APPENDIX D

Certificates of Analysis

Maxxam
A Bureau Veritas Group Company

Success Through Science®

Your P.O. #: 100347-001
Your Project #: Roberts Bay
Your C.O.C. #: 501415-01-01

Attention:Elliott Holden

ARCADIS Canada
121 GRANTON DRIVE, UNIT 12
RICHMOND HILL, ON
CANADA T4B 3N4

Report Date: 2016/08/31
Report #: R2250991
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B672104
Received: 2016/08/23, 09:45

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity @25C (pp, total), CO3,HCO3,OH	6	N/A	2016/08/25	AB SOP-00005	SM 22 2320 B m
BTEX/F1 in Water by HS GC/MS/FID	6	N/A	2016/08/29	AB SOP-00039	CCME CWS/EPA 8260c m
Cadmium - low level CCME - Dissolved	6	N/A	2016/08/27	AB WI-00065	Auto Calc
Cadmium - low level CCME (Total)	6	N/A	2016/08/27	AB WI-00065	Auto Calc
Chloride by Automated Colourimetry	6	N/A	2016/08/25	AB SOP-00020	SM 22 4500-Cl G m
True Colour	6	N/A	2016/08/25	EENVSOP-00065	SM 22 2120 C m
Total Hexavalent Chromium	6	N/A	2016/08/26	AB SOP-00063	SM 22 3500-Cr B m
Conductivity @25C	6	N/A	2016/08/25	AB SOP-00005	SM 22 2510 B m
PCB in Water - Subcontract (1)	6	N/A	2016/08/29		
CCME Hydrocarbons (F2-F4 in water)	6	2016/08/28	2016/08/29	AB SOP-00037 / AB SOP-00040	CCME PHC-CWS m
Hardness	6	N/A	2016/08/27	AB WI-00065	Auto Calc
Mercury-Low Level-Dissolved-Lab Filtered	6	2016/08/30	2016/08/30	EENVSOP-00031	EPA 1631E/245.1 R3 m
Mercury - Low Level (Total)	6	2016/08/30	2016/08/30	EENVSOP-00031	EPA 1631E/245.1 R3 m
Elements by ICP-Dissolved-Lab Filtered	6	N/A	2016/08/27	AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICP - Total	6	2016/08/27	2016/08/27	AB SOP-00014 / AB SOP-00042	EPA 200.7 CFR 2012 m
Elements by ICPMS-Dissolved-Lab Filtered	6	N/A	2016/08/27	AB SOP-00043	EPA 200.8 R5.4 m
Elements by ICPMS - Total	6	2016/08/27	2016/08/27	AB SOP-00014 / AB SOP-00043	EPA 200.8 R5.4 m
Ion Balance	6	N/A	2016/08/27	AB WI-00065	Auto Calc
Sum of cations, anions	6	N/A	2016/08/27	AB WI-00065	Auto Calc
Nitrate and Nitrite	6	N/A	2016/08/26	AB WI-00065	Auto Calc
Nitrate + Nitrite-N (calculated)	6	N/A	2016/08/26	AB WI-00065	Auto Calc
Nitrogen, (Nitrite, Nitrate) by IC	6	N/A	2016/08/25	AB SOP-00023	SM 22 4110 B m
pH @25°C	6	N/A	2016/08/25	AB SOP-00005	SM 22 4500 H+ B m
Sulphate by Automated Colourimetry	6	N/A	2016/08/25	AB SOP-00018	SM 22 4500-SO4 E m
Total Dissolved Solids (Filt. Residue)	6	2016/08/26	2016/08/27	AB SOP-00065	SM 22 2540 C m
Total Dissolved Solids (Calculated)	6	N/A	2016/08/27	AB WI-00065	Auto Calc
Total Suspended Solids (NFR)	6	2016/08/26	2016/08/29	AB SOP-00061	SM 22 2540 D m

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Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* 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 Edmonton)

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Parminder Virk, Project Manager
Email: PVirk@maxxam.ca
Phone# (780) 577-7100

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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.

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Report Date: 2016/08/31

ARCADIS Canada
Client Project #: Roberts Bay
Your P.O. #: 100347-001
Sampler Initials: EH, JM, KL

AT1 BTEX AND F1-F4 IN WATER (WATER)

Maxxam ID		PI6981	PI6982	PI6983	PI6984	PI6985	PI6986		
Sampling Date		2016/08/19 15:30	2016/08/19 16:05	2016/08/19 15:10	2016/08/19 17:35	2016/08/19 14:45	2016/08/19		
COC Number		501415-01-01	501415-01-01	501415-01-01	501415-01-01	501415-01-01	501415-01-01		
	UNITS	ROB-6	ROB-7	ROB-8	ROB-9	ROB-10	ROB DUP	RDL	QC Batch
Ext. Pet. Hydrocarbon									
F2 (C10-C16 Hydrocarbons)	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10	8379589
F3 (C16-C34 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	8379589
F4 (C34-C50 Hydrocarbons)	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	8379589
Reached Baseline at C50	mg/L	Yes	Yes	Yes	Yes	Yes	Yes		8379589
Volatiles									
Benzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	8379712
Toluene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	8379712
Ethylbenzene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	8379712
m & p-Xylene	ug/L	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	0.80	8379712
o-Xylene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	8379712
Xylenes (Total)	ug/L	<0.80	<0.80	<0.80	<0.80	<0.80	<0.80	0.80	8379712
F1 (C6-C10) - BTEX	ug/L	<100	<100	<100	<100	<100	<100	100	8379712
F1 (C6-C10)	ug/L	<100	<100	<100	<100	<100	<100	100	8379712
Surrogate Recovery (%)									
1,4-Difluorobenzene (sur.)	%	98	100	102	98	98	100		8379712
4-Bromofluorobenzene (sur.)	%	100	98	101	99	100	98		8379712
D4-1,2-Dichloroethane (sur.)	%	101	102	103	99	100	101		8379712
O-TERPHENYL (sur.)	%	98	102	98	99	98	98		8379589

RDL = Reportable Detection Limit

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Sampler Initials: EH, JM, KL

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		PI6981	PI6982		PI6983		
Sampling Date		2016/08/19 15:30	2016/08/19 16:05		2016/08/19 15:10		
COC Number		501415-01-01	501415-01-01		501415-01-01		
	UNITS	ROB-6	ROB-7	RDL	ROB-8	RDL	QC Batch
Calculated Parameters							
Anion Sum	meq/L	1.9	3.2	N/A	41	N/A	8375306
Cation Sum	meq/L	2.3	3.4	N/A	45	N/A	8375306
Hardness (CaCO3)	mg/L	98	140	0.50	820	0.50	8375154
Ion Balance	N/A	1.3	1.1	0.010	1.1	0.010	8375305
Dissolved Nitrate (NO3)	mg/L	<0.044	0.24	0.044	<0.044	0.044	8374860
Nitrate plus Nitrite (N)	mg/L	<0.020	0.054	0.020	<0.020	0.020	8374861
Dissolved Nitrite (NO2)	mg/L	<0.033	<0.033	0.033	<0.033	0.033	8374860
Calculated Total Dissolved Solids	mg/L	110	160	10	2400	10	8375307
Misc. Inorganics							
Conductivity	uS/cm	190	300	1.0	4400	1.0	8376147
pH	pH	7.01	7.91	N/A	7.83	N/A	8376144
Low Level Elements							
Dissolved Cadmium (Cd)	ug/L	0.026	<0.020	0.020	<0.020	0.020	8374379
Anions							
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	0.50	<0.50	0.50	8376146
Alkalinity (Total as CaCO3)	mg/L	68	130	0.50	290	0.50	8376146
Bicarbonate (HCO3)	mg/L	83	150	0.50	360	0.50	8376146
Carbonate (CO3)	mg/L	<0.50	<0.50	0.50	<0.50	0.50	8376146
Hydroxide (OH)	mg/L	<0.50	<0.50	0.50	<0.50	0.50	8376146
Dissolved Sulphate (SO4)	mg/L	9.7	8.7	1.0	140	1.0	8376471
Dissolved Chloride (Cl)	mg/L	11	16	1.0	1100 (1)	10	8376462
Nutrients							
Dissolved Nitrite (N)	mg/L	<0.010	<0.010	0.010	<0.010	0.010	8376885
Dissolved Nitrate (N)	mg/L	<0.010	0.054	0.010	<0.010	0.010	8376885
Lab Filtered Elements							
Dissolved Aluminum (Al)	mg/L	0.098	0.014	0.0030	0.0059	0.0030	8379135
Dissolved Antimony (Sb)	mg/L	<0.00060	<0.00060	0.00060	<0.00060	0.00060	8379135
Dissolved Arsenic (As)	mg/L	0.0015	0.00027	0.00020	0.0022	0.00020	8379135
Dissolved Barium (Ba)	mg/L	0.028	0.025	0.010	0.066	0.010	8379113
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	0.0010	<0.0010	0.0010	8379135

RDL = Reportable Detection Limit
N/A = Not Applicable
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		PI6981	PI6982		PI6983		
Sampling Date		2016/08/19 15:30	2016/08/19 16:05		2016/08/19 15:10		
COC Number		501415-01-01	501415-01-01		501415-01-01		
	UNITS	ROB-6	ROB-7	RDL	ROB-8	RDL	QC Batch
Dissolved Boron (B)	mg/L	<0.020	<0.020	0.020	0.049	0.020	8379113
Dissolved Calcium (Ca)	mg/L	31 (1)	35 (1)	0.30	140	0.30	8379113
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0010	<0.0010	0.0010	8379135
Dissolved Cobalt (Co)	mg/L	0.0015	<0.00030	0.00030	0.00035	0.00030	8379135
Dissolved Copper (Cu)	mg/L	0.0085	0.0077	0.00020	0.00040	0.00020	8379135
Dissolved Iron (Fe)	mg/L	0.66	<0.060	0.060	0.29	0.060	8379113
Dissolved Lead (Pb)	mg/L	0.00032	<0.00020	0.00020	<0.00020	0.00020	8379135
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	0.020	<0.020	0.020	8379113
Dissolved Magnesium (Mg)	mg/L	4.9 (1)	13 (1)	0.20	110	0.20	8379113
Dissolved Manganese (Mn)	mg/L	0.028	<0.0040	0.0040	0.59	0.0040	8379113
Dissolved Molybdenum (Mo)	mg/L	0.00057 (1)	0.00048	0.00020	0.0014	0.00020	8379135
Dissolved Nickel (Ni)	mg/L	0.0017	<0.00050	0.00050	0.00072	0.00050	8379135
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	0.10	<0.10	0.10	8379113
Dissolved Potassium (K)	mg/L	<0.30	1.3	0.30	10 (1)	0.30	8379113
Dissolved Selenium (Se)	mg/L	0.00034	<0.00020	0.00020	<0.00020	0.00020	8379135
Dissolved Silicon (Si)	mg/L	2.8 (1)	1.8	0.10	1.1	0.10	8379113
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	0.00010	<0.00010	0.00010	8379135
Dissolved Sodium (Na)	mg/L	8.2 (1)	12	0.50	650 (2)	5.0	8379113
Dissolved Strontium (Sr)	mg/L	0.035	0.033 (3)	0.020	0.66 (1)	0.020	8379113
Dissolved Sulphur (S)	mg/L	5.1 (1)	3.0	0.20	45	0.20	8379113
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	0.00020	<0.00020	0.00020	8379135
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	0.0010	<0.0010	0.0010	8379135
Dissolved Titanium (Ti)	mg/L	0.0013	<0.0010	0.0010	<0.0010	0.0010	8379135
Dissolved Uranium (U)	mg/L	<0.00010	0.00020	0.00010	0.0018	0.00010	8379135
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	0.0010	<0.0010	0.0010	8379135
Dissolved Zinc (Zn)	mg/L	0.0068 (1)	<0.0030	0.0030	<0.0030	0.0030	8379135

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results within acceptable limits of precision.
(2) Detection limits raised due to dilution to bring analyte within the calibrated range.
(3) Dissolved greater than total. Results are within limits of uncertainty(MU).

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Your P.O. #: 100347-001
Sampler Initials: EH, JM, KL

ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		PI6984	PI6985	PI6986		
Sampling Date		2016/08/19 17:35	2016/08/19 14:45	2016/08/19		
COC Number		501415-01-01	501415-01-01	501415-01-01		
	UNITS	ROB-9	ROB-10	ROB DUP	RDL	QC Batch
Calculated Parameters						
Anion Sum	meq/L	2.5	9.0	3.1	N/A	8375306
Cation Sum	meq/L	2.6	9.5	3.3	N/A	8375306
Hardness (CaCO3)	mg/L	52	330	140	0.50	8375154
Ion Balance	N/A	1.0	1.1	1.1	0.010	8375305
Dissolved Nitrate (NO3)	mg/L	<0.044	9.9	0.25	0.044	8375530
Nitrate plus Nitrite (N)	mg/L	<0.020	2.2	0.057	0.020	8375531
Dissolved Nitrite (NO2)	mg/L	<0.033	<0.033	<0.033	0.033	8375530
Calculated Total Dissolved Solids	mg/L	140	520	160	10	8375307
Misc. Inorganics						
Conductivity	uS/cm	280	890	310	1.0	8376147
pH	pH	7.51	7.71	7.97	N/A	8376144
Low Level Elements						
Dissolved Cadmium (Cd)	ug/L	0.020	<0.020	<0.020	0.020	8374379
Anions						
Alkalinity (PP as CaCO3)	mg/L	<0.50	<0.50	<0.50	0.50	8376146
Alkalinity (Total as CaCO3)	mg/L	28	180	130	0.50	8376146
Bicarbonate (HCO3)	mg/L	34	210	150	0.50	8376146
Carbonate (CO3)	mg/L	<0.50	<0.50	<0.50	0.50	8376146
Hydroxide (OH)	mg/L	<0.50	<0.50	<0.50	0.50	8376146
Dissolved Sulphate (SO4)	mg/L	4.4	140	8.8	1.0	8376471
Dissolved Chloride (Cl)	mg/L	66	90	16	1.0	8376462
Nutrients						
Dissolved Nitrite (N)	mg/L	<0.010	<0.010	<0.010	0.010	8376885
Dissolved Nitrate (N)	mg/L	<0.010	2.2	0.057	0.010	8376885
Lab Filtered Elements						
Dissolved Aluminum (Al)	mg/L	0.077	0.0048	0.013	0.0030	8379135
Dissolved Antimony (Sb)	mg/L	<0.00060	0.0017	<0.00060	0.00060	8379135
Dissolved Arsenic (As)	mg/L	0.00021	0.0012	0.00034	0.00020	8379135
Dissolved Barium (Ba)	mg/L	<0.010	0.048	0.025	0.010	8379113
Dissolved Beryllium (Be)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	8379135
Dissolved Boron (B)	mg/L	<0.020	0.048	<0.020	0.020	8379113

RDL = Reportable Detection Limit
N/A = Not Applicable

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ROUTINE WATER & DISS. REGULATED METALS (WATER)

Maxxam ID		PI6984	PI6985	PI6986		
Sampling Date		2016/08/19 17:35	2016/08/19 14:45	2016/08/19		
COC Number		501415-01-01	501415-01-01	501415-01-01		
	UNITS	ROB-9	ROB-10	ROB DUP	RDL	QC Batch
Dissolved Calcium (Ca)	mg/L	9.3 (1)	85 (1)	35 (1)	0.30	8379113
Dissolved Chromium (Cr)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	8379135
Dissolved Cobalt (Co)	mg/L	<0.00030	<0.00030	<0.00030	0.00030	8379135
Dissolved Copper (Cu)	mg/L	0.0016	0.0058	0.0077	0.00020	8379135
Dissolved Iron (Fe)	mg/L	0.083	<0.060	<0.060	0.060	8379113
Dissolved Lead (Pb)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	8379135
Dissolved Lithium (Li)	mg/L	<0.020	<0.020	<0.020	0.020	8379113
Dissolved Magnesium (Mg)	mg/L	7.0 (1)	29 (1)	13 (1)	0.20	8379113
Dissolved Manganese (Mn)	mg/L	0.011	<0.0040	<0.0040	0.0040	8379113
Dissolved Molybdenum (Mo)	mg/L	<0.00020	0.0017	0.00049	0.00020	8379135
Dissolved Nickel (Ni)	mg/L	0.00052	<0.00050	<0.00050	0.00050	8379135
Dissolved Phosphorus (P)	mg/L	<0.10	<0.10	<0.10	0.10	8379113
Dissolved Potassium (K)	mg/L	2.3 (1)	4.6 (1)	1.3	0.30	8379113
Dissolved Selenium (Se)	mg/L	<0.00020	0.00032	<0.00020	0.00020	8379135
Dissolved Silicon (Si)	mg/L	0.57	2.2	1.8	0.10	8379113
Dissolved Silver (Ag)	mg/L	<0.00010	<0.00010	<0.00010	0.00010	8379135
Dissolved Sodium (Na)	mg/L	35 (1)	63 (1)	12	0.50	8379113
Dissolved Strontium (Sr)	mg/L	0.056 (2)	0.15 (1)	0.033 (2)	0.020	8379113
Dissolved Sulphur (S)	mg/L	1.8	41	3.0	0.20	8379113
Dissolved Thallium (Tl)	mg/L	<0.00020	<0.00020	<0.00020	0.00020	8379135
Dissolved Tin (Sn)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	8379135
Dissolved Titanium (Ti)	mg/L	0.0031	<0.0010	<0.0010	0.0010	8379135
Dissolved Uranium (U)	mg/L	<0.00010	0.0034	0.00021	0.00010	8379135
Dissolved Vanadium (V)	mg/L	<0.0010	<0.0010	<0.0010	0.0010	8379135
Dissolved Zinc (Zn)	mg/L	<0.0030	<0.0030	<0.0030	0.0030	8379135

RDL = Reportable Detection Limit
(1) Dissolved greater than total. Results within acceptable limits of precision.
(2) Dissolved greater than total. Results are within limits of uncertainty(MU).

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REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		PI6981	PI6982		PI6983		PI6984		
Sampling Date		2016/08/19 15:30	2016/08/19 16:05		2016/08/19 15:10		2016/08/19 17:35		
COC Number		501415-01-01	501415-01-01		501415-01-01		501415-01-01		
	UNITS	ROB-6	ROB-7	RDL	ROB-8	RDL	ROB-9	RDL	QC Batch
Low Level Elements									
Total Cadmium (Cd)	ug/L	0.031	<0.020	0.020	<0.020	0.020	<0.020	0.020	8374380
Elements									
Total Aluminum (Al)	mg/L	0.16	0.073	0.0030	0.011	0.0030	0.47	0.0030	8379037
Total Antimony (Sb)	mg/L	<0.00060	<0.00060	0.00060	<0.00060	0.00060	<0.00060	0.00060	8379037
Total Arsenic (As)	mg/L	0.0039	0.00035	0.00020	0.0024	0.00020	0.00036	0.00020	8379037
Total Barium (Ba)	mg/L	0.044	0.026	0.010	0.068	0.010	<0.010	0.010	8379040
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8379037
Total Boron (B)	mg/L	<0.020	<0.020	0.020	0.050	0.020	0.021	0.020	8379040
Total Calcium (Ca)	mg/L	29	34	0.30	140	0.30	8.5	0.30	8379040
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0010	<0.0010	0.0010	0.0011	0.0010	8379037
Total Cobalt (Co)	mg/L	0.0020	<0.00030	0.00030	0.00044	0.00030	<0.00030	0.00030	8379037
Total Copper (Cu)	mg/L	0.0086	0.0093	0.00020	0.00064	0.00020	0.0022	0.00020	8379037
Total Iron (Fe)	mg/L	2.9	0.14	0.060	0.53	0.060	0.59	0.060	8379040
Total Lead (Pb)	mg/L	0.0023	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	8379037
Total Lithium (Li)	mg/L	<0.020	<0.020	0.020	<0.020	0.020	<0.020	0.020	8379040
Total Magnesium (Mg)	mg/L	4.7	12	0.20	110	0.20	6.6	0.20	8379040
Total Manganese (Mn)	mg/L	0.032	0.0062	0.0040	0.69	0.0040	0.017	0.0040	8379040
Total Molybdenum (Mo)	mg/L	0.00037	0.00050	0.00020	0.0014	0.00020	<0.00020	0.00020	8379037
Total Nickel (Ni)	mg/L	0.0023	0.00060	0.00050	0.00081	0.00050	0.0012	0.00050	8379037
Total Phosphorus (P)	mg/L	<0.10	<0.10	0.10	<0.10	0.10	<0.10	0.10	8379040
Total Potassium (K)	mg/L	<0.30	1.3	0.30	9.6	0.30	2.2	0.30	8379040
Total Selenium (Se)	mg/L	0.00042	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	8379037
Total Silicon (Si)	mg/L	2.5	2.0	0.10	1.1	0.10	1.4	0.10	8379040
Total Silver (Ag)	mg/L	<0.00010	<0.00010	0.00010	<0.00010	0.00010	<0.00010	0.00010	8379037
Total Sodium (Na)	mg/L	7.2	12	0.50	660 (1)	5.0	33	0.50	8379040
Total Strontium (Sr)	mg/L	0.035	0.032	0.020	0.63	0.020	0.049	0.020	8379040
Total Sulphur (S)	mg/L	4.7	3.2	0.20	49	0.20	1.9	0.20	8379040
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	0.00020	<0.00020	0.00020	<0.00020	0.00020	8379037
Total Tin (Sn)	mg/L	<0.0010	<0.0010	0.0010	<0.0010	0.0010	<0.0010	0.0010	8379037
Total Titanium (Ti)	mg/L	0.0039	0.0027	0.0010	<0.0010	0.0010	0.026	0.0010	8379037
Total Uranium (U)	mg/L	0.00014	0.00021	0.00010	0.0018	0.00010	<0.00010	0.00010	8379037

RDL = Reportable Detection Limit
(1) Detection limits raised due to dilution to bring analyte within the calibrated range.

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Client Project #: Roberts Bay
Your P.O. #: 100347-001
Sampler Initials: EH, JM, KL

REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		PI6981	PI6982		PI6983		PI6984		
Sampling Date		2016/08/19 15:30	2016/08/19 16:05		2016/08/19 15:10		2016/08/19 17:35		
COC Number		501415-01-01	501415-01-01		501415-01-01		501415-01-01		
	UNITS	ROB-6	ROB-7	RDL	ROB-8	RDL	ROB-9	RDL	QC Batch
Total Vanadium (V)	mg/L	0.0014	<0.0010	0.0010	<0.0010	0.0010	0.0017	0.0010	8379037
Total Zinc (Zn)	mg/L	0.0056	<0.0030	0.0030	<0.0030	0.0030	<0.0030	0.0030	8379037
RDL = Reportable Detection Limit									

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REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		PI6985	PI6986		
Sampling Date		2016/08/19 14:45	2016/08/19		
COC Number		501415-01-01	501415-01-01		
	UNITS	ROB-10	ROB DUP	RDL	QC Batch
Low Level Elements					
Total Cadmium (Cd)	ug/L	<0.020	<0.020	0.020	8374380
Elements					
Total Aluminum (Al)	mg/L	0.034	0.055	0.0030	8379037
Total Antimony (Sb)	mg/L	0.0017	<0.00060	0.00060	8379037
Total Arsenic (As)	mg/L	0.0014	0.00042	0.00020	8379037
Total Barium (Ba)	mg/L	0.049	0.026	0.010	8379040
Total Beryllium (Be)	mg/L	<0.0010	<0.0010	0.0010	8379037
Total Boron (B)	mg/L	0.048	<0.020	0.020	8379040
Total Calcium (Ca)	mg/L	79	34	0.30	8379040
Total Chromium (Cr)	mg/L	<0.0010	<0.0010	0.0010	8379037
Total Cobalt (Co)	mg/L	<0.00030	<0.00030	0.00030	8379037
Total Copper (Cu)	mg/L	0.0072	0.010	0.00020	8379037
Total Iron (Fe)	mg/L	<0.060	0.088	0.060	8379040
Total Lead (Pb)	mg/L	0.00064	<0.00020	0.00020	8379037
Total Lithium (Li)	mg/L	<0.020	<0.020	0.020	8379040
Total Magnesium (Mg)	mg/L	27	12	0.20	8379040
Total Manganese (Mn)	mg/L	0.0045	<0.0040	0.0040	8379040
Total Molybdenum (Mo)	mg/L	0.0018	0.00060	0.00020	8379037
Total Nickel (Ni)	mg/L	0.00064	<0.00050	0.00050	8379037
Total Phosphorus (P)	mg/L	<0.10	<0.10	0.10	8379040
Total Potassium (K)	mg/L	4.3	1.3	0.30	8379040
Total Selenium (Se)	mg/L	0.00034	<0.00020	0.00020	8379037
Total Silicon (Si)	mg/L	2.5	1.9	0.10	8379040
Total Silver (Ag)	mg/L	<0.00010	<0.00010	0.00010	8379037
Total Sodium (Na)	mg/L	60	12	0.50	8379040
Total Strontium (Sr)	mg/L	0.14	0.032	0.020	8379040
Total Sulphur (S)	mg/L	44	3.2	0.20	8379040
Total Thallium (Tl)	mg/L	<0.00020	<0.00020	0.00020	8379037
Total Tin (Sn)	mg/L	<0.0010	<0.0010	0.0010	8379037
Total Titanium (Ti)	mg/L	<0.0010	0.0021	0.0010	8379037
Total Uranium (U)	mg/L	0.0038	0.00025	0.00010	8379037
Total Vanadium (V)	mg/L	<0.0010	<0.0010	0.0010	8379037
RDL = Reportable Detection Limit					

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REGULATED METALS (CCME/AT1) - TOTAL

Maxxam ID		PI6985	PI6986		
Sampling Date		2016/08/19 14:45	2016/08/19		
COC Number		501415-01-01	501415-01-01		
	UNITS	ROB-10	ROB DUP	RDL	QC Batch
Total Zinc (Zn)	mg/L	<0.0030	<0.0030	0.0030	8379037
RDL = Reportable Detection Limit					

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RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		PI6981	PI6982	PI6983	PI6984	PI6985		
Sampling Date		2016/08/19 15:30	2016/08/19 16:05	2016/08/19 15:10	2016/08/19 17:35	2016/08/19 14:45		
COC Number		501415-01-01	501415-01-01	501415-01-01	501415-01-01	501415-01-01		
	UNITS	ROB-6	ROB-7	ROB-8	ROB-9	ROB-10	RDL	QC Batch
Parameter								
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	ATTACHED	ATTACHED	N/A	8383618
Misc. Inorganics								
Total Dissolved Solids	mg/L	180	190	2500	170	540	10	8378619
Total Suspended Solids	mg/L	120	97	8.7	24	85	1.0	8377542
Metals								
Total Hex. Chromium (Cr 6+)	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	8377393
Physical Properties								
True Colour	PtCo units	170	47	80	24	25	2.0	8377619

RDL = Reportable Detection Limit
N/A = Not Applicable

Maxxam ID		PI6986		
Sampling Date		2016/08/19		
COC Number		501415-01-01		
	UNITS	ROB DUP	RDL	QC Batch
Parameter				
Subcontract Parameter	N/A	ATTACHED	N/A	8383618
Misc. Inorganics				
Total Dissolved Solids	mg/L	200	10	8378619
Total Suspended Solids	mg/L	12	1.0	8377542
Metals				
Total Hex. Chromium (Cr 6+)	mg/L	<0.0010	0.0010	8377393
Physical Properties				
True Colour	PtCo units	45	2.0	8377619

RDL = Reportable Detection Limit
N/A = Not Applicable

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		PI6981	PI6982	PI6983	PI6984	PI6985	PI6986		
Sampling Date		2016/08/19 15:30	2016/08/19 16:05	2016/08/19 15:10	2016/08/19 17:35	2016/08/19 14:45	2016/08/19		
COC Number		501415-01-01	501415-01-01	501415-01-01	501415-01-01	501415-01-01	501415-01-01		
	UNITS	ROB-6	ROB-7	ROB-8	ROB-9	ROB-10	ROB DUP	RDL	QC Batch
Low Level Elements									
Total Mercury (Hg)	ug/L	<0.020 (1)	<0.020 (1)	<0.020 (1)	<0.020 (1)	<0.020 (1)	<0.020 (1)	0.020	8381472
Lab Filtered Elements-Low									
Dissolved Mercury (Hg)	ug/L	0.0045	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0020	8381481

RDL = Reportable Detection Limit
(1) Detection limits raised due to sample matrix.

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GENERAL COMMENTS

Sample PI6981-01 : Cation anion balance exceeds normal acceptance limits, due to the low concentrations of ions being measured.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8376144	MA4	Spiked Blank	pH	2016/08/25		100	%	97 - 103
8376144	MA4	RPD	pH	2016/08/25	0.27		%	N/A
8376146	MA4	Spiked Blank	Alkalinity (Total as CaCO3)	2016/08/25		98	%	80 - 120
8376146	MA4	Method Blank	Alkalinity (PP as CaCO3)	2016/08/25	<0.50		mg/L	
			Alkalinity (Total as CaCO3)	2016/08/25	<0.50		mg/L	
			Bicarbonate (HCO3)	2016/08/25	<0.50		mg/L	
			Carbonate (CO3)	2016/08/25	<0.50		mg/L	
			Hydroxide (OH)	2016/08/25	<0.50		mg/L	
8376146	MA4	RPD	Alkalinity (PP as CaCO3)	2016/08/25	NC		%	20
			Alkalinity (Total as CaCO3)	2016/08/25	0.40		%	20
			Bicarbonate (HCO3)	2016/08/25	0.39		%	20
			Carbonate (CO3)	2016/08/25	NC		%	20
			Hydroxide (OH)	2016/08/25	NC		%	20
8376147	MA4	Spiked Blank	Conductivity	2016/08/25		102	%	90 - 110
8376147	MA4	Method Blank	Conductivity	2016/08/25	<1.0		uS/cm	
8376147	MA4	RPD	Conductivity	2016/08/25	0.81		%	20
8376462	CH7	Matrix Spike	Dissolved Chloride (Cl)	2016/08/25		106	%	80 - 120
8376462	CH7	Spiked Blank	Dissolved Chloride (Cl)	2016/08/25		103	%	80 - 120
8376462	CH7	Method Blank	Dissolved Chloride (Cl)	2016/08/25	<1.0		mg/L	
8376462	CH7	RPD	Dissolved Chloride (Cl)	2016/08/25	NC		%	20
8376471	CH7	Matrix Spike	Dissolved Sulphate (SO4)	2016/08/25		NC	%	80 - 120
8376471	CH7	Spiked Blank	Dissolved Sulphate (SO4)	2016/08/25		112	%	80 - 120
8376471	CH7	Method Blank	Dissolved Sulphate (SO4)	2016/08/25	<1.0		mg/L	
8376471	CH7	RPD	Dissolved Sulphate (SO4)	2016/08/25	12		%	20
8376885	LMD	Matrix Spike [PI6981-02]	Dissolved Nitrite (N)	2016/08/25		100	%	80 - 120
			Dissolved Nitrate (N)	2016/08/25		103	%	80 - 120
8376885	LMD	Spiked Blank	Dissolved Nitrite (N)	2016/08/25		99	%	80 - 120
			Dissolved Nitrate (N)	2016/08/25		101	%	80 - 120
8376885	LMD	Method Blank	Dissolved Nitrite (N)	2016/08/25	<0.010		mg/L	
			Dissolved Nitrate (N)	2016/08/25	<0.010		mg/L	
8376885	LMD	RPD [PI6981-02]	Dissolved Nitrite (N)	2016/08/25	NC		%	20
			Dissolved Nitrate (N)	2016/08/25	NC		%	20
8377393	AL2	Matrix Spike	Total Hex. Chromium (Cr 6+)	2016/08/26		98	%	80 - 120
8377393	AL2	Spiked Blank	Total Hex. Chromium (Cr 6+)	2016/08/26		108	%	80 - 120
8377393	AL2	Method Blank	Total Hex. Chromium (Cr 6+)	2016/08/26	0.0010, RDL=0.0010		mg/L	
8377393	AL2	RPD	Total Hex. Chromium (Cr 6+)	2016/08/26	NC		%	20
8377542	MPH	Matrix Spike	Total Suspended Solids	2016/08/29		97	%	80 - 120
8377542	MPH	Spiked Blank	Total Suspended Solids	2016/08/29		93	%	80 - 120
8377542	MPH	Method Blank	Total Suspended Solids	2016/08/29	<1.0		mg/L	
8377542	MPH	RPD	Total Suspended Solids	2016/08/29	NC		%	20
8377619	KPG	Spiked Blank	True Colour	2016/08/25		101	%	80 - 120
8377619	KPG	Method Blank	True Colour	2016/08/25	<2.0		PtCo unit	
8377619	KPG	RPD	True Colour	2016/08/25	5.4		%	20
8378619	MPH	Matrix Spike	Total Dissolved Solids	2016/08/27		101	%	80 - 120
8378619	MPH	Spiked Blank	Total Dissolved Solids	2016/08/27		101	%	80 - 120
8378619	MPH	Method Blank	Total Dissolved Solids	2016/08/27	<10		mg/L	
8378619	MPH	RPD	Total Dissolved Solids	2016/08/27	1.8		%	20
8379037	APY	Matrix Spike	Total Aluminum (Al)	2016/08/27		93	%	80 - 120
			Total Antimony (Sb)	2016/08/27		103	%	80 - 120
			Total Arsenic (As)	2016/08/27		100	%	80 - 120
			Total Beryllium (Be)	2016/08/27		101	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Chromium (Cr)	2016/08/27		101	%	80 - 120
			Total Cobalt (Co)	2016/08/27		100	%	80 - 120
			Total Copper (Cu)	2016/08/27		99	%	80 - 120
			Total Lead (Pb)	2016/08/27		101	%	80 - 120
			Total Molybdenum (Mo)	2016/08/27		108	%	80 - 120
			Total Nickel (Ni)	2016/08/27		95	%	80 - 120
			Total Selenium (Se)	2016/08/27		101	%	80 - 120
			Total Silver (Ag)	2016/08/27		101	%	80 - 120
			Total Thallium (Tl)	2016/08/27		101	%	80 - 120
			Total Tin (Sn)	2016/08/27		108	%	80 - 120
			Total Titanium (Ti)	2016/08/27		99	%	80 - 120
			Total Uranium (U)	2016/08/27		101	%	80 - 120
			Total Vanadium (V)	2016/08/27		103	%	80 - 120
			Total Zinc (Zn)	2016/08/27		98	%	80 - 120
8379037	APY	Spiked Blank	Total Aluminum (Al)	2016/08/27		98	%	80 - 120
			Total Antimony (Sb)	2016/08/27		98	%	80 - 120
			Total Arsenic (As)	2016/08/27		101	%	80 - 120
			Total Beryllium (Be)	2016/08/27		94	%	80 - 120
			Total Chromium (Cr)	2016/08/27		104	%	80 - 120
			Total Cobalt (Co)	2016/08/27		101	%	80 - 120
			Total Copper (Cu)	2016/08/27		102	%	80 - 120
			Total Lead (Pb)	2016/08/27		99	%	80 - 120
			Total Molybdenum (Mo)	2016/08/27		105	%	80 - 120
			Total Nickel (Ni)	2016/08/27		100	%	80 - 120
			Total Selenium (Se)	2016/08/27		99	%	80 - 120
			Total Silver (Ag)	2016/08/27		101	%	80 - 120
			Total Thallium (Tl)	2016/08/27		100	%	80 - 120
			Total Tin (Sn)	2016/08/27		105	%	80 - 120
			Total Titanium (Ti)	2016/08/27		99	%	80 - 120
			Total Uranium (U)	2016/08/27		99	%	80 - 120
			Total Vanadium (V)	2016/08/27		103	%	80 - 120
			Total Zinc (Zn)	2016/08/27		97	%	80 - 120
8379037	APY	Method Blank	Total Aluminum (Al)	2016/08/27	0.0039, RDL=0.0030		mg/L	
			Total Antimony (Sb)	2016/08/27	<0.00060		mg/L	
			Total Arsenic (As)	2016/08/27	<0.00020		mg/L	
			Total Beryllium (Be)	2016/08/27	<0.0010		mg/L	
			Total Chromium (Cr)	2016/08/27	<0.0010		mg/L	
			Total Cobalt (Co)	2016/08/27	<0.00030		mg/L	
			Total Copper (Cu)	2016/08/27	<0.00020		mg/L	
			Total Lead (Pb)	2016/08/27	<0.00020		mg/L	
			Total Molybdenum (Mo)	2016/08/27	<0.00020		mg/L	
			Total Nickel (Ni)	2016/08/27	<0.00050		mg/L	
			Total Selenium (Se)	2016/08/27	<0.00020		mg/L	
			Total Silver (Ag)	2016/08/27	<0.00010		mg/L	
			Total Thallium (Tl)	2016/08/27	<0.00020		mg/L	
			Total Tin (Sn)	2016/08/27	<0.0010		mg/L	
			Total Titanium (Ti)	2016/08/27	<0.0010		mg/L	
			Total Uranium (U)	2016/08/27	<0.00010		mg/L	
			Total Vanadium (V)	2016/08/27	<0.0010		mg/L	
			Total Zinc (Zn)	2016/08/27	<0.0030		mg/L	
8379037	APY	RPD	Total Aluminum (Al)	2016/08/27	0.94		%	20

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Antimony (Sb)	2016/08/27	NC		%	20
			Total Arsenic (As)	2016/08/27	NC		%	20
			Total Beryllium (Be)	2016/08/27	NC		%	20
			Total Chromium (Cr)	2016/08/27	NC		%	20
			Total Cobalt (Co)	2016/08/27	NC		%	20
			Total Copper (Cu)	2016/08/27	1.1		%	20
			Total Lead (Pb)	2016/08/27	NC		%	20
			Total Molybdenum (Mo)	2016/08/27	NC		%	20
			Total Nickel (Ni)	2016/08/27	NC		%	20
			Total Selenium (Se)	2016/08/27	NC		%	20
			Total Silver (Ag)	2016/08/27	NC		%	20
			Total Thallium (Tl)	2016/08/27	NC		%	20
			Total Tin (Sn)	2016/08/27	NC		%	20
			Total Titanium (Ti)	2016/08/27	NC		%	20
			Total Uranium (U)	2016/08/27	0.57		%	20
			Total Vanadium (V)	2016/08/27	NC		%	20
			Total Zinc (Zn)	2016/08/27	NC		%	20
8379040	PM5	Matrix Spike	Total Barium (Ba)	2016/08/27		102	%	80 - 120
			Total Boron (B)	2016/08/27		105	%	80 - 120
			Total Calcium (Ca)	2016/08/27		NC	%	80 - 120
			Total Iron (Fe)	2016/08/27		103	%	80 - 120
			Total Lithium (Li)	2016/08/27		101	%	80 - 120
			Total Magnesium (Mg)	2016/08/27		105	%	80 - 120
			Total Manganese (Mn)	2016/08/27		99	%	80 - 120
			Total Phosphorus (P)	2016/08/27		99	%	80 - 120
			Total Potassium (K)	2016/08/27		103	%	80 - 120
			Total Silicon (Si)	2016/08/27		101	%	80 - 120
			Total Sodium (Na)	2016/08/27		NC	%	80 - 120
			Total Strontium (Sr)	2016/08/27		97	%	80 - 120
8379040	PM5	Spiked Blank	Total Barium (Ba)	2016/08/27		102	%	80 - 120
			Total Boron (B)	2016/08/27		104	%	80 - 120
			Total Calcium (Ca)	2016/08/27		98	%	80 - 120
			Total Iron (Fe)	2016/08/27		102	%	80 - 120
			Total Lithium (Li)	2016/08/27		100	%	80 - 120
			Total Magnesium (Mg)	2016/08/27		104	%	80 - 120
			Total Manganese (Mn)	2016/08/27		99	%	80 - 120
			Total Phosphorus (P)	2016/08/27		98	%	80 - 120
			Total Potassium (K)	2016/08/27		102	%	80 - 120
			Total Silicon (Si)	2016/08/27		101	%	80 - 120
			Total Sodium (Na)	2016/08/27		99	%	80 - 120
			Total Strontium (Sr)	2016/08/27		98	%	80 - 120
			Total Sulphur (S)	2016/08/27		101	%	80 - 120
8379040	PM5	Method Blank	Total Barium (Ba)	2016/08/27	<0.010		mg/L	
			Total Boron (B)	2016/08/27	<0.020		mg/L	
			Total Calcium (Ca)	2016/08/27	<0.30		mg/L	
			Total Iron (Fe)	2016/08/27	<0.060		mg/L	
			Total Lithium (Li)	2016/08/27	<0.020		mg/L	
			Total Magnesium (Mg)	2016/08/27	<0.20		mg/L	
			Total Manganese (Mn)	2016/08/27	<0.0040		mg/L	
			Total Phosphorus (P)	2016/08/27	<0.10		mg/L	
			Total Potassium (K)	2016/08/27	<0.30		mg/L	
			Total Silicon (Si)	2016/08/27	<0.10		mg/L	

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Sampler Initials: EH, JM, KL

QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Sodium (Na)	2016/08/27	<0.50		mg/L	
			Total Strontium (Sr)	2016/08/27	<0.020		mg/L	
			Total Sulphur (S)	2016/08/27	<0.20		mg/L	
8379040	PM5	RPD	Total Barium (Ba)	2016/08/27	NC		%	20
			Total Boron (B)	2016/08/27	2.2		%	20
			Total Calcium (Ca)	2016/08/27	0.091		%	20
			Total Iron (Fe)	2016/08/27	NC		%	20
			Total Lithium (Li)	2016/08/27	NC		%	20
			Total Magnesium (Mg)	2016/08/27	0.79		%	20
			Total Manganese (Mn)	2016/08/27	NC		%	20
			Total Phosphorus (P)	2016/08/27	NC		%	20
			Total Potassium (K)	2016/08/27	0.91		%	20
			Total Silicon (Si)	2016/08/27	NC		%	20
			Total Sodium (Na)	2016/08/27	0.51		%	20
			Total Strontium (Sr)	2016/08/27	NC		%	20
			Total Sulphur (S)	2016/08/27	1.6		%	20
8379113	PM5	Matrix Spike	Dissolved Barium (Ba)	2016/08/27		103	%	80 - 120
			Dissolved Boron (B)	2016/08/27		107	%	80 - 120
			Dissolved Calcium (Ca)	2016/08/27		99	%	80 - 120
			Dissolved Iron (Fe)	2016/08/27		103	%	80 - 120
			Dissolved Lithium (Li)	2016/08/27		98	%	80 - 120
			Dissolved Magnesium (Mg)	2016/08/27		107	%	80 - 120
			Dissolved Manganese (Mn)	2016/08/27		101	%	80 - 120
			Dissolved Phosphorus (P)	2016/08/27		104	%	80 - 120
			Dissolved Potassium (K)	2016/08/27		101	%	80 - 120
			Dissolved Silicon (Si)	2016/08/27		109	%	80 - 120
			Dissolved Sodium (Na)	2016/08/27		NC	%	80 - 120
			Dissolved Strontium (Sr)	2016/08/27		97	%	80 - 120
8379113	PM5	Spiked Blank	Dissolved Barium (Ba)	2016/08/27		100	%	80 - 120
			Dissolved Boron (B)	2016/08/27		104	%	80 - 120
			Dissolved Calcium (Ca)	2016/08/27		96	%	80 - 120
			Dissolved Iron (Fe)	2016/08/27		101	%	80 - 120
			Dissolved Lithium (Li)	2016/08/27		98	%	80 - 120
			Dissolved Magnesium (Mg)	2016/08/27		104	%	80 - 120
			Dissolved Manganese (Mn)	2016/08/27		98	%	80 - 120
			Dissolved Phosphorus (P)	2016/08/27		100	%	80 - 120
			Dissolved Potassium (K)	2016/08/27		102	%	80 - 120
			Dissolved Silicon (Si)	2016/08/27		106	%	80 - 120
			Dissolved Sodium (Na)	2016/08/27		99	%	80 - 120
			Dissolved Strontium (Sr)	2016/08/27		95	%	80 - 120
			Dissolved Sulphur (S)	2016/08/27		103	%	80 - 120
8379113	PM5	Method Blank	Dissolved Barium (Ba)	2016/08/27	<0.010		mg/L	
			Dissolved Boron (B)	2016/08/27	<0.020		mg/L	
			Dissolved Calcium (Ca)	2016/08/27	<0.30		mg/L	
			Dissolved Iron (Fe)	2016/08/27	<0.060		mg/L	
			Dissolved Lithium (Li)	2016/08/27	<0.020		mg/L	
			Dissolved Magnesium (Mg)	2016/08/27	<0.20		mg/L	
			Dissolved Manganese (Mn)	2016/08/27	<0.0040		mg/L	
			Dissolved Phosphorus (P)	2016/08/27	<0.10		mg/L	
			Dissolved Potassium (K)	2016/08/27	<0.30		mg/L	
			Dissolved Silicon (Si)	2016/08/27	<0.10		mg/L	
			Dissolved Sodium (Na)	2016/08/27	<0.50		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Strontium (Sr)	2016/08/27	<0.020		mg/L	
			Dissolved Sulphur (S)	2016/08/27	<0.20		mg/L	
8379113	PM5	RPD	Dissolved Calcium (Ca)	2016/08/27	0.42		%	20
			Dissolved Magnesium (Mg)	2016/08/27	0.53		%	20
			Dissolved Potassium (K)	2016/08/27	0.20		%	20
8379135	APY	Matrix Spike	Dissolved Aluminum (Al)	2016/08/27		NC	%	80 - 120
			Dissolved Antimony (Sb)	2016/08/27		99	%	80 - 120
			Dissolved Arsenic (As)	2016/08/27		99	%	80 - 120
			Dissolved Beryllium (Be)	2016/08/27		96	%	80 - 120
			Dissolved Chromium (Cr)	2016/08/27		97	%	80 - 120
			Dissolved Cobalt (Co)	2016/08/27		95	%	80 - 120
			Dissolved Copper (Cu)	2016/08/27		94	%	80 - 120
			Dissolved Lead (Pb)	2016/08/27		98	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/08/27		102	%	80 - 120
			Dissolved Nickel (Ni)	2016/08/27		94	%	80 - 120
			Dissolved Selenium (Se)	2016/08/27		98	%	80 - 120
			Dissolved Silver (Ag)	2016/08/27		98	%	80 - 120
			Dissolved Thallium (Tl)	2016/08/27		98	%	80 - 120
			Dissolved Tin (Sn)	2016/08/27		105	%	80 - 120
			Dissolved Titanium (Ti)	2016/08/27		97	%	80 - 120
			Dissolved Uranium (U)	2016/08/27		98	%	80 - 120
			Dissolved Vanadium (V)	2016/08/27		99	%	80 - 120
			Dissolved Zinc (Zn)	2016/08/27		95	%	80 - 120
8379135	APY	Spiked Blank	Dissolved Aluminum (Al)	2016/08/27		99	%	80 - 120
			Dissolved Antimony (Sb)	2016/08/27		96	%	80 - 120
			Dissolved Arsenic (As)	2016/08/27		100	%	80 - 120
			Dissolved Beryllium (Be)	2016/08/27		96	%	80 - 120
			Dissolved Chromium (Cr)	2016/08/27		99	%	80 - 120
			Dissolved Cobalt (Co)	2016/08/27		98	%	80 - 120
			Dissolved Copper (Cu)	2016/08/27		98	%	80 - 120
			Dissolved Lead (Pb)	2016/08/27		99	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/08/27		101	%	80 - 120
			Dissolved Nickel (Ni)	2016/08/27		97	%	80 - 120
			Dissolved Selenium (Se)	2016/08/27		99	%	80 - 120
			Dissolved Silver (Ag)	2016/08/27		99	%	80 - 120
			Dissolved Thallium (Tl)	2016/08/27		99	%	80 - 120
			Dissolved Tin (Sn)	2016/08/27		104	%	80 - 120
			Dissolved Titanium (Ti)	2016/08/27		97	%	80 - 120
			Dissolved Uranium (U)	2016/08/27		97	%	80 - 120
			Dissolved Vanadium (V)	2016/08/27		99	%	80 - 120
			Dissolved Zinc (Zn)	2016/08/27		99	%	80 - 120
8379135	APY	Method Blank	Dissolved Aluminum (Al)	2016/08/27	0.0046, RDL=0.0030		mg/L	
			Dissolved Antimony (Sb)	2016/08/27	<0.00060		mg/L	
			Dissolved Arsenic (As)	2016/08/27	<0.00020		mg/L	
			Dissolved Beryllium (Be)	2016/08/27	<0.0010		mg/L	
			Dissolved Chromium (Cr)	2016/08/27	<0.0010		mg/L	
			Dissolved Cobalt (Co)	2016/08/27	<0.00030		mg/L	
			Dissolved Copper (Cu)	2016/08/27	<0.00020		mg/L	
			Dissolved Lead (Pb)	2016/08/27	<0.00020		mg/L	
			Dissolved Molybdenum (Mo)	2016/08/27	<0.00020		mg/L	
			Dissolved Nickel (Ni)	2016/08/27	<0.00050		mg/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Selenium (Se)	2016/08/27	<0.00020		mg/L	
			Dissolved Silver (Ag)	2016/08/27	<0.00010		mg/L	
			Dissolved Thallium (Tl)	2016/08/27	<0.00020		mg/L	
			Dissolved Tin (Sn)	2016/08/27	<0.0010		mg/L	
			Dissolved Titanium (Ti)	2016/08/27	<0.0010		mg/L	
			Dissolved Uranium (U)	2016/08/27	<0.00010		mg/L	
			Dissolved Vanadium (V)	2016/08/27	<0.0010		mg/L	
			Dissolved Zinc (Zn)	2016/08/27	<0.0030		mg/L	
8379135	APY	RPD	Dissolved Aluminum (Al)	2016/08/27	7.8		%	20
			Dissolved Antimony (Sb)	2016/08/27	NC		%	20
			Dissolved Arsenic (As)	2016/08/27	NC		%	20
			Dissolved Beryllium (Be)	2016/08/27	NC		%	20
			Dissolved Chromium (Cr)	2016/08/27	NC		%	20
			Dissolved Cobalt (Co)	2016/08/27	NC		%	20
			Dissolved Copper (Cu)	2016/08/27	NC		%	20
			Dissolved Lead (Pb)	2016/08/27	NC		%	20
			Dissolved Molybdenum (Mo)	2016/08/27	0.26		%	20
			Dissolved Nickel (Ni)	2016/08/27	NC		%	20
			Dissolved Selenium (Se)	2016/08/27	NC		%	20
			Dissolved Silver (Ag)	2016/08/27	NC		%	20
			Dissolved Thallium (Tl)	2016/08/27	NC		%	20
			Dissolved Tin (Sn)	2016/08/27	NC		%	20
			Dissolved Titanium (Ti)	2016/08/27	NC		%	20
			Dissolved Uranium (U)	2016/08/27	1.4		%	20
			Dissolved Vanadium (V)	2016/08/27	NC		%	20
			Dissolved Zinc (Zn)	2016/08/27	NC		%	20
8379589	JR1	Matrix Spike	O-TERPHENYL (sur.)	2016/08/29		101	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/08/29		101	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2016/08/29		101	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2016/08/29		94	%	50 - 130
8379589	JR1	Spiked Blank	O-TERPHENYL (sur.)	2016/08/29		98	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/08/29		100	%	70 - 130
			F3 (C16-C34 Hydrocarbons)	2016/08/29		99	%	70 - 130
			F4 (C34-C50 Hydrocarbons)	2016/08/29		92	%	70 - 130
8379589	JR1	Method Blank	O-TERPHENYL (sur.)	2016/08/29		100	%	50 - 130
			F2 (C10-C16 Hydrocarbons)	2016/08/29	<0.10		mg/L	
			F3 (C16-C34 Hydrocarbons)	2016/08/29	<0.20		mg/L	
			F4 (C34-C50 Hydrocarbons)	2016/08/29	<0.20		mg/L	
8379589	JR1	RPD	F2 (C10-C16 Hydrocarbons)	2016/08/29	NC		%	40
			F3 (C16-C34 Hydrocarbons)	2016/08/29	NC		%	40
			F4 (C34-C50 Hydrocarbons)	2016/08/29	NC		%	40
8379712	NSE	Matrix Spike	1,4-Difluorobenzene (sur.)	2016/08/29		96	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/08/29		97	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/08/29		100	%	70 - 130
			Benzene	2016/08/29		97	%	70 - 130
			Toluene	2016/08/29		92	%	70 - 130
			Ethylbenzene	2016/08/29		99	%	70 - 130
			m & p-Xylene	2016/08/29		96	%	70 - 130
			o-Xylene	2016/08/29		94	%	70 - 130
			F1 (C6-C10)	2016/08/29		75	%	70 - 130
8379712	NSE	Spiked Blank	1,4-Difluorobenzene (sur.)	2016/08/29		102	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/08/29		101	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			D4-1,2-Dichloroethane (sur.)	2016/08/29		99	%	70 - 130
			Benzene	2016/08/29		100	%	70 - 130
			Toluene	2016/08/29		98	%	70 - 130
			Ethylbenzene	2016/08/29		104	%	70 - 130
			m & p-Xylene	2016/08/29		102	%	70 - 130
			o-Xylene	2016/08/29		98	%	70 - 130
			F1 (C6-C10)	2016/08/29		96	%	70 - 130
8379712	NSE	Method Blank	1,4-Difluorobenzene (sur.)	2016/08/29		99	%	70 - 130
			4-Bromofluorobenzene (sur.)	2016/08/29		100	%	70 - 130
			D4-1,2-Dichloroethane (sur.)	2016/08/29		99	%	70 - 130
			Benzene	2016/08/29	<0.40		ug/L	
			Toluene	2016/08/29	<0.40		ug/L	
			Ethylbenzene	2016/08/29	<0.40		ug/L	
			m & p-Xylene	2016/08/29	<0.80		ug/L	
			o-Xylene	2016/08/29	<0.40		ug/L	
			F1 (C6-C10) - BTEX	2016/08/29	<100		ug/L	
			F1 (C6-C10)	2016/08/29	<100		ug/L	
8379712	NSE	RPD	Benzene	2016/08/29	NC		%	40
			Toluene	2016/08/29	NC		%	40
			Ethylbenzene	2016/08/29	NC		%	40
			m & p-Xylene	2016/08/29	NC		%	40
			o-Xylene	2016/08/29	NC		%	40
			Xylenes (Total)	2016/08/29	NC		%	40
			F1 (C6-C10) - BTEX	2016/08/29	NC		%	40
			F1 (C6-C10)	2016/08/29	NC		%	40
8381472	JLO	Matrix Spike	Total Mercury (Hg)	2016/08/30		109	%	85 - 115
8381472	JLO	QC Standard	Total Mercury (Hg)	2016/08/30		106	%	85 - 115
8381472	JLO	Spiked Blank	Total Mercury (Hg)	2016/08/30		110	%	85 - 115
8381472	JLO	Method Blank	Total Mercury (Hg)	2016/08/30	<0.0020		ug/L	
8381472	JLO	RPD	Total Mercury (Hg)	2016/08/30	NC		%	20
8381481	JLO	Matrix Spike [PI6984-06]	Dissolved Mercury (Hg)	2016/08/30		106	%	85 - 115
8381481	JLO	QC Standard	Dissolved Mercury (Hg)	2016/08/30		108	%	85 - 115
8381481	JLO	Spiked Blank	Dissolved Mercury (Hg)	2016/08/30		100	%	85 - 115
8381481	JLO	Method Blank	Dissolved Mercury (Hg)	2016/08/30	<0.0020		ug/L	
8381481	JLO	RPD [PI6984-06]	Dissolved Mercury (Hg)	2016/08/30	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.

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

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.

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).

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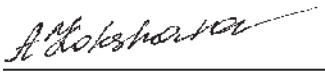
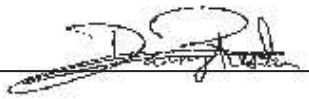
VALIDATION SIGNATURE PAGE

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

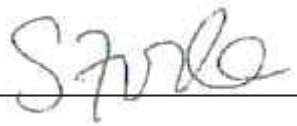
Amanda Dwyer, Project Manager Assistant



Anna Koksharova, M.Sc., Organics Senior Analyst



Daniel Reslan, cCT, QP, Organics Supervisor



Suwan Fock, B.Sc., QP, Inorganics Senior Analyst

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 Edmonton: 9331 - 48th Street T6B 2R4 Telephone (780)577-7100 Fax (780)450-4187

Maxxam Analytics International Corporation o/a Maxxam Analytics
Unit 105 - 349 Old Airport Road, Yellowknife, North West Territories Canada X1A 3X6 Tel (867) 445-2448 Toll-free 800-563-6266 Fax (905) 817-5779 www.maxxam.ca

1154(6)

Chain Of Custody Record

Page 1 of 1

INVOICE TO:		Report Information		Project Information		Laboratory Use Only	
Company Name	#10410 ARCADIS Canada	Company Name	ARCADIS	Quotation #		Maxxam Job #	Bottle Order #:
Contact Name	Jason Mauchan	Contact Name	Elliott Holden	P.O. #	100347-001	B672104	501415
Address	121 GRANTON DRIVE, UNIT 12 RICHMOND HILL ON T4B 3N4	Address	329 Churchill Ave N Ottawa, ON	Project #	Roberts Bay	Chain Of Custody Record	Project Manager
Phone	(613) 721-0555 x Fax: (905) 764-9386	Phone	613 721 0555 Fax:	Project Name		C#501415-01-01	Parminder Virk
Email	Jason.Mauchan@arcadis.com; Stephanie.Joyce@arca	Email	Elliott.Holden@arcadis.com	Site #			
				Sampled By	JM KL EH		

Regulatory Criteria: CCME

Special Instructions: Dissolved metals bottles were rinsed.

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

Samples must be kept cool (< 10°C) from time of sampling until delivery to maxxam

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water? (Y/N)	Metals Field Filtered? (Y/N)	Analysis Requested: Cr6 Total	Hg total + dissolved	Total metals Dissolved metals	G1, Routine	PHC F1-F4 BTEX	PCBs	N+N	Conductivity, colour	# of Bottles	Comments
1		ROB-6	19Aug2016	330pm	SW	N	N	✓	✓	✓	✓	✓	✓	✓	✓		
2		ROB-7	19 Aug 2016	405pm	SW	N	N	✓	✓	✓	✓	✓	✓	✓	✓		
3		ROB-8	19 Aug 2016	310pm	SW	N	N	✓	✓	✓	✓	✓	✓	✓	✓		
4		ROB-9	19Aug2016	535pm	SW	N	N	✓	✓	✓	✓	✓	✓	✓	✓		
5		ROB-10	19Aug2016	245pm	SW	N	N	✓	✓	✓	✓	✓	✓	✓	✓		
6		ROB DUP	19 Aug 2016		SW	N	N	✓	✓	✓	✓	✓	✓	✓	✓		
7																	
8																	
9																	
10																	

Turnaround Time (TAT) Required

Please provide advance notice for rush projects

Regular (Standard) TAT ☑
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____ ☐
Rush Confirmation Number: _____ (call lab for #)

RECEIVED IN YELLOWKNIFE
By: Michelle Bruce 09:45
2016-08-23
4-4-6
3-3-5
Temp: 6 1 3 17
4-7-4
4-5-4

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Lab Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
MM Jason Mauchan	21/8/16	1000	Jenna Waltos	2016/08/24	1110		☐	See ACTR	☐ Yes ☐ No

* 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

Maxxam Analytics International Corporation o/a Maxxam Analytics

Confirmation of Sample Receipt

Parameter Summary

Package/Test	Parameter	RDL *	Unit	Samples
AT1 BTEX and F1-F4 in Water	Benzene	0.4	ug/L	All
	Toluene	0.4	ug/L	All
	Ethylbenzene	0.4	ug/L	All
	m & p-Xylene	0.8	ug/L	All
	o-Xylene	0.4	ug/L	All
	Xylenes (Total)	0.8	ug/L	All
	F1 (C6-C10) - BTEX	100	ug/L	All
	F1 (C6-C10)	100	ug/L	All
	F2 (C10-C16 Hydrocarbons)	0.1	mg/L	All
	F3 (C16-C34 Hydrocarbons)	0.2	mg/L	All
	F4 (C34-C50 Hydrocarbons)	0.2	mg/L	All
	Reached Baseline at C50	1	mg/L	All
Regulated Metals (CCME/AT1) - Total	Total Cadmium (Cd)	0.02	ug/L	All
	Total Barium (Ba)	0.01	mg/L	All
	Total Boron (B)	0.02	mg/L	All
	Total Calcium (Ca)	0.3	mg/L	All
	Total Iron (Fe)	0.06	mg/L	All
	Total Lithium (Li)	0.02	mg/L	All
	Total Magnesium (Mg)	0.2	mg/L	All
	Total Manganese (Mn)	0.004	mg/L	All
	Total Phosphorus (P)	0.1	mg/L	All
	Total Potassium (K)	0.3	mg/L	All
	Total Silicon (Si)	0.1	mg/L	All
	Total Sodium (Na)	0.5	mg/L	All
	Total Strontium (Sr)	0.02	mg/L	All
	Total Sulphur (S)	0.2	mg/L	All
	Total Aluminum (Al)	0.003	mg/L	All
	Total Antimony (Sb)	0.0006	mg/L	All
	Total Arsenic (As)	0.0002	mg/L	All
	Total Beryllium (Be)	0.001	mg/L	All
	Total Chromium (Cr)	0.001	mg/L	All
	Total Cobalt (Co)	0.0003	mg/L	All
	Total Copper (Cu)	0.0002	mg/L	All
	Total Lead (Pb)	0.0002	mg/L	All
	Total Molybdenum (Mo)	0.0002	mg/L	All
	Total Nickel (Ni)	0.0005	mg/L	All
	Total Selenium (Se)	0.0002	mg/L	All
	Total Silver (Ag)	0.0001	mg/L	All
	Total Thallium (Tl)	0.0002	mg/L	All
	Total Tin (Sn)	0.001	mg/L	All
	Total Titanium (Ti)	0.001	mg/L	All
	Total Uranium (U)	0.0001	mg/L	All
	Total Vanadium (V)	0.001	mg/L	All

Maxxam PM: Parminder Virk (PVirk@maxxam.ca)

Parameter Summary

Package/Test	Parameter	RDL *	Unit	Samples
Regulated Metals (CCME/AT1) - Total	Total Zinc (Zn)	0.003	mg/L	All
Routine Water & Diss. Regulated Metals	Alkalinity (PP as CaCO3)	0.5	mg/L	All
	Alkalinity (Total as CaCO3)	0.5	mg/L	All
	Bicarbonate (HCO3)	0.5	mg/L	All
	Carbonate (CO3)	0.5	mg/L	All
	Hydroxide (OH)	0.5	mg/L	All
	Dissolved Cadmium (Cd)	0.02	ug/L	All
	Dissolved Chloride (Cl)	1	mg/L	All
	Conductivity	1	uS/cm	All
	Dissolved Barium (Ba)	0.01	mg/L	All
	Dissolved Boron (B)	0.02	mg/L	All
	Dissolved Calcium (Ca)	0.3	mg/L	All
	Dissolved Iron (Fe)	0.06	mg/L	All
	Dissolved Lithium (Li)	0.02	mg/L	All
	Dissolved Magnesium (Mg)	0.2	mg/L	All
	Dissolved Manganese (Mn)	0.004	mg/L	All
	Dissolved Phosphorus (P)	0.1	mg/L	All
	Dissolved Potassium (K)	0.3	mg/L	All
	Dissolved Silicon (Si)	0.1	mg/L	All
	Dissolved Sodium (Na)	0.5	mg/L	All
	Dissolved Strontium (Sr)	0.02	mg/L	All
	Dissolved Sulphur (S)	0.2	mg/L	All
	Dissolved Aluminum (Al)	0.003	mg/L	All
	Dissolved Antimony (Sb)	0.0006	mg/L	All
	Dissolved Arsenic (As)	0.0002	mg/L	All
	Dissolved Beryllium (Be)	0.001	mg/L	All
	Dissolved Chromium (Cr)	0.001	mg/L	All
	Dissolved Cobalt (Co)	0.0003	mg/L	All
	Dissolved Copper (Cu)	0.0002	mg/L	All
	Dissolved Lead (Pb)	0.0002	mg/L	All
	Dissolved Molybdenum (Mo)	0.0002	mg/L	All
	Dissolved Nickel (Ni)	0.0005	mg/L	All
	Dissolved Selenium (Se)	0.0002	mg/L	All
	Dissolved Silver (Ag)	0.0001	mg/L	All
	Dissolved Thallium (Tl)	0.0002	mg/L	All
	Dissolved Tin (Sn)	0.001	mg/L	All
	Dissolved Titanium (Ti)	0.001	mg/L	All
	Dissolved Uranium (U)	0.0001	mg/L	All
	Dissolved Vanadium (V)	0.001	mg/L	All
	Dissolved Zinc (Zn)	0.003	mg/L	All
	Hardness (CaCO3)	0.5	mg/L	All
	Ion Balance	0.01	N/A	All
	Nitrate plus Nitrite (N)	0.02	mg/L	All

Maxxam PM: Parminder Virk (PVirk@maxxam.ca)

Confirmation of Sample Receipt

Parameter Summary

Package/Test	Parameter	RDL *	Unit	Samples
Routine Water & Diss. Regulated Metals	Dissolved Nitrate (NO3)	0.044	mg/L	All
	Dissolved Nitrite (NO2)	0.033	mg/L	All
	Dissolved Nitrite (N)	0.01	mg/L	All
	Dissolved Nitrate (N)	0.01	mg/L	All
	pH	N/A	pH	All
	Dissolved Sulphate (SO4)	1	mg/L	All
	Anion Sum	N/A	meq/L	All
	Cation Sum	N/A	meq/L	All
	Calculated Total Dissolved Solids	10	mg/L	All
Mercury - Low Level (Total)	Total Mercury (Hg)	0.002	ug/L	All
Mercury-Low Level-Dissolved-Lab Filtered	Dissolved Mercury (Hg)	0.002	ug/L	All
PCB in Water - Subcontract	Subcontract Parameter	N/A	N/A	All
Total Dissolved Solids (Filt. Residue)	Total Dissolved Solids	10	mg/L	All
Total Hexavalent Chromium	Total Hex. Chromium (Cr 6+)	0.001	mg/L	All
Total Suspended Solids (NFR)	Total Suspended Solids	1	mg/L	All
True Colour	True Colour	2	PtCo units	All

**RDLs are subject to change based on interferences present at the time of analysis.*

Maxxam PM: Parminder Virk (PVirk@maxxam.ca)

APPENDIX E

Health and Safety Plan

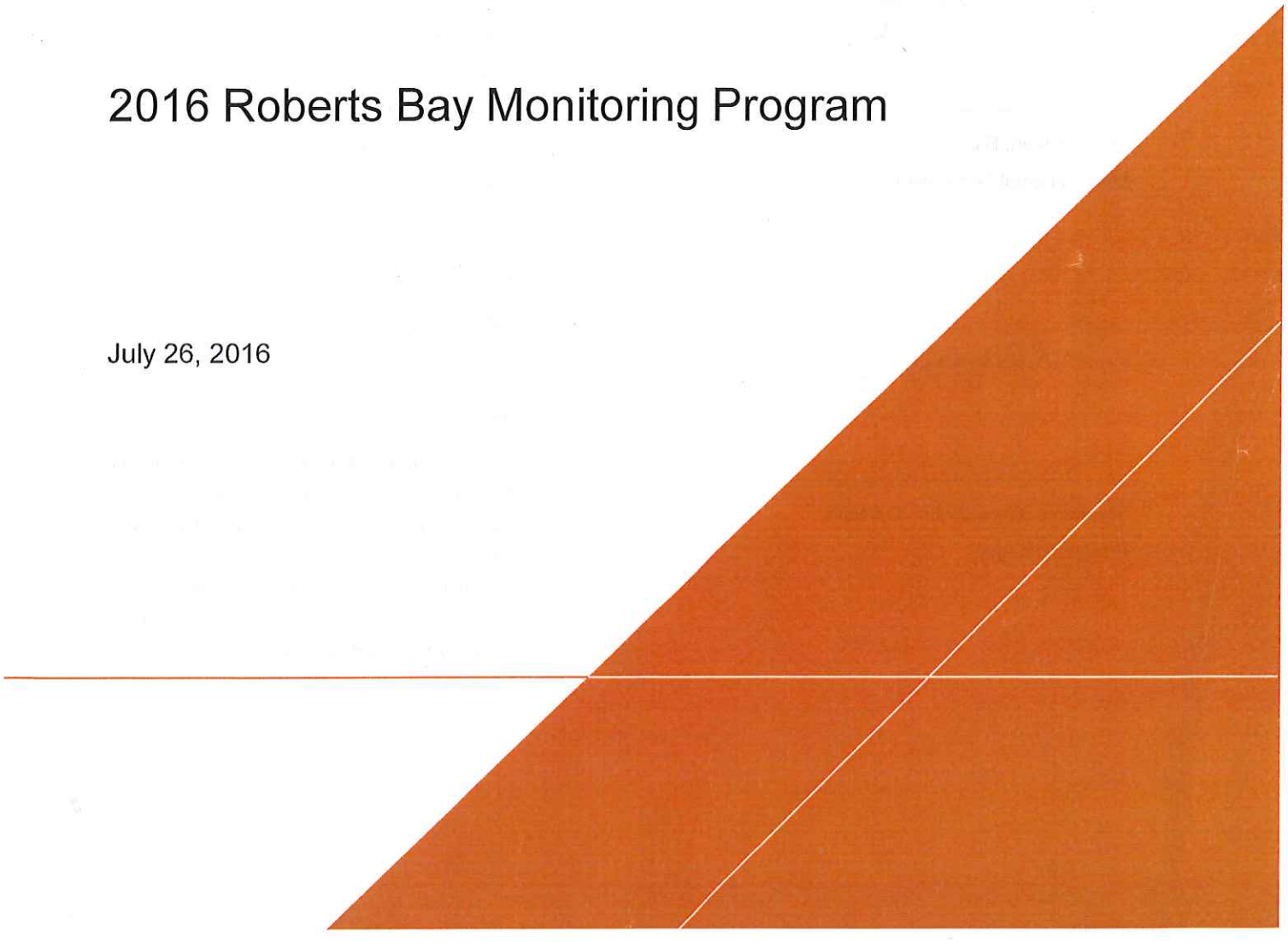
ARCADIS Design & Consultancy for natural and built assets

Indigenous and Northern Affairs Canada

HEALTH AND SAFETY PLAN

2016 Roberts Bay Monitoring Program

July 26, 2016



HEALTH AND SAFETY PLAN

2016 Roberts Bay Monitoring Program

Jason Mauchan, P.Eng.
Environmental Technician

Elliott Holden, B.Eng.
Environmental Technician

Stephanie Joyce, M.Sc., C.Chem.
Project Manager

Prepared for:

Karla Letto

Contaminants Specialist

Indigenous and Northern Affairs Canada – Nunavut Regional Office

969 Qimugjuk Building, 2nd Floor

Iqaluit, NU, X0A 0H0

Prepared by:

Arcadis Canada Inc.

329 Churchill Avenue North

Suite 200

Ottawa

Ontario K1Z 5B8

Tel 613 721 0555

Fax 613 721 0029

Our Ref.:

100347-001

Date:

July 26, 2016

CONTENTS

TABLES

APPENDICES

1 PURPOSE

The purpose of this Site Specific Health and Safety Plan (HASP) prepared by Arcadis Canada Inc. (Arcadis) is to specify the detailed measures to be taken to protect both site workers and the public during the work to be carried out at Roberts Bay. The site specific HASP also assigns responsibilities; establishes personnel protection standards and mandatory safety practices and procedures with respect to environmental aspects of the site related activities; and provides for contingencies that may arise during on-site activities.

The provisions of this plan are mandatory for all sub-contractors engaged in conducting the work activities. As necessary, when new information regarding a potential hazard emerges and this new information suggests that further safeguards would be prudent, amendments to this plan will be issued pertaining to specific precautions to be taken for specific locations or operations or regarding specific hazards. Unless any of these amendments specify otherwise, all provisions of this plan shall remain in effect for the duration of project work at the site.

This plan has been developed in accordance with accepted worker health and safety practices and applicable territorial and federal Occupational Health and Safety regulations. This HASP represents the minimum Health and Safety precautionary requirements and guidelines to be expected. All sub-contractors working on-site will agree to, and abide by, the requirements of this site specific HASP as a condition of working on this Project. A copy of the site specific HASP shall be kept on-site at all times for the duration of on-site activities. Anticipated personnel to whom this HASP becomes applicable are:

- 2 Arcadis staff members;
- 1 Bear Monitor;
- 1 Indigenous and Northern Affairs Canada (INAC) representative; and
- 2 Aircraft Pilot. for Dornier 228

2 AUTHORITY

This site specific HASP is provided by Arcadis to cover environmental activities at Roberts Bay, the Site. This plan is intended to supplement, not replace, applicable acts and regulations regarding worker health and safety.

The Arcadis Site Health and Safety Officer (SHSO) or his/her representative will be responsible for implementing the site specific HASP for the duration of work being conducted at the Site. Mr. Jason Mauchan, or his designate shall function as the SHSO and will be responsible for the health and safety of those on the site. Mr. Mauchan is appropriately trained for the position. The SHSO has the authority to stop work and to authorize the resumption of work based on health and safety considerations, as specified in this plan. Any health and safety issues or concerns will be communicated directly to the on-site representative of INAC, to the Arcadis Project Manager and to the appropriate authority at INAC.

Prior to commencement of the work, every sub-contractor working at the Site will provide a copy of their HASP to Arcadis for their records and maintain a copy at the site. This is a mandatory requirement to work on the site.

Personnel involved in health and safety related communications and other emergency numbers are listed in Table 1:

Table 1: Emergency Contact Information

Contact	Person or Agency	Phone Number
Hospital	Stanton Territorial Hospital, Yellowknife Kitikmeot Regional Health Centre, Cambridge Bay	867-669-4100 867-983-4500
Police	RCMP Cambridge Bay RCMP Emergency Contact	867-983-0123 867-983-1111
Fire Department	Cambridge Bay Fire Department	867-983-2337
Consulting Engineers	Arcadis Canada Inc. 329 Churchill Avenue North	(613) 721-0555
Arcadis Health Care Line	WorkCare (non-lifethreatening injury/illness)	1-800-455-6155
Drug and Alcohol Testing	Driver Check Inc.	1-800-463-4310
Arcadis Canada Inc.	Chris Ludwig	613-721-0555 (O) 613-222-8192 (cell)
	Stephanie Joyce	613-721-0555 (O) 613-986-8398 (cell)
	Andrew Henderson	613-721-0555 (O) 613-286-7760 (cell)
	Julie Dittburner	613-721-0555 (O) 613-794-7447 (cell)
	David McClellan (Corporate H&S Director)	905-614-1978
	Alec MacAdam (Corporate H&S Specialist)	720-454-0948
INAC	Charlotte Lamontagne	867-975-4578 (O) 867-222-1712 (cell) 867-223-1417 (cell)
	Spencer Dewar	867-975-4625 (O)
Nunatta Environmental Services Inc.	Jim Wilson	867-979-1488 (O) 867-222-4111 (cell)
Aircraft Charter Company	Adlair Aviation - Cambridge Bay Dispatch	867- 983-2569
Spill Report Line (24-hr)	Department of Environment, Nunavut	867-920-8130

The Arcadis SHSO may choose to conduct a safety site audit as and when site operations demand. During the audit, if health and safety related deficiencies are found, suitable written corrective actions will

be recommended. It is binding on the part of the subcontractors to abide and implement the recommended corrective actions within the specified time limits. The Arcadis SHSO will reserve the authority to inspect the implementation of corrective and/or mitigative actions.

3 HEALTH AND SAFETY REGULATIONS

Before activities at the Site commence, sub-contractor(s) Health and Safety representative(s) must review this HASP and indicate that they understand, and all workers engaged at the Site will demonstrate ongoing compliance of the plan by signing the Tailgate Health & Safety Meeting Forms (**Appendix B**). While carrying out work at the site, it is the responsibility of the Prime sub-contractor to ensure the health and safety of its employees and sub-contractors engaged by it. It is the duty of all workers employed at the site to report unsafe working conditions to the SHSO. To comply with the health and safety requirements outlined in this plan, Arcadis will ensure/provide that:

- At least one on-site personnel is trained in first aid and level C CPR. First-aid and additional Arcadis personnel certification is provided in **Appendix A**.
- On-site personnel are equipped with appropriate Canadian Standards Association (CSA) approved personal protective equipment as deemed necessary by the SHSO (personal protective equipment requirements at the Site are discussed in Section 7.0 of this HASP).
- On-site personnel will attend daily health and safety tailgate meetings led by the Arcadis SHSO. Tailgate Health and Safety Meetings will be conducted at the beginning of each work day for the review of health and safety issues and site conditions. Tailgate Health and Safety Meeting forms are provided in **Appendix B**.
- Equipment and materials used in the project meet applicable safety standards.
- A health and safety incident/accident reporting system will be in place to prevent reoccurrence of incidents/accidents through staff education.
- An appropriate area shall be designated as the onsite First-Aid Station. It shall be selected so that it is in close proximity to the work area but remain a safe distance from major activities and potential hazards. The First Aid Station shall be clearly identified and will contain: the First Aid Kit, copy of this HASP, an appropriate supply of water for washing/decontamination, and any other objects deemed necessary by the SHSO and/or Arcadis Project Manager.

4 SITE AND WORK PROGRAM DESCRIPTION

4.1 Site Location and Description

The Roberts Bay abandoned mine site is located near Melville Sound, on the north coast of mainland Nunavut and southern side of the Northwest Passage, approximately 1 km north of Roberts Lake. The Roberts Bay site was an active silver mine in the early 1970s and was again the subject of exploration in the 1980s and 1990s. Remedial activities were conducted at the site between 2008 and 2010, including demolition of remaining site structures and disposal of non-hazardous waste and contaminated soils. To contain the soils and waste, a non-hazardous waste landfill was constructed over the former tailings pond.

Franz Environmental Inc. conducted the field activities for the Roberts Bay and Ida Bay Long-Term Monitoring Plan on August 2010, August 2012 and August 2014. This HSP has been developed in preparation for the fourth monitoring event prescribed in the Roberts Bay and Ida Bay Long Term Monitoring Plan.

4.2 Description of Work Program

Arcadis proposes to complete Year 7 of the Roberts Bay Silver Mine LTM Plan. Tasks involved in the completion of site monitoring include, but are not limited to:

- Mobilization to and from Cambridge Bay via scheduled flights from Ottawa;
- Mobilization to Roberts Bay by chartered aircraft (Dornier 228 on floats);
- One field day on-site with a return trip to Cambridge Bay;
- Provision of a bear monitor with firearm;
- Visual monitoring of the general site conditions including borrow areas, excavation areas, regrades etc;
- Natural environmental monitoring as detailed in the Abandoned Military Site Remediation Protocol (AMSRP) and LTM Plan;
- Visual monitoring (including photographs) of the NHWL looking for evidence of evidence of erosion, ponding, frost action, settlement and lateral movement, using the recording template provided in the LTM plan;
- Thermal monitoring of the non-hazardous waste landfill; downloading of information on the data loggers installed at the temperature monitoring stations, and replacement of data loggers, batteries and desiccant cartridges;
- Surface water sample collection, if possible, from the channel running towards the Roberts Lake and other streams surrounding the NHWL. This will include ROB-6 to ROB-11 monitoring requirements specified in the Nunavut Water Board Water License. Six surface water samples plus a QA/QC sample will be collected. Surface water samples will be submitted to a Canadian Association for Laboratory Accreditation (CALA)-accredited laboratory for analysis of total and dissolved metals, petroleum hydrocarbon compound (PHC) fractions F1 and F2, polychlorinated biphenyls (PCBs), major ions, hardness, total dissolved solids (TDS), total suspended solids (TSS), colour, pH and conductivity; and

- Collection of soil samples in areas of seepage and staining identified during the visual monitoring, if required; analyses to include PHC F1 to F4, select metals (defined to include arsenic, cadmium, cobalt, copper, chromium, lead, nickel and zinc) and PCBs.

4.3 General Safety Precautions

The following general safety precautions are applicable to all work tasks:

- Eating, chewing gum or tobacco, and smoking are prohibited in contaminated or potentially contaminated areas, or where there is a possibility for the transfer of contamination.
- Contact with potentially contaminated substances should be avoided. Puddles, pools, mud, etc., should not be walked through. Kneeling, leaning, or sitting on equipment or the ground should be avoided, whenever possible. Monitoring equipment should not be placed on a potentially contaminated surface, such as the ground.
- Spillage of contaminated/hazardous liquids should be prevented, to the extent possible. In the event that spillage occurs, the liquid should be contained, if possible.
- Splashing of contaminated materials should be prevented.
- Field crew members should use all their senses to alert themselves to potentially dangerous situations (i.e. presence of strong, irritating, or nauseating odours).
- Field crew members should be familiar with the physical characteristics of investigations, including:
  - Wind direction in relation to the ground zero area
  - Accessibility to associates, equipment, and vehicles
  - Communications
  - Hot zones (areas of known or suspected contamination)
  - Site access
  - Nearest water sources
  - Routes and procedures to be used during emergencies
- A minimum number of personnel and equipment should be in the contaminated area, but only to the extent consistent with workforce requirements of safe site operations.
- All wastes generated during Arcadis or subcontractor activities at the site must be disposed of as directed by the Project Manager.

4.3.1 Buddy System

Where deemed hazardous by the Arcadis SHSO, workers will conduct all site activities with a buddy who is able to:

- Provide his or her partner with assistance;
- Observe his or her partner for signs of chemical or heat exposure;
- Check the integrity of his or her partner's protective clothing periodically;
- Notify the site supervisor if emergency help is needed;
- Prearrange hand signals or other emergency communication signals such as:
  - Hand gripping throat: out of air, can't breathe;

- Gripping partners wrist or placing both hands around waist: leave area immediately, no debate;
- Hands on top of head: need assistance;
- Thumbs up: okay, I'm alright, I understand;
- Thumbs down: no, negative.

4.4 Aircraft Passengers Safety

Fixed-wing aircraft will be used extensively to mobilize to and from the Site. A "Safety Guide for Aircraft Charter Passengers", produced by Transport Canada is available in **Appendix C**. Standard protocols for the use of aircraft will be followed, including:

Normal Operation

- Inform the pilot of:
  - Cargo weights;
  - Site coordinates;
  - Any hazardous goods (e.g. firearms, ammunition, bear spray, bear bangers, fuel, volatile substances, flammable liquids). Note that batteries for data loggers are considered dangerous goods;
  - Applicable medical problems; and
  - Susceptibility to motion sickness.
- Stay well to the side of runways/approaches when aircraft are arriving or departing;
- Protect eyes against blown dust and particles;
- Keep runways/approaches clear;
- Wait for instruction to approach or leave aircraft;
- Load cargo carefully and secure it against movement;
- Secure seatbelts (and shoulder straps, if provided) while in flight; and
- Read instructions on the operation of doors, emergency exits, and the location of the emergency locator transmitter (ELT) and emergency equipment.

During an Emergency

- Follow instructions;
- Do not distract the pilot;
- Check that any loose gear in the cabin is secured;
- Assume brace position;
  - Tighten seatbelt;

- If shoulder straps are present, tighten shoulder straps and sit upright, knees together, arms folded across chest; or
- Without shoulder straps, bend forward so chest is on your lap, head on knees, arms folded under thighs.

After an Emergency Landing

- Wait for instructions to exit;
- Ensure no hazards (i.e. fire, water) are present outside emergency exit before opening. If hazards exist, locate an alternative exit;
- Assist others to evacuate well clear of the aircraft (up-wind of aircraft to avoid inhalation of fumes if necessary);
- Remove first aid and other emergency equipment after no threat of fire;
- Administer first aid if required;
- Remove ELT, read instructions and activate;
- Make the site as conspicuous as possible from the air; and
- Stay near the aircraft - don't wander away from the site.

4.5 On-site Communications

Communications during the fieldwork is as follows:

- Satellite phone, activated 24/7 to contact Cambridge Bay, Yellowknife, Ottawa, or other external locations during emergencies and for routine updates of field progress;
- Verbal communications between workers using 2-way radios;
- Use of a rifle or bear banger to get immediate attention of all staff.

A rally/muster point in case of an emergency will be established once on-site and will remain for the duration of the field program unless otherwise decided by the SHSO.

4.6 Physical Hazards and Mitigation Procedures

The following sections provide potential physical hazards encountered during the execution of tasks included in the work program. Procedures for the mitigation of hazards are also discussed as part of this HASP. Further, the identified hazard(s) and mitigation procedures will be discussed with all personnel working on site prior to working in the area of the hazard(s).

Generally encountered hazards during field operations include but are not limited to:

- Slips, trips and falls;
- Partially buried debris, exposed at the surface, which might be unseen;
- Heavy lifting, bending, shovelling, (general manual labour) hazards;
- Poor housekeeping practices;

- Cuts, scrapes, and bruises from hand tool usage or handling of soils/rock;
- Heat stress/cold stress (harsh weather, including snow etc. – See Section 4.8);
- Bears and other wildlife (See Section 4.9); and
- Entering/exiting charter planes/working near propellers.

The following measures are considered mandatory to ensure that the above hazards are mitigated to the greatest extent possible:

- Daily Health and Safety meetings – be aware of specific known physical hazards;
- Ongoing last minute risk assessment will be conducted by site workers;
- Job Safety Analysis forms shall be completed for required specific work tasks and shall be reviewed prior to the execution of the task (**Appendix D**);
- Personal Protective Equipment (PPE) as prescribed by the HASP and SHSO;
- All underground utilities will be clearly marked and delineated prior to any subsurface disturbances;
- Overhead utilities will be identified and strategies for their avoidance will be decided upon prior to execution of the work program;
- Labour intensive tasks shall be carried out at an appropriate pace, and using appropriate lifting/bending techniques;
- Potentially hazardous debris shall be removed from work areas or flagged at the soonest possible opportunity; and

Work areas will be kept clean and clear of obstructions to the extent possible.

4.7 Chemical Hazards and Mitigation Procedures

Potentially hazardous chemical constituents are present at the site in contaminated soil and groundwater). Contaminants of concern include: PHCs, PCBs, and metals. All work involving the handling of contaminated/hazardous material requires the following mitigation procedures:

- PPE must be worn as prescribed for the handling of potentially contaminated materials.
- Normal hygiene practices such as washing hands and face before eating, drinking, smoking, chewing gum or tobacco, or other hand-to-face activity, or before leaving the project site shall be employed.
- Avoid skin contact with or accidental ingestion of soil or water.
- Field staff should use all their senses to alert themselves to potentially dangerous situations (i.e., presence of strong, irritating, or nauseating odours). Respirators may be prescribed by the SHSO at any time throughout the execution of the work program.

All recovered contaminated/hazardous materials shall be contained appropriately in a manner preventing potential releases to the environment.

4.8 Monitoring

Based on the nature of the site activities that will be performed and the type of (suspected) contamination present in the area, monitoring of chemical concentrations in air or for combustible gases is not required as part of this HASP.

Should operations commence which disturb or expose any substance to create a potential airborne hazard or if airborne contamination is suspected as a result of observed site conditions; work at the Site shall cease until a sufficient air monitoring program is in place and appropriate protective measures are implemented to mitigate identified risks.

4.9 Harsh Weather Conditions

Harsh weather conditions can arrive at the Site anytime, therefore, each member of the team must abide by the following:

- To deal with low and sub zero temperature every staff member must bring warm clothes, backup clothes, waterproof breathable outerwear, waterproof boots, hats, gloves, rain vests; learn how to use a kerosene heater; and learn how set up wall tents;
- To deal with strong winds, have adequate clothing and shelter, avoid working near steep slopes or water bodies until winds have calmed down, and cancel return charter until landing conditions are improved;
- To deal with fog, only work near camp where field workers can always be under direct sight of the bear monitor and stop work if fog is too dense; and
- To deal with rain and freezing rain, have adequate clothing and shelter and remember keeping dry remains the most important point.

Occasional delays may occur due to adverse weather conditions. It is of primary importance to work under safe conditions even if it causes delays. The Team Leader/SHSO decides when to stop work. Staff will stay in their tents, the aircraft or nearby buildings (e.g. Hope Bay mine) during adverse weather conditions. Regular safety rounds are undertaken every hour around the camp installations by the Team Leader/SHSO.

4.10 Wildlife Safety

Wildlife safety and monitoring is continuous during the entire fieldwork period. One Inuit staff member or sub-contractor having a strong knowledge of wildlife, and the use of rifles to scare or kill bears will be assigned as the Bear Monitor. The role of a Bear Monitor is as follows, but not limited to:

- Conduct a visual inspection of gun and fire a test shot to ensure gun is in working order;
- Check for wildlife, such as bears, approaching the work site;
- Protect wildlife by preventing it from approaching the workers by using a loud noise such as a shot from a fire arm by the wildlife monitor, aimed towards the sky (bears will be temporarily scared by a loud noise);
- Ensure that all garbage and food waste are picked up and properly packaged after meals (all workers at the site should assist with maintaining a clean camp);

- Have all field workers under direct view at all times;
- Walk around perimeter of the work place or hills to look for wildlife approaching the site, inform staff if wildlife are approaching, and inform field workers of the measures being taken to address the approaching wildlife; and
- Conduct any other measures necessary to protect the health and safety of staff and contractors from wildlife, especially bears.

Before any fieldwork begins on this project, all Arcadis staff and subcontractor staff are to have reviewed documentation related to Grizzly and Polar Bear Safety. Listed below are resources where some documentation is located.

- Parks Canada Polar Bear Safety and other wildlife can be found at: http://www.pc.gc.ca/eng/pn-np/nu/quttinirpaaq/activ/activ3/e.aspx
- Parks Canada – If you Encounter a Bear: http://www.pc.gc.ca/eng/docs/pc/guide/nature/nature03.aspx
- Hinterland's Who's Who – Grizzly Bear Fact Sheet found at: http://www.hww.ca/en/wildlife/mammals/grizzly-bear.html?referrer=https://www.google.ca/
- Hinterland's Who's Who – Polar Bear Fact Sheet found at: http://www.hww.ca/en/wildlife/mammals/polar-bear.html

A couple of general comments regarding bear behaviour include:

- Do not try to run away from a bear. They can outrun a human. Seeing an animal fleeing from them arouses their instincts to chase. They think you are prey. Always back away slowly from a bear.
- Do not stare at them directly. Direct eye contact, to them, is a sign of aggression.
- If a bear stalks you and then attacks, or attacks at camp while you are sleeping do not play dead – fight back.

5 TASK SPECIFIC JOB SAFETY ANALYSES

Activities which involve potentially higher risks require a documented risk management procedure referred to as a Job Safety Analysis (JSA). A JSA consists of a step by step analysis of the task to be carried out, the hazards which may be encountered, and the techniques or controls to be implemented in order to prevent an incident or near-miss from occurring. JSAs are to be completed prior to the undertaking of the activity for which it is written and reviewed and discussed by all persons involved in the task. Since site, weather, equipment, and/or crew conditions may vary from day to day; the JSA must be reviewed and revised as per any changes during the daily safety meeting. Activities included in the scope of work which will require the completion of a JSA include, but are not necessarily limited to:

- Water sampling
- Soil sampling
- Geotechnical assessment
- Wildlife Monitoring
- Thermistor Monitoring

Four partially completed and one blank JSA forms, to be completed prior to any of the aforementioned activities or when deemed necessary by the SHSO, are provided in **Appendix D**.

6 PERSONAL PROTECTIVE EQUIPMENT

PPE that will protect personnel and visitors from the hazards and potential hazards likely to be encountered during site work will be prescribed by the Arcadis SHSO and used by all personnel working at or visiting the Site. PPE selection is based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.

6.1 Level of Protection

PPE required to be worn at the site is dependent upon the task(s) being performed. The SHSO/project manager has the authority to regulate additional PPE requirements should he/she deem it necessary. Based on the task(s) being carried out at the Site, the following PPE levels are required:

Table 2: PPE Requirements

TASK	Description	Required Protection
Charter Aircraft Travel	Travel by plane to site	• As per pilot's direction
Water Sampling	Sampling surface water from shore of water bodies	• Hard hat • Visi-Vest • Safety Boots • Safety Glasses • Work Gloves (handling tools) • Nitrile Gloves (handling water/soils)
Soil Sampling	Sampling soil from hand-excavations	• Hard hat • Visi-Vest • Safety Boots • Safety Glasses • Work Gloves (handling tools) • Nitrile Gloves (handling water/soils)
Geotechnical Assessment	Visual and photographic inspection of landfill areas	• Hard hat • Visi-Vest • Safety Boots • Safety Glasses • Work Gloves (handling tools) • Nitrile Gloves (handling water/soils)

7 HAZARD, INCIDENT AND NEAR MISS REPORTING

If an accident occurs or an incident which could have resulted in an accident occurs, the SHSO or his/her representative and the affected party or parties will complete an incident/accident report. The affected parties will review the report and determine together, as a team, appropriate mitigation to prevent the reoccurrence of the incident/accident in the future. The incident/accident, regardless of severity, will be reported immediately to the client representative and Arcadis Project Manager. Near-Miss occurrences and hazard identifications will also be recorded and reported for the prevention of future hazardous situations. Forms for the reporting of near misses, hazard identification, and incidents are attached in **Appendix E**.

8 EMERGENCY RESPONSE PLAN

This section describes contingencies and emergency planning procedures to be implemented at the Site. This Emergency Response Plan is compatible with local emergency management plans.

8.1 Emergency Contacts

A listing of emergency contacts, including the local police, fire department, ambulance, poison control centre, spill reporting department, client and project manager is provided in **Appendix F**. Copies of this listing will be posted in close proximity to all work areas across the site.

8.2 Pre-Emergency Planning

An emergency evacuation route to the nearest hospital is provided in **Appendix F.** If necessary, this route will be reviewed and revised by the SHSO to ensure that the route is adequate and consistent with prevailing conditions. Note that this route is from the Cambridge Bay Airport to the Kitikmeot Health Centre in Cambridge Bay.

8.3 Emergency Supplies

Arcadis personnel will carry emergency supplies with them to Roberts Bay. These will include:

- First aid kit
- Tent
- Tarp
- Matches
- Cooking equipment (i.e. pots)
- Dehydrated meals
- Emergency blanket
- Drinking water (to be purchased in Cambridge Bay)
- Bear bangers and/or bear spray (if available in Cambridge Bay – they cannot be transported by commercial aircraft)

The charter aircraft will also be equipped with emergency supplies. Prior to taking off, Arcadis personnel will confirm with the pilot(s) what emergency supplies are in the aircraft and where they are located.

As the wildlife monitor will be carrying a firearm, bear bangers and bear spray may not be required. They could be purchased in Cambridge Bay, prior to the charter flight, if they are available. However, the wildlife monitor with a firearm should be sufficient.

8.4 Roles and Lines of Authority

The SHSO has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measures to ensure the safety of site personnel (and the public), such as evacuation of personnel and adjacent residents from the site area. The site supervisor must also ensure

that corrective measures have been implemented, appropriate authorities have been notified, and follow-up reports have been completed.

8.5 Emergency Recognition

Personnel should be familiar with techniques of hazard recognition from pre-assignment and site-specific briefings. In an emergency, personnel should proceed to the closest exit with their buddies and mobilize to a safe distance area identified prior to the start of work. Personnel should remain at that area until it is deemed safe by an authorized person (e.g. SHSO) to enter the area.

8.6 Emergency Medical Treatment Procedures

In the event that any person becomes ill or injured, first aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must be reported immediately to the SHSO and the Project Manager.

The SHSO, Mr. Jason Mauchan has experience working in remote wilderness environments and has received first aid and Level C CPR training (refer to **Appendix A**).

If an incident occurs while on-site at Roberts Bay that requires immediate medical attention, the sat phone will be used to contact emergency personnel. Depending on the situation, one of the following options could occur:

- The field team remains on site, to await assistance from emergency personnel;
- The entire field team travels by plane, to the location indicated by emergency personnel (Cambridge Bay).

It will be important to notify emergency personnel immediately and follow their instructions.

8.7 Fire or Explosion

In the unlikely event that such a hazard be identified, the property owner, Project Manager and proper authorities shall be contacted immediately. Following, an incident investigation and report will be carried out and its findings documented for future hazard identification.

8.8 Spills or Leaks

In the unlikely event that such a hazard be identified, the property owner, Project Manager and proper authorities, including the Government of Nunavut Department of Environment 24-hr Spill Line (867-920-8130) shall be contacted immediately. Following, an incident investigation and report will be carried out and its findings documented for future hazard identification.