dissolved	mg/L	-	-	0.005	0.04	0.027	0.027	0.041	0.042	-	0.0614
Phosphorus Total	mg/L	-	-	0.006	0.246	0.84	0.933	7.86	0.114	0.092	1.21
Total Metals[b]											
Aluminum	mg/L	0.1	-	**0.106**	**218**	**928**	**1490**	**482**	**5.21**	**4.25**	**45.7**
Antimony	mg/L	-	0.006	<0.0005	0.0007	<0.005	<0.005	<0.0005	<0.0005	<0.0005	0.00081
Arsenic	mg/L	-	0.01	0.0008	**0.0331**	**0.058**	**0.103**	**0.109**	**0.0012**	0.0009	**0.0115**
Barium	mg/L	-	1	0.003	**1.48**	**6.13**	**8.45**	**4.41**	0.0571	0.0357	0.348
Beryllium (Be)	mg/L	-	-	<0.00005	0.00385	0.0183	0.03	0.00902	0.00008	0.00005	0.00200
Bismuth (Bi)	mg/L	-	-	-	-	-	-	-	-	-	<0.0010
Boron (B)	mg/L	-	5	<0.005	0.185	0.432	1.58	0.167	0.008	0.006	0.116
Cadmium (Cd)	mg/L	-	0.005	<0.00001	0.0013	**0.0055**	**0.0076**	0.00211	0.00003	0.00005	0.00143
Calcium (Ca)	mg/L	-	-	1.06	94.8	256	473	195	6.74	16.1	54.6
Chromium (Cr)	mg/L	-	0.05	<0.0005	**0.231**	**1.05**	**2.15**	**0.397**	0.0135	0.0167	**0.110**
Cobalt (Co)	mg/L	-	-	0.00009	0.12	0.542	0.921	0.359	0.00296	0.0024	0.0325
Copper (Cu)	mg/L	1	-	0.0024	**1.67**	**2.99**	**4.19**	**1.48**	0.0297	0.0266	0.152
Iron (Fe)	mg/L	0.3	-	0.224	**277**	**1380**	**2460**	**745**	**9.81**	**13.8**	**67.8**
Lead (Pb)	mg/L	-	0.01	0.00029	**0.087**	**0.273**	**0.568**	**0.19**	0.00177	0.00249	**0.0272**
Lithium (Li)	mg/L	-	-	<0.0005	0.171	0.634	1.14	0.27	0.0031	0.0019	0.0218
Magnesium (Mg)	mg/L	-	-	0.13	106	566	865	241	2.23	1.22	21.3
Manganese (Mn)	mg/L	0.05	-	0.008	**4.69**	**22.9**	**35.6**	10.3	0.144	0.226	**1.5**
Mercury (Hg)	mg/L		0.001	<0.00001	<0.00001	0.00005	<0.00001	0.002	<0.00001	<0.00001	<0.00020
Molybdenum (Mo)	mg/L	-	-	0.0002	0.0325	0.057	0.107	0.0193	0.0057	0.0067	0.034
Nickel (Ni)	mg/L	-	-	<0.0005	0.381	1.06	1.27	0.423	0.0078	0.0041	0.0739
Potassium (K)	mg/L	-	-	-	-	-	-	-	-	-	6.17
Selenium (Se)	mg/L	-	0.01	<0.0005	0.006	**0.026**	**0.056**	0.0288	<0.0005	<0.0005	0.00078
Silicon (Si)	mg/L	-	-	-	-	-	-	-	-	-	54.3
Silver (Ag)	mg/L	-	-	<0.00002	0.00163	0.003	0.0068	0.00155	<0.00002	<0.00002	0.000114
Sodium (Na)	mg/L	200	-	5.39	21.8	72.6	85.7	28.8	6.42	51.8	87.5
Strontium (Sr)	mg/L	-	-	-	-	-	-	-	-	-	0.403
Sulfur (S)	mg/L	-	-	-	-	-	-	-	-	-	41.9
Thallium (Tl)	mg/L	-	-	<0.00002	0.0007	0.0041	0.0074	0.0026	<0.00002	<0.00002	0.00082
Tin (Sn)	mg/L	-	-	-	-	-	-	-	-	-	0.02
Titanium (Ti)	mg/L	-	-	0.002	2.53	26.5	10.8	0.707	0.218	0.158	0.753
Uranium (U)	mg/L	-	0.02	0.00006	0.00523	**0.0215**	**0.0455**	0.00965	0.00013	0.00012	0.00635
Vanadium (V)	mg/L	-	-	<0.001	0.519	3.59	4.15	0.737	0.014	0.01	0.133
Zinc (Zn)	mg/L	5	-	<0.005	1.72	4.29	**6.99**	1.8	0.044	0.021	0.311
Zirconium (Zr)	mg/L	-	-	-	-	-	-	-	-	-	0.00349
Dissolved Metals											
Aluminum	mg/L	0.1	-	0.028	**0.179**	**0.26**	**0.301**	**0.118**	**0.126**	-	**0.401**
Antimony	mg/L	-	0.006	<0.0002	0.0019	0.0033	0.0034	0.0041	<0.0002	-	0.00086
Arsenic	mg/L	-	0.01	0.0007	0.0023	0.0077	0.0062	0.0097	0.0004	-	0.00137

Barium	mg/L	-	1	0.0027	0.0065	0.0056	0.0117	0.0132	0.0027	-	0.0193
Beryllium (Be)	mg/L	-	-	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	-	<0.00010
Bismuth (Bi)	mg/L	-	-	-	-	-	-	-	-	-	<0.0010
Boron (B)	mg/L	-	5	0.003	0.057	0.099	0.217	0.114	0.006	-	0.101
Cadmium (Cd)	mg/L	-	0.005	<0.00001	0.00001	0.00001	0.00002	0.00009	<0.00001	-	0.000026
Calcium (Ca)	mg/L	-	-	1.04	8.35	8.06	7.98	9.72	4.69	2.19	30.0
Chromium (Cr)	mg/L	-	0.05	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	-	0.0012
Cobalt (Co)	mg/L	-	-	<0.00005	<0.00005	0.00009	0.00011	0.00007	<0.00005	-	0.00142
Copper (Cu)	mg/L	1	-	0.0014	0.0019	0.003	0.0073	0.0039	0.0011	-	0.00214
Iron (Fe)	mg/L	0.3	-	0.061	0.022	0.045	0.099	0.061	**0.303**	0.01	**0.532**
Lead (Pb)	mg/L	-	0.01	0.00023	0.00016	0.00036	0.00127	0.001	0.00016	-	0.00026
Lithium (Li)	mg/L	-	-	<0.0005	0.0032	0.0025	0.0025	0.001	0.0008	-	<0.0050
Magnesium (Mg)	mg/L	-	-	0.118	2.05	1.09	0.557	0.539	0.23	0.17	2.67
Manganese (Mn)	mg/L	0.05	-	0.004	0.013	0.005	0.006	0.008	0.009	0.029	0.350
Mercury (Hg)	mg/L		0.001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001	-	<0.000010
Molybdenum (Mo)	mg/L	-	-	0.00017	0.0217	0.0453	0.0781	0.0914	0.00357	-	0.0232
Nickel (Ni)	mg/L	-	-	0.0003	0.0006	0.0004	0.0003	0.0005	<0.0002	-	0.018
Potassium (K)	mg/L	-	-	0.13	2.45	4.03	3.74	2.51	1.04	2.05	2.53
Selenium (Se)	mg/L	-	0.01	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	<0.0005	-	0.00016
Silicon (Si)	mg/L	-	-	-	-	-	-			-	4.91
Silver (Ag)	mg/L	-	-	<0.00002	<0.00002	<0.00002	<0.00002	0.00003	<0.00002	-	<0.000020
Sodium (Na)	mg/L	200	-	5.360	10.100	15.300	16.300	11.3	5.23	3.56	84.7
Strontium (Sr)	mg/L	-	-	-	-	-	-	-	-	-	0.201
Sulfur (S)	mg/L	-	-	-	-	-	-	-	-	-	44.0
Thallium (Tl)	mg/L	-	-	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-	0.00007
Tin (Sn)	mg/L	-	-	-	-	-	-	-	-	-	<0.0050
Titanium (Ti)	mg/L	-	-	0.0007	0.0415	0.0687	0.366	0.504	0.0072	-	0.0113
Uranium (U)	mg/L	-	0.02	0.00003	0.0002	0.00016	0.00028	0.00027	0.00002	-	0.00278
Vanadium (V)	mg/L	-	-	<0.0005	0.0126	0.112	0.0294	0.0053	0.0006	-	<0.0050
Zinc (Zn)	mg/L	5	-	0.003	<0.002	0.003	0.003	<0.002	<0.002	-	<0.0050
Zirconium (Zr)	mg/L	-	-	-	-	-	-	-	-	-	<0.00050
Hydrocarbons											
F1 (C6-C10)	µg/L	-	-	-	-	-	-	-	-	-	<300
Chloroform	µg/L	-	100[d]	-	-	-	-	-	-	-	2.4
Methyl tert-butyl ether (MTBE)	µg/L	15	-	<1	<1	<1	<1	<1	<1	<1	<4.0
Benzene	µg/L	5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.40
Toluene	µg/L	24	60	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.94
Ethylbenzene	µg/L	2.4	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.40
m&p-Xylene	µg/L	-	-	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5	<0.40
o-Xylene	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.40
Styrene	µg/L	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.50
VPH	µg/L	-	1500[d]	<100	<100	<100	<100	<100	<100	<100	<300
VH	µg/L	-	15000[d]	<100	<100	<100	<100	<100	<100	<100	<300
EPH C10-C19	µg/L	-	5000[d]	<100	170	<100	170	<100	<100	<100	<0.20
EPH C19-C32	µg/L	-	-	140	2380	<100	1490	120	1020	190	310
Total Xylenes	µg/L	300	-	<1	<1	<1	<1	<1	<1	<1	<0.40
Terphenyl	%	-	-	-	-	-	-	-	-	-	100
Dichloroethane	%	-	-	-	-	-	-	-	-	-	98
Bromofluorobenzene	%	-	-	-	-	-	-	82	82	80	105
Dibromofluoromethane	%	-	-	-	-	-	-	115	115	110	120
Toluene - d8	%	-	-	-	-	-	-	93	90	88	-
Gases (Water)											
Methane	L/m^3	-	-	-	-	-	-	-	-	-	0.006
Calculated Methane	mg/L	-	-	-	-	-	-	-	-	-	0.004
Hydrogen Sulphide	mg/L	0.05	-	-	-	-	-	-	-	-	<0.0050

Notes: [a]Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, 2014) 'AO' means Aesthetic Objective exceedance, 'MAC' means Maximum Allowable Concentration;
[b]RDL raised due to sample dilution; [c]Chain of Custody shows sampling date of WS3 as September 15, 2014, but personal communication with BGC indicates September 13, 2014.
[d]Guideline from the BC Contaminated Sites Regulations for Drinking Water (BC MoE, 2014)

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: BGC ENGINEERING INC.
#500-1045 HOWE STREET
VANCOUVER, BC V6Z2A9
(604) 684-5900

ATTENTION TO: Cathy Schmid

PROJECT: 0090 150 15

AGAT WORK ORDER: 14V888816

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

WATER ANALYSIS REVIEWED BY: Angela Bond, Technical Reviewer

DATE REPORTED: Sep 23, 2014

PAGES (INCLUDING COVER): 18

VERSION*: 3

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 3: Sample receipt temperature: 9°C

Version 3 of this report contains additional results and supersedes Version 2 which was a partial report. Total Phenol is now included. New report issued on September 24, 2014.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH / EPH in Water

DATE RECEIVED: 2014-09-15

DATE REPORTED: 2014-09-23

Parameter	Unit	G / S	RDL	SAMPLE DESCRIPTION: HWM-BH-03-WS1	HWM-BH-03-WS2	HWM-BH-03-WS3	HWM-BH-03-WS4
				SAMPLE TYPE: Water	Water	Water	Water
				DATE SAMPLED: 9/12/2014	9/12/2014	9/15/2014	9/15/2014
				5807550	5807551	5807552	5807554
Methyl tert-butyl ether (MTBE)	µg/L		1	<1	<1	<1	<1
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	0.5
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5
VPH	µg/L		100	<100	<100	<100	<100
VH	µg/L		100	<100	<100	<100	<100
EPH C10-C19	µg/L		100	<100	170	<100	170
EPH C19-C32	µg/L		100	140	2380	<100	1490
Total Xylenes	ug/L		1	<1	<1	<1	<1

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5807550-5807554 VPH results have been corrected for BTEX contributions.
LEPH & HEPH results have been corrected for PAH contributions.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Dissolved Metals

DATE RECEIVED: 2014-09-15

DATE REPORTED: 2014-09-23

SAMPLE DESCRIPTION:				HWM-BH-03-WS1	HWM-BH-03-WS2	HWM-BH-03-WS3	HWM-BH-03-WS4
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				9/12/2014	9/12/2014	9/15/2014	9/15/2014
Parameter	Unit	G / S	RDL	5807550	5807551	5807552	5807554
Aluminum Dissolved	µg/L		2	28	179	260	301
Antimony Dissolved	µg/L		0.2	<0.2	1.9	3.3	3.4
Arsenic Dissolved	µg/L		0.1	0.7	2.3	7.7	6.2
Barium Dissolved	µg/L		0.2	2.7	6.5	5.6	11.7
Beryllium Dissolved	µg/L		0.01	<0.01	<0.01	<0.01	0.01
Boron Dissolved	µg/L		2	3	57	99	217
Cadmium Dissolved	µg/L		0.01	<0.01	0.01	0.01	0.02
Calcium Dissolved	µg/L		50	1040	8350	8060	7980
Chromium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	0.6
Cobalt Dissolved	µg/L		0.05	<0.05	<0.05	0.09	0.11
Copper Dissolved	µg/L		0.2	1.4	1.9	3.0	7.3
Iron Dissolved	µg/L		10	61	22	45	99
Lead Dissolved	µg/L		0.05	0.23	0.16	0.36	1.27
Lithium Dissolved	µg/L		0.5	<0.5	3.2	2.5	2.5
Magnesium Dissolved	µg/L		50	118	2050	1090	557
Manganese Dissolved	µg/L		1	4	13	5	6
Mercury Dissolved	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.17	21.7	45.3	78.1
Nickel Dissolved	µg/L		0.2	0.3	0.6	0.4	0.3
Selenium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	0.8
Silver Dissolved	µg/L		0.02	<0.02	<0.02	<0.02	<0.02
Sodium Dissolved	µg/L		50	5360	10100	15300	16300
Thallium Dissolved	µg/L		0.01	<0.01	<0.01	<0.01	<0.01
Titanium Dissolved	µg/L		0.5	0.7	41.5	68.7	366
Uranium Dissolved	µg/L		0.01	0.03	0.20	0.16	0.28
Vanadium Dissolved	µg/L		0.5	<0.5	12.6	112	29.4
Zinc Dissolved	µg/L		2	3	<2	3	3
Hardness (calc)	ug CaCO3/L		100	3080	29300	24600	22200

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Dissolved Metals

DATE RECEIVED: 2014-09-15

DATE REPORTED: 2014-09-23

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
5807550-5807554 Sample not filtered at time of collection as per analysis requirements.

Certified By: Angela Bond

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Total Metals

DATE RECEIVED: 2014-09-15

DATE REPORTED: 2014-09-23

SAMPLE DESCRIPTION:				HWM-BH-03-WS1		HWM-BH-03-WS2		HWM-BH-03-WS3		HWM-BH-03-WS4
SAMPLE TYPE:				Water		Water		Water		Water
DATE SAMPLED:				9/12/2014		9/12/2014		9/15/2014		9/15/2014
Parameter	Unit	G / S	RDL	5807550	RDL	5807551	RDL	5807552	RDL	5807554
Aluminum Total	µg/L		5	106	5000	218000	5000	928000	5000	1490000
Antimony Total	µg/L		0.5	<0.5	0.5	0.7	5	<5	5	<5
Arsenic Total	µg/L		0.1	0.8	0.1	33.1	1	58	1	103
Barium Total	µg/L		0.5	3.0	0.5	1480	5	6130	5	8450
Beryllium Total	µg/L		0.05	<0.05	0.05	3.85	0.5	18.3	0.5	30.0
Boron Total	µg/L		5	<5	5	185	50	432	50	1580
Cadmium Total	µg/L		0.01	<0.01	0.01	1.30	0.1	5.5	0.1	7.6
Calcium Total	µg/L		50	1060	50	94800	500	256000	500	473000
Chromium Total	µg/L		0.5	<0.5	0.5	231	5	1050	5	2150
Cobalt Total	µg/L		0.05	0.09	0.05	120	0.5	542	0.5	921
Copper Total	µg/L		0.5	2.4	5	1670	5	2990	5	4190
Iron Total	µg/L		10	224	100	277000	1000	1380000	1000	2460000
Lead Total	µg/L		0.05	0.29	0.05	87.0	0.5	273	0.5	568
Lithium Total	µg/L		0.5	<0.5	5	171	5	634	50	1140
Magnesium Total	µg/L		50	130	500	106000	500	566000	500	865000
Manganese Total	µg/L		1	8	1	4690	10	22900	10	35600
Mercury Total	µg/L		0.01	<0.01	0.01	<0.01	0.01	0.05	0.01	<0.01
Molybdenum Total	µg/L		0.1	0.2	0.1	32.5	1	57	1	107
Nickel Total	µg/L		0.5	<0.5	0.5	381	5	1060	5	1270
Selenium Total	µg/L		0.5	<0.5	0.5	6.0	5	26	5	56
Silver Total	µg/L		0.02	<0.02	0.02	1.63	0.2	3.0	0.2	6.8
Sodium Total	µg/L		100	5390	100	21800	1000	72600	1000	85700
Thallium Total	µg/L		0.02	<0.02	0.02	0.70	0.2	4.1	0.2	7.4
Titanium Total	µg/L		1	2	10	2530	100	26500	10	10800
Uranium Total	µg/L		0.01	0.06	0.01	5.23	0.1	21.5	0.1	45.5
Vanadium Total	µg/L		1	<1	1	519	10	3590	10	4150
Zinc Total	µg/L		5	<5	5	1720	50	4290	50	6990
Total Hardness (calc)	ug CaCO3/L		100	3180	100	673000	100	2970000	100	4740000

Certified By: Angela Bond

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Total Metals

DATE RECEIVED: 2014-09-15

DATE REPORTED: 2014-09-23

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

5807551 Some total metal results are less than the dissolved metal results; results are within the precision of the method.

5807552 Sample improperly preserved as per analysis requirements for Total Mercury.
Total Mercury sample container inappropriate as per analysis requirements.

Certified By: Angela Bond

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Routine Chemistry Water Analysis

DATE RECEIVED: 2014-09-15

DATE REPORTED: 2014-09-23

SAMPLE DESCRIPTION:				HWM-BH-03-WS1	HWM-BH-03-WS2	HWM-BH-03-WS3	HWM-BH-03-WS4
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				9/12/2014	9/12/2014	9/15/2014	9/15/2014
Parameter	Unit	G / S	RDL	5807550	5807551	5807552	5807554
pH	pH units		0.01	7.34	7.72	8.06	8.17
p-Alkalinity	mg CaCO3/L		1	<1	<1	<1	<1
Alkalinity (pH 4.5)	mg CaCO3/L		1	14	53	72	70
Alkalinity, Bicarbonate	mg CaCO3/L		1	14	53	72	70
Alkalinity, Carbonate	mg CaCO3/L		1	<1	<1	<1	<1
Alkalinity, Hydroxide	mg CaCO3/L		1	<1	<1	<1	<1
Electrical Conductivity	uS/cm		1	35	106	118	122
Chloride	mg/L		0.05	2.01	3.52	3.15	5.93
Fluoride	mg/L		0.02	<0.02	0.11	0.24	0.27
Nitrate-N	mg/L		0.005	0.070	0.038	0.046	0.046
Nitrite-N	mg/L		0.005	<0.005	<0.005	0.018	<0.005
Sulphate	mg/L		0.5	0.6	3.5	1.9	3.2
Calcium Dissolved	mg/L		0.05	1.04	8.35	8.06	7.98
Magnesium Dissolved	mg/L		0.05	0.12	2.05	1.09	0.56
Sodium Dissolved	mg/L		0.05	5.36	10.1	15.3	16.3
Potassium Dissolved	mg/L		0.05	0.13	2.45	4.03	3.74
Iron Dissolved	mg/L		0.01	0.06	0.02	0.05	0.10
Manganese Dissolved	mg/L		0.001	0.004	0.013	0.005	0.006
Calculated TDS	mg/L		1	18	62	77	80
Hardness (calc)	mg CaCO3/L		0.5	3.1	29.3	24.6	22.2
Nitrate + Nitrite-N	mg/L		0.01	0.07	0.04	0.06	0.05

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
5807550-5807554 Literature holding time exceeded for pH analysis.

Certified By:

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Total Phenols - 4AAP

DATE RECEIVED: 2014-09-15

DATE REPORTED: 2014-09-23

				HWM-BH-03-WS1	HWM-BH-03-WS2	HWM-BH-03-WS3	HWM-BH-03-WS4
SAMPLE DESCRIPTION:				HWM-BH-03-WS1	HWM-BH-03-WS2	HWM-BH-03-WS3	HWM-BH-03-WS4
SAMPLE TYPE:				Water	Water	Water	Water
DATE SAMPLED:				9/12/2014	9/12/2014	9/15/2014	9/15/2014
Parameter	Unit	G / S	RDL	5807550	5807551	5807552	5807554
Phenol, Total	mg/L		0.002	<0.002	0.003	<0.002	0.003

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Angela Bond

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Total Phosphorus and Total Dissolved Phosphorus

DATE RECEIVED: 2014-09-15

DATE REPORTED: 2014-09-23

SAMPLE DESCRIPTION:				HWM-BH-03-WS1		HWM-BH-03-WS2	HWM-BH-03-WS3	HWM-BH-03-WS4
SAMPLE TYPE:				Water		Water	Water	Water
DATE SAMPLED:				9/12/2014		9/12/2014	9/15/2014	9/15/2014
Parameter	Unit	G / S	RDL	5807550	RDL	5807551	5807552	5807554
Phosphorus Dissolved	mg/L		0.005	0.005	0.005	0.040	0.027	0.027
Phosphorus Total	mg/L		0.005	0.006	0.02	0.246	0.840	0.933

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Angela Bond

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Turbidity

DATE RECEIVED: 2014-09-15

DATE REPORTED: 2014-09-23

		SAMPLE DESCRIPTION:		HWM-BH-03-WS1	HWM-BH-03-WS2		HWM-BH-03-WS3	HWM-BH-03-WS4	
		SAMPLE TYPE:		Water	Water		Water	Water	
		DATE SAMPLED:		9/12/2014	9/12/2014		9/15/2014	9/15/2014	
Parameter	Unit	G / S	RDL	5807550	5807551	RDL	5807552	5807554	
Turbidity	NTU		0.5	2.5	8.6	5	543	921	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By: Angela Bond

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Sep 23, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
BTEX / VPH / EPH in Water															
Methyl tert-butyl ether (MTBE)	63134	5807554	<1	<1	0.0%	< 1	100%	80%	120%				98%	70%	130%
Benzene	63134	5807554	<0.5	<0.5	0.0%	< 0.5	100%	80%	120%				102%	70%	130%
Toluene	63134	5807554	<0.5	<0.5	0.0%	< 0.5	98%	80%	120%				101%	70%	130%
Ethylbenzene	63134	5807554	<0.5	<0.5	0.0%	< 0.5	96%	80%	120%				100%	70%	130%
m&p-Xylene	63134	5807554	0.5	0.5	0.0%	< 0.5	97%	80%	120%				101%	70%	130%
o-Xylene	63134	5807554	<0.5	<0.5	0.0%	< 0.5	97%	80%	120%				102%	70%	130%
Styrene	63134	5807554	<0.5	<0.5	0.0%	< 0.5	96%	80%	120%				100%	70%	130%
VPH	63134	5807554	<100	<100	0.0%	< 100									
VH	63134	5807554	<100	<100	0.0%	< 100									
EPH C10-C19	63126	MS	1900	1840	3.0%	< 100	104%	70%	130%				86%	65%	120%
EPH C19-C32	63126	MS	2400	2270	5.6%	< 100	105%	70%	130%				98%	80%	120%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.
AGAT WORK ORDER: 14V888816
PROJECT: 0090 150 15
ATTENTION TO: Cathy Schmid
SAMPLING SITE:
SAMPLED BY:

Water Analysis

RPT Date: Sep 23, 2014

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Routine Chemistry Water Analysis															
pH	5738183		11.0	11.1	0.5%	< 0.01	99%	95%	105%						
p-Alkalinity	5738183		133	141	6.3%	< 1									
Alkalinity (pH 4.5)	5738183		187	190	1.5%	< 1	93%	90%	110%						
Alkalinity, Bicarbonate	5738183		<1	<1	0.0%	< 1									
Alkalinity, Carbonate	5738183		109	98	11.0%	< 1									
Alkalinity, Hydroxide	5738183		78	92	16.8%	< 1									
Electrical Conductivity	5738183		1160	1190	2.6%	< 1	99%	90%	110%						
Chloride	5812422		0.86	0.88	1.9%	< 0.05	103%	85%	115%	104%	90%	110%			
Fluoride	5812422		<0.02	<0.02	0.0%	< 0.02	99%	85%	115%	102%	90%	110%			
Nitrate-N	5812422		0.300	0.299	0.3%	< 0.005	98%	85%	115%	99%	90%	110%			
Nitrite-N	5812422		<0.005	<0.005	0.0%	< 0.005				98%	90%	110%			
Sulphate	5812422		4.5	4.5	0.3%	< 0.5	97%	85%	115%	98%	90%	110%			
Calcium Dissolved	5811607		73.1	74.4	1.8%	< 0.05	98%	90%	110%	96%	90%	110%			
Magnesium Dissolved	5811607		9.75	9.86	1.1%	< 0.05	103%	90%	110%	99%	90%	110%			
Sodium Dissolved	5811607		2.48	2.52	1.2%	< 0.05	105%	90%	110%	106%	90%	110%			
Potassium Dissolved	5811607		0.20	0.23	0.0%	< 0.05	100%	90%	110%	99%	90%	110%			
Iron Dissolved	5811607		23.7	24.2	2.0%	< 0.01	98%	90%	110%	100%	90%	110%			
Manganese Dissolved	5811607		0.196	0.199	1.5%	< 0.001	104%	90%	110%	101%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Total Phosphorus and Total Dissolved Phosphorus															
Phosphorus Dissolved	5807550		0.005	0.003	NA	< 0.005	87%	85%	115%	106%	90%	110%	101%	80%	120%
Phosphorus Total	5844604		0.013	0.015	14.3%	< 0.005	104%	85%	115%	101%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

British Columbia CSR- Schedule 6 Total Metals															
Aluminum Total	5818001		25	25	0.0%	< 5	105%	85%	115%	100%	85%	115%			
Antimony Total	5818001		2.8	2.8	0.2%	< 0.5	110%	85%	115%	105%	90%	110%			
Arsenic Total	5818001		3.1	3.3	4.8%	< 0.1	92%	85%	115%	106%	90%	110%			
Barium Total	5818001		64.4	65.5	1.7%	< 0.5	113%	85%	115%	101%	90%	110%			
Beryllium Total	5818001		<0.05	<0.05	0.0%	< 0.05	102%	85%	115%	100%	90%	110%			
Boron Total	5818001		44	45	2.0%	< 5	104%	85%	115%	104%	80%	120%			
Cadmium Total	5818001		0.05	0.06	6.0%	< 0.01	102%	85%	115%	102%	90%	110%			
Calcium Total	5818001		49800	50700	1.8%	< 50	100%	85%	115%	97%	90%	110%			
Chromium Total	5818001		<0.5	<0.5	0.0%	< 0.5	105%	85%	115%	100%	90%	110%			
Cobalt Total	5818001		0.70	0.69	2.0%	< 0.05	111%	85%	115%	97%	90%	110%			
Copper Total	5818001		<0.5	<0.5	0.0%	< 0.5	102%	85%	115%	102%	90%	110%			
Iron Total	5818001		497	500	0.6%	< 10	102%	85%	115%	104%	90%	110%			
Lead Total	5818001		0.09	0.07	NA	< 0.05	90%	85%	115%	109%	90%	110%			
Lithium Total	5818001		6.3	6.2	2.2%	< 0.5				106%	90%	110%			

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.
AGAT WORK ORDER: 14V888816
PROJECT: 0090 150 15
ATTENTION TO: Cathy Schmid
SAMPLING SITE:
SAMPLED BY:

Water Analysis (Continued)

RPT Date: Sep 23, 2014

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Magnesium Total	5818001		18100	18500	2.1%	< 50	103%	85%	115%	102%	90%	110%			
Manganese Total	5818001		107	109	2.1%	< 1	105%	85%	115%	102%	90%	110%			
Mercury Total	5807550		< 0.01	< 0.01	0.0%	< 0.01	108%	85%	115%	100%	90%	110%			
Molybdenum Total	5818001		1.5	1.5	0.2%	< 0.1	106%	85%	115%	104%	90%	110%			
Nickel Total	5818001		3.0	3.0	3.0%	< 0.5	107%	85%	115%	96%	90%	110%			
Selenium Total	5818001		2.7	2.9	4.2%	< 0.5	91%	85%	115%	99%	85%	115%			
Silver Total	5818001		<0.02	<0.02	0.0%	< 0.02				98%	90%	110%			
Sodium Total	5818001		19500	19700	0.8%	< 100	105%	85%	115%	106%	90%	110%			
Thallium Total	5818001		0.10	0.05	NA	< 0.02	113%	85%	115%	101%	90%	110%			
Titanium Total	5818001		2	2	0.0%	< 1				99%	90%	110%			
Uranium Total	5818001		0.89	0.91	1.7%	< 0.01	99%	85%	115%	109%	90%	110%			
Vanadium Total	5818001		<1	<1	0.0%	< 1	99%	85%	115%	100%	90%	110%			
Zinc Total	5818001		<5	<5	0.0%	< 5	93%	85%	115%	100%	80%	120%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

British Columbia CSR- Schedule 6 Dissolved Metals

Aluminum Dissolved	5812345		9	10	0.0%	< 2	95%	90%	110%	102%	85%	115%			
Antimony Dissolved	5812345		0.5	0.5	0.0%	< 0.2	100%	90%	110%	100%	85%	110%			
Arsenic Dissolved	5812345		0.1	0.1	0.0%	< 0.1	101%	90%	110%	103%	90%	110%			
Barium Dissolved	5812345		272	270	0.8%	< 0.2	103%	90%	110%	98%	90%	110%			
Beryllium Dissolved	5812345		<0.01	<0.01	0.0%	< 0.01	102%	90%	110%	103%	90%	110%			
Boron Dissolved	5812345		16	16	2.4%	< 2	102%	90%	110%	108%	80%	120%			
Cadmium Dissolved	5812345		0.02	0.02	0.0%	< 0.01	105%	90%	110%	99%	90%	110%			
Calcium Dissolved	5811607		73100	74400	1.8%	< 50	98%	90%	110%	96%	90%	110%			
Chromium Dissolved	5812345		<0.5	<0.5	0.0%	< 0.5	108%	90%	110%	108%	90%	110%			
Cobalt Dissolved	5812345		0.08	0.05	0.0%	< 0.05	99%	90%	110%	97%	90%	110%			
Copper Dissolved	5812345		1.1	0.8	0.0%	< 0.2	102%	90%	110%	99%	90%	110%			
Iron Dissolved	5811607		23700	24200	2.0%	< 10	98%	90%	110%	100%	90%	110%			
Lead Dissolved	5812345		0.11	0.10	0.0%	< 0.05	100%	90%	110%	99%	90%	110%			
Lithium Dissolved	5812345		15.6	15.7	0.6%	< 0.5				103%	90%	110%			
Magnesium Dissolved	5811607		9750	9860	1.1%	< 50	103%	90%	110%	99%	90%	110%			
Manganese Dissolved	5811607		196	199	1.5%	< 1	104%	90%	110%	101%	90%	110%			
Mercury Dissolved	5807550		< 0.01	< 0.01	0.0%	< 0.01	108%	90%	110%	100%	90%	110%			
Molybdenum Dissolved	5812345		2.69	2.69	0.1%	< 0.05	101%	90%	110%	100%	90%	110%			
Nickel Dissolved	5812345		2.4	2.4	1.8%	< 0.2	98%	90%	110%	98%	90%	110%			
Silver Dissolved	5812345		<0.02	<0.02	0.0%	< 0.02				98%	90%	110%			
Sodium Dissolved	5811607		2480	2520	1.2%	< 50	105%	90%	110%	106%	90%	110%			
Titanium Dissolved	5812345		<0.5	0.5	0.0%	< 0.5				95%	90%	110%			
Uranium Dissolved	5812345		1.32	1.34	1.1%	< 0.01	99%	90%	110%	103%	90%	110%			
Vanadium Dissolved	5812345		<0.5	<0.5	0.0%	< 0.5	101%	90%	110%	101%	90%	110%			

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Sep 23, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Zinc Dissolved	5812345		<2	<2	0.0%	< 2	96%	90%	110%	98%	85%	115%			
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Turbidity															
Turbidity	5815941		0.9	0.9	0.0%	< 0.5	102%	85%	115%	102%	90%	110%			
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Total Phenols - 4AAP															
Phenol, Total	5807550		< 0.002	< 0.002	NA	< 0.002	99%	85%	115%	101%	90%	110%	99%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															

Certified By: Angela Bond

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methyl tert-butyl ether (MTBE)	ORG-180-5130	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Benzene	ORG-180-5130	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Toluene	ORG-180-5130	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Ethylbenzene	ORG-180-5130	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
m&p-Xylene	ORG-180-5130	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
o-Xylene	ORG-180-5130	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
Styrene	ORG-180-5130	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VPH	ORG-180-5130	Modified from BC MOE Lab Manual Sec D (BTEX, VPH)	GC/MS/FID
VH	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Mercury Dissolved	MET-181-6103, LAB-181-4015	Modified from EPA 245.7	CV/AA
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Aluminum Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Antimony Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Arsenic Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Barium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Beryllium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Boron Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Cadmium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Calcium Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Chromium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Cobalt Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Copper Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Iron Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Lead Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Lithium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Magnesium Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Manganese Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Mercury Total	MET-181-6103	Modified from EPA 245.7	CV/AA
Molybdenum Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Nickel Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Selenium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Silver Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Sodium Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Thallium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Titanium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Uranium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Vanadium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Zinc Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
pH	INOR-181-6000	Modified from SM 4500-H+	PH METER
p-Alkalinity	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity (pH 4.5)	INOR-181-6000	Modified from SM 2320 B	PC TITRATE

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V888816

PROJECT: 0090 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Alkalinity, Bicarbonate	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity, Carbonate	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity, Hydroxide	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Electrical Conductivity	INOR-181-6000	Modified from SM 2510B	PC TITRATE
Chloride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Fluoride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate-N	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite-N	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Phenol, Total	INOR-181-6014	Modified from SM 5530 C and EPA 420.2	CONTINUOUS FLOW ANALYZER
Phosphorus Dissolved	INOR-181-6011	Modified from SM 4500-P B&E	SPECTROPHOTOMETER
Phosphorus Total	INOR-181-6011	Modified from SM 4500-P B&E	SPECTROPHOTOMETER
Turbidity	INOR-181-6008	SM 2130 B	PC TITRATE

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
webearth.agatlabs.com
P: 778.452.4000 • F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 9°C
AGAT Job Number: 14V888816
Notes: 15
Sept 15/2014 9:12am

Report Information
Company: BGC Engineering Inc
Contact: Cathy Schmid
Address: Kamloops, BC
Phone: ~~(604)~~ 250 374 8600 Fax:
LSD:
Client Project #: 0090 150 15

Report Information
1. Name: Cathy Schmid
Email: cschmid@bgcengineering.ca
2. Name:
Email:

Report Format
☐ Single Sample per page
☐ Multiple Samples per page
☐ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☐ 5 to 7 working days
Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☑ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:

Requirements *(Please Check)*
☐ BC CSR Soil
☐ AL ☐ IL ☐ PL ☐ CL ☐ RL
☐ BC CSR - Water
☐ DW ☐ AW ☐ IW ☐ LW
Schedule 11 *(Please Specify)*
CCME *(Please Specify)*
Other *(Please Specify)*

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
580 550	HWM-BH-03-WS1							
580 551	WS2							
" 52	WS3							
	WS4							

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Anne Clayton	Sept 15/9am	Steven Rudlong	Sept 15/2014 9:12am

Page 1 of 1
N°: 005594

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 14V888816

RECEIVING BASICS:

Received From: Anne Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 1 Containers: 47

TIME SENSITIVE ISSUES:

Earliest Date Sampled: 12 Sept 14' ALREADY EXCEEDED? Yes (No)

Nitrate / Nitrite samples expire 15 Sept 14' or the sooner.

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 9 + 9 + 8 = 9 °C (2) ___ + ___ + ___ = ___ °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity issues:

1) No bottles received for sample "HWM-BH-03-WS4"
2) Two sets of bottles labeled "HWM-BH-03 WS03" received (except
3) for the 1L plastic bottle, only 1 received)

Account Project Manager: _____ Have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

Only (2ml) of sample received for "HWM-BH-03 WS02" for TDP analysis. Dissolved metal bottle for "HWM-BH-03-WS02" is empty upon receipt. The received dissolved metal samples require filtration, which will be done so in the lab.

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM
Your C.O.C. #: G095530

Attention:David Van Everdingen

WATERLINE RESOURCES INC.
UNIT D
2301 MCCULLOUGH RD.
Nanaimo, BC
CANADA V9S 4M8

Report Date: 2014/10/22
Report #: R1669043
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B492100
Received: 2014/10/11, 12:40

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity - Water	1	2014/10/14	2014/10/14	BBY6SOP-00026	SM 22 2320 B m
Chloride by Automated Colourimetry	1	N/A	2014/10/14	BBY6SOP-00011	SM 22 4500-Cl- G m
Colour (True)	1	N/A	2014/10/11	BBY6SOP-00021	SM 22 2120 B m
Conductance - water	1	N/A	2014/10/14	BBY6SOP-00026	SM 22 2510 B m
Fluoride	1	N/A	2014/10/14	BBY6SOP-00048	SM 22 4500-F C m
Sulphide (as H2S)	1	N/A	2014/10/20		
Hardness Total (calculated as CaCO3)	1	N/A	2014/10/16	BBY7SOP-00002	EPA 6020a R1 m
Hardness (calculated as CaCO3)	1	N/A	2014/10/20	BBY7SOP-00002	EPA 6020a R1 m
Mercury (Dissolved) by CVAF	1	N/A	2014/10/20	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAF	1	2014/10/20	2014/10/21	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (diss.)	1	N/A	2014/10/20	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (dissolved)	1	N/A	2014/10/17	BBY7SOP-00002	EPA 6020A R1 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	1	2014/10/11	2014/10/16	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (total)	1	2014/10/14	2014/10/16	BBY7SOP-00002	EPA 6020A R1 m
Nitrate + Nitrite (N)	1	N/A	2014/10/11	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrite (N) by CFA	1	N/A	2014/10/11	BBY6SOP-00010	SM 22 4500-NO3- I m
Nitrogen - Nitrate (as N)	1	N/A	2014/10/11	BBY6SOP-00010	SM 22 4500-NO3 I m
Filter and HNO3 Preserve for Metals	1	N/A	2014/10/17	BBY7 WI-00004	BCMOE Reqs 08/14
pH Water (2)	1	N/A	2014/10/14	BBY6SOP-00026	SM 22 4500-H+ B m
Phenols (4-AAP)	1	N/A	2014/10/15	BBY6SOP-00008	SM 22 5530 D m
Sulphate by Automated Colourimetry	1	N/A	2014/10/14	BBY6SOP-00017	SM 22 4500-SO42- E m
Sulphide	1	N/A	2014/10/17	BBY6SOP-00006	SM 22 4500-S2- D m
Total Dissolved Solids (Filt. Residue)	1	2014/10/15	2014/10/16	BBY6SOP-00033	SM 22 2540 C m
Extrac. Petroleum HC in Water by GC/FID	1	2014/10/16	2014/10/16	BBY8SOP-00029	BCMOE EPH w 07/99 m
Phosphorus-P (Total, dissolved) - FF/FP	1	2014/10/15	2014/10/15	BBY6SOP-00013	SM 22 4500-P E m
Total Phosphorus	1	N/A	2014/10/15	BBY6SOP-00013	SM 22 4500-P E m
Turbidity	1	N/A	2014/10/11	BBY6SOP-00027	SM 22 2130 B m
VOCs, VH, F1, LH in Water by HS GC/MS	1	2014/10/12	2014/10/12	BBY8SOP-00009	EPA 8260c R3 m
Volatile HC-BTEX	1	N/A	2014/10/14	BBY WI-00033	Auto Calc

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Your Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM
Your C.O.C. #: G095530

Attention:David Van Everdingen

WATERLINE RESOURCES INC.
UNIT D
2301 MCCULLOUGH RD.
Nanaimo, BC
CANADA V9S 4M8

Report Date: 2014/10/22
Report #: R1669043
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B492100
Received: 2014/10/11, 12:40

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Methane Water Subcontract (1)	1	2014/10/22	2014/10/22		

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Ontario (From Burnaby)
(2) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jared Rudek, Project Manager
Email: JRudek@maxxam.ca
Phone# (604) 734 7276

==========

This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		KV8523	KV8523		
Sampling Date		2014/10/10 08:15	2014/10/10 08:15		
COC Number		G095530	G095530		
	Units	HMM-BH-03	HMM-BH-03 Lab-Dup	RDL	QC Batch
Parameter					
Subcontract Parameter	N/A	ATTACHED		N/A	7688108
ANIONS					
Nitrite (N)	mg/L	0.307 (1)		0.050	7676520
Calculated Parameters					
Filter and HNO3 Preservation	N/A	FIELD		N/A	ONSITE
Total Hardness (CaCO3)	mg/L	224		0.50	7676050
Hydrogen Sulphide (H2S)	mg/L	<0.0050		0.0050	7678481
Nitrate (N)	mg/L	<0.20		0.20	7676052
Misc. Inorganics					
Fluoride (F)	mg/L	0.340		0.010	7677537
Alkalinity (Total as CaCO3)	mg/L	129		0.50	7677789
Alkalinity (PP as CaCO3)	mg/L	<0.50		0.50	7677789
Bicarbonate (HCO3)	mg/L	158		0.50	7677789
Carbonate (CO3)	mg/L	<0.50		0.50	7677789
Hydroxide (OH)	mg/L	<0.50		0.50	7677789
Anions					
Dissolved Sulphate (SO4)	mg/L	136	137	0.50	7678172
Dissolved Chloride (Cl)	mg/L	8.0	8.0	0.50	7678168
MISCELLANEOUS					
True Colour	Col. Unit	70.0		5.0	7676466
Nutrients					
Dissolved Phosphorus (P)	mg/L	0.0614	0.0645	0.0050	7679440
Nitrate plus Nitrite (N)	mg/L	0.34 (1)		0.20	7676519
Total Phosphorus (P)	mg/L	1.21		0.050	7679442
Misc. Organics					
Phenols	mg/L	0.0055		0.0010	7679677
Physical Properties					
Conductivity	uS/cm	555		1.0	7677802
pH	pH	7.99		N/A	7677797
Physical Properties					
Total Dissolved Solids	mg/L	394		10	7678441
Turbidity	NTU	3740		0.10	7676462

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate
(1) RDL raised due to sample matrix interference.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

MERCURY BY COLD VAPOR (WATER)

Maxxam ID		KV8523		
Sampling Date		2014/10/10 08:15		
COC Number		G095530		
	Units	**HMM-BH-03**	**RDL**	**QC Batch**
Elements				
Total Mercury (Hg)	ug/L	<0.20	0.20	7685161
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		KV8523	KV8523		
Sampling Date		2014/10/10 08:15	2014/10/10 08:15		
COC Number		G095530	G095530		
	Units	HMM-BH-03	HMM-BH-03 Lab-Dup	RDL	QC Batch
Total Metals by ICPMS					
Total Aluminum (Al)	mg/L	45.7	45.5	0.0030	7678176
Total Antimony (Sb)	mg/L	0.00081	0.00087	0.00050	7678176
Total Arsenic (As)	mg/L	0.0115	0.0118	0.00010	7678176
Total Barium (Ba)	mg/L	0.348	0.356	0.0010	7678176
Total Beryllium (Be)	mg/L	0.00200	0.00200	0.00010	7678176
Total Bismuth (Bi)	mg/L	<0.0010	<0.0010	0.0010	7678176
Total Boron (B)	mg/L	0.116	0.116	0.050	7678176
Total Cadmium (Cd)	mg/L	0.00143	0.00145	0.000010	7678176
Total Chromium (Cr)	mg/L	0.110	0.113	0.0010	7678176
Total Cobalt (Co)	mg/L	0.0325	0.0327	0.00050	7678176
Total Copper (Cu)	mg/L	0.152	0.148	0.00050	7678176
Total Iron (Fe)	mg/L	67.8	70.0	0.010	7678176
Total Lead (Pb)	mg/L	0.0272	0.0274	0.00020	7678176
Total Lithium (Li)	mg/L	0.0218	0.0213	0.0050	7678176
Total Manganese (Mn)	mg/L	1.50	1.52	0.0010	7678176
Total Molybdenum (Mo)	mg/L	0.0340	0.0332	0.0010	7678176
Total Nickel (Ni)	mg/L	0.0739	0.0749	0.0010	7678176
Total Selenium (Se)	mg/L	0.00078	0.00081	0.00010	7678176
Total Silicon (Si)	mg/L	54.3	57.0	0.10	7678176
Total Silver (Ag)	mg/L	0.000114	0.000137	0.000020	7678176
Total Strontium (Sr)	mg/L	0.403	0.410	0.0010	7678176
Total Thallium (Tl)	mg/L	0.000820	0.000841	0.000050	7678176
Total Tin (Sn)	mg/L	0.0200	0.0200	0.0050	7678176
Total Titanium (Ti)	mg/L	0.753	0.751	0.0050	7678176
Total Uranium (U)	mg/L	0.00635	0.00639	0.00010	7678176
Total Vanadium (V)	mg/L	0.133	0.135	0.0050	7678176
Total Zinc (Zn)	mg/L	0.311	0.313	0.0050	7678176
Total Zirconium (Zr)	mg/L	0.00349	0.00371	0.00050	7678176
Total Calcium (Ca)	mg/L	54.6		0.050	7676051
Total Magnesium (Mg)	mg/L	21.3		0.050	7676051
Total Potassium (K)	mg/L	6.17		0.050	7676051
Total Sodium (Na)	mg/L	87.5		0.050	7676051
Total Sulphur (S)	mg/L	41.9		3.0	7676051

RDL = Reportable Detection Limit
Lab-Dup = Laboratory Initiated Duplicate

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

TOTAL PETROLEUM HYDROCARBONS (WATER)

Maxxam ID		KV8523		
Sampling Date		2014/10/10 08:15		
COC Number		G095530		
	Units	**HMM-BH-03**	**RDL**	**QC Batch**
Ext. Pet. Hydrocarbon				
EPH (C10-C19)	mg/L	<0.20	0.20	7680637
EPH (C19-C32)	mg/L	0.31	0.20	7680637
Surrogate Recovery (%)				
O-TERPHENYL (sur.)	%	100		7680637
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

MISCELLANEOUS (WATER)

Maxxam ID		KV8523		
Sampling Date		2014/10/10 08:15		
COC Number		G095530		
	Units	**HMM-BH-03**	**RDL**	**QC Batch**
MISCELLANEOUS				
Sulphide	mg/L	<0.0050	0.0050	7682247
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		KV8523		
Sampling Date		2014/10/10 08:15		
COC Number		G095530		
	Units	HMM-BH-03	RDL	QC Batch
Misc. Inorganics				
Dissolved Hardness (CaCO3)	mg/L	85.8	0.50	7675900
Elements				
Dissolved Mercury (Hg)	ug/L	<0.010	0.010	7682848
Dissolved Metals by ICPMS				
Dissolved Aluminum (Al)	mg/L	0.401	0.0030	7681550
Dissolved Antimony (Sb)	mg/L	0.00086	0.00050	7681550
Dissolved Arsenic (As)	mg/L	0.00137	0.00010	7681550
Dissolved Barium (Ba)	mg/L	0.0193	0.0010	7681550
Dissolved Beryllium (Be)	mg/L	<0.00010	0.00010	7681550
Dissolved Bismuth (Bi)	mg/L	<0.0010	0.0010	7681550
Dissolved Boron (B)	mg/L	0.101	0.050	7681550
Dissolved Cadmium (Cd)	mg/L	0.000026	0.000010	7681550
Dissolved Chromium (Cr)	mg/L	0.0012	0.0010	7681550
Dissolved Cobalt (Co)	mg/L	0.00142	0.00050	7681550
Dissolved Copper (Cu)	mg/L	0.00214	0.00020	7681550
Dissolved Iron (Fe)	mg/L	0.532	0.0050	7681550
Dissolved Lead (Pb)	mg/L	0.00026	0.00020	7681550
Dissolved Lithium (Li)	mg/L	<0.0050	0.0050	7681550
Dissolved Manganese (Mn)	mg/L	0.350	0.0010	7681550
Dissolved Molybdenum (Mo)	mg/L	0.0232	0.0010	7681550
Dissolved Nickel (Ni)	mg/L	0.0180	0.0010	7681550
Dissolved Selenium (Se)	mg/L	0.00016	0.00010	7681550
Dissolved Silicon (Si)	mg/L	4.91	0.10	7681550
Dissolved Silver (Ag)	mg/L	<0.000020	0.000020	7681550
Dissolved Strontium (Sr)	mg/L	0.201	0.0010	7681550
Dissolved Thallium (Tl)	mg/L	0.000070	0.000050	7681550
Dissolved Tin (Sn)	mg/L	<0.0050	0.0050	7681550
Dissolved Titanium (Ti)	mg/L	0.0113	0.0050	7681550
Dissolved Uranium (U)	mg/L	0.00278	0.00010	7681550
Dissolved Vanadium (V)	mg/L	<0.0050	0.0050	7681550
Dissolved Zinc (Zn)	mg/L	<0.0050	0.0050	7681550
Dissolved Zirconium (Zr)	mg/L	<0.00050	0.00050	7681550
Dissolved Calcium (Ca)	mg/L	30.0	0.050	7676133
Dissolved Magnesium (Mg)	mg/L	2.67	0.050	7676133
Dissolved Potassium (K)	mg/L	2.53	0.050	7676133
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

CSR DISSOLVED METALS IN WATER WITH CV HG (WATER)

Maxxam ID		KV8523		
Sampling Date		2014/10/10 08:15		
COC Number		G095530		
	Units	**HMM-BH-03**	**RDL**	**QC Batch**
Dissolved Sodium (Na)	mg/L	84.7	0.050	7676133
Dissolved Sulphur (S)	mg/L	44.0	3.0	7676133
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

CCME&CSR VOC/F1/VPH IN WATER (WATER)

Maxxam ID		KV8523		
Sampling Date		2014/10/10 08:15		
COC Number		G095530		
	Units	HMM-BH-03	RDL	QC Batch
Volatiles				
F1 (C6-C10) - BTEX	ug/L	<300	300	7675984
VPH (VH6 to 10 - BTEX)	ug/L	<300	300	7675984
Chloromethane	ug/L	<1.0	1.0	7676816
Vinyl chloride	ug/L	<0.50	0.50	7676816
Chloroethane	ug/L	<1.0	1.0	7676816
Trichlorofluoromethane	ug/L	<4.0	4.0	7676816
1,1-dichloroethene	ug/L	<0.50	0.50	7676816
Dichloromethane	ug/L	<2.0	2.0	7676816
trans-1,2-dichloroethene	ug/L	<1.0	1.0	7676816
1,1-dichloroethane	ug/L	<0.50	0.50	7676816
cis-1,2-dichloroethene	ug/L	<1.0	1.0	7676816
Chloroform	ug/L	2.4	1.0	7676816
1,1,1-trichloroethane	ug/L	<0.50	0.50	7676816
1,2-dichloroethane	ug/L	<0.50	0.50	7676816
Carbon tetrachloride	ug/L	<0.50	0.50	7676816
Benzene	ug/L	<0.40	0.40	7676816
Methyl-tert-butylether (MTBE)	ug/L	<4.0	4.0	7676816
1,2-dichloropropane	ug/L	<0.50	0.50	7676816
cis-1,3-dichloropropene	ug/L	<1.0	1.0	7676816
trans-1,3-dichloropropene	ug/L	<1.0	1.0	7676816
Bromomethane	ug/L	<1.0	1.0	7676816
1,1,2-trichloroethane	ug/L	<0.50	0.50	7676816
Trichloroethene	ug/L	<0.50	0.50	7676816
Chlorodibromomethane	ug/L	<1.0	1.0	7676816
Tetrachloroethene	ug/L	<0.50	0.50	7676816
Bromodichloromethane	ug/L	<1.0	1.0	7676816
Toluene	ug/L	0.94	0.40	7676816
Ethylbenzene	ug/L	<0.40	0.40	7676816
m & p-Xylene	ug/L	<0.40	0.40	7676816
Bromoform	ug/L	<1.0	1.0	7676816
Styrene	ug/L	<0.50	0.50	7676816
o-Xylene	ug/L	<0.40	0.40	7676816
Xylenes (Total)	ug/L	<0.40	0.40	7676816
1,1,1,2-tetrachloroethane	ug/L	<0.50	0.50	7676816
1,1,2,2-tetrachloroethane	ug/L	<0.50	0.50	7676816
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

CCME&CSR VOC/F1/VPH IN WATER (WATER)

Maxxam ID		KV8523		
Sampling Date		2014/10/10 08:15		
COC Number		G095530		
	Units	**HMM-BH-03**	**RDL**	**QC Batch**
1,2-dichlorobenzene	ug/L	<0.50	0.50	7676816
1,3-dichlorobenzene	ug/L	<0.50	0.50	7676816
1,4-dichlorobenzene	ug/L	<0.50	0.50	7676816
Chlorobenzene	ug/L	<0.50	0.50	7676816
VH C6-C10	ug/L	<300	300	7676816
(C6-C10)	ug/L	<300	300	7676816
Surrogate Recovery (%)				
1,4-Difluorobenzene (sur.)	%	120		7676816
4-Bromofluorobenzene (sur.)	%	105		7676816
D4-1,2-Dichloroethane (sur.)	%	98		7676816
RDL = Reportable Detection Limit				

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

GENERAL COMMENTS

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

QUALITY ASSURANCE REPORT

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7676816	1,4-Difluorobenzene (sur.)	2014/10/12	78	70 - 130	113	70 - 130	110	%		
7676816	4-Bromofluorobenzene (sur.)	2014/10/12	93	70 - 130	105	70 - 130	107	%		
7676816	D4-1,2-Dichloroethane (sur.)	2014/10/12	82	70 - 130	96	70 - 130	93	%		
7680637	O-TERPHENYL (sur.)	2014/10/16	100	50 - 130	99	50 - 130	99	%		
7676462	Turbidity	2014/10/11			100	80 - 120	<0.10	NTU	0.59	20
7676466	True Colour	2014/10/11					<5.0	Col. Unit	NC	20
7676519	Nitrate plus Nitrite (N)	2014/10/11			103	80 - 120	<0.020	mg/L		
7676520	Nitrite (N)	2014/10/11			100	80 - 120	<0.0050	mg/L		
7676816	(C6-C10)	2014/10/12			92	70 - 130	<300	ug/L		
7676816	1,1,1,2-tetrachloroethane	2014/10/12	88	70 - 130	100	70 - 130	<0.50	ug/L		
7676816	1,1,1-trichloroethane	2014/10/12	91	70 - 130	104	70 - 130	<0.50	ug/L		
7676816	1,1,2,2-tetrachloroethane	2014/10/12	103	70 - 130	87	70 - 130	<0.50	ug/L		
7676816	1,1,2-trichloroethane	2014/10/12	88	70 - 130	102	70 - 130	<0.50	ug/L		
7676816	1,1-dichloroethane	2014/10/12	86	70 - 130	100	70 - 130	<0.50	ug/L		
7676816	1,1-dichloroethene	2014/10/12	81	70 - 130	92	70 - 130	<0.50	ug/L		
7676816	1,2-dichlorobenzene	2014/10/12	106	70 - 130	97	70 - 130	<0.50	ug/L		
7676816	1,2-dichloroethane	2014/10/12	88	70 - 130	100	70 - 130	<0.50	ug/L		
7676816	1,2-dichloropropane	2014/10/12	101	70 - 130	94	70 - 130	<0.50	ug/L		
7676816	1,3-dichlorobenzene	2014/10/12	106	70 - 130	105	70 - 130	<0.50	ug/L		
7676816	1,4-dichlorobenzene	2014/10/12	104	70 - 130	102	70 - 130	<0.50	ug/L		
7676816	Benzene	2014/10/12	NC	70 - 130	111	70 - 130	<0.40	ug/L		
7676816	Bromodichloromethane	2014/10/12	84	70 - 130	97	70 - 130	<1.0	ug/L		
7676816	Bromoform	2014/10/12	100	70 - 130	90	70 - 130	<1.0	ug/L		
7676816	Bromomethane	2014/10/12	81	60 - 140	118	60 - 140	<1.0	ug/L		
7676816	Carbon tetrachloride	2014/10/12	86	70 - 130	96	70 - 130	<0.50	ug/L		
7676816	Chlorobenzene	2014/10/12	91	70 - 130	103	70 - 130	<0.50	ug/L		
7676816	Chlorodibromomethane	2014/10/12	81	70 - 130	96	70 - 130	<1.0	ug/L		
7676816	Chloroethane	2014/10/12	81	60 - 140	117	60 - 140	<1.0	ug/L		
7676816	Chloroform	2014/10/12	87	70 - 130	102	70 - 130	<1.0	ug/L		
7676816	Chloromethane	2014/10/12	95	60 - 140	107	60 - 140	<1.0	ug/L		
7676816	cis-1,2-dichloroethene	2014/10/12	84	70 - 130	99	70 - 130	<1.0	ug/L		
7676816	cis-1,3-dichloropropene	2014/10/12	89	70 - 130	116	70 - 130	<1.0	ug/L		

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

QUALITY ASSURANCE REPORT(CONT'D)

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7676816	Dichloromethane	2014/10/12	103	70 - 130	115	70 - 130	<2.0	ug/L		
7676816	Ethylbenzene	2014/10/12	93	70 - 130	111	70 - 130	<0.40	ug/L		
7676816	m & p-Xylene	2014/10/12	90	70 - 130	107	70 - 130	<0.40	ug/L		
7676816	Methyl-tert-butylether (MTBE)	2014/10/12	88	70 - 130	100	70 - 130	<4.0	ug/L		
7676816	o-Xylene	2014/10/12	92	70 - 130	108	70 - 130	<0.40	ug/L		
7676816	Styrene	2014/10/12	93	70 - 130	104	70 - 130	<0.50	ug/L		
7676816	Tetrachloroethene	2014/10/12	95	70 - 130	108	70 - 130	<0.50	ug/L		
7676816	Toluene	2014/10/12	87	70 - 130	103	70 - 130	<0.40	ug/L		
7676816	trans-1,2-dichloroethene	2014/10/12	86	70 - 130	98	70 - 130	<1.0	ug/L		
7676816	trans-1,3-dichloropropene	2014/10/12	85	70 - 130	117	70 - 130	<1.0	ug/L		
7676816	Trichloroethene	2014/10/12	91	70 - 130	104	70 - 130	<0.50	ug/L		
7676816	Trichlorofluoromethane	2014/10/12	128	60 - 140	139	60 - 140	<4.0	ug/L		
7676816	VH C6-C10	2014/10/12			90	70 - 130	<300	ug/L		
7676816	Vinyl chloride	2014/10/12	106	60 - 140	122	60 - 140	<0.50	ug/L	NC	30
7676816	Xylenes (Total)	2014/10/12					<0.40	ug/L		
7677537	Fluoride (F)	2014/10/14	97	80 - 120	96	80 - 120	<0.010	mg/L	1.7	20
7677789	Alkalinity (PP as CaCO3)	2014/10/14					<0.50	mg/L		
7677789	Alkalinity (Total as CaCO3)	2014/10/14	NC	80 - 120	101	80 - 120	<0.50	mg/L	0.51	20
7677789	Bicarbonate (HCO3)	2014/10/14					<0.50	mg/L		
7677789	Carbonate (CO3)	2014/10/14					<0.50	mg/L		
7677789	Hydroxide (OH)	2014/10/14					<0.50	mg/L		
7677797	pH	2014/10/14			101	97 - 103			0.13	N/A
7677802	Conductivity	2014/10/14			97	80 - 120	<1.0	uS/cm	0.23	20
7678168	Dissolved Chloride (Cl)	2014/10/14	93	80 - 120	99	80 - 120	<0.50	mg/L	0.35	20
7678172	Dissolved Sulphate (SO4)	2014/10/14	NC	80 - 120	99	80 - 120	<0.50	mg/L	0.49	20
7678176	Total Aluminum (Al)	2014/10/16	NC	80 - 120	100	80 - 120	<0.0030	mg/L	0.40	20
7678176	Total Antimony (Sb)	2014/10/16	NC	80 - 120	102	80 - 120	<0.00050	mg/L	NC	20
7678176	Total Arsenic (As)	2014/10/16	NC	80 - 120	102	80 - 120	<0.00010	mg/L	2.6	20
7678176	Total Barium (Ba)	2014/10/16	NC	80 - 120	101	80 - 120	<0.0010	mg/L	2.5	20
7678176	Total Beryllium (Be)	2014/10/16	97	80 - 120	98	80 - 120	<0.00010	mg/L	0	20
7678176	Total Bismuth (Bi)	2014/10/16	NC	80 - 120	99	80 - 120	<0.0010	mg/L	NC	20
7678176	Total Boron (B)	2014/10/16					<0.050	mg/L	NC	20

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7678176	Total Cadmium (Cd)	2014/10/16	103	80 - 120	102	80 - 120	<0.000010	mg/L	1.5	20
7678176	Total Chromium (Cr)	2014/10/16	NC	80 - 120	105	80 - 120	<0.0010	mg/L	2.7	20
7678176	Total Cobalt (Co)	2014/10/16	NC	80 - 120	99	80 - 120	<0.00050	mg/L	0.74	20
7678176	Total Copper (Cu)	2014/10/16	NC	80 - 120	98	80 - 120	<0.00050	mg/L	2.5	20
7678176	Total Iron (Fe)	2014/10/16	NC	80 - 120	109	80 - 120	<0.010	mg/L	3.2	20
7678176	Total Lead (Pb)	2014/10/16	NC	80 - 120	100	80 - 120	<0.00020	mg/L	0.74	20
7678176	Total Lithium (Li)	2014/10/16	NC	80 - 120	97	80 - 120	<0.0050	mg/L	NC	20
7678176	Total Manganese (Mn)	2014/10/16	NC	80 - 120	102	80 - 120	<0.0010	mg/L	1.5	20
7678176	Total Molybdenum (Mo)	2014/10/16	NC	80 - 120	90	80 - 120	<0.0010	mg/L	2.3	20
7678176	Total Nickel (Ni)	2014/10/16	NC	80 - 120	96	80 - 120	<0.0010	mg/L	1.4	20
7678176	Total Selenium (Se)	2014/10/16	101	80 - 120	99	80 - 120	<0.00010	mg/L	3.4	20
7678176	Total Silicon (Si)	2014/10/16					<0.10	mg/L	4.8	20
7678176	Total Silver (Ag)	2014/10/16	100	80 - 120	102	80 - 120	0.000039 ,RDL=0.000020	mg/L	18	20
7678176	Total Strontium (Sr)	2014/10/16	NC	80 - 120	100	80 - 120	<0.0010	mg/L	1.8	20
7678176	Total Thallium (Tl)	2014/10/16	NC	80 - 120	95	80 - 120	<0.000050	mg/L	2.5	20
7678176	Total Tin (Sn)	2014/10/16	NC	80 - 120	102	80 - 120	<0.0050	mg/L	NC	20
7678176	Total Titanium (Ti)	2014/10/16	NC	80 - 120	93	80 - 120	<0.0050	mg/L	0.22	20
7678176	Total Uranium (U)	2014/10/16	NC	80 - 120	98	80 - 120	<0.00010	mg/L	0.50	20
7678176	Total Vanadium (V)	2014/10/16	NC	80 - 120	101	80 - 120	<0.0050	mg/L	1.7	20
7678176	Total Zinc (Zn)	2014/10/16	NC	80 - 120	103	80 - 120	<0.0050	mg/L	0.66	20
7678176	Total Zirconium (Zr)	2014/10/16					<0.00050	mg/L	6.0	20
7678441	Total Dissolved Solids	2014/10/16	NC	80 - 120	82	80 - 120	<10	mg/L	5.3	20
7679440	Dissolved Phosphorus (P)	2014/10/15	NC	80 - 120	110	80 - 120	<0.0050	mg/L	4.8	20
7679442	Total Phosphorus (P)	2014/10/15	NC	80 - 120	112	80 - 120	<0.0050	mg/L	3.8	20
7679677	Phenols	2014/10/15	102	80 - 120	101	80 - 120	<0.0010	mg/L	NC	20
7680637	EPH (C10-C19)	2014/10/16	94	50 - 130	92	50 - 130	<0.20	mg/L		
7680637	EPH (C19-C32)	2014/10/16	108	50 - 130	104	50 - 130	<0.20	mg/L		
7681550	Dissolved Aluminum (Al)	2014/10/17	110	80 - 120	104	80 - 120	<0.0030	mg/L		
7681550	Dissolved Antimony (Sb)	2014/10/17	100	80 - 120	101	80 - 120	<0.00050	mg/L		
7681550	Dissolved Arsenic (As)	2014/10/17	105	80 - 120	100	80 - 120	<0.00010	mg/L	NC	20
7681550	Dissolved Barium (Ba)	2014/10/17	100	80 - 120	95	80 - 120	<0.0010	mg/L		

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

QUALITY ASSURANCE REPORT(CONT'D)

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7681550	Dissolved Beryllium (Be)	2014/10/17	101	80 - 120	100	80 - 120	<0.00010	mg/L		
7681550	Dissolved Bismuth (Bi)	2014/10/17	91	80 - 120	96	80 - 120	<0.0010	mg/L		
7681550	Dissolved Boron (B)	2014/10/17					<0.050	mg/L		
7681550	Dissolved Cadmium (Cd)	2014/10/17	101	80 - 120	97	80 - 120	<0.000010	mg/L		
7681550	Dissolved Chromium (Cr)	2014/10/17	99	80 - 120	97	80 - 120	<0.0010	mg/L	NC	20
7681550	Dissolved Cobalt (Co)	2014/10/17	97	80 - 120	98	80 - 120	<0.00050	mg/L		
7681550	Dissolved Copper (Cu)	2014/10/17	99	80 - 120	97	80 - 120	<0.00020	mg/L		
7681550	Dissolved Iron (Fe)	2014/10/17	102	80 - 120	102	80 - 120	<0.0050	mg/L		
7681550	Dissolved Lead (Pb)	2014/10/17	90	80 - 120	96	80 - 120	<0.00020	mg/L		
7681550	Dissolved Lithium (Li)	2014/10/17	99	80 - 120	102	80 - 120	<0.0050	mg/L		
7681550	Dissolved Manganese (Mn)	2014/10/17	102	80 - 120	98	80 - 120	<0.0010	mg/L		
7681550	Dissolved Molybdenum (Mo)	2014/10/17	92	80 - 120	96	80 - 120	<0.0010	mg/L		
7681550	Dissolved Nickel (Ni)	2014/10/17	98	80 - 120	99	80 - 120	<0.0010	mg/L		
7681550	Dissolved Selenium (Se)	2014/10/17	96	80 - 120	97	80 - 120	<0.00010	mg/L		
7681550	Dissolved Silicon (Si)	2014/10/17					<0.10	mg/L		
7681550	Dissolved Silver (Ag)	2014/10/17	83	80 - 120	94	80 - 120	<0.000020	mg/L		
7681550	Dissolved Strontium (Sr)	2014/10/17	102	80 - 120	97	80 - 120	<0.0010	mg/L		
7681550	Dissolved Thallium (Tl)	2014/10/17	97	80 - 120	96	80 - 120	<0.000050	mg/L		
7681550	Dissolved Tin (Sn)	2014/10/17	100	80 - 120	97	80 - 120	<0.0050	mg/L		
7681550	Dissolved Titanium (Ti)	2014/10/17	94	80 - 120	96	80 - 120	<0.0050	mg/L		
7681550	Dissolved Uranium (U)	2014/10/17	91	80 - 120	97	80 - 120	<0.00010	mg/L		
7681550	Dissolved Vanadium (V)	2014/10/17	100	80 - 120	94	80 - 120	<0.0050	mg/L		
7681550	Dissolved Zinc (Zn)	2014/10/17	103	80 - 120	98	80 - 120	<0.0050	mg/L		
7681550	Dissolved Zirconium (Zr)	2014/10/17					<0.00050	mg/L		
7682247	Sulphide	2014/10/17	116	80 - 120	105	80 - 120	<0.0050	mg/L	NC	20
7682848	Dissolved Mercury (Hg)	2014/10/20	81	80 - 120	85	80 - 120	<0.010	ug/L	NC	20
7685161	Total Mercury (Hg)	2014/10/21	84	80 - 120	103	80 - 120	<0.010	ug/L	NC	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

QUALITY ASSURANCE REPORT(CONT'D)

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

			Matrix Spike		Spiked Blank		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

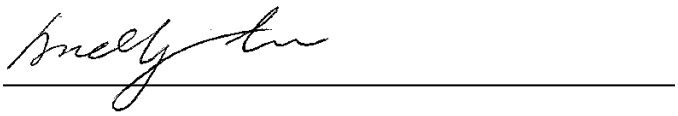
Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Maxxam Job #: B492100
Report Date: 2014/10/22

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Location: BURNABY TANK FARM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Andy Lu, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics Burnaby: 4606 Canada Way V5G 1K5 Telephone(604) 734-7276 Fax(604) 731-2386

Please see Jared Rudek if questions w analysis (or call J. Hermanson or David. van Everdingen)

Maxxam

4606 Canada Way, Burnaby, BC Canada V5G 1K5 Ph: 604 734 7276 Toll Free: 1 800 665 8566 Fax: 604 731 2386

CHAIN OF CUSTODY RECORD

Page: 1 of 2

Maxxam Job#: B492100

G 095530

*NOTE: Labels won't stick on some bottles (Glass). Please attach appropriately if necessary, thanks. Satried to keep in bag.

Invoice To: Require Report? Yes [X] No [ ]	**Report To:**
Company Name: Waterline Resources	Company Name: Waterline Resources
Contact Name: David van Everdingen	Contact Name: David van Everdingen.
Address: Unit D 2301 McCullough Rd Nanaimo BC PC: V9S 4M9	Address: Unit D 2301 McCullough Rd Nanaimo BC PC: V9S 4M9.
Phone / Fax#: Ph: 250.472.2252 Fax:	Phone / Fax#: Ph: 250.472.2252 Fax:
E-mail dvaneverdingen@waterline resources.com	E-mail dvaneverdingen@waterline resources.com.

PO #:	
Quotation #:	
Project #:	2137-14-004
Proj. Name:	Burnaby Tank Farm Sampling
Location:	Burnaby Tank Farm
Sampled By:	Jolene Hermanson. jhermanson@waterline resources 778-538-4445

REGULATORY REQUIREMENTS SERVICE REQUESTED:

- [ ] CSR
- [ ] CCME
- [X] BC Water Quality
- [ ] Other
- [ ] DRINKING WATER
- [X] Regular Turn Around Time (TAT) (5 days for most tests)
- [ ] RUSH (Please contact the lab)
- [ ] 1 Day [ ] 2 Day [ ] 3 Day

Date Required:

Special Instructions:

Return Cooler [ ] Ship Sample Bottles (please specify) [ ]

Extra unpreserved water included if required. Please dispose of if not required. Empty bottles were used & need cleaning.

ANALYSIS REQUESTED

	Sample Identification	Lab Identification	Sample Type	Date/Time Sampled
1	HMM-BH-03 KVBT23	120ml Gen Plastic	Plastic	Oct. 10/14 8:15am
2		120ml Plastic H2SO4	Plastic.	"
3		250ml Plastic General	Plastic	"
4		BTEX/VPH/VOC/F1	40ml Glass Vial	"
5		Carbon (DOC)	120ml Plastic	"
6		EPH/F2-F4	250mL Amber	"
		Mercury/Dissolved	40ml Glass	"
		Mercury/Dissolved	40ml Glass	"
		Mercury/Total	40ml Glass	"
		Metals Diss	20ml Plastic	"
		Metals Tot	120ml Plastic	

BTEX/VPH [X] MTBE [X] VOC/VPH [X] EPH [ ] TEH [X] PAH [ ] LEPH/HEPH [ ] CCME-PHC (Fractions 1-4 Plus BTEX) CCME-PHC (Fractions 2-4) CCME BTEX (Fraction 3 Plus BTEX) PCB

Phenols by 4AAP [ ] Phenols by GCMS [X] TOG [ ] SWOG [ ] MOG

Dissolved Metals: Y [X] N [ ] Field Filtered? Y [X] N [ ] Field Acidified? Y [X] N [ ]

Totals Metals Field Acidified? Y [X] N [ ]

Nitrate [X] Nitrite [X] Ammonia [X] Chloride [X] Fluoride [X] Sulphate [X] Total Suspended Solids-TSS [ ] TDS [X] pH [X] Conductivity [X] Alkalinity [X] BOD [ ] COD [ ] Coliform, Total & E.coli [ ] Fecal [ ] Asbestos [ ] Colour [X] General Chemistry [X] Total Phosphorus [X] Turbidity [X] DOC (Prepware-P, Total/Dissolved) [X] HOLD [ ]

Mercury (Filtered) Diss

Mercury (Not Filtered) Diss

Mercury, Total

Samples are from a Drinking Water Source? YES [ ] NO [X]

Does source supply multiple households? YES [ ] NO [ ]

B492100

Laboratory Use Only

*Relinquished by:	Date (YY/MM/DD):	Time:	Received by:	Date (YY/MM/DD):	Time:	Time Sensitive	Temperature on Receipt (°C)	Custody Seal Intact on Cooler?
Jolene Hermanson	14/10/11	13:00	PASCUAL	20141101111	12:40	[ ]	3,4,3	Yes [ ] No [ ] N/A

*IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

COC-1020 (05/10) Maxxam International Corporation o/a Maxxam Analytics

- All samples requiring preservatives were preserved.
- All samples requiring field filtering were field filtered; however an unfiltered Mercury was included and preserved w HCl in case the amount filtered was insufficient.

Maxxam

4606 Canada Way, Burnaby, BC Canada V5G 1K5 Ph: 604 734 7276 Toll Free: 1 800 665 8566 Fax: 604 731 2386

CHAIN OF CUSTODY RECORD

Page: 2 of 2

G 095531

Maxxam Job#: B492100

*Note: Labels won't stick on some bottles (mostly glass) so tried to keep in bags. Please attach appropriately if necessary, thanks.

Invoice To: Require Report? Yes [X] No [ ]

Company Name: Waterline Resources
Contact Name: David van Everdingen
Address: Unit D 2301 McCullough Rd Nanaimo BC V9S 4M9
Phone / Fax#: Ph: 250.472.2252 Fax:
E-mail

Report To:

Company Name: Same as invoice.
Contact Name:
Address:
PC:
Phone / Fax#: Ph: Fax:
E-mail

PO #:
Quotation #:
Project # : 2137-14-004
Proj. Name: Burnaby Tank Farm Sampling
Location: Burnaby Tank Farm
Sampled By: Jolene Hermanson

jhermanson@waterlineresources.com
778.538.4445.

REGULATORY REQUIREMENTS SERVICE REQUESTED:

- [ ] CSR
- [ ] CCME
- [X] BC Water Quality
- [ ] Other
- [ ] DRINKING WATER

- [X] Regular Turn Around Time (TAT) (5 days for most tests)
- [ ] RUSH (Please contact the lab)
- [ ] 1 Day [ ] 2 Day [ ] 3 Day

Date Required:

Special Instructions:

Return Cooler [ ] Ship Sample Bottles (please specify) [ ]

Extra unpreserved water included if required. Please dispose of if not required. Empty bottles were used & need cleaning

ANALYSIS REQUESTED

	Sample Identification	Lab Identification	Sample Type	Date/Time Sampled	BTEX/VPH	VOC/VPH	EPH	PAH	CCME-PHC (Fractions 1-4 Plus BTEX)	CCME-PHC (Fractions 2-4)	CCME BTEX (Fraction 1 Plus BTEX)	PCB	Phenols by 4AAP	Phenols by GC/MS	TOG	SWOG	MOG	Dissolved Metals (Y/N)	Field Filtered?	Field Acidified?	Totals Metals Field Acidified? (Y/N)	Nitrate	Nitrite	Ammonia	Chloride	Fluoride	Sulphate	Total Suspended Solids-TSS	TDS	pH	Conductivity	Alkalinity	BOD	COD	Coliform, Total & E.coli	Fecal	Asbestos	Sulphide (H_2S)	Methane Gas.	HOLD
1	HMM-BH-03	120ml Plastic	Sulphide	Oct-10/14 8:15am																																	X		
2																																							
3	"	Unpreserved Vials	40ml Glass	"																																		X	
4																																							
5																																							
6																																							
7																																							
8																																							
9																																							
10																																							
11																																							
12																																							

Samples are from a Drinking Water Source? YES [ ] NO [X]

Does source supply multiple households? YES [ ] NO [X]

*Relinquished by:	Date (YY/MM/DD):	Time:	Received by:	Date (YY/MM/DD):	Time:
Jolene Hermanson	14/10/11	13:00	WELBERT PASCUAL	2014/10/11	12:40

Laboratory Use Only

Time Sensitive	Temperature on Receipt (°C)	Custody Seal Intact on Cooler? Yes	No
[ ]	3,4,3		N/A

*IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

White: Maxxam Yellow: Client

DOC-1020 (05/10)

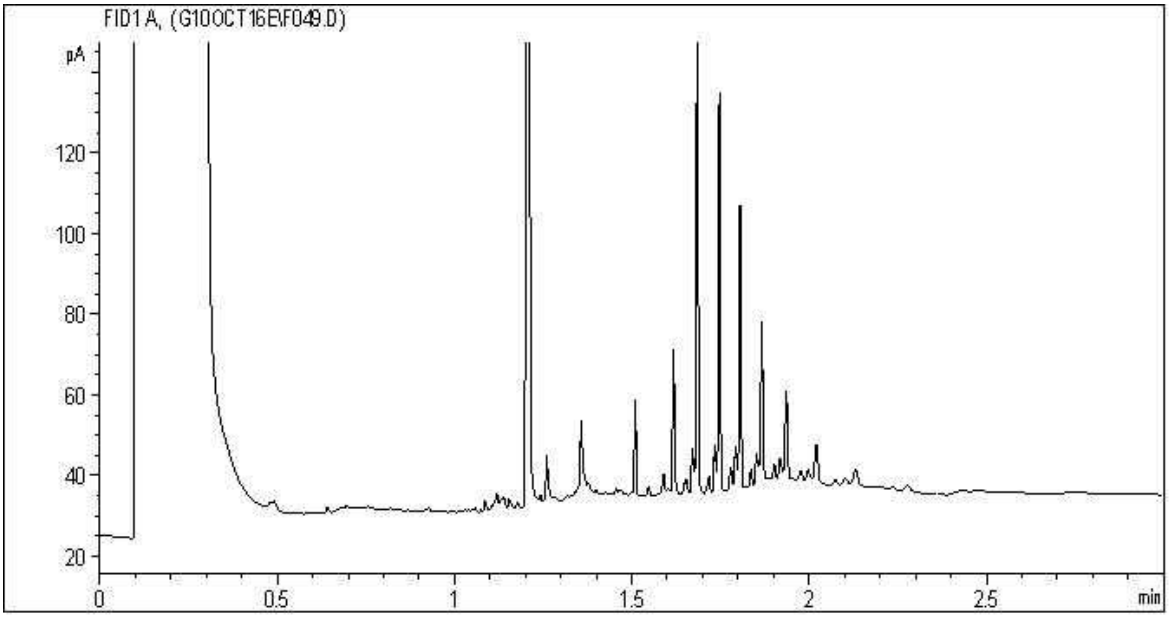
Maxxam International Corporation o/a Maxxam Analytics

* Please contact David van Everdingen to verify whether there is enough water/gas in methane vials to do isoptope analysis

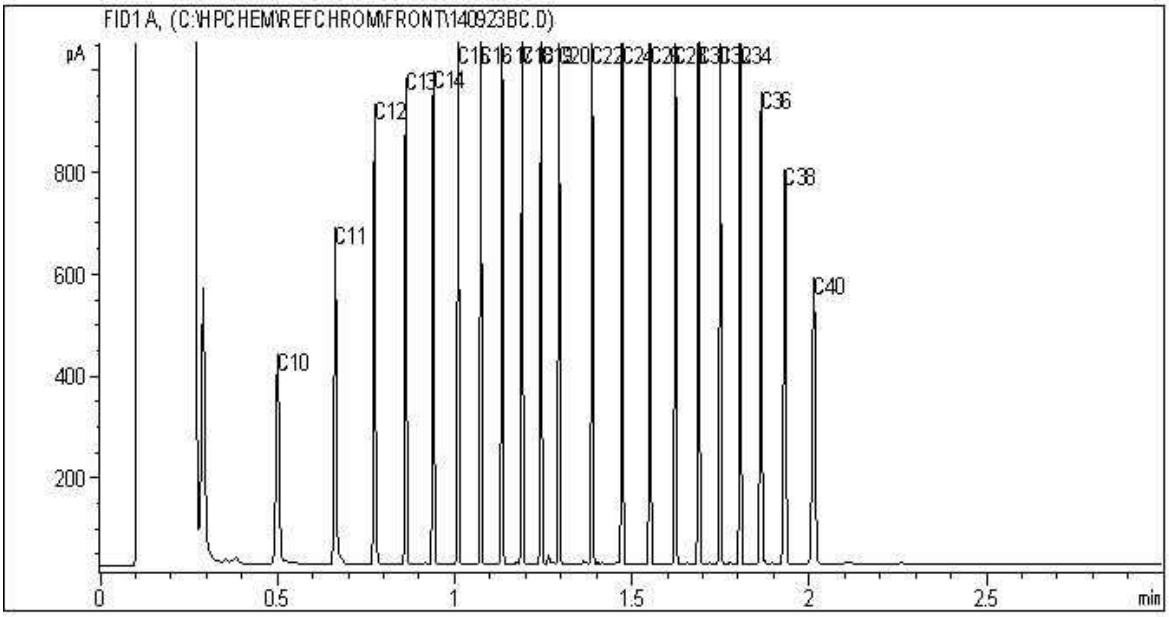
Maxxam Job #: B492100
Report Date: 2014/10/22
Maxxam Sample: KV8523

WATERLINE RESOURCES INC.
Client Project #: 2137-14-004 BURNABY TANK FARM
Site Reference: BURNABY TANK FARM
Client ID: HMM-BH-03

Extrac. Petroleum HC in Water by GC/FID Chromatogram



Carbon Range Distribution - Reference Chromatogram



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline:	C4 - C12	Diesel:	C8 - C22
Varsol:	C8 - C12	Lubricating Oils:	C20 - C40

Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your Project #: B492100
Your C.O.C. #: na

Attention:Jared Rudek

Maxxam Analytics
4606 Canada Way
Burnaby, BC
V5G 1K5

Report Date: 2014/10/17
Report #: R3192269
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B4J1631
Received: 2014/10/15, 10:20

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Dissolved Gases in Water in mg/L units	1	N/A	2014/10/17		
Dissolved Methane in Water	1	N/A	2014/10/17	CAM SOP-00219 Modified Combustible Gas Indicator Method	RSKSOP-175 m

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Shaun Nowickyj, Customer Service
Email: SNowickyj@maxxam.ca
Phone# (905) 817-5700
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B4J1631
Report Date: 2014/10/17

Maxxam Analytics
Client Project #: B492100

PERMANENT GASES (WATER)

Maxxam ID		XZ6247		
Sampling Date		2014/10/10 08:15		
COC Number		na		
	Units	KV8523 \ HMM-BH-03	RDL	QC Batch
Fixed Gases				
Methane	L/m3	0.006	0.005	3788220
Calculated Methane	mg/L	0.004	0.003	3785318

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J1631
Report Date: 2014/10/17

Maxxam Analytics
Client Project #: B492100

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.3°C

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J1631
Report Date: 2014/10/17

QUALITY ASSURANCE REPORT

Maxxam Analytics
Client Project #: B492100

			Method Blank		RPD	
QC Batch	**Parameter**	**Date**	**Value**	**Units**	**Value (%)**	**QC Limits**
3788220	Methane	2014/10/17	<0.005	L/m3	11	30

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B4J1631
Report Date: 2014/10/17

Maxxam Analytics
Client Project #: B492100

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Tom Mitchell, B.Sc, Supervisor, Compressed Gases

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

APPENDIX C

RKI Eagle Calibration Certificates

Pine Environmental Services Inc.
3470 Gardner Court, Burnaby, BC V5G 3K4 604-678-8300/877-678-8383

RKI Eagle - Multi
Calibration Sheet

This is to certify that this instrument has been calibrated to the manufacturer's specifications.

Rental	mm/dd/yyyy	Service	mm/dd/yyyy	Identification	
Date Dep.	Oct 6/2019	Date Rec.		Order	C006611
Date Ret.		Date Ret.		S/N	15716

Procedures Prior to Departure:

1. Set methane response to "off" (unless otherwise requested).
2. Check filter housing for O-ring and filter.
3. Turn unit "ON" and wait for 5 minutes.
4. Check pump function.
5. Adjust "Zero" as required using ambient air free of target gases. Note: CO2 zero calibration requires scrubber.
6. Calibrate applicable sensors using appropriate span gases (see below).
7. Allow to return to zero prior to shut-down.

Procedures Upon Return:

1. Clean unit as required.
2. Check pump function.
3. Ensure sensors are operating properly.
4. Store unit on charge.

Calibration Information			
Calibration Gas	Calibrated	Returned	Additional Information
Zero Calibration			
LEL (spec. gas/conc.)			40%LEL for Hexane & 50%LEL for Methane
O2 (20.9%)			
H2S (25ppm)			+ H2S
CO (50ppm)			
CO2 (5000ppm for 0-10K Range)			

Calibration by: _____

Parts List	Out	In	Additional Information
RKI Eagle	✓		Alkalines installed
Charger	—		
Manual	✓		
Carrying Case	✓		
Probe w/ Filter Housing	✓		
Spare External Filter	✓		
Polyurethane Hose (5ft)	✓		
Spare Batteries (4xD)	✓		
Shoulder Strap	—		
CO2 Scrubber (if applicable)	—		
Regulator w/ Tubing Adapter	—		
Calibration Gas (specify)	—		
Other Cal cert	✓		
Other Quick card	✓		

Packed by: _____ QC by: AP

Special Notes: _____

Note: If you change the batteries to alkaline, please change battery type in setup menu.

Customer must notify PES of any defect/discrepancy within 24 hours of delivery.
Please call 1-877-678-8383 for technical assistance.
Thank you for choosing Pine!

Pine Environmental Services Limited Liability:
The calibration of this unit is guaranteed to be within the product specifications when the unit leaves Pine Environmental Services Inc.
Pine Environmental Services Inc. will not assume any liability incurred during the use of this instrument should it lose its calibration for any reason.
IMPORTANT: LIST PRICES WILL BE CHARGED FOR ANY MISSING/DAMAGED COMPONENTS.

pine-bc@pine-environmental.com, www.pine-environmental.com

INSTRUMENT CALIBRATION REPORT

Pine Environmental Services, LLC.
3470 Gardner Court
Burnaby, BC V5G 3K4
Toll-free: (877) 678-8383

Pine Environmental Services, Inc.

Instrument ID 15716
Description RKI Eagle
Calibrated 10/6/2014 8:41:01PM

$CH_4 + H_2S$

Manufacturer RKI
Model Number Eagle
Serial Number/ Lot Number E103015
Location British Columbia
Department

State Certified
Status Pass
Temp °C 24
Humidity % 52

Calibration Specifications

Group # 1
Group Name Methane
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
50.00 / 50.00	%LEL	50.00	%LEL	50.00	50.00	0.00%	Pass

Group # 2
Group Name H2S
Stated Accy Pct of Reading

Range Acc % 0.0000
Reading Acc % 3.0000
Plus/Minus 0.00

Nom In Val / In Val	In Type	Out Val	Out Type	Fnd As	Lft As	Dev%	Pass/Fail
25.00 / 25.00	PPM	25.00	PPM	25.00	25.00	0.00%	Pass

Test Instruments Used During the Calibration

(As Of Cal Entry Date)

Test Standard ID	Description	Manufacturer	Model Number	Serial Number / Lot Number	Next Cal Date / Last Cal Date/ Expiration Date / Opened Date

Notes about this calibration

Calibration Result Calibration Successful
Who Calibrated Jason Murray

All instruments are calibrated by Pine Environmental Services, LLC. according to the manufacturer's specifications, but it is the customer's responsibility to calibrate and maintain this unit in accordance with the manufacturer's specifications and/or the customer's own specific needs.

Notify Pine Environmental Services, LLC. of any defect within 24 hours of receipt of equipment

Please call 866-960-7463 for Technical Assistance

APPENDIX D

Site Photos

Photo 1: Gas Sampling HMM-BH-03 with RKI Eagle

Photo 2: Groundwater Sampling HMM-BH-03 with Waterra HydroLift II gas powered pump

2301 McCullough Road, Unit D
Nanaimo, British Columbia
Canada V9S 4M9
Tel: 250.585.0800
Fax: 250.585.0802
Toll Free: 1.888.641.6795
www.waterlineresources.com

Technical Memorandum

Prepared For:	Bill Nooyen, P.Eng., Trans Mountain Pipeline ULC	**Date:**	December 4, 2013
Prepared By:	Jolene Hermanson, M.Sc., G.I.T.	**File No.:**	2137-14-004
Subject:	TMEP – BGC Water Sampling Results from Drilling of HMM-BH-01 and HMM-BH-02		

1.0 INTRODUCTION AND BACKGROUND

Waterline Resources Inc. (Waterline) was retained by TERA Environmental Consultants (TERA) on behalf of Trans Mountain Pipeline ULC to compile and interpret results of groundwater sampling conducted by BGC Engineering Inc. (BGC) during drilling of boreholes HMM-BH-01 and HMM-BH-02 on Burnaby Mountain. This is part of an ongoing investigation into the environmental site conditions at Burnaby Mountain along the proposed Trans Mountain Expansion Project (TMEP) corridor.

From November 22 to 27, 2014, BGC advanced boreholes HMM-BH-01 and HMM-BH-02 to 70.1 and 186.4 m below ground level (mbgl), respectively, to investigate rock and fluid properties at/near the proposed portal of the TMEP trenchless route from Burnaby Terminal to Westridge Marine Terminal. The location of the boreholes on Burnaby Mountain is presented on Figure 1. Vibrating wire piezometers were installed in the boreholes before they were grouted/backfilled to surface

During drilling of boreholes HMM-BH-01 and HMMBH-02, BGC collected three water quality samples (WS) from the return water used for drilling each borehole (WS01 through WS03). No other fluids were used for drilling at any time. Analytical results are provided in Appendix A and a comparison table is provided in Table A1.

A third borehole, HMM-BH-03, was previously drilled at the Kinder Morgan Burnaby Mountain Tank Farm in September 2014. The location of HMM-BH-03 is presented on Figure 1. BGC sampled the drilling return water while the borehole was advanced to a depth of 182 mbgl. The borehole was then completed with a 2.54 (1 inch) piezometer installed to a depth of 113 m. Following completion, gas and groundwater sampling was conducted by Waterline in October 2014. The results of this sampling program were summarized in a letter report entitled *TMEP – Burnaby Terminal HMM-BH-03 Groundwater Sampling* (Waterline, 2014). The results of the report indicated that the samples collected by BGC during drilling were not representative of the groundwater at the site, although mixing with the groundwater is likely to have occurred.

The enclosed technical memorandum was completed by Waterline to present the results of the drilling fluid sampling conducted by BGC at HMM-BH-01 and HMM-BH-02 in November, 2014. A comparison is made to the return water samples collected by BGC during drilling at HMM-BH-03.

2.0 RESULTS

Table A1 (Appendix A) summarizes the water quality results for samples collected during drilling of HMM-BH-01 and HMM-BH-02 between November 22 to 27, 2014, and compares the results with the groundwater samples collected by BGC during drilling of HMM-BH-03 in September 2014. Although the water from HMM-BH-01 and HMM-BH-02 is not used for drinking water purposes, the results are compared for reference with the Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, 2014) Maximum Acceptable Concentrations (MAC) and Aesthetic Objectives (AO), or, where applicable, the BC Contaminated Sites Regulation for Aquatic Life and Drinking Water (BC CSR; BC MoE, 2014). Water quality results can be summarized as follows:

- Numerous total metal concentrations exceed the MAC or AO guidelines in all of the samples collected, with the exception of HMM-BH-01 WS01. This indicates the total metal concentrations are likely influenced by high particulate (suspended solids) concentrations in the water as reflected by high turbidity. This condition also influenced the HMM-BH-03 sampling and analysis;
- Dissolved aluminum exceeds the AO guideline of 0.1 mg/L in all of the samples except HMM-BH-01 WS01. The dissolved aluminum concentration was also elevated in the samples collected from HMM-BH-03, with the exception of the sample WS01;
- pH is greater than the AO guideline of 6.5 – 8.5 in one sample from HMM-BH-01 (WS02) and two samples from HMM-BH-02 (WS02 and WS03);
- Nitrate was detected in all of the samples collected from BGC, but its concentration was less than the MAC guideline of 10 mg/L. Nitrate was also detected in the samples collected from HMM-BH-03;
- Nitrite was detected in one sample from HMM-BH-01 (WS03) and one sample from HMM-BH-02 (WS03), but its concentration was less than the MAC guideline of 1 mg/L. Nitrite was also detected in two samples from HMM-BH-03 (WS03 and WS05);
- Extractable Petroleum Hydrocarbons (EPH; C19-C32) were detected in all of the samples collected. EPH C19-C32 were also detected in all of the samples collected from HMM-BH-03 except WS03;
- EPH C10-C19 were detected in all three samples collected from HMM-BH-01, and in one sample collected from HMM-BH-02 (WS02). EPH C10-C19 were also detected in two samples from HMM-BH-03 (WS02 and WS04);
- Toluene was detected in one sample collected from HMM-BH-01 (WS03) and two samples collected from HMM-BH-02 (WS02 and WS03), but its concentration was less than the AO and MAC guidelines of 24 and 60 µg/L, respectively;
- Total xylenes (including o-xylene and m&p-xylene) were detected in one sample from HMM-BH-01 (WS03) but their concentration was less than the AO and MAC guidelines of 20 and 90 µg/L, respectively; and

- Styrene was detected in one sample from HMM-BH-01 (WS03) but its concentration was less than the BC CSR water guideline for the protection of aquatic life.

Water quality results have been plotted on a Piper diagram (Figure 2). The water chemistry of the November 2014 samples collected from HMM-BH-01 and HMM-BH-02 is similar to the chemistry of the samples collected by BGC from HMM-BH-03 in September 2014. With the exception of one sample collected from HMM-BH-01;WS01, all samples are characterized as calcium/sodium-bicarbonate type water. HMM-BH-01 WS01, is characterized as a calcium-bicarbonate type water with lower sodium concentration. In addition, no dissolved metal concentrations analysed in sample WS01 collected from HMM-BH-01 exceeded the AO and MAC guidelines for total and dissolved metals.

Certificates of Analysis and copies of the chain of custody records are provided in Appendix A.

3.0 CONCLUSIONS

The enclosed report provides a review and evaluation of drilling water samples collected from HMM-BH-01 and HMM-BH-02 on Burnaby Mountain between November 22 and 27, 2014.

As concluded in previous sampling at HMM-BH-03 (Waterline, 2014), the samples collected by BGC during drilling are representative of the drilling fluids used and are likely not representative of the groundwater at the site, although mixing with the groundwater is likely to have occurred.

Although the BGC water samples cannot be used as a baseline data for the site groundwater conditions, the samples are beneficial in that they indicate whether any cross-contamination may have occurred during drilling. In this respect, low concentrations of EPH C19-C32 were detected in all of the samples collected. Low concentrations of EPH C10-C19, toluene, total xylenes and styrene were also detected. BGC noted the presence of coal at a number of depth intervals during drilling of HMM-BH-03 in September, 2014, (BGC Engineering Inc., 2014), which could account for the presence of low concentrations of hydrocarbons in the water.

Low concentrations of nitrate and nitrite were detected in the water samples collected by BGC. Nitrite and nitrate can be formed as a result of nitrification of excess ammonia, which occurs naturally in groundwater from the decay of organic materials (Health Canada, 2013a; 2013b). The presence of either nitrate or nitrite is dependent on the redox conditions of the environment. Boreholes HMM-BH-01 and HMM-BH-02 are completed in a sedimentary environment that likely contains abundant organic materials, which would explain the presence of nitrate and nitrite.

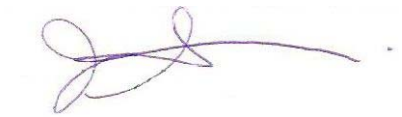
4.0 CERTIFICATION

This document was prepared under the direction of a professional geoscientist registered in the Province of British Columbia.

Waterline Resources Inc. trusts that the information provided in this document is sufficient for your requirements. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

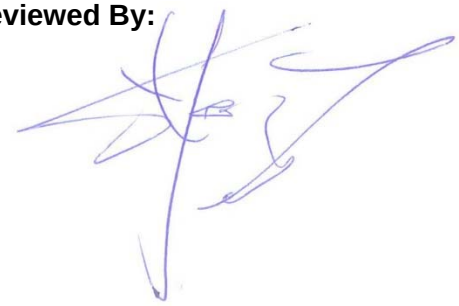
Respectfully submitted,

Waterline Resources Inc.



Jolene Hermanson, M.Sc., G.I.T.
Project Hydrogeologist

Reviewed By:



Steve Foley, M.Sc., P.Geo.
Principal Hydrogeologist

David van Everdingen, Ph.D., P.Geol., P.Geo.
Senior Hydrogeologist

5.0 REFERENCES

BGC Engineering Inc., 2014. TMEP Westridge Tunnel Investigation: 2014 Site Investigation Data Report, November 2014.

British Columbia Ministry of Environment (BC MoE, 2014). Contaminated Sites Regulation, BC Reg 375/96.

Health Canada, 2103a. Guidelines for Canadian Drinking Water Quality, Guideline Technical Document, Nitrate and Nitrite.

Health Canada, 2103b. Guidelines for Canadian Drinking Water Quality, Guideline Technical Document, Ammonia.

Health Canada, 2014. Guidelines for Canadian Drinking Water Quality – Summary Table. Prepared by the Federal-Provincial-Territorial Committee on Drinking Water of the Federal-Provincial-Territorial Committee on Health and the Environment. October, 2014.

Waterline Resources Inc., 2014. TMEP – Burnaby Terminal HMM BH-03 Groundwater Sampling. Submitted to Transmountain Pipeline ULC. November 18, 2014. Project Reference 2137-14-004.

6.0 LIMITATIONS AND USE

The information presented in this document was compiled exclusively for Trans Mountain Pipeline ULC (the Client) by Waterline Resources Inc. (Waterline). This work was completed in accordance with the scope of work for this project that was agreed between Waterline and the Client. Waterline exercised reasonable skill, care and diligence to assess the information acquired during the preparation of this document, but makes no guarantees or warranties as to the accuracy or completeness of this information. The information contained in this document is based upon, and limited by, the circumstances and conditions acknowledged herein, and upon information available at the time of the preparation of this document. Any information provided by others is believed to be accurate but cannot be guaranteed. No other warranty, expressed or implied, is made as to the professional services provided to the Client.

Any use, reliance on, or decision made, by a third party based on this document is the sole responsibility of said third party. Waterline makes no representation or warranty to any third party with regard to this document and, or the work referred to in this document, and accepts no duty of care to any third party or any liability or responsibility whatsoever for any losses, expenses, damages, fines, penalties or other harm that may be suffered or incurred as a result of the use of, reliance on, any decision made, or any action taken based on, this document or the work referred to in this document.

When Waterline submits instruments of professional service; including, reports, drawings and project-related deliverables, the Client agrees that only original signed and stamped paper versions shall be considered as original documents. The hard copy versions submitted by Waterline to the Client shall be considered as copies of the original documents, and in the event of a dispute or discrepancy, the signed and stamped original documents retained by Waterline shall govern over all copies, electronic or otherwise, provided to the Client.

This document is intended to be used in its entirety, and no individual part of the document may be taken as representative of the findings of the document. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form, by any third party, without the expressed written permission of the Client or Waterline.

FIGURES

Borehole Location

Scale: 1:12,000 0 50 100 200 300 Metres

Coordinate System: NAD 1983 UTM Zone 10N

Source: Google Earth, 2014

PROJECT

TMEP - BGC Water Sampling Results from Drilling of HMM-BH-01 and HMM-BH-02 Burnaby Mountain, Burnaby, BC Submitted to Trans Mountain Pipeline ULC

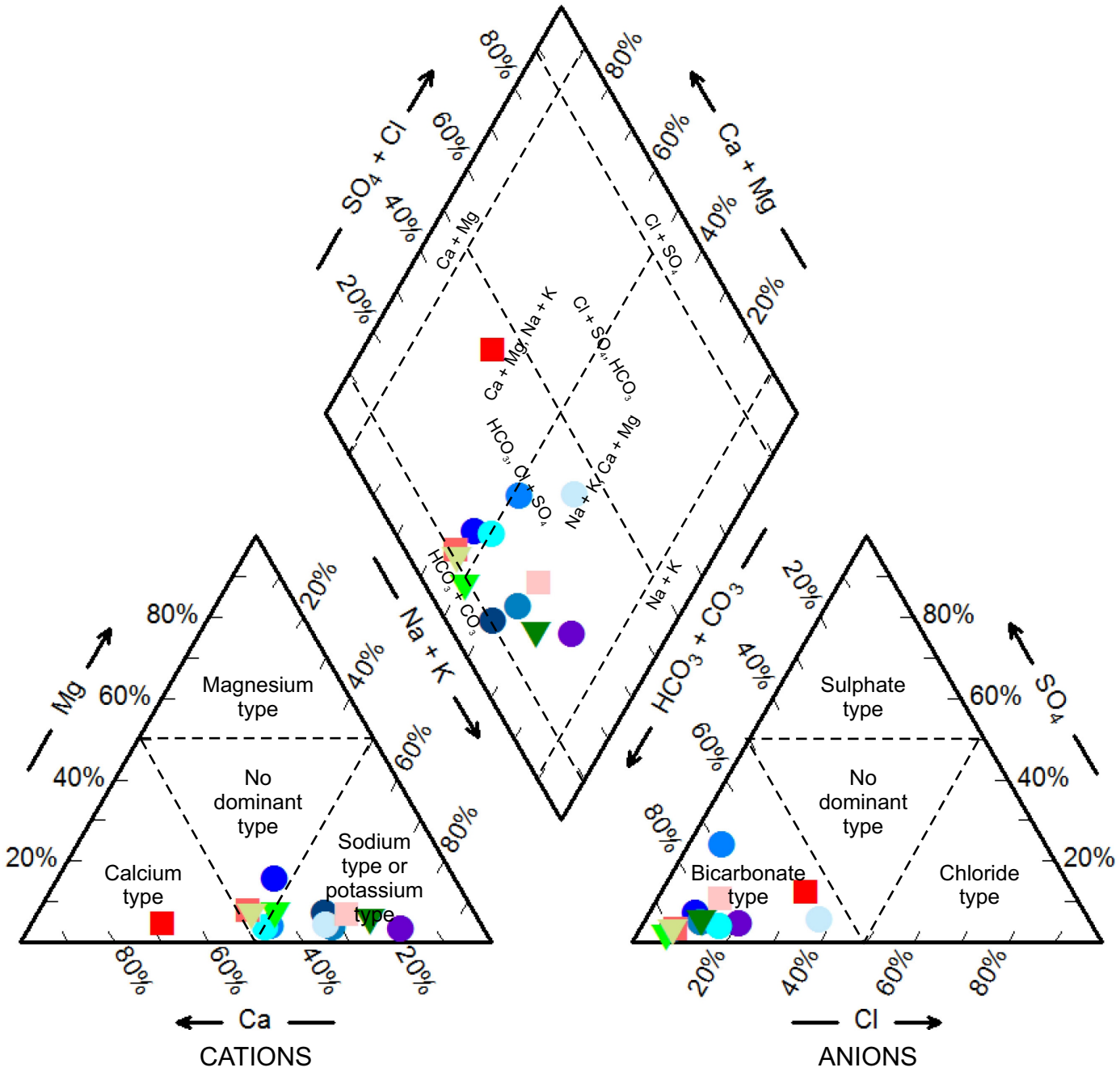
TITLE

SITE LOCATION

PREPARED BY:	Waterline Resources Inc.
PROJECT:	2137-14-004
COMPILED BY:	dvaneverdingen
DATE ISSUED:	2014-Dec-09
DATE REVISED:	

Waterline Resources Inc.

Figure 1



LEGEND:

- HMM-BH-03 WS01
- HMM-BH-03 WS02
- HMM-BH-03 WS03
- HMM-BH-03 WS04
- HMM-BH-03 WS05
- HMM-BH-03 WS06
- HMM-BH-03 WS07
- HMM-BH-01 WS01
- HMM-BH-01 WS02
- HMM-BH-01 WS03
- HMM-BH-02 WS01
- HMM-BH-02 WS02
- HMM-BH-02 WS03

PROJECT	**TMEP - BGC Water Sampling Results from Drilling of HMM-BH-01 and HMM-BH-02 Burnaby Mountain, Burnaby, BC Submitted to Trans Mountain Pipeline ULC**
TITLE	**PIPER PLOT**
PREPARED BY: Waterline Resources Inc.	
PROJECT: 2137-14-004	
COMPILED BY: CGD	
DATE ISSUED: December 2014	
REVISED: –	

Waterline Resources Inc.

FIGURE 2

APPENDIX A

Water Quality Results

Table A1: BGC November 2014 Water Quality Results Summary
November 22-26, 2014 Water Quality Results from AGAT Laboratories – BGC Engineering
November 27, 2014 Water Quality Results from AGAT Laboratories – BGC Engineering

TMEP - Burnaby Mountain Groundwater Sampling - BGC November 2014
Burnaby Mountain
Burnaby, BC
Submitted to Trans Mountain Pipeline ULC

2137-14-004
December 2014

Table A1: BGC November 2014 Water Quality Results Summary

Well Name	Units	CDWQG Guidelines[a]		HMM-BH-01 WS01	HMM-BH-01 WS02	HMM-BH-01 WS03	HMM-BH-02 WS01	HMM-BH-02 WS02	HMM-BH-02 WS03	HMM-BH-03 WS01	HMM-BH-03 WS02	HMM-BH-03 WS03	HMM-BH-03 WS04	HMM-BH-03 WS05	HMM-BH-03 WS06	HMM-BH-03 WS07
Date Collected		AO	MAC	25-Nov-14	26-Nov-14	27-Nov-14	22-Nov-14	23-Nov-14	25-Nov-14	12-Sep-2014	12-Sep-2014	13-Sep-14	15-Sep-2014	15-Sep-2014	17-Sep-2014	18-Sep-2014
Description				NA	Recirculated drilling water		NA	Recirculated drilling water		Clean water as delivered	Recirculated drilling water					Recirculated drilling water - after flushing
General Chemistry																
Total Dissolved Solids Calculated	mg/L	500	-	19	67	91	69	101	104	18	62	77	80	78	28	20
Hardness (CaCO3) - Calculated	mg/L	-	-	12.2	23.4	25.3	13.2	25.3	31.6	3.1	29.3	24.6	22.2	26.5	12.7	6.2
pH	-	6.5-8.5	-	7.06	**8.66**	7.45	8.49	**8.68**	**8.68**	7.34	7.72	8.06	8.17	7.95	7.34	6.94
Conductivity (EC)	uS/cm	-	-	38	81	158	89	100	108	35	106	118	122	124	53	37
Turbidity	NTU	0.1	-	**2.2**	**9600**	**960**	**27000**	**21000**	**50000**	**2.5**	**8.6**	**543**	**921**	-	-	-
Alkalinity, pH 4.5 (as CaCO3)	mg/L	-	-	12	71	69	65	119	115	14	53	72	70	58	23	13
Alkalinity, p (as CaCO3)	mg/L	-	-	<1	3	<1	2	3	3	<1	<1	<1	<1	<1	<1	<1
Sulphate (SO4)	mg/L	500	-	1.7	1.9	7.1	3.3	2	3.3	0.6	3.5	1.9	3.2	15.5	0.8	0.8
Chloride (Cl)	mg/L	250	-	3.14	3.31	6.66	5.26	4.62	4.95	2.01	3.52	3.15	5.93	3.35	2.5	3.82
Fluoride (F)	mg/L	-	1.5	0.04	0.09	0.18	0.2	0.17	0.18	<0.02	0.11	0.24	0.27	0.29	<0.02	<0.02
Bicarbonate (HCO3)	mg/L	-	-	12	65	69	61	112	108	14	53	72	70	58	23	13
Carbonate (CO3)	mg/L	-	-	<1	6	<1	4	7	7	<1	<1	<1	<1	<1	<1	<1
Hydroxide (OH)	mg/L	-	-	<1	<1	<1	<1	<1	<1	-	-	-	-	-	-	-
Nitrate+Nitrite-N	mg/L	-	10	0.13	0.09	0.55	0.07	0.11	0.42	0.07	0.04	0.06	0.05	0.02	0.05	0.06
Nitrate-N	mg/L	-	10	0.133	0.087	0.548	0.07	0.111	0.406	0.07	0.038	0.046	0.046	<0.005	0.053	0.058
Nitrite-N	mg/L	-	1	<0.005	<0.005	0.006	<0.005	<0.005	0.01	<0.005	<0.005	0.018	<0.005	0.02	<0.005	<0.005
Total Phenols (4AAP)																
Total Phenols	mg/L	-	-	< 0.002	0.002	0.006	< 0.002	0.002	0.004	<0.002	0.003	<0.002	0.003	0.003	< 0.002	< 0.002
Total and Dissolved Phosphorus																
Phosphorus Dissolved	mg/L	-	-	0.013	0.112	0.016	0.072	0.013	0.014	0.005	0.04	0.027	0.027	0.041	0.042	-
Phosphorus Total	mg/L	-	-	0.013	3.42	0.36	2.59	8.69	13.7	0.006	0.246	0.84	0.933	7.86	0.114	0.092
Total Metals																
Aluminum (Al)	mg/L	0.1	-	0.088	**180**	**38.6**	**139**	**667**	**614**	**0.106**	**218**	**928**	**1490**	**482**	**5.21**	**4.25**
Antimony (Sb)	mg/L	-	0.006	<0.0005	<0.0005	0.0007	<0.0005	<0.0005	<0.0005	<0.0005	0.0007	<0.005	<0.005	<0.0005	<0.0005	<0.0005
Arsenic (As)	mg/L	-	0.01	0.0007	**0.0202**	0.0028	**0.0197**	**0.0847**	**0.0344**	0.0008	**0.0331**	**0.058**	**0.103**	**0.109**	**0.0012**	0.0009
Barium (Ba)	mg/L	-	1	0.017	**1.19**	0.422	0.59	**7.82**	**4.25**	0.003	**1.48**	**6.13**	**8.45**	**4.41**	0.0571	0.0357
Beryllium (Be)	mg/L	-	-	<0.00005	0.0029	0.00084	0.00192	0.0105	0.0098	<0.00005	0.00385	0.0183	0.03	0.00902	0.00008	0.00005
Boron (B)	mg/L	-	5	<0.0005	0.065	0.107	0.032	0.154	0.153	<0.005	0.185	0.432	1.58	0.167	0.008	0.006
Cadmium (Cd)	mg/L	-	0.005	0.00009	0.00078	0.0001	0.00052	0.00233	0.00175	<0.00001	0.0013	**0.0055**	**0.0076**	0.00211	0.00003	0.00005
Calcium (Ca)	mg/L	-	-	4.54	78.1	23.9	53.4	287	294	1.06	94.8	256	473	195	6.74	16.1
Chromium (Cr)	mg/L	-	0.05	<0.0005	**0.259**	0.0316	**0.394**	**0.96**	**0.472**	<0.0005	**0.231**	**1.05**	**2.15**	**0.397**	0.0135	0.0167
Cobalt (Co)	mg/L	-	-	0.00011	0.0969	0.0095	0.114	0.46	0.339	0.00009	0.12	0.542	0.921	0.359	0.00296	0.0024
Copper (Cu)	mg/L	1	-	0.0124	0.808	0.111	**1.79**	**6.43**	**3.36**	0.0024	**1.67**	**2.99**	**4.19**	**1.48**	0.0297	0.0266
Iron (Fe)	mg/L	0.3	-	0.162	**280**	**41.9**	**274**	**1190**	**1020**	0.224	**277**	**1380**	**2460**	**745**	**9.81**	**13.8**
Lead (Pb)	mg/L	-	0.01	0.00075	**0.0487**	0.00936	**0.0459**	**0.218**	**0.191**	0.00029	**0.087**	**0.273**	**0.568**	**0.19**	0.00177	0.00249
Lithium (Li)	mg/L	-	-	<0.0005	0.104	0.0158	0.0733	0.378	0.314	<0.0005	0.171	0.634	1.14	0.27	0.0031	0.0019
Magnesium (Mg)	mg/L	-	-	0.209	96.5	13.3	86.7	358	291	0.13	106	566	865	241	2.23	1.22
Manganese (Mn)	mg/L	0.05	-	0.013	**4.44**	**0.724**	**3.76**	**17.5**	**15.4**	0.008	**4.69**	**22.9**	**35.6**	10.3	0.144	0.226
Mercury (Hg)	mg/L		0.001	<0.00001	0.00006	<0.00001	0.00005	0.00003	<0.00001	<0.00001	<0.00001	0.00005	<0.00001	0.002	<0.00001	<0.00001
Molybdenum (Mo)	mg/L	-	-	0.0004	0.0444	0.0845	0.0835	0.125	0.0289	0.0002	0.0325	0.057	0.107	0.0193	0.0057	0.0067
Nickel (Ni)	mg/L	-	-	0.0005	0.11	0.0168	0.325	1.15	0.627	<0.0005	0.381	1.06	1.27	0.423	0.0078	0.0041
Selenium (Se)	mg/L	-	0.01	<0.0005	<0.0005	0.0045	<0.0005	<0.0005	<0.0005	<0.0005	0.006	**0.026**	**0.056**	0.0288	<0.0005	<0.0005
Silver (Ag)	mg/L	-	-	0.00003	0.00468	0.00176	0.559	0.592	0.41	<0.00002	0.00163	0.003	0.0068	0.00155	<0.00002	<0.00002
Sodium (Na)	mg/L	200	-	1.99	18.7	25	14.4	38.6	26.6	5.39	21.8	72.6	85.7	28.8	6.42	51.8
Thallium (Tl)	mg/L	-	-	<0.00002	0.00076	0.00013	0.00051	0.00358	0.00224	<0.00002	0.0007	0.0041	0.0074	0.0026	<0.00002	<0.00002
Titanium (Ti)	mg/L	-	-	0.002	3.39	0.494	3.31	4.43	3.68	0.002	2.53	26.5	10.8	0.707	0.218	0.158
Uranium (U)	mg/L	-	0.02	0.00002	0.00392	0.00069	0.00344	0.0146	0.0125	0.00006	0.00523	**0.0215**	**0.0455**	0.00965	0.00013	0.00012
Vanadium (V)	mg/L	-	-	<0.001	0.444	0.088	0.357	1.71	1.67	<0.001	0.519	3.59	4.15	0.737	0.014	0.01
Zinc (Zn)	mg/L	5	-	0.024	0.752	0.094	0.619	1.74	1.33	<0.005	1.72	4.29	**6.99**	1.8	0.044	0.021
Dissolved Metals																
Aluminum (Al)	mg/L	0.1	-	0.016	**0.287**	**0.335**	**0.292**	**0.179**	**0.175**	0.028	**0.179**	**0.26**	**0.301**	**0.118**	**0.126**	-
Antimony (Sb)	mg/L	-	0.006	<0.0005	0.0013	0.002	0.0047	0.0019	0.0018	<0.0002	0.0019	0.0033	0.0034	0.0041	<0.0002	-
Arsenic (As)	mg/L	-	0.01	0.0009	0.0024	0.0008	0.0036	0.0029	0.002	0.0007	0.0023	0.0077	0.0062	0.0097	0.0004	-
Barium (Ba)	mg/L	-	1	0.0179	0.0078	0.0083	0.0043	0.0053	0.0068	0.0027	0.0065	0.0056	0.0117	0.0132	0.0027	-
Beryllium (Be)	mg/L	-	-	<0.00001	0.00002	0.00002	0.00002	0.00003	0.00005	<0.00001	<0.00001	<0.00001	0.00001	<0.00001	<0.00001	-
Boron (B)	mg/L	-	5	0.003	0.019	0.105	0.043	0.072	0.077	0.003	0.057	0.099	0.217	0.114	0.006	-
Cadmium (Cd)	mg/L	-	0.005	0.00009	0.00003	0.00011	0.0001	0.00004	0.00006	<0.00001	0.00001	0.00001	0.00002	0.00009	<0.00001	-
Calcium (Ca)	mg/L	-	-	4.56	8	8.12	4.15	8.56	11	1.04	8.35	8.06	7.98	9.72	4.69	2.19
Chromium (Cr)	mg/L	-	0.05	<0.0005	<0.0005	0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0006	<0.0005	<0.0005	-
Cobalt (Co)	mg/L	-	-	0.00006	<0.00005	<0.00005	0.0001	<0.00005	<0.00005	<0.00005	<0.00005	0.00009	0.00011	0.00007	<0.00005	-
Copper (Cu)	mg/L	1	-	0.005	0.0022	0.0035	0.002	0.0021	0.0018	0.0014	0.0019	0.003	0.0073	0.0039	0.0011	-
Iron (Fe)	mg/L	0.3	-	0.024	0.05	0.108	0.092	0.025	0.021	0.061	0.022	0.045	0.099	0.061	**0.303**	0.01
Lead (Pb)	mg/L	-	0.01	0.00024	0.00013	0.0001	0.00023	0.00014	0.00013	0.00023	0.00016	0.00036	0.00127	0.001	0.00016	-
Lithium (Li)	mg/L	-	-	<0.0005	0.0044	0.0033	0.001	0.0014	0.0015	<0.0005	0.0032	0.0025	0.0025	0.001	0.0008	-
Magnesium (Mg)	mg/L	-	-	0.195	0.816	1.22	0.679	0.953	1	0.118	2.05	1.09	0.557	0.539	0.23	0.17
Manganese (Mn)	mg/L	0.05	-	0.009	0.009	0.024	0.007	0.008	0.009	0.004	0.013	0.005	0.006	0.008	0.009	0.029
Mercury (Hg)	mg/L		0.001	<0.00001	<0.00001	<0.00001	0.00001	0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001	-
Molybdenum (Mo)	mg/L	-	-	0.00035	0.02	0.0968	0.0712	0.0215	0.0428	0.00017	0.0217	0.0453	0.0781	0.0914	0.00357	-
Nickel (Ni)	mg/L	-	-	0.0003	0.0002	0.0006	0.0006	0.0003	0.0002	0.0003	0.0006	0.0004	0.0003	0.0005	<0.0002	-
Potassium (K)	mg/L	-	-	0.25	4.35	6.43	2.6	3.51	3.76	0.13	2.45	4.03	3.74	2.51	1.04	2.05
Selenium (Se)	mg/L	-	0.01	<0.0005	<0.0005	0.0027	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.0008	<0.0005	<0.0005	-
Silver (Ag)	mg/L	-	-	0.00005	0.00013	0.00005	0.00019	0.00017	0.00011	<0.00002	<0.00002	<0.00002	<0.00002	0.00003	<0.00002	-
Sodium (Na)	mg/L	200	-	2.0	6.0	18.9	13.6	9.8	9.94	5.360	10.100	15.300	16.300	11.3	5.23	3.56
Thallium (Tl)	mg/L	-	-	0.00004	0.00004	0.00004	0.00003	0.00003	0.00004	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	-
Titanium (Ti)	mg/L	-	-	<0.0005	0.0464	0.0215	0.0556	0.0339	0.0291	0.0007	0.0415	0.0687	0.366	0.504	0.0072	-
Uranium (U)	mg/L	-	0.02	<0.00001	0.00007	0.00005	0.00006	0.00014	0.00013	0.00003	0.0002	0.00016	0.00028	0.00027	0.00002	-
Vanadium (V)	mg/L	-	-	<0.0005	0.007	0.0014	0.0035	0.0139	0.0072	<0.0005	0.0126	0.112	0.0294	0.0053	0.0006	-
Zinc (Zn)	mg/L	5	-	0.02	<0.002	0.003	<0.002	<0.002	<0.002	0.003	<0.002	0.003	0.003	<0.002	<0.002	-
Hydrocarbons																
Methyl tert-butyl ether (MTBE)	µg/L	15	-	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Benzene	µg/L	5	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L	24	60	<0.5	<0.5	3.5	<0.5	16.7	2.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	µg/L	1.6	140	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L	-	-	<0.5	<0.5	2.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	<0.5	<0.5	<0.5
o-Xylene	µg/L	-	-	<0.5	<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L	-	720[b]	<0.5	<0.5	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VPH	µg/L	-	1500[b]	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
VH	µg/L	-	15000[b,c]	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
EPH C10-C19	µg/L	-	5000[b,c]	140	180	1240	<100	100	<100	<100	170	<100	170	<100	<100	<100
EPH C19-C32	µg/L	-	-	3110	520	800	130	130	140	140	2380	<100	1490	120	1020	190
Total Xylenes	µg/L	20	90	<1	<1	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes: [a]Canadian Drinking Water Quality Guidelines (CDWQG; Health Canada, 2014) 'AO' means Aesthetic Objective exceedance, 'MAC' means Maximum Allowable Concentration;
[b]Guideline from the BC Contaminated Sites Regulations for Aquatic Life (BC MoE, 2014); cGuideline from the BC Contaminated Sites Regulations for Drinking Water (BC MoE, 2014)

Waterline Resources Inc.

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: BGC ENGINEERING INC.
#500-1045 HOWE STREET
VANCOUVER, BC V6Z2A9
(604) 684-5900

ATTENTION TO: Cathy Schmid

PROJECT: 0095 150 15

AGAT WORK ORDER: 14V922126

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

WATER ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Dec 02, 2014

PAGES (INCLUDING COVER): 19

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 1: Sample receipt temperature 10°C.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH / EPH

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

				HMM	HMM	HMM	HMM	HMM
		SAMPLE DESCRIPTION:		BH01-WS01	BH01-WS02	BH02-WS01	BH02-WS02	BH02-WS03
		SAMPLE TYPE:		Water	Water	Water	Water	Water
		DATE SAMPLED:		11/25/2014	11/26/2014	11/22/2014	11/23/2014	11/25/2014
Parameter	Unit	G / S	RDL	6129772	6129780	6129786	6129789	6129791
Methyl tert-butyl ether (MTBE)	µg/L		1	<1	<1	<1	<1	<1
Benzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	µg/L		0.5	<0.5	<0.5	<0.5	16.7	2.5
Ethylbenzene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
m&p-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
o-Xylene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Styrene	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
VPH	µg/L		100	<100	<100	<100	<100	<100
VH	µg/L		100	<100	<100	<100	<100	<100
EPH C10-C19	µg/L		100	140	180	<100	100	<100
EPH C19-C32	µg/L		100	3110	520	130	130	140
Total Xylenes	ug/L		1	<1	<1	<1	<1	<1
Surrogate	Unit	Acceptable Limits						
Bromofluorobenzene	%	70-130		94	100	94	94	96
Dibromofluoromethane	%	70-130		109	111	117	115	114
Toluene - d8	%	70-130		94	98	92	99	103

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6129772-6129791 VPH results have been corrected for BTEX contributions.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Dissolved Metals

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

				HMM	HMM	HMM	HMM	HMM
SAMPLE DESCRIPTION:				BH01-WS01	BH01-WS02	BH02-WS01	BH02-WS02	BH02-WS03
SAMPLE TYPE:				Water	Water	Water	Water	Water
DATE SAMPLED:				11/25/2014	11/26/2014	11/22/2014	11/23/2014	11/25/2014
Parameter	Unit	G / S	RDL	6129772	6129780	6129786	6129789	6129791
Aluminum Dissolved	µg/L		2	16	287	292	179	175
Antimony Dissolved	µg/L		0.5	<0.5	1.3	4.7	1.9	1.8
Arsenic Dissolved	µg/L		0.1	0.9	2.4	3.6	2.9	2.0
Barium Dissolved	µg/L		0.2	17.9	7.8	4.3	5.3	6.8
Beryllium Dissolved	µg/L		0.01	<0.01	0.02	0.02	0.03	0.05
Boron Dissolved	µg/L		2	3	19	43	72	77
Cadmium Dissolved	µg/L		0.01	0.09	0.03	0.10	0.04	0.06
Calcium Dissolved	µg/L		50	4560	8000	4150	8560	11000
Chromium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Cobalt Dissolved	µg/L		0.05	0.06	<0.05	0.10	<0.05	<0.05
Copper Dissolved	µg/L		0.2	5.0	2.2	2.0	2.1	1.8
Iron Dissolved	µg/L		10	24	50	92	25	21
Lead Dissolved	µg/L		0.05	0.24	0.13	0.23	0.14	0.13
Lithium Dissolved	µg/L		0.5	<0.5	4.4	1.0	1.4	1.5
Magnesium Dissolved	µg/L		50	195	816	679	953	1000
Manganese Dissolved	µg/L		1	9	9	7	8	9
Mercury Dissolved	µg/L		0.01	<0.01	<0.01	0.01	0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	0.35	20.0	71.2	21.5	42.8
Nickel Dissolved	µg/L		0.2	0.3	0.2	0.6	0.3	0.2
Selenium Dissolved	µg/L		0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Silver Dissolved	µg/L		0.02	0.05	0.13	0.19	0.17	0.11
Sodium Dissolved	µg/L		50	1960	5990	13600	9780	9940
Thallium Dissolved	µg/L		0.01	0.04	0.04	0.03	0.03	0.04
Titanium Dissolved	µg/L		0.5	<0.5	46.4	55.6	33.9	29.1
Uranium Dissolved	µg/L		0.01	<0.01	0.07	0.06	0.14	0.13
Vanadium Dissolved	µg/L		0.5	<0.5	7.0	3.5	13.9	7.2
Zinc Dissolved	µg/L		2	20	<2	<2	<2	<2
Hardness (calc)	ug CaCO3/L		100	12200	23300	13200	25300	31600

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Dissolved Metals

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6129772-6129791 Sample not filtered at time of collection as per analysis requirements.
Sample improperly preserved as per analysis requirements.
Sample container inappropriate as per analysis requirements for Dissolved Mercury.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Total Metals

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

SAMPLE DESCRIPTION:				HMM BH01-WS01		HMM BH01-WS02		HMM BH02-WS01		HMM BH02-WS02
SAMPLE TYPE:				Water		Water		Water		Water
DATE SAMPLED:				11/25/2014		11/26/2014		11/22/2014		11/23/2014
Parameter	Unit	G / S	RDL	6129772	RDL	6129780	RDL	6129786	RDL	6129789
Aluminum Total	µg/L		5	88	500	180000	500	139000	500	667000
Antimony Total	µg/L		0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5
Arsenic Total	µg/L		0.1	0.7	0.1	20.2	0.1	19.7	0.1	84.7
Barium Total	µg/L		0.5	17.0	0.5	1190	0.5	590	5	7820
Beryllium Total	µg/L		0.05	<0.05	0.05	2.90	0.05	1.92	0.05	10.5
Boron Total	µg/L		5	<5	5	65	5	32	5	154
Cadmium Total	µg/L		0.01	0.09	0.01	0.78	0.01	0.52	0.01	2.33
Calcium Total	µg/L		50	4540	50	78100	50	53400	50	287000
Chromium Total	µg/L		0.5	<0.5	0.5	259	0.5	394	0.5	960
Cobalt Total	µg/L		0.05	0.11	0.05	96.9	0.05	114	0.05	460
Copper Total	µg/L		0.5	12.4	0.5	808	5	1790	5	6430
Iron Total	µg/L		10	162	100	280000	100	274000	1000	1190000
Lead Total	µg/L		0.05	0.75	0.05	48.7	0.05	45.9	0.05	218
Lithium Total	µg/L		0.5	<0.5	5	104	0.5	73.3	5	378
Magnesium Total	µg/L		50	209	500	96500	50	86700	500	358000
Manganese Total	µg/L		1	13	1	4440	1	3760	10	17500
Mercury Total	µg/L		0.01	<0.01	0.01	0.06	0.01	0.05	0.01	0.03
Molybdenum Total	µg/L		0.1	0.4	0.1	44.4	0.1	83.5	1	125
Nickel Total	µg/L		0.5	0.5	0.5	110	0.5	325	5	1150
Selenium Total	µg/L		0.5	<0.5	0.5	<0.5	0.5	<0.5	0.5	<0.5
Silver Total	µg/L		0.02	0.03	0.02	4.68	0.2	559	0.2	592
Sodium Total	µg/L		100	1990	100	18700	100	14400	100	38600
Thallium Total	µg/L		0.02	<0.02	0.02	0.76	0.02	0.51	0.02	3.58
Titanium Total	µg/L		1	2	10	3390	10	3310	10	4430
Uranium Total	µg/L		0.01	0.02	0.01	3.92	0.01	3.44	0.01	14.6
Vanadium Total	µg/L		1	<1	1	444	1	357	10	1710
Zinc Total	µg/L		5	24	5	752	5	619	5	1740
Total Hardness (calc)	ug CaCO3/L		100	12200	100	592000	100	490000	100	2190000

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Total Metals

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

				HMM
		SAMPLE DESCRIPTION:		BH02-WS03
		SAMPLE TYPE:		Water
		DATE SAMPLED:		11/25/2014
Parameter	Unit	G / S	RDL	6129791
Aluminum Total	µg/L		500	614000
Antimony Total	µg/L		0.5	<0.5
Arsenic Total	µg/L		0.1	34.4
Barium Total	µg/L		5	4250
Beryllium Total	µg/L		0.05	9.80
Boron Total	µg/L		5	153
Cadmium Total	µg/L		0.01	1.75
Calcium Total	µg/L		500	294000
Chromium Total	µg/L		0.5	472
Cobalt Total	µg/L		0.05	339
Copper Total	µg/L		5	3360
Iron Total	µg/L		1000	1020000
Lead Total	µg/L		0.05	191
Lithium Total	µg/L		5	314
Magnesium Total	µg/L		500	291000
Manganese Total	µg/L		10	15400
Mercury Total	µg/L		0.01	<0.01
Molybdenum Total	µg/L		0.1	28.9
Nickel Total	µg/L		0.5	627
Selenium Total	µg/L		0.5	<0.5
Silver Total	µg/L		0.2	410
Sodium Total	µg/L		100	26600
Thallium Total	µg/L		0.02	2.24
Titanium Total	µg/L		10	3680
Uranium Total	µg/L		0.01	12.5
Vanadium Total	µg/L		10	1670
Zinc Total	µg/L		5	1330
Total Hardness (calc)	ug CaCO3/L		100	1930000

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Total Metals

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6129772-6129791 Some total metal results are less than the dissolved metal results; results are within the precision of the method.

Certified By:

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Phenols, Total - 4AAP

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

				HMM	HMM	HMM	HMM	HMM
SAMPLE DESCRIPTION:				BH01-WS01	BH01-WS02	BH02-WS01	BH02-WS02	BH02-WS03
SAMPLE TYPE:				Water	Water	Water	Water	Water
DATE SAMPLED:				11/25/2014	11/26/2014	11/22/2014	11/23/2014	11/25/2014
Parameter	Unit	G / S	RDL	6129772	6129780	6129786	6129789	6129791
Phenol, Total	mg/L		0.002	< 0.002	0.002	< 0.002	0.002	0.004

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Phosphorus

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

				HMM	HMM	HMM	HMM		HMM
SAMPLE DESCRIPTION:				BH01-WS01	BH01-WS02	BH02-WS01	BH02-WS02		BH02-WS03
SAMPLE TYPE:				Water	Water	Water	Water		Water
DATE SAMPLED:				11/25/2014	11/26/2014	11/22/2014	11/23/2014		11/25/2014
Parameter	Unit	G / S	RDL	6129772	6129780	6129786	6129789	RDL	6129791
Phosphorus Dissolved	mg/L		0.005	0.013	0.112	0.072	0.013	0.005	0.014
Phosphorus Total	mg/L		0.005	0.013	3.42	2.59	8.69	0.05	13.7

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Routine Chemistry Water Analysis

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

SAMPLE DESCRIPTION:				HMM BH01-WS01	HMM BH01-WS02	HMM BH02-WS01	HMM BH02-WS02	HMM BH02-WS03
SAMPLE TYPE:				Water	Water	Water	Water	Water
DATE SAMPLED:				11/25/2014	11/26/2014	11/22/2014	11/23/2014	11/25/2014
Parameter	Unit	G / S	RDL	6129772	6129780	6129786	6129789	6129791
pH	pH units		0.01	7.06	8.66	8.49	8.68	8.68
p-Alkalinity	mg CaCO3/L		1	<1	3	2	3	3
Alkalinity (pH 4.5)	mg CaCO3/L		1	12	71	65	119	115
Alkalinity, Bicarbonate	mg CaCO3/L		1	12	65	61	112	108
Alkalinity, Carbonate	mg CaCO3/L		1	<1	6	4	7	7
Alkalinity, Hydroxide	mg CaCO3/L		1	<1	<1	<1	<1	<1
Electrical Conductivity	uS/cm		1	38	81	89	100	108
Chloride	mg/L		0.05	3.14	3.31	5.26	4.62	4.95
Fluoride	mg/L		0.02	0.04	0.09	0.20	0.17	0.18
Nitrate-N	mg/L		0.005	0.133	0.087	0.070	0.111	0.406
Nitrite-N	mg/L		0.005	<0.005	<0.005	<0.005	<0.005	0.010
Sulphate	mg/L		0.5	1.7	1.9	3.3	2.0	3.3
Calcium Dissolved	mg/L		0.05	4.56	8.00	4.15	8.56	11.0
Magnesium Dissolved	mg/L		0.05	0.20	0.82	0.68	0.95	1.00
Sodium Dissolved	mg/L		0.05	1.96	5.99	13.6	9.78	9.94
Potassium Dissolved	mg/L		0.05	0.25	4.35	2.60	3.51	3.76
Iron Dissolved	mg/L		0.01	0.02	0.05	0.09	0.03	0.02
Manganese Dissolved	mg/L		0.001	0.009	0.009	0.007	0.008	0.009
Calculated TDS	mg/L		1	19	67	69	101	104
Hardness (calc)	mg CaCO3/L		0.5	12.2	23.4	13.2	25.3	31.6
Nitrate + Nitrite-N	mg/L		0.01	0.13	0.09	0.07	0.11	0.42

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6129772-6129780 Literature holding time exceeded for pH analysis.

6129786-6129789 Literature holding time exceeded for pH, Nitrate, Nitrite analysis.

6129791 Literature holding time exceeded for pH analysis.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Turbidity

DATE RECEIVED: 2014-11-27

DATE REPORTED: 2014-12-02

SAMPLE DESCRIPTION:				HMM BH01-WS01	HMM BH01-WS02	HMM BH02-WS01	HMM BH02-WS02	HMM BH02-WS03
SAMPLE TYPE:				Water	Water	Water	Water	Water
DATE SAMPLED:				11/25/2014	11/26/2014	11/22/2014	11/23/2014	11/25/2014
Parameter	Unit	G / S	RDL	6129772	6129780	6129786	6129789	6129791
Turbidity	NTU		0.5	2.2	9600	27000	21000	50000

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard
6129786-6129789 Literature holding time exceeded.

Certified By:

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.
AGAT WORK ORDER: 14V922126
PROJECT: 0095 150 15
ATTENTION TO: Cathy Schmid
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Dec 02, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
BTEX / VPH / EPH															
Methyl tert-butyl ether (MTBE)	63450	6128010	<1	<1	0.0%	< 1	98%	80%	120%				101%	70%	130%
Benzene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	101%	80%	120%				101%	70%	130%
Toluene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	91%	80%	120%				115%	70%	130%
Ethylbenzene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	97%	80%	120%				105%	70%	130%
m&p-Xylene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	88%	80%	120%				99%	70%	130%
o-Xylene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	97%	80%	120%				101%	70%	130%
Styrene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	99%	80%	120%				101%	70%	130%
VPH	63450	6128010	<100	<100	0.0%	< 100									
VH	63450	6128010	<100	<100	0.0%	< 100									
Bromofluorobenzene	63450	6128010	96	93	3.0%		99%	70%	130%				102%	70%	130%
Dibromofluoromethane	63450	6128010	106	109	3.0%		106%	70%	130%				90%	70%	130%
Toluene - d8	63450	6128010	102	102	0.0%		85%	70%	130%				96%	70%	130%
EPH C10-C19	63455	MS	2080	2020	3.0%	< 100	101%	70%	130%				103%	65%	120%
EPH C19-C32	63455	MS	2480	2400	3.3%	< 100	102%	70%	130%				111%	80%	120%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.
AGAT WORK ORDER: 14V922126
PROJECT: 0095 150 15
ATTENTION TO: Cathy Schmid
SAMPLING SITE:
SAMPLED BY:

Water Analysis

RPT Date: Dec 02, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Routine Chemistry Water Analysis															
pH	6067409		4.32	4.21	2.6%	< 0.01	99%	95%	105%						
Alkalinity (pH 4.5)	6067409		<1	<1	NA	< 1	96%	90%	110%						
Electrical Conductivity	6067409		19	19	1.9%	< 1	101%	90%	110%						
Chloride	6129959		2.08	2.07	0.4%	< 0.05	100%	85%	115%	96%	90%	110%			
Fluoride	6129959		0.03	0.03	NA	< 0.02	101%	85%	115%	99%	90%	110%			
Nitrate-N	6129959		0.201	0.200	0.7%	< 0.005	94%	85%	115%	99%	90%	110%			
Nitrite-N	6129959		<0.005	<0.005	NA	< 0.005				102%	90%	110%			
Sulphate	6129959		4.0	4.1	1.3%	< 0.5	99%	85%	115%	100%	90%	110%			
Calcium Dissolved	6133080		207	249	18.4%	< 0.05	102%	90%	110%	100%	90%	110%			
Magnesium Dissolved	6133080		90.7	105	14.6%	< 0.05	100%	90%	110%	99%	90%	110%			
Sodium Dissolved	6133080		7.06	7.99	12.4%	< 0.05	104%	90%	110%	91%	90%	110%			
Potassium Dissolved	6133080		4.37	5.35	20.0%	< 0.05	101%	90%	110%	108%	90%	110%			
Iron Dissolved	6133080		0.02	0.02	NA	< 0.01	100%	90%	110%	100%	90%	110%			
Manganese Dissolved	6133080		0.544	0.616	12.3%	< 0.001	103%	90%	110%	94%	90%	110%			
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
British Columbia CSR- Schedule 6 Dissolved Metals															
Aluminum Dissolved	6133080		10	10	5.9%	< 2	100%	90%	110%	107%	85%	115%			
Antimony Dissolved	6133080		2.4	2.2	8.3%	< 0.2	107%	90%	110%	104%	85%	110%			
Arsenic Dissolved	6133080		1.0	1.0	1.0%	< 0.1	99%	90%	110%	93%	90%	110%			
Barium Dissolved	6133080		194	227	15.8%	< 0.2	109%	90%	110%	104%	90%	110%			
Beryllium Dissolved	6133080		0.03	0.04	NA	< 0.01	100%	90%	110%	98%	90%	110%			
Boron Dissolved	6133080		21	22	5.6%	< 2	99%	90%	110%	101%	80%	120%			
Cadmium Dissolved	6133080		0.19	0.18	7.6%	< 0.01	103%	90%	110%	102%	90%	110%			
Calcium Dissolved	6133080		207000	249000	18.4%	< 50	102%	90%	110%	100%	90%	110%			
Chromium Dissolved	6133080		<0.5	<0.5	NA	< 0.5	106%	90%	110%	96%	90%	110%			
Cobalt Dissolved	6133080		9.02	10.4	14.6%	< 0.05	104%	90%	110%	101%	90%	110%			
Copper Dissolved	6133080		1.3	1.4	6.5%	< 0.2	103%	90%	110%	95%	90%	110%			
Iron Dissolved	6133080		17	19	NA	< 10	100%	90%	110%	100%	90%	110%			
Lead Dissolved	6133080		0.17	<0.05	NA	< 0.05	102%	90%	110%	102%	90%	110%			
Lithium Dissolved	6133080		25.5	29.6	15.0%	< 0.5				102%	90%	110%			
Magnesium Dissolved	6133080		90700	105000	14.6%	< 50	100%	90%	110%	99%	90%	110%			
Manganese Dissolved	6133080		544	616	12.3%	< 1	103%	90%	110%	94%	90%	110%			
Mercury Dissolved	6134576		< 0.01	< 0.01	NA	< 0.01	100%	90%	110%	109%	90%	110%			
Molybdenum Dissolved	6133080		26.6	26.8	0.6%	< 0.05	104%	90%	110%	107%	90%	110%			
Nickel Dissolved	6133080		66.0	79.9	19.0%	< 0.2	103%	90%	110%	95%	90%	110%			
Selenium Dissolved	6133080		91.3	76.0	18.2%	< 0.5	100%	90%	110%	115%	85%	115%			
Silver Dissolved	6133080		0.07	0.06	NA	< 0.02				97%	90%	110%			
Sodium Dissolved	6133080		7060	7990	12.4%	< 50	104%	90%	110%	91%	90%	110%			

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Dec 02, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Titanium Dissolved	6133080		<0.5	0.5	NA	< 0.5				103%	90%	110%			
Uranium Dissolved	6133080		14.4	14.9	3.3%	< 0.01	107%	90%	110%	105%	90%	110%			
Vanadium Dissolved	6133080		<0.5	<0.5	NA	< 0.5	102%	90%	110%	95%	90%	110%			
Zinc Dissolved	6133080		8	7	NA	< 2	103%	90%	110%	94%	85%	115%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

British Columbia CSR- Schedule 6 Total Metals															
Aluminum Total	6134675		621	588	5.5%	< 5	97%	85%	115%	99%	85%	115%			
Antimony Total	6134675		1.4	1.4	NA	< 0.5	114%	85%	115%	97%	90%	110%			
Arsenic Total	6134675		0.6	0.6	8.2%	< 0.1	107%	85%	115%	101%	90%	110%			
Barium Total	6134675		1.7	1.7	NA	< 0.5	103%	85%	115%	100%	90%	110%			
Beryllium Total	6134675		0.08	0.08	NA	< 0.05	104%	85%	115%	94%	90%	110%			
Boron Total	6134675		1110	1190	7.0%	< 5	94%	85%	115%	93%	80%	120%			
Cadmium Total	6134675		0.10	0.10	0.3%	< 0.01	100%	85%	115%	96%	90%	110%			
Calcium Total	6134675		24900	25100	1.0%	< 50	104%	85%	115%	99%	90%	110%			
Chromium Total	6134675		<0.5	<0.5	NA	< 0.5	101%	85%	115%	94%	90%	110%			
Cobalt Total	6134675		0.11	0.09	NA	< 0.05	110%	85%	115%	97%	90%	110%			
Copper Total	6134675		2.8	2.5	10.8%	< 0.5	101%	85%	115%	99%	90%	110%			
Iron Total	6134675		287	267	7.3%	< 10	102%	85%	115%	104%	90%	110%			
Lead Total	6134675		0.10	0.09	NA	< 0.05	98%	85%	115%	99%	90%	110%			
Lithium Total	6134675		776	858	10.0%	< 0.5				104%	90%	110%			
Magnesium Total	6134675		2770	2760	0.3%	< 50	102%	85%	115%	100%	90%	110%			
Manganese Total	6134675		203	202	0.6%	< 1	105%	85%	115%	101%	90%	110%			
Mercury Total	6134576		< 0.01	< 0.01	0.0%	< 0.01	101%	85%	115%	109%	90%	110%			
Molybdenum Total	6134675		24.6	23.3	5.3%	< 0.1	107%	85%	115%	97%	90%	110%			
Nickel Total	6134675		<0.5	<0.5	NA	< 0.5	106%	85%	115%	103%	90%	110%			
Selenium Total	6134675		1.2	0.8	NA	< 0.5	96%	85%	115%	98%	85%	115%			
Silver Total	6134675		0.04	0.02	NA	< 0.02				97%	90%	110%			
Sodium Total	6134675		199000	194000	2.4%	< 100	105%	85%	115%	106%	90%	110%			
Thallium Total	6134675		0.05	0.03	NA	< 0.02	110%	85%	115%	100%	90%	110%			
Titanium Total	6134675		6	6	10.0%	< 1				97%	90%	110%			
Uranium Total	6134675		0.25	0.24	4.3%	< 0.01	100%	85%	115%	96%	90%	110%			
Vanadium Total	6134675		<1	<1	NA	< 1	95%	85%	115%	99%	90%	110%			
Zinc Total	6134675		8	7	NA	< 5	92%	85%	115%	99%	80%	120%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Phosphorus															
Phosphorus Dissolved	6131116		< 0.005	< 0.005	0.0%	< 0.005	99%	85%	115%	95%	90%	110%	107%	80%	120%
Phosphorus Total	6131116		< 0.005	< 0.005	0.0%	< 0.005	87%	85%	115%	90%	90%	110%	115%	80%	120%

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Dec 02, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Phenols, Total - 4AAP															
Phenol, Total	6127914		< 0.002	< 0.002	NA	< 0.002	102%	85%	115%	97%	90%	110%	105%	70%	130%
Turbidity															
Turbidity	6131213		5.2	5.4	3.8%	< 0.5	101%	85%	115%	101%	90%	110%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methyl tert-butyl ether (MTBE)	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Benzene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Toluene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Ethylbenzene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
m&p-Xylene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
o-Xylene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Styrene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
VPH	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
VH	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Bromofluorobenzene	ORG-180-5130	modified from BC MOE Lab Manual Section D	GC/MS
Dibromofluoromethane	ORG-180-5130	modified from BC MOE Lab Manual Section D	GC/MS
Toluene - d8	ORG-180-5130	modified from BC MOE Lab Manual Section D	GC/MS
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Mercury Dissolved	MET-181-6103, LAB-181-4015	Modified from EPA 245.7	CV/AA
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Aluminum Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Antimony Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Arsenic Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Barium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Beryllium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Boron Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Cadmium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Calcium Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Chromium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Cobalt Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Copper Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Iron Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Lead Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Lithium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Magnesium Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Manganese Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Mercury Total	MET-181-6103	Modified from EPA 245.7	CV/AA
Molybdenum Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Nickel Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Selenium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Silver Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Sodium Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Thallium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Titanium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Uranium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Vanadium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Zinc Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Phenol, Total	INOR-181-6014	Modified from SM 5530 C and EPA 420.2	CONTINUOUS FLOW ANALYZER
Phosphorus Dissolved	INOR-181-6011	Modified from SM 4500-P B&E	SPECTROPHOTOMETER

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922126

PROJECT: 0095 150 15

ATTENTION TO: Cathy Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Phosphorus Total	INOR-181-6011	Modified from SM 4500-P B&E	SPECTROPHOTOMETER
pH	INOR-181-6000	Modified from SM 4500-H+	PH METER
p-Alkalinity	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity (pH 4.5)	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity, Bicarbonate	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity, Carbonate	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity, Hydroxide	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Electrical Conductivity	INOR-181-6000	Modified from SM 2510B	PC TITRATE
Chloride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Fluoride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate-N	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite-N	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Turbidity	INOR-181-6008	SM 2130 B	PC TITRATE

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC V5J 0B6
778.452.4006
webearth.agatlabs.com

P: 778.452.4000 · F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 10°C
AGAT Job Number: 14V922126
Notes: NOV 27 PM4:01

Report Information
Company: BGC Engineering
Contact: Cathy Schmid
Address: Kamloops BC
Phone: 250 3748100 Fax: 250
LSD:
Client Project #: 0095 150 15

Report Information
1. Name: Cathy Schmid
Email: cschmid@bgcengineering.ca
2. Name: Anne Clayton
Email: aclayton@bgcengineering.ca

Report Format
☐ Single Sample per page
☐ Multiple Samples per page
☐ Excel Format Included

Turnaround Time Required (TAT)
Regular TAT ☐ 5 to 7 working days
Rush TAT ☐ Day 2 - 100% ☐ Day 3 - 50% ☐ Day 4 - 25%
Date Required:
PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To Same as above Yes ☑ / No ☐
Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:

Requirements *(Please Check)*
☐ BC CSR Soil: ☐ AL ☐ IL ☐ PL ☐ CL ☐ RL
☐ BC CSR - Water: ☐ DW ☐ AW ☐ IW ☐ LW
Schedule 11 *(Please Specify)*
CCME *(Please Specify)*
Other *(Please Specify)*

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	Potable	Dis Metals	Total Metals	Mercury	Phosphorous	EPH	Phenols	BC BTEX	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
6120,772	HMMBH01 WS01		Nov 25 5am		✓	✓	✓	✓	✓	✓	✓	✓				
80	" WS02		Nov 26 1am		✓	✓	✓	✓	✓	✓	✓	✓				
86	HMMBH02 WS1		Nov 22 5am		✓	✓	✓	✓	✓	✓	✓	✓				
89	" 2		~~Nov 25 12am~~ Nov 23 3p		✓	✓	✓	✓	✓	✓	✓	✓				
91	" 3		Nov 25 12am		✓	✓	✓	✓	✓	✓	✓	✓				

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
[signature]	Nov 27		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign): Jocelyn Baron [signature]	Date/Time NOV. 27/14

Page ____ of ____
N°: 010290

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 14V922126

RECEIVING BASICS:

Received From: Ann Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 12 Containers: 60 2 bags on side

TIME SENSITIVE ISSUES:

Earliest Date Sampled: 22 Nov 14' ALREADY EXCEEDED? (Yes) No

HMMRH02 WS1/WS2 nitrate/nitrite expired 25/26 Nov 14'.

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 9 + 8 + 8 = 8 °C (2) 10 + 11 + 11 = 11 °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) (No) JB

Integrity Issues:

Analyses cannot be run from the dissolved metal / Hg bottles due to preservation before filtration, we will subsample from the 1L bottles and have samples filtered/preserved.

Account Project Manager: _____ have they been notified of the above issues: Yes (No)

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

CLIENT NAME: BGC ENGINEERING INC.
#500-1045 HOWE STREET
VANCOUVER, BC V6Z2A9
(604) 684-5900

ATTENTION TO: Catherine Schmid

PROJECT: 0095-150-15-01

AGAT WORK ORDER: 14V922453

TRACE ORGANICS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

WATER ANALYSIS REVIEWED BY: Andrew Garrard, B.Sc., General Manager

DATE REPORTED: Dec 02, 2014

PAGES (INCLUDING COVER): 18

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (778) 452-4000

*NOTES

VERSION 1: Sample receipt temperature 6°C.

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

BTEX / VPH / EPH Water

DATE RECEIVED: 2014-11-28

DATE REPORTED: 2014-12-02

				HMM-BH-01,WS
		SAMPLE DESCRIPTION:		03
		SAMPLE TYPE:		Water
		DATE SAMPLED:		11/27/2014
Parameter	Unit	G / S	RDL	6133096
Methyl tert-butyl ether (MTBE)	µg/L		1	1
Benzene	µg/L		0.5	<0.5
Toluene	µg/L		0.5	3.5
Ethylbenzene	µg/L		0.5	<0.5
m&p-Xylene	µg/L		0.5	2.2
o-Xylene	µg/L		0.5	0.7
Styrene	µg/L		0.5	1.2
VPH	µg/L		100	<100
VH	µg/L		100	<100
EPH C10-C19	µg/L		100	1240
EPH C19-C32	µg/L		100	800
Total Xylenes	ug/L		1	3
Surrogate	Unit	Acceptable Limits		
Bromofluorobenzene	%	70-130		116
Dibromofluoromethane	%	70-130		107
Toluene - d8	%	70-130		102

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6133096 VPH results have been corrected for BTEX contributions.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Dissolved Metals

DATE RECEIVED: 2014-11-28

DATE REPORTED: 2014-12-02

Parameter	Unit	G / S	RDL	HMM-BH-01,WS 03 Water 11/27/2014 6133096
Aluminum Dissolved	µg/L		2	335
Antimony Dissolved	µg/L		0.5	2.0
Arsenic Dissolved	µg/L		0.1	0.8
Barium Dissolved	µg/L		0.2	8.3
Beryllium Dissolved	µg/L		0.01	0.02
Boron Dissolved	µg/L		2	105
Cadmium Dissolved	µg/L		0.01	0.11
Calcium Dissolved	µg/L		50	8120
Chromium Dissolved	µg/L		0.5	0.5
Cobalt Dissolved	µg/L		0.05	<0.05
Copper Dissolved	µg/L		0.2	3.5
Iron Dissolved	µg/L		10	108
Lead Dissolved	µg/L		0.05	0.10
Lithium Dissolved	µg/L		0.5	3.3
Magnesium Dissolved	µg/L		50	1220
Manganese Dissolved	µg/L		1	24
Mercury Dissolved	µg/L		0.01	<0.01
Molybdenum Dissolved	µg/L		0.05	96.8
Nickel Dissolved	µg/L		0.2	0.6
Selenium Dissolved	µg/L		0.5	2.7
Silver Dissolved	µg/L		0.02	0.05
Sodium Dissolved	µg/L		50	18900
Thallium Dissolved	µg/L		0.01	0.04
Titanium Dissolved	µg/L		0.5	21.5
Uranium Dissolved	µg/L		0.01	0.05
Vanadium Dissolved	µg/L		0.5	1.4
Zinc Dissolved	µg/L		2	3
Hardness (calc)	ug CaCO3/L		100	25300

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Dissolved Metals

DATE RECEIVED: 2014-11-28

DATE REPORTED: 2014-12-02

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6133096 Sample container inappropriate as per analysis requirements for Dissolved Mercury.
Sample not filtered at time of collection as per analysis requirements.
Sample improperly preserved as per analysis requirements.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Total Metals

DATE RECEIVED: 2014-11-28

DATE REPORTED: 2014-12-02

Parameter	Unit	G / S	RDL	HMM-BH-01,WS 03 Water 11/27/2014 6133096
Aluminum Total	µg/L		500	38600
Antimony Total	µg/L		0.5	0.7
Arsenic Total	µg/L		0.1	2.8
Barium Total	µg/L		0.5	422
Beryllium Total	µg/L		0.05	0.84
Boron Total	µg/L		5	107
Cadmium Total	µg/L		0.01	0.10
Calcium Total	µg/L		50	23900
Chromium Total	µg/L		0.5	31.6
Cobalt Total	µg/L		0.05	9.50
Copper Total	µg/L		0.5	111
Iron Total	µg/L		10	41900
Lead Total	µg/L		0.05	9.36
Lithium Total	µg/L		0.5	15.8
Magnesium Total	µg/L		50	13300
Manganese Total	µg/L		1	724
Mercury Total	µg/L		0.01	<0.01
Molybdenum Total	µg/L		0.1	84.5
Nickel Total	µg/L		0.5	16.8
Selenium Total	µg/L		0.5	4.5
Silver Total	µg/L		0.02	1.76
Sodium Total	µg/L		100	25000
Thallium Total	µg/L		0.02	0.13
Titanium Total	µg/L		1	494
Uranium Total	µg/L		0.01	0.69
Vanadium Total	µg/L		1	88
Zinc Total	µg/L		5	94
Total Hardness (calc)	ug CaCO3/L		100	114000

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

British Columbia CSR- Schedule 6 Total Metals

DATE RECEIVED: 2014-11-28

DATE REPORTED: 2014-12-02

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6133096 Some total metal results are less than the dissolved metal results; results are within the precision of the method.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

Phenols, Total - 4AAP

DATE RECEIVED: 2014-11-28

DATE REPORTED: 2014-12-02

				HMM-BH-01,WS
		SAMPLE DESCRIPTION:		03
		SAMPLE TYPE:		Water
		DATE SAMPLED:		11/27/2014
Parameter	Unit	G / S	RDL	6133096
Phenol, Total	mg/L		0.002	0.006

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

Phosphorus

DATE RECEIVED: 2014-11-28

DATE REPORTED: 2014-12-02

				HMM-BH-01,WS
		SAMPLE DESCRIPTION:		03
		SAMPLE TYPE:		Water
		DATE SAMPLED:		11/27/2014
Parameter	Unit	G / S	RDL	6133096
Phosphorus Dissolved	mg/L		0.005	0.016
Phosphorus Total	mg/L		0.005	0.360

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

Routine Chemistry Water Analysis

DATE RECEIVED: 2014-11-28

DATE REPORTED: 2014-12-02

				HMM-BH-01,WS
SAMPLE DESCRIPTION:				03
SAMPLE TYPE:				Water
DATE SAMPLED:				11/27/2014
Parameter	Unit	G / S	RDL	6133096
pH	pH units		0.01	7.45
p-Alkalinity	mg CaCO3/L		1	<1
Alkalinity (pH 4.5)	mg CaCO3/L		1	69
Alkalinity, Bicarbonate	mg CaCO3/L		1	69
Alkalinity, Carbonate	mg CaCO3/L		1	<1
Alkalinity, Hydroxide	mg CaCO3/L		1	<1
Electrical Conductivity	uS/cm		1	158
Chloride	mg/L		0.05	6.66
Fluoride	mg/L		0.02	0.18
Nitrate-N	mg/L		0.005	0.548
Nitrite-N	mg/L		0.005	0.006
Sulphate	mg/L		0.5	7.1
Calcium Dissolved	mg/L		0.05	8.12
Magnesium Dissolved	mg/L		0.05	1.22
Sodium Dissolved	mg/L		0.05	18.9
Potassium Dissolved	mg/L		0.05	6.43
Iron Dissolved	mg/L		0.01	0.11
Manganese Dissolved	mg/L		0.001	0.024
Calculated TDS	mg/L		1	91
Hardness (calc)	mg CaCO3/L		0.5	25.3
Nitrate + Nitrite-N	mg/L		0.01	0.55

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

6133096 Literature holding time exceeded for pH analysis.

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

CLIENT NAME: BGC ENGINEERING INC.

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

Turbidity

DATE RECEIVED: 2014-11-28

DATE REPORTED: 2014-12-02

SAMPLE DESCRIPTION:				HMM-BH-01,WS 03
SAMPLE TYPE:				Water
DATE SAMPLED:				11/27/2014
Parameter	Unit	G / S	RDL	6133096
Turbidity	NTU		0.5	960

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Dec 02, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
BTEX / VPH / EPH Water															
Methyl tert-butyl ether (MTBE)	63450	6128010	<1	<1	0.0%	< 1	98%	80%	120%				101%	70%	130%
Benzene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	101%	80%	120%				101%	70%	130%
Toluene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	91%	80%	120%				115%	70%	130%
Ethylbenzene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	97%	80%	120%				105%	70%	130%
m&p-Xylene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	88%	80%	120%				99%	70%	130%
o-Xylene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	97%	80%	120%				101%	70%	130%
Styrene	63450	6128010	<0.5	<0.5	0.0%	< 0.5	99%	80%	120%				101%	70%	130%
VPH	63450	6128010	<100	<100	0.0%	< 100									
VH	63450	6128010	<100	<100	0.0%	< 100									
Bromofluorobenzene	63450	6128010	96	93	3.0%		99%	70%	130%				102%	70%	130%
Dibromofluoromethane	63450	6128010	106	109	3.0%		106%	70%	130%				90%	70%	130%
Toluene - d8	63450	6128010	102	102	0.0%		85%	70%	130%				96%	70%	130%
EPH C10-C19	63455	MS	2080	2020	3.0%	< 100	101%	70%	130%				103%	65%	120%
EPH C19-C32	63455	MS	2480	2400	3.3%	< 100	102%	70%	130%				111%	80%	120%

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

Certified By:

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.
AGAT WORK ORDER: 14V922453
PROJECT: 0095-150-15-01
ATTENTION TO: Catherine Schmid
SAMPLING SITE:
SAMPLED BY:

Water Analysis

RPT Date: Dec 02, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Routine Chemistry Water Analysis															
pH	6129959		4.79	5.30	10.1%	< 0.01	99%	95%	105%						
p-Alkalinity	6129959		<1	<1	NA	< 1									
Alkalinity (pH 4.5)	6129959		7.85	7.72	1.7%	< 1	93%	90%	110%						
Alkalinity, Bicarbonate	6129959		<1	2	NA	< 1									
Alkalinity, Carbonate	6129959		<1	<1	NA	< 1									
Alkalinity, Hydroxide	6129959		<1	<1	NA	< 1									
Electrical Conductivity	6129959		190	190	0.0%	< 1	102%	90%	110%						
Chloride	6129959		2.08	2.07	0.4%	< 0.05	100%	85%	115%	96%	90%	110%			
Fluoride	6129959		0.03	0.03	NA	< 0.02	101%	85%	115%	99%	90%	110%			
Nitrate-N	6129959		0.201	0.200	0.7%	< 0.005	94%	85%	115%	99%	90%	110%			
Nitrite-N	6129959		<0.005	<0.005	NA	< 0.005				102%	90%	110%			
Sulphate	6129959		4.0	4.1	1.3%	< 0.5	99%	85%	115%	100%	90%	110%			
Calcium Dissolved	6133080		207	249	18.4%	< 0.05	102%	90%	110%	100%	90%	110%			
Magnesium Dissolved	6133080		90.7	105	14.6%	< 0.05	100%	90%	110%	99%	90%	110%			
Sodium Dissolved	6133080		7.06	7.99	12.4%	< 0.05	104%	90%	110%	91%	90%	110%			
Potassium Dissolved	6133080		4.37	5.35	20.0%	< 0.05	101%	90%	110%	108%	90%	110%			
Iron Dissolved	6133080		0.02	0.02	NA	< 0.01	100%	90%	110%	100%	90%	110%			
Manganese Dissolved	6133080		0.544	0.616	12.3%	< 0.001	103%	90%	110%	94%	90%	110%			
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Turbidity															
Turbidity	6133301		730	730	0.0%	< 0.5	104%	85%	115%	102%	90%	110%			
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
British Columbia CSR- Schedule 6 Total Metals															
Aluminum Total	6134675		623	630	1.0%	< 5	95%	85%	115%	99%	85%	115%			
Antimony Total	6134675		1.4	1.4	NA	< 0.5	114%	85%	115%	97%	90%	110%			
Arsenic Total	6134675		0.6	0.6	8.2%	< 0.1	107%	85%	115%	101%	90%	110%			
Barium Total	6134675		1.7	1.7	NA	< 0.5	103%	85%	115%	100%	90%	110%			
Beryllium Total	6134675		0.08	0.08	NA	< 0.05	104%	85%	115%	94%	90%	110%			
Boron Total	6134675		1110	1190	7.0%	< 5	94%	85%	115%	93%	80%	120%			
Cadmium Total	6134675		0.10	0.10	0.3%	< 0.01	100%	85%	115%	96%	90%	110%			
Calcium Total	6131119		30900	31600	2.2%	< 50	102%	85%	115%	102%	90%	110%			
Chromium Total	6134675		<0.5	<0.5	NA	< 0.5	101%	85%	115%	94%	90%	110%			
Cobalt Total	6134675		0.11	0.09	NA	< 0.05	110%	85%	115%	97%	90%	110%			
Copper Total	6134675		2.8	2.5	10.8%	< 0.5	101%	85%	115%	99%	90%	110%			
Iron Total	6131119		25	26	NA	< 10	101%	85%	115%	101%	90%	110%			
Lead Total	6134675		0.10	0.09	NA	< 0.05	98%	85%	115%	99%	90%	110%			
Lithium Total	6134675		776	858	10.0%	< 0.5				104%	90%	110%			

AGAT Laboratories
Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.
AGAT WORK ORDER: 14V922453
PROJECT: 0095-150-15-01
ATTENTION TO: Catherine Schmid
SAMPLING SITE:
SAMPLED BY:

Water Analysis (Continued)

RPT Date: Dec 02, 2014

PARAMETER	Batch	Sample Id	DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
			Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Magnesium Total	6131119		10800	11000	2.4%	< 50	100%	85%	115%	102%	90%	110%			
Manganese Total	6131119		5	5	6.2%	< 1	103%	85%	115%	96%	90%	110%			
Mercury Total	6134576		< 0.01	< 0.01	NA	< 0.01	101%	85%	115%	109%	90%	110%			
Molybdenum Total	6134675		24.6	23.3	5.3%	< 0.1	107%	85%	115%	97%	90%	110%			
Nickel Total	6134675		<0.5	<0.5	NA	< 0.5	106%	85%	115%	103%	90%	110%			
Selenium Total	6134675		1.2	0.8	NA	< 0.5	96%	85%	115%	98%	85%	115%			
Silver Total	6134675		0.04	0.02	NA	< 0.02				97%	90%	110%			
Sodium Total	6131119		4260	4360	2.5%	< 100	104%	85%	115%	92%	90%	110%			
Thallium Total	6134675		0.05	0.03	NA	< 0.02	110%	85%	115%	100%	90%	110%			
Titanium Total	6134675		6	6	10.0%	< 1				97%	90%	110%			
Uranium Total	6134675		0.25	0.24	4.3%	< 0.01	100%	85%	115%	96%	90%	110%			
Vanadium Total	6134675		<1	<1	NA	< 1	95%	85%	115%	99%	90%	110%			
Zinc Total	6134675		8	7	NA	< 5	92%	85%	115%	99%	80%	120%			

Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.

British Columbia CSR- Schedule 6 Dissolved Metals

Aluminum Dissolved	6133080		10	10	5.9%	< 2	100%	90%	110%	107%	85%	115%			
Antimony Dissolved	6133080		2.4	2.2	8.3%	< 0.2	107%	90%	110%	104%	85%	110%			
Arsenic Dissolved	6133080		1.0	1.0	1.0%	< 0.1	99%	90%	110%	93%	90%	110%			
Barium Dissolved	6133080		194	227	15.8%	< 0.2	109%	90%	110%	104%	90%	110%			
Beryllium Dissolved	6133080		0.03	0.04	NA	< 0.01	100%	90%	110%	98%	90%	110%			
Boron Dissolved	6133080		21	22	5.6%	< 2	99%	90%	110%	101%	80%	120%			
Cadmium Dissolved	6133080		0.19	0.18	7.6%	< 0.01	103%	90%	110%	102%	90%	110%			
Calcium Dissolved	6133080		207000	249000	18.4%	< 50	102%	90%	110%	100%	90%	110%			
Chromium Dissolved	6133080		<0.5	<0.5	NA	< 0.5	106%	90%	110%	96%	90%	110%			
Cobalt Dissolved	6133080		9.02	10.4	14.6%	< 0.05	104%	90%	110%	101%	90%	110%			
Copper Dissolved	6133080		1.3	1.4	6.5%	< 0.2	103%	90%	110%	95%	90%	110%			
Iron Dissolved	6133080		17	19	NA	< 10	100%	90%	110%	100%	90%	110%			
Lead Dissolved	6133080		0.17	<0.05	NA	< 0.05	102%	90%	110%	102%	90%	110%			
Lithium Dissolved	6133080		25.5	29.6	15.0%	< 0.5				102%	90%	110%			
Magnesium Dissolved	6133080		90700	105000	14.6%	< 50	100%	90%	110%	99%	90%	110%			
Manganese Dissolved	6133080		544	616	12.3%	< 1	103%	90%	110%	94%	90%	110%			
Mercury Dissolved	6134576		< 0.01	< 0.01	NA	< 0.01	100%	90%	110%	109%	90%	110%			
Molybdenum Dissolved	6133080		26.6	26.8	0.6%	< 0.05	104%	90%	110%	107%	90%	110%			
Nickel Dissolved	6133080		66.0	79.9	19.0%	< 0.2	103%	90%	110%	95%	90%	110%			
Selenium Dissolved	6133080		91.3	76.0	18.2%	< 0.5	100%	90%	110%	115%	85%	115%			
Silver Dissolved	6133080		0.07	0.06	NA	< 0.02				97%	90%	110%			
Sodium Dissolved	6133080		7060	7990	12.4%	< 50	104%	90%	110%	91%	90%	110%			
Titanium Dissolved	6133080		<0.5	0.5	NA	< 0.5				103%	90%	110%			
Uranium Dissolved	6133080		14.4	14.9	3.3%	< 0.01	107%	90%	110%	105%	90%	110%			

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

Water Analysis (Continued)

RPT Date: Dec 02, 2014			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Vanadium Dissolved	6133080		<0.5	<0.5	NA	< 0.5	102%	90%	110%	95%	90%	110%			
Zinc Dissolved	6133080		8	7	NA	< 2	103%	90%	110%	94%	85%	115%			
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Phosphorus															
Phosphorus Dissolved	6131116		< 0.005	< 0.005	NA	< 0.005	93%	85%	115%	90%	90%	110%	107%	80%	120%
Phosphorus Total	6131116		< 0.005	< 0.005	NA	< 0.005	87%	85%	115%	90%	90%	110%	115%	80%	120%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															
Phenols, Total - 4AAP															
Phenol, Total	6133096		0.006	0.008	NA	< 0.002	104%	85%	115%	99%	90%	110%	101%	70%	130%
Comments: RPDs are calculated using raw analytical data and not the rounded duplicate values reported.															

Certified By:

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Methyl tert-butyl ether (MTBE)	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Benzene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Toluene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Ethylbenzene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
m&p-Xylene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
o-Xylene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Styrene	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
VPH	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
VH	ORG-180-5130	Modified from BC MOE Lab Manual Section D	GC/MS/FID
Bromofluorobenzene	ORG-180-5130	modified from BC MOE Lab Manual Section D	GC/MS
Dibromofluoromethane	ORG-180-5130	modified from BC MOE Lab Manual Section D	GC/MS
Toluene - d8	ORG-180-5130	modified from BC MOE Lab Manual Section D	GC/MS
EPH C10-C19	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID
EPH C19-C32	ORG-180-5134	Modified from BC MOE Lab Manual Section D (EPH)	GC/FID

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Aluminum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Antimony Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Arsenic Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Barium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Beryllium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Boron Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cadmium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Chromium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Cobalt Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Copper Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Lead Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Lithium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Mercury Dissolved	MET-181-6103, LAB-181-4015	Modified from EPA 245.7	CV/AA
Molybdenum Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Nickel Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Selenium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Silver Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Thallium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Titanium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Uranium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Vanadium Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS
Zinc Dissolved	MET-181-6102, LAB-181-4015	Modified from SM 3125 B	ICP-MS

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Aluminum Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Antimony Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Arsenic Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Barium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Beryllium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Boron Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Cadmium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Calcium Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Chromium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Cobalt Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Copper Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Iron Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Lead Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Lithium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Magnesium Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Manganese Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Mercury Total	MET-181-6103	Modified from EPA 245.7	CV/AA
Molybdenum Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Nickel Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Selenium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Silver Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Sodium Total	MET-181-6101, LAB-181-4009	Modified from SM 3120 B	ICP/OES
Thallium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Titanium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Uranium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Vanadium Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Zinc Total	MET-181-6102, LAB-181-4009	Modified from SM 3125 B	ICP-MS
Phenol, Total	INOR-181-6014	Modified from SM 5530 C and EPA 420.2	CONTINUOUS FLOW ANALYZER
Phosphorus Dissolved	INOR-181-6011	Modified from SM 4500-P B&E	SPECTROPHOTOMETER

AGAT Laboratories

Unit 120, 8600 Glenlyon Parkway
Burnaby, British Columbia
CANADA V5J 0B6
TEL (778)452-4000
FAX (778)452-4074
http://www.agatlabs.com

Method Summary

CLIENT NAME: BGC ENGINEERING INC.

AGAT WORK ORDER: 14V922453

PROJECT: 0095-150-15-01

ATTENTION TO: Catherine Schmid

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Phosphorus Total	INOR-181-6011	Modified from SM 4500-P B&E	SPECTROPHOTOMETER
pH	INOR-181-6000	Modified from SM 4500-H+	PH METER
p-Alkalinity	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity (pH 4.5)	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity, Bicarbonate	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity, Carbonate	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Alkalinity, Hydroxide	INOR-181-6000	Modified from SM 2320 B	PC TITRATE
Electrical Conductivity	INOR-181-6000	Modified from SM 2510B	PC TITRATE
Chloride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Fluoride	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Nitrate-N	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Nitrite-N	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR-181-6002	Modified from SM 4110 B	ION CHROMATOGRAPH
Calcium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Magnesium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Sodium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Potassium Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Iron Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Manganese Dissolved	MET-181-6101, LAB-181-4015	Modified from SM 3120 B	ICP/OES
Turbidity	INOR-181-6008	SM 2130 B	PC TITRATE

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC
V5J 0B6
webearth.agatlabs.com

P: 778.452.4000 • F: 778.452.4074

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 6°C
AGAT Job Number: 14V922453

Notes:
28 NOV 2014 12:55

Report Information

Company: BGC Engineering
Contact: Catherine Schmid
Address: 234 St Paul Street
Kamloops, BC V2C 6G4
Phone: (250) 374-8606 Fax: (250) 374-8606
LSD:
Client Project #:

Report Information

1. Name: Catherine Schmid
Email: cschmid@bcgengineering.ca
2. Name:
Email:

Report Format

- ☐ Single Sample per page
- ☑ Multiple Samples per page
- ☑ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☐ 5 to 7 working days
Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%

Date Required:

PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

Invoice To

Same as above Yes ☑ / No ☐

Company:
Contact:
Address:
Phone: Fax:
PO/AFE#:

Requirements (Please Check)

- ☐ BC CSR Soil
  - ☐ AL
  - ☐ IL
  - ☐ PL
  - ☐ CL
  - ☐ RL
- ☐ BC CSR - Water
  - ☐ DW
  - ☐ AW
  - ☐ IW
  - ☐ LW

Schedule 11 (Please Specify)
CCME (Please Specify)
Other (Please Specify)

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	Routine Potable Water	Turbidity	BC CSR Total Metals	BC CSR Dissolved Metals	Total Phosphorus	Total Dissolved Phosphorus	Total Phenols (4AAP)	BTEX/VPH	EPH	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
6133096																	

50% Rush
Due Tues Dec 2

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
		Jocelyn	Nov. 28/14

Page ____ of ____

V102048

Document #: DIV-186-1500.002

Date Revised: October 29, 2013

AGAT Laboratories

120 - 8600 Glenlyon Parkway
Burnaby, BC V5J 0B6
778.452.4006
webearth.agatlabs.com

Chain of Custody Record

P: 778.452.4000 - F: 778.452.4074

Laboratory Use Only

Arrival Temperature: 6C

AGAT Job Number: 14V 922453

Notes:

NOV 28 PM12:56

Report Information

Company: BGC Engineering

Contact:

Address:

Phone: Fax:

LSD:

Client Project #: 0095-150-15-01

Invoice To

Same as above Yes ☒ / No ☐

Company:

Contact:

Address:

Phone: Fax:

PO/AFE#:

Report Information

1. Name:
   Email:
2. Name:
   Email:

Requirements *(Please Check)*

☐ BC CSR Soil
- ☐ AL
- ☐ IL
- ☐ PL
- ☐ CL
- ☐ RL

☐ BC CSR - Water
- ☐ DW
- ☐ AW
- ☐ IW
- ☐ LW

Schedule 11 *(Please Specify)*

CCME *(Please Specify)*

Other *(Please Specify)*

Report Format

☐ Single Sample per page

☐ Multiple Samples per page

☐ Excel Format Included

Turnaround Time Required (TAT)

Regular TAT ☐ 5 to 7 working days

Rush TAT ☐ Day 2 - 100%
☐ Day 3 - 50%
☐ Day 4 - 25%

Date Required:

PLEASE CONTACT LABORATORY IF RUSH REQUIRED SAMPLE SUBMISSION CUT OFF FOR EFFECTIVE DATE BY 3 PM

LABORATORY USE (LAB ID #)	SAMPLE IDENTIFICATION	SAMPLE MATRIX	DATE/TIME SAMPLED	COMMENTS - SITE SAMPLE INFO. SAMPLE CONTAINMENT	NUMBER OF CONTAINERS	PRESERVED (Y/N)	HAZARDOUS (Y/N)	Hold for: ☐ 60 DAYS
5133096	HMM-BH-01, WS 03							

Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Scott Garrison	NOV 26/14		
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign):	Date/Time
Samples Relinquished By (Print Name and Sign):	Date/Time	Samples Received By (Print Name and Sign): Jocelyn Baron	Date/Time NOV. 28/14

Page 1 of 1

N°: 010271

AGAT Laboratories

SAMPLE INTEGRITY RECEIPT FORM - BURNABY

Work Order # 14V 922453

RECEIVING BASICS:

Received From: Scott Waybill #: _____

SAMPLE QUANTITIES:

Coolers: 1 Containers: 12

TIME SENSITIVE ISSUES:

Earliest Date Sampled: 27 NOV 2014 ALREADY EXCEEDED? Yes (No)

NON-CONFORMANCES:

3 temperatures of samples* and average of each cooler: (record differing temperatures on the CoC next to sample ID's) *use jars when available

(1) 6 + 6 + 5 = 6 °C (2) ___ + ___ + ___ = ___ °C (3) ___ + ___ + ___ = ___ °C (4) ___ + ___ + ___ = ___ °C

Was ice or ice pack present: (Yes) No

Integrity Issues:

Account Project Manager: _____ have they been notified of the above issues: Yes No

Whom spoken to: _____ Date and Time: _____

ADDITIONAL NOTES:

Dissolved metals, dissolved mercury, total dissolved phosphorus were all preserved, but not filtered. Will have to subsample from 1 L plastic

APPENDIX H
LABORATORY TESTING RESULTS - SOIL AND ROCK

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX OF SOILS

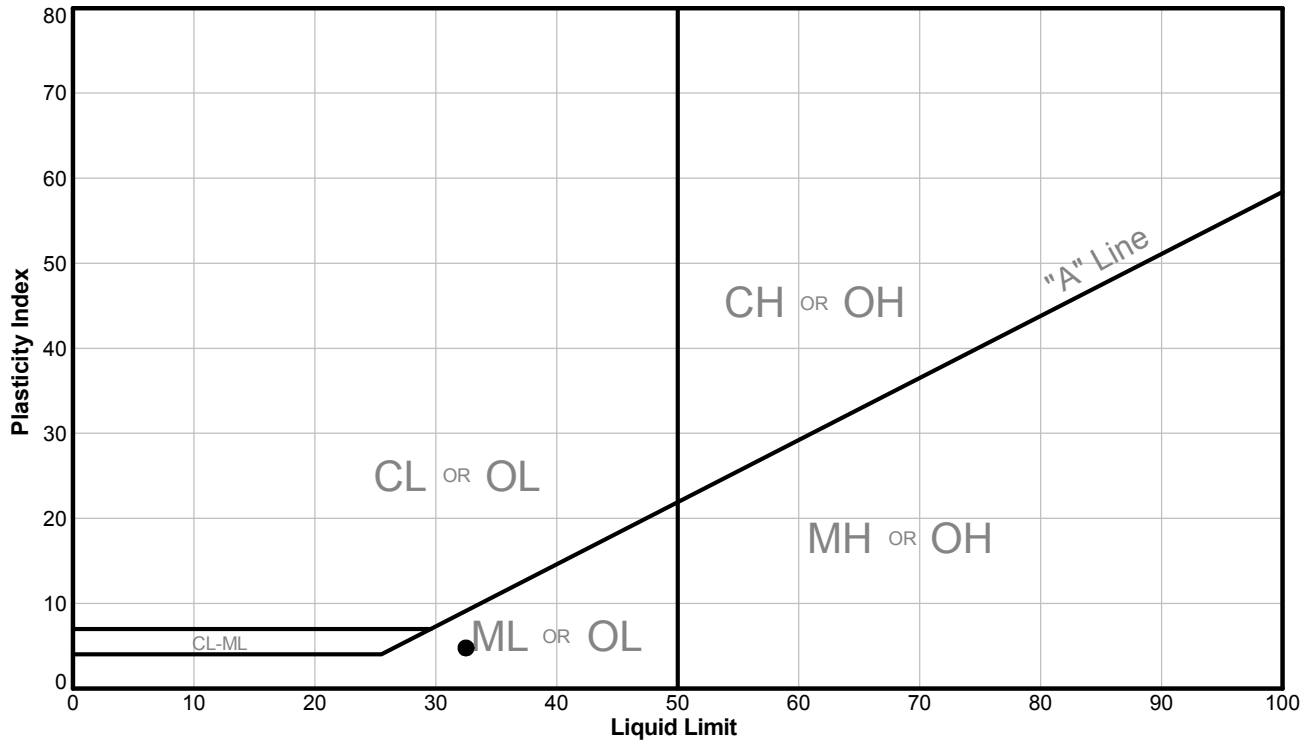
Reference(s)
ASTM D 4318-10

Client: BGC Engineering Inc.	**ID: HMM-BH-05**
Project: Burnaby Mountain Geotech Drilling	**Sample No.: SPT5**
Location: Burnaby, BC	**Depth Interval (m):** 4.55 to 5.16
Project No.: 1412835 **Phase:** 1000	**Lab Schedule No.:**

Other Remarks: **N/A**

Test Method: A-Multi Point | **Preparation Method: Air Dried**

PLASTICITY CHART



Sym.	Sample Location	Sample / Specimen Number	Depth (m)	Bottom (m)	Percent Passing #40 Sieve (%)	Liquid Limit	Plastic Limit	Plasticity Index	Natural Water Content (%)	Liquidity Index
●	HMM-BH-05	SPT5	4.55	5.16	44	32	28	4.0	22.4	-1.4

NP - NON-PLASTIC RESULT ND - NOT DETERMINED

Note: The test data given herein pertain to the sample provided only. This report constitutes a testing service only.

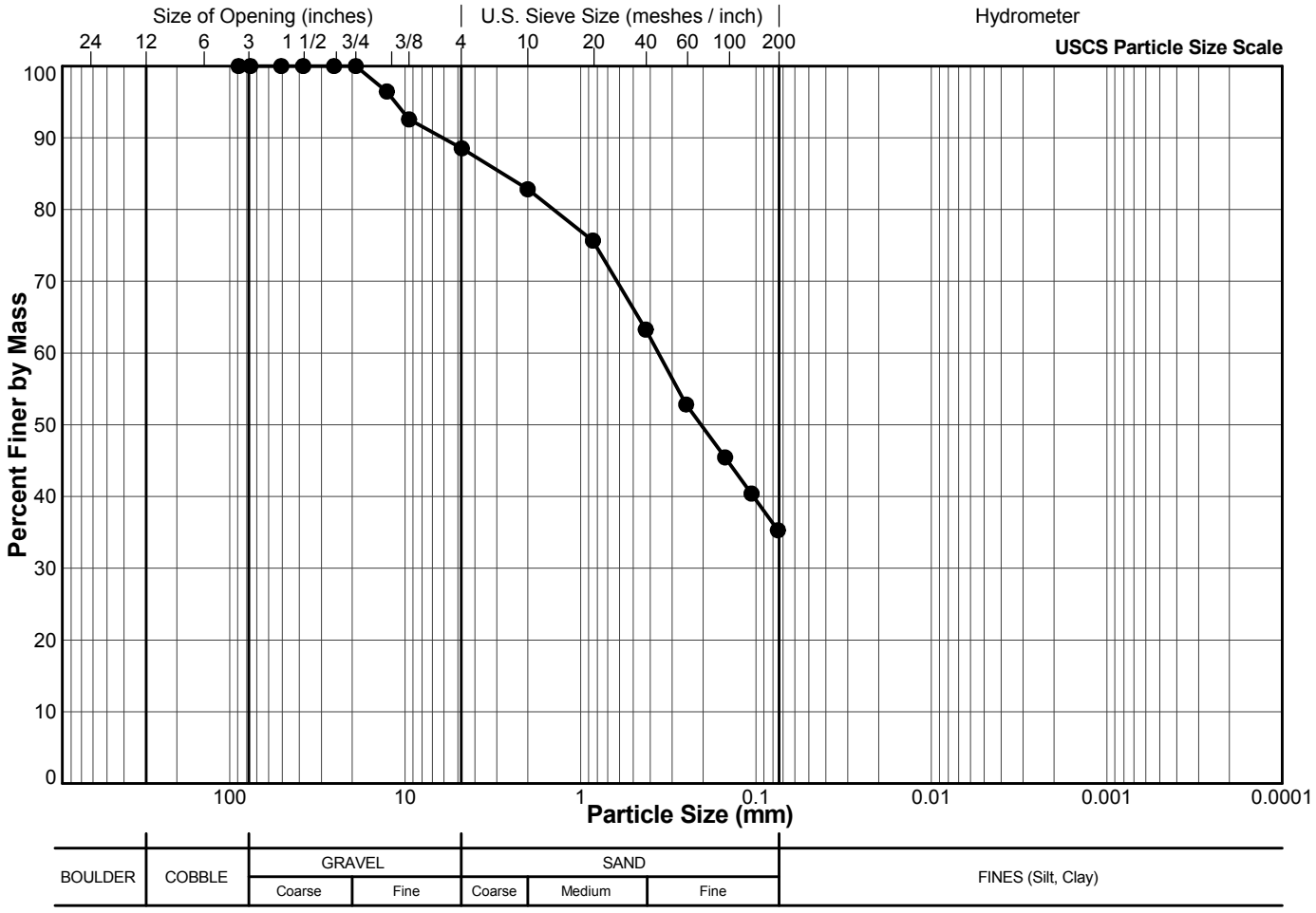
OA/DC	10/17/2014	LP	10/17/2014
Tech	Date	Checked	Date

Golder Associates Ltd.
300 - 3811 North Fraser Way Burnaby, BC, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

SUMMARY OF PARTICLE SIZE DISTRIBUTION

Reference(s)
ASTM C136, C117

Client:	BGC Engineering Inc.	**Sample Location:**	HMM-BH-03
Project:	Burnaby Mountain Geotech Drilling	**Sample No.:**	SPT2
Location:	Burnaby, BC	**Depth Interval (m):**	0.91 to 1.52
Project No.:	1412835 **Phase:** 1000	**Lab Schedule No.:**	



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
3.5"	88.9		100.0
3"	76.2		100.0
2"	50.8		100.0
1 1/2"	38.1		100.0
1"	25.4		100.0
3/4"	19.1		100.0
1/2"	12.7		96.4
3/8"	9.5		92.6
#4 US MESH	4.75		88.5
#10 US MESH	2		82.8
#20 US MESH	0.85		75.7
#40 US MESH	0.425		63.3
#60 US MESH	0.25		52.8
#100 US MESH	0.15		45.5
#140 US MESH	0.106		40.4
#200 US MESH	0.075		35.3

	SJ	**10/16/2014**	**LP**	**10/17/2014**
	Tech	Date	Checked	Date

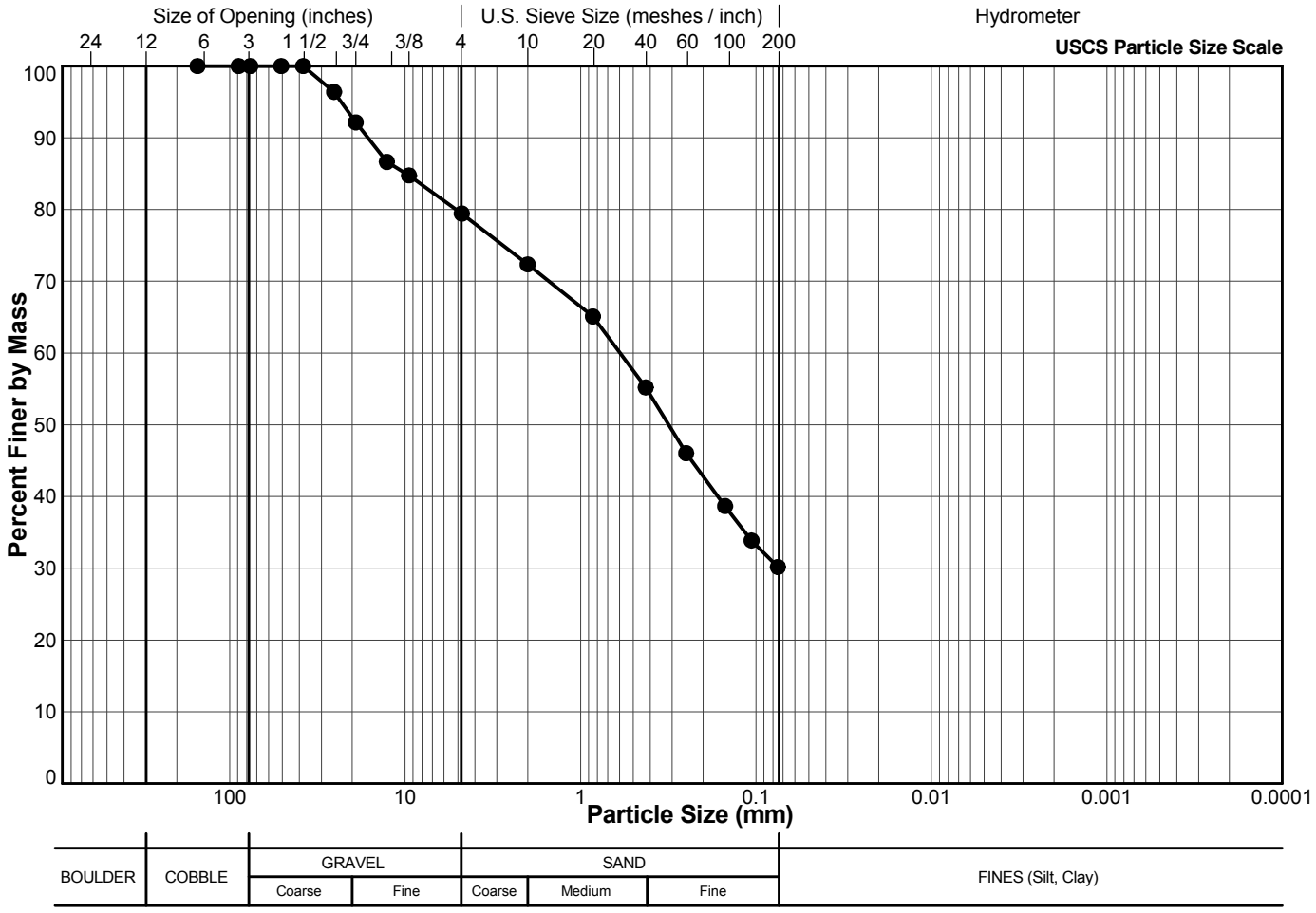
Golder Associates Ltd.
300 - 3811 North Fraser Way Burnaby, BC, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

Golder Associates

SUMMARY OF PARTICLE SIZE DISTRIBUTION

Reference(s)
ASTM C136, C117

Client:	BGC Engineering Inc.	**Sample Location:**	HMM-BH-03
Project:	Burnaby Mountain Geotech Drilling	**Sample No.:**	SPT4
Location:	Burnaby, BC	**Depth Interval (m):**	2.44 to 3.05
Project No.:	1412835 **Phase:** 1000	**Lab Schedule No.:**	



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
6"	152.4		100.0
3.5"	88.9		100.0
3"	76.2		100.0
2"	50.8		100.0
1 1/2"	38.1		100.0
1"	25.4		96.4
3/4"	19.1		92.1
1/2"	12.7		86.6
3/8"	9.5		84.8
#4 US MESH	4.75		79.4
#10 US MESH	2		72.4
#20 US MESH	0.85		65.1
#40 US MESH	0.425		55.2
#60 US MESH	0.25		46.0
#100 US MESH	0.15		38.7
#140 US MESH	0.106		33.9
#200 US MESH	0.075		30.2

	SJ/MP	**10/16/2014**	**LP**	**10/17/2014**
	Tech	Date	Checked	Date

National IM Server:GINT_GAL_NATIONALIM Unique Project ID:532 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) sjohn 10/20/14

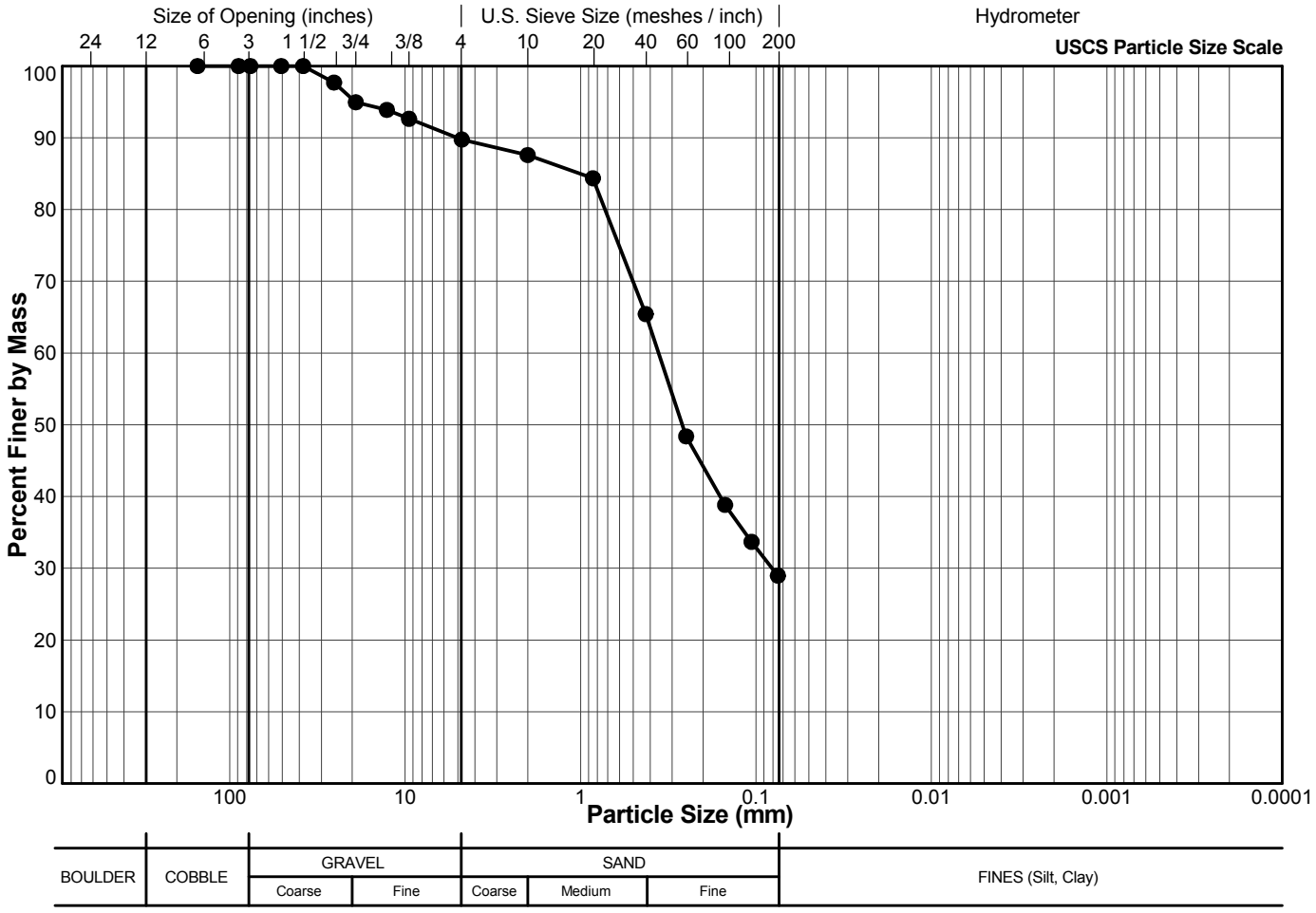
Golder Associates Ltd.
300 - 3811 North Fraser Way Burnaby, BC, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

Golder Associates

SUMMARY OF PARTICLE SIZE DISTRIBUTION

Reference(s)
ASTM C136, C117

Client:	BGC Engineering Inc.	**Sample Location:**	HMM-BH-03
Project:	Burnaby Mountain Geotech Drilling	**Sample No.:**	SPT6
Location:	Burnaby, BC	**Depth Interval (m):**	3.96 to 4.57
Project No.:	1412835 **Phase:** 1000	**Lab Schedule No.:**	



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
6"	152.4		100.0
3.5"	88.9		100.0
3"	76.2		100.0
2"	50.8		100.0
1 1/2"	38.1		100.0
1"	25.4		97.7
3/4"	19.1		95.0
1/2"	12.7		93.9
3/8"	9.5		92.6
#4 US MESH	4.75		89.8
#10 US MESH	2		87.6
#20 US MESH	0.85		84.4
#40 US MESH	0.425		65.4
#60 US MESH	0.25		48.4
#100 US MESH	0.15		38.8
#140 US MESH	0.106		33.7
#200 US MESH	0.075		29.0

SJ/MP	10/16/2014	LP	10/17/2014
Tech	Date	Checked	Date

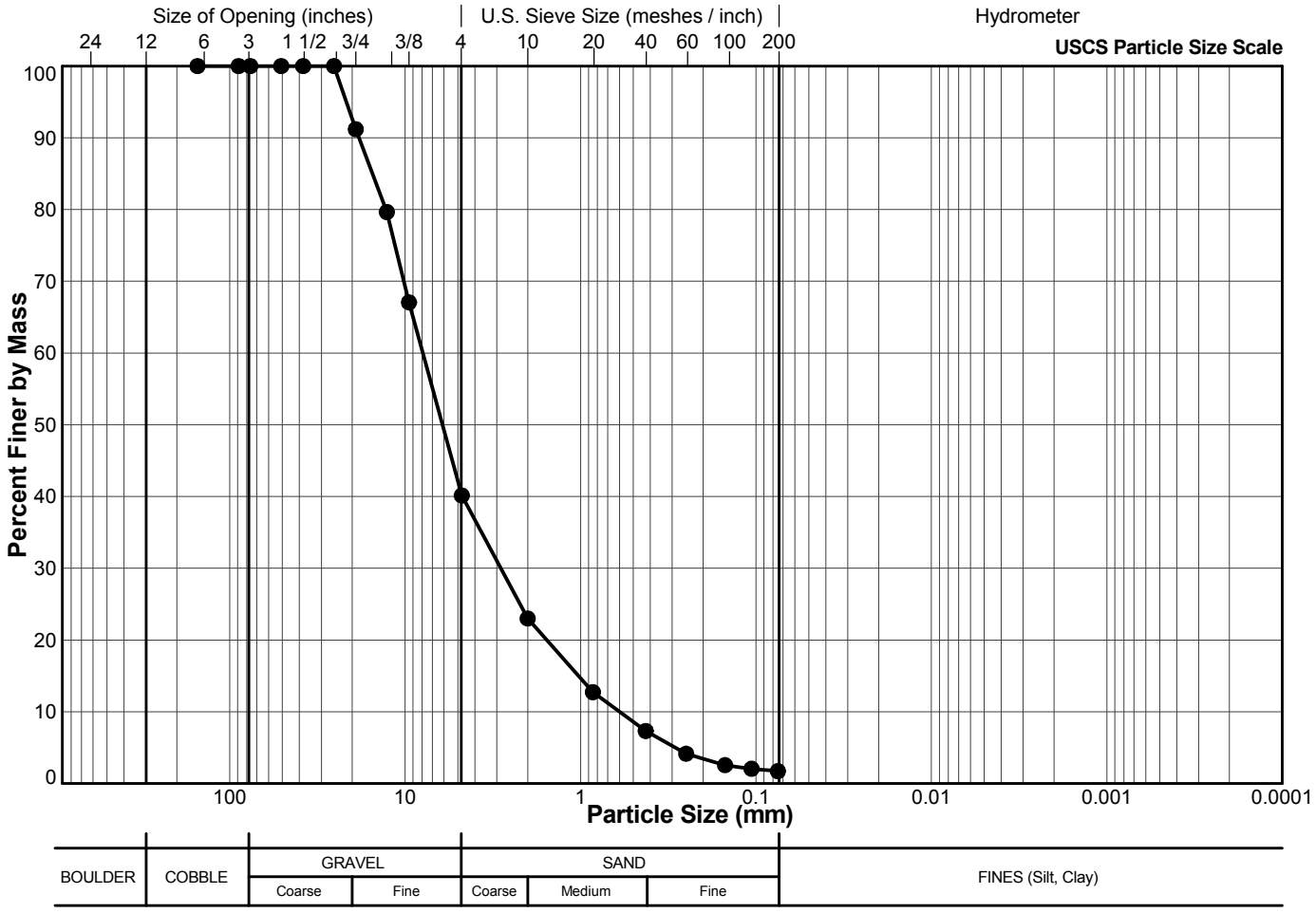
National IM Server:GINT_GAL_NATIONALIM Unique Project ID:532 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) sjohn 10/20/14

Golder Associates Ltd.
300 - 3811 North Fraser Way Burnaby, BC, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

SUMMARY OF PARTICLE SIZE DISTRIBUTION

Reference(s)
ASTM C136, C117

Client:	BGC Engineering Inc.	**Sample Location:**	HMM-BH-05
Project:	Burnaby Mountain Geotech Drilling	**Sample No.:**	SPT2
Location:	Burnaby, BC	**Depth Interval (m):**	2.41 to 2.77
Project No.:	1412835 **Phase:** 1000	**Lab Schedule No.:**	



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
6"	152.4		100.0
3.5"	88.9		100.0
3"	76.2		100.0
2"	50.8		100.0
1 1/2"	38.1		100.0
1"	25.4		100.0
3/4"	19.1		91.2
1/2"	12.7		79.7
3/8"	9.5		67.1
#4 US MESH	4.75		40.1
#10 US MESH	2		23.0
#20 US MESH	0.85		12.7
#40 US MESH	0.425		7.3
#60 US MESH	0.25		4.1
#100 US MESH	0.15		2.6
#140 US MESH	0.106		2.0
#200 US MESH	0.075		1.7

	SJ	**10/16/2014**	**LP**	**10/17/2014**
	Tech	Date	Checked	Date

National IM Server:GINT_GAL_NATIONALIM Unique Project ID:532 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) sjohn 10/20/14

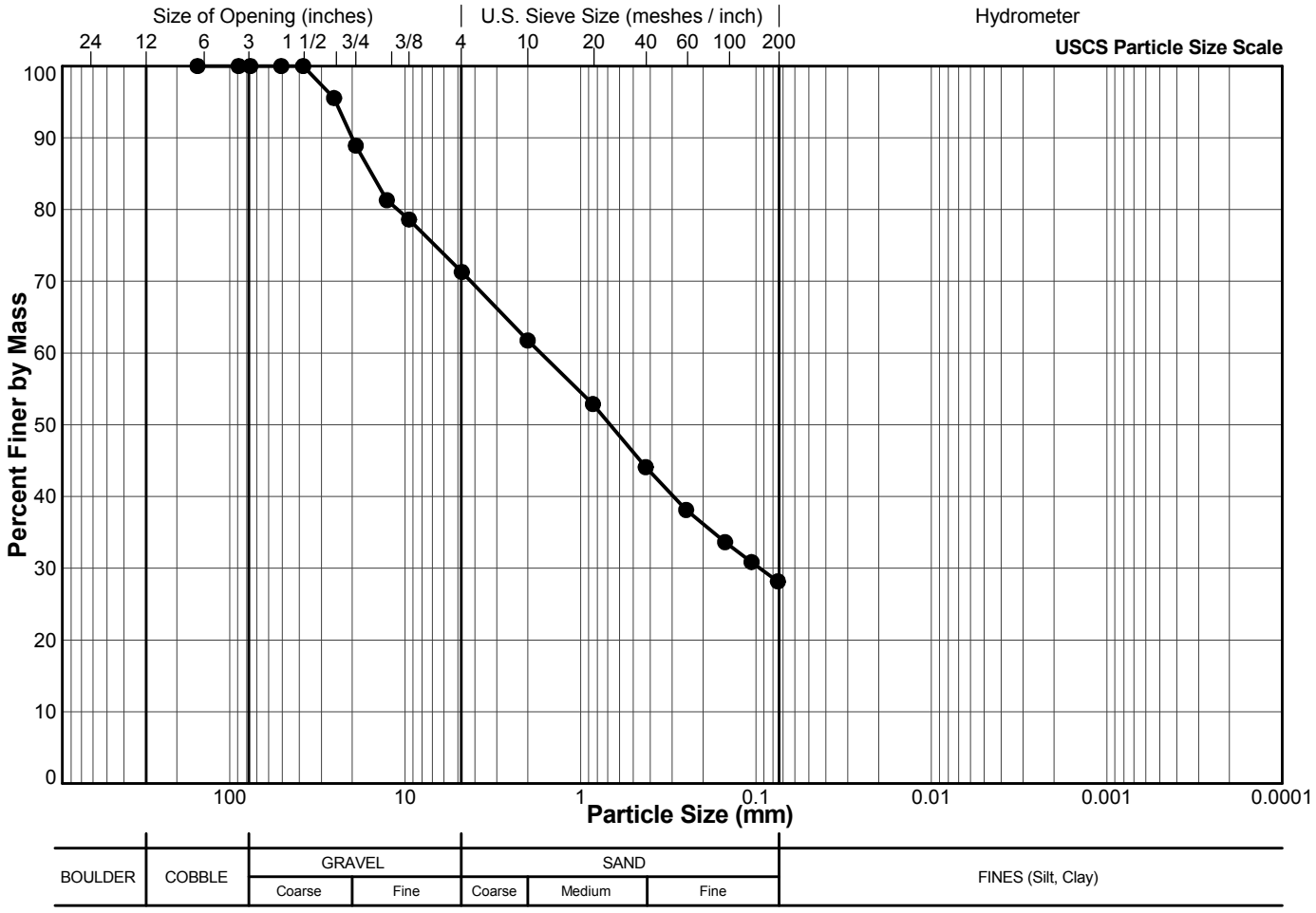
Golder Associates Ltd.
300 - 3811 North Fraser Way Burnaby, BC, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

Golder Associates

SUMMARY OF PARTICLE SIZE DISTRIBUTION

Reference(s)
ASTM C136, C117

Client:	BGC Engineering Inc.	**Sample Location:**	HMM-BH-05
Project:	Burnaby Mountain Geotech Drilling	**Sample No.:**	SPT5
Location:	Burnaby, BC	**Depth Interval (m):**	4.55 to 5.16
Project No.:	1412835 **Phase:** 1000	**Lab Schedule No.:**	



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
6"	152.4		100.0
3.5"	88.9		100.0
3"	76.2		100.0
2"	50.8		100.0
1 1/2"	38.1		100.0
1"	25.4		95.5
3/4"	19.1		88.9
1/2"	12.7		81.3
3/8"	9.5		78.6
#4 US MESH	4.75		71.3
#10 US MESH	2		61.7
#20 US MESH	0.85		52.9
#40 US MESH	0.425		44.1
#60 US MESH	0.25		38.1
#100 US MESH	0.15		33.6
#140 US MESH	0.106		30.9
#200 US MESH	0.075		28.2

SJ/MP	10/16/2014	LP	10/17/2014
Tech	Date	Checked	Date

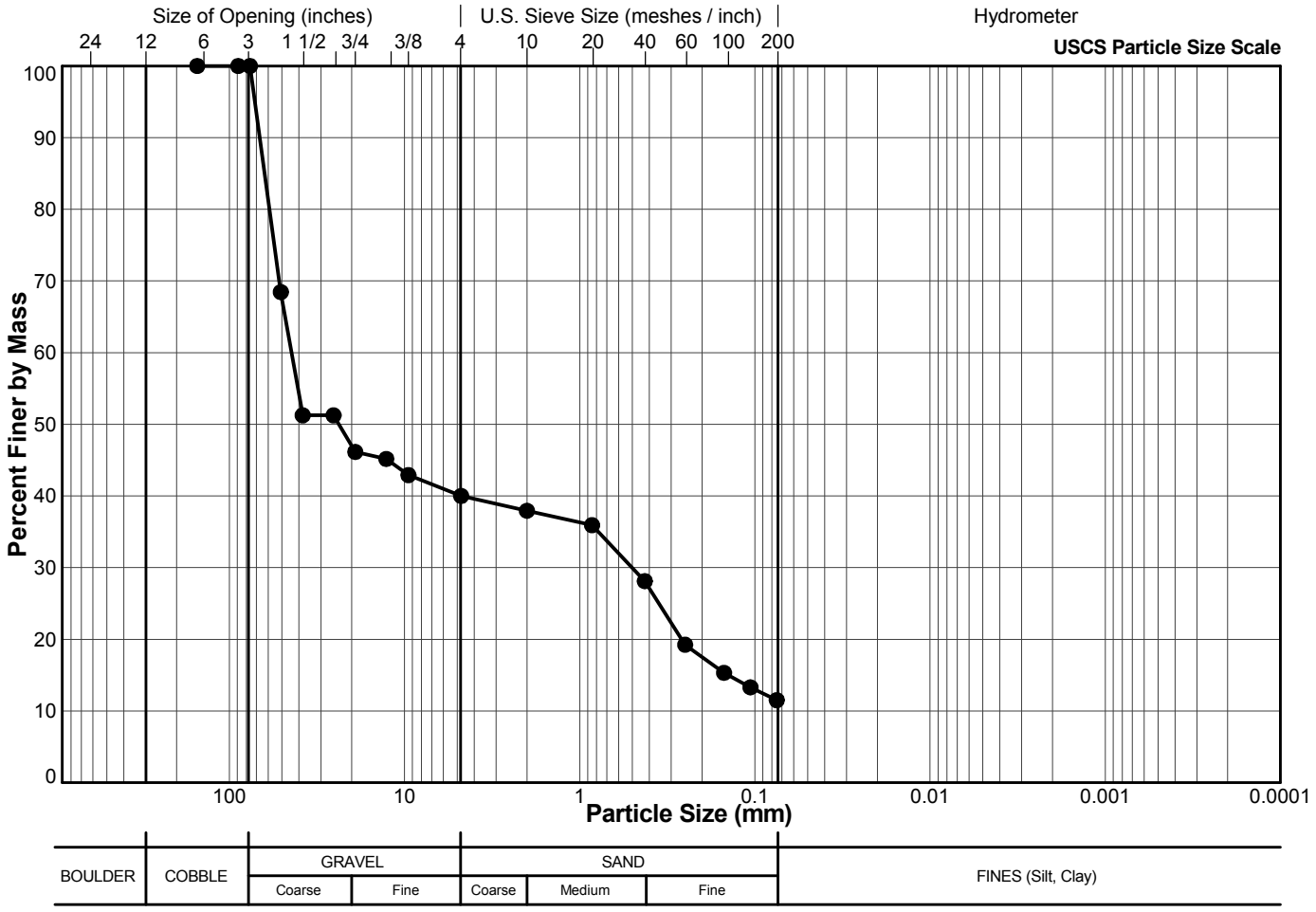
National IM Server:GINT_GAL_NATIONALIM Unique Project ID:532 Output Form:_LAB_PARTICLE SIZE (W/ GRADATIONS) sjohn 10/20/14

Golder Associates Ltd.
300 - 3811 North Fraser Way Burnaby, BC, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

SUMMARY OF PARTICLE SIZE DISTRIBUTION

Reference(s)
ASTM C136, C117

Client:	BGC Engineering Inc.	**Sample Location:**	HMM-BH-05
Project:	Burnaby Mountain Geotech Drilling	**Sample No.:**	G2
Location:	Burnaby, BC	**Depth Interval (m):**	28.95 to 29.20
Project No.:	1412835 **Phase:** 1000	**Lab Schedule No.:**	



Legend

Sieve Size (USS)	(mm)	Particle Size (mm)	Percent Passing
6"	152.4		100.0
3.5"	88.9		100.0
3"	76.2		100.0
2"	50.8		68.4
1 1/2"	38.1		51.3
1"	25.4		51.3
3/4"	19.1		46.1
1/2"	12.7		45.2
3/8"	9.5		42.9
#4 US MESH	4.75		40.0
#10 US MESH	2		37.9
#20 US MESH	0.85		35.9
#40 US MESH	0.425		28.1
#60 US MESH	0.25		19.2
#100 US MESH	0.15		15.3
#140 US MESH	0.106		13.3
#200 US MESH	0.075		11.5

SJ/MP	10/16/2014	LP	10/17/2014
Tech	Date	Checked	Date

Golder Associates Ltd.
300 - 3811 North Fraser Way Burnaby, BC, Canada V5J 5J2
Tel: 604-412-6899 Fax: 604-412-6816 www.golder.com

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835
Project:	Burnaby Mountain Geotechnical Drilling Investigation
Client:	BGC Engineering Inc.
Location:	Burnaby, BC
Lab ID	431

Failure Mode

(1) Diagonal shear plane(s) (5) Conical
(2) Vertical fracture(s) (6) Spalling
(3) Vertical splitting (7) Other
(4) Shear along foliation / discontinuit Note: (deg) measured from core axis

									Wet		Dry	Maximum	Stress			
No.	**Borehole**	**Sample**	**Depth**	**Dia**	**Ht**	**A**	**V**	**Mass**	**Density**	**W**	**Density**	**Load**	σ_u	**Rock Type**	**Failure Mode**	
	#	#	(m)	(mm)	(mm)	(cm^2)	(cm^3)	(g)	(kg/m^3)	(%)	(kg/m^3)	(kN)	(MPa)		Type	(deg)
1	HMM-BH-01	UCS 1	20.63 - 20.92	61.89	124.52	30.08	374.60	850.00	2269	9.71	2068	23.80	7.9	Sandstone	1	25
2	HMM-BH-01	UCS 3	63.28 - 63.48	61.09	122.97	29.31	360.44	886.00	2458	5.37	2333	23.70	8.1	Conglomerate	1/7	20
3	HMM-BH-01	UCS 4	69.65 - 69.82	61.07	126.32	29.29	370.01	909.60	2458	5.25	2336	17.02	5.8	Conglomerate	7	N/A
4	HMM-BH-02	UCS 1	22.00 - 22.45	60.55	126.71	28.80	364.86	844.10	2313	9.35	2116	28.00	9.7	Sandstone	1/2	20
5	HMM-BH-02	UCS 4	71.44 - 71.69	60.74	126.97	28.98	367.91	831.50	2260	9.83	2058	16.17	5.6	Sandstone	1	24
6	HMM-BH-02	UCS 6	100.85 - 101.00	60.23	125.21	28.49	356.74	813.30	2280	9.70	2078	19.49	6.8	Sandstone	1	24
7	HMM-BH-02	UCS 8	128.96 - 129.15	60.77	121.34	29.00	351.94	934.30	2655	1.65	2612	147.40	50.8	Conglomerate	7	N/A
8	HMM-BH-02	UCS 9	145.05 - 145.25	60.86	126.77	29.09	368.78	854.20	2316	9.86	2108	50.25	17.3	Sandstone	6	N/A
9	HMM-BH-02	UCS 11	176.16 - 176.33	61.15	123.91	29.37	363.91	891.90	2451	6.90	2293	26.00	8.9	Conglomerate	7	N/A
10	HMM-BH-02	UCS 12	22.62 - 22.85	60.84	127.69	29.07	371.21	869.60	2343	7.59	2177	38.70	13.3	Fine Sandstone / Siltstone	1/2	17
11	HMM-BH-02	UCS 13	46.00 - 46.19	60.49	125.77	28.74	361.44	845.20	2338	7.80	2169	72.90	25.4	Siltstone	1/2	24
12	HMM-BH-02	UCS 15	60.87 - 61.03	Sample broke during preparation - Unsuitable for testing										Siltstone		
13	HMM-BH-02	UCS 16	64.85 - 65.05	60.76	125.71	29.00	364.50	855.70	2348	7.26	2189	84.89	29.3	Fine Sandstone / Siltstone	2/1	21
14	HMM-BH-02	UCS 19	117.03 - 117.21	60.73	123.25	28.97	357.01	858.90	2406	7.14	2245	71.70	24.8	Siltstone	2/6	N/A
15	HMM-BH-02	UCS 22	169.40 - 169.58	61.25	125.85	29.46	370.81	924.90	2494	4.68	2383	21.30	7.2	Conglomerate	7	N/A
16	HMM-BH-02	UCS 24	180.60 - 180.78	60.98	126.15	29.21	368.43	898.40	2438	6.10	2298	10.72	3.7	Conglomerate	7	N/A
17	HMM-BH-02	UCS 26	165.93 - 166.16	61.11	128.71	29.33	377.51	939.30	2488	4.96	2371	30.80	10.5	Conglomerate	7	N/A
18	HMM-BH-02	UCS 27	161.65 - 161.82	61.05	125.79	29.27	368.22	896.40	2434	7.04	2274	18.47	6.3	Conglomerate	7	N/A

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835
Project:	Burnaby Mountain Geotechnical Drilling Investigation
Client:	BGC Engineering Inc.
Location:	Burnaby, BC
Lab ID	431

Failure Mode

(1) Diagonal shear plane(s) (5) Conical
(2) Vertical fracture(s) (6) Spalling
(3) Vertical splitting (7) Other
(4) Shear along foliation / discontinuit Note: (deg) measured from core axis

									Wet		Dry	Maximum	Stress			
No.	**Borehole**	**Sample**	**Depth**	**Dia**	**Ht**	**A**	**V**	**Mass**	**Density**	**W**	**Density**	**Load**	σ_u	**Rock Type**	**Failure Mode**	
	#	#	(m)	(mm)	(mm)	(cm^2)	(cm^3)	(g)	(kg/m^3)	(%)	(kg/m^3)	(kN)	(MPa)		Type	(deg)
19	HMM-BH-02	UCS 29	146.97 - 147.16	Sample broke during preparation - Unsuitable for testing										Conglomerate		
20	HMM-BH-03	UCS 15	107.40 - 107.62	61.01	127.76	29.23	373.50	881.10	2359	9.06	2163	63.70	21.8	Siltstone	1/2	30

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-01**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 1
Location:	Burnaby, BC	**Depth (m):**	20.63 - 20.92
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results		Sample Measurements	
Max Load (kN)	**23.80**	Diameter (mm)	61.89
		Height (mm)	124.52
Stress σ_u (MPa)	**7.9**	Area (cm^2)	30.08
		Volume (cm^3)	374.60
Pace Rate (kN/s)	0.50	Mass (g)	850.00
		Moisture Content (%)	9.71
Lithology	Sandstone	Wet Density (kg/m^3)	2269.08
		Dry Density (kg/m^3)	2068.28

Failure Mode		Notes
		- Water content as received
Type:	**1**	**Mode:**
		(1) Diagonal shear plane(s)
Degrees:*	**25**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-01**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 3
Location:	Burnaby, BC	**Depth (m):**	63.28 - 63.48
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results

Max Load (kN)	**23.70**
Stress σ_u (MPa)	**8.1**
Pace Rate (kN/s)	0.50
Lithology	Conglomerate

Sample Measurements

Diameter (mm)	61.09
Height (mm)	122.97
Area (cm^2)	29.31
Volume (cm^3)	360.44
Mass (g)	886.00
Moisture Content (%)	5.37
Wet Density (kg/m^3)	2458.13
Dry Density (kg/m^3)	2332.76

Failure Mode

Type: **1/7**

Degrees:* **20**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Sample broke through matrix material.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-01**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 4
Location:	Burnaby, BC	**Depth (m):**	69.65 - 69.82
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results		Sample Measurements	
Max Load (kN)	**17.02**	Diameter (mm)	61.07
		Height (mm)	126.32
Stress σ_u (MPa)	**5.8**	Area (cm^2)	29.29
		Volume (cm^3)	370.01
Pace Rate (kN/s)	0.50	Mass (g)	909.60
		Moisture Content (%)	5.25
Lithology	Conglomerate	Wet Density (kg/m^3)	2458.29
		Dry Density (kg/m^3)	2335.59

Failure Mode		Notes
		- Water content as received
Type:	**7**	**Mode:**
		(1) Diagonal shear plane(s)
Degrees:*	**N/A**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

Comments

Sample broke through matrix material.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

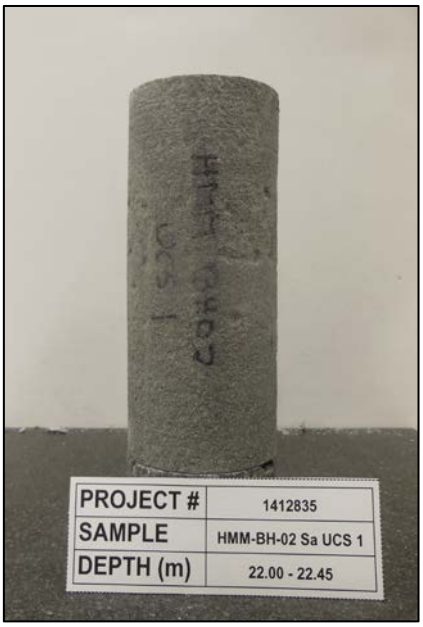
Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 1
Location:	Burnaby, BC	**Depth (m):**	22.00 - 22.45
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results		Sample Measurements	
Max Load (kN)	**28.00**	Diameter (mm)	60.55
		Height (mm)	126.71
Stress σ_u (MPa)	**9.7**	Area (cm^2)	28.80
		Volume (cm^3)	364.86
Pace Rate (kN/s)	0.50	Mass (g)	844.10
		Moisture Content (%)	9.35
Lithology	Sandstone	Wet Density (kg/m^3)	2313.48
		Dry Density (kg/m^3)	2115.71

Failure Mode		Notes
		- Water content as received
Type:	**1/2**	**Mode:**
		(1) Diagonal shear plane(s)
Degrees:*	**20**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*



BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 4
Location:	Burnaby, BC	**Depth (m):**	71.44 - 71.69
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results		Sample Measurements	
Max Load (kN)	**16.17**	Diameter (mm)	60.74
		Height (mm)	126.97
Stress σ_u (MPa)	**5.6**	Area (cm^2)	28.98
		Volume (cm^3)	367.91
Pace Rate (kN/s)	0.50	Mass (g)	831.50
		Moisture Content (%)	9.83
Lithology	Sandstone	Wet Density (kg/m^3)	2260.07
		Dry Density (kg/m^3)	2057.80

Failure Mode		Notes
		- Water content as received
Type:	**1**	**Mode:**
		(1) Diagonal shear plane(s)
Degrees:*	**24**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 6
Location:	Burnaby, BC	**Depth (m):**	100.85 - 101.00
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results

Max Load (kN)	**19.49**
Stress σ_u (MPa)	**6.8**
Pace Rate (kN/s)	0.50
Lithology	Sandstone

Sample Measurements

Diameter (mm)	60.23
Height (mm)	125.21
Area (cm^2)	28.49
Volume (cm^3)	356.74
Mass (g)	813.30
Moisture Content (%)	9.70
Wet Density (kg/m^3)	2279.80
Dry Density (kg/m^3)	2078.21

Failure Mode

Type: **1**

Degrees:* **24**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 8
Location:	Burnaby, BC	**Depth (m):**	128.96 - 129.15
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results

Max Load (kN)	**147.40**
Stress σ_u (MPa)	**50.8**
Pace Rate (kN/s)	0.50
Lithology	Conglomerate

Sample Measurements

Diameter (mm)	60.77
Height (mm)	121.34
Area (cm^2)	29.00
Volume (cm^3)	351.94
Mass (g)	934.30
Moisture Content (%)	1.65
Wet Density (kg/m^3)	2654.69
Dry Density (kg/m^3)	2611.72

Failure Mode

Type: **7**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Sample broke through matrix material.

BEFORE TEST

AFTER TEST

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 9
Location:	Burnaby, BC	**Depth (m):**	145.05 - 145.25
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results		Sample Measurements	
Max Load (kN)	**50.25**	Diameter (mm)	60.86
		Height (mm)	126.77
Stress σ_u (MPa)	**17.3**	Area (cm^2)	29.09
		Volume (cm^3)	368.78
Pace Rate (kN/s)	0.50	Mass (g)	854.20
		Moisture Content (%)	9.86
Lithology	Sandstone	Wet Density (kg/m^3)	2316.27
		Dry Density (kg/m^3)	2108.29

Failure Mode		Notes
		- Water content as received
Type:	**6**	**Mode:**
		(1) Diagonal shear plane(s)
Degrees:*	**N/A**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 11
Location:	Burnaby, BC	**Depth (m):**	176.16 - 176.33
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results

Max Load (kN)	**26.00**
Stress σ_u (MPa)	**8.9**
Pace Rate (kN/s)	0.50
Lithology	Conglomerate

Sample Measurements

Diameter (mm)	61.15
Height (mm)	123.91
Area (cm^2)	29.37
Volume (cm^3)	363.91
Mass (g)	891.90
Moisture Content (%)	6.90
Wet Density (kg/m^3)	2450.91
Dry Density (kg/m^3)	2292.72

Failure Mode

Type: **7**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Sample broke through matrix material.

BEFORE TEST

AFTER TEST

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 12
Location:	Burnaby, BC	**Depth (m):**	22.62 - 22.85
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results		Sample Measurements	
Max Load (kN)	**38.70**	Diameter (mm)	60.84
		Height (mm)	127.69
Stress σ_u (MPa)	**13.3**	Area (cm^2)	29.07
		Volume (cm^3)	371.21
Pace Rate (kN/s)	0.50	Mass (g)	869.60
		Moisture Content (%)	7.59
Lithology	Fine Sandstone / Siltstone	Wet Density (kg/m^3)	2342.58
		Dry Density (kg/m^3)	2177.37

Failure Mode		Notes
		- Water content as received
Type:	**1/2**	**Mode:**
		(1) Diagonal shear plane(s)
Degrees:*	**17**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 13
Location:	Burnaby, BC	**Depth (m):**	46.00 - 46.19
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results		Sample Measurements	
Max Load (kN)	**72.90**	Diameter (mm)	60.49
		Height (mm)	125.77
Stress σ_u (MPa)	**25.4**	Area (cm^2)	28.74
		Volume (cm^3)	361.44
Pace Rate (kN/s)	0.50	Mass (g)	845.20
		Moisture Content (%)	7.80
Lithology	Siltstone	Wet Density (kg/m^3)	2338.44
		Dry Density (kg/m^3)	2169.32

Failure Mode		Notes
		- Water content as received
Type:	**1/2**	**Mode:**
		(1) Diagonal shear plane(s)
Degrees:*	**24**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 16
Location:	Burnaby, BC	**Depth (m):**	64.85 - 65.05
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results

Max Load (kN)	**84.89**
Stress σ_u (MPa)	**29.3**
Pace Rate (kN/s)	0.50
Lithology	Fine Sandstone / Siltstone

Sample Measurements

Diameter (mm)	60.76
Height (mm)	125.71
Area (cm^2)	29.00
Volume (cm^3)	364.50
Mass (g)	855.70
Moisture Content (%)	7.26
Wet Density (kg/m^3)	2347.61
Dry Density (kg/m^3)	2188.74

Failure Mode

Type: **2/1**

Degrees:* **21**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 19
Location:	Burnaby, BC	**Depth (m):**	117.03 - 117.21
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results

Max Load (kN)	**71.70**
Stress σ_u (MPa)	**24.8**
Pace Rate (kN/s)	0.50
Lithology	Siltstone

Sample Measurements

Diameter (mm)	60.73
Height (mm)	123.25
Area (cm^2)	28.97
Volume (cm^3)	357.01
Mass (g)	858.90
Moisture Content (%)	7.14
Wet Density (kg/m^3)	2405.80
Dry Density (kg/m^3)	2245.37

Failure Mode

Type: **2/6**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 22
Location:	Burnaby, BC	**Depth (m):**	169.40 - 169.58
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results

Max Load (kN)	**21.30**
Stress σ_u (MPa)	**7.2**
Pace Rate (kN/s)	0.50
Lithology	Conglomerate

Sample Measurements

Diameter (mm)	61.25
Height (mm)	125.85
Area (cm^2)	29.46
Volume (cm^3)	370.81
Mass (g)	924.90
Moisture Content (%)	4.68
Wet Density (kg/m^3)	2494.25
Dry Density (kg/m^3)	2382.75

Failure Mode

Type: **7**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Sample broke through matrix material.

BEFORE TEST

AFTER TEST

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 24
Location:	Burnaby, BC	**Depth (m):**	180.60 - 180.78
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results

Max Load (kN)	**10.72**
Stress σ_u (MPa)	**3.7**
Pace Rate (kN/s)	0.50
Lithology	Conglomerate

Sample Measurements

Diameter (mm)	60.98
Height (mm)	126.15
Area (cm^2)	29.21
Volume (cm^3)	368.43
Mass (g)	898.40
Moisture Content (%)	6.10
Wet Density (kg/m^3)	2438.47
Dry Density (kg/m^3)	2298.23

Failure Mode

Type: **7**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Sample broke through matrix material.

BEFORE TEST

AFTER TEST

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 26
Location:	Burnaby, BC	**Depth (m):**	165.93 - 166.16
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results

Max Load (kN)	**30.80**
Stress σ_u (MPa)	**10.5**
Pace Rate (kN/s)	0.50
Lithology	Conglomerate

Sample Measurements

Diameter (mm)	61.11
Height (mm)	128.71
Area (cm^2)	29.33
Volume (cm^3)	377.51
Mass (g)	939.30
Moisture Content (%)	4.96
Wet Density (kg/m^3)	2488.16
Dry Density (kg/m^3)	2370.67

Failure Mode

Type: **7**

Degrees:* **N/A**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

Sample broke through matrix material.

BEFORE TEST

AFTER TEST

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-02**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 27
Location:	Burnaby, BC	**Depth (m):**	161.65 - 161.82
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results		Sample Measurements	
Max Load (kN)	**18.47**	Diameter (mm)	61.05
		Height (mm)	125.79
Stress σ_u (MPa)	**6.3**	Area (cm^2)	29.27
		Volume (cm^3)	368.22
Pace Rate (kN/s)	0.50	Mass (g)	896.40
		Moisture Content (%)	7.04
Lithology	Conglomerate	Wet Density (kg/m^3)	2434.41
		Dry Density (kg/m^3)	2274.29

Failure Mode		Notes
		- Water content as received
Type:	**7**	**Mode:**
		(1) Diagonal shear plane(s)
Degrees:*	**N/A**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

Comments

Sample broke through matrix material.

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-03**
Project:	Burnaby Mountain Geotechnical Drilling Investiga	**Sample Number:**	UCS 15
Location:	Burnaby, BC	**Depth (m):**	107.40 - 107.62
Client:	BGC Engineering Inc.	**Lab ID No:**	431

Testing Results		Sample Measurements	
Max Load (kN)	**63.70**	Diameter (mm)	61.01
		Height (mm)	127.76
Stress σ_u (MPa)	**21.8**	Area (cm^2)	29.23
		Volume (cm^3)	373.50
Pace Rate (kN/s)	0.50	Mass (g)	881.10
		Moisture Content (%)	9.06
Lithology	Siltstone	Wet Density (kg/m^3)	2359.06
		Dry Density (kg/m^3)	2163.03

Failure Mode		Notes
		- Water content as received
Type:	**1/2**	**Mode:**
		(1) Diagonal shear plane(s)
Degrees:*	**30**	(2) Vertical fracture(s)
		(3) Vertical splitting
		(4) Shear along foliation /discontinuity
		(5) Conical
* Degrees measured with respect to core axis.		(6) Spalling
		(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

G. Patton	December 5, 2014	E. Kostyukov	December 11, 2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.: 1412835
Project: Burnaby Mountain Geotechnical Drilling Investigation
Client: BGC Engineering Inc.
Location: Burnaby, BC
Lab ID 288

Failure Mode
(1) Diagonal shear plane(s) (5) Conical
(2) Vertical fracture(s) (6) Spalling
(3) Vertical splitting (7) Other
(4) Shear along foliation / discontinuity Note: (deg) measured from core axis

No.	Borehole	Sample	Depth	Dia	Ht	A	V	Mass	Wet Density	W	Dry Density	Maximum Load	Stress σ_u	Rock Type	Failure Mode	
	#	#	(m)	(mm)	(mm)	(cm^2)	(cm^3)	(g)	(kg/m^3)	(%)	(kg/m^3)	(kN)	(MPa)		Type	(deg)
1	HMM-BH-03	2	16.63-16.89	58.75	125.79	27.11	341.00	792.20	2323	7.35	2164	29.78	11.0	Sandstone	4	18
2	HMM-BH-03	4	41.14-41.37	60.38	126.47	28.63	362.13	845.90	2336	8.45	2154	29.07	10.2	Sandstone	4	18
3	HMM-BH-03	6	49.64-49.81	60.14	125.57	28.41	356.70	853.10	2392	7.60	2223	43.89	15.5	Sandstone	2	
4	HMM-BH-03	8	61.46-61.65	59.71	125.83	28.00	352.35	836.70	2375	7.94	2200	48.32	17.3	Sandstone	4/2	21
5	HMM-BH-03	12	87.43-87.66	60.70	127.08	28.94	367.74	881.80	2398	7.98	2221	53.62	18.5	Mudstone	4/2	13
6	HMM-BH-03	16	114.35-114.61	61.25	129.02	29.46	380.15	1004.00	2641	1.37	2605	267.50	90.8	Conglomerate	2/6	
7	HMM-BH-03	20	137.68-137.88	61.55	128.35	29.75	381.89	1013.60	2654	1.82	2607	60.00	20.2	Conglomerate	2/3	
8	HMM-BH-03	21	146.43-146.68											Conglomerate		
9	HMM-BH-03	22	152.52-152.80	61.74	126.53	29.94	378.81	1001.80	2645	1.47	2606	108.39	36.2	Conglomerate	2/4	27
10	HMM-BH-03	24	162.79-163.03	61.81	125.21	30.01	375.70	921.20	2452	6.22	2308	67.72	22.6	Conglomerate	2/3	
11	HMM-BH-03	26	178.32-178.54	61.83	126.69	30.03	380.39	988.20	2598	4.76	2480	73.00	24.3	Conglomerate	4/6	28

MM	September 30, 2014	LP	October 1,2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-03**
Project:	Burnaby Mountain Geotechnical Drilling Investigat	**Sample Number:**	2
Location:	Burnaby, BC	**Depth (m):**	16.63-16.89
Client:	BGC Engineering Inc.	**Lab ID No:**	288

Testing Results

Max Load (kN)	**29.78**
Stress σ_u (MPa)	**11.0**
Pace Rate (kN/s)	1.25
Lithology	Sandstone

Sample Measurements

Diameter (mm)	58.75
Height (mm)	125.79
Area (cm^2)	27.11
Volume (cm^3)	341.00
Mass (g)	792.20
Moisture Content (%)	7.35
Wet Density (kg/m^3)	2323.18
Dry Density (kg/m^3)	2164.11

Failure Mode

Type: **4**

Degrees:* **18**

* Degrees measured with respect to core axis.

Notes

- Water content as received

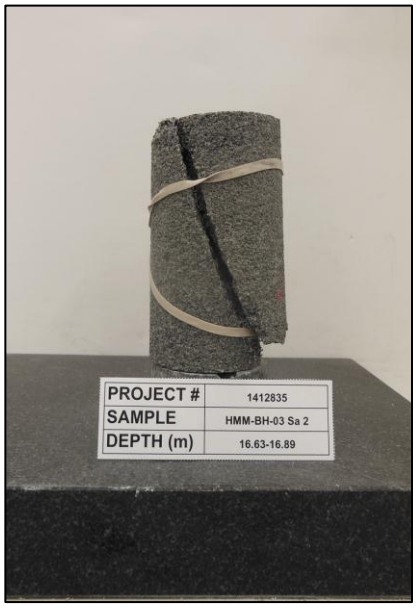
Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST



AFTER TEST

MM	September 30, 2014	LP	October 1,2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-03**
Project:	Burnaby Mountain Geotechnical Drilling Investigat	**Sample Number:**	4
Location:	Burnaby, BC	**Depth (m):**	41.14-41.37
Client:	BGC Engineering Inc.	**Lab ID No:**	288

Testing Results

Max Load (kN)	**29.07**
Stress σ_u (MPa)	**10.2**
Pace Rate (kN/s)	1.25
Lithology	Sandstone

Sample Measurements

Diameter (mm)	60.38
Height (mm)	126.47
Area (cm^2)	28.63
Volume (cm^3)	362.13
Mass (g)	845.90
Moisture Content (%)	8.45
Wet Density (kg/m^3)	2335.91
Dry Density (kg/m^3)	2153.92

Failure Mode

Type: **4**

Degrees:* **18**

* Degrees measured with respect to core axis.

Notes

- Water content as received

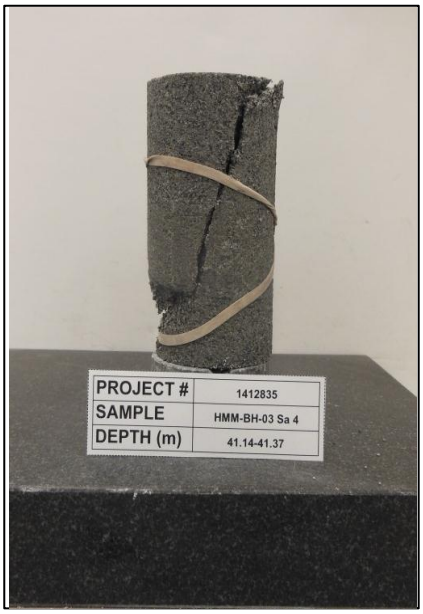
Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST



AFTER TEST

MM	September 30, 2014	LP	October 1,2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-03**
Project:	Burnaby Mountain Geotechnical Drilling Investigat	**Sample Number:**	6
Location:	Burnaby, BC	**Depth (m):**	49.64-49.81
Client:	BGC Engineering Inc.	**Lab ID No:**	288

Testing Results

Max Load (kN)	**43.89**
Stress σ_u (MPa)	**15.5**
Pace Rate (kN/s)	1.25
Lithology	Sandstone

Sample Measurements

Diameter (mm)	60.14
Height (mm)	125.57
Area (cm^2)	28.41
Volume (cm^3)	356.70
Mass (g)	853.10
Moisture Content (%)	7.60
Wet Density (kg/m^3)	2391.65
Dry Density (kg/m^3)	2222.68

Failure Mode

Type: **2**

Degrees:*

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

MM	September 30, 2014	LP	October 1,2014
TESTED BY	DATE	CHECKED BY	DATE

Golder Associates

Golder Associates Ltd. - Burnaby Lab
#300 - 3811 North Fraser Way
Burnaby, B.C. Canada V5J 5J2

Uniaxial Compressive Strength of Intact Rock Core Specimens

Reference
ASTM D7012-14 Method C

Project No.:	1412835	**Borehole:**	**HMM-BH-03**
Project:	Burnaby Mountain Geotechnical Drilling Investigat	**Sample Number:**	8
Location:	Burnaby, BC	**Depth (m):**	61.46-61.65
Client:	BGC Engineering Inc.	**Lab ID No:**	288

Testing Results

Max Load (kN)	**48.32**
Stress σ_u (MPa)	**17.3**
Pace Rate (kN/s)	1.25
Lithology	Sandstone

Sample Measurements

Diameter (mm)	59.71
Height (mm)	125.83
Area (cm^2)	28.00
Volume (cm^3)	352.35
Mass (g)	836.70
Moisture Content (%)	7.94
Wet Density (kg/m^3)	2374.66
Dry Density (kg/m^3)	2199.96

Failure Mode

Type: **4/2**

Degrees:* **21**

* Degrees measured with respect to core axis.

Notes

- Water content as received

Mode:

(1) Diagonal shear plane(s)
(2) Vertical fracture(s)
(3) Vertical splitting
(4) Shear along foliation /discontinuity
(5) Conical
(6) Spalling
(7) Other

Comments

** The test data given herein pertain to the sample provided only. This report constitutes a testing service only. Interpretation of the data given here may be provided upon request.*

BEFORE TEST

AFTER TEST

MM	September 30, 2014	LP	October 1,2014
TESTED BY	DATE	CHECKED BY	DATE