APPENDIX I

Baseline Data

- **Data Summary**
- **Water Quality**
- **Trip Reports**
- **Snowpack Survey**

Morrison Project- Summary of Environmental Data Collected (2001 to Present)

Surface Water_ Streams - 2004-2011

	Water Quality												Depth											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Stream 1 (MCS-1)																								
2001					X					X							X	X	X	X		X		
2002								X												X				
2003										X														
2004					X	X		X	X	X	X						X	X		X	X	X	X	
2005	X	X	X	X	X	X							X		X		X	X	X	X	X		X	X
2006							X	X					X	X	X	X	X	X						
2007		X			X	X	X	X	X		X													
2008	X		X	X	X	X	X	X							X	X	X	X	X	X	X	X		
2009																								
2010									X	X														
2011																								
Morrison River (Creek)																								
2001					X					X														
2002								X																
2003										X														
2004					X	X		X	X	X	X													
2005	X	X	X	X	X	X																		
2006							X	X	X	X														
2007		X			X	X	X	X	X		X	X				X	X	X	X	X	X	X	X	X
2008			X	X	X	X	X	X							X	X	X	X	X	X	X	X		
2009																								
2010									X	X												X		
2011	X																							
Stream 4 (MSC-4)																								
2001					X					X								X	X	X		X		
2002								X												X				
2003										X											X			
2004					X	X		X	X	X	X						X	X		X	X	X		
2005	X	X	X	X	X	X							X	X	X	X	X	X					X	
2006							X	X	X	X														
2007		X			X	X	X	X	X							X	X	X	X	X				X
2008	X		X	X		X	X	X							X	X	X	X	X	X	X	X		
2009																		X						
2010									X	X												X		
2011	X																							
2012																								
Unnamed Stream (670947, 6117813; 67782, 6118194; 67838, 6118222; 669856, 6119197) (Rescan 2009)																								
2009																			X					
Stream 5 (MCS-5)																								
2001					X					X								X	X	X		X		
2002								X																
2003										X											X			
2004					X	X		X	X	X	X						X	X		X	X	X	X	X
2005	X	X	X	X	X	X							X	X	X	X	X						X	X
2006							X	X	X	X			X	X	X									
2007					X	X	X	X	X		X	X					X	X	X	X	X	X		X
2008	X		X	X	X	X	X	X							X	X	X	X	X	X	X	X		
2009																		X						
2010			X						X	X					X			X				X		
2011	X																							
Stream 6 (MSC-6)																								
2001					X					X								X	X	X		X		
2002								X													X			
2003										X											X			
2004					X	X		X	X	X	X						X	X				X	X	
2005	X	X	X	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X
2006							X	X	X	X			X	X	X	X	X	X						
2007		X			X	X	X	X	X		X	X				X	X	X	X	X	X	X		X
2008	X		X	X		X	X	X							X	X	X	X	X	X	X	X		
2009																								
2010									X	X								X				X		
2011	X																							
Stream 26 (discontinued)																								
2004					X	X		X	X															
2005																								
2006							X	X	X	X														
2007					X	X		X	X		X													
2008					X	X	X	X																
Stream 475000 (668583 6121074)																								
2004																								
Stream 50000-48010																								
2004																								
2006																								
2009																		X						
Lower 7 (MSC-7)																								
2004					X	X		X	X	X	X						X	X		X	X	X	X	X
2005	X	X	X	X	X	X							X	X	X	X	X	X	X	X	X	X	X	X
2006								X		X			X	X	X	X	X	X						
2007					X	X	X	X	X			X					X	X	X	X	X	X	X	X
2008	X		X	X	X	X	X	X							X	X	X	X	X	X	X	X		
2009							X											X	X					
2010			X							X					X			X				X		
2011						X																		
Upper 7																								
2004																						X	X	X
2005																	X	X	X	X	X	X	X	X
2006								X	X	X			X	X	X	X	X							
2007					X																			
2008						X	X	X																
2009							X																	
2010										X														
2011						X																		
Stream 8 (MCS-8)																								
2004																								
2005																								
2006																								
2007					X	X	X	X	X	X							X	X	X	X	X	X		
2008			X		X	X	X	X							X	X	X	X	X	X	X	X		
2009																								

	Sediment												Flow											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Stream 1 (MCS-1)																								
2001																	X				X	X		
2002																				X				
2003																					X			
2004																	X	X		X	X	X		
2005													X		X		X	X					X	
2006								X																
2007							X																	
2008							X									X	X	X	X	X	X	X		
2009																								
2010																								
2011																		X						
Morrison River (Creek)																								
2001																								
2002																								
2003																								
2004																								
2005																								
2006								X																
2007							X									X	X	X	X	X	X	X		X
2008							X								X	X	X	X	X	X	X	X		
2009																								
2010																						X		
2011																		H						
Stream 4 (MSC-4)																								
2001																	X					X		
2002																				X				
2003																					X			
2004																	X	X		X	X	X		
2005													X	X	X	X	X	X					X	
2006								X																
2007							X									X	X	X	X	X				X
2008							X								X	X	X	X	X	X	X	X		
2009																								
2010																								
2011													X					X						
2012																								
Unnamed Stream (670947, 6117813; 67782, 6118194; 67838, 6118222; 669856, 6119197) (Rescan 2009)																								
2009																								
Stream 5 (MCS-5)																								
2001																		X				X		
2002																								
2003																					X			
2004																	X	X		X	X	X		
2005													X		X	X	X	X					X	
2006								X																
2007							X										X	X	X	X	X			X
2008							X								X	X	X	X	X	X	X	X		
2009																								
2010															X							X		
2011													X					X						
Stream 6 (MSC-6)																								
2001																		X				X		
2002																					X			
2003																					X			
2004																	X	X				X		
2005													X		X		X	X					X	
2006								X																
2007							X									X	X	X	X	X	X	X		X
2008							X								X	X	X	X	X	X	X	X		
2009																								
2010															X						X			
2011													X					X						
Stream 26 (discontinued)																								
2004																								
2005																								
2006								X																
2007							X																	
2008							X																	
Stream 475000 (668583 6121074)																								
2004																								
Stream 50000-48010																								
2004																								
2006																								
2009																								
Lower 7 (MSC-7)																								
2004																	X	X		X	X	X		
2005													X	X	X	X	X	X					X	
2006								X																
2007							X										X	X	X	X	X	X	X	X
2008							X								X	X	X	X	X	X	X	X		
2009																								
2010															X									
2011																		X						
Upper 7																								
2004																								
2005																	X	X					X	
2006								X																
2007							X																	
2008							X																	
2009																								
2010															X									
2011													X					X						
Stream 8 (MCS-8)																								
2004																								
2005																								
2006																								
2007							X										X	X	X	X	X	X		
2008							X								X	X	X	X	X	X	X	X		
2009																								

	Fish Habitat												Fish Survey											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Stream 1 (MCS-1)																								
2001																								
2002																								
2003																								
2004																								
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2011																								
Morrison River (Creek)																								
2001																								
2002																								
2003																								
2004					X			X												X				
2005																								
2006								X												X				
2007																								
2008																								
2009																								
2010										X										X	X	X		
2011																								
Stream 4 (MSC-4)																								
2001																								
2002																								
2003																								
2004					X			X												X				
2005																								
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2009						X												X						
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Unnamed Stream (670947, 6117813; 67782, 6118194; 67838, 6118222; 669856, 6119197) (Rescan 2009)																								
2009								X											X					
Stream 5 (MCS-5)																								
2001																								
2002																								
2003																								
2004					X			X												X				
2005																								
2006								X												X				
2007																								
2008																								
2009						X	X											X						
2010																								
2011																								
Stream 6 (MSC-6)																								
2001																								
2002																								
2003																								
2004					X			X												X				
2005																								
2006								X												X				
2007																								
2008							X																	
2009							X																	
2010																								
2011																								
Stream 26 (discontinued)																								
2004																								
2005																								
2006																								
2007																								
2008																								
Stream 475000 (668583 6121074)																								
2004					X																			
Stream 50000-48010																								
2004								X												X				
2006								X												X				
2009						X																		
Lower 7 (MSC-7)																								
2004								X												X				
2005																								
2006								X												X				
2007																								
2008																								
2009						X	X												X					
2010																								
2011																								
Upper 7																								
2004					X																			
2005																								
2006																								
2007																								
2008																								
2009																								
2010																								
2011																								
Stream 8 (MCS-8)																								
2004					X																			
2005																								
2006								X												X				
2007																								
2008																								
2009																								

	Fish Tissue												Bray Curtis Percent Similarity Values of Benthos												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN
Stream 1 (MCS-1)																									
2001																									
2002																									
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2004																									
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2008																			X						
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Morrison River (Creek)																									
2001																									
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2007																			X						
2008																			X						
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Stream 4 (MSC-4)																									
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Unnamed Stream (670947, 6117813; 67782, 6118194; 67838, 6118222; 669856, 6119197) (Rescan 2009)																									
2009																									
Stream 5 (MCS-5)																									
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Stream 6 (MSC-6)																									
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Stream 26 (discontinued)																									
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Stream 475000 (668583 6121074)																									
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Stream 50000-48010																									
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2006																									
2009																									
Lower 7 (MSC-7)																									
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Upper 7																									
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Stream 8 (MCS-8)																									
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2006																									
2007																			X						
2008																			X						
2009																									

Morrison Project- Su

Surface Water_ Strea

	Benthic Invertebrate \Benthos											Periphyton											
	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Stream 1 (MCS-1)																							
2001																							
2002																							
2003																							
2004																							
2005																							
2006																		X					
2007						X												X					
2008						X												X					
2009																							
2010																							
2011																							
Morrison River (Creek)																							
2001																							
2002																							
2003																							
2004																							
2005																							
2006							X											X					
2007						X												X					
2008						X												X					
2009																							
2010																							
2011																							
Stream 4 (MSC-4)																							
2001																							
2002																							
2003																							
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2006							X											X					
2007						X												X					
2008						X												X					
2009																							
2010																							
2011																							
2012																							
Unnamed Stream (670947, 6117813; 67782, 6118194; 67838, 6118222; 669856, 6119197) (Rescan 2009)																							
2009																							
Stream 5 (MCS-5)																							
2001																							
2002																							
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2005																							
2006																		X					
2007						X												X					
2008						X												X					
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Stream 6 (MSC-6)																							
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2004																							
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2007						X												X					
2008						X												X					
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2011																							
Stream 26 (discontinued)																							
2004																							
2005																							
2006							X											X					
2007						X												X					
2008						X												X					
Stream 475000 (668583 6																							
2004																							
Stream 50000-48010																							
2004																							
2006																							
2009																							
Lower 7 (MSC-7)																							
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Upper 7																							
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2007						X												X					
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2011																							
Stream 8 (MCS-8)																							
2004																							
2005																							
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2007						X												X					
2008						X												X					
2009																							

	Periphyton & PhytoPlankton Biomass											PhytoPlankton												ZooPlankton											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
Stream 1 (MCS-1)																																				
2001																																				
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Morrison River (Creek)																																				
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Stream 4 (MSC-4)																																				
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2007							X												X																	
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Stream 5 (MCS-5)																																				
2001																																				
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2007							X												X																	
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Stream 6 (MSC-6)																																				
2001																																				
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2004																																				
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2007							X												X																	
2008							X												X																	
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2011																																				
Stream 26 (discontinued)																																				
2004																																				
2005																																				
2006							X												X																	
2007							X												X																	
2008							X												X																	
Stream 475000 (668583 6																																				
2004																																				
Stream 50000-48010																																				
2004																																				
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2009																																				
Lower 7 (MSC-7)																																				
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2006							X												X																	
2007							X												X																	
2008							X												X																	
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2010																																				
2011																																				
Upper 7																																				
2004																																				
2005																																				
2006							X												X																	
2007							X												X																	
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2009																																				
2010																																				
2011																																				
Stream 8 (MCS-8)																																				
2004																																				
2005																																				
2006																																				
2007							X												X																	
2008							X												X																	
2009																																				

	Water Quality											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
2010			X						X	X		
2011						X						
Stream 9 (aka Olympic Creek)												
2004												
2005												
2006												
2007												
2008					X	X	X	X				
2009												
2010												
2011						X						
Stream 10 (6070) -1												
2004												
2005												
2006								X				
2007					X					X		
2008						X	X					
2009												
2010			X						X	X		
2011						X						
Stream 10 (6070) -2												
2011						X						
Hautete Creek - 1												
2011						X						
Hautete Creek - 2												
2011	X					X						
Tahlo Creek - 1												
2004												
2006												
2010												
Tahlo Creek - 2												
2006												
Stream 480-600800 (Babine)												
2009												
2010												
2011												
Proposed Transmission Line												
Transmission Line (sampling at intervals)												
2006												
2007												
2008							X					
2009												
2010												
2011												
Stream 11.9												
2006												
2007												
2008							X					
2009												
2010												
2011												
Stream 17.1												
2006												
2007												
2008							X					
2009												
2010												
2011												
TL Wetland												
2006												
2007												
2008							X					
2009												
2010												
2011												
Power Station												
2006												
2007												
2008							X					
2009												
2010												
2011												
Surface Water_ Morrison Lake- 2004-2011	Water Quality											
Site A - Surface/Deep												
2004												
2005												
2006								x				
2007												
2008							x					
2009												
2010			x						x	x		
2011	x					x						
Site B - Surface/Deep												
2004												
2005												
2006								x				
2007												
2008							x					
2009												
2010										x		
2011	x					x						
2012												
Site C - Surface/Deep												
2004												
2005												
2006								x				
2007												
2008							x					

	Depth											
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
2010												
2011												
Stream 9 (aka Olympic Creek)												
2004												
2005												
2006												
2007												
2008												
2009							X					
2010												
2011												
Stream 10 (6070) -1												
2004												
2005												
2006												
2007												
2008												
2009												
2010			X									
2011												
Stream 10 (6070) -2												
2011												
Hautete Creek - 1												
2011												
Hautete Creek - 2												
2011												
Tahlo Creek - 1												
2004												
2006												
2010												
Tahlo Creek - 2												
2006												
Stream 480-600800 (Babine)												
2009						X						
2010												
2011												
Proposed Transmission Line												
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	Benthic Invertebrate \Benthos												Periphyton											
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	Periphyton & PhytoPlankton Biomass												PhytoPlankton												ZooPlankton											
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	Sample not collected (i.e., stream frozen, not accessible)
X	Sampled
H	Hydrometric station download only

References:

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- Appendix 26: Aquatics Baseline Report 2006-2007
- Appendix 27: Aquatics Baseline Report, 2008
- Appendix 28: Fisheries Baseline Report 2006-2008

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Klohn Crippen Berger (2011) January 2011 Preliminary Field Results

Addendum Appendix AD: 2004 Fisheries Studies Morrison Watershed_Bustard

Mcelhanney (May 2002): 2001 Surface Hydrology and Water Quality Report

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	Benthic Invertebrate \Benthos											Periphyton												Periphyton & PhytoPlankton Biomass												PhytoPlankton												ZooPlankton											
	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC
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Sample ID	MW07-01A	MW07-01A	MW07-01B	MW07-01B	MW07-02A	MW07-02A	MW07-02B	MW07-02B	MW07-02C	MW07-04A	MW07-04B	DH06-7	DH06-7	DH06-12	DH06-12
Date Sampled	24-Oct-10	23-Jan-11	24-Oct-10	23-Jan-10	24-Oct-10	24-Jan-11	24-Oct-10	24-Oct-11	24-Jan-11	25-Jan-11	25-Jan-11	23-Oct-10	24-Jan-11	24-Oct-10	24-Oct-11
Physical Tests															
Colour, True															
Conductivity	860	843	950	945	637	602	570	563	603	952	1060	413	363	642	894
Hardness (as CaCO3)	155	168	280	295	31.9	69.3	291	291	43.1	211	529	127	140	38.3	12.8
pH	8.26	8.25	7.95	8.03	8.35	8.37	8.15	8.01	8.39	8.12	7.79	8.25	8.20	8.37	8.81
Total Suspended Solids	5.0	3	30.0	204	185	133	57.0	75.3	120	7880	297	3	3	11.5	3
Total Dissolved Solids	535	511	622	549	393	374	335	270	361	678	642	230	224	639	557
Turbidity															
Anions and Nutrients															
Acidity (as CaCO3)	1	1.1	4.0	14.3	1	1	3.2	7.6	<1.0	3.4	33.4	1	2.0	1	1
Alkalinity, Bicarbonate (as CaCO3)															
Alkalinity, Carbonate (as CaCO3)															
Alkalinity, Hydroxide (as CaCO3)															
Alkalinity, Total (as CaCO3)	333	320	552	569	276	279	283	281	279	202	635	185	186	284	398
Ammonia as N	0.0802	0.0662	0.0076	0.0434	0.0359	0.0190	0.0067	0.0077	0.0204	0.197	0.0433	0.0065	0.0058	0.0178	0.0513
Bromide (Br)	0.5	0.25	0.25	0.25	0.05	0.05	0.05	0.05	<0.050	<0.25	<0.50	0.05	0.05	0.05	0.25
Chloride (Cl)	5	2.5	2.5	2.5	1.10	0.81	0.5	0.5	0.81	<2.5	<5.0	0.5	0.5	0.64	<2.5
Fluoride (F)	1.14	1.01	0.17	0.24	0.387	0.346	0.206	0.172	0.349	0.13	<0.20	1.39	1.19	2.96	5.94
Nitrate (as N)	0.05	0.025	0.025	0.025	0.005	0.005	0.114	0.162	<0.0050	<0.025	<0.050	0.005	0.005	0.005	0.025
Nitrite (as N)	0.01	0.005	0.005	0.005	0.001	0.001	0.001	0.0076	<0.0010	<0.0050	<0.010	0.001	0.001	0.001	0.005
Total Kjeldahl Nitrogen		0.134		2.76		0.188		0.094	0.191	3.94	2.36		0.187		0.331
Total Nitrogen		0.070		0.779		0.115		0.190	0.107	1.90	1.63		0.050		0.160
Total Phosphate as P		0.0025		0.212		0.181		0.0208	0.172	0.126	0.202		0.002		0.0261
Sulfate (SO4)	143	145	2.5	2.5	59.0	54.4	40.9	42.2	54.4	310	15.2	15.5	15.7	20.9	80.3
Total Metals															
Aluminum (Al)-Total	0.0098	0.006	0.0438	3.51	1.63	5.32	1.02	0.782	5.27	109	1.46	0.0680	0.0037	0.189	0.092
Antimony (Sb)-Total	0.00005	0.0001	0.000093	0.00073	0.000137	0.00024	0.000085	0.000065	0.00026	0.00067	0.000723	0.00005	0.00005	0.000235	0.00025
Arsenic (As)-Total	0.000231	0.000165	0.0110	0.0215	0.00613	0.0123	0.00107	0.00139	0.0113	0.0992	0.0192	0.000360	0.000287	0.000946	0.00078
Barium (Ba)-Total	0.0148	0.0142	0.357	0.387	0.0405	0.0683	0.0763	0.0658	0.0595	1.60	0.690	0.0327	0.0328	0.0290	0.0232
Beryllium (Be)-Total	0.0002	0.0004	0.0002	0.0004	0.0002	0.00043	0.0002	0.0002	<0.00040	0.0041	<0.00020	0.0002	0.0002	0.0002	0.001
Bismuth (Bi)-Total	0.0005	0.001	0.0005	0.001	0.0005	0.001	0.0005	0.0005	<0.0010	<0.0050	<0.00050	0.0005	0.0005	0.0005	0.0025
Boron (B)-Total	0.101	0.0934	0.102	0.104	0.0739	0.0781	0.0137	0.0138	0.0795	0.205	0.122	0.0844	0.0850	0.312	0.298
Cadmium (Cd)-Total	0.000158	0.00001	0.000280	0.000426	0.000138	0.000475	0.000147	0.000091	0.000460	0.00463	0.000352	0.000073	0.000005	0.000054	0.000118
Calcium (Ca)-Total	30.3	33.7	79.9	76.5	8.48	19.3	83.5	76.5	15.0	180	87.0	40.7	42.2	5.90	3.17
Chromium (Cr)-Total	0.00092	0.0002	0.00106	0.00831	0.00143	0.00463	0.00082	0.00059	0.00396	0.163	0.00378	0.00261	0.0001	0.00062	0.0005
Cobalt (Co)-Total	0.0001	0.0002	0.00028	0.0126	0.00117	0.00273	0.00160	0.00114	0.00258	0.108	0.0180	0.0001	0.0001	0.00014	0.0005
Copper (Cu)-Total	0.00073	0.001	0.00055	0.0095	0.00259	0.0159	0.00121	0.00086	0.0150	0.375	0.00672	0.00126	0.0005	0.0005	0.0025
Iron (Fe)-Total	0.342	0.144	10.2	22.5	0.944	6.15	1.42	1.28	4.55	202	24.4	0.090	0.057	0.180	0.078
Lead (Pb)-Total	0.00005	0.0001	0.000185	0.00303	0.000673	0.00269	0.000928	0.000610	0.00226	0.0824	0.00292	0.000106	0.00005	0.000085	0.00025
Lithium (Li)-Total	0.127	0.116	0.005	0.01	0.227	0.224	0.0123	0.0129	0.226	0.077	<0.0050	0.0180	0.0181	0.214	0.249
Magnesium (Mg)-Total	20.2	21.5	22.3	23.5	3.66	4.55	24.5	23.5	4.22	69.7	73.9	7.69	7.98	0.795	0.723
Manganese (Mn)-Total	0.00636	0.00485	3.21	2.69	0.194	0.350	0.329	0.223	0.264	7.25	2.84	0.0723	0.0702	0.0288	0.0327
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.000054	0.00001	0.000021	0.00001	0.00001	0.000026	0.000191	0.000018	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.00158	0.00136	0.00762	0.00930	0.00265	0.00452	0.00291	0.00263	0.00425	0.00561	0.00903	0.00205	0.00216	0.00340	0.00135
Nickel (Ni)-Total	0.00015	0.0002	0.00062	0.0216	0.00185	0.00385	0.00210	0.00131	0.00356	0.224	0.0223	0.00027	0.0001	0.00056	0.0005
Phosphorus (P)-Total	0.3	0.3	0.3	0.52	0.3	0.3	0.3	0.3	<0.30	5.52	0.35	0.3	0.3	0.3	0.3
Potassium (K)-Total	1.69	1.65	2.98	3.38	1.72	2.71	0.942	0.815	2.79	9.44	2.52	0.167	0.088	1.53	0.79
Selenium (Se)-Total	0.0001	0.0002	0.0001	0.0002	0.00010	0.00035	0.00029	0.00013	0.00031	0.0017	0.00029	0.0001	0.0001	0.0001	0.0005
Silicon (Si)-Total	4.54	4.60	6.23	12.7	7.26	13.5	7.45	6.63	16.9	93.6	9.93	9.19	9.10	3.92	3.49
Silver (Ag)-Total	0.00001	0.00002	0.000022	0.000052	0.000060	0.000713	0.00001	0.00001	0.000620	0.00121	0.000026	0.00001	0.00001	0.000057	0.00005
Sodium (Na)-Total	141	142	120	114	129	117	9.65	8.40	118	102	39.3	27.9	27.3	160	201
Strontium (Sr)-Total	0.800	0.706	0.898	0.857	0.221	0.229	0.443	0.443	0.221	1.06	1.06	0.576	0.573	0.195	0.136
Thallium (Tl)-Total	0.00005	0.0001	0.00005	0.00016	0.000087	0.00021	0.000057	0.00005	0.00020	0.00182	0.000104	0.00005	0.00005	0.00005	0.00025
Tin (Sn)-Total	0.00010	0.0002	0.00028	0.00056	0.00016	0.00062	0.00013	0.0001	0.00079	<0.0010	0.00025	0.00028	0.0001	0.00533	0.00117
Titanium (Ti)-Total	0.01	0.01	0.012	0.114	0.023	0.055	0.043	0.024	0.087	0.640	0.040	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.000029	0.000026	0.000091	0.000615	0.000925	0.00117	0.000527	0.000409	0.00106	0.00729	0.00356	0.000023	0.000024	0.000166	0.000062
Vanadium (V)-Total	0.000130	0.0001	0.000398	0.0111	0.110	0.266	0.00201	0.00195	0.291	0.316	0.00439	0.000168	0.000113	0.000282	0.00025
Zinc (Zn)-Total	0.0031	0.006	0.0066	0.0332	0.0206	0.201	0.0055	0.0050	0.154	0.676	0.0190	0.0185	0.003	0.0038	0.015

Sample ID	MW07-01A	MW07-01A	MW07-01B	MW07-01B	MW07-02A	MW07-02A	MW07-02B	MW07-02B	MW07-02C	MW07-04A	MW07-04B	DH06-7	DH06-7	DH06-12	DH06-12
Date Sampled	24-Oct-10	23-Jan-11	24-Oct-10	23-Jan-10	24-Oct-10	24-Jan-11	24-Oct-10	24-Oct-11	24-Jan-11	25-Jan-11	25-Jan-11	23-Oct-10	24-Jan-11	24-Oct-10	24-Oct-11
Dissolved Metals															
Aluminum (Al)-Dissolved	0.003	0.006	0.003	1.95	0.0097	1.63	0.003	0.348	1.16	<0.03	0.477	0.003	0.003	0.0329	0.081
Antimony (Sb)-Dissolved	0.00005	0.0001	0.000061	0.00013	0.000141	0.0001	0.000081	0.00005	<0.00010	<0.00050	0.000263	0.00005	0.00005	0.000711	0.00025
Arsenic (As)-Dissolved	0.000125	0.000160	0.00408	0.0135	0.00528	0.00714	0.000529	0.00111	0.00567	0.00305	0.0160	0.000298	0.000299	0.00100	0.00074
Barium (Ba)-Dissolved	0.0140	0.0137	0.248	0.404	0.0309	0.0602	0.0659	0.0648	0.0423	0.0842	0.672	0.0314	0.0321	0.0233	0.0220
Beryllium (Be)-Dissolved	0.0002	0.0004	0.0002	0.0004	0.0002	0.0004	0.0002	0.0002	<0.00040	<0.0020	<0.00020	0.0002	0.0002	0.0002	0.001
Bismuth (Bi)-Dissolved	0.0005	0.001	0.0005	0.001	0.0005	0.001	0.0005	0.0005	<0.0010	<0.0050	<0.00050	0.0005	0.0005	0.0005	0.0025
Boron (B)-Dissolved	0.0963	0.0826	0.0991	0.0973	0.0710	0.0716	0.0118	0.0094	0.0698	0.169	0.111	0.0780	0.0826	0.195	0.286
Cadmium (Cd)-Dissolved	0.000131	0.00001	0.000046	0.000334	0.000017	0.000140	0.000083	0.000088	0.000071	<0.00005	0.000168	0.000017	0.0000138	0.000017	0.000178
Calcium (Ca)-Dissolved	29.4	32.8	76.1	79.0	7.29	20.6	76.3	77.8	11.4	58.1	88.2	38.4	43.2	12.8	3.94
Chromium (Cr)-Dissolved	0.00024	0.0002	0.00026	0.00629	0.00012	0.00176	0.00013	0.00027	0.00076	<0.0010	0.00178	0.00031	<0.00010	0.00025	0.0005
Cobalt (Co)-Dissolved	0.0001	0.0002	0.00019	0.0148	0.00029	0.00091	0.00106	0.00111	0.00065	<0.0010	0.0150	0.0001	0.0001	0.00019	0.0005
Copper (Cu)-Dissolved	0.0005	0.001	0.0005	0.001	0.0005	0.001	0.0005	0.00065	<0.0010	<0.0050	0.00213	0.0005	0.0005	0.0005	0.0025
Iron (Fe)-Dissolved	0.01	0.137	0.020	28.1	0.01	4.77	0.01	0.762	1.91	0.029	0.043	0.036	0.043	0.01	0.085
Lead (Pb)-Dissolved	0.00005	0.0001	0.00005	0.00277	0.00005	0.00151	0.00005	0.000584	0.00085	<0.00050	0.00246	0.00005	0.00005	0.000058	0.00025
Lithium (Li)-Dissolved	0.123	0.112	0.005	0.01	0.231	0.230	0.0124	0.0126	0.225	<0.050	<0.0050	0.0183	0.0178	0.151	0.242
Magnesium (Mg)-Dissolved	19.9	21.0	21.8	23.8	3.33	4.34	24.3	23.6	3.57	16.1	75.1	7.58	7.89	1.52	0.725
Manganese (Mn)-Dissolved	0.00594	0.00470	2.98	2.78	0.143	0.353	0.252	0.219	0.199	0.884	3.01	0.0677	0.0689	0.0716	0.0302
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.000049	0.00001	0.000022	0.00001	0.00001	<0.000010	<0.000010	0.000022	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Dissolved	0.00149	0.00123	0.00739	0.00185	0.00210	0.00133	0.00302	0.00135	0.00159	0.00529	0.00354	0.00197	0.00211	0.00929	0.00148
Nickel (Ni)-Dissolved	0.0001	0.0002	0.00039	0.0220	0.00084	0.00235	0.00133	0.00126	0.00145	0.0021	0.0201	0.0001	0.00014	0.00060	<0.00050
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.48	0.3	0.3	0.3	0.3	<0.30	<0.30	<0.30	0.3	0.3	0.3	0.3
Potassium (K)-Dissolved	1.64	1.62	2.99	3.05	1.01	1.27	0.726	0.684	1.18	2.56	2.39	0.094	0.100	0.954	0.79
Selenium (Se)-Dissolved	0.0001	0.0002	0.0001	0.00055	0.0001	0.0002	0.00026	0.00013	<0.00020	<0.0010	0.00034	0.0001	0.0001	0.0001	0.0005
Silicon (Si)-Dissolved	4.40	4.55	5.64	8.97	3.24	6.80	5.43	5.67	9.64	5.43	7.10	9.08	9.02	3.31	3.47
Silver (Ag)-Dissolved	0.00001	0.00002	0.00001	0.00002	0.00001	0.00002	0.00001	0.00001	0.000053	<0.00010	<0.000010	0.00001	0.00001	0.00001	0.00005
Sodium (Na)-Dissolved	138	139	118	116	130	119	9.56	8.41	119	101	40.8	27.5	26.9	110	193
Strontium (Sr)-Dissolved	0.778	0.657	0.850	0.871	0.213	0.232	0.456	0.435	0.211	0.558	1.01	0.563	0.560	0.0945	0.132
Thallium (Tl)-Dissolved	0.00005	0.0001	0.00005	0.00013	0.00005	0.0001	0.00005	0.00005	<0.00010	<0.00050	0.000067	0.00005	0.00005	0.00005	0.00025
Tin (Sn)-Dissolved	0.0001	0.0002	0.0001	0.00038	0.0001	0.00028	0.0001	0.0001	<0.00020	<0.0010	<0.00010	0.0001	0.0001	0.00344	0.00112
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.020	0.01	0.021	0.010	0.011	0.050	0.011	0.012	0.01	0.01	0.01	0.01
Uranium (U)-Dissolved	0.000027	0.000024	0.000084	0.000771	0.000799	0.00102	0.000405	0.000390	0.000864	0.00199	0.00380	0.000020	0.000021	0.000259	0.000078
Vanadium (V)-Dissolved	0.00005	0.0001	0.000055	0.00938	0.000390	0.0506	0.000183	0.00136	0.0397	0.00211	0.00226	0.000096	0.000103	0.000276	0.00025
Zinc (Zn)-Dissolved	0.003	0.006	0.003	0.0483	0.003	0.103	0.003	0.0032	0.0370	<0.030	0.0113	0.003	0.003	0.003	0.015
Organic / Inorganic Carbon															
Total Organic Carbon	1.43	0.67	16.4	12.7	4.75	3.91	1.74	1.38	3.83	41.1	17.5	5.62	2.93	70.5	2.82

Revised Baseline for MCS-7, MCS-8 and MCS-10

Parameter	Units	BCWQ Based on MCS 7 hardness	MCS-7 Measured								MCS-8 Measured								MCS-10 Measured								
			Dissolved				Total				Dissolved				Total				Dissolved				Total				
			EAC Baseline	Mar-10	Oct-10	Average (Revised Baseline)	EAC Baseline	Mar-10	Oct-10	Average (Revised Baseline)	Mar-10	Sep-10	Oct-10	Average	Mar-10	Sep-10	Oct-10	Average	Mar-10	Sep-10	Oct-10	Average	Mar-10	Sep-10	Oct-10	Jul-10	Average
pH			**8**	8.02	8.02	**8.01**					7.72	8.09	8.06	**7.96**					7.73	7.85	7.86	**7.81**				7.41	**7.41**
Alkalinity	mgCACO$_3$/L		**72**	83.5	90.5	**82.00**					104	110	114	**109.33**					32.1	51.3	58.9	**47.4**				34.2	**34.2**
F	mg/L	0.3*	**0.064**	0.09	0.048	**0.07**					0.078	0.068	0.060	**0.07**					0.040	0.055	0.045	**0.047**				0.033	**0.033**
Cl	mg/L	140	**0.25**	0.5	0.5	**0.42**					0.5	0.5	0.5	**0.500**					0.5	0.5	0.5	**0.5**				<0.50	**<0.50**
Sulphate	mg/L	50	**8.8**	9.30	11.6	**9.90**					15.7	9.37	12.5	**12.52**					9.09	2.18	4.99	**5.42**				0.90	**0.90**
Nitrite	mg/L	0.02	**0.00057**		0.001	**0.001**							0.001	**0.001**							0.001	**0.001**				0.0016	**0.0016**
Nitrate	mg/L	3	**0.15**		0.113	**0.13**							0.330	**0.330**							0.0313	**0.0313**				<0.0050	**<0.0050**
Ammonia	mg/L	1.85	**0.0044**	0.02	0.005	**0.010**					0.02		0.0054	**0.0127**					0.027		0.0274	**0.0272**					
Hg	mg/L	0.00001	**0.0000055**	0.00005	0.00001	**0.00002**	0.0000053	0.00005	0.00001	**0.0000218**	0.00005	0.00001	0.00001	**0.00002**	0.00005	0.00001	0.00001	**0.00002**	0.00005	0.00001	0.00001	**0.00002**	0.00005	0.00001	0.00001	0.00005	**0.000030**
Ag	mg/L	0.0015	**0.0000067**	0.00001	0.00001	**0.00001**	0.0000064	0.000035	0.00001	**0.0000171**	0.00001	0.00001	0.00001	**0.00001**	0.00001	0.00001	0.00001	**0.00001**	0.00001	0.00001	0.00001	**0.00001**	0.000012	0.00001	0.000048	0.00001	**0.000020**
AI	mg/L	0.05	**0.046**	0.0269	0.0101	**0.028**	0.061	0.0676	0.0118	**0.047**	0.0066	0.0070	0.0054	**0.0063**	0.0084	0.0197	0.0220	**0.0167**	0.111	0.182	0.0246	**0.1059**	0.314	0.168	0.0613	0.170	**0.178325**
As	mg/L	0.005	**0.00026**	0.00033	0.000199	**0.00026**	0.00027	0.00034	0.000201	**0.00027**	0.00028	0.000541	0.000396	**0.000406**	0.00027	0.000592	0.000422	**0.000428**	0.00034	0.00131	0.000666	**0.000772**	0.00055	0.00126	0.000804	0.0005	**0.000779**
Ba	mg/L	1	**0.025**	0.0269	0.0303	**0.027**	0.026	0.0295	0.0319	**0.0291**	0.0461	0.0548	0.0545	**0.0518**	0.0476	0.0588	0.0553	**0.0539**	0.0253	0.0372	0.0397	**0.0341**	0.0336	0.0373	0.0413	0.0213	**0.033375**
Be	mg/L	0.0053	**0.00025**	0.0005	0.0002	**0.00032**	0.0025	0.0005	0.0002	**0.0011**	0.0005	0.0002	0.0002	**0.0003**	0.0005	0.0002	0.0002	**0.0003**	0.0005	0.0002	0.0002	**0.0003**	0.0005	0.0002	0.0002	0.0002	**0.000275**
B	mg/L	1.2	**0.0078**	0.015	0.0141	**0.0123**	0.0078	0.016	0.0162	**0.0133**	0.011	0.0132	0.0184	**0.0142**	0.012	0.0164	0.0179	**0.0154**	0.01	0.005	0.0061	**0.0070**	0.01	0.0058	0.0075	0.008	**0.008**
Ca	mg/L	--	**21**	24.5	22.7	**22.73**	20	23.8	22.5	**22.1**	36.8	34.0	31.1	**33.97**	35.7	35.5	31.0	**34.07**	11.6	14.4	13.3	**13.1**	11.5	15.3	13.1	9.87	**12.443**
Cd	mg/L	0.00002	**0.00001**	0.000282	0.000017	**0.00010**	0.00001	0.000545	0.000017	**0.000191**	0.00005	0.000017	0.000017	**0.000028**	0.00005	0.000017	0.000017	**0.000028**	0.00005	0.000072	0.000123	**0.000082**	0.00005	0.000038	0.000373	0.000017	**0.000120**
Co	mg/L	0.004	**0.00005**	0.0001	0.0001	**0.0001**	0.00005	0.0001	0.0001	**0.00008**	0.0001	0.0001	0.0001	**0.0001**	0.0001	0.0001	0.0001	**0.0001**	0.0001	0.00013	0.00016	**0.00013**	0.00021	0.00011	0.00019	0.0001	**0.000153**
Cr	mg/L	0.001 (Cr VI)	**0.00025**	0.00270	0.00013	**0.00103**	0.00025	0.0005	0.00041	**0.00039**	0.0005	0.0005	0.00022	**0.00041**	0.0005	0.0005	0.00046	**0.00049**	0.0005	0.0005	0.00020	**0.00040**	0.0005	0.0005	0.00046	0.00021	**0.000418**
Cu	mg/L	0.0024	**0.00088**	0.00188	0.00072	**0.00116**	0.00088	0.00575	0.00073	**0.00245**	0.00058	0.00072	0.00061	**0.00064**	0.00067	0.00078	0.00094	**0.00080**	0.00096	0.00104	0.00052	**0.00084**	0.00122	0.00092	0.00085	0.00164	**0.001158**
Fe	mg/L	0.35	**0.051**	0.03	0.01	**0.030**	0.068	0.059	0.01	**0.0457**	0.03	0.036	0.028	**0.0313**	0.03	0.130	0.073	**0.078**	0.503	1.13	0.687	**0.773**	0.887	1.16	1.24	0.103	**0.848**
K	mg/L	--	**0.29**	2	0.388	**0.89**	0.29	2	0.384	**0.891**	2	0.433	0.436	**0.956**	2	0.431	0.424	**0.952**	2	0.352	0.372	**0.908**	0.3	0.364	0.392	0.103	**0.290**
Li	mg/L	0.014	**0.0025**	0.005	0.005	**0.0042**	0.0025	0.005	0.005	**0.0042**	0.005	0.005	0.005	**0.005**	0.005	0.005	0.005	**0.005**	0.005	0.005	0.005	**0.005**	0.005	0.005	0.005	0.005	**0.005**
Mg	mg/L	--	**4**	5.26	4.78	**4.68**	4	5.13	4.74	**4.62**	6.56	6.31	6.14	**6.34**	6.38	6.52	6.17	**6.36**	2.79	3.63	3.64	**3.35**	2.81	3.64	3.67	2.40	**3.13**
Mn	mg/L	0.87	**0.0006**	0.00133	0.000185	**0.0007**	0.027	0.00248	0.00219	**0.01056**	0.0135	0.0366	0.00649	**0.01886**	0.0143	0.126	0.0303	**0.0569**	0.106	0.0927	0.286	**0.162**	0.296	0.0855	0.289	0.00338	**0.168470**
Mo	mg/L	1	**0.000053**	0.000089	0.000076	**0.000073**	0.000052	0.000128	0.000092	**0.000091**	0.000155	0.000126	0.000120	**0.000134**	0.000146	0.000131	0.000139	**0.000139**	0.00005	0.000129	0.000070	**0.000083**	0.000050	0.000146	0.000096	0.00005	**0.000086**
Na	mg/L	--	**5.2**	7.6	5.62	**6.14**	5.3	7.2	5.63	**6.04**	6.5	5.23	5.37	**5.70**	6.3	5.39	5.34	**5.68**	5.6	4.47	4.23	**4.77**	5.8	4.48	4.20	1.45	**3.98**
Ni	mg/L	0.065	**0.00026**	0.0005	0.00025	**0.00034**	0.00028	0.00092	0.00030	**0.0005**	0.0005	0.00050	0.00041	**0.00047**	0.0005	0.00056	0.00047	**0.00051**	0.0005	0.00057	0.00043	**0.00050**	0.00073	0.00050	0.00048	0.00052	**0.000558**
Pb	mg/L	0.005	**0.000039**	0.000164	0.00005	**0.000084**	0.000026	0.000559	0.00005	**0.000212**	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.000079	**0.000060**	0.000055	0.000123	0.00005	**0.000076**	0.000106	0.000076	0.000086	0.00005	**0.000080**
Sb	mg/L	0.02	**0.00005**	0.0001	0.00005	**0.00007**	0.00005	0.00019	0.00005	**0.00010**	0.0001	0.00005	0.00005	**0.00007**	0.0001	0.00005	0.00005	**0.00007**	0.0001	0.00005	0.00005	**0.00007**	0.0001	0.00005	0.00005	0.00005	**0.000063**
Se	mg/L	0.002	**0.0003**	0.001	0.0001	**0.0005**	0.0004	0.001	0.0001	**0.0005**	0.001	0.0002	0.0001	**0.0004**	0.001	0.0002	0.0001	**0.0004**	0.001	0.0002	0.0001	**0.0004333**	0.001	0.0002	0.0001	0.0002	**0.000375**
Si	mg/L	--	**2.7**	2.75	2.47	**2.64**	2.7	2.69	2.48	**2.62**	3.79	4.34	4.07	**4.07**	3.65	4.37	4.09	**4.04**	3.92	0.522	1.80	**2.08**	4.09	0.623	1.85	3.85	**2.603250**
Sn	mg/L	--	**0.000061**	0.00016	0.0001	**0.000107**	0.000057	0.00023	0.0001	**0.000129**	0.0001	0.0001	0.0001	**0.0001**	0.0001	0.0001	0.0001	**0.0001**	0.0001	0.0001	0.0001	**0.0001**	0.0001	0.0001	0.0001	0.00019	**0.000123**
V	mg/L	--	**0.0005**	0.001	0.000093	**0.0005**	0.0005	0.001	0.000074	**0.000525**	0.001	0.0005	0.000111	**0.00054**	0.001	0.0005	0.000141	**0.000547**	0.001	0.00095	0.000140	**0.000697**	0.001	0.00066	0.000294	0.0005	**0.000614**
Zn	mg/L	0.0075	**0.00061**	0.0048	0.003	**0.00280**	0.00062	0.0095	0.003	**0.00437**	0.001	0.001	0.003	**0.002**	0.001	0.001	0.003	**0.002**	0.0021	0.0027	0.003	**0.0**	0.0036	0.0014	0.0044	0.0013	**0.002675**
Hardness (calc)	mgCACO$_3$/L	--	**68**	82.9	76.3	**75.73**					119	111	103	**111**					40.4	50.8	48.2	**46.5**				35.1	**35.1**

Sample ID	MORRISON LAKE	MORRISON LAKE	MORRISON LAKE A DEEP	MORRISON LAKE B DEEP	MORRISON LAKE A SURFACE	MORRISON LAKE B SURFACE	MORRISON LAKE D DEEP WATER	MORRISON LAKE D SURFACE	MORRISON LAKE C SURFACE	MORRISON LAKE C DEEP	MORRISON LAKE E DEEP	MORRISON LAKE E SURFACE	MORRISON B-SURFACE	MORRISON B-DEEP	MORRISON C-SURFACE	MORRISON C-DEEP	MORRISON D-SURFACE
Date Sampled	09-MAR-10	16-SEP-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	12-JAN-11	12-JAN-11	11-JAN-11	11-JAN-11	12-JAN-11
Time Sampled	00:00	17:00	13:21	12:50	13:21	12:50	11:25	11:25	10:47	10:47	12:11	12:11	00:00	00:00	00:00	00:00	00:00
ALS Sample ID	L868643-4	L933296-6	L947757-1	L947757-2	L947757-3	L947757-4	L947772-1	L947772-2	L947772-3	L947772-4	L947772-5	L947772-6	L971339-1	L971339-2	L971339-3	L971339-4	L971339-5
Matrix	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests																	
Colour, True	34.9																
Conductivity	61.6	63.5	62.8	62.8	62.4	62.2	62.3	62.1	62.4	63.0	62.7	62.3	61.4	66.0	67.9	63.1	68.8
Hardness (as CaCO3)	29.9	30.3	29.3	29.4	30.2	30.0	29.1	28.0	27.1	26.7	28.5	25.5	30.0	31.4	33.0	30.0	31.7
pH	7.84	7.82	7.86	7.80	7.81	7.79	7.71	7.78	7.76	7.75	7.69	7.40	7.40	7.79	7.83	7.84	7.85
[H+]																	
Total Suspended Solids	3		3	5.0	5.0	3	3	3	3		3	3	3	3	3	3	3
Total Dissolved Solids	52		51	50	55	58	57	55	52	52	57	54	50	54	35	44	51
Turbidity	0.37																
Anions and Nutrients																	
Acidity (as CaCO3)	5.7		2.2	2.2	2.1	2.1	2.2	2.1	2.1	2.1	2.1	2.8	4.4	3.9	3.9	3.8	3.7
Alkalinity, Bicarbonate (as CaCO3)	28.5																
Alkalinity, Carbonate (as CaCO3)	<2.0																
Alkalinity, Hydroxide (as CaCO3)	<2.0																
Alkalinity, Total (as CaCO3)	28.5	29.1	28.3	28.2	28.0	28.1	28.1	28.2	28.1	28.1	27.6	28.0	28.3	29.1	31.5	28.6	31.3
Ammonia as N	0.02		0.005	0.005	0.005	0.005	0.005	0.0058	0.0052	0.005	0.005	0.005	0.005	0.0071	0.0129	0.0072	0.0078
Bromide (Br)		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Chloride (Cl)	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	0.5	0.5	0.5	0.5
Fluoride (F)	0.036	0.033	0.034	0.034	0.034	0.035	0.021	0.021	0.021	0.020	0.020	0.021	0.029	0.028	0.026	0.026	0.028
Nitrate (as N)			0.0338	0.0390	0.0364	0.0396	0.0679	0.0330	0.0339	0.0429	0.0651	0.0359	0.0605	0.0630	0.0650	0.0640	0.0679
Nitrite (as N)			0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Total Kjeldahl Nitrogen	0.275												0.244	0.298	0.277	0.335	0.297
Total Nitrogen													0.210	0.250	0.230	0.210	0.250
Total Phosphate as P													0.0056	0.0052	0.0051	0.0050	0.0053
Sulfate (SO4)	2.30	2.44	2.41	2.40	2.42	2.40	2.36	2.40	2.40	2.40	2.36	2.40	2.36	2.54	2.64	2.42	2.65
Cyanides																	
Cyanide, Weak Acid Diss													-	0.005	0.005		0.005
Cyanide, Total													-	0.005	0.005		0.0066
Organic / Inorganic Carbon																	
Total Organic Carbon	8.58		7.62	9.61	8.07	9.67	9.85	9.91	9.50	9.37	9.83	9.30	9.49	10.5	9.86	9.73	11.1
Total Metals																	
Aluminum (Al)-Total	0.0294	0.0332	0.0355	0.0442	0.0540	0.0332	0.0380	0.0413	0.0296	0.109	0.0329	0.0328	0.0277	0.0338	0.0309	0.0278	0.0349
Antimony (Sb)-Total	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000105	0.00005	0.00005	0.00005
Arsenic (As)-Total	0.00026	0.000355	0.000336	0.000378	0.000346	0.000313	0.000273	0.000291	0.000284	0.000642	0.000305	0.000281	0.000274	0.000308	0.000306	0.000290	0.000296
Barium (Ba)-Total	0.0164	0.0182	0.0165	0.0164	0.0179	0.0166	0.0163	0.0170	0.0162	0.0183	0.0160	0.0162	0.0160	0.0172	0.0172	0.0158	0.0177
Beryllium (Be)-Total	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.01	0.0073	0.0083	0.0085	0.0087	0.0084	0.0098	0.0100	0.0101	0.0105	0.0098	0.0097	0.0110	0.0094	0.0096	0.0094	0.0099
Cadmium (Cd)-Total	0.00005	0.000030	0.000017	0.000017	0.000022	0.000017	0.000017	0.000017	0.000017	0.000063	0.000017	0.000017	0.0000054	0.0000155	0.0000348	0.0000074	0.0000175
Calcium (Ca)-Total	8.40	9.77	8.47	8.65	8.90	8.74	8.63	7.82	8.33	7.94	7.97	7.50	8.43	9.08	9.19	8.18	9.31
Chromium (Cr)-Total	0.0005	0.0005	0.00048	0.00036	0.00050	0.00038	0.00050	0.00047	0.00050	0.00076	0.00046	0.00053	0.00020	0.00033	0.00081	0.00025	0.00027
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.00093	0.00181	0.00119	0.00151	0.00234	0.00092	0.00113	0.00109	0.00090	0.00219	0.00143	0.00100	0.00084	0.00281	0.00965	0.0459	0.00494
Iron (Fe)-Total	0.088	0.094	0.104	0.137	0.139	0.096	0.104	0.108	0.098	0.342	0.103	0.101	0.083	0.091	0.107	0.080	0.087
Lead (Pb)-Total	0.00005	0.000083	0.00005	0.00005	0.000229	0.00005	0.00005	0.000065	0.00005	0.000251	0.00005	0.00005	0.00005		0.000127	0.00005	0.000081
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	1.95	2.08	1.97	1.94	1.99	1.98	1.81	1.79	1.75	1.71	1.79	1.77	1.87	2.02	2.04	1.90	2.15
Manganese (Mn)-Total	0.00184	0.00313	0.00493	0.00578	0.0150	0.00371	0.00313	0.00358	0.00266	0.0241	0.00276	0.00254	0.00227	0.00168	0.00304	0.00220	0.00151
Mercury (Hg)-Total	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000031	0.00001
Molybdenum (Mo)-Total	0.000116	0.000152	0.000127	0.000127	0.000142	0.000122	0.000132	0.000142	0.000130	0.000136	0.000122	0.000127	0.000109	0.000127	0.000134	0.000116	0.000131
Nickel (Ni)-Total	0.0005	0.00064	0.00049	0.00049	0.00062	0.00053	0.00056	0.00086	0.00072	0.00084	0.00048	0.00043	0.00045	0.00060	0.00054	0.00046	0.00056
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total		0.437	0.316	0.312	0.330	0.323	0.332	0.324	0.321	0.329	0.318	0.322	0.321	0.343	0.338	0.319	0.371
Selenium (Se)-Total	0.001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	2.48	2.26	2.42	2.40	2.49	2.41	2.62	2.28	2.28	2.39	2.51	2.30	2.43	2.56	2.44	2.41	2.67
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	2	2.05	1.99	1.95	2.00	2.00	1.78	1.76	1.72	1.69	1.74	1.72	1.84	1.97	1.99	1.87	2.07
Strontium (Sr)-Total	0.0471	0.0524	0.0489	0.0478	0.0498	0.0481	0.0486	0.0476	0.0477	0.0468	0.0480	0.0485	0.0456	0.0491	0.0492	0.0467	0.0506
Thallium (Tl)-Total	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Tin (Sn)-Total	0.00026	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00099	0.00189	0.00048	0.00111	0.00017
Titanium (Ti)-Total	<0.010	0.01	0.01	0.01	0.01	0.01	<0.010	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000011	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Total	0.001	0.0005	0.000104	0.000124	0.000152	0.000089	0.000085	0.000118	0.000085	0.000329	0.000096	0.000111	0.000077	0.000084	0.000085	0.000087	0.000078
Zinc (Zn)-Total	0.001	0.0022	0.003	0.003	0.0036	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.0038	0.003	0.0038
Dissolved Metals																	
Aluminum (Al)-Dissolved	0.0258	0.0310	0.0239	0.0256	0.0256	0.0264	0.0289	0.0244	0.0251	0.0245	0.003	0.0228	0.0284	0.0288	0.0318	0.0284	0.0297
Antimony (Sb)-Dissolved	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Arsenic (As)-Dissolved	0.00026	0.000321	0.000308	0.000286	0.000332	0.000315	0.000273	0.000303	0.000285	0.000254	0.000194	0.000261	0.000312	0.000291	0.000280	0.000319	0.000315
Barium (Ba)-Dissolved	0.0157	0.0173	0.0160	0.0160	0.0162	0.0160	0.0158	0.0161	0.0161	0.0175	0.0123	0.0159	0.0166	0.0170	0.0179	0.0166	0.0179
Beryllium (Be)-Dissolved	0.0005	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Dissolved	<0.010	0.005	0.0084	0.0074	0.0078	0.0078	0.0073	0.0102	0.0101	0.0071	0.0033	0.0089	0.0061	0.0057	0.0059	0.0058	0.0059
Cadmium (Cd)-Dissolved	0.00005	0.000021	0.0000085	0.0000085	0.0000085	0.0000085	0.0000085	0.0000085	0.0000085	0.000031	0.0000085	0.0000085	0.0000114	0.0000064	0.0000267	0.0000094	0.0000114
Calcium (Ca)-Dissolved	8.66	8.97	8.57	8.59	8.91	8.86	8.69	8.36	8.01	7.87	8.68	7.33	8.80	9.24	9.74	8.73	9.23
Chromium (Cr)-Dissolved	0.0005	0.0005	0.00021	0.00045	0.00022	0.00022	0.00019	0.00028	0.00030	0.00022	0.0001	0.00039	0.00014	0.00017	0.00051	0.00025	0.00015
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Dissolved	0.00073	0.00140	0.00098	0.00121	0.00088	0.00079	0.00132	0.00097	0.00078	0.00125	0.00076	0.00077	0.00137	0.00134	0.00577	0.0473	0.0107
Iron (Fe)-Dissolved	0.089	0.104	0.066	0.069	0.067	0.069	0.077	0.071	0.071	0.071	0.112	0.074	0.086	0.086	0.110	0.084	0.087
Lead (Pb)-Dissolved	0.00005	0.000105	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000053	0.00005	0.00005	0.000195	0.000072	0.000125	0.000110	0.000063
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Dissolved	2.01	1.92	1.93	1.92	1.93	1.92	1.80	1.74	1.72	1.72	1.66	1.74	1.94	2.01	2.10	2.00	2.10
Manganese (Mn)-Dissolved	0.00146	0.00435	0.000255	0.000371	0.000275	0.000298	0.000363	0.000280	0.000273	0.000260	0.000319	0.000249	0.00238	0.00140	0.00320	0.00240	0.00143
Mercury (Hg)-Dissolved	0.00005	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000030	0.00001
Molybdenum (Mo)-Dissolved	0.000102	0.000114	0.000111	0.000113	0.000119	0.000111	0.000107	0.000121	0.000118	0.000126	0.000098	0.000117	0.000118	0.000113	0.000113	0.000104	0.000115
Nickel (Ni)-Dissolved	0.0005	0.00047	0.00045	0.00053	0.00060	0.00050	0.00055	0.00071	0.00071	0.00058	0.00020	0.00049	0.00051	0.00056	0.00058	0.00049	0.00053
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Dissolved	2	0.401	0.304	0.319	0.377	0.318	0.335	0.328	0.324	0.321	0.282	0.319	0.325	0.341	0.340	0.329	0.358
Selenium (Se)-Dissolved	0.001	0.0002	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Dissolved	2.57	2.18	2.34	2.36	2.34	2.34	2.63	2.27	2.27	2.34	2.48	2.26	2.44	2.59	2.51	2.47	2.70
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Dissolved	2	1.90	1.93	1.96	2.05	1.97	1.76	1.75	1.70	1.72	1.68	1.72	1.89	1.96	2.02	1.94	2.03
Strontium (Sr)-Dissolved	0.0450	0.0468	0.0468	0.0470	0.0470	0.0466	0.0471	0.0465	0.0465	0.0466	0.0494	0.0466	0.0487	0.0497	0.0493	0.0473	0.0510
Thallium (Tl)-Dissolved	0.0001	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Tin (Sn)-Dissolved	0.00015	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00346	0.00176	0.00026	0.00213	0.00043
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Dissolved	0.001	0.0005	0.000078	0.000077	0.000080	0.000082	0.000066	0.000088	0.000100	0.000087	0.000092	0.000064	0.000070	0.000101	0.000093	0.000068	0.000088
Zinc (Zn)-Dissolved	0.001	0.0012	0.003	0.003	0.0091	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003

Sample ID	MORRISON D-15M	MORRISON D-DEEP	MORRISON E-SURFACE	MORRISON E-DEEP	MORRISON A - SURFACE	MORRISON A - DEEP	MORRISON A - SHALLOW	MORRISON A - DEEP	MORRISON B - SHALLOW	MORRISON B - SHALLOW (Duplicate)	MORRISON B - DEEP	MORRISON C - SHALLOW	MORRISON C - DEEP	MORRISON D - SHALLOW	MORRISON D - THERMOCLINE	MORRISON D - DEEP	MORRISON E - SHALLOW	MORRISON E - DEEP
Date Sampled	12-JAN-11	12-JAN-11	11-JAN-11	11-JAN-11	12-JAN-11	12-JAN-11	01-JUN-11	01-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11
Time Sampled	00:00	00:00	00:00	00:00	00:00	00:00	14:30	14:30	14:24	14:30	14:15	13:30	13:25	12:44	12:40	12:15	11:21	11:06
ALS Sample ID	L971339-6	L971339-7	L971339-8	L971339-9	L973964-1	L973964-2	L1014720-7	L1014720-6	L1014719-1	L1014719-2	L1014719-4	L1014719-3	L1014719-6	L1014720-4	L1014720-5	L1014720-1	L1014720-3	L1014720-2
Matrix	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water	Water
Physical Tests																		
Colour, True																		
Conductivity	62.5	63.1	73.3	71.3	64.2	63.9	60.0	65.6	55.2	56.2	58.7	51.4	62.2	52.0	58.2	57.0	54.4	61.9
Hardness (as CaCO3)	29.1	27.6	30.6	28.2	28.1	27.8	28.3	30.9	26.3	26.1	28.5	24.5	29.1	24.7	27.6	29.3	27.0	29.1
pH	7.90	7.86	7.86	7.86	7.56	7.59	7.94	7.92	8.08	7.98	7.61	7.93	7.97	7.90	7.92	7.95	7.92	7.94
[H+]																		
Total Suspended Solids	3	3	3	3	3	3	3	14.7	3	3	3	3	3	3	3	3	3	3
Total Dissolved Solids	39	52	54	51	45	47	62	63	60	64	52	62	62	60	62	59	65	61
Turbidity																		
Anions and Nutrients																		
Acidity (as CaCO3)	3.5	3.6	3.5	3.5	1.9	1.9	3.8	2.7	3.4	4.0	5.3	2.4	3.6	2.7	4.0	3.9	4.1	2.7
Alkalinity, Bicarbonate (as CaCO3)																		
Alkalinity, Carbonate (as CaCO3)																		
Alkalinity, Hydroxide (as CaCO3)																		
Alkalinity, Total (as CaCO3)	29.7	26.6	29.2	27.9	30.1	29.1	26.2	28.2	23.6	24.1	26.4	21.7	27.1	22.1	25.8	24.9	23.2	27.7
Ammonia as N	0.0100	0.0115	0.0207	0.0127	0.005	0.0055	0.0092	0.0175	0.0116	0.0076	0.0137	0.0096	0.0085	0.0118	0.0119	0.0204	0.0086	0.0075
Bromide (Br)	0.05	0.05	0.05	0.05	0.05	0.05	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Chloride (Cl)	0.5	0.5	2.41	2.30	<0.50	0.51	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Fluoride (F)	0.026	0.027	0.026	0.028	0.026	0.026	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.10	0.10	0.1	0.1	0.1
Nitrate (as N)	0.0629	0.0663	0.0629	0.0643	0.0572	0.0545	0.025	0.061	0.025	0.025	0.042	0.025	0.053	0.025	0.048	0.036	0.028	0.062
Nitrite (as N)	0.001	0.001	0.001	0.001	0.001	0.001	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Total Kjeldahl Nitrogen	0.260	0.244	0.275	0.247	0.314	0.283	0.524	0.433	0.412	0.473	0.379	0.541	0.314	0.548	0.310	0.305	0.522	0.615
Total Nitrogen	0.220	0.210	0.230	0.230	0.230	0.240	0.524	0.493	0.438	0.498	0.421	0.541	0.367	0.548	0.358	0.341	0.550	0.677
Total Phosphate as P	0.0054	0.0062	0.0052	0.0056	0.0049	0.0065	0.0155	0.0286	0.0125	0.0093	0.0103	0.0111	0.0077	0.0122	0.0098	0.0096	0.0109	0.0069
Sulfate (SO4)	2.40	2.40	2.73	2.68	2.46	2.46	2.6	3.0	2.5	2.5	2.7	2.5	2.7	2.5	2.5	2.5	2.5	2.6
Cyanides																		
Cyanide, Weak Acid Diss		0.005			0.005	0.005	0.005	0.005		0.005	0.005	0.005		0.005		0.005		
Cyanide, Total		0.0071			0.0065	0.0066	0.0080	0.0080		0.0076	0.0061	0.0074		0.0086		0.0054		
Organic / Inorganic Carbon																		
Total Organic Carbon	10.0	9.98	10.1	10.5	10.2	9.87	10.1	9.17	9.61	17.3	11.3	13.8	10.1	10.2	10.3	8.75	13.3	7.96
Total Metals																		
Aluminum (Al)-Total	0.0278	0.0372	0.0275	0.0281	0.0289	0.126	0.129	0.373	0.157	0.169	0.113	0.157	0.0766	0.167	0.131	0.0563	0.151	0.0834
Antimony (Sb)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.000081	0.00005	0.000084	0.00005	0.000132	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Arsenic (As)-Total	0.000294	0.000288	0.000281	0.000285	0.000273	0.000705	0.000380	0.00145	0.000336	0.000346	0.000324	0.000320	0.000301	0.000324	0.000340	0.000289	0.000316	0.000887
Barium (Ba)-Total	0.0162	0.0163	0.0165	0.0160	0.0170	0.0186	0.0183	0.0233	0.0175	0.0181	0.0174	0.0171	0.0176	0.0175	0.0181	0.0186	0.0177	0.0192
Beryllium (Be)-Total	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Bismuth (Bi)-Total	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Total	0.0100	0.0091	0.0102	0.0096	0.009	0.009	0.0089	0.0091	0.0091	0.0092	0.0094	0.0082	0.0092	0.0091	0.0085	0.0093	0.0090	0.0096
Cadmium (Cd)-Total	0.0000074	0.0000214	0.0000103	0.000005	.0000161	0.000033	0.00001	0.000015	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.000013	0.00001	0.00001	0.00001
Calcium (Ca)-Total	8.56	8.07	8.46	7.69	8.43	8.01	8.52	9.15	7.71	7.78	8.53	7.09	8.92	7.31	8.33	8.89	7.65	8.71
Chromium (Cr)-Total	0.00042	0.00027	0.00022	0.00020	0.00025	0.0004	0.00035	0.00061	0.00042	0.00044	0.00027	0.00035	0.00028	0.00036	0.00035	0.00029	0.00037	0.00027
Cobalt (Co)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.00018	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Total	0.00319	0.00219	0.0112	-0.0426	0.00089	0.00248	0.00146	0.00225	0.00107	0.00131	0.00117	0.00150	0.00112	0.00118	0.00115	0.00155	0.00114	0.00099
Iron (Fe)-Total	0.087	0.099	0.091	0.095	0.077	0.387	0.265	0.931	0.310	0.322	0.224	0.317	0.169	0.343	0.262	0.148	0.322	0.330
Lead (Pb)-Total	0.000185	0.000152	0.000174	0.00005	0.00005	0.000067	0.000052	0.000244	0.000053	0.000077	0.00005	0.000079	0.00005	0.000063	0.00005	0.00005	0.000050	0.00005
Lithium (Li)-Total	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Total	1.97	1.92	2.12	1.98	2.03	2.09	1.87	2.06	1.72	1.75	1.83	1.65	1.89	1.68	1.87	2.04	1.75	1.88
Manganese (Mn)-Total	0.00212	0.00286	0.00180	0.00273	0.00108	0.0301	0.0111	0.0388	0.0115	0.0113	0.00994	0.0112	0.0100	0.0117	0.00978	0.00522	0.0115	0.0399
Mercury (Hg)-Total	0.00001	0.00001	0.00001	0.000010	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Total	0.000120	0.000119	0.000120	0.000117	0.000143	0.000152	0.000118	0.000155	0.000118	0.000116	0.000118	0.000098	0.000120	0.000102	0.000124	0.000126	0.000112	0.000120
Nickel (Ni)-Total	0.00049	0.00061	0.00048	0.00046	0.00040	0.00063	0.00061	0.00094	0.00089	0.00081	0.00065	0.00078	0.00072	0.00071	0.00071	0.00063	0.00071	0.00058
Phosphorus (P)-Total	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Total	0.317	0.316	0.377	0.332	0.340	0.360	0.374	0.407	0.376	0.376	0.346	0.369	0.354	0.373	0.371	0.364	0.383	0.340
Selenium (Se)-Total	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Total	2.46	2.50	2.51	2.47	2.48	2.59	2.61	3.20	2.71	2.72	2.64	2.71	2.59	2.71	2.71	2.49	2.67	2.52
Silver (Ag)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Total	1.87	1.89	3.11	2.35	1.85	2.26	1.84	2.09	1.79	1.80	1.82	1.75	1.85	1.74	1.90	2.06	1.81	1.89
Strontium (Sr)-Total	0.0499	0.0468	0.0470	0.0462	0.0496	0.0504	0.0457	0.0481	0.0415	0.0425	0.0443	0.0398	0.0469	0.0406	0.0447	0.0487	0.0416	0.0476
Thallium (Tl)-Total	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Tin (Sn)-Total	0.00032	0.00254	0.00511	0.00212	0.0001	0.0001	0.00017	0.00062	0.0001	0.0001	0.00030	0.0001	0.00050	0.0001	0.00145	0.00071	0.0001	0.00048
Titanium (Ti)-Total	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.013	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Total	0.00001	0.00001	0.00001	0.00001	0.00001	0.000011	0.00001	0.000019	0.000011	0.000012	0.00001	0.000011	0.00001	0.000011	0.00001	0.00001	0.000010	0.000011
Vanadium (V)-Total	0.000077	0.000091	0.000091	0.000083	0.000085	0.000313	0.000291	0.000891	0.000369	0.000402	0.000253	0.000354	0.000180	0.000399	0.000330	0.000134	0.000338	0.000232
Zinc (Zn)-Total	0.003	0.003	0.003	0.003	0.003	0.0031	0.003	0.0037	0.003	0.0046	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003
Dissolved Metals																		
Aluminum (Al)-Dissolved	0.0294	0.0305	0.0278	0.0265	0.0283	0.0493	0.0490	0.0371	0.0666	0.0625	0.0457	0.0750	0.0394	0.0731	0.0546	0.0299	0.0664	0.0313
Antimony (Sb)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Arsenic (As)-Dissolved	0.000285	0.000281	0.000289	0.000288	0.000302	0.000489	0.000293	0.000361	0.000274	0.000275	0.000275	0.000270	0.000270	0.000287	0.000276	0.000268	0.000295	0.000340
Barium (Ba)-Dissolved	0.0161	0.0160	0.0168	0.0163	0.0169	0.0173	0.0168	0.0191	0.0163	0.0164	0.0166	0.0160	0.0165	0.0159	0.0165	0.0167	0.0167	0.0169
Beryllium (Be)-Dissolved	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002
Bismuth (Bi)-Dissolved	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
Boron (B)-Dissolved	0.0053	0.0062	0.0062	0.0054	0.006	0.006	0.0088	0.0083	0.0081	0.0081	0.0078	0.0079	0.0083	0.0078	0.0078	0.0091	0.0084	0.0080
Cadmium (Cd)-Dissolved	0.000005	0.0000194	0.0000123	0.0000063	0.000025	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Calcium (Ca)-Dissolved	8.43	7.89	8.58	8.00	7.92	7.85	8.35	8.94	7.75	7.72	8.49	7.16	8.66	7.21	8.13	8.69	8.03	8.60
Chromium (Cr)-Dissolved	0.00020	0.00016	0.00012	0.00012	0.00013	0.00014	0.00019	0.00018	0.00023	0.00017	0.00019	0.00022	0.00017	0.00022	0.00017	0.00018	0.00019	0.00016
Cobalt (Co)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Copper (Cu)-Dissolved	0.00311	0.00182	0.0109	0.0418	0.00120	0.00090	0.00126	0.00149	0.00100	0.00109	0.00101	0.00114	0.00098	0.00104	0.00096	0.00125	0.00096	0.00086
Iron (Fe)-Dissolved	0.083	0.092	0.090	0.096	0.076	0.182	0.114	0.106	0.139	0.140	0.106	0.153	0.089	0.162	0.120	0.080	0.149	0.088
Lead (Pb)-Dissolved	0.00005	0.000108	0.000081	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Lithium (Li)-Dissolved	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Magnesium (Mg)-Dissolved	1.96	1.91	2.23	2.00	2.03	1.98	1.82	2.08	1.69	1.66	1.78	1.60	1.82	1.62	1.77	1.85	1.68	1.84
Manganese (Mn)-Dissolved	0.00213	0.00263	0.00191	0.00282	0.00122	0.0192	0.0011	0.0027	0.0018	0.0018	0.0012	0.0023	0.0013	0.0023	0.0018	0.0008	0.0020	0.0024
Mercury (Hg)-Dissolved	0.00001	0.00001	0.00001	0.000012	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Molybdenum (Mo)-Dissolved	0.000110	0.000107	0.000112	0.000102	0.000120	0.000092	0.000112	0.000119	0.000104	0.000101	0.000108	0.000106	0.000111	0.000098	0.000108	0.000117	0.000101	0.000111
Nickel (Ni)-Dissolved	0.00048	0.00048	0.00050	0.00044	0.00047	0.00051	0.00061	0.00053	0.00069	0.00058	0.00059	0.00074	0.00057	0.00059	0.00060	0.00049	0.00057	0.00052
Phosphorus (P)-Dissolved	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Potassium (K)-Dissolved	0.327	0.314	0.405	0.335	0.344	0.322	0.396	0.383	0.359	0.358	0.339	0.361	0.343	0.346	0.347	0.351	0.358	0.334
Selenium (Se)-Dissolved	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Silicon (Si)-Dissolved	2.47	2.49	2.53	2.49	2.50	2.45	2.39	2.44	2.48	2.48	2.45	2.50	2.48	2.48	2.44	2.41	2.44	2.42
Silver (Ag)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Sodium (Na)-Dissolved	1.87	1.82	3.55	2.30	1.83	1.81	1.82	2.17	1.77	1.71	1.77	1.74	1.81	1.73	1.80	1.87	1.75	1.87
Strontium (Sr)-Dissolved	0.0464	0.0452	0.0492	0.0456	0.0478	0.0466	0.0443	0.0470	0.0420	0.0415	0.0438	0.0395	0.0450	0.0398	0.0438	0.0469	0.0432	0.0467
Thallium (Tl)-Dissolved	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005
Tin (Sn)-Dissolved	0.00029	0.00215	0.00342	0.00173	0.0001	0.0001	0.00016	0.00054	0.0001	0.0001	0.00027	0.0001	0.00046	0.0001	0.00130	0.00063	0.0001	0.00041
Titanium (Ti)-Dissolved	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Uranium (U)-Dissolved	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001
Vanadium (V)-Dissolved	0.000078	0.000096	0.000098	0.000098	0.000082	0.000142	0.000132	0.000171	0.000154	0.000128	0.000121	0.000160	0.000106	0.000160	0.000123	0.000089	0.000136	0.000094
Zinc (Zn)-Dissolved	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003	0.003

Sample ID	Morrison L A - Surface	Morrison L A - Surface	Morrison L A	Morrison L B - Deep	Morrison L B - Surface	Morrison L B	Morrison L C - Deep	Morrison L C - Surface	Morrison L C	Morrison L C - Duplicate	Morrison L D - Surface	Morrison L D	Morrison L E - Deep	Morrison Lake D - Deep	Morrison L E	Morrison L E - Surface	Min	Max	Stdev	Revised Baseline (Mean)
Date Sampled	23-Jul-08	23-Jul-08	24-Aug-06	23-Jul-08	23-Jul-08	24-Aug-06	23-Jul-08	23-Jul-08	25-Aug-06	25-Aug-06	23-Jul-08	24-Aug-06	23-Jul-08	23-Jul-08	24-Aug-06	23-Jul-08				
Time Sampled																				
ALS Sample ID																				
Matrix																				
Physical Tests																				
Colour, True	38.3	38.6	36.2	36.6	38.8	36	36.5	38.8	35.9	38	38.8	36.1	38	36.5	35.6	38.7	34.9	38.8	1.3	37.1941176
Conductivity	58.4	59.4	64.6	65	58.6	63.7	62	57.5	63.5	63.2	57.9	62.9	60.8	61.1	62.8	58.4	51.4	73.3	4.121616	61.7294118
Hardness (as CaCO3)	30.1	29.7	28.4	30.9	28.5	29.6	29.9	28.5	28.5	27.8	28.8	28.7	28.2	29.4	27.7	28.3	24.5	33.0	1.671557	28.7431373
pH	7.63	7.65	7.88	7.23	7.62	7.84	7.42	7.54	7.83	7.8	7.53	7.81	7.42	7.47	7.81	7.58	07.2	08.1	0.183502	7.7543137
[H+]	2.34E-08	2.24E-08	1.32E-08	5.89E-08	2.40E-08	1.45E-08	3.80E-08	2.88E-08	1.48E-08	1.58E-08	2.95E-08	1.55E-08	3.80E-08	3.39E-08	1.55E-08	2.63E-08	00.0	00.0	1.22E-08	0.0000000
Total Suspended Solids	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	01.5	14.7	1.933714	2.8306122
Total Dissolved Solids	59	57	48	57	54	48	57	58	48	46	55	47	58	54	46	54	35.0	65.0	6.395183	53.8600000
Turbidity	0.43	0.45	0.59	0.51	0.55	0.38	0.45	0.52	0.56	0.42	0.56	0.52	0.54	0.55	0.73	0.85	00.4	00.9	0.12048	0.5282353
Anions and Nutrients																				
Acidity (as CaCO3)	2.1	2.1	2.9	3.4	1.7	2.8	2.5	2	2.6	2.7	2.5	3	2.4	2.3	2.8	1.8	01.7	05.7	0.913895	2.9500000
Alkalinity, Bicarbonate (as CaCO3)	26.5	26.3		27.7	25.8		27.5	26.1			26.1		26.8	28		26.3	25.8	28.5	0.90232	26.8727273
Alkalinity, Carbonate (as CaCO3)	1	1		1	1		1	1			1		1	1		1	01.0	01.0	0	1.0000000
Alkalinity, Hydroxide (as CaCO3)	1	1		1	1		1	1			1		1	1		1	01.0	01.0	0	1.0000000
Alkalinity, Total (as CaCO3)	26.5	26.3	32.2	27.7	25.8	31.8	27.5	26.1	32	31.6	26.1	31.6	26.8	28	31.3	26.3	21.7	32.2	2.436248	27.8098039
Ammonia as N	1.00E-02	1.00E-02	2.50E-03	1.13E-01	1.21E-02	6.00E-03	2.50E-03	1.82E-02	5.30E-03	5.30E-03	2.10E-02	5.30E-03	7.40E-03	2.50E-03	7.30E-03	1.35E-02	00.0	00.1	0.015508	0.0111240
Bromide (Br)	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	2.50E-02	00.0	00.3	0.091473	0.0900000
Chloride (Cl)	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	2.50E-01	00.3	02.5	0.954425	0.9744000
Fluoride (F)	3.50E-02	3.50E-02	4.00E-02	3.50E-02	3.50E-02	3.80E-02	3.50E-02	3.50E-02	3.80E-02	3.60E-02	3.60E-02	3.60E-02	3.50E-02	2.20E-02	3.60E-02	3.60E-02	00.0	00.1	0.030245	0.0468431
Nitrate (as N)	5.00E-03	9.90E-03	1.01E-02	6.35E-02	5.30E-03	2.50E-03	6.44E-02	2.50E-03	2.50E-03	2.50E-03	6.60E-03	2.50E-03	4.75E-02	5.89E-02	2.50E-03	8.00E-03	00.0	00.1	0.02326	0.0380653
Nitrite (as N)	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	00.0	00.0	0.001845	0.0018163
Total Kjeldahl Nitrogen	8.50E-02	1.30E-01	2.98E-01	1.17E-01	1.35E-01	2.75E-01	1.36E-01	1.40E-01	2.48E-01	2.60E-01	1.53E-01	3.84E-01	1.23E-01	1.61E-01	3.10E-01	1.12E-01	00.1	00.6	0.134557	0.2948000
Total Nitrogen	9.00E-02	1.40E-01	3.08E-01	1.80E-01	1.40E-01	2.75E-01	2.00E-01	1.40E-01	2.48E-01	2.60E-01	1.60E-01	3.84E-01	1.70E-01	2.20E-01	3.10E-01	1.20E-01	00.1	00.7	0.143775	0.2977179
Total Phosphate as P	6.10E-03	6.80E-03	7.90E-03	5.80E-03	1.16E-02	5.70E-03	6.30E-03	7.60E-03	6.00E-03	5.90E-03	8.30E-03	7.10E-03	7.00E-03	6.60E-03	7.70E-03	1.24E-02	00.0	00.0	0.004243	0.0082872
Sulfate (SO4)	2.40E+00	2.40E+00	2.51E+00	2.54E+00	2.39E+00	2.38E+00	2.46E+00	2.34E+00	2.35E+00	2.34E+00	2.43E+00	2.32E+00	2.42E+00	2.61E+00	2.30E+00	2.56E+00	02.3	03.0	0.132606	2.4760784
Cyanides																				
Cyanide, Weak Acid Diss																			9.03E-19	0.0050000
Cyanide, Total	8.10E-03	7.10E-03	5.10E-03	6.30E-03	7.70E-03	4.90E-03	7.00E-03	8.00E-03	4.60E-03	4.80E-03	8.60E-03	5.10E-03	7.80E-03	7.60E-03	4.50E-03	7.60E-03	00.0	00.0	0.001322	0.0066448
Organic / Inorganic Carbon																	00.0	00.0		
Total Organic Carbon	5.61E+00	1.01E+01	1.05E+01	9.58E+00	9.83E+00	1.04E+01	1.02E+01	9.76E+00	1.05E+01	1.04E+01	1.00E+01	1.06E+01	1.03E+01	9.99E+00	1.04E+01	9.96E+00	05.6	17.3	1.583675	10.0532000
Total Metals																	00.0	00.0		
Aluminum (Al)-Total	4.12E-02	4.12E-02	2.21E-02	4.36E-02	4.01E-02	3.24E-02	4.27E-02	3.88E-02	2.49E-02	2.07E-02	4.27E-02	2.09E-02	4.83E-02	4.28E-02	2.10E-02	4.09E-02	00.0	00.4	0.062338	0.0641431
Antimony (Sb)-Total	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	00.0	00.0	1.62E-05	0.0000549
Arsenic (As)-Total	2.70E-04	2.90E-04	3.30E-04	2.90E-04	2.80E-04	3.40E-04	2.60E-04	2.80E-04	3.30E-04	3.00E-04	2.70E-04	3.10E-04	2.70E-04	2.90E-04	3.20E-04	2.80E-04	00.0	00.0	0.000192	0.0003527
Barium (Ba)-Total	1.50E-02	1.65E-02	1.78E-02	1.68E-02	1.58E-02	1.79E-02	1.62E-02	1.55E-02	1.82E-02	1.75E-02	1.61E-02	1.72E-02	2.54E-02	1.63E-02	1.73E-02	1.57E-02	00.0	00.0	0.001729	0.0172961
Beryllium (Be)-Total	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	00.0	00.0	4.61E-05	0.0002216
Bismuth (Bi)-Total	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	00.0	00.0	0.000117	0.0004216
Boron (B)-Total	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	00.0	00.0	0.002107	0.0079588
Cadmium (Cd)-Total	3.10E-05	8.50E-06	1.00E-05	8.50E-06	8.50E-06	1.00E-05	8.50E-06	8.50E-06	1.00E-05	1.00E-05	8.50E-06	1.00E-05	8.50E-06	8.50E-06	1.00E-05	8.50E-06	00.0	00.0	1.09E-05	0.0000151
Calcium (Ca)-Total	7.82E+00	8.36E+00	8.67E+00	9.10E+00	8.31E+00	8.64E+00	8.22E+00	7.81E+00	9.84E+00	8.62E+00	8.50E+00	8.51E+00	8.34E+00	8.73E+00	8.46E+00	8.16E+00	07.1	09.8	0.563103	8.4158824
Chromium (Cr)-Total	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.54E-03	2.50E-04	2.50E-04	2.50E-04	00.0	00.0	0.000335	0.0003963
Cobalt (Co)-Total	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	1.10E-04	5.00E-05	5.00E-05	5.00E-05	00.0	00.0	2.66E-05	0.0000871
Copper (Cu)-Total	1.49E-03	1.01E-03	8.70E-04	1.06E-03	9.30E-04	8.50E-04	9.00E-04	8.30E-04	9.90E-04	8.20E-04	9.90E-04	7.90E-04	1.81E-03	9.10E-04	7.60E-04	8.90E-04	00.0	00.0	0.009057	0.0017592
Iron (Fe)-Total	1.11E-01	1.20E-01	1.23E-01	1.38E-01	1.25E-01	1.23E-01	1.42E-01	1.26E-01	1.35E-01	1.16E-01	1.24E-01	1.19E-01	1.53E-01	1.32E-01	1.17E-01	1.22E-01	00.1	00.9	0.13882	0.1719020
Lead (Pb)-Total	8.40E-05	1.50E-04	2.50E-05	5.90E-05	2.50E-05	2.50E-05	5.40E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	1.45E-04	2.50E-05	2.50E-05	2.50E-05	00.0	00.0	5.8E-05	0.0000730
Lithium (Li)-Total	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	00.0	00.0	0.001172	0.0042157
Magnesium (Mg)-Total	1.85E+00	1.99E+00	1.74E+00	2.14E+00	1.94E+00	1.73E+00	2.00E+00	1.88E+00	1.93E+00	1.72E+00	2.04E+00	1.71E+00	1.93E+00	1.99E+00	1.69E+00	1.83E+00	01.7	02.2	0.133863	1.8964706
Manganese (Mn)-Total	2.57E-03	2.66E-03	2.80E-03	3.51E-03	2.63E-03	2.45E-03	3.15E-03	2.48E-03	2.24E-03	1.90E-03	3.00E-03	2.13E-03	4.93E-03	3.41E-03	2.05E-03	2.77E-03	00.0	00.0	0.008719	0.0068857
Mercury (Hg)-Total	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	1.30E-05	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	00.0	00.0	6.96E-06	0.0000098
Molybdenum (Mo)-Total	1.24E-04	1.21E-04	1.57E-04	1.14E-04	1.20E-04	1.29E-04	1.11E-04	1.11E-04	1.56E-04	1.29E-04	1.26E-04	1.25E-04	1.19E-04	9.40E-05	1.41E-04	1.14E-04	00.0	00.0	1.4E-05	0.0001251
Nickel (Ni)-Total	7.60E-04	2.00E-03	2.50E-04	8.50E-04	6.80E-04	2.50E-04	9.40E-04	6.20E-04	6.00E-04	2.50E-04	7.70E-04	2.50E-04	5.51E-02	8.60E-04	2.50E-04	7.40E-04	00.0	00.1	0.007632	0.0017010
Phosphorus (P)-Total																	00.3	00.3	1.13E-16	0.3000000
Potassium (K)-Total	3.38E-01	3.32E-01	3.54E-01	3.58E-01	3.37E-01	3.46E-01	3.32E-01	3.25E-01	3.99E-01	3.47E-01	3.55E-01	3.39E-01	3.43E-01	3.54E-01	3.40E-01	3.26E-01	00.3	00.4	0.026268	0.3471200
Selenium (Se)-Total	3.40E-04	3.60E-04	5.80E-04	3.60E-04	2.80E-04	2.50E-04	1.90E-04	1.10E-04	2.50E-04	2.50E-04	4.50E-04	2.50E-04	1.90E-04	2.20E-04	2.50E-04	3.20E-04	00.0	00.0	0.000159	0.0001794
Silicon (Si)-Total	2.44E+00	2.54E+00	2.01E+00	2.83E+00	2.57E+00	2.06E+00	2.80E+00	2.56E+00	2.02E+00	2.04E+00	2.44E+00	2.01E+00	2.74E+00	2.76E+00	2.03E+00	2.54E+00	02.0	03.2	0.235184	2.4907843
Silver (Ag)-Total	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	00.0	00.0	2.34E-06	0.0000084
Sodium (Na)-Total	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	01.0	03.1	0.486426	1.6433333
Strontium (Sr)-Total	3.96E-02	4.15E-02	4.76E-02	4.67E-02	4.13E-02	4.71E-02	4.21E-02	3.95E-02	5.14E-02	4.70E-02	4.44E-02	4.66E-02	4.15E-02	4.19E-02	4.62E-02	4.08E-02	00.0	00.1	0.00337	0.0460706
Thallium (Tl)-Total	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	00.0	00.0	7E-06	0.0000510
Tin (Sn)-Total	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	1.10E-04	5.00E-05	5.00E-05	5.00E-05	00.0	00.0	0.000868	0.0004290
Titanium (Ti)-Total	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	00.0	00.0	0.002449	0.0084286
Uranium (U)-Total	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	1.00E-05	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	00.0	00.0	2.83E-06	0.0000089
Vanadium (V)-Total	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	00.0	00.0	0.000219	0.0003160
Zinc (Zn)-Total	4.20E-03	5.00E-04	5.00E-04	5.00E-04	5.00E-04	1.00E-03	1.10E-03	5.00E-04	2.50E-03	1.40E-03	1.00E-03	5.00E-04	1.50E-03	5.00E-04	5.00E-04	5.00E-04	00.0	00.0	0.001159	0.0024314
Dissolved Metals																				
Aluminum (Al)-Dissolved	3.57E-02	3.41E-02	1.61E-02	3.43E-02	3.52E-02	1.64E-02	3.50E-02	3.47E-02	1.59E-02	1.78E-02	3.54E-02	1.63E-02	3.72E-02	3.36E-02	1.58E-02	3.49E-02	00.0	00.1	0.014906	0.0334294
Antimony (Sb)-Dissolved	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	00.0	00.0	7E-06	0.0000510
Arsenic (As)-Dissolved	2.70E-04	2.70E-04	3.10E-04	2.60E-04	2.60E-04	3.10E-04	3.40E-04	2.70E-04	3.10E-04	3.00E-04	2.70E-04	3.00E-04	2.40E-04	2.60E-04	2.90E-04	2.80E-04	00.0	00.0	3.97E-05	0.0002915
Barium (Ba)-Dissolved	1.59E-02	1.64E-02	1.74E-02	1.64E-02	1.57E-02	1.74E-02	1.65E-02	1.58E-02	1.70E-02	1.68E-02	1.60E-02	1.73E-02	2.50E-02	1.60E-02	1.68E-02	1.55E-02	00.0	00.0	0.001498	0.0166392
Beryllium (Be)-Dissolved	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	00.0	00.0	4.61E-05	0.0002216
Bismuth (Bi)-Dissolved	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	00.0	00.0	0.000117	0.0004216
Boron (B)-Dissolved	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	00.0	00.0	0.001639	0.0065240
Cadmium (Cd)-Dissolved	8.50E-06	8.50E-06	1.00E-05	8.50E-06	8.50E-06	1.00E-05	8.50E-06	8.50E-06	1.00E-05	1.00E-05	8.50E-06	1.00E-05	8.50E-06	8.50E-06	1.00E-05	8.50E-06	00.0	00.0	7.41E-06	0.0000116
Calcium (Ca)-Dissolved	8.67E+00	8.58E+00	8.56E+00	8.91E+00	8.19E+00	8.93E+00	8.59E+00	8.23E+00	8.61E+00	8.35E+00	8.30E+00	8.67E+00	8.17E+00	8.60E+00	8.32E+00	8.28E+00	07.2	09.7	0.503086	8.4235294
Chromium (Cr)-Dissolved	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	2.50E-04	1.65E-03	2.50E-04	2.50E-04	2.50E-04	00.0	00.0	0.000219	0.0002616
Cobalt (Co)-Dissolved	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	00.0	00.0	2.34E-05	0.0000843
Copper (Cu)-Dissolved	1.03E-03	1.04E-03	8.70E-04	1.05E-03	9.70E-04	7.90E-04	9.50E-04	9.90E-04	7.30E-04	7.70E-04	9.10E-04	7.90E-04	1.47E-03	9.70E-04	7.80E-04	8.70E-04	00.0	00.0	0.008684	0.0032563
Iron (Fe)-Dissolved	1.02E-01	1.02E-01	9.30E-02	1.06E-01	1.01E-01	9.20E-02	1.07E-01	1.04E-01	8.70E-02	8.80E-02	1.08E-01	8.90E-02	1.15E-01	1.11E-01	8.90E-02	1.04E-01	00.1	00.2	0.025114	0.0991373
Lead (Pb)-Dissolved	2.50E-05	7.00E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	2.50E-05	7.00E-05	2.50E-05	2.50E-05	2.50E-05	00.0	00.0	3.08E-05	0.0000530
Lithium (Li)-Dissolved	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	2.50E-03	00.0	00.0	0.001172	0.0042157
Magnesium (Mg)-Dissolved	2.05E+00	2.02E+00	1.71E+00	2.10E+00	1.95E+00	1.78E+00	2.06E+00	1.93E+00	1.71E+00	1.68E+00	1.96E+00	1.72E+00	1.90E+00	1.92E+00	1.67E+00	1.86E+00	01.6	02.2	0.15118	1.8725490
Manganese (Mn)-Dissolved	6.20E-04	6.12E-04	2.67E-04	8.08E-04	5.11E-04	2.69E-04	7.25E-04	5.90E-04	2.20E-04	2.21E-04	6.96E-04	2.60E-04	1.47E-03	6.73E-04	2.09E-04	5.86E-04	00.0	00.0	0.002701	0.0015623
Mercury (Hg)-Dissolved	1.10E-05	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	1.10E-05	5.00E-06	5.00E-05	5.00E-06	5.00E-06	5.00E-05	00.0	00.0	1.04E-05	0.0000116
Molybdenum (Mo)-Dissolved	1.00E-04	1.00E-04	1.38E-04	1.00E-04	1.00E-04	1.37E-04	1.00E-04	1.00E-04	1.28E-04	1.15E-04	1.00E-04	1.31E-04	1.00E-04	1.00E-04	1.28E-04	1.00E-04	00.0	00.0	1.06E-05	0.0001105
Nickel (Ni)-Dissolved	7.50E-04	1.25E-03	2.50E-04	1.13E-03	8.00E-04	2.50E-04	1.03E-03	6.60E-04	5.00E-04	5.70E-04	7.80E-04	2.50E-04	5.34E-02	8.60E-04	2.50E-04	6.70E-04	00.0	00.1	0.007399	0.0016141
Phosphorus (P)-Dissolved																	00.3	00.3	1.13E-16	0.3000000
Potassium (K)-Dissolved	3.61E-01	3.43E-01	3.51E-01	3.72E-01	3.37E-01	3.61E-01	3.48E-01	3.38E-01	3.45E-01	3.34E-01	3.46E-01	3.56E-01	3.34E-01	3.36E-01	3.34E-01	3.37E-01	00.3	02.0	0.233099	0.3760000
Selenium (Se)-Dissolved	3.80E-04	4.40E-04	2.50E-04	4.70E-04	2.80E-04	2.50E-04	2.60E-04	1.40E-04	2.50E-04	2.50E-04	3.80E-04	2.50E-04	1.20E-04	1.90E-04	2.50E-04	2.20E-04	00.0	00.0	0.000153	0.0001741
Silicon (Si)-Dissolved	2.47E+00	2.50E+00	1.92E+00	2.77E+00	2.51E+00	1.97E+00	2.75E+00	2.48E+00	1.94E+00	1.96E+00	2.48E+00	2.00E+00	2.69E+00	2.69E+00	1.94E+00	2.49E+00	01.9	02.8	0.205206	2.4115686
Silver (Ag)-Dissolved	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	00.0	00.0	2.34E-06	0.0000084
Sodium (Na)-Dissolved	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	1.00E+00	01.0	03.6	0.501556	1.6268627
Strontium (Sr)-Dissolved	4.32E-02	4.27E-02	4.68E-02	4.41E-02	4.12E-02	4.84E-02	4.45E-02	4.20E-02	4.71E-02	4.54E-02	4.39E-02	4.71E-02	4.13E-02	4.18E-02	4.53E-02	4.10E-02	00.0	00.1	0.002682	0.0454510
Thallium (Tl)-Dissolved	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	00.0	00.0	7E-06	0.0000510
Tin (Sn)-Dissolved	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	5.00E-05	1.20E-04	5.00E-05	5.00E-05	5.00E-05	00.0	00.0	0.000809	0.0004357
Titanium (Ti)-Dissolved	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	5.00E-03	00.0	00.0	0.002343	0.0084314
Uranium (U)-Dissolved	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	5.00E-06	00.0	00.0	2.34E-06	0.0000084
Vanadium (V)-Dissolved	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	5.00E-04	00.0	00.0	0.000217	0.0002530
Zinc (Zn)-Dissolved	5.00E-04	5.00E-04	5.00E-04	1.40E-03	5.00E-04	5.00E-04	1.40E-03	5.00E-04	5.00E-04	5.00E-04	1.30E-03	5.00E-04	1.90E-03	1.50E-03	5.00E-04	5.00E-04	00.0	00.0	0.00144	0.0023588

Klohn Crippen Berger

July 9, 2010

Pacific Booker Minerals Inc.
1702-1166 Alberni Street
Vancouver, British Columbia
V6E 3Z3

Mr. Erik Tornquist
Executive VP & COO

Dear Mr. Tornquist:

Morrison Copper/Gold Project: Water Quality Trip Report March 7 to 11, 2010

Klohn Crippen Berger field personnel: Bryn Laidlaw
Babine Barge support staff: Kelly and Chuck

Field Program Task List:

- Collect water quality samples and measure water flow and in situ properties of streams 5, 7, 8, 10 and Morrison Lake.
- Collect visual estimates of flow in stream 6 and other minor streams.

Sunday, March 7, 2010

- Evening flight to Smithers, BC.
- Transported to Granisle, BC by Black Hawk drillers Thomas and Jared.

Monday, March 8, 2010

- 7:00 am: Travelled by barge and truck to site.
- Weather conditions: clear, sunny. Temperature: -15°C to +5°C.
- Travelled by snowmobile to Creek 53400 (MCS-7) (669525E, 6122553N).
  - Augured through 40 cm of ice to water.
  - Flow velocity below measurement threshold, less than 1 litre per second.

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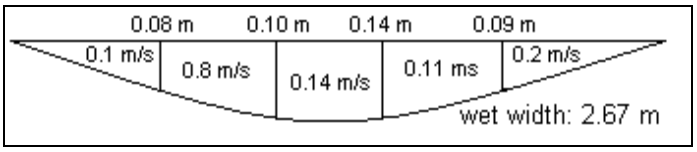
- At sample location, creek 7 has a wet width of 2.1 m, and maximum depth of 0.76 m, including ice.
- Collected and preserved water samples according to ALS requirements. Samples were collected for General Characteristics, Total and Dissolved Metals, Total Organic Carbon, and Ammonia/Nitrate concentrations.
- 11:15 am: Measured in situ water properties:

0.67 °C	87.0 DO %
172 µS/cm[c]	12.48 DO mg/L
92 µS/cm	13.920 psia
0.111 TDS g/L	8.81 pH
0.08 SAL	85.9 ORP

- Travelled by snowmobile to weather station. Existing data collection module was replaced with new module, and station diagnostic was run. Station appeared to be operating normally.
- Travelled by snowmobile to Creek 29000 (MCS-5), immediately below Ore Pond (670749E, 6119071N).
  - Creek 29000 (MCS-5) was open with flowing water, with the following profile. Note: Depth measurements shown at equally spaced intervals. From these measurements a flow rate of 61.8 litres per second was calculated.



  - Collected and preserved water samples according to ALS requirements. Samples were collected for General Characteristics, Total and Dissolved Metals, Total Organic Carbon, and Ammonia/Nitrate concentrations.

- 3:15 pm: Measured in situ water properties at:

1.29 °C	23.8 DO %
198 µS/cm[c]	0.75 DO mg/L
107 µS/cm	13.436 psia
0.033 TDS g/L	8.02 pH
0.02 SAL	40.3 ORP

- 5:15 pm: Returned to Granisle via snowmobile, truck and barge.

Tuesday, March 9, 2010

- 7:00 am: Travelled by barge and truck to site.
- Weather conditions: overcast, light snow in afternoon. Temperature: -10°C to 0°C.
- Travelled by snowmobile to Morrison Lake proposed diffuser location (667861E, 6123518N).
  - Opened a hole in lake ice with chainsaw, approximately 0.5 m by 0.75 m. Ice was approximately 0.6 m thick.
  - Collected and preserved water samples according to ALS requirements. Samples were collected for General Characteristics, Total and Dissolved Metals, Total Organic Carbon, and Ammonia/Nitrate concentrations. Water was sampled from a depth of 30 m.
  - 10:45 am: In situ water properties were measured at 5 m intervals down to 60 m. Note temperature readings are anomalous and unreliable.

4.7 m		**10.8 m**	
80.32°C	31.2 DO %	81.46°C	31.0 DO %
17 µS/cm[c]	1.03 DO mg/L	17 µS/cm[c]	1.01 DO mg/L
36 µS/cm	21.204 psia	36 µS/cm	29.579 psia
0.011 TDS g/L	7.59 pH	0.012 TDS g/L	7.63 pH
0.01 SAL	99.3 ORP	0.01 SAL	104.4 ORP
15.67 m		**20.45 m**	

83.17 °C	28.9 DO %	80.95°C	28.8 DO %
17 µS/cm[c]	0.93 DO mg/L	17 µS/cm[c]	0.87 DO mg/L
36 µS/cm	36.614 psia	36 µS/cm	42.853 psia
0.011 TDS g/L	7.58 pH	0.011 TDS g/L	7.51 pH
0.01 SAL	109.0 ORP	0.01 SAL	112.8 ORP
25.07 m		**29.98 m**	
84.67°C	28.3 DO %	84.36°C	28.3 DO %
17 µS/cm[c]	0.86 DO mg/L	17 µS/cm[c]	0.87 DO mg/L
37 µS/cm	49.240 psia	37 µS/cm	56.043 psia
0.011 TDS g/L	7.46 pH	0.012 TDS g/L	7.42 pH
0.01 SAL	115.2 ORP	0.01 SAL	117.2 ORP
35.04 m		**39.82 m**	
85.60°C	28.0 DO %	86.13°C	26. DO %
17 µS/cm[c]	0.87 DO mg/L	17 µS/cm[c]	0.79 DO mg/L
37 µS/cm	62.993 psia	37 µS/cm	69.583 psia
0.011 TDS g/L	7.38 pH	0.011 TDS g/L	7.33 pH
0.01 SAL	119.5 ORP	0.01 SAL	121.0 ORP
45.37 m		**49.94 m**	
85.06°C	25.5 DO %	85.85°C	25.0 DO %
18 µS/cm[c]	0.73 DO mg/L	17 µS/cm[c]	0.66 DO mg/L
37 µS/cm	77.242 psia	36 µS/cm	83.550 psia
0.011 TDS g/L	7.30 pH	0.011 TDS g/L	7.27 pH
0.01 SAL	122.6 ORP	0.01 SAL	124.4 ORP
55.22 m		**60.12 m**	
86.70°C	22.6 DO %	85.90°C	18.4 DO %
18 µS/cm[c]	0.66 DO mg/L	19 µS/cm[c]	0.55 DO mg/L
38 µS/cm	90.814 psia	41 µS/cm	97.589 psia
0.012 TDS g/L	7.22 pH	0.012 TDS g/L	7.16 pH
0.01 SAL	125.5 ORP	0.01 SAL	128.7 ORP

- Travelled by snowmobile to Creek 61100 (MCS-8) outlet into Morrison Lake (668366E, 6123775N).
- The creek was mostly frozen, a 0.25 m by 2 m opening in the ice allowed access to water.

- 11:45 am: Collected and preserved water samples according to ALS requirements. Samples were collected for General Characteristics, Total and Dissolved Metals, Total Organic Carbon, and Ammonia/Nitrate concentrations.
- Water depth insufficient to submerge sensor for in situ properties.
- Water flow velocity at or just below measurement threshold, approximately 1 litre per second.
- Travelled by snowmobile to proposed freshwater intake and Creek 29000 (MCS-5) discharge point for observation and photographs.
- Travelled by snowmobile to the bridge crossing of Creek 44800 (MCS-6). Creek is 3.45 m wide and ice covered. Estimated minimum flow of 10 L/s.
- Travelled by snowmobile to Booker Lake.
- Attempted to locate inflows to lake, one stream in north-west corner was located, 1.04 m wide and completely frozen. One stream shown on topographic maps in the south-west corner of lake was not located.
- 4:45 pm: Travelled back to Granisle by snowmobile, truck and barge.

Wednesday, March 10, 2010

- 7:00 am: Travelled by barge and truck to site.
- Weather conditions: clear, sunny. Temperature: -10°C to +5°C.
- Travelled by snowmobile to Creek MCS-10 (672313E, 6125924N).
- Four feet of snow covered flowing water in the creek. There was no ice.
- Water flow was below measurement threshold, about 1 litre per minute. Creek wet width was 1.05 m, and was 0.11 m deep.
- Collected and preserved water samples according to ALS requirements. Samples were collected for General Characteristics, Total and Dissolved Metals, Total Organic Carbon, and Ammonia/Nitrate concentrations.

- 1:15 pm: Measured in situ water properties:

0.86°C	36.9 DO %
24 µS/cm[c]	1.24 DO mg/L
48 µS/cm	13.156 psia
0.016 TDS g/L	8.51 pH
0.01 SAL	168.1 ORP

- Observed upper reach of Creek 53400 (MCS-7) near the proposed spillway outlet while traveling back to trucks, under 1 m of snow, wet width approximately 1 meter, flow less than 1 litre per second.
- Collected core samples DH-10-3-6 (90 m-92 m), DH-10-4-1 (15 m-17 m) and DH-10-4-2 (30 m-32 m) from drill pad B, and retrieved core sample DH-10-12-6 (85 m-87 m) from Morrison Camp, and transported the boxes to Babine Lodge.
- 3:15 pm: Returned to Granisle via snowmobile, truck and barge.
- Travelled to Smithers with Black Hawk crew.

Thursday, March 11, 2010

- Arranged for shipment of field gear from Smithers to Vancouver.
- 11:30 am: Travelled with water samples to Vancouver by Air Canada.
- 3:30 pm: Couriered water samples from KCB Vancouver office to ALS laboratory in Burnaby for analysis. In accordance with ALS procedures, samples were stored in low temperature coolers and were not allowed to freeze.

Data collected from the site weather station will be provided to PBM separately. Water chemistry results from ALS will also be provided to PBM once these have been obtained.

Please contact the undersigned for further information if required.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

Bryn Laidlaw, G.I.T.
Project Engineer

Terence Jibiki, M.Eng., P.Eng.
Project Manager

TJ/BL:dl

Attach: Site Photographs (Photo 1 to Photo 8)
ALS Data

Photo 1 Babine Lake

Photo 2 Creek 7, note augured hole in lower left

Photo 3 Cutting through ice on Morrison Lake

Photo 4 Natural break in ice at creek 8

Photo 5 Looking upstream at snow cover over stream 10

Photo 6 Exposed water under 4' of snow at creek 10. Water less turbid than pictured

Photo 7 Bridge across creek 6

Photo 8 Frozen waterfall at outlet of creek 5 to Morrison

Certificate of Analysis

KLOHN CRIPPEN BERGER LTD.
ATTN: JOHN JEMMETT
500-2955 VIRTUAL WAY
VANCOUVER BC V5M 4X6

Report Date: 23-MAR-10 14:46 (MT)
Version: FINAL

Lab Work Order #: **L868643** **Date Received:** **11-MAR-10**

Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
CofC Numbers: 09-047889,09-047756

Other Information:

Comments:

Can Dang
Account Manager

THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL WITHOUT THE WRITTEN AUTHORITY OF THE LABORATORY.
ALL SAMPLES WILL BE DISPOSED OF AFTER 30 DAYS FOLLOWING ANALYSIS. PLEASE CONTACT THE LAB IF YOU REQUIRE ADDITIONAL SAMPLE STORAGE TIME.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L868643-1 08-MAR-10 13:15 CREEK 7-LOWER	L868643-2 08-MAR-10 14:10 CREEK 7-SOUTH	L868643-3 08-MAR-10 14:50 ONE CREEK	L868643-4 09-MAR-10 MORRISON LAKE	L868643-5 09-MAR-10 CREEK 8
WATER						
Physical Tests	Colour, True (CU)	16.3	16.8	19.9	34.9	11.8
	Conductivity (uS/cm)	181	171	204	61.6	232
	Hardness (as CaCO3) (mg/L)	82.9	82.7	113	29.9	119
	pH (pH)	8.02	6.90	7.74	7.84	7.72
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	<3.0	<3.0
	Total Dissolved Solids (mg/L)	113	113	136	52	143
	Turbidity (NTU)	0.63	0.29	0.62	0.37	0.26
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	4.6	9.8	8.3	5.7	8.4
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	83.5	85.0	104	28.5	104
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
	Alkalinity, Total (as CaCO3) (mg/L)	83.5	85.0	104	28.5	104
	Ammonia as N (mg/L)	<0.020	<0.020	0.044	<0.020	<0.020
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.090	0.083	0.062	0.036	0.078
	Total Kjeldahl Nitrogen (mg/L)	0.507	0.359	0.400	0.275	0.202
	Sulfate (SO4) (mg/L)	9.30	9.24	7.63	2.30	15.7
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	6.63	7.16	8.92	8.58	5.69
Total Metals	Aluminum (Al)-Total (mg/L)	0.0676	0.0294	0.0639	0.0294	0.0084
	Antimony (Sb)-Total (mg/L)	0.00019	<0.00010	0.00076	<0.00010	<0.00010
	Arsenic (As)-Total (mg/L)	0.00034	0.00031	0.00022	0.00026	0.00027
	Barium (Ba)-Total (mg/L)	0.0295	0.0276	0.0155	0.0164	0.0476
	Beryllium (Be)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.016	0.016	<0.010	<0.010	0.012
	Cadmium (Cd)-Total (mg/L)	0.000545	0.000173	0.00427	<0.000050	<0.000050
	Calcium (Ca)-Total (mg/L)	23.8	23.4	33.5	8.40	35.7
	Chromium (Cr)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00575	0.00163	0.00918	0.00093	0.00067
	Iron (Fe)-Total (mg/L)	0.059	<0.030	0.101	0.088	<0.030
	Lead (Pb)-Total (mg/L)	0.000559	0.000178	0.00174	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	0.0087	<0.0050	<0.0050
	Magnesium (Mg)-Total (mg/L)	5.13	5.05	6.25	1.95	6.38
	Manganese (Mn)-Total (mg/L)	0.00248	0.00131	0.0434	0.00184	0.0143
	Mercury (Hg)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L868643-6				
	Description					
	Sampled Date	10-MAR-10				
	Sampled Time	11:30				
	Client ID	CREEK 10				
Grouping	**Analyte**					
WATER						
Physical Tests	Colour, True (CU)	19.4				
	Conductivity (uS/cm)	105				
	Hardness (as CaCO3) (mg/L)	40.4				
	pH (pH)	7.73				
	Total Suspended Solids (mg/L)	17.5				
	Total Dissolved Solids (mg/L)	74				
	Turbidity (NTU)	6.10				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	9.7				
	Alkalinity, Bicarbonate (as CaCO3) (mg/L)	32.1				
	Alkalinity, Carbonate (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Hydroxide (as CaCO3) (mg/L)	<2.0				
	Alkalinity, Total (as CaCO3) (mg/L)	32.1				
	Ammonia as N (mg/L)	0.027				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	0.040				
	Total Kjeldahl Nitrogen (mg/L)	0.798				
	Sulfate (SO4) (mg/L)	9.09				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	7.28				
Total Metals	Aluminum (Al)-Total (mg/L)	0.314				
	Antimony (Sb)-Total (mg/L)	<0.00010				
	Arsenic (As)-Total (mg/L)	0.00055				
	Barium (Ba)-Total (mg/L)	0.0336				
	Beryllium (Be)-Total (mg/L)	<0.00050				
	Bismuth (Bi)-Total (mg/L)	<0.00050				
	Boron (B)-Total (mg/L)	<0.010				
	Cadmium (Cd)-Total (mg/L)	<0.000050				
	Calcium (Ca)-Total (mg/L)	11.5				
	Chromium (Cr)-Total (mg/L)	<0.00050				
	Cobalt (Co)-Total (mg/L)	0.00021				
	Copper (Cu)-Total (mg/L)	0.00122				
	Iron (Fe)-Total (mg/L)	0.887				
	Lead (Pb)-Total (mg/L)	0.000106				
	Lithium (Li)-Total (mg/L)	<0.0050				
	Magnesium (Mg)-Total (mg/L)	2.81				
	Manganese (Mn)-Total (mg/L)	0.296				
	Mercury (Hg)-Total (mg/L)	<0.000050				

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L868643-1	L868643-2	L868643-3	L868643-4	L868643-5
Description					
Sampled Date	08-MAR-10	08-MAR-10	08-MAR-10	09-MAR-10	09-MAR-10
Sampled Time	13:15	14:10	14:50		
Client ID	CREEK 7-LOWER	CREEK 7-SOUTH	ONE CREEK	MORRISON LAKE	CREEK 8
Grouping / **Analyte**					
WATER					
Total Metals Molybdenum (Mo)-Total (mg/L)	0.000128	0.000095	0.00190	0.000116	0.000146
Nickel (Ni)-Total (mg/L)	0.00092	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0
Selenium (Se)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Silicon (Si)-Total (mg/L)	2.69	2.62	2.76	2.48	3.65
Silver (Ag)-Total (mg/L)	0.000035	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	7.2	7.0	2.6	<2.0	6.3
Strontium (Sr)-Total (mg/L)	0.0773	0.0783	0.931	0.0471	0.114
Thallium (Tl)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Tin (Sn)-Total (mg/L)	0.00023	<0.00010	<0.00010	0.00026	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total (mg/L)	0.000037	0.000035	0.000139	<0.000010	0.000039
Vanadium (V)-Total (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Zinc (Zn)-Total (mg/L)	0.0095	0.0030	0.386	<0.0010	<0.0010
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0269	0.0173	0.0029	0.0258	0.0066
Antimony (Sb)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Arsenic (As)-Dissolved (mg/L)	0.00033	0.00032	0.00118	0.00026	0.00028
Barium (Ba)-Dissolved (mg/L)	0.0269	0.0265	0.0363	0.0157	0.0461
Beryllium (Be)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)	0.015	0.014	<0.010	<0.010	0.011
Cadmium (Cd)-Dissolved (mg/L)	0.000282	0.000132	<0.000050	<0.000050	<0.000050
Calcium (Ca)-Dissolved (mg/L)	24.5	24.5	34.5	8.66	36.8
Chromium (Cr)-Dissolved (mg/L)	0.00270	<0.00050	<0.00050	<0.00050	<0.00050
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00188	0.00107	0.00065	0.00073	0.00058
Iron (Fe)-Dissolved (mg/L)	<0.030	<0.030	0.106	0.089	<0.030
Lead (Pb)-Dissolved (mg/L)	0.000164	0.000051	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved (mg/L)	5.26	5.24	6.38	2.01	6.56
Manganese (Mn)-Dissolved (mg/L)	0.00133	0.000950	0.0519	0.00146	0.0135
Mercury (Hg)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Molybdenum (Mo)-Dissolved (mg/L)	0.000089	0.000088	0.000118	0.000102	0.000155
Nickel (Ni)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)	<2.0	<2.0	<2.0	<2.0	<2.0

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L868643-6				
	Description					
	Sampled Date	10-MAR-10				
	Sampled Time	11:30				
	Client ID	CREEK 10				
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.000050				
	Nickel (Ni)-Total (mg/L)	0.00073				
	Phosphorus (P)-Total (mg/L)	<0.30				
	Potassium (K)-Total (mg/L)	<2.0				
	Selenium (Se)-Total (mg/L)	<0.0010				
	Silicon (Si)-Total (mg/L)	4.09				
	Silver (Ag)-Total (mg/L)	0.000012				
	Sodium (Na)-Total (mg/L)	5.8				
	Strontium (Sr)-Total (mg/L)	0.0529				
	Thallium (Tl)-Total (mg/L)	<0.00010				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.000014				
	Vanadium (V)-Total (mg/L)	<0.0010				
	Zinc (Zn)-Total (mg/L)	0.0036				
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.111				
	Antimony (Sb)-Dissolved (mg/L)	<0.00010				
	Arsenic (As)-Dissolved (mg/L)	0.00034				
	Barium (Ba)-Dissolved (mg/L)	0.0253				
	Beryllium (Be)-Dissolved (mg/L)	<0.00050				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	<0.010				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050				
	Calcium (Ca)-Dissolved (mg/L)	11.6				
	Chromium (Cr)-Dissolved (mg/L)	<0.00050				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	0.00096				
	Iron (Fe)-Dissolved (mg/L)	0.503				
	Lead (Pb)-Dissolved (mg/L)	0.000055				
	Lithium (Li)-Dissolved (mg/L)	<0.0050				
	Magnesium (Mg)-Dissolved (mg/L)	2.79				
	Manganese (Mn)-Dissolved (mg/L)	0.106				
	Mercury (Hg)-Dissolved (mg/L)	<0.000050				
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050				
	Nickel (Ni)-Dissolved (mg/L)	<0.00050				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	<2.0				

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L868643-1	L868643-2	L868643-3	L868643-4	L868643-5
	Description					
	Sampled Date	08-MAR-10	08-MAR-10	08-MAR-10	09-MAR-10	09-MAR-10
	Sampled Time	13:15	14:10	14:50		
	Client ID	CREEK 7-LOWER	CREEK 7-SOUTH	ONE CREEK	MORRISON LAKE	CREEK 8
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Silicon (Si)-Dissolved (mg/L)	2.75	2.75	2.84	2.57	3.79
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	7.6	7.1	2.6	<2.0	6.5
	Strontium (Sr)-Dissolved (mg/L)	0.0750	0.0766	0.0813	0.0450	0.109
	Thallium (Tl)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Tin (Sn)-Dissolved (mg/L)	0.00016	<0.00010	<0.00010	0.00015	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.000035	0.000035	0.000021	<0.000010	0.000035
	Vanadium (V)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Zinc (Zn)-Dissolved (mg/L)	0.0048	0.0017	<0.0010	<0.0010	<0.0010
Aggregate Organics	COD (mg/L)	24	<20	24	26	24

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L868643-6				
	Description					
	Sampled Date	10-MAR-10				
	Sampled Time	11:30				
	Client ID	CREEK 10				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.0010				
	Silicon (Si)-Dissolved (mg/L)	3.92				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	5.6				
	Strontium (Sr)-Dissolved (mg/L)	0.0484				
	Thallium (Tl)-Dissolved (mg/L)	<0.00010				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	<0.0010				
	Zinc (Zn)-Dissolved (mg/L)	0.0021				
Aggregate Organics	COD (mg/L)	45				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-SCR-VA	Water	Alkalinity by colour or titration	EPA 310.2 OR APHA 2320
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method. OR This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
C-TOT-ORG-LOW-CL	Water	Total Organic Carbon	APHA 5310 C-Instrumental
COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
COLOUR-TRUE-VA	Water	Colour (True) by Spectrometer	APHA 2120 "Color"
This analysis is carried out using procedures adapted from APHA Method 2120 "Color". Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Aparent Colour is determined without prior sample filtration. Colour is pH dependent. Unless otherwise indicated, reported colour results pertain to the pH of the sample as received, to within +/- 1 pH unit.			
COLOUR-TRUE-VA	Water	Colour (True) by Spectrometer	APHA 2120 Color
This analysis is carried out using procedures adapted from APHA Method 2120 "Color". Colour (True Colour) is determined by filtering a sample through a 0.45 micron membrane filter followed by analysis of the filtrate using the platinum-cobalt colourimetric method. Aparent Colour is determined without prior sample filtration. Colour is pH dependent. Unless otherwise indicated, reported colour results pertain to the pH of the sample as received, to within +/- 1 pH unit.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
HG-DIS-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS	EPA SW-846 3005A & EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			
HG-TOT-CVAFS-VA	Water	Total Mercury in Water by CVAFS	EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			
MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-SIE-VA Water Ammonia by SIE APHA 4500 D. - NH3 NITROGEN (AMMONIA)

This analysis is carried out, on sulphuric acid preserved samples, using procedures adapted from APHA Method 4500-NH3 "Nitrogen (Ammonia)". Ammonia is determined using an ammonia selective electrode.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-SIE-VA Water Total Kjeldahl Nitrogen by SIE APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total kjeldahl nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 "Turbidity"

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

TURBIDITY-VA Water Turbidity by Meter APHA 2130 Turbidity

This analysis is carried out using procedures adapted from APHA Method 2130 "Turbidity". Turbidity is determined by the nephelometric method.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
CL	ALS LABORATORY GROUP - CALGARY, ALBERTA, CANADA
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

09-047889,09-047756

Reference Information

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

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COC # 09 - 047889

Page ___ of ___

Report To John Jemmett	**Report Format / Distribution**	**Service Requested:** (Rush subject to availability)
Company: Klohn Crippen Berger	Standard: ✓ Other (specify):	Regular (Standard Turnaround Times))
Contact:	Select: PDF ✓ Excel ✓ Digital ___ Fax ___	Priority, Date Req'd: ___ (Surcharges apply)
Address: 500-2955 Virtual Way Vancouver BC	Email 1: jjemmett@klohn.com	Emergency (1 Business Day) - 100% Surcharge
	Email 2: blaidlaw@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 604-669-3800 Fax: 604.251.8510		**Analysis Request**
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only) L868643	**ALS Contact:**	**Sampler:** B. Laidlaw

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Chemistry	COD / NH_3 / TKN	Total Metal	Dissolved Metal	TOC	Number of Containers
	Creek 7 - Lower	08-Mar-10	1315	water	✓	P	P	F/P	P	
	Creek 7 - South	08-Mar-10	1410	water	✓	P	P	F/P	P	
	Ore Creek	08-Mar-10	1450	water	✓	P	P	F/P	P	
	Morrison Lake	9-Mar-10		water	✓	P	P	F/P	P	
	Creek 8	9-Mar-10		water	✓	P	P	F/P	P	
	creek 10	10-Mar-10	1130	water	✓	P	P	F/P	P	

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (laboratory use only)				SHIPMENT VERIFICATION (laboratory use only)			
Released by:	Date:	Time:	Received by: CY	Date: Mar11	Time: 3PM	Temperature: 14 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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GENF 18.01 Front

Klohn Crippen Berger

MEMORANDUM

TO:	Don Betton (PBM)	**DATE:**	March 25, 2011
FROM:	Mathew Mackinnon /Jeff Lam	**FILE NO:**	M09382A04.720
		LOG NO:	
SUBJECT:	PBM - Field Work Report - September 12 – 17 , 2010		

1. PERSONNEL

The following personnel were involved in the Field Work summarized in this Memo:

Matt MacKinnon (KCB)
Jeff Lam (KCB)
James (Babine Barge)
Ed King (LBN)
Shaun Conlon (LBN)

2. INTRODUCTION

JL and MM flew out of Vancouver early morning on September 12, 2010 and arrived in Smithers at 9:30, followed by a 1.5 hr drive to Granisle. Commuting from Granisle to site required boarding the Babine Lake barge at 6:00 in the morning, followed by a 1 hour to 1.5 hour drive to site along the gravel forestry roads. The Babine Lake barge travelled back to Granisle at 15:00. The time available on-site was limited to 6 hours per day.

James from the Lake Babine Barge company provided on-site assistance with miscellaneous work from September 13 - 17, 2010. EK and SC from LBN provided on-site assistance and feedback from September 13 - 16, 2010.

The weather was sunny and dry for the whole week with near freezing temperatures in the morning, warming up to mid-teens in the afternoon.

The following report summarizes the tasks completed and site observations compared to the trip objectives.

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3. OBJECTIVES/WORK COMPLETED

The objectives of this field trip are as follows, with comments:

1. MLARD

    a. Sample MLARD cubes and barrels.

    Sampling of MLARD cubes #1,#2,#3,and #4 and MLARD barrels #1,and #2, was conducted September 14, 2010 (Attachment 2 - Photo 1). See chain of custody for details (Attachment 1).

2. Meteorological

    a. Check weather station and download data.

    JL and MM performed an inspection and diagnostic of the weather station on September 13 following the procedure outlined in the April 16, 2009 Rescan "Instructions for maintenance of the Morrison Project (Pacific Booker Minerals Inc.) meteorological station" memo (Attachment 2 - Photo 2).

    JL and MM observed that the station was not reading the correct temperature, humidity, and precipitation values. The temperature sensor read -72.8°C for the entire recording period, the humidity sensor showed negative values, and the precipitation gauge indicated constant rain for the recording period since March 2010.

    JL and MM were not able to fully diagnose the problem and recommend having a weather station professional on site to properly diagnose and fix parts if necessary. At the moment the only accurate readings being taken are wind speed and wind direction.

    The SM4M storage module was taken out of the weather station and replaced with an empty one on September 13. A fresh dessicant pack was installed September 15.

    Retrieved meteorological readings are included in Attachment 3.

3. Baseline Data Collection

    a. Check thermocline depth in Morrison Lake at diffuser outlet.

    A complete thermocline profile was not obtained due to time constraints. In situ temperature readings of Morrison Lake at the diffuser outlet surface and

at 15 m showed temperatures between 5-7°C suggesting that fall mixing of the lake is occurring.

b. Conduct water quality sampling in Morrison Lake and Booker Lake.

Surface water quality sampling in Morrison Lake, Booker Lake, and Olympic Lake was completed. A Booker Lake water quality sample 1 m from the bottom was not obtained as there is no boat access into the lake.

c. Collect baseline water quality samples from streams and groundwater wells.

Baseline water quality sampling was collected from streams MCS-1, MCS-4, MCS-5, MCS-6, MCS-8, MCS-10, Olympic Creek, and Morrison Creek. Sampling from groundwater wells was not possible due to padlocks on the well covers. One groundwater well sample was collected in the MET-1 piezometer casing. The representativeness of groundwater for this sample should be reviewed before addition to the database.

4. HADD Baseline

a. Assess the Morrison Lake shoreline at diffuser entrance to Morrison Lake for sockeye salmon spawning.

KCB and LBN conducted a shoreline spawning survey by boat along the lakeshore near the diffuser entrance into Morrison Lake. No sockeye spawning or signs of salmon spawning were identified at or near the shoreline. Substrates along the shoreline at diffuser entrance to Morrison Lake consist of large gravel and cobble suitable for spawning salmonids (Attachment 2 - Photo 3). Lake trout captured along the lake shore near the diffuser entrance to Morrison Lake exhibited spawning coloration.

b. Interface with LBN Salmon Spawning Survey crew 1 day at Morrison Creek/Morrison Lake.

JL and LBN performed creek survey at Morrison Creek/Morrison Lake for approximately 700 m within the creek from the Morrison outlet. No signs of salmon spawning were observed, this is likely due to low water levels impeding fish access from Babine Lake. One salmon jaw bone was found. (Attachment 2 - Photo 4-6).

Morrison Lake shoreline in the south basin was also assessed for sockeye salmon spawning. No spawning activity was observed although it does appear that lake char and rainbow trout are utilizing the shoreline and reef areas throughout Morrison Lake for spawning (Attachment 2 - Photo 7).

c. To conduct fish habitat surveys of Stream 7 (53400) and 10 to assess fish presence.

Detailed stream surveys were completed by MM for Stream 7 and 10. Both creek beds were dry at the time of survey. Presence of rainbow trout is expected in Stream 7 during spring freshet conditions. Stream 10 does not appear to be fish bearing at any time of year due unsuitable pool-riffle to beaver dam obstruction at the small pond downstream.

Stream habitat surveys and habitat cards were completed for Streams 1, 4, 5, 7, 8, 10, Morrison Creek and Olympic Creek. Juvenile Rainbow trout were observed in MCS-8 only.

d. Re-install hydrology data loggers in Streams 3-7.

Data loggers were re-installed and data retrieved from hydrometric stations MCS-1, MCS-4, MCS-5, MCS-7, MCS-10, and Morrison Creek. Hydrometric stations MCS-6 and MCS-8 are damaged and not currently collecting flow data. Data logger MCS-8 was collected while data from MCS-6 was collected and re-installed. Both sites require repair/replacement.

e. Conduct water quality sampling in Booker Lake and additional stream locations if necessary.

Water quality sampling was conducted at Booker Lake, Morrison Lake, and Olympic Lake. Baseline water quality sampling was collected from streams MCS-1, MCS-4, MCS-5, MCS-6, MCS-8, MCS-10, Olympic Creek, and Morrison Creek. Samples were shipped to ALS laboratory for analysis (see Attachment 1).

5. Fish Habitat Compensation Plan

a. Ground survey the off-lake channel compensation area. Document existing vegetation, ground/soil types, lowermost section of proposed dewatered creeks, shoreline characteristics, and dig test pits in the area.

A ground survey was conducted in the planned channel compensation area and along Morrison creek. Pictures of vegetation were taken, and logging of ground/soil types was conducted. Field observations indicate that local hills in the planned area more than 10 m above lake elevation will make the construction of a continuous fish spawning channel expensive and un-feasible.

LBN and MM believe that a more effective location for the spawning channel will be along Morrison creek, and involve stream enhancements around the

area. Subsequent ground survey efforts were focused on Morrison Creek (see figures below)

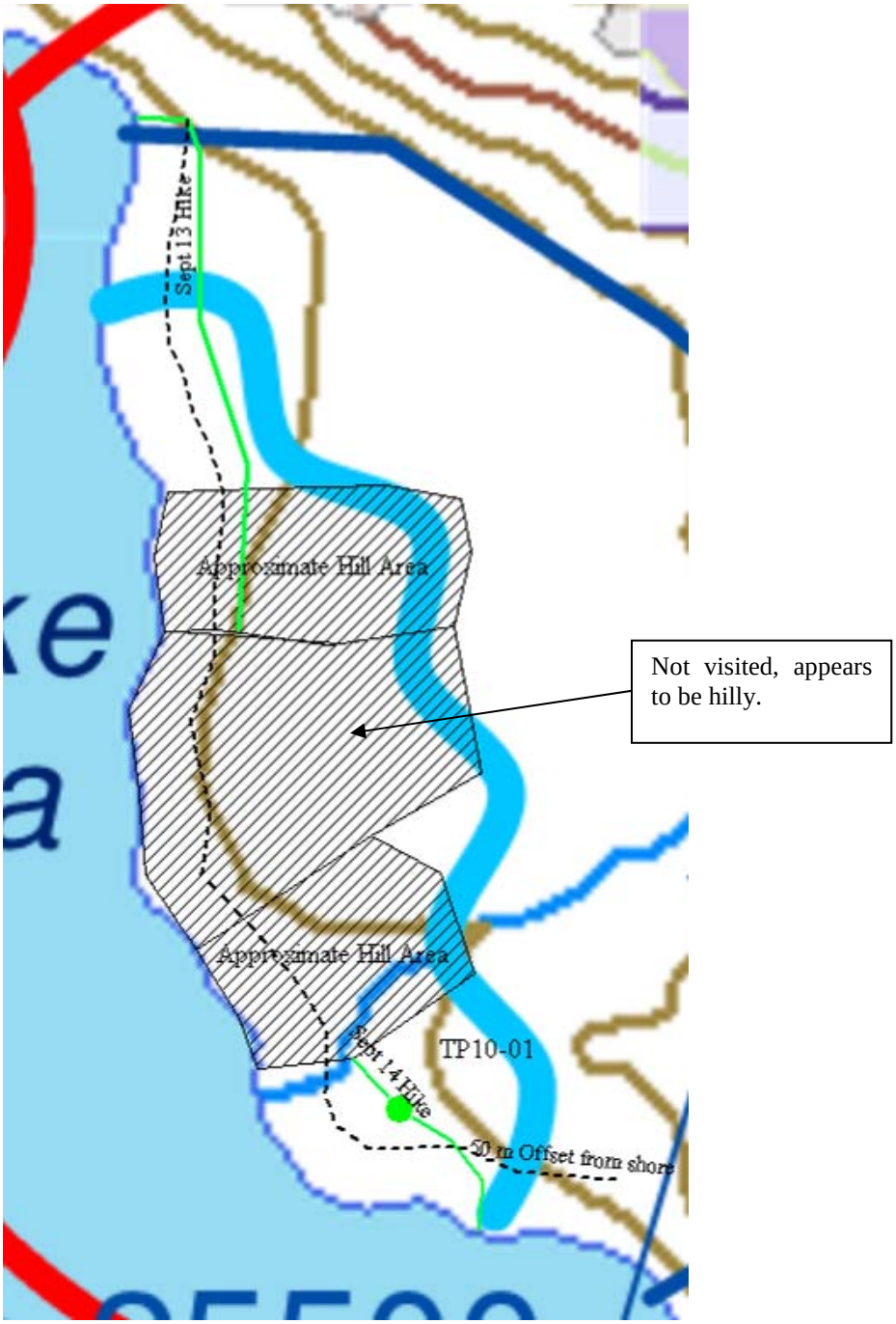

Figure 1 Ground Survey in Planned Area

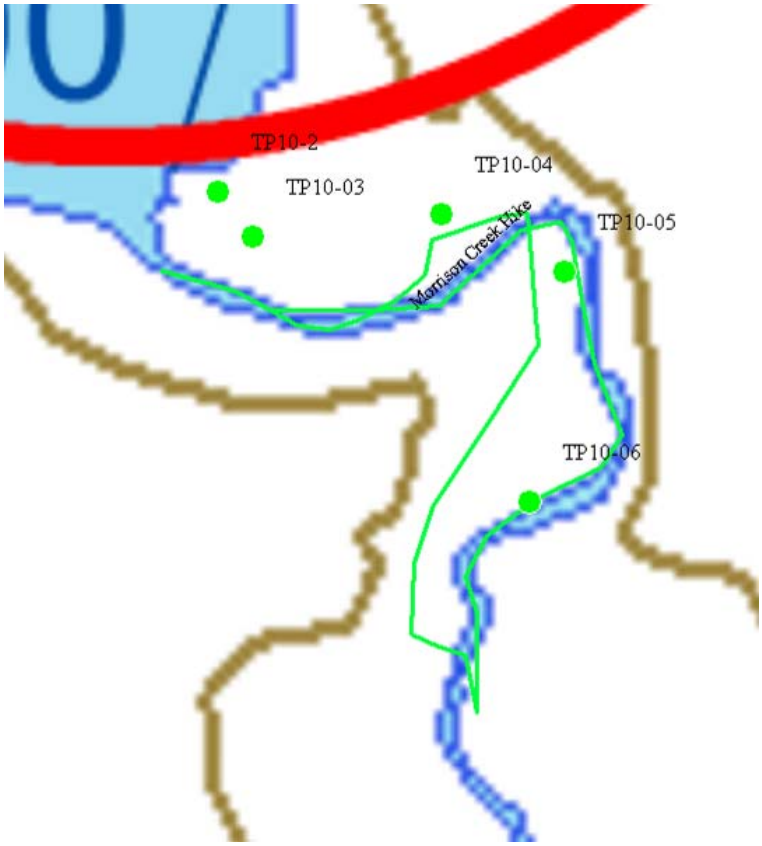

Figure 2 Ground Survey at Morrison Creek

b. Measure channel widths, bank heights, beaver dam outlet characteristics, and stream gradients at Olympic and Oval Lake for compensation objectives.

KCB visited the Olympic Lake to record channel widths, bank heights, beaver dam outlet characteristics, stream gradients, local topography, and ground conditions. Two possible fish barriers were observed and recorded along the creek 77300 which flows from Olympic Lake (Attachment 2 - Photos 8, 9 and 10). The Oval Lake was not visited.

Attachments: Attachment 1 – Sample List, Chain of Custody, Sample Receipt Confirmation
Attachment 2 – Site Photos
Attachment 3 – Weather Data

ATTACHMENT 1

Sample List, Chain of Custody, Sample Receipt Confirmation, ALS Results

Attachment 1 - 2010 PBM - Morrison EAC

Soil Samples

Sample	Test Pit	Date	Location			Depth (m)	USCS Description
			Area	Easting (m)	Northing (m)		
1	TP10-01	9/13/2010	Off lake compensation channel	671028	6117615	0.4	Clay (CH) some silt, hi plastic, hard, grey, MC<PL.
2	TP10-02	9/14/2010	Morrison Stream	671223	6117278	0.3	Clay (CH) trace sand, trace gravel, hi plastic, soft, brown, MC<PL.
3	TP10-04	9/15/2010	Morrison Stream	671382	6117261	0.2	Gravel (GS) fine to coarse, sandy, clayey, well graded, max sz = 100 mm, sub-rounded to angular, dark brown, moist.
4	TP10-09	9/16/2010	Olympic Lake	667122	6126587	0.4	Clay (CL) silty, sandy, very soft, grey, MC>PL, wet.

Short Holding Time

Rush Processing

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 2

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Pacific Booker Minerals	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Don Betton	☑ PDF ☑ Excel ☑ Digital ☑ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	1166 Alberni St. Suite 1702	Email 1: d.betton@pacificbooker.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC Canada V6E 3Z3	Email 2:	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	1-604-681-8556 Fax: 604.687.5995	Email 3:	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	
Hardcopy of Invoice with Report?	☑ Yes ☐ No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L933287	ALS Contact:	Sampler:

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	NO3	N02	Ammonia	Total Dissolved Solids	Total Suspended Solids	ultra-trace total metals + Hg	ultra-trace dissolved metals + Hg					Number of Containers
								P				P					
1	MLARD Cube #1	14-9-10	5:00 pm	water	✓	✓	✓	~~✓~~	✓	✓	✓	✓					3
2	MLARD Cube #2	14-9-10	"	water	✓	✓	✓	✓	✓	✓	✓	✓					~~4~~ 4
3	MLARD Cube #3	14-9-10	"	water	✓	✓	✓	~~✓~~	✓	✓	✓	✓					3
4	MLARD Barrel #1	14-9-10	"	water	✓	✓	✓	✓	✓	✓	✓	✓					~~3~~ 4
5	MLARD Barrel #2	14-9-10	"	water	✓	✓	✓	✓	✓	✓	✓	✓					~~3~~ 4
6	~~MLARD Barrel #3~~ MLARD CUBE #4	14-9-10	"	water	✓	✓	✓	~~✓~~	✓	✓	✓	✓					3

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Dissolved Metals Filter in Lab

General Parameters should include - pH, conductivity, alkalinity, hardness, and anions (SO4, Br, Cl, F)

FOR Questions call Matt MacKinnon 778-868-2901

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ?
M. Mackinnon	Sep 14, 10	5:00 pm	RC	20 Sept	8:30	11.8 --				

ALS Laboral
ANALYTICAL CHEMISTRY & TES

Short Holding Time

Environmental Div

Rush Processing

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

10-039622

Page 2 of 2

Report To	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company:	Standard: ____ Other (specify): ____	Regular (Standard Turnaround Times))
Contact:	Select: PDF ____ Excel ____ Digital ____ Fax ____	Priority, Date Req'd: ____ (Surcharges apply)
Address: page 2	Email 1:	Emergency (1 Business Day) - 100% Surcharge
	Email 2:	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: Fax:		

Invoice To	Client / Project Information
Same as Report ? (circle) Yes or No (if No, provide details)	
Copy of Invoice with Report? (circle) Yes or No	Job #:
Company:	PO / AFE:
Contact:	LSD:
Address:	
Phone: Fax:	Quote #:

Lab Work Order # (lab use only) L933287 | **ALS Contact:** | **Sampler:**

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Total Metals	Dissolved Metals	Number of Containers
	MLS-8	9/16/10	18:00	H_2O	✓	✓	✓	3
	Morrison Creek	9/16/10	18:00	H_2O	✓	✓	✓	3
	Olympic Lake	9/16/10	18:00	H_2O	✓	✓	✓	3
	GROUND WATER WELL 1	"	"	"	✓			1

Special Instructions / Regulations / Hazardous Details

Dissolved Metals - Filter in Lab! Questions? Call Matt MacKinnon 778-868-2901

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			R. C	20 Sep 1	8:30	11.8 °C				

ALS Canada Ltd.
Part of the ALS Laboratory Group
Toll Free: 1-800-668-9878 Manitoba: 1-800-607-7555
8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada
| Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS LABORATORY GROUP SAMPLE RECEIPT CONFIRMATION

Company:	PACIFIC BOOKER MINERALS INC.
ATTN:	Don Betton
Fax Number:	604-687-5995
Account Manager:	Andre Langlais
Job Reference:	
Project P.O. #:	
Date Sampled:	15-SEP-10
Date Received:	20-SEP-10
Estimated Completion Date:	29-SEP-10
Sampled By:	
Workorder #:	**L933296**
Chain of Custody #:	

Sample #/SampleID/DateSampled/DateDue: L933296-1/MCS-1/15-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	

ALS Laboratory Group strives to deliver on-time results to our clients at all times. However, there are times when, due to capacity issues or other unforeseen circumstances, we are unable to meet our expected TATs. The information above is related to a recent workorder you have submitted to our laboratory. We have also included a summary on the parameters of interest for this workorder. In the event that you have an inquiry, please refer to the Work Order # (L+6 digits) when calling your Account Manager.

IMPORTANT: The accompanying message is intended only for the use of the individual or entity to which it is addressed and may represent an attorney-client communication or otherwise contain information privileged, confidential and exempt from disclosure under applicable law. If the reader of this message is not the intended recipient, you are hereby notified that any dissemination, distribution or copying or other use of the communication is strictly prohibited. If you receive the communication in error, please notify us immediately by telephone, and return the message to us at the above address via Canadian Postal Service postage due. Thank you.

Sample #/SampleID/DateSampled/DateDue: L933296-1/MCS-1/15-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933296-2/MCS-4/16-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933296-3/MCS-6/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	

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Sample #/SampleID/DateSampled/DateDue: L933296-3/MCS-6/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933296-4/BOOKER LAKE/13-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	

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Sample #/SampleID/DateSampled/DateDue: L933296-4/BOOKER LAKE/13-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933296-5/MCS-5/15-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

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Sample #/SampleID/DateSampled/DateDue: L933296-6/MORRISON LAKE/16-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933296-7/MCS-10//29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	

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Sample #/SampleID/DateSampled/DateDue: L933296-7/MCS-10//29-SEP-10

Matrix	Product Description	Product Due*
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

* INDICATES ESTIMATED COMPLETION DATE OF REQUESTED PRODUCT IF DIFFERENT THAN THE ESTIMATED COMPLETION DATE.

ALS Laboratory Group strives to deliver on-time results to our clients at all times. However, there are times when, due to capacity issues or other unforeseen circumstances, we are unable to meet our expected TATs. The information above is related to a recent workorder you have submitted to our laboratory. We have also included a summary on the parameters of interest for this workorder. In the event that you have an inquiry, please refer to the Work Order # (L+6 digits) when calling your Account Manager.

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Short Holding Time

ALS Environment

Rush Processing

ain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
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Report To	**Report Format / Distribution**	**Service Request** (Rush subject to availability - Contact ALS to confirm TAT)
Company: PACIFIC BOOKER MINERALS	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: DON BETTON	Select: PDF ✓ Excel ✓ Digital ✓ Fax ✓	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 1166 Alberni St Suite 1702 Vancouver BC CANADA V6E 3Z3	Email 1: d.betton@pacificbooker.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
Phone: 604-681-8556 Fax: 604-687-3995	Email 2: bythebridge@gmail.com	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) Yes or No	Job #:	(Indicate Filtered or Preserved, F/P)
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only) L933296	**ALS Contact:**	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Total Metals	Dissolved Metals	Number of Containers
	MCS - 1	9/15	16:00	H_2O	✓	✓	✓	3
	MCS - 4	9/16	16:00		✓	✓	✓	3
	MCS - 6	9/14	17:00		✓	✓	✓	3
	Booker Lake	9/13	16:00		✓	✓	✓	3
	MCS - 5	9/15/2010	16:00		✓	✓	✓	3
	~~MCS - 8~~	~~9/16/10~~	~~17:00~~					3
	Morrison LAKE	9/15	16:00		✓	✓	✓	3
	MCS - 10	Sep 16, 10	17:00		✓	✓	✓	3

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/etc) / Hazardous Details

Dissolved Metals - Filter in Lab!!!

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. Mach	9/17/10	17:00	KC	20 Sept	8:30	1.8 °C				

Attachment 1 - 2010 PBM - Morrison EAC

Water Samples

Sample #	Sample ID	Date Sampled	Due Date		
L933287-1	MLARD CUBE #1	9/14/2010	9/29/2010		
L933287-1	MLARD CUBE #1	9/14/2010	9/29/2010		
L933287-1	MLARD CUBE #1	9/14/2010	9/29/2010		
L933287-2	MLARD CUBE #2	9/14/2010	9/29/2010		
L933287-2	MLARD CUBE #2	9/14/2010	9/29/2010		
L933287-3	MLARD CUBE #3	9/14/2010	9/29/2010		
L933287-4	MLARD BARREL #1	9/14/2010	9/29/2010		
L933287-5	MLARD BARREL #2	9/14/2010	9/29/2010		
L933287-5	MLARD BARREL #2	9/14/2010	9/29/2010		
L933287-6	MLARD BARREL #4	9/14/2010	9/29/2010		
L933287-6	MLARD BARREL #4	9/14/2010	9/29/2010		
L933287-6	MLARD BARREL #4	9/14/2010	9/29/2010		
L933287-7	MCS-8	9/16/2010	9/29/2010		
L933287-7	MCS-8	9/16/2010	9/29/2010		
L933287-8	MORRISON CREEK	9/16/2010	9/29/2010		
L933287-8	MORRISON CREEK	9/16/2010	9/29/2010		
L933287-9	OLYMPIC LAKE	9/16/2010	9/29/2010		
L933287-10	GROUNDWATER WELL	9/16/2010	9/29/2010		
L933296-1	MCS-1	9/15/2010	9/29/2010		
L933296-1	MCS-1	9/15/2010	9/29/2010		
L933296-2	MCS-4	9/16/2010	9/29/2010		
L933296-3	MCS-6	9/14/2010	9/29/2010		
L933296-3	MCS-6	9/14/2010	9/29/2010		
L933296-4	BOOKER LAKE	9/13/2010	9/29/2010		
L933296-4	BOOKER LAKE	9/13/2010	9/29/2010		
L933296-5	MCS-5	9/15/2010	9/29/2010		
L933296-6	MORRISON LAKE	9/16/2010	9/29/2010		
L933296-7	MCS-10		9/29/2010		
L933296-7	MCS-10		9/29/2010		

ALS Canada Ltd.
Part of the ALS Laboratory Group
Toll Free: 1-800-668-9878 Manitoba: 1-800-607-7555
8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada
| Phone: +1 604 253 4188 | Fax: +1 604 253 6700

ALS LABORATORY GROUP SAMPLE RECEIPT CONFIRMATION

Company:	PACIFIC BOOKER MINERALS INC.
ATTN:	Don Betton
Fax Number:	604-687-5995
Account Manager:	Andre Langlais
Job Reference:	
Project P.O. #:	
Date Sampled:	14-SEP-10
Date Received:	20-SEP-10
Estimated Completion Date:	29-SEP-10
Sampled By:	
Workorder #:	**L933287**
Chain of Custody #:	

Sample #/SampleID/DateSampled/DateDue: L933287-1/MLARD CUBE #1/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Acidity by Automatic Titration	
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Nitrite by Ion Chromatography	
	Nitrate by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	

ALS Laboratory Group strives to deliver on-time results to our clients at all times. However, there are times when, due to capacity issues or other unforeseen circumstances, we are unable to meet our expected TATs. The information above is related to a recent workorder you have submitted to our laboratory. We have also included a summary on the parameters of interest for this workorder. In the event that you have an inquiry, please refer to the Work Order # (L+6 digits) when calling your Account Manager.

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Sample #/SampleID/DateSampled/DateDue: L933287-1/MLARD CUBE #1/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Water	Total Dissolved Solids by Gravimetric	
Water	Total Suspended Solids by Gravimetric	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933287-2/MLARD CUBE #2/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Acidity by Automatic Titration	
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Nitrite by Ion Chromatography	
	Nitrate by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	

Sample #/SampleID/DateSampled/DateDue: L933287-2/MLARD CUBE #2/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	

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Sample #/SampleID/DateSampled/DateDue: L933287-2/MLARD CUBE #2/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	Ammonia by Fluorescence	
Water	pH by Meter (Automated)	
Water	Total Dissolved Solids by Gravimetric	
Water	Total Suspended Solids by Gravimetric	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933287-3/MLARD CUBE #3/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Acidity by Automatic Titration	
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Nitrite by Ion Chromatography	
	Nitrate by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	

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Sample #/SampleID/DateSampled/DateDue: L933287-3/MLARD CUBE #3/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	pH by Meter (Automated)	
Water	Total Dissolved Solids by Gravimetric	
Water	Total Suspended Solids by Gravimetric	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933287-4/MLARD BARREL #1/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Acidity by Automatic Titration	
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Nitrite by Ion Chromatography	
	Nitrate by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	Ammonia by Fluorescence	
Water	pH by Meter (Automated)	
Water	Total Dissolved Solids by Gravimetric	
Water	Total Suspended Solids by Gravimetric	
Misc.	Sample Handling and Disposal Fee	

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Sample #/SampleID/DateSampled/DateDue: L933287-5/MLARD BARREL #2/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Acidity by Automatic Titration	
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Nitrite by Ion Chromatography	
	Nitrate by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	Ammonia by Fluorescence	
Water	pH by Meter (Automated)	
Water	Total Dissolved Solids by Gravimetric	
Water	Total Suspended Solids by Gravimetric	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933287-6/MLARD BARREL #4/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Acidity by Automatic Titration	
Water	Alkalinity by Colourimetric (Automated)	

ALS Laboratory Group strives to deliver on-time results to our clients at all times. However, there are times when, due to capacity issues or other unforeseen circumstances, we are unable to meet our expected TATs. The information above is related to a recent workorder you have submitted to our laboratory. We have also included a summary on the parameters of interest for this workorder. In the event that you have an inquiry, please refer to the Work Order # (L+6 digits) when calling your Account Manager.

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Sample #/SampleID/DateSampled/DateDue: L933287-6/MLARD BARREL #4/14-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Nitrite by Ion Chromatography	
	Nitrate by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Water	Total Dissolved Solids by Gravimetric	
Water	Total Suspended Solids by Gravimetric	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933287-7/MCS-8/16-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	

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Sample #/SampleID/DateSampled/DateDue: L933287-7/MCS-8/16-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933287-8/MORRISON CREEK/16-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	

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Sample #/SampleID/DateSampled/DateDue: L933287-8/MORRISON CREEK/16-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

Sample #/SampleID/DateSampled/DateDue: L933287-9/OLYMPIC LAKE/16-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	Dissolved metals ultra low package	
	Dissolved Fe in Water by ICPOES	
	Hardness	
	Dissolved Mercury in Water by CVAFS(Low)	
	Dissolved Metals in Water by ICPOES	
	Dissolved Metals in Water by ICPMS(Low)	
	Diss. Metals in Water by ICPMS (Ultra)	
Water	Total metals ultra low package	
	Total Fe in Water by ICPOES	
	Hardness	
	Total Mercury in Water by CVAFS(Low)	
	Total Metals in Water by ICPOES	
	Total Metals in Water by ICPMS(Low)	
	Total Metals in Water by ICPMS (Ultra)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

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Sample #/SampleID/DateSampled/DateDue: L933287-10/GROUND WATER WELL 1/16-SEP-10/29-SEP-10

Matrix	Product Description	Product Due*
Water	Alkalinity by Colourimetric (Automated)	
Water	Anions by Ion Chromatography	
	Bromide by Ion Chromatography	
	Chloride by Ion Chromatography	
	Fluoride by Ion Chromatography	
	Sulfate by Ion Chromatography	
Water	Conductivity (Automated)	
Water	pH by Meter (Automated)	
Misc.	Sample Handling and Disposal Fee	

* INDICATES ESTIMATED COMPLETION DATE OF REQUESTED PRODUCT IF DIFFERENT THAN THE ESTIMATED COMPLETION DATE.

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Short Holding Time

Rush Processing

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 2

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Pacific Booker Minerals	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Don Betton	☑ PDF ☑ Excel ☑ Digital ☑ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	1166 Alberni St. Suite 1702	Email 1: d.betton@pacificbooker.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC Canada V6E 3Z3	Email 2:	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	1-604-681-8556 Fax: 604.687.5995	Email 3:	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	
Hardcopy of Invoice with Report?	☑ Yes ☐ No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L933287	ALS Contact:	Sampler:

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	NO3	N02	Ammonia	Total Dissolved Solids	Total Suspended Solids	ultra-trace total metals + Hg	ultra-trace dissolved metals + Hg					Number of Containers
								P				P					
1	MLARD Cube #1	14-9-10	5:00 pm	water	✓	✓	✓	~~✓~~	✓	✓	✓	✓					3
2	MLARD Cube #2	14-9-10	"	water	✓	✓	✓	✓	✓	✓	✓	✓					~~4~~ 4
3	MLARD Cube #3	14-9-10	"	water	✓	✓	✓	~~✓~~	✓	✓	✓	✓					3
4	MLARD Barrel #1	14-9-10	"	water	✓	✓	✓	✓	✓	✓	✓	✓					~~3~~ 4
5	MLARD Barrel #2	14-9-10	"	water	✓	✓	✓	✓	✓	✓	✓	✓					~~3~~ 4
6	~~MLARD Barrel #3~~ MLARD CUBE #4	14-9-10	"	water	✓	✓	✓	~~✓~~	✓	✓	✓	✓					3

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Dissolved Metals Filter in Lab

General Parameters should include - pH, conductivity, alkalinity, hardness, and anions (SO4, Br, Cl, F)

FOR Questions call Matt MacKinnon 778-868-2901

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ?
M. Mackinnon	Sep 14, 10	5:00 pm	RC	20 Sept	8:30	11.8 --				

ALS Laboral
ANALYTICAL CHEMISTRY & TES

Short Holding Time

Environmental Div

Rush Processing

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

10-039622

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Report To	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company:	Standard: ____ Other (specify): ____	Regular (Standard Turnaround Times))
Contact:	Select: PDF ____ Excel ____ Digital ____ Fax ____	Priority, Date Req'd: ____ (Surcharges apply)
Address: page 2	Email 1:	Emergency (1 Business Day) - 100% Surcharge
	Email 2:	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: Fax:		

Invoice To	Client / Project Information
Same as Report ? (circle) Yes or No (if No, provide details)	
Copy of Invoice with Report? (circle) Yes or No	Job #:
Company:	PO / AFE:
Contact:	LSD:
Address:	
Phone: Fax:	Quote #:

Lab Work Order # (lab use only) L933287 | **ALS Contact:** | **Sampler:**

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Total Metals	Dissolved Metals	Number of Containers
	MLS-8	9/16/10	18:00	H_2O	✓	✓	✓	3
	Morrison Creek	9/16/10	18:00	H_2O	✓	✓	✓	3
	Olympic Lake	9/16/10	18:00	H_2O	✓	✓	✓	3
	GROUND WATER WELL 1	"	"	"	✓			1

Special Instructions / Regulations / Hazardous Details

Dissolved Metals - Filter in Lab! Questions? Call Matt MacKinnon 778-868-2901

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			R. C	20 Sep 1	8:30	11.8 °C				

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 20-SEP-10
Report Date: 01-OCT-10 12:42 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L933287
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers:

Andre Langlais
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L933287-1	L933287-2	L933287-3	L933287-4	L933287-5
Description					
Sampled Date	14-SEP-10	14-SEP-10	14-SEP-10	14-SEP-10	14-SEP-10
Sampled Time	17:00	17:00	17:00	17:00	17:00
Client ID	MLARD CUBE #1	MLARD CUBE #2	MLARD CUBE #3	MLARD BARREL #1	MLARD BARREL #2
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	1520	1290	713	1350	469
Hardness (as CaCO3) (mg/L)	956	760	352	761	195
pH (pH)	7.76	7.99	7.99	7.34	8.13
Total Suspended Solids (mg/L)	4.8	3.8	99.6	4.2	14.1
Total Dissolved Solids (mg/L)	1370	1120	529	1220	315
Anions and Nutrients					
Acidity (as CaCO3) (mg/L)	3.1	4.4	4.6	5.3	2.7
Alkalinity, Total (as CaCO3) (mg/L)	69.5	75.2	118	26.1	95.4
Ammonia as N (mg/L)		<0.0050		0.0152	0.0182
Bromide (Br) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.050
Chloride (Cl) (mg/L)	<5.0	<5.0	<5.0	<5.0	0.52
Fluoride (F) (mg/L)	0.23	<0.20	<0.20	0.52	0.230
Nitrate (as N) (mg/L)	<0.050	2.40	1.22	4.72	<0.0050
Nitrite (as N) (mg/L)	<0.010	<0.010	0.684	0.093	<0.0010
Sulfate (SO4) (mg/L)	915	727	268	768	141
Total Metals					
Aluminum (Al)-Total (mg/L)	0.0053	0.0080	0.367	0.0098	0.0171
Antimony (Sb)-Total (mg/L)	0.00355	0.00177	0.00249	0.00732	0.00114
Arsenic (As)-Total (mg/L)	0.00310	0.00217	0.00606	0.00531	0.0126
Barium (Ba)-Total (mg/L)	0.0189	0.0326	0.0574	0.0125	0.00410
Beryllium (Be)-Total (mg/L)	<0.0010 DLA	<0.00040 DLA	<0.00020	<0.00040 DLA	<0.00020
Bismuth (Bi)-Total (mg/L)	<0.0025 DLA	<0.0010 DLA	<0.00050	<0.0010 DLA	<0.00050
Boron (B)-Total (mg/L)	<0.025 DLM	<0.010 DLM	0.0102	0.040	0.0361
Cadmium (Cd)-Total (mg/L)	<0.000085 DLA	<0.000034 DLA	0.000066	0.00810	0.000050
Calcium (Ca)-Total (mg/L)	124	153	81.2	130	37.6
Chromium (Cr)-Total (mg/L)	<0.0010 DLM	<0.0010 DLM	0.00168	<0.0010 DLM	0.00076
Cobalt (Co)-Total (mg/L)	<0.00050 DLA	<0.00020 DLA	0.00045	0.0544	0.00052
Copper (Cu)-Total (mg/L)	0.0145	0.0156	0.0465	0.188	0.0780
Iron (Fe)-Total (mg/L)	<0.010	0.041	0.445	0.035	0.164
Lead (Pb)-Total (mg/L)	<0.00025 DLA	<0.00010 DLA	0.000929	<0.00010 DLA	0.000108
Lithium (Li)-Total (mg/L)	<0.025 DLA	<0.010 DLA	0.0066	0.012	<0.0050
Magnesium (Mg)-Total (mg/L)	169	97.1	37.6	103	24.1
Manganese (Mn)-Total (mg/L)	0.00232	0.00539	0.0135	3.28	0.00519
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000012	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.00643	0.0331	0.0216	0.00399	0.00981
Nickel (Ni)-Total (mg/L)	0.00296	0.0232	0.00553	0.370	0.0113
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	0.33	<0.30	<0.30
Potassium (K)-Total (mg/L)	11.8	5.16	15.2	24.9	36.1
Selenium (Se)-Total (mg/L)	0.0103	0.0140	0.00355	0.0145	0.00300

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L933287-6	L933287-7	L933287-8	L933287-9	L933287-10
Sample ID		L933287-6	L933287-7	L933287-8	L933287-9	L933287-10
Description						
Sampled Date		14-SEP-10	16-SEP-10	16-SEP-10	16-SEP-10	16-SEP-10
Sampled Time		17:00	18:00	18:00	18:00	18:00
Client ID		MLARD BARREL #4	MCS-8	MORRISON CREEK	OLYMPIC LAKE	GROUND WATER WELL 1
WATER						
Physical Tests	Conductivity (uS/cm)	2220	216	67.4	153	289
	Hardness (as CaCO3) (mg/L)	1570	111	33.5	79.3	
	pH (pH)	7.73	8.09	7.74	7.91	9.70
	Total Suspended Solids (mg/L)	17.3				
	Total Dissolved Solids (mg/L)	2190				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	5.9				
	Alkalinity, Total (as CaCO3) (mg/L)	40.8	110	32.9	81.1	57.5
	Ammonia as N (mg/L)					
	Bromide (Br) (mg/L)	<1.0	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<10	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	<0.40	0.068	0.031	0.083	0.064
	Nitrate (as N) (mg/L)	1.90				
	Nitrite (as N) (mg/L)	<0.020				
	Sulfate (SO4) (mg/L)	1550	9.37	2.55	3.22	89.4
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0050 DLA	0.0197	0.0224	0.0554	
	Antimony (Sb)-Total (mg/L)	0.00366	<0.000050	<0.000050	<0.000050	
	Arsenic (As)-Total (mg/L)	0.00740	0.000592	0.000422	0.00316	
	Barium (Ba)-Total (mg/L)	0.0575	0.0588	0.0235	0.0698	
	Beryllium (Be)-Total (mg/L)	<0.0010 DLA	<0.00020	<0.00020	<0.00020	
	Bismuth (Bi)-Total (mg/L)	<0.0025 DLA	<0.00050	<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	<0.025 DLM	0.0164	0.0079	0.0134	
	Cadmium (Cd)-Total (mg/L)	<0.000085 DLA	<0.000017	0.000048	0.000055	
	Calcium (Ca)-Total (mg/L)	348 DLM	35.5 DLM	10.4 DLM	25.0 DLM	
	Chromium (Cr)-Total (mg/L)	<0.0010	<0.00050	<0.00050	<0.00050	
	Cobalt (Co)-Total (mg/L)	<0.00050 DLA	<0.00010	<0.00010	0.00014	
	Copper (Cu)-Total (mg/L)	0.0217	0.00078	0.00158	0.00110	
	Iron (Fe)-Total (mg/L)	0.102	0.130	0.174	1.30	
	Lead (Pb)-Total (mg/L)	<0.00025 DLA	<0.000050	0.000072	0.000167	
	Lithium (Li)-Total (mg/L)	<0.025 DLA	<0.0050	<0.0050	<0.0050	
	Magnesium (Mg)-Total (mg/L)	176	6.52	2.45	4.81	
	Manganese (Mn)-Total (mg/L)	0.00261	0.126	0.0146	0.227	
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.0194	0.000131	0.000117	0.000098	
	Nickel (Ni)-Total (mg/L)	0.0257	0.00056	0.00063	0.00065	
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Total (mg/L)	16.4	0.431	0.438	0.738	
	Selenium (Se)-Total (mg/L)	0.0215	<0.00020 DLM	<0.00020 DLM	<0.00020 DLM	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L933287-1 14-SEP-10 17:00 MLARD CUBE #1	L933287-2 14-SEP-10 17:00 MLARD CUBE #2	L933287-3 14-SEP-10 17:00 MLARD CUBE #3	L933287-4 14-SEP-10 17:00 MLARD BARREL #1	L933287-5 14-SEP-10 17:00 MLARD BARREL #2
WATER						
Total Metals	Silicon (Si)-Total (mg/L)	1.08	0.932	2.79	1.78	0.942
	Silver (Ag)-Total (mg/L)	DLA <0.000050	DLA <0.000020	0.000058	DLA <0.000020	0.000017
	Sodium (Na)-Total (mg/L)	2.26	3.46	3.78	8.56	5.26
	Strontium (Sr)-Total (mg/L)	0.817	1.55	3.27	0.609	0.145
	Thallium (Tl)-Total (mg/L)	0.00029	DLA <0.00010	0.000069	0.00021	0.000329
	Tin (Sn)-Total (mg/L)	DLA <0.00050	DLA <0.00020	0.00016	DLA <0.00020	0.00090
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	0.022	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00717	0.00135	0.00566	0.000857	0.000648
	Vanadium (V)-Total (mg/L)	DLM <0.0025	DLM <0.0010	0.00183	DLM <0.0010	0.00073
	Zinc (Zn)-Total (mg/L)	DLA <0.0050	0.0375	0.154	1.86	0.0993
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	DLA <0.0050	0.0071	0.0136	0.0069	0.0110
	Antimony (Sb)-Dissolved (mg/L)	0.00348	0.00174	0.00256	0.00735	0.00112
	Arsenic (As)-Dissolved (mg/L)	0.00283	0.00219	0.00528	0.00534	0.0129
	Barium (Ba)-Dissolved (mg/L)	0.0180	0.0313	0.0389	0.0127	0.00359
	Beryllium (Be)-Dissolved (mg/L)	DLA <0.0010	DLA <0.00040	<0.00020	DLA <0.00040	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	DLA <0.0025	DLA <0.0010	<0.00050	DLA <0.0010	<0.00050
	Boron (B)-Dissolved (mg/L)	DLM <0.025	DLM <0.010	0.0067	0.034	0.0355
	Cadmium (Cd)-Dissolved (mg/L)	DLA <0.000085	DLA <0.000034	0.000030	0.00800	0.000042
	Calcium (Ca)-Dissolved (mg/L)	117	148	78.8	132	37.1
	Chromium (Cr)-Dissolved (mg/L)	DLM <0.0025	DLM <0.0010	DLM <0.00050	DLM <0.0010	DLM <0.00050
	Cobalt (Co)-Dissolved (mg/L)	DLA <0.00050	DLA <0.00020	0.00013	0.0546	0.00052
	Copper (Cu)-Dissolved (mg/L)	0.0136	0.0151	0.0359	0.182	0.0753
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	0.014
	Lead (Pb)-Dissolved (mg/L)	DLA <0.00025	DLA <0.00010	0.000097	DLA <0.00010	0.000111
	Lithium (Li)-Dissolved (mg/L)	DLA <0.025	DLA <0.010	0.0062	0.012	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	162	94.8	37.6	105	24.9
	Manganese (Mn)-Dissolved (mg/L)	0.00201	0.00455	0.00444	3.28	0.00651
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00579	0.0295	0.0215	0.00369	0.00795
	Nickel (Ni)-Dissolved (mg/L)	0.00279	0.0207	0.00385	0.373	0.0109
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	11.2	5.06	15.6	25.6	35.4
	Selenium (Se)-Dissolved (mg/L)	0.0089	0.0132	0.00392	0.0132	0.00346
	Silicon (Si)-Dissolved (mg/L)	1.08	0.972	2.30	1.77	1.01
	Silver (Ag)-Dissolved (mg/L)	DLA <0.000050	DLA <0.000020	0.000013	DLA <0.000020	0.000012
	Sodium (Na)-Dissolved (mg/L)	2.14	3.37	3.86	8.83	5.36
	Strontium (Sr)-Dissolved (mg/L)	0.792	1.48	3.29	0.612	0.143

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L933287-6 14-SEP-10 17:00 MLARD BARREL #4	L933287-7 16-SEP-10 18:00 MCS-8	L933287-8 16-SEP-10 18:00 MORRISON CREEK	L933287-9 16-SEP-10 18:00 OLYMPIC LAKE	L933287-10 16-SEP-10 18:00 GROUND WATER WELL 1
WATER						
Total Metals	Silicon (Si)-Total (mg/L)	0.057	4.37	1.81	1.72	
	Silver (Ag)-Total (mg/L)	<0.000050 DLA	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	6.58	5.39	2.13	3.18	
	Strontium (Sr)-Total (mg/L)	6.76	0.117	0.0557	0.0892	
	Thallium (Tl)-Total (mg/L)	0.00039	<0.000050	<0.000050	<0.000050	
	Tin (Sn)-Total (mg/L)	<0.00050 DLA	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.00711	0.000022	<0.000010	0.000011	
	Vanadium (V)-Total (mg/L)	<0.0025 DLM	<0.00050 DLM	<0.00050 DLM	0.00061	
	Zinc (Zn)-Total (mg/L)	0.0050	<0.0010	0.0027	0.0022	
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.0050	0.0070	0.0164	0.0424	
	Antimony (Sb)-Dissolved (mg/L)	0.00342	<0.000050	<0.000050	<0.000050	
	Arsenic (As)-Dissolved (mg/L)	0.00738	0.000541	0.000383	0.00319	
	Barium (Ba)-Dissolved (mg/L)	0.0587	0.0548	0.0217	0.0685	
	Beryllium (Be)-Dissolved (mg/L)	0.0012	<0.00020	<0.00020	0.00021	
	Bismuth (Bi)-Dissolved (mg/L)	<0.0025 DLA	<0.00050	<0.00050	<0.00050	
	Boron (B)-Dissolved (mg/L)	<0.025 DLM	0.0132	0.0051	0.0116	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000085 DLA	<0.000017	<0.000017	<0.000017	
	Calcium (Ca)-Dissolved (mg/L)	344	34.0	9.63	24.0	
	Chromium (Cr)-Dissolved (mg/L)	<0.0025 DLM	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	
	Cobalt (Co)-Dissolved (mg/L)	<0.00050 DLA	<0.00010	<0.00010	0.00014	
	Copper (Cu)-Dissolved (mg/L)	0.0221	0.00072	0.00088	0.00060	
	Iron (Fe)-Dissolved (mg/L)	<0.010	0.036	0.120	0.662	
	Lead (Pb)-Dissolved (mg/L)	<0.00025 DLA	<0.000050	<0.000050	0.000100	
	Lithium (Li)-Dissolved (mg/L)	<0.025 DLA	<0.0050	<0.0050	<0.0050	
	Magnesium (Mg)-Dissolved (mg/L)	173	6.31	2.29	4.71	
	Manganese (Mn)-Dissolved (mg/L)	0.00422	0.0366	0.0146	0.250	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	0.0189	0.000126	0.000112	0.000083	
	Nickel (Ni)-Dissolved (mg/L)	0.0245	0.00050	0.00048	0.00053	
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)	16.5	0.433	0.357	0.622	
	Selenium (Se)-Dissolved (mg/L)	0.0184	<0.00020 DLM	<0.00020 DLM	<0.00020 DLM	
	Silicon (Si)-Dissolved (mg/L)	<0.050	4.34	1.75	1.56	
	Silver (Ag)-Dissolved (mg/L)	<0.000050 DLA	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	6.54	5.23	1.97	3.07	
	Strontium (Sr)-Dissolved (mg/L)	6.67	0.114	0.0508	0.0860	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L933287-1	L933287-2	L933287-3	L933287-4	L933287-5
	Description					
	Sampled Date	14-SEP-10	14-SEP-10	14-SEP-10	14-SEP-10	14-SEP-10
	Sampled Time	17:00	17:00	17:00	17:00	17:00
	Client ID	MLARD CUBE #1	MLARD CUBE #2	MLARD CUBE #3	MLARD BARREL #1	MLARD BARREL #2
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	0.00028	<0.00010 DLA	0.000063	0.00022	0.000339
	Tin (Sn)-Dissolved (mg/L)	<0.00050 DLA	<0.00020 DLA	<0.00010	<0.00020 DLA	0.00088
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00655	0.00122	0.00521	0.000816	0.000602
	Vanadium (V)-Dissolved (mg/L)	<0.0025 DLM	<0.0010 DLM	<0.00050 DLM	<0.0010 DLM	0.00061
	Zinc (Zn)-Dissolved (mg/L)	<0.0050 DLA	0.0410	0.0972	2.04	0.105

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L933287-6 14-SEP-10 17:00 MLARD BARREL #4	L933287-7 16-SEP-10 18:00 MCS-8	L933287-8 16-SEP-10 18:00 MORRISON CREEK	L933287-9 16-SEP-10 18:00 OLYMPIC LAKE	L933287-10 16-SEP-10 18:00 GROUND WATER WELL 1
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	0.00040	<0.000050	<0.000050	<0.000050	
	Tin (Sn)-Dissolved (mg/L)	<0.00050 DLA	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00698	0.000020	<0.000010	0.000011	
	Vanadium (V)-Dissolved (mg/L)	<0.0025 DLM	<0.00050 DLM	<0.00050 DLM	0.00057	
	Zinc (Zn)-Dissolved (mg/L)	0.0064	<0.0010	<0.0010	<0.0010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.

ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

Reference Information

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulphuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Reference Information

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Short Holding Time

Rush Processing

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page 1 of 2

Report To		Report Format / Distribution	Service Requested (Rush for routine analysis subject to availability)
Company:	Pacific Booker Minerals	☑ Standard ☐ Other	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Don Betton	☑ PDF ☑ Excel ☑ Digital ☑ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	1166 Alberni St. Suite 1702	Email 1: d.betton@pacificbooker.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Vancouver, BC Canada V6E 3Z3	Email 2:	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	1-604-681-8556 Fax: 604.687.5995	Email 3:	
Invoice To	Same as Report ? ☑ Yes ☐ No	Client / Project Information	
Hardcopy of Invoice with Report?	☑ Yes ☐ No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L933287	ALS Contact:	Sampler:

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	NO3	N02	Ammonia	Total Dissolved Solids	Total Suspended Solids	ultra-trace total metals + Hg	ultra-trace dissolved metals + Hg					Number of Containers
								P				P					
1	MLARD Cube #1	14-9-10	5:00 pm	water	✓	✓	✓	~~✓~~	✓	✓	✓	✓					3
2	MLARD Cube #2	14-9-10	"	water	✓	✓	✓	✓	✓	✓	✓	✓					~~4~~ 4
3	MLARD Cube #3	14-9-10	"	water	✓	✓	✓	~~✓~~	✓	✓	✓	✓					3
4	MLARD Barrel #1	14-9-10	"	water	✓	✓	✓	✓	✓	✓	✓	✓					~~3~~ 4
5	MLARD Barrel #2	14-9-10	"	water	✓	✓	✓	✓	✓	✓	✓	✓					~~3~~ 4
6	~~MLARD Barrel #3~~ MLARD CUBE #4	14-9-10	"	water	✓	✓	✓	~~✓~~	✓	✓	✓	✓					3

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Dissolved Metals Filter in Lab

General Parameters should include - pH, conductivity, alkalinity, hardness, and anions (SO4, Br, Cl, F)

FOR Questions call Matt MacKinnon 778-868-2901

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ?
M. Mackinnon	Sep 14, 10	5:00 pm	RC	20 Sept	8:30	11.8 --				

ALS Laboral
ANALYTICAL CHEMISTRY & TES

Short Holding Time

Environmental Div

Rush Processing

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
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10-039622

Page 2 of 2

Report To	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company:	Standard: ____ Other (specify): ____	Regular (Standard Turnaround Times))
Contact:	Select: PDF ____ Excel ____ Digital ____ Fax ____	Priority, Date Req'd: ____ (Surcharges apply)
Address: page 2	Email 1:	Emergency (1 Business Day) - 100% Surcharge
	Email 2:	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: Fax:		

Invoice To	Client / Project Information
Same as Report ? (circle) Yes or No (if No, provide details)	
Copy of Invoice with Report? (circle) Yes or No	Job #:
Company:	PO / AFE:
Contact:	LSD:
Address:	
Phone: Fax:	Quote #:

Lab Work Order # (lab use only) L933287 | **ALS Contact:** | **Sampler:**

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Total Metals	Dissolved Metals	Number of Containers
	MLS-8	9/16/10	18:00	H_2O	✓	✓	✓	3
	Morrison Creek	9/16/10	18:00	H_2O	✓	✓	✓	3
	Olympic Lake	9/16/10	18:00	H_2O	✓	✓	✓	3
	GROUND WATER WELL 1	"	"	"	✓			1

Special Instructions / Regulations / Hazardous Details

Dissolved Metals - Filter in Lab! Questions? Call Matt MacKinnon 778-868-2901

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			R. C	20 Sep 1	8:30	11.8 °C				

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 20-SEP-10
Report Date: 29-SEP-10 17:41 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L933296
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers:

Comments: For some of the submitted water samples, the measured concentration of specific dissolved parameters is greater than the corresponding total parameters concentration. The explanation for these findings is one or a combination of the following:
- laboratory method variability;
- field sampling method variability;
- bias introduced during general handling, storage, transportation and/or analysis of the sample;
- field sample grab bias - where separate grab samples are processed to produce total and dissolved samples;
- field sample split bias - where total and dissolved parameters samples are produced from the same grab sample.

Andre Langlais
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L933296-1	L933296-2	L933296-3	L933296-4	L933296-5
Sample ID		L933296-1	L933296-2	L933296-3	L933296-4	L933296-5
Description						
Sampled Date		15-SEP-10	16-SEP-10	14-SEP-10	13-SEP-10	15-SEP-10
Sampled Time		16:00	16:00	17:00	16:00	16:00
Client ID		MCS-1	MCS-4	MCS-6	BOOKER LAKE	MCS-5
WATER						
Physical Tests	Conductivity (uS/cm)	95.6	249	176	192	240
	Hardness (as CaCO3) (mg/L)	45.0	123	83.2	96.3	124
	pH (pH)	7.80	7.96	8.18	8.20	8.21
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	44.1	120	79.3	93.5	108
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.023	0.045	0.034	0.053	0.071
	Sulfate (SO4) (mg/L)	3.79	13.6	10.1	6.77	18.3
Total Metals	Aluminum (Al)-Total (mg/L)	0.0214	0.0362	0.0074	<0.0060 DLB	0.0084
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000050
	Arsenic (As)-Total (mg/L)	0.000129	0.000274	0.000155	0.000700	0.00253
	Barium (Ba)-Total (mg/L)	0.0227	0.0591	0.0355	0.0350	0.0419
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	<0.0050 DLM	0.0059	0.0105	0.0096	0.0090
	Cadmium (Cd)-Total (mg/L)	<0.000017	0.00168	<0.000017	<0.000017	0.000042
	Calcium (Ca)-Total (mg/L)	14.9	41.1	30.7 DLM	32.4 DLM	39.8 DLM
	Chromium (Cr)-Total (mg/L)	0.00025	0.00022	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00092	0.00181	0.00041	0.00072	0.00963
	Iron (Fe)-Total (mg/L)	0.015	0.085	<0.010	0.014	0.056
	Lead (Pb)-Total (mg/L)	<0.000050	0.000105	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Total (mg/L)	3.06	6.65	3.49	5.38	9.15
	Manganese (Mn)-Total (mg/L)	0.00137	0.0413	0.000358	0.00193	0.0150
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.000267	0.000110	0.000082	0.000911
	Nickel (Ni)-Total (mg/L)	0.00034	0.00045	0.00014	0.00057	0.00098
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	0.287	0.681	0.353	0.437	0.882
	Selenium (Se)-Total (mg/L)	<0.00020 DLM	<0.00020 DLM	<0.00020 DLM	<0.00020 DLM	<0.00020 DLM
	Silicon (Si)-Total (mg/L)	3.74	4.86	2.79	1.80	2.73
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.61	2.51	2.61	2.51	2.99
	Strontium (Sr)-Total (mg/L)	0.0397	0.108	0.0594	0.0757	0.173
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Total (mg/L)	<0.00010	0.00017	<0.00010	<0.00010	<0.00010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L933296-6	L933296-7			
	Description					
	Sampled Date	16-SEP-10				
	Sampled Time	17:00				
	Client ID	MORRISON LAKE	MCS-10			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	63.5	108			
	Hardness (as CaCO3) (mg/L)	30.3	50.8			
	pH (pH)	7.82	7.85			
Anions and Nutrients	Alkalinity, Total (as CaCO3) (mg/L)	29.1	51.3			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	<0.50	<0.50			
	Fluoride (F) (mg/L)	0.033	0.055			
	Sulfate (SO4) (mg/L)	2.44	2.18			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0332	0.168			
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050			
	Arsenic (As)-Total (mg/L)	0.000355	0.00126			
	Barium (Ba)-Total (mg/L)	0.0182	0.0373			
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	0.0073	0.0058			
	Cadmium (Cd)-Total (mg/L)	0.000030	0.000038			
	Calcium (Ca)-Total (mg/L)	9.77	15.3			
	Chromium (Cr)-Total (mg/L)	<0.00050 DLM	<0.00050 DLM			
	Cobalt (Co)-Total (mg/L)	<0.00010	0.00011			
	Copper (Cu)-Total (mg/L)	0.00181	0.00092			
	Iron (Fe)-Total (mg/L)	0.094	1.16			
	Lead (Pb)-Total (mg/L)	0.000083	0.000076			
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050			
	Magnesium (Mg)-Total (mg/L)	2.08	3.64			
	Manganese (Mn)-Total (mg/L)	0.00313	0.0855			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.000152	0.000146			
	Nickel (Ni)-Total (mg/L)	0.00064	0.00050			
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30			
	Potassium (K)-Total (mg/L)	0.437	0.364			
	Selenium (Se)-Total (mg/L)	<0.00020 DLM	<0.00020 DLM			
	Silicon (Si)-Total (mg/L)	2.26	0.623			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	2.05	4.48			
	Strontium (Sr)-Total (mg/L)	0.0524	0.0667			
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L933296-1 15-SEP-10 16:00 MCS-1	L933296-2 16-SEP-10 16:00 MCS-4	L933296-3 14-SEP-10 17:00 MCS-6	L933296-4 13-SEP-10 16:00 BOOKER LAKE	L933296-5 15-SEP-10 16:00 MCS-5
WATER						
Total Metals	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000012	0.000047	0.000019	0.000022	0.000040
	Vanadium (V)-Total (mg/L)	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM
	Zinc (Zn)-Total (mg/L)	<0.0010	0.0052	<0.0010	0.0017	<0.0010
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0259	0.0134	0.0056	0.0043	0.0379
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000051
	Arsenic (As)-Dissolved (mg/L)	0.000148	0.000244	0.000143	0.000667	0.00287
	Barium (Ba)-Dissolved (mg/L)	0.0229	0.0568	0.0334	0.0335	0.0409
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.0050 DLM	<0.0050 DLM	0.0071	0.0063	0.0078
	Cadmium (Cd)-Dissolved (mg/L)	0.000131	0.00195	<0.000017	<0.000017	0.000051
	Calcium (Ca)-Dissolved (mg/L)	13.5 DLM	38.9 DLM	28.0 DLM	30.1 DLM	35.9 DLM
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00012
	Copper (Cu)-Dissolved (mg/L)	0.00136	0.00146	0.00033	0.00047	0.0137
	Iron (Fe)-Dissolved (mg/L)	0.021	0.056	<0.010	0.016	0.162
	Lead (Pb)-Dissolved (mg/L)	0.000093	0.000076	<0.000050	<0.000050	0.000082
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	2.76	6.27	3.21	5.11	8.44
	Manganese (Mn)-Dissolved (mg/L)	0.00291	0.0385	0.000336	0.00188	0.0678
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.000208	0.000094	0.000069	0.000681
	Nickel (Ni)-Dissolved (mg/L)	0.00031	0.00031	<0.00010	0.00040	0.00109
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.279	0.466	0.319	0.378	0.825
	Selenium (Se)-Dissolved (mg/L)	<0.00020 DLM	<0.00020 DLM	<0.00020 DLM	<0.00020 DLM	<0.00020 DLM
	Silicon (Si)-Dissolved (mg/L)	3.59	4.72	2.73	1.77	2.57
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.52	2.23	2.43	2.38	2.81
	Strontium (Sr)-Dissolved (mg/L)	0.0362	0.100	0.0539	0.0699	0.154
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00014
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	0.000044	0.000018	0.000020	0.000035
	Vanadium (V)-Dissolved (mg/L)	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM	<0.00050 DLM
	Zinc (Zn)-Dissolved (mg/L)	0.0036	0.0037	<0.0010	<0.0010	0.0028

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L933296-6	L933296-7			
	Description					
	Sampled Date	16-SEP-10				
	Sampled Time	17:00				
	Client ID	MORRISON LAKE	MCS-10			
Grouping	**Analyte**					
WATER						
Total Metals	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	<0.000010	0.000014			
	Vanadium (V)-Total (mg/L)	<0.00050 DLM	0.00066			
	Zinc (Zn)-Total (mg/L)	0.0022	0.0014			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0310	0.182			
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Arsenic (As)-Dissolved (mg/L)	0.000321	0.00131			
	Barium (Ba)-Dissolved (mg/L)	0.0173	0.0372			
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	<0.0050 DLM	<0.0050 DLM			
	Cadmium (Cd)-Dissolved (mg/L)	0.000021	0.000072			
	Calcium (Ca)-Dissolved (mg/L)	8.97	14.4			
	Chromium (Cr)-Dissolved (mg/L)	<0.00050 DLM	<0.00050 DLM			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.00013			
	Copper (Cu)-Dissolved (mg/L)	0.00140	0.00104			
	Iron (Fe)-Dissolved (mg/L)	0.104	1.13			
	Lead (Pb)-Dissolved (mg/L)	0.000105	0.000123			
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050			
	Magnesium (Mg)-Dissolved (mg/L)	1.92	3.63			
	Manganese (Mn)-Dissolved (mg/L)	0.00435	0.0927			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000114	0.000129			
	Nickel (Ni)-Dissolved (mg/L)	0.00047	0.00057			
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30			
	Potassium (K)-Dissolved (mg/L)	0.401	0.352			
	Selenium (Se)-Dissolved (mg/L)	<0.00020 DLM	<0.00020 DLM			
	Silicon (Si)-Dissolved (mg/L)	2.18	0.522			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	1.90	4.47			
	Strontium (Sr)-Dissolved (mg/L)	0.0468	0.0632			
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	<0.000010	0.000021			
	Vanadium (V)-Dissolved (mg/L)	<0.00050 DLM	0.00095			
	Zinc (Zn)-Dissolved (mg/L)	0.0012	0.0027			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection limit was raised due to detection of analyte at comparable level in Method Blank.
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

Reference Information

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Short Holding Time

ALS Environment

Rush Processing

ain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To	**Report Format / Distribution**	**Service Request** (Rush subject to availability - Contact ALS to confirm TAT)
Company: PACIFIC BOOKER MINERALS	Standard: ✓ Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact: DON BETTON	Select: PDF ✓ Excel ✓ Digital ✓ Fax ✓	Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address: 1166 Alberni St Suite 1702 Vancouver BC CANADA V6E 3Z3	Email 1: d.betton@pacificbooker.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
Phone: 604-681-8556 Fax: 604-687-3995	Email 2: bythebridge@gmail.com	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	**Client / Project Information**	**Analysis Request**
Copy of Invoice with Report? (circle) Yes or No	Job #:	(Indicate Filtered or Preserved, F/P)
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only) L933296	**ALS Contact:**	**Sampler:**

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Total Metals	Dissolved Metals	Number of Containers
	MCS - 1	9/15	16:00	H_2O	✓	✓	✓	3
	MCS - 4	9/16	16:00		✓	✓	✓	3
	MCS - 6	9/14	17:00		✓	✓	✓	3
	Booker Lake	9/13	16:00		✓	✓	✓	3
	MCS - 5	9/15/2010	16:00		✓	✓	✓	3
	~~MCS - 8~~	~~9/16/10~~	~~17:00~~					3
	Morrison LAKE	9/15	16:00		✓	✓	✓	3
	MCS - 10	Sep 16, 10	17:00		✓	✓	✓	3

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/etc) / Hazardous Details

Dissolved Metals - Filter in Lab!!!

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. Mach	9/17/10	17:00	KC	20 Sept	8:30	1.8 °C				

ATTACHMENT 2

Site Photos

Photo 1 MLARD Cubes and Barrels at the Old PBM Camp

Photo 2 Weather Station Diagnostics

Photo 3 Shoreline near Proposed Diffuser Location

Photo 4 Morrison Creek during Spawning Survey Assessment

Photo 5 Morrison Creek during Spawning Survey Assessment at Morrison Lake

Photo 6 Morrison Creek during Spawning Survey Assessment

Photo 7 Morrison Lake South Basin Shoreline Spawning Survey

Photo 8 Fish Barrier at Olympic Creek

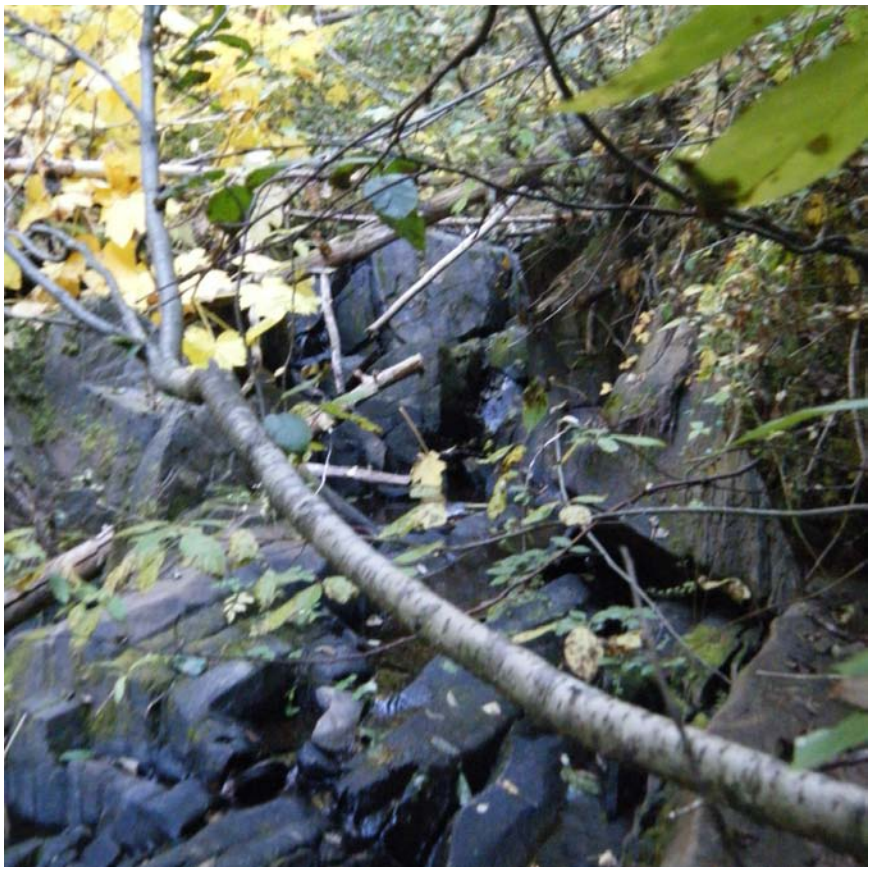

Photo 9 Fish Barrier at Olympic Creek, Large Boulder

Photo 10 Steeper Section of Olympic Creek, Possible Fish Barrier

ATTACHMENT 3

Weather Data

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	168	600	17-Jun-10	-72.8	19.78	1.847	263.5	26.73	1.847	263.5	33.38	0	0.69	-244
60	2010	168	700	17-Jun-10	-72.8	29.57	1.401	271.2	35.55	1.401	271.2	43.88	1.27	0.685	-229
60	2010	168	800	17-Jun-10	-72.8	28.91	1.485	263.8	34.67	1.485	263.8	39.83	0	0.675	-269
60	2010	168	900	17-Jun-10	-72.8	32.47	1.541	253.8	33.5	1.541	253.8	45.42	0	0.711	-233
60	2010	168	1000	17-Jun-10	-72.8	33.77	2.043	251	39.4	2.043	251	47.57	0	0.703	-205
60	2010	168	1100	17-Jun-10	-72.8	34.98	2.185	248.7	37.42	2.185	248.7	47.36	0	0.712	-213
60	2010	168	1200	17-Jun-10	-72.8	34.05	2.709	245.2	28.26	2.709	245.2	34.7	0	0.704	-229
60	2010	168	1300	17-Jun-10	-72.8	33.73	2.303	226.2	34.99	2.303	226.2	41.29	0	0.693	-269
60	2010	168	1400	17-Jun-10	-72.8	32.53	2.09	258.3	31.65	2.09	258.3	37.58	0	0.684	-217
60	2010	168	1500	17-Jun-10	-72.8	29.47	2.004	234.8	26.63	2.004	234.8	30.18	0	0.703	-216
60	2010	168	1600	17-Jun-10	-72.8	27.66	1.915	240.9	25.01	1.915	240.9	30.58	0	0.717	-205
60	2010	168	1700	17-Jun-10	-72.8	21.58	1.491	236	28.38	1.491	236	32.73	0	0.723	-436
60	2010	168	1800	17-Jun-10	-72.8	6.465	0.927	272.8	32.86	0.927	272.8	38.66	0	0.658	-184
60	2010	168	1900	17-Jun-10	-72.8	-14.83	0.886	342.8	14.11	0.886	342.8	18.35	0	0.631	-196
60	2010	168	2000	17-Jun-10	-72.8	-29.59	0.569	5.428	16.8	0.569	5.428	29.4	0	0.671	-237
60	2010	168	2100	17-Jun-10	-72.8	-36.44	0.664	23.95	8.19	0.664	23.95	13.04	0	0.659	-234
60	2010	168	2200	17-Jun-10	-72.8	-39.77	0.608	16.85	12.79	0.608	16.85	23.52	0	0.653	-279
60	2010	168	2300	17-Jun-10	-72.8	-40.8	0.467	5.428	13.34	0.467	5.428	24.89	0	0.659	-294
60	2010	168	2400	17-Jun-10	-72.8	-41.1	0.34	1.94	13.02	0.34	1.94	18.91	0	0.662	-288
60	2010	169	100	18-Jun-10	-72.8	-40.87	0.505	345.2	13.92	0.505	345.2	34.1	0	0.655	-253
60	2010	169	200	18-Jun-10	-72.8	-37.43	0.544	325.9	11.59	0.544	325.9	22.76	0	0.628	-236
60	2010	169	300	18-Jun-10	-72.8	-31.73	0.409	320.6	13.22	0.409	320.6	28.18	0	0.62	-205
60	2010	169	400	18-Jun-10	-72.8	-15.56	0.445	331.6	18.71	0.445	331.6	27.5	0	0.652	-180
60	2010	169	500	18-Jun-10	-72.8	2.809	1.262	289.5	31.57	1.262	289.5	39.28	0	0.672	-197
60	2010	169	600	18-Jun-10	-72.8	10.21	1.597	274.8	34.35	1.597	274.8	39.68	0	0.663	-204
60	2010	169	700	18-Jun-10	-72.8	13.69	1.486	258.9	33.02	1.486	258.9	48.58	0	0.703	-243
60	2010	169	800	18-Jun-10	-72.8	20.32	1.772	254.7	35.27	1.772	254.7	42.43	0	0.677	-220
60	2010	169	900	18-Jun-10	-72.8	25.75	1.914	262.8	30.39	1.914	262.8	44.31	0	0.669	-198
60	2010	169	1000	18-Jun-10	-72.8	29.19	1.964	258.5	32.21	1.964	258.5	41.11	0	0.669	-195
60	2010	169	1100	18-Jun-10	-72.8	30.66	2.16	236.4	33.05	2.16	236.4	44.98	0	0.748	-243
60	2010	169	1200	18-Jun-10	-72.8	30.15	2.745	164.4	29.56	2.745	164.4	36.44	0	0.729	-315
60	2010	169	1300	18-Jun-10	-72.8	29.1	2.502	175.5	34.66	2.502	175.5	39.52	0	0.685	-208
60	2010	169	1400	18-Jun-10	-72.8	27.56	2.164	203.7	32.66	2.164	203.7	43.72	0	0.727	-468
60	2010	169	1500	18-Jun-10	-72.8	25.64	2.197	222.4	28.29	2.197	222.4	38.07	0	0.732	-212
60	2010	169	1600	18-Jun-10	-72.8	21.7	1.636	229.6	31	1.636	229.6	36.44	0	0.716	-281
60	2010	169	1700	18-Jun-10	-72.8	13.85	1.578	253.6	23.74	1.578	253.6	25.29	0	0.702	-342
60	2010	169	1800	18-Jun-10	-72.8	1.221	1.229	272.5	22.25	1.229	272.5	24.34	0	0.689	-240
60	2010	169	1900	18-Jun-10	-72.8	-18.61	0.632	349.4	20.72	0.632	349.4	33.56	0	0.664	-211
60	2010	169	2000	18-Jun-10	-72.8	-32.6	0.566	2.992	15.86	0.566	2.992	21.53	0	0.662	-246
60	2010	169	2100	18-Jun-10	-72.8	-38.04	0.641	35.32	9.04	0.641	35.32	16.07	0	0.652	-288
60	2010	169	2200	18-Jun-10	-72.8	-40.34	0.293	358.3	9.47	0.293	358.3	22.07	0	0.664	-236
60	2010	169	2300	18-Jun-10	-72.8	-41.15	0.358	1.625	14.29	0.358	1.625	25.76	0	0.659	-244
60	2010	169	2400	18-Jun-10	-72.8	-40.64	0.414	31.68	13.53	0.414	31.68	32.01	0	0.644	-285
60	2010	170	100	19-Jun-10	-72.8	-39.49	0.494	8.12	18.44	0.494	8.12	37.45	0	0.63	-305
60	2010	170	200	19-Jun-10	-72.8	-31.46	0.404	13.97	9.2	0.404	13.97	31.59	0	0.643	-565
60	2010	170	300	19-Jun-10	-72.8	-23.92	0.345	355.6	11.93	0.345	355.6	27.97	0	0.657	-299
60	2010	170	400	19-Jun-10	-72.8	-21.74	0.267	323.6	19.92	0.267	323.6	30.76	0	0.64	-206
60	2010	170	500	19-Jun-10	-72.8	7.49	0.618	326.7	31.07	0.618	326.7	37.63	0	0.667	-281
60	2010	170	600	19-Jun-10	-72.8	14.48	1.103	292	30.81	1.103	292	41.51	0	0.687	-211
60	2010	170	700	19-Jun-10	-72.8	16.47	1.043	326.3	40.02	1.043	326.3	60.06	0	0.671	-199
60	2010	170	800	19-Jun-10	-72.8	20.94	1.07	233.2	47.09	1.07	233.2	78.7	0	0.682	-279
60	2010	170	900	19-Jun-10	-72.8	26.1	1.304	251.8	40.92	1.304	251.8	61.06	0	0.72	-452
60	2010	170	1000	19-Jun-10	-72.8	28.28	1.992	238.3	36.62	1.992	238.3	47.67	0	0.69	-196
60	2010	170	1100	19-Jun-10	-72.8	29.91	2.341	252.8	33.32	2.341	252.8	38.99	0	0.707	-236
60	2010	170	1200	19-Jun-10	-72.8	30.26	2.2	207.2	38.2	2.2	207.2	45.78	0	0.74	-279
60	2010	170	1300	19-Jun-10	-72.8	29.28	2.47	193.7	32.78	2.47	193.7	37.73	0	0.722	-364
60	2010	170	1400	19-Jun-10	-72.8	27.3	2.307	199	30.07	2.307	199	36.24	0	0.733	-244
60	2010	170	1500	19-Jun-10	-72.8	26.38	1.965	220.1	31.14	1.965	220.1	35.55	0	0.702	-287
60	2010	170	1600	19-Jun-10	-72.8	22.87	1.987	232.9	26.44	1.987	232.9	30.97	0	0.694	-201
60	2010	170	1700	19-Jun-10	-72.8	16.89	1.73	241	25.16	1.73	241	26.99	0	0.704	-270
60	2010	170	1800	19-Jun-10	-72.8	6.025	1.175	274.1	23.87	1.175	274.1	25.22	0	0.663	-204
60	2010	170	1900	19-Jun-10	-72.8	-16.39	1.035	339.6	15.69	1.035	339.6	20.71	0	0.703	-271
60	2010	170	2000	19-Jun-10	-72.8	-31.07	0.392	12.85	15.42	0.392	12.85	20.93	0	0.699	-242
60	2010	170	2100	19-Jun-10	-72.8	-38.11	0.509	358.9	14.61	0.509	358.9	22.14	0	0.677	-248
60	2010	170	2200	19-Jun-10	-72.8	-40.93	0.519	349.7	14.07	0.519	349.7	18.99	0	0.677	-276
60	2010	170	2300	19-Jun-10	-72.8	-41.84	0.72	11.85	10.31	0.72	11.85	13.99	0	0.677	-209
60	2010	170	2400	19-Jun-10	-72.8	-41.68	0.648	11.5	14.76	0.648	11.5	20.16	0	0.674	-207
60	2010	171	100	20-Jun-10	-72.8	-40.83	0.554	15.55	10.73	0.554	15.55	15.36	0	0.666	-210
60	2010	171	200	20-Jun-10	-72.8	-37.03	0.357	29.22	11.5	0.357	29.22	27.62	0	0.656	-236
60	2010	171	300	20-Jun-10	-72.8	-34.02	0.287	16.71	6.965	0.287	16.71	22.29	0	0.655	-291
60	2010	171	400	20-Jun-10	-72.8	-26.14	0.25	350.8	5.644	0.25	350.8	14.29	0	0.661	-208
60	2010	171	500	20-Jun-10	-72.8	3.926	1.079	284.9	31.26	1.079	284.9	39.3	0	0.674	-206
60	2010	171	600	20-Jun-10	-72.8	11.04	1.603	270.6	27.93	1.603	270.6	36.61	0	0.697	-277
60	2010	171	700	20-Jun-10	-72.8	13.31	1.287	278.4	37.45	1.287	278.4	49	0	0.742	-288
60	2010	171	800	20-Jun-10	-72.8	18.76	1.126	287.1	41.05	1.126	287.1	62.93	0	0.709	-248
60	2010	171	900	20-Jun-10	-72.8	22.5	1.311	174.7	37.85	1.311	174.7	61.05	0	0.721	-452
60	2010	171	1000	20-Jun-10	-72.8	26.63	1.477	290.8	36.52	1.477	290.8	62.77	0	0.68	-245
60	2010	171	1100	20-Jun-10	-72.8	28.4	1.703	144	37.86	1.703	144	67.84	0	0.697	-234
60	2010	171	1200	20-Jun-10	-72.8	29.57	1.988	162.6	36.62	1.988	162.6	49.31	0	0.699	-496
60	2010	171	1300	20-Jun-10	-72.8	29.97	1.974	177.7	34.35	1.974	177.7	44.2	0	0.734	-232
60	2010	171	1400	20-Jun-10	-72.8	28.33	2.036	185.6	33.25	2.036	185.6	38.89	0	0.687	-248
60	2010	171	1500	20-Jun-10	-72.8	26.5	1.749	206.9	29.9	1.749	206.9	33.96	0	0.679	-174
60	2010	171	1600	20-Jun-10	-72.8	23.15	1.584	202.5	33.57	1.584	202.5	36.68	0	0.71	-271
60	2010	171	1700	20-Jun-10	-72.8	17.01	1.356	228.2	28.23	1.356	228.2	31.86	0	0.664	-199
60	2010	171	1800	20-Jun-10	-72.8	3.845	0.809	295.7	17.86	0.809	295.7	20.38	0	0.688	-280
60	2010	171	1900	20-Jun-10	-72.8	-20.26	0.621	337.8	18.59	0.621	337.8	22.29	0	0.678	-207
60	2010	171	2000	20-Jun-10	-72.8	-33.49	0.688	356.1	19.37	0.688	356.1	30.43	0	0.68	-228
60	2010	171	2100	20-Jun-10	-72.8	-38.49	0.618	3.465	20.44	0.618	3.465	27.33	0	0.678	-227
60	2010	171	2200	20-Jun-10	-72.8	-40.6	0.685	32.15	11.05	0.685	32.15	20.76	0	0.664	-231
60	2010	171	2300	20-Jun-10	-72.8	-41.48	0.426	10.04	19.61	0.426	10.04	30.42	0	0.657	-241
60	2010	171	2400	20-Jun-10	-72.8	-41.27	0.547	25.68	13.03	0.547	25.68	23.18	0	0.656	-241
60	2010	172	100	21-Jun-10	-72.8	-40.85	0.53	20.07	14.36	0.53	20.07	25.26	0	0.651	-407

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	172	200	21-Jun-10	-72.8	-38.3	0.46	356.4	20.04	0.46	356.4	28.85	0	0.659	-239
60	2010	172	300	21-Jun-10	-72.8	-35.31	0.455	355.1	16.19	0.455	355.1	30.06	0	0.661	-235
60	2010	172	400	21-Jun-10	-72.8	-26.36	0.276	346.5	9.64	0.276	346.5	25.77	0	0.643	-214
60	2010	172	500	21-Jun-10	-72.8	1.53	0.579	315.9	25.77	0.579	315.9	41.08	0	0.678	-235
60	2010	172	600	21-Jun-10	-72.8	12.75	1.125	300.8	29.89	1.125	300.8	50.28	0	0.722	-392
60	2010	172	700	21-Jun-10	-72.8	13.63	1.034	121.6	35.58	1.034	121.6	66.84	0	0.7	-211
60	2010	172	800	21-Jun-10	-72.8	10.43	1.399	104.9	34.22	1.399	104.9	48.24	0	0.693	-279
60	2010	172	900	21-Jun-10	-72.8	6.111	1.779	113	31.55	1.779	113	33.78	0	0.688	-289
60	2010	172	1000	21-Jun-10	-72.8	15.95	1.678	92.8	44.13	1.678	92.8	66.5	0	0.683	-204
60	2010	172	1100	21-Jun-10	-72.8	21.71	1.529	117.8	37.15	1.529	117.8	60.85	0	0.702	-206
60	2010	172	1200	21-Jun-10	-72.8	12.85	1.247	141.6	43.56	1.247	141.6	56.36	0	0.705	-207
60	2010	172	1300	21-Jun-10	-72.8	15.46	2.269	121.7	29.12	2.269	121.7	32.2	0	0.71	-243
60	2010	172	1400	21-Jun-10	-72.8	15.71	1.716	140.6	30.04	1.716	140.6	33.39	0	0.702	-234
60	2010	172	1500	21-Jun-10	-72.8	12.74	2.03	162.5	32.83	2.03	162.5	37.37	0	0.708	-205
60	2010	172	1600	21-Jun-10	-72.8	14.54	2.173	208.3	34.52	2.173	208.3	36.8	0	0.707	-230
60	2010	172	1700	21-Jun-10	-72.8	6.087	1.987	191.8	31.56	1.987	191.8	35.21	0	0.697	-247
60	2010	172	1800	21-Jun-10	-72.8	-10.73	1.389	168.6	32.92	1.389	168.6	37.11	0	0.718	-245
60	2010	172	1900	21-Jun-10	-72.8	-27.5	0.77	79	16.62	0.77	79	19.45	0	0.646	-197
60	2010	172	2000	21-Jun-10	-72.8	-35.97	0.572	24.02	14.17	0.572	24.02	25.8	0	0.642	-197
60	2010	172	2100	21-Jun-10	-72.8	-39.7	0.647	42.75	18.26	0.647	42.75	24.41	0	0.627	-195
60	2010	172	2200	21-Jun-10	-72.8	-41.16	0.948	53.19	28.65	0.948	53.19	47.04	0	0.644	-231
60	2010	172	2300	21-Jun-10	-72.8	-39.88	0.728	40.3	13.95	0.728	40.3	29.3	0	0.654	-318
60	2010	172	2400	21-Jun-10	-72.8	-39.41	0.574	32.12	9.75	0.574	32.12	24.05	0	0.651	-349
60	2010	173	100	22-Jun-10	-72.8	-40.33	0.352	15.15	17.82	0.352	15.15	36.02	0	0.658	-244
60	2010	173	200	22-Jun-10	-72.8	-38.81	0.388	24.9	8.54	0.388	24.9	22.96	0	0.663	-239
60	2010	173	300	22-Jun-10	-72.8	-35.33	0.38	13.19	5.999	0.38	13.19	24.77	0	0.663	-276
60	2010	173	400	22-Jun-10	-72.8	-22.4	0.304	350.6	12.81	0.304	350.6	25	0	0.698	-241
60	2010	173	500	22-Jun-10	-72.8	-4.481	0.312	40.88	29.45	0.312	40.88	62.13	0	0.699	-270
60	2010	173	600	22-Jun-10	-72.8	-0.902	0.737	269.9	33.2	0.737	269.9	49.62	0	0.691	-237
60	2010	173	700	22-Jun-10	-72.8	-0.973	1.148	344.7	30.65	1.148	344.7	50.66	0	0.687	-239
60	2010	173	800	22-Jun-10	-72.8	2.808	1.29	12.82	34.32	1.29	12.82	54.97	0	0.68	-197
60	2010	173	900	22-Jun-10	-72.8	5.818	1.522	82.7	33.84	1.522	82.7	40.54	0	0.687	-200
60	2010	173	1000	22-Jun-10	-72.8	8.41	1.39	121.2	40.37	1.39	121.2	59.23	0	0.67	-196
60	2010	173	1100	22-Jun-10	-72.8	3.696	1.478	173.8	33.85	1.478	173.8	46.43	0	0.681	-235
60	2010	173	1200	22-Jun-10	-72.8	11.67	1.502	140.9	35.95	1.502	140.9	47.25	0	0.693	-216
60	2010	173	1300	22-Jun-10	-72.8	5.88	1.156	110.3	27.65	1.156	110.3	33.65	0	0.694	-297
60	2010	173	1400	22-Jun-10	-72.8	2.106	1.186	80.2	31.45	1.186	80.2	40.58	0	0.754	-315
60	2010	173	1500	22-Jun-10	-72.8	0.226	0.787	107.7	24.04	0.787	107.7	35.62	0	0.683	-227
60	2010	173	1600	22-Jun-10	-72.8	-2.429	1.042	124	26.53	1.042	124	30.85	0	0.677	-224
60	2010	173	1700	22-Jun-10	-72.8	-8.82	0.667	177.2	34.41	0.667	177.2	45.38	0	0.678	-199
60	2010	173	1800	22-Jun-10	-72.8	-11.58	0.339	49.32	17.65	0.339	49.32	31.47	0	0.691	-422
60	2010	173	1900	22-Jun-10	-72.8	-16.09	0.526	43.75	11.2	0.526	43.75	16.98	0	0.655	-199
60	2010	173	2000	22-Jun-10	-72.8	-23.24	0.548	47.51	11.85	0.548	47.51	26.32	0	0.662	-387
60	2010	173	2100	22-Jun-10	-72.8	-28.96	0.344	5.127	6.834	0.344	5.127	15	0	0.679	-276
60	2010	173	2200	22-Jun-10	-72.8	-31.58	0.576	37.59	10.46	0.576	37.59	18.41	0	0.662	-416
60	2010	173	2300	22-Jun-10	-72.8	-28.2	0.79	52.85	9.99	0.79	52.85	12.22	0	0.631	-197
60	2010	173	2400	22-Jun-10	-72.8	-28.3	0.432	21.23	10.38	0.432	21.23	29.69	0	0.63	-198
60	2010	174	100	23-Jun-10	-72.8	-28.8	0.429	7.05	7.73	0.429	7.05	27.94	0	0.628	-197
60	2010	174	200	23-Jun-10	-72.8	-29.64	0.588	45.63	11.48	0.588	45.63	22.23	0	0.633	-200
60	2010	174	300	23-Jun-10	-72.8	-25.87	0.351	359.8	6.968	0.351	359.8	21.44	0	0.64	-204
60	2010	174	400	23-Jun-10	-72.8	-18.22	0.288	334.5	5.998	0.288	334.5	24.26	0	0.657	-236
60	2010	174	500	23-Jun-10	-72.8	9.01	0.357	212.4	27.18	0.357	212.4	36.15	0	0.689	-281
60	2010	174	600	23-Jun-10	-72.8	20.78	0.77	144.3	25.14	0.77	144.3	35.74	0	0.688	-241
60	2010	174	700	23-Jun-10	-72.8	23.17	0.715	181.5	30.89	0.715	181.5	63.5	0	0.662	-197
60	2010	174	800	23-Jun-10	-72.8	26.48	1.21	190.7	37.9	1.21	190.7	75.5	0	0.687	-272
60	2010	174	900	23-Jun-10	-72.8	18.12	1.5	94.2	27.11	1.5	94.2	39.12	0	0.67	-194
60	2010	174	1000	23-Jun-10	-72.8	16.56	1.998	102.3	31.05	1.998	102.3	40.46	0	0.713	-428
60	2010	174	1100	23-Jun-10	-72.8	20.76	1.65	109.6	36.88	1.65	109.6	46.38	0	0.685	-202
60	2010	174	1200	23-Jun-10	-72.8	14.56	1.688	259.8	26.39	1.688	259.8	29.89	0	0.665	-194
60	2010	174	1300	23-Jun-10	-72.8	13.99	0.951	206.8	33.71	0.951	206.8	43.39	0	0.674	-546
60	2010	174	1400	23-Jun-10	-72.8	16.15	1	194.8	26.63	1	194.8	39.72	0	0.664	-194
60	2010	174	1500	23-Jun-10	-72.8	11.25	1.508	107.2	28.4	1.508	107.2	50.64	0	0.671	-197
60	2010	174	1600	23-Jun-10	-72.8	6.801	1.066	116.5	22.77	1.066	116.5	29.99	0	0.683	-285
60	2010	174	1700	23-Jun-10	-72.8	5.101	0.823	123.8	20.97	0.823	123.8	24.56	0	0.673	-200
60	2010	174	1800	23-Jun-10	-72.8	-1.007	0.728	110.9	25.72	0.728	110.9	38.12	0	0.669	-236
60	2010	174	1900	23-Jun-10	-72.8	-3.146	0.531	351.9	10.8	0.531	351.9	21.48	0	0.653	-195
60	2010	174	2000	23-Jun-10	-72.8	-3.92	0.339	319.3	14.69	0.339	319.3	30.59	0	0.663	-204
60	2010	174	2100	23-Jun-10	-72.8	-3.436	0.283	14.87	8.66	0.283	14.87	18.51	0	0.662	-232
60	2010	174	2200	23-Jun-10	-72.8	-4.188	0.353	20.74	4.644	0.353	20.74	12.57	0	0.665	-212
60	2010	174	2300	23-Jun-10	-72.8	-5.725	0.308	27.73	4.248	0.308	27.73	14.79	0	0.662	-214
60	2010	174	2400	23-Jun-10	-72.8	-6.163	0.34	43.32	5.844	0.34	43.32	11.38	0	0.662	-203
60	2010	175	100	24-Jun-10	-72.8	-4.818	0.255	30.66	5.797	0.255	30.66	11.71	0	0.664	-205
60	2010	175	200	24-Jun-10	-72.8	-1.895	0.175	32.53	4.5	0.175	32.53	12.48	1.016	0.645	-211
60	2010	175	300	24-Jun-10	-72.8	2.737	0.174	14.02	4.197	0.174	14.02	9.02	1.778	0.674	-240
60	2010	175	400	24-Jun-10	-72.8	7.68	0.367	251.1	10.95	0.367	251.1	21.08	0.762	0.659	-203
60	2010	175	500	24-Jun-10	-72.8	11.69	0.341	231.3	16.89	0.341	231.3	23.24	0.508	0.658	-254
60	2010	175	600	24-Jun-10	-72.8	12.08	0.354	174.9	14.53	0.354	174.9	28.38	3.81	0.694	-250
60	2010	175	700	24-Jun-10	-72.8	14.34	0.297	321.9	15.36	0.297	321.9	24.59	2.286	0.662	-227
60	2010	175	800	24-Jun-10	-72.8	14.78	0.472	138	20.39	0.472	138	40.62	3.048	0.66	-225
60	2010	175	900	24-Jun-10	-72.8	22.1	1.206	328.3	25.94	1.206	328.3	39.91	0	0.649	-203
60	2010	175	1000	24-Jun-10	-72.8	28.65	1.13	307.2	30.97	1.13	307.2	38.61	0	0.666	-173
60	2010	175	1100	24-Jun-10	-72.8	31.93	1.255	275.3	41.63	1.255	275.3	51.61	0	0.663	-224
60	2010	175	1200	24-Jun-10	-72.8	29.14	1.81	336.1	30.86	1.81	336.1	43.29	4.318	0.686	-240
60	2010	175	1300	24-Jun-10	-72.8	14	1.249	33.1	18.91	1.249	33.1	24.56	9.91	0.787	-443
60	2010	175	1400	24-Jun-10	-72.8	22.75	0.842	274.3	24.59	0.842	274.3	37.01	0	0.687	-404
60	2010	175	1500	24-Jun-10	-72.8	26.3	0.868	268	25.38	0.868	268	42.22	0	0.698	-282
60	2010	175	1600	24-Jun-10	-72.8	28.33	1.063	263.6	26.51	1.063	263.6	30.51	0	0.719	-246
60	2010	175	1700	24-Jun-10	-72.8	25.96	1.246	260.2	25.65	1.246	260.2	29.21	0	0.707	-283
60	2010	175	1800	24-Jun-10	-72.8	20.71	0.501	247	25.68	0.501	247	36.67	0	0.643	-197
60	2010	175	1900	24-Jun-10	-72.8	14.83	0.414	324.2	16.14	0.414	324.2	22.54	0	0.667	-334
60	2010	175	2000	24-Jun-10	-72.8	6.705	0.319	9.01	12.45	0.319	9.01	27.49	0	0.65	-263
60	2010	175	2100	24-Jun-10	-72.8	0.264	0.397	343	11.44	0.397	343	16.37	0	0.654	-304

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	175	2200	24-Jun-10	-72.8	-3.636	0.257	342.8	7.76	0.257	342.8	18.1	0	0.649	-331
60	2010	175	2300	24-Jun-10	-72.8	-5.005	0.294	5.723	7.11	0.294	5.723	14.09	0	0.653	-308
60	2010	175	2400	24-Jun-10	-72.8	-3.471	0.348	340.9	10.03	0.348	340.9	18.43	0	0.671	-472
60	2010	176	100	25-Jun-10	-72.8	-1.084	0.762	320.3	19.94	0.762	320.3	22.02	0	0.69	-280
60	2010	176	200	25-Jun-10	-72.8	-0.739	0.754	318.9	14.2	0.754	318.9	15.25	0	0.687	-455
60	2010	176	300	25-Jun-10	-72.8	2.225	0.972	309	22.9	0.972	309	23.93	0	0.681	-285
60	2010	176	400	25-Jun-10	-72.8	2.27	0.957	295.3	21.42	0.957	295.3	24.27	0.254	0.677	-236
60	2010	176	500	25-Jun-10	-72.8	0.761	0.906	306.3	23.84	0.906	306.3	26.63	0.254	0.677	-236
60	2010	176	600	25-Jun-10	-72.8	2.081	1.435	299.9	24.31	1.435	299.9	27.2	0.762	0.667	-207
60	2010	176	700	25-Jun-10	-72.8	4.879	1.411	301.3	22.29	1.411	301.3	25.22	0.254	0.673	-236
60	2010	176	800	25-Jun-10	-72.8	11.45	1.247	281.1	24.84	1.247	281.1	29.35	0	0.646	-177
60	2010	176	900	25-Jun-10	-72.8	14.7	1.086	292.9	23.59	1.086	292.9	31.13	0	0.734	-369
60	2010	176	1000	25-Jun-10	-72.8	15.8	1.31	302.1	24.13	1.31	302.1	27.84	0	0.687	-543
60	2010	176	1100	25-Jun-10	-72.8	17.72	0.682	294.5	27.24	0.682	294.5	35.66	0.254	0.705	-274
60	2010	176	1200	25-Jun-10	-72.8	21.86	1.451	277.9	30.88	1.451	277.9	33.86	0	0.653	-258
60	2010	176	1300	25-Jun-10	-72.8	22.19	1.704	271.9	25.71	1.704	271.9	28.62	0	0.69	-272
60	2010	176	1400	25-Jun-10	-72.8	20.52	1.559	291.9	24.29	1.559	291.9	27.62	0	0.66	-200
60	2010	176	1500	25-Jun-10	-72.8	21.96	1.702	263.3	24.19	1.702	263.3	28.3	0	0.694	-363
60	2010	176	1600	25-Jun-10	-72.8	17.92	1.132	270.5	21.97	1.132	270.5	25.59	0	0.697	-507
60	2010	176	1700	25-Jun-10	-72.8	14.23	0.995	294.4	25.11	0.995	294.4	27.16	0	0.693	-593
60	2010	176	1800	25-Jun-10	-72.8	10.09	0.479	342	12.37	0.479	342	17.73	0	0.652	-203
60	2010	176	1900	25-Jun-10	-72.8	5.829	0.202	344	17.01	0.202	344	33.15	0	0.65	-206
60	2010	176	2000	25-Jun-10	-72.8	2.334	0.38	30.26	13.49	0.38	30.26	23.01	0	0.666	-274
60	2010	176	2100	25-Jun-10	-72.8	1.161	0.841	320.8	15.44	0.841	320.8	19.58	0	0.67	-321
60	2010	176	2200	25-Jun-10	-72.8	1.498	0.824	304	23.58	0.824	304	25.28	0	0.66	-239
60	2010	176	2300	25-Jun-10	-72.8	-1.898	0.591	322.7	20.56	0.591	322.7	24.15	0	0.677	-464
60	2010	176	2400	25-Jun-10	-72.8	-7.6	0.671	338.1	12.4	0.671	338.1	14.57	0	0.662	-593
60	2010	177	100	26-Jun-10	-72.8	-22.11	0.702	347.7	7.77	0.702	347.7	9.83	0	0.644	-280
60	2010	177	200	26-Jun-10	-72.8	-29.33	0.477	359	4.436	0.477	359	9.7	0	0.653	-276
60	2010	177	300	26-Jun-10	-72.8	-29.03	0.343	354	9.1	0.343	354	15.33	0	0.763	-275
60	2010	177	400	26-Jun-10	-72.8	-16.61	0.803	338.6	16.88	0.803	338.6	19.36	0	0.658	-241
60	2010	177	500	26-Jun-10	-72.8	8.6	1.185	308.6	26.78	1.185	308.6	38.98	0	0.669	-232
60	2010	177	600	26-Jun-10	-72.8	18.29	1.038	308.1	31.81	1.038	308.1	67.7	0	0.675	-206
60	2010	177	700	26-Jun-10	-72.8	21.34	0.816	32.53	30.86	0.816	32.53	47.32	0	0.671	-268
60	2010	177	800	26-Jun-10	-72.8	25.23	1.564	103.7	34.35	1.564	103.7	43.79	0	0.698	-207
60	2010	177	900	26-Jun-10	-72.8	29.68	1.606	159	41.06	1.606	159	59.32	0	0.663	-173
60	2010	177	1000	26-Jun-10	-72.8	32.87	1.888	150.1	35.62	1.888	150.1	45.02	0	0.676	-227
60	2010	177	1100	26-Jun-10	-72.8	33.23	1.715	207.2	32.29	1.715	207.2	42.97	0	0.673	-174
60	2010	177	1200	26-Jun-10	-72.8	32.36	1.359	146	35.1	1.359	146	53.44	0	0.762	-283
60	2010	177	1300	26-Jun-10	-72.8	32.75	1.333	208.4	35.01	1.333	208.4	54.91	0	0.707	-250
60	2010	177	1400	26-Jun-10	-72.8	33.77	1.847	175.1	29.8	1.847	175.1	36.5	0	0.688	-278
60	2010	177	1500	26-Jun-10	-72.8	32.47	1.52	162.2	33.87	1.52	162.2	36.78	0	0.737	-285
60	2010	177	1600	26-Jun-10	-72.8	24.56	1.508	162	36.43	1.508	162	41.93	0	0.662	-198
60	2010	177	1700	26-Jun-10	-72.8	17.46	1.146	109.5	24.66	1.146	109.5	33.62	0	0.687	-530
60	2010	177	1800	26-Jun-10	-72.8	11.57	0.992	130.6	21.89	0.992	130.6	25.14	0	0.65	-202
60	2010	177	1900	26-Jun-10	-72.8	3.648	0.185	91.6	13.65	0.185	91.6	22.07	0	0.688	-365
60	2010	177	2000	26-Jun-10	-72.8	-1.142	0.389	86	27.92	0.389	86	49.21	0	0.662	-320
60	2010	177	2100	26-Jun-10	-72.8	-5.082	0.476	26.88	8.93	0.476	26.88	31.3	0	0.653	-252
60	2010	177	2200	26-Jun-10	-72.8	-14.22	0.581	32.71	8.63	0.581	32.71	15.34	0	0.652	-285
60	2010	177	2300	26-Jun-10	-72.8	-20.33	0.421	38.26	7.22	0.421	38.26	13.16	0	0.658	-251
60	2010	177	2400	26-Jun-10	-72.8	-25.06	0.611	39.99	8.65	0.611	39.99	15.28	0	0.663	-235
60	2010	178	100	27-Jun-10	-72.8	-28.69	0.671	41.55	11.03	0.671	41.55	28.49	0	0.674	-240
60	2010	178	200	27-Jun-10	-72.8	-26.51	0.541	58.84	10.2	0.541	58.84	31	0	0.671	-214
60	2010	178	300	27-Jun-10	-72.8	-26.85	0.844	66.11	15.72	0.844	66.11	25.87	0	0.667	-237
60	2010	178	400	27-Jun-10	-72.8	-13.48	1.197	92.1	32.93	1.197	92.1	37.68	0	0.717	-422
60	2010	178	500	27-Jun-10	-72.8	8.18	1.275	100.3	28.96	1.275	100.3	40.17	0	0.646	-195
60	2010	178	600	27-Jun-10	-72.8	18.26	1.177	120.3	32.02	1.177	120.3	46.25	0	0.759	-282
60	2010	178	700	27-Jun-10	-72.8	22.82	1.956	113.4	31.71	1.956	113.4	34.98	0	0.685	-274
60	2010	178	800	27-Jun-10	-72.8	19.44	1.372	76.2	31.21	1.372	76.2	59.09	0.508	0.657	-196
60	2010	178	900	27-Jun-10	-72.8	17.12	1.566	42.92	27.91	1.566	42.92	32.94	0	0.678	-208
60	2010	178	1000	27-Jun-10	-72.8	22.48	1.062	72.6	28.06	1.062	72.6	44.33	0	0.698	-291
60	2010	178	1100	27-Jun-10	-72.8	19.19	1.984	60.24	29.18	1.984	60.24	45.95	1.778	0.701	-272
60	2010	178	1200	27-Jun-10	-72.8	11.93	0.951	62.94	25.91	0.951	62.94	35.16	0.508	0.685	-217
60	2010	178	1300	27-Jun-10	-72.8	24.25	0.765	124	27.6	0.765	124	53.24	0	0.687	-239
60	2010	178	1400	27-Jun-10	-72.8	25.56	1.818	260.6	30.46	1.818	260.6	44.44	0	0.676	-208
60	2010	178	1500	27-Jun-10	-72.8	17.34	1.156	348.6	21	1.156	348.6	45.97	0.508	0.663	-279
60	2010	178	1600	27-Jun-10	-72.8	13.65	0.954	183	22.11	0.954	183	49.38	0	0.66	-248
60	2010	178	1700	27-Jun-10	-72.8	3.425	0.986	10.82	30.48	0.986	10.82	45.2	0.254	0.793	-280
60	2010	178	1800	27-Jun-10	-72.8	-2.567	0.811	6.065	24.97	0.811	6.065	70.4	0.508	0.676	-463
60	2010	178	1900	27-Jun-10	-72.8	-10.75	0.653	13.43	22.62	0.653	13.43	39.76	0	0.65	-313
60	2010	178	2000	27-Jun-10	-72.8	-21.04	0.595	32.5	11.49	0.595	32.5	40.22	0	0.655	-272
60	2010	178	2100	27-Jun-10	-72.8	-26.98	0.568	28.53	7.98	0.568	28.53	17.72	0	0.665	-239
60	2010	178	2200	27-Jun-10	-72.8	-31.67	0.47	44.25	8.43	0.47	44.25	24.11	0	0.62	-264
60	2010	178	2300	27-Jun-10	-72.8	-33.43	0.429	20.23	8.95	0.429	20.23	18.65	0	0.664	-271
60	2010	178	2400	27-Jun-10	-72.8	-34.17	0.486	33.08	10.01	0.486	33.08	15.8	0	0.669	-244
60	2010	179	100	28-Jun-10	-72.8	-34.47	0.401	11.69	7.19	0.401	11.69	16.48	0	0.655	-241
60	2010	179	200	28-Jun-10	-72.8	-32.45	0.359	353.9	15.17	0.359	353.9	20.43	0	0.664	-252
60	2010	179	300	28-Jun-10	-72.8	-25.87	0.385	12.23	17.53	0.385	12.23	34.24	0	0.626	-498
60	2010	179	400	28-Jun-10	-72.8	-12.74	1.028	63.66	21.92	1.028	63.65	30.03	0	0.642	-224
60	2010	179	500	28-Jun-10	-72.8	-0.73	1.472	93.1	24.75	1.472	93.1	27.72	0	0.67	-226
60	2010	179	600	28-Jun-10	-72.8	11.84	0.84	86.1	31.97	0.84	86.1	52.99	0	0.662	-385
60	2010	179	700	28-Jun-10	-72.8	19.9	1.479	110.8	39.26	1.479	110.8	56.99	0	0.671	-212
60	2010	179	800	28-Jun-10	-72.8	24.09	1.691	96.8	42.96	1.691	96.8	55.83	0	0.667	-231
60	2010	179	900	28-Jun-10	-72.8	25.83	2.38	84.8	34.97	2.38	84.8	41.79	0	0.691	-239
60	2010	179	1000	28-Jun-10	-72.8	29.52	2.322	97.6	39.19	2.322	97.6	49.31	0	2.66	0
60	2010	179	1100	28-Jun-10	-72.8	29.96	2.323	99.5	32.88	2.323	99.5	37.35	0	0.357	-287
60	2010	179	1200	28-Jun-10	-72.8	31.24	1.997	86.6	33.45	1.997	86.6	56.43	0	0.721	-426
60	2010	179	1300	28-Jun-10	-72.8	29.93	1.214	159.2	30.76	1.214	159.2	48.89	0	0.703	-242
60	2010	179	1400	28-Jun-10	-72.8	30.87	1.178	205.2	26.81	1.178	205.2	53.6	0	0.684	-244
60	2010	179	1500	28-Jun-10	-72.8	26.42	1.755	113.1	30.13	1.755	113.1	34.65	0	0.701	-368
60	2010	179	1600	28-Jun-10	-72.8	25.61	1.61	126	31.1	1.61	126	32.79	0	0.675	-207
60	2010	179	1700	28-Jun-10	-72.8	21.22	1.83	124.3	25.55	1.83	124.3	27.56	0	0.767	-278

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	179	1800	28-Jun-10	-72.8	6.395	1.731	108.4	23.84	1.731	108.4	24.74	0	0.692	-240
60	2010	179	1900	28-Jun-10	-72.8	-14.97	0.769	70.1	11.06	0.769	70.1	17.43	0	0.678	-243
60	2010	179	2000	28-Jun-10	-72.8	-26.61	0.735	73.5	10.64	0.735	73.5	30.64	0	0.677	-238
60	2010	179	2100	28-Jun-10	-72.8	-27.57	0.667	324	6.389	0.667	324	16.68	0	0.628	-202
60	2010	179	2200	28-Jun-10	-72.8	-31.08	0.575	35.02	11.95	0.575	35.02	23.62	0	0.621	-205
60	2010	179	2300	28-Jun-10	-72.8	-35.54	0.208	7.64	3.597	0.208	7.64	7.9	0	0.632	-202
60	2010	179	2400	28-Jun-10	-72.8	-34.4	0.259	342.3	14.51	0.259	342.3	26.25	0	0.657	-233
60	2010	180	100	29-Jun-10	-72.8	-24.28	1.775	96.4	25.73	1.775	96.4	32.02	0	0.658	-243
60	2010	180	200	29-Jun-10	-72.8	-18.54	2.301	98.7	32.6	2.301	98.7	33.52	0	0.652	-291
60	2010	180	300	29-Jun-10	-72.8	-18.8	0.824	144.5	23.69	0.824	144.5	55.33	0	0.648	-213
60	2010	180	400	29-Jun-10	-72.8	-16.5	0.869	138.9	21.9	0.869	138.9	30.42	0	0.643	-211
60	2010	180	500	29-Jun-10	-72.8	-7.11	1.081	170.9	29.39	1.081	170.9	44.64	0	2.66	0
60	2010	180	600	29-Jun-10	-72.8	-4.572	1.809	168.7	31.57	1.809	168.7	39.25	0	0.676	-236
60	2010	180	700	29-Jun-10	-72.8	-4.159	1.669	136.2	30.97	1.669	136.2	40.27	0	0.697	-244
60	2010	180	800	29-Jun-10	-72.8	-3.502	1.912	160.9	30.26	1.912	160.9	33.84	0.254	0.681	-205
60	2010	180	900	29-Jun-10	-72.8	8.83	2.26	149.3	30.52	2.26	149.3	36.16	0	0.668	-200
60	2010	180	1000	29-Jun-10	-72.8	7.59	1.893	147.2	30.85	1.893	147.2	42.42	0	0.648	-177
60	2010	180	1100	29-Jun-10	-72.8	1.821	1.612	109.4	34.17	1.612	109.4	41.86	0	0.657	-230
60	2010	180	1200	29-Jun-10	-72.8	1.269	2.044	89.1	30.8	2.044	89.1	37.7	0	0.708	-277
60	2010	180	1300	29-Jun-10	-72.8	0.681	1.961	113.2	32.62	1.961	113.2	45.02	0	0.779	-323
60	2010	180	1400	29-Jun-10	-72.8	-5.143	1.711	162.5	38.93	1.711	162.5	49.85	0	0.652	-239
60	2010	180	1500	29-Jun-10	-72.8	-12.95	1.154	41.28	26.76	1.154	41.28	54.89	0	0.664	-307
60	2010	180	1600	29-Jun-10	-72.8	-20.56	1.581	111.4	28.02	1.581	111.4	31.53	0	0.64	-231
60	2010	180	1700	29-Jun-10	-72.8	-21.41	0.537	114.2	22.48	0.537	114.2	42.02	0	0.79	-311
60	2010	180	1800	29-Jun-10	-72.8	-25.95	0.89	86.4	17.8	0.89	86.4	22.59	0	0.626	-209
60	2010	180	1900	29-Jun-10	-72.8	-36.04	0.485	44.77	6.556	0.485	44.77	15.71	0	0.616	-234
60	2010	180	2000	29-Jun-10	-72.8	-38.09	0.459	10.46	26.08	0.459	10.46	45.44	0	0.67	-243
60	2010	180	2100	29-Jun-10	-72.8	-38.96	0.482	2.716	8.1	0.482	2.716	24.37	0	0.766	-325
60	2010	180	2200	29-Jun-10	-72.8	-38.13	0.324	18.84	6.048	0.324	18.84	23.3	0	0.635	-378
60	2010	180	2300	29-Jun-10	-72.8	-36.41	0.243	6.048	4.811	0.243	6.048	17.2	0	0.639	-460
60	2010	180	2400	29-Jun-10	-72.8	-37.17	0.471	37.34	9.5	0.471	37.34	33.93	0	0.6	-199
60	2010	181	100	30-Jun-10	-72.8	-37.71	0.443	23.38	9.87	0.443	23.38	34.12	0	0.668	-242
60	2010	181	200	30-Jun-10	-72.8	-37.58	0.758	41.32	9.53	0.758	41.32	31.23	0	0.692	-279
60	2010	181	300	30-Jun-10	-72.8	-32.78	0.557	2.627	15.48	0.557	2.627	54.46	0	0.62	-200
60	2010	181	400	30-Jun-10	-72.8	-24.16	0.454	179.7	25.48	0.454	179.7	60.01	0	0.64	-305
60	2010	181	500	30-Jun-10	-72.8	-17.88	1.559	105.8	29.13	1.559	105.8	31.43	0	0.665	-248
60	2010	181	600	30-Jun-10	-72.8	-14.07	1.445	136.3	30.41	1.445	136.3	36.51	0	0.652	-287
60	2010	181	700	30-Jun-10	-72.8	-15.29	2.001	160.4	27.97	2.001	160.4	30.78	0	0.649	-206
60	2010	181	800	30-Jun-10	-72.8	-13.14	1.878	168.1	31.78	1.878	168.1	36.25	0	0.655	-234
60	2010	181	900	30-Jun-10	-72.8	-10.21	2.143	156.4	27.71	2.143	156.4	29	0	0.662	-232
60	2010	181	1000	30-Jun-10	-72.8	-6.412	2.265	165.4	26.59	2.265	165.4	28.96	0	0.658	-205
60	2010	181	1100	30-Jun-10	-72.8	-4.306	2.004	190.4	33.27	2.004	190.4	38.14	0	0.65	-202
60	2010	181	1200	30-Jun-10	-72.8	-1.32	2.43	173.7	32.14	2.43	173.7	33.53	0	0.673	-238
60	2010	181	1300	30-Jun-10	-72.8	-4.874	2.015	195.5	33.6	2.015	195.5	37.53	0	0.683	-245
60	2010	181	1400	30-Jun-10	-72.8	-7.33	2.136	198.9	36.42	2.136	198.9	39.26	0	0.696	-325
60	2010	181	1500	30-Jun-10	-72.8	-10.55	1.418	286.7	27.37	1.418	286.7	31	0	0.683	-273
60	2010	181	1600	30-Jun-10	-72.8	-18.23	0.842	90.6	16.13	0.842	90.6	25.56	1.016	0.694	-239
60	2010	181	1700	30-Jun-10	-72.8	-19.46	0.902	127.4	28.7	0.902	127.4	39.55	0.762	0.702	-246
60	2010	181	1800	30-Jun-10	-72.8	-22.96	0.615	32.37	16.17	0.615	32.37	33.21	0	0.699	-286
60	2010	181	1900	30-Jun-10	-72.8	-25.07	0.456	48.34	15.23	0.456	48.34	48.87	0	0.679	-232
60	2010	181	2000	30-Jun-10	-72.8	-26.69	0.369	9.32	7.03	0.369	9.32	16.84	0	0.664	-206
60	2010	181	2100	30-Jun-10	-72.8	-29.55	0.202	33.53	3.162	0.202	33.53	7.93	0	0.662	-208
60	2010	181	2200	30-Jun-10	-72.8	-29.88	0.382	24.66	7.59	0.382	24.66	18.12	0	0.661	-204
60	2010	181	2300	30-Jun-10	-72.8	-25.8	0.138	58.62	3.571	0.138	58.62	11.81	0	0.661	-207
60	2010	181	2400	30-Jun-10	-72.8	-21.75	0.107	30.79	2.672	0.107	30.79	9.73	0.254	0.658	-209
60	2010	182	100	01-Jul-10	-72.8	-21.62	0.356	340.5	6.81	0.356	340.5	22.02	0	0.649	-209
60	2010	182	200	01-Jul-10	-72.8	-22.87	0.358	336.5	8.11	0.358	336.5	15.14	0	0.648	-231
60	2010	182	300	01-Jul-10	-72.8	-19.97	0.234	5.763	4.536	0.234	5.763	14.42	0	0.668	-234
60	2010	182	400	01-Jul-10	-72.8	-15.3	0.336	27.77	15.2	0.336	27.77	31.8	0	0.653	-205
60	2010	182	500	01-Jul-10	-72.8	-11.92	0.569	148.2	15.79	0.569	148.2	47.98	0	0.661	-271
60	2010	182	600	01-Jul-10	-72.8	-5.185	0.508	307.3	26.25	0.508	307.3	43.75	0	0.662	-266
60	2010	182	700	01-Jul-10	-72.8	1.956	1.141	109.1	28.22	1.141	109.1	34.79	0	0.668	-233
60	2010	182	800	01-Jul-10	-72.8	12.87	0.834	148.6	38.87	0.834	148.6	73.9	0	0.652	-201
60	2010	182	900	01-Jul-10	-72.8	14.18	1.575	228.8	36.81	1.575	228.8	54.8	0	0.697	-248
60	2010	182	1000	01-Jul-10	-72.8	14.87	2.044	263.1	29.3	2.044	263.1	36.8	0	0.724	-274
60	2010	182	1100	01-Jul-10	-72.8	11.27	2.06	250	30.54	2.06	250	34.16	0	0.653	-201
60	2010	182	1200	01-Jul-10	-72.8	15.92	2.812	226.2	27.94	2.812	226.2	37.3	0	0.667	-202
60	2010	182	1300	01-Jul-10	-72.8	15.55	2.481	229.9	30.21	2.481	229.9	35.14	0	0.714	-281
60	2010	182	1400	01-Jul-10	-72.8	13.26	2.29	219.4	33.66	2.29	219.4	37.25	0	0.712	-326
60	2010	182	1500	01-Jul-10	-72.8	12.06	2.127	228.9	33.82	2.127	228.9	36.8	0	0.675	-231
60	2010	182	1600	01-Jul-10	-72.8	6.878	2.574	252.2	25.72	2.574	252.2	28.79	0	0.674	-410
60	2010	182	1700	01-Jul-10	-72.8	-1.648	2.141	252.2	28.2	2.141	252.2	30	0	0.685	-286
60	2010	182	1800	01-Jul-10	-72.8	-7.03	1.76	251.3	28.48	1.76	251.3	29.16	0	0.668	-284
60	2010	182	1900	01-Jul-10	-72.8	-14.54	0.936	240.1	33.64	0.936	240.1	47.28	0	0.648	-233
60	2010	182	2000	01-Jul-10	-72.8	-26.27	0.531	18.84	23.2	0.531	18.84	50.44	0	0.661	-238
60	2010	182	2100	01-Jul-10	-72.8	-28.39	0.76	328.9	14.09	0.76	328.9	19.2	0	0.653	-243
60	2010	182	2200	01-Jul-10	-72.8	-24.16	1.083	302.4	17.56	1.083	302.4	19.78	0	0.644	-287
60	2010	182	2300	01-Jul-10	-72.8	-23.53	0.59	319.8	13.27	0.59	319.8	18.75	0	0.634	-246
60	2010	182	2400	01-Jul-10	-72.8	-25.9	0.471	2.875	8.12	0.471	2.875	15.05	0	0.639	-285
60	2010	183	100	02-Jul-10	-72.8	-27.2	0.322	351.2	10.25	0.322	351.2	14.69	0	0.613	-200
60	2010	183	200	02-Jul-10	-72.8	-29.1	0.37	12.36	6.298	0.37	12.36	15.74	0	0.643	-283
60	2010	183	300	02-Jul-10	-72.8	-28.93	0.459	349.4	13.79	0.459	349.4	26.82	0	0.635	-204
60	2010	183	400	02-Jul-10	-72.8	-9.73	0.698	309.6	32.51	0.698	309.6	39.69	0	0.651	-241
60	2010	183	500	02-Jul-10	-72.8	2.843	1.482	278.9	24.44	1.482	278.9	31.83	0	0.643	-230
60	2010	183	600	02-Jul-10	-72.8	4.961	1.627	263.6	24.44	1.627	263.6	29.59	0	0.663	-274
60	2010	183	700	02-Jul-10	-72.8	8.7	1.791	265.8	27.29	1.791	265.8	29.11	0	0.651	-202
60	2010	183	800	02-Jul-10	-72.8	11	2.173	258.4	27.02	2.173	258.4	30.9	0	0.671	-240
60	2010	183	900	02-Jul-10	-72.8	13.03	2.421	257.8	25.8	2.421	257.8	28.57	0	0.689	-366
60	2010	183	1000	02-Jul-10	-72.8	14.23	2.302	262.3	26.72	2.302	262.3	28.21	0	0.701	-245
60	2010	183	1100	02-Jul-10	-72.8	15.6	2.324	266	22.68	2.324	266	24.46	0	0.677	-207
60	2010	183	1200	02-Jul-10	-72.8	17.38	2.638	263.6	22.45	2.638	263.6	24.97	0	0.682	-243
60	2010	183	1300	02-Jul-10	-72.8	16.78	2.947	263.7	23.15	2.947	263.7	23.96	0	0.672	-227

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	183	1400	02-Jul-10	-72.8	18.37	2.356	257.4	23.74	2.356	257.4	25.37	0	0.703	-238
60	2010	183	1500	02-Jul-10	-72.8	17.16	2.594	252	25.3	2.594	252	27.87	0	0.707	-254
60	2010	183	1600	02-Jul-10	-72.8	11.35	2.496	252.6	24.89	2.496	252.6	26.11	0	0.685	-208
60	2010	183	1700	02-Jul-10	-72.8	4.885	2.549	255.2	26.25	2.549	255.2	27.08	0	0.668	-206
60	2010	183	1800	02-Jul-10	-72.8	-0.298	1.865	253	26.06	1.865	253	28.37	0	0.666	-205
60	2010	183	1900	02-Jul-10	-72.8	-5.048	1.621	263.8	25.25	1.621	263.8	26.58	0	0.668	-203
60	2010	183	2000	02-Jul-10	-72.8	-8.15	1.107	281.6	25.15	1.107	281.6	27.93	0	0.679	-210
60	2010	183	2100	02-Jul-10	-72.8	-11.2	0.868	283.5	21.9	0.868	283.5	26.13	0	0.691	-275
60	2010	183	2200	02-Jul-10	-72.8	-13.72	0.981	274.9	22.35	0.981	274.9	26.57	0	0.672	-230
60	2010	183	2300	02-Jul-10	-72.8	-17.39	1.071	301.2	17.25	1.071	301.2	18.66	0	0.706	-325
60	2010	183	2400	02-Jul-10	-72.8	-19.77	1.033	300.6	21.08	1.033	300.6	23.93	0	0.688	-324
60	2010	184	100	03-Jul-10	-72.8	-20.9	0.599	329.8	20.7	0.599	329.8	26.78	0	0.677	-534
60	2010	184	200	03-Jul-10	-72.8	-19.35	0.368	321.7	18.31	0.368	321.7	26.73	0	0.617	-201
60	2010	184	300	03-Jul-10	-72.8	-14.48	0.842	298.6	23.78	0.842	298.6	26.82	0	0.635	-233
60	2010	184	400	03-Jul-10	-72.8	-8	1.158	287.8	25.68	1.158	287.8	28.92	0	0.647	-212
60	2010	184	500	03-Jul-10	-72.8	3.472	1.979	272.6	25.47	1.979	272.6	27.7	0	0.667	-281
60	2010	184	600	03-Jul-10	-72.8	4.463	2.062	264.5	24.36	2.062	264.5	26.14	0	0.687	-240
60	2010	184	700	03-Jul-10	-72.8	9.41	2.362	270.7	26.5	2.362	270.7	31.88	0	0.687	-279
60	2010	184	800	03-Jul-10	-72.8	13.85	2.238	270.2	26.66	2.238	270.2	29.91	0	0.739	-245
60	2010	184	900	03-Jul-10	-72.8	18.48	2.208	257.4	26.94	2.208	257.4	29.5	0	0.698	-241
60	2010	184	1000	03-Jul-10	-72.8	22.54	2.135	265.8	29.32	2.135	265.8	35.72	0	0.698	-237
60	2010	184	1100	03-Jul-10	-72.8	23.59	2.44	260.2	25.53	2.44	260.2	30.08	0	0.706	-241
60	2010	184	1200	03-Jul-10	-72.8	22.15	2.268	246.2	28.44	2.268	246.2	30.78	0	0.684	-239
60	2010	184	1300	03-Jul-10	-72.8	18.95	1.817	218.5	32.37	1.817	218.5	39.3	0	0.682	-235
60	2010	184	1400	03-Jul-10	-72.8	14.17	1.294	231.6	31.17	1.294	231.6	35.83	0	0.706	-367
60	2010	184	1500	03-Jul-10	-72.8	9.62	0.445	244.6	23.9	0.445	244.6	45.94	0	0.706	-252
60	2010	184	1600	03-Jul-10	-72.8	4.655	0.441	177.8	27.18	0.441	177.8	31.15	0.508	0.817	-291
60	2010	184	1700	03-Jul-10	-72.8	-1.728	0.751	115.5	29.85	0.751	115.5	37.13	1.016	0.651	-251
60	2010	184	1800	03-Jul-10	-72.8	-4.207	0.251	75.1	12.86	0.251	75.1	22.16	0.762	0.715	-322
60	2010	184	1900	03-Jul-10	-72.8	-6.683	0.596	78.4	12.87	0.596	78.4	15.3	0.508	0.713	-510
60	2010	184	2000	03-Jul-10	-72.8	-8.54	0.595	76.5	14.07	0.595	76.5	19.4	0	0.687	-242
60	2010	184	2100	03-Jul-10	-72.8	-10.46	0.353	84.7	15.44	0.353	84.7	21.76	0	0.706	-304
60	2010	184	2200	03-Jul-10	-72.8	-12.17	1.078	80.2	15.65	1.078	80.2	23.53	0	0.684	-274
60	2010	184	2300	03-Jul-10	-72.8	-15.6	0.714	78.4	22.32	0.714	78.4	41.56	0	0.655	-204
60	2010	184	2400	03-Jul-10	-72.8	-17.85	0.809	37.27	16.26	0.809	37.27	30.22	0	0.656	-204
60	2010	185	100	04-Jul-10	-72.8	-20.94	0.678	41.62	17.5	0.678	41.62	25.67	0	0.694	-312
60	2010	185	200	04-Jul-10	-72.8	-18.58	0.618	34.37	16.17	0.618	34.37	40.59	0	0.664	-269
60	2010	185	300	04-Jul-10	-72.8	-15.62	0.451	30.99	17.16	0.451	30.99	37.6	0.254	0.68	-272
60	2010	185	400	04-Jul-10	-72.8	-14.29	0.84	344.3	22.16	0.84	344.3	44.64	0	0.682	-352
60	2010	185	500	04-Jul-10	-72.8	6.643	1.34	272.9	29.27	1.34	272.9	49.75	0	0.736	-241
60	2010	185	600	04-Jul-10	-72.8	9.3	1.963	270.8	23.11	1.963	270.8	25.04	0	0.668	-250
60	2010	185	700	04-Jul-10	-72.8	11.97	2.214	272.5	26.69	2.214	272.5	27.98	0	0.704	-278
60	2010	185	800	04-Jul-10	-72.8	14.43	2.893	270.3	23.69	2.893	270.3	25.74	0	0.696	-318
60	2010	185	900	04-Jul-10	-72.8	14.81	3.038	264.4	25.06	3.038	264.4	26.7	0	0.756	-252
60	2010	185	1000	04-Jul-10	-72.8	13.26	2.316	259.4	24.91	2.316	259.4	26.06	0	0.68	-255
60	2010	185	1100	04-Jul-10	-72.8	13.78	2.389	245.4	29.63	2.389	245.4	31.45	0	0.749	-541
60	2010	185	1200	04-Jul-10	-72.8	15.38	2.274	220.2	37.32	2.274	220.2	38.91	0	0.692	-330
60	2010	185	1300	04-Jul-10	-72.8	18.27	2.499	247.8	29.58	2.499	247.8	32.52	0	0.7	-281
60	2010	185	1400	04-Jul-10	-72.8	20.72	2.756	251.2	27.11	2.756	251.2	28.55	0	0.674	-204
60	2010	185	1500	04-Jul-10	-72.8	19.58	2.249	216	30.99	2.249	216	36.54	0	0.68	-236
60	2010	185	1600	04-Jul-10	-72.8	17.16	2.92	250.1	26.1	2.92	250.1	27.54	0	0.678	-272
60	2010	185	1700	04-Jul-10	-72.8	9.34	2.205	268.3	22.53	2.205	268.3	24.44	0	0.683	-209
60	2010	185	1800	04-Jul-10	-72.8	1.279	1.157	279	18.67	1.157	279	22.2	0	0.673	-232
60	2010	185	1900	04-Jul-10	-72.8	-8.03	1.221	287.7	24.99	1.221	287.7	28.36	0	0.67	-208
60	2010	185	2000	04-Jul-10	-72.8	-14.82	1.203	298.4	20.56	1.203	298.4	23.73	0	0.712	-283
60	2010	185	2100	04-Jul-10	-72.8	-27.78	1.037	303.8	13.77	1.037	303.8	16.51	0	0.639	-239
60	2010	185	2200	04-Jul-10	-72.8	-33.31	0.776	352.4	17.96	0.776	352.4	26.41	0	0.635	-234
60	2010	185	2300	04-Jul-10	-72.8	-36.71	0.608	347.5	8.65	0.608	347.5	16.28	0	0.643	-207
60	2010	185	2400	04-Jul-10	-72.8	-37.86	0.768	344.1	8.61	0.768	344.1	20.02	0	0.663	-237
60	2010	186	100	05-Jul-10	-72.8	-38.22	0.486	355.8	14.68	0.486	355.8	18.96	0	0.671	-239
60	2010	186	200	05-Jul-10	-72.8	-36.9	0.376	3.897	6.706	0.376	3.897	13.09	0	0.665	-237
60	2010	186	300	05-Jul-10	-72.8	-35.31	0.464	338.9	4.887	0.464	338.9	10.4	0	0.673	-239
60	2010	186	400	05-Jul-10	-72.8	-24.52	0.413	4.341	15.8	0.413	4.341	25.13	0	0.69	-215
60	2010	186	500	05-Jul-10	-72.8	0.029	1.341	288.8	29.33	1.341	288.8	36.47	0	0.695	-233
60	2010	186	600	05-Jul-10	-72.8	13.01	2.112	263.5	28.82	2.112	263.5	32.82	0	0.687	-246
60	2010	186	700	05-Jul-10	-72.8	18.79	2.966	259.1	24.93	2.966	259.1	27.21	0	0.702	-287
60	2010	186	800	05-Jul-10	-72.8	19.99	2.037	246.3	30.86	2.037	246.3	34.54	0	0.692	-238
60	2010	186	900	05-Jul-10	-72.8	21.83	2.502	248.9	23.67	2.502	248.9	27.72	0	0.353	-314
60	2010	186	1000	05-Jul-10	-72.8	23.12	2.269	233.1	30.47	2.269	233.1	34.62	0	0.708	-272
60	2010	186	1100	05-Jul-10	-72.8	24.73	2.635	257.6	28.09	2.635	257.6	30.62	0	0.714	-310
60	2010	186	1200	05-Jul-10	-72.8	26.7	3.098	250.1	23.49	3.098	250.1	25.95	0	0.682	-375
60	2010	186	1300	05-Jul-10	-72.8	27.37	2.723	246.4	27.33	2.723	246.4	29.96	0	2.66	0
60	2010	186	1400	05-Jul-10	-72.8	28.61	2.418	254.6	27.75	2.418	254.6	31.37	0	0.701	-311
60	2010	186	1500	05-Jul-10	-72.8	28.6	2.728	251.1	25.94	2.728	251.1	27.74	0	0.746	-288
60	2010	186	1600	05-Jul-10	-72.8	25.42	1.919	249.8	29.25	1.919	249.8	31.2	0	0.684	-354
60	2010	186	1700	05-Jul-10	-72.8	20.95	3.039	264.7	21.55	3.039	264.7	22.12	0	0.698	-272
60	2010	186	1800	05-Jul-10	-72.8	15.09	1.714	279.6	21.66	1.714	279.6	22.57	0	0.643	-197
60	2010	186	1900	05-Jul-10	-72.8	6.87	1.048	285.2	21.81	1.048	285.2	23.88	0	0.798	-520
60	2010	186	2000	05-Jul-10	-72.8	2.139	1.032	278.1	23.29	1.032	278.1	24.99	0	0.672	-239
60	2010	186	2100	05-Jul-10	-72.8	-5.755	0.382	355.4	15.98	0.382	355.4	21.66	0	0.67	-216
60	2010	186	2200	05-Jul-10	-72.8	-19.46	0.466	21.62	8.66	0.466	21.62	17.86	0	0.674	-280
60	2010	186	2300	05-Jul-10	-72.8	-25.29	0.862	336.9	12.14	0.862	336.9	17	0	0.673	-254
60	2010	186	2400	05-Jul-10	-72.8	-28.41	0.497	345	7.33	0.497	345	19.07	0	0.648	-239
60	2010	187	100	06-Jul-10	-72.8	-31.68	0.457	2.226	18.68	0.457	2.226	25.96	0	0.663	-276
60	2010	187	200	06-Jul-10	-72.8	-32.62	0.488	17.22	24.77	0.488	17.22	31.32	0	0.636	-241
60	2010	187	300	06-Jul-10	-72.8	-31.03	0.578	7.44	18.7	0.578	7.44	30.37	0	0.667	-214
60	2010	187	400	06-Jul-10	-72.8	-18.75	0.713	359.6	18.51	0.713	359.6	21.25	0	0.683	-242
60	2010	187	500	06-Jul-10	-72.8	10.77	1.099	320.6	24.3	1.099	320.6	29.36	0	0.721	-316
60	2010	187	600	06-Jul-10	-72.8	20.07	1.678	269.3	30.97	1.678	269.3	36.86	0	0.663	-201
60	2010	187	700	06-Jul-10	-72.8	21.83	2.931	266.7	24.73	2.931	266.7	27.4	0	0.671	-232
60	2010	187	800	06-Jul-10	-72.8	23.78	3.394	263.2	24.37	3.394	263.2	25.05	0	0.68	-197
60	2010	187	900	06-Jul-10	-72.8	25.23	3.054	257.3	24.92	3.054	257.3	26.9	0	0.68	-194

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	187	1000	06-Jul-10	-72.8	27.5	3.203	255	25.04	3.203	255	26.61	0	0.754	-285
60	2010	187	1100	06-Jul-10	-72.8	28.87	2.991	249	27.95	2.991	249	31.4	0	0.789	-279
60	2010	187	1200	06-Jul-10	-72.8	29.72	2.951	257.1	25.75	2.951	257.1	26.8	0	0.803	-239
60	2010	187	1300	06-Jul-10	-72.8	30.89	3.446	256.4	24.3	3.446	256.4	26.5	0	0.743	-284
60	2010	187	1400	06-Jul-10	-72.8	32.24	3.156	258.4	24.8	3.156	258.4	26.54	0	0.702	-208
60	2010	187	1500	06-Jul-10	-72.8	33.3	3.155	255.8	26.42	3.155	255.8	27.46	0	0.714	-266
60	2010	187	1600	06-Jul-10	-72.8	33.75	2.942	260	23.73	2.942	260	24.73	0	0.736	-283
60	2010	187	1700	06-Jul-10	-72.8	32.7	2.538	265.3	23.45	2.538	265.3	24.17	0	0.727	-325
60	2010	187	1800	06-Jul-10	-72.8	30.08	1.524	284.3	20.81	1.524	284.3	22.44	0	0.708	-241
60	2010	187	1900	06-Jul-10	-72.8	16.23	0.513	28.74	13.93	0.513	28.74	27.01	0	0.696	-237
60	2010	187	2000	06-Jul-10	-72.8	-0.751	0.423	14.81	22.09	0.423	14.81	27.66	0	0.685	-236
60	2010	187	2100	06-Jul-10	-72.8	-12.32	0.675	12.28	20.1	0.675	12.28	26.42	0	0.678	-208
60	2010	187	2200	06-Jul-10	-72.8	-18.15	0.626	359.8	20.83	0.626	359.8	31.9	0	0.672	-235
60	2010	187	2300	06-Jul-10	-72.8	-20.64	0.455	358.3	15.1	0.455	358.3	44.05	0	0.666	-239
60	2010	187	2400	06-Jul-10	-72.8	-23.53	0.509	8.39	16.51	0.509	8.39	33.02	0	0.663	-245
60	2010	188	100	07-Jul-10	-72.8	-25.88	0.458	349.6	14.4	0.458	349.6	31.06	0	0.664	-237
60	2010	188	200	07-Jul-10	-72.8	-26.83	0.287	15.44	15.93	0.287	15.44	37.36	0	0.674	-241
60	2010	188	300	07-Jul-10	-72.8	-26.55	0.192	10.31	12.32	0.192	10.31	28.39	0	0.684	-244
60	2010	188	400	07-Jul-10	-72.8	-15.53	0.331	322.3	12.74	0.331	322.3	19.89	0	0.705	-239
60	2010	188	500	07-Jul-10	-72.8	14.09	1.136	255.6	21.41	1.136	255.6	24.87	0	0.718	-241
60	2010	188	600	07-Jul-10	-72.8	22.6	1.467	242.3	28.25	1.467	242.3	28.87	0	0.711	-291
60	2010	188	700	07-Jul-10	-72.8	25.71	2.018	251.3	21.57	2.018	251.3	23.37	0	0.739	-447
60	2010	188	800	07-Jul-10	-72.8	28.84	1.546	241.3	32.4	1.546	241.3	34.92	0	0.755	-283
60	2010	188	900	07-Jul-10	-72.8	31.58	1.227	233.6	32.72	1.227	233.6	45.77	0	0.725	-289
60	2010	188	1000	07-Jul-10	-72.8	34.33	1.564	228.7	37.15	1.564	228.7	42.1	0	0.703	-200
60	2010	188	1100	07-Jul-10	-72.8	35.57	2.03	237.8	27.44	2.03	237.8	31.65	0	0.759	-245
60	2010	188	1200	07-Jul-10	-72.8	35.55	1.865	225.9	27.53	1.865	225.9	36.4	0	0.697	-229
60	2010	188	1300	07-Jul-10	-72.8	35.72	1.522	226.6	36.06	1.522	226.6	42.45	0	0.754	-551
60	2010	188	1400	07-Jul-10	-72.8	36.43	1.53	224.2	32.61	1.53	224.2	38.41	0	0.918	-248
60	2010	188	1500	07-Jul-10	-72.8	37.52	1.478	236.7	25.48	1.478	236.7	30.35	0	0.918	-216
60	2010	188	1600	07-Jul-10	-72.8	38.39	1.767	255.4	22.33	1.767	255.4	24.11	0	0.921	-240
60	2010	188	1700	07-Jul-10	-72.8	37.85	1.181	260.1	15.05	1.181	260.1	16.84	0	0.729	-245
60	2010	188	1800	07-Jul-10	-72.8	32.74	0.37	23.93	11.76	0.37	23.93	13.38	0	0.714	-277
60	2010	188	1900	07-Jul-10	-72.8	20.34	0.643	26.78	16.69	0.643	26.78	22.61	0	0.706	-211
60	2010	188	2000	07-Jul-10	-72.8	2.09	0.419	8.37	15.48	0.419	8.37	22.73	0	0.709	-244
60	2010	188	2100	07-Jul-10	-72.8	-10.87	0.295	1.089	10.28	0.295	1.089	23.82	0	0.714	-243
60	2010	188	2200	07-Jul-10	-72.8	-19.74	0.235	352.4	8.24	0.235	352.4	20.89	0	0.864	-248
60	2010	188	2300	07-Jul-10	-72.8	-25.04	0.202	343.4	2	0.202	343.4	4.876	0	0.867	-272
60	2010	188	2400	07-Jul-10	-72.8	-28.32	0.193	348.7	2.903	0.193	348.7	10.5	0	0.863	-285
60	2010	189	100	08-Jul-10	-72.8	-30.35	0.354	341.5	3.974	0.354	341.5	9.98	0	0.86	-246
60	2010	189	200	08-Jul-10	-72.8	-30.67	0.269	345.6	6.134	0.269	345.6	12.88	0	0.859	-281
60	2010	189	300	08-Jul-10	-72.8	-29.31	0.122	357.5	4.238	0.122	357.5	8.97	0	0.86	-272
60	2010	189	400	08-Jul-10	-72.8	-15.43	0.222	346.4	5.521	0.222	346.4	16.03	0	0.863	-319
60	2010	189	500	08-Jul-10	-72.8	18.03	0.246	289	16.22	0.246	289	23.19	0	0.725	-211
60	2010	189	600	08-Jul-10	-72.8	29.28	0.985	247.4	26.16	0.985	247.4	30	0	0.899	-240
60	2010	189	700	08-Jul-10	-72.8	32.89	1.385	252.4	25.24	1.385	252.4	27.99	0	0.917	-242
60	2010	189	800	08-Jul-10	-72.8	36.27	0.962	245.8	33.86	0.962	245.8	50.56	0	0.924	-235
60	2010	189	900	08-Jul-10	-72.8	37.3	0.97	130.7	36.85	0.97	130.7	68.15	0	0.751	-244
60	2010	189	1000	08-Jul-10	-72.8	38.39	1.2	137.9	34.56	1.2	137.9	70.4	0	0.919	-244
60	2010	189	1100	08-Jul-10	-72.8	38.96	1.432	227.1	42.61	1.432	227.1	62.72	0	0.93	-236
60	2010	189	1200	08-Jul-10	-72.8	39.27	1.402	218.5	36.05	1.402	218.5	48.78	0	2.66	0
60	2010	189	1300	08-Jul-10	-72.8	39.67	2.077	216	34.05	2.077	216	44.03	0	0.748	-240
60	2010	189	1400	08-Jul-10	-72.8	40.77	1.953	222	32.28	1.953	222	45.56	0	0.753	-233
60	2010	189	1500	08-Jul-10	-72.8	41.26	2.663	263.3	21.15	2.663	263.3	21.81	0	0.913	-244
60	2010	189	1600	08-Jul-10	-72.8	41.01	2.001	260.9	24.7	2.001	260.9	27.31	0	0.929	-239
60	2010	189	1700	08-Jul-10	-72.8	39.06	2.147	259.8	22.51	2.147	259.8	23.6	0	0.915	-242
60	2010	189	1800	08-Jul-10	-72.8	31.24	1.067	286.8	17.8	1.067	286.8	25.33	0	0.891	-280
60	2010	189	1900	08-Jul-10	-72.8	8.01	0.478	10.83	14.09	0.478	10.83	18.95	0	0.877	-241
60	2010	189	2000	08-Jul-10	-72.8	-15.24	0.539	1.341	21.15	0.539	1.341	24.24	0	0.878	-212
60	2010	189	2100	08-Jul-10	-72.8	-27.17	0.245	353	11.13	0.245	353	18.59	0	0.871	-213
60	2010	189	2200	08-Jul-10	-72.8	-33.29	0.55	13.76	14.2	0.55	13.76	27.04	0	0.871	-210
60	2010	189	2300	08-Jul-10	-72.8	-35.69	0.41	360	11.23	0.41	360	17.94	0	0.869	-237
60	2010	189	2400	08-Jul-10	-72.8	-37.11	0.293	7.09	18.42	0.293	7.09	35.74	0	0.861	-240
60	2010	190	100	09-Jul-10	-72.8	-37.01	0.358	353	16.27	0.358	353	35.07	0	0.855	-281
60	2010	190	200	09-Jul-10	-72.8	-32.9	0.316	349.9	6.659	0.316	349.9	18.31	0	0.861	-273
60	2010	190	300	09-Jul-10	-72.8	-29.42	0.174	356.6	5.973	0.174	356.6	16.2	0	0.871	-246
60	2010	190	400	09-Jul-10	-72.8	-20.01	0.06	325.8	2.332	0.06	325.8	10.17	0	0.88	-242
60	2010	190	500	09-Jul-10	-72.8	11.65	0.281	232.5	17.67	0.281	232.5	32.26	0	0.893	-238
60	2010	190	600	09-Jul-10	-72.8	24.03	0.725	306.9	22.7	0.725	306.9	62.35	0	0.9	-268
60	2010	190	700	09-Jul-10	-72.8	25.74	0.694	11.19	24.29	0.694	11.19	33.09	0	0.906	-249
60	2010	190	800	09-Jul-10	-72.8	24.94	1.279	280.4	24.62	1.279	280.4	30.4	0	0.903	-288
60	2010	190	900	09-Jul-10	-72.8	24.97	1.532	258.9	24.22	1.532	258.9	27.3	0	0.91	-280
60	2010	190	1000	09-Jul-10	-72.8	28.35	1.495	250	23.32	1.495	250	28.45	0	0.913	-241
60	2010	190	1100	09-Jul-10	-72.8	26.62	1.298	226.2	26.86	1.298	226.2	34.16	0	0.904	-270
60	2010	190	1200	09-Jul-10	-72.8	25.41	1.726	202.9	28.97	1.726	202.9	32.69	0	0.904	-207
60	2010	190	1300	09-Jul-10	-72.8	23.57	1.557	184.5	33.44	1.557	184.5	40.08	0	0.911	-278
60	2010	190	1400	09-Jul-10	-72.8	28.29	1.122	180.1	31.53	1.122	180.1	46.4	0	0.908	-237
60	2010	190	1500	09-Jul-10	-72.8	24.71	1.194	184.2	31.63	1.194	184.2	34.99	0	0.917	-205
60	2010	190	1600	09-Jul-10	-72.8	17.97	0.462	177.3	24.29	0.462	177.3	31.53	0	0.905	-242
60	2010	190	1700	09-Jul-10	-72.8	16.27	0.128	62.43	16.87	0.128	62.43	40.41	0	0.895	-484
60	2010	190	1800	09-Jul-10	-72.8	13.64	0.231	29.8	24.97	0.231	29.8	53.16	0	0.902	-234
60	2010	190	1900	09-Jul-10	-72.8	8.29	0.418	15.68	24.36	0.418	15.68	48.52	0	0.896	-238
60	2010	190	2000	09-Jul-10	-72.8	3.255	0.286	18.66	14.52	0.286	18.66	28.95	0	0.646	-196
60	2010	190	2100	09-Jul-10	-72.8	1.661	0.378	19.89	10.16	0.378	19.89	18.22	0	0.642	-200
60	2010	190	2200	09-Jul-10	-72.8	2.037	0.339	346.2	11.82	0.339	346.2	16.08	0	0.871	-275
60	2010	190	2300	09-Jul-10	-72.8	1.438	0.963	335.4	17.29	0.963	335.4	20.74	0	0.875	-316
60	2010	190	2400	09-Jul-10	-72.8	-0.839	0.279	341.5	21.36	0.279	341.5	28.25	0.254	0.902	-201
60	2010	191	100	10-Jul-10	-72.8	-3.308	0.696	334.7	18.69	0.696	334.7	21.61	0.508	0.855	-315
60	2010	191	200	10-Jul-10	-72.8	-2.848	0.457	324.5	13.97	0.457	324.5	27.16	0.254	0.891	-423
60	2010	191	300	10-Jul-10	-72.8	-2.657	0.224	319.3	11.26	0.224	319.3	25.89	0	0.888	-234
60	2010	191	400	10-Jul-10	-72.8	1.537	0.572	277	17.99	0.572	277	22.09	0	0.894	-209
60	2010	191	500	10-Jul-10	-72.8	14.54	1.038	271	21.3	1.038	271	24.63	0	0.727	-271

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	191	600	10-Jul-10	-72.8	23.36	1.412	267.8	24.75	1.412	267.8	30.45	0	0.888	-246
60	2010	191	700	10-Jul-10	-72.8	25.31	1.413	254.6	23.43	1.413	254.6	28.66	0	0.684	-596
60	2010	191	800	10-Jul-10	-72.8	26.16	0.958	247.1	30.34	0.958	247.1	45.07	0	0.903	-211
60	2010	191	900	10-Jul-10	-72.8	26.43	0.979	242.2	34.08	0.979	242.2	75.5	0	0.912	-309
60	2010	191	1000	10-Jul-10	-72.8	27.6	1.24	243	37.46	1.24	243	58.7	0	0.917	-252
60	2010	191	1100	10-Jul-10	-72.8	29.12	1.377	251.3	41.27	1.377	251.3	53.21	0	0.922	-279
60	2010	191	1200	10-Jul-10	-72.8	30.09	0.927	230.1	32.09	0.927	230.1	60.47	0	0.924	-239
60	2010	191	1300	10-Jul-10	-72.8	30.03	1.346	172.5	35.14	1.346	172.5	41.98	0	0.928	-243
60	2010	191	1400	10-Jul-10	-72.8	28.68	1.325	251.3	23.23	1.325	251.3	30.56	0	0.922	-238
60	2010	191	1500	10-Jul-10	-72.8	28.43	1.35	265.1	25.03	1.35	265.1	30.86	0	0.919	-246
60	2010	191	1600	10-Jul-10	-72.8	27.63	0.964	263.3	19.73	0.964	263.3	23.44	0	0.925	-207
60	2010	191	1700	10-Jul-10	-72.8	25.95	0.887	271.5	21.87	0.887	271.5	24.31	0	0.919	-211
60	2010	191	1800	10-Jul-10	-72.8	24.33	0.463	265.3	18.63	0.463	265.3	27.51	0	0.708	-244
60	2010	191	1900	10-Jul-10	-72.8	23.45	0.401	307.6	21.7	0.401	307.6	42.1	0	0.883	-280
60	2010	191	2000	10-Jul-10	-72.8	21.83	0.994	307	16.58	0.994	307	32.99	0	0.885	-321
60	2010	191	2100	10-Jul-10	-72.8	18.64	0.434	19.01	8.58	0.434	19.01	13.95	0	0.897	-288
60	2010	191	2200	10-Jul-10	-72.8	12.7	0.515	1.213	11.48	0.515	1.213	32.79	0	0.896	-245
60	2010	191	2300	10-Jul-10	-72.8	4.665	0.337	12.58	9.72	0.337	12.58	17.98	0	0.896	-274
60	2010	191	2400	10-Jul-10	-72.8	0.791	0.642	51.77	10	0.642	51.77	14.26	0	0.9	-244
60	2010	192	100	11-Jul-10	-72.8	1.297	0.815	325.1	16.76	0.815	325.1	26.46	0	0.898	-239
60	2010	192	200	11-Jul-10	-72.8	3.948	0.516	312.1	16.31	0.516	312.1	21.9	0	0.884	-236
60	2010	192	300	11-Jul-10	-72.8	-1.561	0.565	20.77	11.25	0.565	20.77	16.15	0	0.871	-244
60	2010	192	400	11-Jul-10	-72.8	5.085	0.484	349.1	10.94	0.484	349.1	17.92	0	0.903	-236
60	2010	192	500	11-Jul-10	-72.8	20.54	0.616	353.4	18.96	0.616	353.4	32.46	0	0.9	-277
60	2010	192	600	11-Jul-10	-72.8	24.42	1.38	233	30.46	1.38	233	53.5	0	0.902	-239
60	2010	192	700	11-Jul-10	-72.8	23.97	1.582	277	22.4	1.582	277	30.38	0	0.917	-208
60	2010	192	800	11-Jul-10	-72.8	24.93	1.59	177.3	32.39	1.59	177.3	55.22	0	0.917	-227
60	2010	192	900	11-Jul-10	-72.8	23.8	2.143	168.2	34.84	2.143	168.2	37.12	0	0.914	-328
60	2010	192	1000	11-Jul-10	-72.8	26.81	2.361	173.1	28.39	2.361	173.1	31.44	0	0.925	-202
60	2010	192	1100	11-Jul-10	-72.8	29.81	3.008	179.4	33.68	3.008	179.4	38.5	0	0.913	-233
60	2010	192	1200	11-Jul-10	-72.8	31.13	2.872	179.7	35.7	2.872	179.7	39.93	0	0.918	-209
60	2010	192	1300	11-Jul-10	-72.8	22.59	3.098	175.4	33.34	3.098	175.4	36.37	0	0.906	-244
60	2010	192	1400	11-Jul-10	-72.8	8.5	3.096	179.1	36.56	3.096	179.1	40.97	0	0.902	-235
60	2010	192	1500	11-Jul-10	-72.8	1.694	2.517	215.7	33.8	2.517	215.7	37.48	0	0.9	-238
60	2010	192	1600	11-Jul-10	-72.8	-9.91	1.985	213.2	32.35	1.985	213.2	35.74	0	0.902	-234
60	2010	192	1700	11-Jul-10	-72.8	-18.63	2.108	214.2	32.47	2.108	214.2	37.99	0	0.898	-208
60	2010	192	1800	11-Jul-10	-72.8	-24.78	2.134	242.4	28.96	2.134	242.4	30.77	0	0.884	-275
60	2010	192	1900	11-Jul-10	-72.8	-32.04	2.534	251.5	32.46	2.534	251.5	33.11	0	0.892	-252
60	2010	192	2000	11-Jul-10	-72.8	-37.2	2.133	249.8	26.4	2.133	249.8	28.54	0	0.888	-204
60	2010	192	2100	11-Jul-10	-72.8	-40.33	1.184	250.1	29.09	1.184	250.1	31.44	0	0.887	-208
60	2010	192	2200	11-Jul-10	-72.8	-41.09	1.818	287.9	24.78	1.818	287.9	31.44	0	0.888	-231
60	2010	192	2300	11-Jul-10	-72.8	-40.77	1.277	288.5	23.71	1.277	288.5	27.51	0	0.881	-324
60	2010	192	2400	11-Jul-10	-72.8	-40.53	2.116	258.8	20.95	2.116	258.8	24.02	0	0.873	-450
60	2010	193	100	12-Jul-10	-72.8	-40.75	1.025	307	23.39	1.025	307	32	0	0.842	-244
60	2010	193	200	12-Jul-10	-72.8	-41.88	0.64	314	23.5	0.64	314	29.79	0	0.864	-209
60	2010	193	300	12-Jul-10	-72.8	-41.17	0.694	320.9	18.11	0.694	320.9	25.79	0	0.855	-232
60	2010	193	400	12-Jul-10	-72.8	-35.51	1.282	293.4	22.29	1.282	293.4	27.53	0	0.855	-267
60	2010	193	500	12-Jul-10	-72.8	-33.1	1.255	269.4	26.58	1.255	269.4	29.28	0	0.863	-243
60	2010	193	600	12-Jul-10	-72.8	-28.97	2.107	269.9	27.15	2.107	269.9	31.07	0	0.867	-293
60	2010	193	700	12-Jul-10	-72.8	-30.04	2.218	245.5	26.98	2.218	245.5	29.99	0	0.881	-238
60	2010	193	800	12-Jul-10	-72.8	-29.36	2.917	247.1	28.61	2.917	247.1	30.6	0	0.897	-232
60	2010	193	900	12-Jul-10	-72.8	-28.72	3.638	258.7	28.6	3.638	258.7	30.6	0	0.885	-236
60	2010	193	1000	12-Jul-10	-72.8	-25.96	3.581	256.8	26.52	3.581	256.8	28.69	0	0.9	-238
60	2010	193	1100	12-Jul-10	-72.8	-24.3	3.895	261.6	25.41	3.895	261.6	26.78	0	0.891	-271
60	2010	193	1200	12-Jul-10	-72.8	-18.83	3.63	264	24.68	3.63	264	26.14	0	0.896	-211
60	2010	193	1300	12-Jul-10	-72.8	-22.45	3.346	262.9	25.23	3.346	262.9	25.92	0	0.881	-242
60	2010	193	1400	12-Jul-10	-72.8	-22.88	2.743	251	26.04	2.743	251	28.14	0	0.887	-237
60	2010	193	1500	12-Jul-10	-72.8	-28.92	2.573	261.8	28.91	2.573	261.8	31.02	0	0.862	-357
60	2010	193	1600	12-Jul-10	-72.8	-31.99	2.405	274	25.52	2.405	274	29.77	0	0.879	-243
60	2010	193	1700	12-Jul-10	-72.8	-31.97	0.91	300.5	28.22	0.91	300.5	40.09	0	0.886	-274
60	2010	193	1800	12-Jul-10	-72.8	-27.55	0.39	38.11	6.231	0.39	38.11	13.21	0	0.863	-246
60	2010	193	1900	12-Jul-10	-72.8	-31.46	0.471	19.67	13.21	0.471	19.67	31.34	0	0.859	-274
60	2010	193	2000	12-Jul-10	-72.8	-35.2	0.588	18.19	19.15	0.588	18.19	34.84	0	0.872	-208
60	2010	193	2100	12-Jul-10	-72.8	-37.83	0.656	19.81	22.58	0.656	19.81	30.83	0	0.872	-243
60	2010	193	2200	12-Jul-10	-72.8	-37.03	0.466	22.89	13.92	0.466	22.89	43.15	0	0.873	-205
60	2010	193	2300	12-Jul-10	-72.8	-37.01	0.634	13.49	20.39	0.634	13.49	38.84	0	0.874	-241
60	2010	193	2400	12-Jul-10	-72.8	-35.21	0.521	18.38	24.35	0.521	18.38	37.13	0	0.868	-510
60	2010	194	100	13-Jul-10	-72.8	-35.77	0.446	25.59	9.74	0.446	25.59	29.17	0	0.878	-244
60	2010	194	200	13-Jul-10	-72.8	-33.12	0.36	13.21	19.6	0.36	13.21	39.34	0	0.884	-234
60	2010	194	300	13-Jul-10	-72.8	-29.95	0.484	16.36	15.74	0.484	16.36	37.87	0	0.882	-203
60	2010	194	400	13-Jul-10	-72.8	-22.23	0.591	4.56	9.49	0.591	4.56	18.1	0	0.884	-214
60	2010	194	500	13-Jul-10	-72.8	6.08	1.134	298.6	24.61	1.134	298.6	26.63	0	0.888	-237
60	2010	194	600	13-Jul-10	-72.8	9.42	1.643	268.6	28.53	1.643	268.6	31.56	0	2.66	0
60	2010	194	700	13-Jul-10	-72.8	10.71	1.456	270.7	34.66	1.456	270.7	42.67	0	0.897	-233
60	2010	194	800	13-Jul-10	-72.8	13.14	1.531	271.7	38.25	1.531	271.7	47.12	0	0.911	-237
60	2010	194	900	13-Jul-10	-72.8	17.21	1.338	259.1	35.14	1.338	259.1	70.8	0	0.902	-232
60	2010	194	1000	13-Jul-10	-72.8	21.24	2.001	260.3	34.93	2.001	260.3	39.11	0	0.927	-239
60	2010	194	1100	13-Jul-10	-72.8	20.77	2.206	266.5	29.35	2.206	266.5	32.68	0	0.922	-222
60	2010	194	1200	13-Jul-10	-72.8	23.16	1.729	251.3	33.01	1.729	251.3	41.06	0	0.932	-230
60	2010	194	1300	13-Jul-10	-72.8	25.06	1.751	262.5	28.76	1.751	262.5	40.28	0	0.866	-206
60	2010	194	1400	13-Jul-10	-72.8	24.29	2.209	217.2	32.51	2.209	217.2	38.57	0	0.93	-238
60	2010	194	1500	13-Jul-10	-72.8	26.21	2.145	210	29.95	2.145	210	33.77	0	0.928	-202
60	2010	194	1600	13-Jul-10	-72.8	21.14	2.033	232.2	26.74	2.033	232.2	29.23	0	0.924	-242
60	2010	194	1700	13-Jul-10	-72.8	14.93	1.956	259.1	21.76	1.956	259.1	22.47	0	0.916	-231
60	2010	194	1800	13-Jul-10	-72.8	1.105	0.863	289.1	22.76	0.863	289.1	25.66	0	0.901	-238
60	2010	194	1900	13-Jul-10	-72.8	-19.39	0.558	12.73	15.43	0.558	12.73	19.58	0	0.548	-194
60	2010	194	2000	13-Jul-10	-72.8	-27.86	1.004	332.6	20.52	1.004	332.6	26.12	0	0.886	-240
60	2010	194	2100	13-Jul-10	-72.8	-32.02	0.769	357.3	19.82	0.769	357.3	25.29	0	0.878	-365
60	2010	194	2200	13-Jul-10	-72.8	-34.4	0.745	33.1	15.05	0.745	33.1	22.32	0	0.876	-241
60	2010	194	2300	13-Jul-10	-72.8	-36.1	0.664	29.88	15.92	0.664	29.88	22.9	0	0.877	-240
60	2010	194	2400	13-Jul-10	-72.8	-34.09	0.655	35.74	21.55	0.655	35.74	47.37	0	0.881	-238
60	2010	195	100	14-Jul-10	-72.8	-32.39	0.574	356.9	12.38	0.574	356.9	23.68	0	0.881	-268

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	195	200	14-Jul-10	-72.8	-31.92	0.716	46.01	19.86	0.716	46.01	40.37	0	0.882	-238
60	2010	195	300	14-Jul-10	-72.8	-31.96	0.578	31.88	11.96	0.578	31.88	36.35	0	0.879	-233
60	2010	195	400	14-Jul-10	-72.8	-25.88	0.64	1.783	24.8	0.64	1.783	41.65	0	0.886	-237
60	2010	195	500	14-Jul-10	-72.8	3.949	0.999	288.5	32.27	0.999	288.5	36.71	0	0.882	-355
60	2010	195	600	14-Jul-10	-72.8	7.26	1.889	291.3	26.2	1.889	291.3	35.25	0	0.896	-204
60	2010	195	700	14-Jul-10	-72.8	8.44	2.483	255.2	25.47	2.483	255.2	27.3	0	0.894	-242
60	2010	195	800	14-Jul-10	-72.8	8.28	2.087	231.4	30.17	2.087	231.4	35.51	0	0.884	-311
60	2010	195	900	14-Jul-10	-72.8	6.821	1.819	239.6	28.85	1.819	239.6	34.48	0	0.911	-206
60	2010	195	1000	14-Jul-10	-72.8	7.57	2.07	243.6	32.56	2.07	243.6	35.03	0	0.919	-209
60	2010	195	1100	14-Jul-10	-72.8	4.91	2.062	253	28.62	2.062	253	32.49	0	0.909	-211
60	2010	195	1200	14-Jul-10	-72.8	3.976	1.83	209.7	31.3	1.83	209.7	43.97	0	0.904	-278
60	2010	195	1300	14-Jul-10	-72.8	7.34	1.841	242.9	30.48	1.841	242.9	34.47	0	0.92	-206
60	2010	195	1400	14-Jul-10	-72.8	3.847	2.016	230.9	28.77	2.016	230.9	31.47	0	0.916	-229
60	2010	195	1500	14-Jul-10	-72.8	-5.339	2.2	237.3	29.94	2.2	237.3	33.21	0	0.265	-282
60	2010	195	1600	14-Jul-10	-72.8	-14.64	2.222	267.3	21.27	2.222	267.3	22.05	0	0.909	-212
60	2010	195	1700	14-Jul-10	-72.8	-18.88	1.798	289.5	27.06	1.798	289.5	28.29	0	0.905	-231
60	2010	195	1800	14-Jul-10	-72.8	-21.89	1.261	290.1	21.88	1.261	290.1	23.29	0	0.895	-271
60	2010	195	1900	14-Jul-10	-72.8	-27.86	0.609	318.8	16.34	0.609	318.8	26.56	0	0.886	-246
60	2010	195	2000	14-Jul-10	-72.8	-26.05	1.405	286.6	19.71	1.405	286.6	21.69	0	0.898	-241
60	2010	195	2100	14-Jul-10	-72.8	-22.78	1.357	292.4	25.47	1.357	292.4	27.58	0	0.896	-208
60	2010	195	2200	14-Jul-10	-72.8	-23.9	0.568	324.1	21.2	0.568	324.1	25.22	0	0.895	-235
60	2010	195	2300	14-Jul-10	-72.8	-27.6	0.564	344.4	15.89	0.564	344.4	22.7	0	0.896	-246
60	2010	195	2400	14-Jul-10	-72.8	-34.18	0.511	357.9	11.28	0.511	357.9	15.02	0	0.874	-322
60	2010	196	100	15-Jul-10	-72.8	-37.92	0.547	43.95	8.79	0.547	43.95	14.68	0	0.879	-235
60	2010	196	200	15-Jul-10	-72.8	-37.5	0.318	28.36	19.87	0.318	28.36	29.59	0	0.878	-243
60	2010	196	300	15-Jul-10	-72.8	-31.79	0.633	340.6	18.24	0.633	340.6	32.31	0	0.881	-247
60	2010	196	400	15-Jul-10	-72.8	-17.14	0.648	307.5	20.15	0.648	307.5	25.48	0	0.882	-251
60	2010	196	500	15-Jul-10	-72.8	-18.1	1.016	256.2	23.42	1.016	256.2	31.35	0	0.894	-232
60	2010	196	600	15-Jul-10	-72.8	-19.76	0.988	292.8	26.58	0.988	292.8	32.32	0	0.857	-363
60	2010	196	700	15-Jul-10	-72.8	-13.65	1.83	264.3	24.87	1.83	264.3	32.59	0	0.895	-237
60	2010	196	800	15-Jul-10	-72.8	-11.24	2.137	255.4	26.41	2.137	255.4	31.47	0	0.896	-234
60	2010	196	900	15-Jul-10	-72.8	-13.49	2.707	250.5	26.6	2.707	250.5	31.58	0	0.894	-208
60	2010	196	1000	15-Jul-10	-72.8	-15.46	2.935	246.4	24.09	2.935	246.4	26.24	0	0.905	-204
60	2010	196	1100	15-Jul-10	-72.8	-10.41	2.812	241.5	29.39	2.812	241.5	33.99	0	0.913	-318
60	2010	196	1200	15-Jul-10	-72.8	-1.821	2.763	219.2	33.73	2.763	219.2	37.18	0	0.248	-238
60	2010	196	1300	15-Jul-10	-72.8	0.315	3.042	208.6	32.7	3.042	208.6	36.9	0	0.869	-287
60	2010	196	1400	15-Jul-10	-72.8	-8.7	3.052	217	30.87	3.052	217	35.4	0	0.908	-246
60	2010	196	1500	15-Jul-10	-72.8	-14.65	2.698	221	28.29	2.698	221	31.8	0	0.902	-226
60	2010	196	1600	15-Jul-10	-72.8	-17.34	2.54	238.3	28.76	2.54	238.3	32.26	0	0.625	-192
60	2010	196	1700	15-Jul-10	-72.8	-25.31	2.119	234.9	30.49	2.119	234.9	33.13	0	0.89	-286
60	2010	196	1800	15-Jul-10	-72.8	-32.52	1.348	245.9	30.86	1.348	245.9	35.65	0	0.874	-244
60	2010	196	1900	15-Jul-10	-72.8	-35.91	1.174	286.1	29.13	1.174	286.1	33.5	0	0.848	-289
60	2010	196	2000	15-Jul-10	-72.8	-37.75	0.483	341.3	11.36	0.483	341.3	17.28	0	0.874	-238
60	2010	196	2100	15-Jul-10	-72.8	-40.83	0.407	6.237	8.03	0.407	6.237	13.35	0	0.865	-247
60	2010	196	2200	15-Jul-10	-72.8	-42.29	0.366	4.994	8.58	0.366	4.994	13.15	0	0.866	-312
60	2010	196	2300	15-Jul-10	-72.8	-43.18	0.412	6.003	10.13	0.412	6.003	15.38	0	0.863	-209
60	2010	196	2400	15-Jul-10	-72.8	-43.68	0.349	3.207	12.7	0.349	3.207	23.19	0	0.859	-233
60	2010	197	100	16-Jul-10	-72.8	-43.93	0.41	0.675	8.89	0.41	0.675	24.41	0	0.856	-236
60	2010	197	200	16-Jul-10	-72.8	-43.97	0.332	356.5	11.14	0.332	356.5	31.09	0	0.849	-268
60	2010	197	300	16-Jul-10	-72.8	-43.42	0.362	3.311	3.714	0.362	3.311	18.63	0	0.844	-310
60	2010	197	400	16-Jul-10	-72.8	-40.44	0.56	7.58	7.13	0.56	7.58	12.06	0	0.863	-283
60	2010	197	500	16-Jul-10	-72.8	-18.18	1.13	311	27.42	1.13	311	31.48	0	0.887	-210
60	2010	197	600	16-Jul-10	-72.8	-5.301	1.671	270.1	28.48	1.671	270.1	33.81	0	0.884	-245
60	2010	197	700	16-Jul-10	-72.8	-2.651	1.849	256.2	30.27	1.849	256.2	36.95	0	0.893	-247
60	2010	197	800	16-Jul-10	-72.8	-1.806	2.131	249.7	33.99	2.131	249.7	37.66	0	0.892	-235
60	2010	197	900	16-Jul-10	-72.8	-2.919	2.438	247.1	29.33	2.438	247.1	31.42	0	0.919	-316
60	2010	197	1000	16-Jul-10	-72.8	-0.498	2.788	254.1	28.61	2.788	254.1	33.09	0	0.912	-231
60	2010	197	1100	16-Jul-10	-72.8	1.533	2.915	260.3	26.77	2.915	260.3	30.34	0	0.9	-274
60	2010	197	1200	16-Jul-10	-72.8	3.03	2.628	260.8	26.66	2.628	260.8	31.5	0	0.916	-236
60	2010	197	1300	16-Jul-10	-72.8	4.935	2.688	263.2	24.38	2.688	263.2	29.14	0	0.918	-272
60	2010	197	1400	16-Jul-10	-72.8	5.514	2.666	259	22.77	2.666	259	25.79	0	0.924	-226
60	2010	197	1500	16-Jul-10	-72.8	4.869	2.365	260.9	25.28	2.365	260.9	29.71	0	0.922	-227
60	2010	197	1600	16-Jul-10	-72.8	1.831	1.906	249.4	27.33	1.906	249.4	29.27	0	0.922	-206
60	2010	197	1700	16-Jul-10	-72.8	-5.377	1.959	252.9	21.82	1.959	252.9	23.83	0	0.917	-201
60	2010	197	1800	16-Jul-10	-72.8	-17.47	1.751	274.9	21.76	1.751	274.9	23	0	0.886	-238
60	2010	197	1900	16-Jul-10	-72.8	-30.58	0.927	308	16.68	0.927	308	17.75	0	0.896	-233
60	2010	197	2000	16-Jul-10	-72.8	-37.32	0.499	351.9	16.83	0.499	351.9	21.28	0	0.874	-209
60	2010	197	2100	16-Jul-10	-72.8	-39.76	0.582	359.2	15.55	0.582	359.2	23.04	0	0.871	-231
60	2010	197	2200	16-Jul-10	-72.8	-39.99	0.691	333.7	16.45	0.691	333.7	22.46	0	0.869	-232
60	2010	197	2300	16-Jul-10	-72.8	-40.94	0.638	5.561	12.98	0.638	5.561	18.3	0	0.868	-209
60	2010	197	2400	16-Jul-10	-72.8	-41.74	0.603	350.9	9.92	0.603	350.9	16.72	0	0.865	-278
60	2010	198	100	17-Jul-10	-72.8	-41.99	0.606	0.322	9.56	0.606	0.322	18.74	0	0.867	-239
60	2010	198	200	17-Jul-10	-72.8	-41.86	0.471	354.7	9.57	0.471	354.7	12.88	0	0.867	-243
60	2010	198	300	17-Jul-10	-72.8	-41.31	0.622	350.8	8.82	0.622	350.8	13.64	0	0.87	-208
60	2010	198	400	17-Jul-10	-72.8	-37.19	0.854	351.3	14.7	0.854	351.3	15.75	0	0.881	-208
60	2010	198	500	17-Jul-10	-72.8	-10.22	1.146	322.1	23.78	1.146	322.1	27.58	0	0.854	-237
60	2010	198	600	17-Jul-10	-72.8	0.338	1.735	277.2	28.5	1.735	277.2	34.33	0	0.85	-315
60	2010	198	700	17-Jul-10	-72.8	0.967	1.916	263	27.72	1.916	263	37.22	0	0.89	-280
60	2010	198	800	17-Jul-10	-72.8	2.723	1.34	269.3	39.94	1.34	269.3	55.68	0	0.913	-230
60	2010	198	900	17-Jul-10	-72.8	6.202	1.621	267.6	37.49	1.621	267.6	51.11	0	0.901	-245
60	2010	198	1000	17-Jul-10	-72.8	8.44	1.971	270.9	28.85	1.971	270.9	40.4	0	0.904	-234
60	2010	198	1100	17-Jul-10	-72.8	9.53	2.177	236.8	34.9	2.177	236.8	39.83	0	0.915	-232
60	2010	198	1200	17-Jul-10	-72.8	10.9	2.307	184.3	31.36	2.307	184.3	39.66	0	0.914	-235
60	2010	198	1300	17-Jul-10	-72.8	10.14	2.431	219.5	32.1	2.431	219.5	39.58	0	0.924	-248
60	2010	198	1400	17-Jul-10	-72.8	6.017	2.42	233	28.93	2.42	233	32.93	0	0.923	-204
60	2010	198	1500	17-Jul-10	-72.8	0.468	2.744	252.1	24.88	2.744	252.1	26.88	0	0.917	-202
60	2010	198	1600	17-Jul-10	-72.8	-10	2.739	253	26.2	2.739	253	26.9	0	0.908	-203
60	2010	198	1700	17-Jul-10	-72.8	-21.32	2.405	247.5	28.13	2.405	247.5	29.5	0	0.908	-211
60	2010	198	1800	17-Jul-10	-72.8	-31.76	1.866	254.7	29.18	1.866	254.7	30.13	0	0.898	-234
60	2010	198	1900	17-Jul-10	-72.8	-37.77	1.085	321.3	18.29	1.085	321.3	20.82	0	0.881	-235
60	2010	198	2000	17-Jul-10	-72.8	-41.07	0.516	17.95	11.02	0.516	17.95	16.09	0	0.876	-230
60	2010	198	2100	17-Jul-10	-72.8	-42.27	0.503	25.23	6.13	0.503	25.23	10.26	0	0.879	-203

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	198	2200	17-Jul-10	-72.8	-41.76	0.514	13.61	10.95	0.514	13.61	18.94	0	0.883	-206
60	2010	198	2300	17-Jul-10	-72.8	-39.43	0.589	331.5	11.7	0.589	331.5	16.77	0	0.881	-231
60	2010	198	2400	17-Jul-10	-72.8	-38.98	0.634	340.1	7.84	0.634	340.1	12.14	0	0.871	-235
60	2010	199	100	18-Jul-10	-72.8	-40.48	0.574	348.9	11.76	0.574	348.9	16.1	0	0.855	-243
60	2010	199	200	18-Jul-10	-72.8	-41.27	0.593	340.7	13.63	0.593	340.7	20.13	0	0.86	-241
60	2010	199	300	18-Jul-10	-72.8	-39.69	0.567	335	13.76	0.567	335	17.34	0	0.866	-211
60	2010	199	400	18-Jul-10	-72.8	-33.44	0.629	345.5	11.7	0.629	345.5	13.38	0	0.889	-243
60	2010	199	500	18-Jul-10	-72.8	-5.685	1.239	304.7	30.63	1.239	304.7	37.62	0	0.778	-317
60	2010	199	600	18-Jul-10	-72.8	2.846	1.593	273.9	27.98	1.593	273.9	33.92	0	0.893	-241
60	2010	199	700	18-Jul-10	-72.8	3.735	1.956	275.4	28.49	1.956	275.4	38.11	0	0.921	-241
60	2010	199	800	18-Jul-10	-72.8	5.982	1.809	239.4	34.6	1.809	239.4	46.79	0	0.915	-209
60	2010	199	900	18-Jul-10	-72.8	11.53	1.961	235.3	28.65	1.961	235.3	34.25	0	0.879	-274
60	2010	199	1000	18-Jul-10	-72.8	15.92	2.186	241.7	30.38	2.186	241.7	38.36	0	0.892	-502
60	2010	199	1100	18-Jul-10	-72.8	17.06	2.1	256.7	29.48	2.1	256.7	31.33	0	0.931	-206
60	2010	199	1200	18-Jul-10	-72.8	20.89	1.811	254	36	1.811	254	40.26	0	0.915	-237
60	2010	199	1300	18-Jul-10	-72.8	14.56	1.195	265.6	21.39	1.195	265.6	26.92	0	0.93	-203
60	2010	199	1400	18-Jul-10	-72.8	8.02	1.309	239	26.55	1.309	239	30.42	0	0.931	-206
60	2010	199	1500	18-Jul-10	-72.8	5.287	2.341	257.8	24.77	2.341	257.8	27.25	0	0.921	-281
60	2010	199	1600	18-Jul-10	-72.8	1.065	2.104	266.5	22.96	2.104	266.5	24.23	0	0.908	-281
60	2010	199	1700	18-Jul-10	-72.8	-5.658	0.868	286.4	21.68	0.868	286.4	27.33	0	0.918	-237
60	2010	199	1800	18-Jul-10	-72.8	-10.09	0.164	21.74	13.72	0.164	21.74	17.93	0	0.896	-313
60	2010	199	1900	18-Jul-10	-72.8	-18.48	0.633	327.6	15.65	0.633	327.6	21.13	0	0.896	-273
60	2010	199	2000	18-Jul-10	-72.8	-24.04	0.69	41.58	11.42	0.69	41.58	21.09	0	0.757	-279
60	2010	199	2100	18-Jul-10	-72.8	-24.32	0.496	19.08	11.9	0.496	19.08	19.57	0	0.765	-273
60	2010	199	2200	18-Jul-10	-72.8	-25.42	0.499	21.56	12.07	0.499	21.56	31.23	0	0.815	-453
60	2010	199	2300	18-Jul-10	-72.8	-23.98	0.228	1.321	6.008	0.228	1.321	11.91	0	0.829	-239
60	2010	199	2400	18-Jul-10	-72.8	-22.82	0.269	357.6	6.748	0.269	357.6	29.76	0	0.818	-242
60	2010	200	100	19-Jul-10	-72.8	-29.57	0.278	357.5	5.672	0.278	357.5	27.77	0	0.82	-280
60	2010	200	200	19-Jul-10	-72.8	-34.19	0.271	355.4	9.33	0.271	355.4	20.33	0	0.879	-280
60	2010	200	300	19-Jul-10	-72.8	-34.61	0.298	354.4	8.69	0.298	354.4	20.84	0	0.877	-277
60	2010	200	400	19-Jul-10	-72.8	-30.15	0.28	343.8	6.414	0.28	343.8	11.39	0	0.881	-279
60	2010	200	500	19-Jul-10	-72.8	4.472	0.509	247.1	22.67	0.509	247.1	32.75	0	0.917	-232
60	2010	200	600	19-Jul-10	-72.8	14.07	1.365	282.9	28.45	1.365	282.9	41.18	0	0.917	-207
60	2010	200	700	19-Jul-10	-72.8	11.68	1.319	282.5	30.37	1.319	282.5	41.34	0	0.923	-233
60	2010	200	800	19-Jul-10	-72.8	15.77	1.561	284.9	26.77	1.561	284.9	35.83	0	0.894	-283
60	2010	200	900	19-Jul-10	-72.8	21.41	1.685	269.7	29.84	1.685	269.7	40.81	0	0.913	-322
60	2010	200	1000	19-Jul-10	-72.8	26.21	1.743	254.8	34.47	1.743	254.8	52.69	0	0.926	-274
60	2010	200	1100	19-Jul-10	-72.8	25.48	1.572	274.6	36.27	1.572	274.6	42.96	0	0.924	-242
60	2010	200	1200	19-Jul-10	-72.8	24.73	1.818	295.3	32.34	1.818	295.3	54.42	0	0.891	-255
60	2010	200	1300	19-Jul-10	-72.8	21.21	1.175	248	22.97	1.175	248	44.29	0	0.924	-530
60	2010	200	1400	19-Jul-10	-72.8	14.48	0.838	304.9	22.14	0.838	304.9	31.43	0	0.933	-207
60	2010	200	1500	19-Jul-10	-72.8	16.96	1.174	329.8	25	1.174	329.8	50.5	0	0.941	-244
60	2010	200	1600	19-Jul-10	-72.8	10.91	0.239	283.2	8.5	0.239	283.2	23.45	0	0.922	-205
60	2010	200	1700	19-Jul-10	-72.8	7.74	0.267	258	8.21	0.267	258	15.09	0	0.919	-211
60	2010	200	1800	19-Jul-10	-72.8	3.367	0.648	5.154	10.51	0.648	5.154	32.79	0	0.897	-281
60	2010	200	1900	19-Jul-10	-72.8	-9.46	0.605	342.1	22.34	0.605	342.1	30.45	0	0.901	-212
60	2010	200	2000	19-Jul-10	-72.8	-13.11	0.764	328.1	20.11	0.764	328.1	47.04	0	0.777	-273
60	2010	200	2100	19-Jul-10	-72.8	-14.65	0.506	23.07	20.08	0.506	23.07	43.09	0	0.89	-250
60	2010	200	2200	19-Jul-10	-72.8	-21.89	0.463	4.513	13.27	0.463	4.513	24.05	0	0.878	-278
60	2010	200	2300	19-Jul-10	-72.8	-27.08	0.399	357.9	12.15	0.399	357.9	30.56	0	0.876	-250
60	2010	200	2400	19-Jul-10	-72.8	-31.38	0.371	357.6	12.7	0.371	357.6	24.35	0	0.875	-241
60	2010	201	100	20-Jul-10	-72.8	-32.61	0.373	350.1	8.48	0.373	350.1	29.65	0	0.873	-244
60	2010	201	200	20-Jul-10	-72.8	-32.42	0.291	357.7	8.34	0.291	357.7	22.42	0	0.81	-312
60	2010	201	300	20-Jul-10	-72.8	-34.74	0.26	353.1	6.444	0.26	353.1	16.25	0	0.812	-279
60	2010	201	400	20-Jul-10	-72.8	-30.3	0.473	332.3	11.15	0.473	332.3	17.64	0	0.892	-238
60	2010	201	500	20-Jul-10	-72.8	6.178	0.983	257.6	23.32	0.983	257.6	27.65	0	0.881	-276
60	2010	201	600	20-Jul-10	-72.8	16.17	1.519	251.3	24.33	1.519	251.3	26.44	0	0.92	-589
60	2010	201	700	20-Jul-10	-72.8	14.42	1.621	250.7	24.12	1.621	250.7	28.76	0	0.898	-290
60	2010	201	800	20-Jul-10	-72.8	17.95	1.02	231	34.34	1.02	231	43.27	0	0.928	-240
60	2010	201	900	20-Jul-10	-72.8	22.96	1.145	217.2	36.74	1.145	217.2	60.28	0	0.921	-241
60	2010	201	1000	20-Jul-10	-72.8	25.84	1.466	174.6	37.46	1.466	174.6	41.78	0	0.598	-195
60	2010	201	1100	20-Jul-10	-72.8	28.13	1.729	146.3	32.55	1.729	146.3	51.93	0	0.932	-208
60	2010	201	1200	20-Jul-10	-72.8	29.08	1.501	159.3	38.11	1.501	159.3	55.14	0	0.909	-237
60	2010	201	1300	20-Jul-10	-72.8	21.93	1.876	196.5	30.65	1.876	196.5	34.98	0	0.938	-243
60	2010	201	1400	20-Jul-10	-72.8	20.75	1.034	183.5	31.71	1.034	183.5	73.8	0	0.928	-277
60	2010	201	1500	20-Jul-10	-72.8	23.78	1.562	229.5	26.14	1.562	229.5	41.73	0	0.935	-236
60	2010	201	1600	20-Jul-10	-72.8	20.59	1.582	203.3	35.19	1.582	203.3	39.58	0	0.899	-236
60	2010	201	1700	20-Jul-10	-72.8	9.5	1.315	271.9	21.86	1.315	271.9	23.17	0	0.929	-242
60	2010	201	1800	20-Jul-10	-72.8	-4.601	1.038	310.5	18.89	1.038	310.5	22.21	0	0.906	-211
60	2010	201	1900	20-Jul-10	-72.8	-23.81	0.878	339.7	19.85	0.878	339.7	26.5	0	0.77	-390
60	2010	201	2000	20-Jul-10	-72.8	-30.77	0.695	351.8	15.45	0.695	351.8	20.93	0	0.702	-245
60	2010	201	2100	20-Jul-10	-72.8	-34.97	0.507	13.27	13.38	0.507	13.27	18.83	0	0.886	-281
60	2010	201	2200	20-Jul-10	-72.8	-37.87	0.271	355	15.41	0.271	355	26.32	0	0.788	-351
60	2010	201	2300	20-Jul-10	-72.8	-38.94	0.314	352.9	5.493	0.314	352.9	11.35	0	0.783	-320
60	2010	201	2400	20-Jul-10	-72.8	-38.96	0.393	1.303	8.33	0.393	1.303	20.32	0	0.866	-249
60	2010	202	100	21-Jul-10	-72.8	-38.7	0.521	14.49	16.5	0.521	14.49	28.16	0	0.759	-401
60	2010	202	200	21-Jul-10	-72.8	-38.35	0.336	18.97	4.265	0.336	18.97	24.44	0	0.872	-286
60	2010	202	300	21-Jul-10	-72.8	-36.28	0.282	352.7	10.04	0.282	352.7	30.94	0	0.782	-313
60	2010	202	400	21-Jul-10	-72.8	-22.53	0.392	346.8	17.41	0.392	346.8	44.18	0	0.905	-272
60	2010	202	500	21-Jul-10	-72.8	6.453	0.584	239.4	28.4	0.584	239.4	38.1	0	0.896	-246
60	2010	202	600	21-Jul-10	-72.8	12.39	1.083	264.6	29.77	1.083	264.6	41.17	0	0.916	-512
60	2010	202	700	21-Jul-10	-72.8	8.67	1.714	268.9	27.61	1.714	268.9	33.49	0	0.87	-240
60	2010	202	800	21-Jul-10	-72.8	11.65	1.606	259.2	29.76	1.606	259.2	37.28	0	0.913	-240
60	2010	202	900	21-Jul-10	-72.8	13.38	1.324	249	39.49	1.324	249	61.07	0	0.923	-238
60	2010	202	1000	21-Jul-10	-72.8	13.4	1.48	269.2	35.29	1.48	269.2	60.36	0	0.926	-252
60	2010	202	1100	21-Jul-10	-72.8	13.31	2.167	202.5	32.56	2.167	202.5	39.51	0	0.913	-239
60	2010	202	1200	21-Jul-10	-72.8	8.29	1.845	220	32.04	1.845	220	34.97	0	0.914	-210
60	2010	202	1300	21-Jul-10	-72.8	-1.596	2.468	262.3	23.28	2.468	262.3	24.44	0.254	0.863	-281
60	2010	202	1400	21-Jul-10	-72.8	-7.76	1.952	228.1	39.06	1.952	228.1	45.11	1.016	0.835	-248
60	2010	202	1500	21-Jul-10	-72.8	-4.156	0.549	56.51	24.96	0.549	56.51	43.37	0.762	0.853	-236
60	2010	202	1600	21-Jul-10	-72.8	-1.963	1.26	236.6	27.8	1.26	236.6	39.7	1.016	0.773	-249
60	2010	202	1700	21-Jul-10	-72.8	-9.63	1.404	294.6	25.1	1.404	294.6	27.05	0.254	0.874	-239

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	202	1800	21-Jul-10	-72.8	-12.89	1.132	301.5	24.1	1.132	301.5	25.86	0	0.877	-238
60	2010	202	1900	21-Jul-10	-72.8	-16.02	0.783	330.6	17.74	0.783	330.6	18.75	0	0.87	-274
60	2010	202	2000	21-Jul-10	-72.8	-18.42	0.83	336.5	11.63	0.83	336.5	19.48	0	0.862	-282
60	2010	202	2100	21-Jul-10	-72.8	-20.81	0.652	321.2	14.39	0.652	321.2	18.82	0	0.843	-287
60	2010	202	2200	21-Jul-10	-72.8	-19.7	0.809	319.4	13.85	0.809	319.4	17.96	0	0.837	-230
60	2010	202	2300	21-Jul-10	-72.8	-18.18	0.586	339.9	14.67	0.586	339.9	19.93	0.254	0.834	-204
60	2010	202	2400	21-Jul-10	-72.8	-19.14	0.23	29.52	5.927	0.23	29.52	10.23	0	0.848	-237
60	2010	203	100	22-Jul-10	-72.8	-18.21	0.14	322.4	9.6	0.14	322.4	16.38	0.254	0.842	-238
60	2010	203	200	22-Jul-10	-72.8	-17.18	0.488	316.7	17.74	0.488	316.7	25.51	0.254	0.849	-246
60	2010	203	300	22-Jul-10	-72.8	-17.3	0.659	303.5	23.05	0.659	303.5	25.1	0.508	0.908	-285
60	2010	203	400	22-Jul-10	-72.8	-16.92	0.476	320.4	17.98	0.476	320.4	23.41	0.762	0.798	-313
60	2010	203	500	22-Jul-10	-72.8	-15.31	0.893	323.1	22.15	0.893	323.1	24.11	0	0.866	-242
60	2010	203	600	22-Jul-10	-72.8	-8.38	1.16	305	25.15	1.16	305	27.29	0	0.852	-270
60	2010	203	700	22-Jul-10	-72.8	4.46	1.198	288	25.96	1.198	288	29.51	0	0.943	-327
60	2010	203	800	22-Jul-10	-72.8	10.19	1.814	281.1	23.3	1.814	281.1	25.82	0	0.891	-316
60	2010	203	900	22-Jul-10	-72.8	15.66	2.188	275.8	24.3	2.188	275.8	27.08	0	0.879	-241
60	2010	203	1000	22-Jul-10	-72.8	16.06	2.474	260.8	22.43	2.474	260.8	24.68	0	0.898	-232
60	2010	203	1100	22-Jul-10	-72.8	13.53	2.767	268	22.98	2.767	268	24.29	0	0.886	-271
60	2010	203	1200	22-Jul-10	-72.8	11.34	2.723	264.1	24.6	2.723	264.1	26.39	0	0.885	-209
60	2010	203	1300	22-Jul-10	-72.8	8.65	3.037	265.8	24.04	3.037	265.8	24.84	0	0.861	-270
60	2010	203	1400	22-Jul-10	-72.8	6.738	2.519	269.3	26.32	2.519	269.3	27.57	0	0.871	-244
60	2010	203	1500	22-Jul-10	-72.8	4.991	2.177	287.4	26.81	2.177	287.4	28.63	0	0.902	-209
60	2010	203	1600	22-Jul-10	-72.8	3.308	2.26	299.2	24.34	2.26	299.2	26.29	0	0.895	-451
60	2010	203	1700	22-Jul-10	-72.8	-0.003	1.524	289.8	28.89	1.524	289.8	30.49	0	0.888	-428
60	2010	203	1800	22-Jul-10	-72.8	-13.13	0.944	309.7	18.17	0.944	309.7	22.13	0	0.839	-284
60	2010	203	1900	22-Jul-10	-72.8	-26.84	0.418	317.4	15.61	0.418	317.4	27.47	0	0.827	-279
60	2010	203	2000	22-Jul-10	-72.8	-33.38	0.404	0.67	11.69	0.404	0.67	21.37	0	0.829	-240
60	2010	203	2100	22-Jul-10	-72.8	-36.81	0.785	316.4	9.88	0.785	316.4	14.36	0	0.862	-280
60	2010	203	2200	22-Jul-10	-72.8	-36.48	0.473	11.79	6.938	0.473	11.79	12.1	0	0.864	-244
60	2010	203	2300	22-Jul-10	-72.8	-36.75	0.384	15.8	5.412	0.384	15.8	16.8	0	0.862	-271
60	2010	203	2400	22-Jul-10	-72.8	-35.7	0.202	10.11	7.18	0.202	10.11	24.37	0	0.866	-245
60	2010	204	100	23-Jul-10	-72.8	-34.35	0.352	35.01	8.65	0.352	35.01	27.47	0	0.853	-539
60	2010	204	200	23-Jul-10	-72.8	-36.83	0.485	26.55	9.49	0.485	26.55	31.54	0	0.842	-282
60	2010	204	300	23-Jul-10	-72.8	-34.74	0.399	38.02	13.66	0.399	38.02	48.99	0	0.866	-253
60	2010	204	400	23-Jul-10	-72.8	-27.14	0.517	295.3	17.14	0.517	295.3	53.41	0	0.847	-274
60	2010	204	500	23-Jul-10	-72.8	-3.276	0.941	120.3	29.64	0.941	120.3	61.56	0	0.855	-207
60	2010	204	600	23-Jul-10	-72.8	12.96	1.462	118.1	28.53	1.462	118.1	38.41	0	0.86	-239
60	2010	204	700	23-Jul-10	-72.8	17.4	1.7	102.2	40.43	1.7	102.2	44.78	0	0.88	-213
60	2010	204	800	23-Jul-10	-72.8	19.55	2.344	90	34.76	2.344	90	36.84	0	0.891	-279
60	2010	204	900	23-Jul-10	-72.8	22.01	2.247	100.3	39.24	2.247	100.3	42.17	0	0.905	-498
60	2010	204	1000	23-Jul-10	-72.8	23.28	2.847	121.3	32.68	2.847	121.3	35.27	0	0.931	-201
60	2010	204	1100	23-Jul-10	-72.8	25.32	2.544	130.9	36.24	2.544	130.9	41.75	0	0.943	-211
60	2010	204	1200	23-Jul-10	-72.8	23.59	2.645	128.1	30.21	2.645	128.1	32.24	0	0.917	-249
60	2010	204	1300	23-Jul-10	-72.8	14.56	2.461	146	30.72	2.461	146	33.05	0	0.902	-278
60	2010	204	1400	23-Jul-10	-72.8	14.57	2.271	152.6	29.66	2.271	152.6	31.23	0	0.905	-236
60	2010	204	1500	23-Jul-10	-72.8	7.57	2.518	179.9	42.17	2.518	179.9	43.28	0.254	0.897	-249
60	2010	204	1600	23-Jul-10	-72.8	5.333	2.222	171.1	37.13	2.222	171.1	38.31	0	0.768	-286
60	2010	204	1700	23-Jul-10	-72.8	-3.289	2.856	171.6	33.38	2.856	171.6	34.68	0	0.892	-414
60	2010	204	1800	23-Jul-10	-72.8	-15.97	1.939	152.9	46.38	1.939	152.9	50.95	0	0.911	-207
60	2010	204	1900	23-Jul-10	-72.8	-28.42	1.304	100.3	24.73	1.304	100.3	38.1	0	0.896	-239
60	2010	204	2000	23-Jul-10	-72.8	-35.16	0.75	94	28.68	0.75	94	39.06	0	0.876	-267
60	2010	204	2100	23-Jul-10	-72.8	-38.94	0.727	314.5	21.24	0.727	314.5	37.86	0	0.885	-240
60	2010	204	2200	23-Jul-10	-72.8	-37.41	0.547	2.816	18.56	0.547	2.816	43.32	0	0.879	-243
60	2010	204	2300	23-Jul-10	-72.8	-33.01	1.334	281.6	22.68	1.334	281.6	29.2	0.254	0.877	-361
60	2010	204	2400	23-Jul-10	-72.8	-31.26	1.529	300.9	23.28	1.529	300.9	29.72	1.016	0.819	-274
60	2010	205	100	24-Jul-10	-72.8	-31.27	1.072	322.5	19.45	1.072	322.5	23.53	0	0.635	-209
60	2010	205	200	24-Jul-10	-72.8	-33.96	0.682	7.64	17.2	0.682	7.64	29.11	0	0.724	-277
60	2010	205	300	24-Jul-10	-72.8	-35.27	0.544	16.03	10.15	0.544	16.03	17.36	0	0.841	-314
60	2010	205	400	24-Jul-10	-72.8	-34.17	0.35	11.37	10.65	0.35	11.37	16.64	0	0.842	-448
60	2010	205	500	24-Jul-10	-72.8	-19.04	0.346	355.5	15.29	0.346	355.5	36.02	0	0.84	-268
60	2010	205	600	24-Jul-10	-72.8	-6.186	0.672	27.06	19.06	0.672	27.06	24.19	0	0.855	-286
60	2010	205	700	24-Jul-10	-72.8	-6.139	1.393	174.5	32.07	1.393	174.5	40.72	0	0.878	-266
60	2010	205	800	24-Jul-10	-72.8	-4.342	2.481	244.6	27.99	2.481	244.6	31.65	0	0.889	-284
60	2010	205	900	24-Jul-10	-72.8	-4.83	2.511	261.5	25.52	2.511	261.5	27.2	0	0.903	-234
60	2010	205	1000	24-Jul-10	-72.8	2.432	2.696	224	27.81	2.696	224	32.39	0	0.895	-206
60	2010	205	1100	24-Jul-10	-72.8	1.36	2.667	250.2	28.15	2.667	250.2	33.87	0	0.875	-349
60	2010	205	1200	24-Jul-10	-72.8	2.402	2.601	241.9	29.85	2.601	241.9	32.92	0	2.66	0
60	2010	205	1300	24-Jul-10	-72.8	-4.159	2.877	262.3	23.09	2.877	262.3	25.41	0	0.888	-307
60	2010	205	1400	24-Jul-10	-72.8	-4.905	2.494	256.6	24.23	2.494	256.6	28.11	0	0.873	-245
60	2010	205	1500	24-Jul-10	-72.8	-7.04	2.003	237.9	32.82	2.003	237.9	36.38	0	0.891	-436
60	2010	205	1600	24-Jul-10	-72.8	-12.87	1.91	216.1	34.83	1.91	216.1	37.19	0	0.889	-564
60	2010	205	1700	24-Jul-10	-72.8	-15.99	2.544	257.8	24.11	2.544	257.8	24.67	0	0.883	-240
60	2010	205	1800	24-Jul-10	-72.8	-21.57	2.415	267.5	21.88	2.415	267.5	23.42	0	0.884	-238
60	2010	205	1900	24-Jul-10	-72.8	-28.91	1.08	302	18.29	1.08	302	27.61	0	0.871	-578
60	2010	205	2000	24-Jul-10	-72.8	-36.75	1.081	316.7	15.7	1.081	316.7	20.47	0	0.866	-275
60	2010	205	2100	24-Jul-10	-72.8	-39.9	0.734	314.1	15.49	0.734	314.1	22.68	0	0.855	-282
60	2010	205	2200	24-Jul-10	-72.8	-41.79	0.562	321.7	8.74	0.562	321.7	20.96	0	0.834	-313
60	2010	205	2300	24-Jul-10	-72.8	-42.8	0.279	2.908	11.15	0.279	2.908	16.19	0	0.851	-241
60	2010	205	2400	24-Jul-10	-72.8	-43.27	0.434	351.2	9.46	0.434	351.2	15.97	0	0.851	-284
60	2010	206	100	25-Jul-10	-72.8	-43.43	0.419	6.31	13.93	0.419	6.31	25.7	0	0.773	-282
60	2010	206	200	25-Jul-10	-72.8	-43.47	0.367	8.32	8.72	0.367	8.32	22.98	0	0.84	-278
60	2010	206	300	25-Jul-10	-72.8	-43.15	0.431	17.08	8.95	0.431	17.08	18.44	0	0.844	-243
60	2010	206	400	25-Jul-10	-72.8	-40.89	0.351	351.3	8.18	0.351	351.3	21.22	0	0.862	-240
60	2010	206	500	25-Jul-10	-72.8	-21.5	1.131	318.8	23.16	1.131	318.8	26	0	0.839	-316
60	2010	206	600	25-Jul-10	-72.8	-2.277	1.696	286.3	27.71	1.696	286.3	31.3	0	0.539	-208
60	2010	206	700	25-Jul-10	-72.8	5.705	2.32	266.6	26.13	2.32	266.6	30.83	0	0.89	-274
60	2010	206	800	25-Jul-10	-72.8	10.25	2.311	269.6	29.99	2.311	269.6	34.26	0	0.885	-442
60	2010	206	900	25-Jul-10	-72.8	13.94	2.726	257.6	28.65	2.726	257.6	30.92	0	0.898	-468
60	2010	206	1000	25-Jul-10	-72.8	14.46	2.87	260.3	26.25	2.87	260.3	29.49	0	0.562	-239
60	2010	206	1100	25-Jul-10	-72.8	17	3.082	261.1	25.2	3.082	261.1	28.53	0	0.907	-267
60	2010	206	1200	25-Jul-10	-72.8	17.66	3.37	266.1	24.59	3.37	266.1	25.86	0	0.881	-316
60	2010	206	1300	25-Jul-10	-72.8	17.32	3.206	259.3	25.04	3.206	259.3	27.69	0	0.878	-202

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	206	1400	25-Jul-10	-72.8	17.23	2.805	255.6	25.12	2.805	255.6	28.77	0	0.904	-235
60	2010	206	1500	25-Jul-10	-72.8	14.84	2.972	263.8	22.71	2.972	263.8	24.1	0	0.883	-499
60	2010	206	1600	25-Jul-10	-72.8	9.7	2.749	267.8	22.54	2.749	267.8	23.92	0	0.889	-244
60	2010	206	1700	25-Jul-10	-72.8	1.224	2.265	276.6	23.98	2.265	276.6	24.9	0	0.858	-252
60	2010	206	1800	25-Jul-10	-72.8	-13.28	1.702	291.7	22.06	1.702	291.7	25.81	0	0.868	-240
60	2010	206	1900	25-Jul-10	-72.8	-29.98	0.577	3.196	14.69	0.577	3.196	22.87	0	0.853	-274
60	2010	206	2000	25-Jul-10	-72.8	-38.9	0.486	16.21	18.04	0.486	16.21	23.68	0	0.861	-277
60	2010	206	2100	25-Jul-10	-72.8	-41.17	0.531	13.97	15.35	0.531	13.97	23.43	0	0.854	-248
60	2010	206	2200	25-Jul-10	-72.8	-41.94	0.315	353.9	15.64	0.315	353.9	23.88	0	0.855	-277
60	2010	206	2300	25-Jul-10	-72.8	-42.56	0.484	24.11	13.74	0.484	24.11	33.33	0	0.85	-286
60	2010	206	2400	25-Jul-10	-72.8	-42.96	0.448	357.4	10.05	0.448	357.4	19.91	0	0.85	-288
60	2010	207	100	26-Jul-10	-72.8	-43.08	0.336	18.37	7.78	0.336	18.37	24.96	0	0.844	-413
60	2010	207	200	26-Jul-10	-72.8	-43.15	0.298	352	7.74	0.298	352	13.19	0	0.812	-236
60	2010	207	300	26-Jul-10	-72.8	-42.54	0.179	61.71	10.3	0.179	61.71	42.33	0	0.81	-210
60	2010	207	400	26-Jul-10	-72.8	-40.44	0.386	342.5	9.95	0.386	342.5	28.26	0	0.839	-271
60	2010	207	500	26-Jul-10	-72.8	-17.68	1.071	270.5	20.02	1.071	270.5	38.79	0	0.879	-322
60	2010	207	600	26-Jul-10	-72.8	5.543	1.647	258.3	23.23	1.647	258.3	26.07	0	0.853	-320
60	2010	207	700	26-Jul-10	-72.8	11.62	1.718	258.5	25.75	1.718	258.5	28.48	0	0.863	-235
60	2010	207	800	26-Jul-10	-72.8	17.26	1.386	209	35.14	1.386	209	40.93	0	0.88	-239
60	2010	207	900	26-Jul-10	-72.8	23.5	1.536	198.1	38.84	1.536	198.1	48.29	0	0.903	-275
60	2010	207	1000	26-Jul-10	-72.8	27.91	1.359	223.1	42.54	1.359	223.1	56.01	0	0.893	-246
60	2010	207	1100	26-Jul-10	-72.8	30.59	1.841	226.5	33.93	1.841	226.5	49.53	0	0.891	-269
60	2010	207	1200	26-Jul-10	-72.8	32.65	1.747	164.3	34.59	1.747	164.3	52.13	0	0.892	-232
60	2010	207	1300	26-Jul-10	-72.8	33.96	1.59	191.5	35.18	1.59	191.5	46.07	0	0.88	-239
60	2010	207	1400	26-Jul-10	-72.8	34.27	1.392	173	37.6	1.392	173	45.44	0	0.893	-242
60	2010	207	1500	26-Jul-10	-72.8	33.15	1.197	173.8	25.73	1.197	173.8	46.33	0	0.926	-241
60	2010	207	1600	26-Jul-10	-72.8	32.2	1.51	170.3	26.47	1.51	170.3	31.5	0	0.93	-242
60	2010	207	1700	26-Jul-10	-72.8	26.15	1.563	90	26.74	1.563	90	27.6	0	0.92	-275
60	2010	207	1800	26-Jul-10	-72.8	7.76	1.14	64.36	14.18	1.14	64.36	15.05	0	0.875	-241
60	2010	207	1900	26-Jul-10	-72.8	-16.12	0.443	356.4	8.76	0.443	356.4	28.48	0	0.855	-235
60	2010	207	2000	26-Jul-10	-72.8	-28.8	0.402	2.715	11.17	0.402	2.715	16.74	0	0.865	-242
60	2010	207	2100	26-Jul-10	-72.8	-33.78	0.341	353	8.09	0.341	353	12.86	0	0.875	-243
60	2010	207	2200	26-Jul-10	-72.8	-35.72	0.284	354.3	12.33	0.284	354.3	20.12	0	0.867	-249
60	2010	207	2300	26-Jul-10	-72.8	-36.83	0.371	353.9	10.93	0.371	353.9	19.76	0	0.864	-291
60	2010	207	2400	26-Jul-10	-72.8	-36.64	0.461	357.4	10.44	0.461	357.4	23.18	0	0.869	-369
60	2010	208	100	27-Jul-10	-72.8	-36.49	0.301	356.2	15.76	0.301	356.2	30.78	0	0.873	-283
60	2010	208	200	27-Jul-10	-72.8	-36.37	0.375	5.213	16.31	0.375	5.213	41.11	0	0.864	-500
60	2010	208	300	27-Jul-10	-72.8	-35.15	0.233	0.893	12.31	0.233	0.893	21.76	0	0.875	-277
60	2010	208	400	27-Jul-10	-72.8	-31.55	0.307	346	10.3	0.307	346	30.18	0	0.884	-289
60	2010	208	500	27-Jul-10	-72.8	-4.01	0.185	304.5	11.12	0.185	304.5	28.52	0	0.903	-287
60	2010	208	600	27-Jul-10	-72.8	21.68	0.649	219	32.38	0.649	219	51.51	0	0.905	-242
60	2010	208	700	27-Jul-10	-72.8	21.3	1.032	191.2	35.35	1.032	191.2	37.18	0	0.587	-198
60	2010	208	800	27-Jul-10	-72.8	23.26	1.636	155.2	29.7	1.636	155.2	33.95	0	0.925	-359
60	2010	208	900	27-Jul-10	-72.8	28.25	1.685	129.1	35.46	1.685	129.1	51.74	0	0.885	-281
60	2010	208	1000	27-Jul-10	-72.8	31.3	1.889	41.46	33.92	1.889	41.46	46.99	0	0.907	-241
60	2010	208	1100	27-Jul-10	-72.8	31.87	1.465	7.84	41.64	1.465	7.84	65.17	0	0.605	-198
60	2010	208	1200	27-Jul-10	-72.8	33.93	1.765	249.8	34.2	1.765	249.8	59.58	0	0.927	-242
60	2010	208	1300	27-Jul-10	-72.8	34.69	1.744	25.51	35.54	1.744	25.51	40.18	0	0.909	-235
60	2010	208	1400	27-Jul-10	-72.8	33.64	1.309	352.4	33.3	1.309	352.4	69.11	0	0.912	-212
60	2010	208	1500	27-Jul-10	-72.8	33.04	1.323	173	34.46	1.323	173	56.49	0	0.929	-236
60	2010	208	1600	27-Jul-10	-72.8	30	1.092	117.3	30.26	1.092	117.3	35.51	0	0.914	-247
60	2010	208	1700	27-Jul-10	-72.8	17.38	0.505	136.3	29.57	0.505	136.3	39.76	0	0.906	-283
60	2010	208	1800	27-Jul-10	-72.8	1.151	0.909	44.73	21.76	0.909	44.73	31.79	0	0.871	-214
60	2010	208	1900	27-Jul-10	-72.8	-10.67	0.537	36.07	12.59	0.537	36.07	21.27	0	0.888	-279
60	2010	208	2000	27-Jul-10	-72.8	-17.59	0.56	21	10.41	0.56	21	28.96	0	0.888	-243
60	2010	208	2100	27-Jul-10	-72.8	-23.92	0.633	34.9	10.5	0.633	34.9	35.5	0	0.883	-500
60	2010	208	2200	27-Jul-10	-72.8	-30.26	0.358	357.6	7.92	0.358	357.6	22.56	0	0.883	-272
60	2010	208	2300	27-Jul-10	-72.8	-31.48	0.464	33.34	24.03	0.464	33.34	46.49	0	0.881	-241
60	2010	208	2400	27-Jul-10	-72.8	-28.16	0.489	12.35	22.63	0.489	12.35	35.86	0.254	0.879	-252
60	2010	209	100	28-Jul-10	-72.8	-23.43	0.926	49.74	34.45	0.926	49.74	53.07	1.524	0.838	-318
60	2010	209	200	28-Jul-10	-72.8	-20.42	0.709	20.01	21.5	0.709	20.01	49.11	0	0.845	-286
60	2010	209	300	28-Jul-10	-72.8	-17.8	1.074	326	23.61	1.074	326	78.8	0	0.87	-253
60	2010	209	400	28-Jul-10	-72.8	-13.03	0.958	266.6	23.42	0.958	266.6	43.47	0	0.89	-240
60	2010	209	500	28-Jul-10	-72.8	-0.375	1.113	308	21.54	1.113	308	36.3	0	0.874	-206
60	2010	209	600	28-Jul-10	-72.8	21.71	0.784	249	27.4	0.784	249	31.55	0	0.908	-240
60	2010	209	700	28-Jul-10	-72.8	24.65	1.434	267.6	28.94	1.434	267.6	34.82	0	0.89	-242
60	2010	209	800	28-Jul-10	-72.8	24.32	1.827	262.1	26.43	1.827	262.1	32.43	0	0.887	-309
60	2010	209	900	28-Jul-10	-72.8	25.97	2.623	254.2	24.23	2.623	254.2	25.49	0	0.892	-240
60	2010	209	1000	28-Jul-10	-72.8	25.75	2.478	255.5	21.65	2.478	255.5	22.68	0	0.95	-324
60	2010	209	1100	28-Jul-10	-72.8	16.29	0.715	305.8	24.59	0.715	305.8	39.2	0	0.911	-273
60	2010	209	1200	28-Jul-10	-72.8	21.48	2.083	283.6	27.91	2.083	283.6	35.91	0	0.896	-233
60	2010	209	1300	28-Jul-10	-72.8	21.24	1.479	233.6	28.31	1.479	233.6	29.93	0	0.892	-246
60	2010	209	1400	28-Jul-10	-72.8	13.14	2.198	127.1	28.38	2.198	127.1	29.55	0	0.882	-213
60	2010	209	1500	28-Jul-10	-72.8	4.21	1.093	74	25.84	1.093	74	40.59	0	0.887	-212
60	2010	209	1600	28-Jul-10	-72.8	1.68	0.455	23.51	20.59	0.455	23.51	55.13	0	0.868	-249
60	2010	209	1700	28-Jul-10	-72.8	0.694	0.874	45.02	13.1	0.874	45.02	35.25	0	0.847	-243
60	2010	209	1800	28-Jul-10	-72.8	-6.123	0.271	20.11	10.55	0.271	20.11	28.18	0	0.842	-242
60	2010	209	1900	28-Jul-10	-72.8	-19.78	0.566	26.46	11.09	0.566	26.46	24.29	0	0.831	-241
60	2010	209	2000	28-Jul-10	-72.8	-27.52	0.571	12.24	14.45	0.571	12.24	48.84	0	0.832	-237
60	2010	209	2100	28-Jul-10	-72.8	-29.38	0.385	353.4	10.05	0.385	353.4	36.53	0	0.841	-244
60	2010	209	2200	28-Jul-10	-72.8	-30.8	0.409	15.47	23.09	0.409	15.47	39.9	0	0.862	-585
60	2010	209	2300	28-Jul-10	-72.8	-32.65	0.447	13.2	20.61	0.447	13.2	39.75	0	0.863	-321
60	2010	209	2400	28-Jul-10	-72.8	-33.66	0.377	8.69	10.12	0.377	8.69	23	0	0.86	-515
60	2010	210	100	29-Jul-10	-72.8	-33.94	0.32	354.9	21.64	0.32	354.9	27.79	0	0.862	-323
60	2010	210	200	29-Jul-10	-72.8	-34.05	0.278	11.63	14.33	0.278	11.63	32.51	0	0.84	-314
60	2010	210	300	29-Jul-10	-72.8	-32.83	0.346	359.8	16.42	0.346	359.8	43.69	0	0.857	-244
60	2010	210	400	29-Jul-10	-72.8	-26.26	0.075	109.9	8.56	0.075	109.9	24.6	0	0.872	-319
60	2010	210	500	29-Jul-10	-72.8	-7.38	0.51	284.4	22.92	0.51	284.4	32.86	0	0.905	-211
60	2010	210	600	29-Jul-10	-72.8	19.35	1.367	275.2	27.31	1.367	275.2	35.51	0	0.879	-287
60	2010	210	700	29-Jul-10	-72.8	21.15	1.562	270	30.25	1.562	270	37.3	0	0.872	-210
60	2010	210	800	29-Jul-10	-72.8	21.11	1.564	254.2	34.3	1.564	254.2	39.41	0	0.868	-274
60	2010	210	900	29-Jul-10	-72.8	19.48	1.555	267.3	31.39	1.555	267.3	43.55	0	0.884	-280

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	210	1000	29-Jul-10	-72.8	19.1	1.693	260.7	28.61	1.693	260.7	40.55	0	0.88	-401
60	2010	210	1100	29-Jul-10	-72.8	20.17	1.278	200.2	31.43	1.278	200.2	54.05	0	0.875	-282
60	2010	210	1200	29-Jul-10	-72.8	15	1.015	163.9	34.73	1.015	163.9	54.76	0	0.874	-242
60	2010	210	1300	29-Jul-10	-72.8	2.245	2.294	354.2	26.79	2.294	354.2	46.92	2.032	0.801	-505
60	2010	210	1400	29-Jul-10	-72.8	0.548	0.495	199.1	20.55	0.495	199.1	44.37	0	0.853	-278
60	2010	210	1500	29-Jul-10	-72.8	11.7	0.379	222.7	16.06	0.379	222.7	33.39	0	0.869	-243
60	2010	210	1600	29-Jul-10	-72.8	17.87	0.604	219.2	19.23	0.604	219.2	25.32	0	0.878	-312
60	2010	210	1700	29-Jul-10	-72.8	14.31	0.252	208	10.68	0.252	208	20.5	0	0.896	-243
60	2010	210	1800	29-Jul-10	-72.8	3.518	0.397	27.1	22.19	0.397	27.1	35.02	0	0.84	-324
60	2010	210	1900	29-Jul-10	-72.8	-7.26	0.502	25.19	13.75	0.502	25.19	22.67	0	0.748	-280
60	2010	210	2000	29-Jul-10	-72.8	-16.17	0.333	354.7	14.79	0.333	354.7	26.19	0	0.836	-397
60	2010	210	2100	29-Jul-10	-72.8	-21.62	0.516	357.5	10.88	0.516	357.5	20.01	0	0.831	-280
60	2010	210	2200	29-Jul-10	-72.8	-25.14	0.593	345.4	16.27	0.593	345.4	39.51	0	0.817	-284
60	2010	210	2300	29-Jul-10	-72.8	-26.96	0.499	344.6	16.91	0.499	344.6	34.32	0	0.837	-327
60	2010	210	2400	29-Jul-10	-72.8	-27.41	0.327	340.3	19.96	0.327	340.3	36.45	0	0.841	-273
60	2010	211	100	30-Jul-10	-72.8	-28.16	0.336	345.3	4.248	0.336	345.3	12.38	0	0.851	-313
60	2010	211	200	30-Jul-10	-72.8	-28.63	0.252	4.512	13.48	0.252	4.512	31.46	0	0.827	-396
60	2010	211	300	30-Jul-10	-72.8	-27.25	0.175	347.4	12.22	0.175	347.4	34.54	0	0.844	-267
60	2010	211	400	30-Jul-10	-72.8	-22.96	0.397	340.3	11.44	0.397	340.3	18.12	0	0.852	-274
60	2010	211	500	30-Jul-10	-72.8	-6.189	0.885	294.6	26.1	0.885	294.6	34.45	0	0.85	-247
60	2010	211	600	30-Jul-10	-72.8	15.18	1.355	312.4	28.72	1.355	312.4	34.01	0	0.747	-284
60	2010	211	700	30-Jul-10	-72.8	19.4	1.269	274	38.74	1.269	274	46.07	0	0.792	-575
60	2010	211	800	30-Jul-10	-72.8	21.44	1.539	273.2	31.4	1.539	273.2	42.24	0	0.92	-392
60	2010	211	900	30-Jul-10	-72.8	23.33	1.382	289.3	31.09	1.382	289.3	38.49	0	0.879	-247
60	2010	211	1000	30-Jul-10	-72.8	25.58	1.099	221.9	43.04	1.099	221.9	54.82	0	0.872	-285
60	2010	211	1100	30-Jul-10	-72.8	27.85	0.913	247	41.32	0.913	247	65.88	0	0.885	-279
60	2010	211	1200	30-Jul-10	-72.8	30.5	1.198	229.4	37.68	1.198	229.4	56.05	0	0.612	-175
60	2010	211	1300	30-Jul-10	-72.8	33.3	1.091	161.3	37.69	1.091	161.3	58.52	0	0.832	-249
60	2010	211	1400	30-Jul-10	-72.8	34.43	1.883	148.5	34.98	1.883	148.5	37.79	0	0.923	-285
60	2010	211	1500	30-Jul-10	-72.8	33.59	1.48	198.3	27.5	1.48	198.3	34.61	0	0.911	-311
60	2010	211	1600	30-Jul-10	-72.8	31.22	1.621	228	27.33	1.621	228	32.26	0	0.909	-244
60	2010	211	1700	30-Jul-10	-72.8	23.71	1.76	270.5	21.32	1.76	270.5	21.97	0	0.894	-245
60	2010	211	1800	30-Jul-10	-72.8	7.13	0.84	315.5	14.49	0.84	315.5	27.29	0	0.869	-235
60	2010	211	1900	30-Jul-10	-72.8	-14.26	0.764	355.9	11.25	0.764	355.9	18.28	0	0.86	-233
60	2010	211	2000	30-Jul-10	-72.8	-24.83	0.565	348.1	16.77	0.565	348.1	21.45	0	0.854	-233
60	2010	211	2100	30-Jul-10	-72.8	-28.92	0.488	347.4	13.5	0.488	347.4	19.82	0	0.849	-211
60	2010	211	2200	30-Jul-10	-72.8	-30.49	0.441	345.6	14.58	0.441	345.6	18.3	0	0.848	-282
60	2010	211	2300	30-Jul-10	-72.8	-31.86	0.325	0.52	11.8	0.325	0.52	27.44	0	0.841	-282
60	2010	211	2400	30-Jul-10	-72.8	-33.06	0.25	353.9	12.93	0.25	353.9	20.96	0	0.835	-282
60	2010	212	100	31-Jul-10	-72.8	-31.78	0.2	356	16.03	0.2	356	32.55	0	0.841	-288
60	2010	212	200	31-Jul-10	-72.8	-30.85	0.209	356.2	7.75	0.209	356.2	18.42	0	0.699	-277
60	2010	212	300	31-Jul-10	-72.8	-27.47	0.224	353.3	15.41	0.224	353.3	31.33	0	0.686	-237
60	2010	212	400	31-Jul-10	-72.8	-21.02	0.114	35.2	17.89	0.114	35.2	26.64	0	1.02	-322
60	2010	212	500	31-Jul-10	-72.8	-4.209	0.942	270.1	22.46	0.942	270.1	28.44	0	0.868	-238
60	2010	212	600	31-Jul-10	-72.8	16.77	1.79	262.5	21.48	1.79	262.5	25.3	0	0.866	-276
60	2010	212	700	31-Jul-10	-72.8	18.83	1.625	248.4	27.36	1.625	248.4	29.46	0	0.871	-312
60	2010	212	800	31-Jul-10	-72.8	20.69	1.792	235.6	24.99	1.792	235.6	29.41	0	0.905	-318
60	2010	212	900	31-Jul-10	-72.8	24.82	1.034	231.9	38.59	1.034	231.9	54.01	0	2.66	0
60	2010	212	1000	31-Jul-10	-72.8	29.3	1.121	209.5	40.53	1.121	209.5	61.18	0	0.884	-279
60	2010	212	1100	31-Jul-10	-72.8	31.75	1.406	232.7	37.21	1.406	232.7	50.22	0	2.66	0
60	2010	212	1200	31-Jul-10	-72.8	33.76	1.436	244.5	37.48	1.436	244.5	62.28	0	0.782	-325
60	2010	212	1300	31-Jul-10	-72.8	36.26	1.294	168.3	37.59	1.294	168.3	56.08	0	2.66	0
60	2010	212	1400	31-Jul-10	-72.8	35.75	1.816	172.4	28.97	1.816	172.4	36.49	0	0.902	-312
60	2010	212	1500	31-Jul-10	-72.8	34.9	1.775	232	25.33	1.775	232	31.7	0	0.807	-273
60	2010	212	1600	31-Jul-10	-72.8	32.69	1.549	237.2	28.83	1.549	237.2	31.81	0	0.909	-246
60	2010	212	1700	31-Jul-10	-72.8	24.11	1.022	250.5	28.11	1.022	250.5	32.16	0	0.878	-244
60	2010	212	1800	31-Jul-10	-72.8	0.39	0.693	348.5	17.16	0.693	348.5	21.78	0	0.864	-240
60	2010	212	1900	31-Jul-10	-72.8	-20.43	0.775	20.49	15.83	0.775	20.49	24.96	0	0.854	-237
60	2010	212	2000	31-Jul-10	-72.8	-29.61	0.557	30.85	15.7	0.557	30.85	19.89	0	0.851	-241
60	2010	212	2100	31-Jul-10	-72.8	-33.8	0.255	0.295	10.27	0.255	0.295	24.43	0	0.846	-217
60	2010	212	2200	31-Jul-10	-72.8	-35.88	0.277	26.4	11.29	0.277	26.4	15.98	0	0.841	-243
60	2010	212	2300	31-Jul-10	-72.8	-36.73	0.337	0.731	6.692	0.337	0.731	16.59	0	0.84	-273
60	2010	212	2400	31-Jul-10	-72.8	-35.17	0.443	9.1	15.54	0.443	9.1	24.61	0	0.835	-248
60	2010	213	100	01-Aug-10	-72.8	-31.68	0.638	22.23	17.68	0.638	22.23	39.23	0	0.826	-324
60	2010	213	200	01-Aug-10	-72.8	-31.02	0.25	4.017	14.48	0.25	4.017	45.71	0	0.841	-285
60	2010	213	300	01-Aug-10	-72.8	-28.07	0.394	35.56	17.31	0.394	35.56	43.89	0	0.834	-279
60	2010	213	400	01-Aug-10	-72.8	-27.55	0.563	331.3	20.82	0.563	331.3	32.64	0	0.85	-284
60	2010	213	500	01-Aug-10	-72.8	-1.411	0.815	296.8	20.17	0.815	296.8	33.48	0	0.864	-238
60	2010	213	600	01-Aug-10	-72.8	17.32	1.152	282.5	25.3	1.152	282.5	31.98	0	0.479	-244
60	2010	213	700	01-Aug-10	-72.8	21.6	1.7	255.6	31.01	1.7	255.6	35.38	0	0.884	-285
60	2010	213	800	01-Aug-10	-72.8	22.3	2.455	260.6	26.77	2.455	260.6	29.85	0	2.66	0
60	2010	213	900	01-Aug-10	-72.8	23.1	2.64	264.1	24.85	2.64	264.1	27.1	0	0.873	-249
60	2010	213	1000	01-Aug-10	-72.8	20.44	2.11	250.9	29.33	2.11	250.9	30.83	0	0.881	-244
60	2010	213	1100	01-Aug-10	-72.8	21.64	2.903	257.6	23.75	2.903	257.6	25.57	0	2.66	0
60	2010	213	1200	01-Aug-10	-72.8	21.68	2.839	262.5	24.8	2.839	262.5	25.51	0	0.859	-238
60	2010	213	1300	01-Aug-10	-72.8	20.45	2.94	278.1	25.31	2.94	278.1	27.81	0	0.887	-285
60	2010	213	1400	01-Aug-10	-72.8	21.72	2.674	275.6	23.91	2.674	275.6	26.56	0	0.895	-210
60	2010	213	1500	01-Aug-10	-72.8	22.52	2.706	262.6	25.19	2.706	262.6	27.97	0	0.921	-442
60	2010	213	1600	01-Aug-10	-72.8	15.04	1.951	271.4	23.86	1.951	271.4	25.7	0	0.876	-211
60	2010	213	1700	01-Aug-10	-72.8	7.83	1.652	283	23.82	1.652	283	24.74	0	0.864	-283
60	2010	213	1800	01-Aug-10	-72.8	0.004	1.724	278.4	20.42	1.724	278.4	21.45	0	0.872	-241
60	2010	213	1900	01-Aug-10	-72.8	-4.578	0.841	312.5	21.65	0.841	312.5	29.45	0	0.85	-289
60	2010	213	2000	01-Aug-10	-72.8	-8.64	0.525	344.8	17.92	0.525	344.8	28.73	0	0.851	-241
60	2010	213	2100	01-Aug-10	-72.8	-9.06	0.396	321.8	11	0.396	321.8	22.17	0	0.759	-247
60	2010	213	2200	01-Aug-10	-72.8	-15.37	0.426	7.04	14.45	0.426	7.04	24.67	0	0.763	-280
60	2010	213	2300	01-Aug-10	-72.8	-23.36	0.385	8.83	12.97	0.385	8.83	24.87	0	0.831	-322
60	2010	213	2400	01-Aug-10	-72.8	-23.29	0.378	5.469	10.75	0.378	5.469	14.3	0	0.843	-275
60	2010	214	100	02-Aug-10	-72.8	-22.28	0.151	1.399	5.727	0.151	1.399	17.18	0	0.835	-270
60	2010	214	200	02-Aug-10	-72.8	-23.37	0.443	4.629	15.56	0.443	4.629	30.77	0	0.833	-239
60	2010	214	300	02-Aug-10	-72.8	-25.89	0.193	7.26	9	0.193	7.26	23.84	0	0.833	-240
60	2010	214	400	02-Aug-10	-72.8	-26.45	0.271	357.4	6.341	0.271	357.4	31.67	0	0.834	-276
60	2010	214	500	02-Aug-10	-72.8	-15.05	0.244	254.8	10.75	0.244	254.8	12.33	0	0.85	-273

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	214	600	02-Aug-10	-72.8	20.1	1.386	243	24	1.386	243	25.84	0	0.846	-269
60	2010	214	700	02-Aug-10	-72.8	20.74	1.63	243	22.88	1.63	243	25.18	0	0.872	-272
60	2010	214	800	02-Aug-10	-72.8	18.79	1.696	255.9	21.36	1.696	255.9	22.93	0	0.879	-232
60	2010	214	900	02-Aug-10	-72.8	21.16	1.648	227	24.28	1.648	227	33.38	0	0.93	-588
60	2010	214	1000	02-Aug-10	-72.8	24.55	1.509	237.4	28.84	1.509	237.4	37.21	0	0.876	-277
60	2010	214	1100	02-Aug-10	-72.8	29.18	1.772	212.8	30.69	1.772	212.8	42.31	0	0.886	-282
60	2010	214	1200	02-Aug-10	-72.8	29.87	2.459	354.8	31.94	2.459	354.8	46.8	8.89	0.854	-273
60	2010	214	1300	02-Aug-10	-72.8	-10.91	1.541	37.78	26.54	1.541	37.78	53.06	2.794	0.857	-279
60	2010	214	1400	02-Aug-10	-72.8	-12.32	0.831	356.6	18.35	0.831	356.6	38.88	0	0.742	-210
60	2010	214	1500	02-Aug-10	-72.8	-3.428	0.511	232.6	22.17	0.511	232.6	46.42	0	0.856	-289
60	2010	214	1600	02-Aug-10	-72.8	15.54	0.557	227.9	15.84	0.557	227.9	25.43	0	0.809	-283
60	2010	214	1700	02-Aug-10	-72.8	9.18	1.275	5.412	23.28	1.275	5.412	50.72	0	0.862	-244
60	2010	214	1800	02-Aug-10	-72.8	2.99	1.643	341.8	19.06	1.643	341.8	25.43	0	0.861	-245
60	2010	214	1900	02-Aug-10	-72.8	-5.519	0.772	348.2	23.11	0.772	348.2	55.53	0	0.856	-238
60	2010	214	2000	02-Aug-10	-72.8	-13.5	0.348	9.27	13.19	0.348	9.27	23.84	0	0.838	-275
60	2010	214	2100	02-Aug-10	-72.8	-21.2	0.535	358.9	17.47	0.535	358.9	24.95	0	0.831	-272
60	2010	214	2200	02-Aug-10	-72.8	-23.84	0.464	13.65	17.55	0.464	13.65	24.14	0	0.837	-315
60	2010	214	2300	02-Aug-10	-72.8	-26.26	0.678	16.37	10.27	0.678	16.37	30.99	0	0.751	-247
60	2010	214	2400	02-Aug-10	-72.8	-26.74	0.223	19.28	8.91	0.223	19.28	26.34	0	0.844	-592
60	2010	215	100	03-Aug-10	-72.8	-27.51	0.32	28.45	5.883	0.32	28.45	19.9	0	0.834	-518
60	2010	215	200	03-Aug-10	-72.8	-28.83	0.416	15.14	9.63	0.416	15.14	24.22	0	0.854	-247
60	2010	215	300	03-Aug-10	-72.8	-29.01	0.387	7.86	10.25	0.387	7.86	25.03	0	0.737	-237
60	2010	215	400	03-Aug-10	-72.8	-24.79	0.22	24.47	5.994	0.22	24.47	22.66	0	0.741	-236
60	2010	215	500	03-Aug-10	-72.8	-13.46	0.049	357.6	14.22	0.049	357.6	30.4	0	0.757	-356
60	2010	215	600	03-Aug-10	-72.8	11.35	0.097	294.9	8.98	0.097	294.9	20.12	0	0.853	-243
60	2010	215	700	03-Aug-10	-72.8	18.71	0.66	187	30.42	0.66	187	41.13	0	0.874	-276
60	2010	215	800	03-Aug-10	-72.8	21	0.726	164.5	27.7	0.726	164.5	46.62	0	0.881	-239
60	2010	215	900	03-Aug-10	-72.8	22.79	1.043	194.8	31.12	1.043	194.8	44.08	0	0.807	-246
60	2010	215	1000	03-Aug-10	-72.8	26.76	1.571	220.2	27.11	1.571	220.2	32.3	0	0.852	-405
60	2010	215	1100	03-Aug-10	-72.8	29.44	1.694	217.7	26.78	1.694	217.7	37.49	0	2.66	0
60	2010	215	1200	03-Aug-10	-72.8	31.37	1.631	211.9	28.88	1.631	211.9	38.42	0	0.816	-531
60	2010	215	1300	03-Aug-10	-72.8	32.91	1.69	247.3	26.71	1.69	247.3	30.36	0	0.81	-316
60	2010	215	1400	03-Aug-10	-72.8	33.39	1.218	270.6	25.92	1.218	270.6	37.1	0	0.821	-240
60	2010	215	1500	03-Aug-10	-72.8	34.21	1.931	256.5	25.61	1.931	256.5	30.16	0	0.81	-248
60	2010	215	1600	03-Aug-10	-72.8	31.36	0.916	282.6	17.55	0.916	282.6	31.79	0	0.866	-249
60	2010	215	1700	03-Aug-10	-72.8	24.44	0.382	301.8	12.46	0.382	301.8	20.18	0	0.73	-282
60	2010	215	1800	03-Aug-10	-72.8	12.49	0.365	5.083	23.98	0.365	5.083	35.21	0	0.838	-315
60	2010	215	1900	03-Aug-10	-72.8	-4.464	0.25	343.9	7.42	0.25	343.9	17.24	0	0.72	-372
60	2010	215	2000	03-Aug-10	-72.8	-16.46	0.269	13.41	4.78	0.269	13.41	15.49	0	0.843	-353
60	2010	215	2100	03-Aug-10	-72.8	-21.69	0.388	357.2	8.41	0.388	357.2	22.8	0	0.846	-396
60	2010	215	2200	03-Aug-10	-72.8	-24.47	0.414	12.1	8.98	0.414	12.1	19.38	0	0.845	-318
60	2010	215	2300	03-Aug-10	-72.8	-25.29	0.209	2.892	10.71	0.209	2.892	14.72	0	0.838	-442
60	2010	215	2400	03-Aug-10	-72.8	-26.94	0.237	0.814	6.663	0.237	0.814	13.44	0	0.839	-282
60	2010	216	100	04-Aug-10	-72.8	-28.57	0.26	350.1	8.25	0.26	350.1	23.52	0	0.787	-354
60	2010	216	200	04-Aug-10	-72.8	-29.61	0.221	325.6	1.143	0.221	325.6	3.674	0	0.847	-246
60	2010	216	300	04-Aug-10	-72.8	-29.29	0.182	353	3.01	0.182	353	7.53	0	0.84	-287
60	2010	216	400	04-Aug-10	-72.8	-25	0.165	16.4	2.407	0.165	16.4	9.4	0	0.754	-216
60	2010	216	500	04-Aug-10	-72.8	-12.33	0.028	357.9	1.536	0.028	357.9	11.11	0	0.767	-278
60	2010	216	600	04-Aug-10	-72.8	13.87	0.283	239.6	16.11	0.283	239.6	31.07	0	0.822	-577
60	2010	216	700	04-Aug-10	-72.8	20.15	0.388	225.9	25.17	0.388	225.9	44.47	0	0.799	-320
60	2010	216	800	04-Aug-10	-72.8	23.01	0.759	204.7	25.37	0.759	204.7	32.24	0	0.809	-279
60	2010	216	900	04-Aug-10	-72.8	25.43	1.147	179.6	29.2	1.147	179.6	34.04	0	0.885	-240
60	2010	216	1000	04-Aug-10	-72.8	27.45	1.237	185.7	30.64	1.237	185.7	44.42	0	2.66	0
60	2010	216	1100	04-Aug-10	-72.8	29.82	1.377	223.6	30.61	1.377	223.6	47.69	0	0.718	-239
60	2010	216	1200	04-Aug-10	-72.8	32.05	1.268	181.3	35.54	1.268	181.3	40.37	0	0.803	-355
60	2010	216	1300	04-Aug-10	-72.8	33.87	1.097	136.6	34.04	1.097	136.6	52.77	0	0.807	-249
60	2010	216	1400	04-Aug-10	-72.8	34.98	1.158	204.7	29.68	1.158	204.7	34.19	0	0.896	-279
60	2010	216	1500	04-Aug-10	-72.8	35.38	0.863	186.7	24.98	0.863	186.7	29.45	0	0.825	-285
60	2010	216	1600	04-Aug-10	-72.8	32.45	0.403	197.8	14	0.403	197.8	22.53	0	0.798	-274
60	2010	216	1700	04-Aug-10	-72.8	25.35	0.505	40.36	8.7	0.505	40.36	9.6	0	0.861	-280
60	2010	216	1800	04-Aug-10	-72.8	17.76	0.535	24.25	11.52	0.535	24.25	24.53	0	0.843	-285
60	2010	216	1900	04-Aug-10	-72.8	0.399	0.582	16.39	10.11	0.582	16.39	26.23	0	0.845	-244
60	2010	216	2000	04-Aug-10	-72.8	-12.14	0.675	24.3	9.28	0.675	24.3	12.16	0	0.836	-281
60	2010	216	2100	04-Aug-10	-72.8	-17.8	0.419	7.58	8.8	0.419	7.58	15.68	0	0.481	-203
60	2010	216	2200	04-Aug-10	-72.8	-20.93	0.324	347.9	7.06	0.324	347.9	12.22	0	0.841	-322
60	2010	216	2300	04-Aug-10	-72.8	-23.26	0.167	0.901	2.455	0.167	0.901	8.48	0	0.844	-280
60	2010	216	2400	04-Aug-10	-72.8	-24.78	0.107	0.381	0.046	0.107	0.381	0.084	0	0.76	-235
60	2010	217	100	05-Aug-10	-72.8	-25.6	0.261	357.6	5.58	0.261	357.6	13.56	0	0.766	-236
60	2010	217	200	05-Aug-10	-72.8	-25.43	0.231	12.53	4.982	0.231	12.53	17.98	0	0.843	-245
60	2010	217	300	05-Aug-10	-72.8	-24.68	0.17	347.6	3.512	0.17	347.6	16.75	0	0.746	-242
60	2010	217	400	05-Aug-10	-72.8	-20.28	0.122	347.6	5.848	0.122	347.6	16.99	0	0.757	-235
60	2010	217	500	05-Aug-10	-72.8	-8.21	0.014	173.6	0.945	0.014	173.6	14.15	0	0.773	-250
60	2010	217	600	05-Aug-10	-72.8	10.78	0.324	213.8	14.74	0.324	213.8	19.82	0	0.778	-212
60	2010	217	700	05-Aug-10	-72.8	18.92	0.545	180.7	28.59	0.545	180.7	43.79	0	0.783	-280
60	2010	217	800	05-Aug-10	-72.8	20.74	1.335	153.2	26.34	1.335	153.2	31.12	0	0.872	-243
60	2010	217	900	05-Aug-10	-72.8	22.38	1.342	142.2	22.49	1.342	142.2	25.04	0	0.845	-444
60	2010	217	1000	05-Aug-10	-72.8	22.81	1.174	138.3	24.91	1.174	138.3	27.84	0	0.877	-271
60	2010	217	1100	05-Aug-10	-72.8	22.53	0.987	136.8	24.89	0.987	136.8	27.54	0	0.884	-319
60	2010	217	1200	05-Aug-10	-72.8	22.14	0.995	143.3	24.63	0.995	143.3	36.5	0	0.884	-237
60	2010	217	1300	05-Aug-10	-72.8	21.96	0.635	142.2	24.75	0.635	142.2	30.22	0	0.88	-323
60	2010	217	1400	05-Aug-10	-72.8	21.34	0.444	136.1	20.29	0.444	136.1	35.26	0	0.881	-319
60	2010	217	1500	05-Aug-10	-72.8	19.63	0.216	51.71	7.19	0.216	51.71	24.03	0	0.88	-251
60	2010	217	1600	05-Aug-10	-72.8	16.41	0.283	44.58	15.9	0.283	44.58	40.19	0	0.879	-276
60	2010	217	1700	05-Aug-10	-72.8	16.63	0.787	54.7	18.02	0.787	54.7	53.81	0	0.875	-283
60	2010	217	1800	05-Aug-10	-72.8	5.139	0.547	9.19	10.99	0.547	9.19	25.51	0	0.838	-275
60	2010	217	1900	05-Aug-10	-72.8	-0.707	0.443	356.3	22.68	0.443	356.3	44.04	0	0.832	-313
60	2010	217	2000	05-Aug-10	-72.8	-3.719	0.439	41.65	11.38	0.439	41.65	43.21	0	0.826	-310
60	2010	217	2100	05-Aug-10	-72.8	-5.844	0.318	7.74	16.37	0.318	7.74	46.91	0	0.791	-267
60	2010	217	2200	05-Aug-10	-72.8	-8.27	0.917	66.2	16.59	0.917	66.2	21.89	0	0.835	-323
60	2010	217	2300	05-Aug-10	-72.8	-8.99	0.576	23.89	16	0.576	23.89	38.84	0	0.846	-319
60	2010	217	2400	05-Aug-10	-72.8	-14.77	0.535	0.118	12.87	0.535	0.118	24.37	0	0.849	-279
60	2010	218	100	06-Aug-10	-72.8	-14.56	0.404	16.89	12.07	0.404	16.89	30.05	0	0.859	-268

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	218	200	06-Aug-10	-72.8	-20.92	0.679	20.25	28.95	0.679	20.25	45.13	0	0.855	-242
60	2010	218	300	06-Aug-10	-72.8	-22.52	0.453	25.37	12.35	0.453	25.37	29.86	0	0.853	-275
60	2010	218	400	06-Aug-10	-72.8	-18.25	0.307	7.1	15.56	0.307	7.1	55.3	0	0.875	-367
60	2010	218	500	06-Aug-10	-72.8	-12.56	0.283	358.5	19.84	0.283	358.5	47.28	0	0.879	-243
60	2010	218	600	06-Aug-10	-72.8	-1.739	0.418	210.8	15.56	0.418	210.8	32.71	0	0.838	-275
60	2010	218	700	06-Aug-10	-72.8	13.42	0.571	220	20.69	0.571	220	33.61	0	0.855	-509
60	2010	218	800	06-Aug-10	-72.8	17.8	0.808	184.8	29.25	0.808	184.8	42.17	0	0.866	-442
60	2010	218	900	06-Aug-10	-72.8	19.8	1.922	145.4	24.65	1.922	145.4	27.37	0	0.9	-272
60	2010	218	1000	06-Aug-10	-72.8	21.64	1.689	158	31.25	1.689	158	35.5	0	0.406	-280
60	2010	218	1100	06-Aug-10	-72.8	21.33	1.252	184	35.04	1.252	184	40.31	0	0.965	-238
60	2010	218	1200	06-Aug-10	-72.8	21.51	1.903	161.8	28.6	1.903	161.8	29.78	0	0.879	-403
60	2010	218	1300	06-Aug-10	-72.8	17.8	1.207	180.7	35.05	1.207	180.7	38.52	0.254	0.901	-244
60	2010	218	1400	06-Aug-10	-72.8	14.7	1.087	118.5	27.17	1.087	118.5	31.34	0	0.78	-543
60	2010	218	1500	06-Aug-10	-72.8	11.38	0.793	108	22.99	0.793	108	26.34	0.254	0.865	-286
60	2010	218	1600	06-Aug-10	-72.8	5.129	1.163	117.4	24.44	1.163	117.4	29.17	0.508	0.827	-319
60	2010	218	1700	06-Aug-10	-72.8	0.311	1.249	73.9	20.74	1.249	73.9	26.68	0.508	0.763	-584
60	2010	218	1800	06-Aug-10	-72.8	-6.367	0.375	53.31	13.43	0.375	53.31	31.73	0	0.879	-240
60	2010	218	1900	06-Aug-10	-72.8	-9.41	0.455	28.1	9.77	0.455	28.1	19.44	0.254	0.875	-238
60	2010	218	2000	06-Aug-10	-72.8	-10.8	0.322	17.92	9.09	0.322	17.92	21.21	0	0.733	-370
60	2010	218	2100	06-Aug-10	-72.8	-11.31	0.399	47.6	7.04	0.399	47.6	14.6	0	0.876	-278
60	2010	218	2200	06-Aug-10	-72.8	-10.77	0.662	103.6	24.3	0.662	103.6	30.77	0	0.702	-246
60	2010	218	2300	06-Aug-10	-72.8	-9.62	1.175	350.4	24.69	1.175	350.4	29.09	0	0.869	-244
60	2010	218	2400	06-Aug-10	-72.8	-10.04	0.564	304.8	22.34	0.564	304.8	35.12	0.508	0.86	-247
60	2010	219	100	07-Aug-10	-72.8	-11.45	0.329	358.2	9.85	0.329	358.2	19.57	1.016	0.853	-243
60	2010	219	200	07-Aug-10	-72.8	-12.05	0.376	46.07	7.31	0.376	46.07	8.85	0.508	0.763	-507
60	2010	219	300	07-Aug-10	-72.8	-12.06	0.494	50.98	8.37	0.494	50.98	11.47	0.254	0.849	-239
60	2010	219	400	07-Aug-10	-72.8	-11.26	0.544	62.02	11.66	0.544	62.02	16.43	0	0.767	-273
60	2010	219	500	07-Aug-10	-72.8	-6.202	0.824	93.5	20.64	0.824	93.5	26.14	0	0.217	-212
60	2010	219	600	07-Aug-10	-72.8	0.477	0.923	123.9	32.01	0.923	123.9	44.08	0	0.709	-285
60	2010	219	700	07-Aug-10	-72.8	8.02	0.743	275.8	21.68	0.743	275.8	29.01	0	0.773	-316
60	2010	219	800	07-Aug-10	-72.8	13.31	1.371	278.1	25.19	1.371	278.1	28.11	0	0.846	-319
60	2010	219	900	07-Aug-10	-72.8	15.11	1.124	258.9	24.53	1.124	258.9	31.65	0	0.871	-368
60	2010	219	1000	07-Aug-10	-72.8	16.83	1.268	258	28.48	1.268	258	34.78	0	0.844	-278
60	2010	219	1100	07-Aug-10	-72.8	17.95	0.878	176.6	30.27	0.878	176.6	63.64	0	0.824	-362
60	2010	219	1200	07-Aug-10	-72.8	18.89	1.522	264	27.56	1.522	264	36.41	0	0.745	-246
60	2010	219	1300	07-Aug-10	-72.8	20.8	2.33	248.1	29.2	2.33	248.1	33.24	0	0.808	-403
60	2010	219	1400	07-Aug-10	-72.8	20.88	2.278	236.5	29.45	2.278	236.5	32.73	0	0.861	-205
60	2010	219	1500	07-Aug-10	-72.8	18.47	2.308	255.1	25.66	2.308	255.1	27.97	0	0.734	-241
60	2010	219	1600	07-Aug-10	-72.8	16.84	1.288	244.7	30.7	1.288	244.7	39.88	0	0.729	-250
60	2010	219	1700	07-Aug-10	-72.8	13.65	1.31	233.7	26.87	1.31	233.7	28.89	0	0.726	-242
60	2010	219	1800	07-Aug-10	-72.8	9.52	0.91	235.2	23.85	0.91	235.2	36.15	0	0.717	-241
60	2010	219	1900	07-Aug-10	-72.8	4.808	0.627	306.4	16.59	0.627	306.4	21.75	0	0.718	-247
60	2010	219	2000	07-Aug-10	-72.8	-0.716	0.617	315.4	13.58	0.617	315.4	22.15	0	0.716	-278
60	2010	219	2100	07-Aug-10	-72.8	-4.881	0.552	336	14.25	0.552	336	15.99	0	0.714	-319
60	2010	219	2200	07-Aug-10	-72.8	-3.528	0.982	308.6	18.28	0.982	308.6	21.94	0	0.711	-320
60	2010	219	2300	07-Aug-10	-72.8	-3.888	1.169	297.6	18.48	1.169	297.6	20.84	0	0.709	-532
60	2010	219	2400	07-Aug-10	-72.8	-7.53	1.308	290.8	18.66	1.308	290.8	21.8	0	0.698	-535
60	2010	220	100	08-Aug-10	-72.8	-17.99	0.406	347.2	23.24	0.406	347.2	36.88	0	0.712	-393
60	2010	220	200	08-Aug-10	-72.8	-28.57	0.552	19.74	18.16	0.552	19.74	34.46	0	0.769	-329
60	2010	220	300	08-Aug-10	-72.8	-32.81	0.524	329	17.95	0.524	329	27.01	0	0.803	-368
60	2010	220	400	08-Aug-10	-72.8	-28.46	0.552	308.3	18.86	0.552	308.3	20.52	0	0.812	-365
60	2010	220	500	08-Aug-10	-72.8	-5.408	1.314	283	26.23	1.314	283	31.67	0	0.83	-282
60	2010	220	600	08-Aug-10	-72.8	6.017	1.436	285.5	26.98	1.436	285.5	34.05	0	2.66	0
60	2010	220	700	08-Aug-10	-72.8	11	1.169	216.6	27.44	1.169	216.6	40.21	0	0.713	-449
60	2010	220	800	08-Aug-10	-72.8	13.69	1.777	255.7	28.4	1.777	255.7	40.48	0	0.83	-276
60	2010	220	900	08-Aug-10	-72.8	15.14	1.416	219.3	31.67	1.416	219.3	38.55	0	0.869	-278
60	2010	220	1000	08-Aug-10	-72.8	14.61	1.58	225.6	24.33	1.58	225.6	31.55	0	0.812	-323
60	2010	220	1100	08-Aug-10	-72.8	13.95	0.936	222.9	26.14	0.936	222.9	37.97	0	0.798	-254
60	2010	220	1200	08-Aug-10	-72.8	14.55	1.332	229.6	31.14	1.332	229.6	43.84	0	0.841	-357
60	2010	220	1300	08-Aug-10	-72.8	13.98	1.954	183.6	34.62	1.954	183.6	37.73	0	0.858	-563
60	2010	220	1400	08-Aug-10	-72.8	12.34	2.311	200.6	36	2.311	200.6	40.79	0	0.918	-235
60	2010	220	1500	08-Aug-10	-72.8	16.6	2.555	220	32.26	2.555	220	36.41	0	0.912	-209
60	2010	220	1600	08-Aug-10	-72.8	6.084	1.919	219.2	33.85	1.919	219.2	36.01	0	0.9	-283
60	2010	220	1700	08-Aug-10	-72.8	0.608	1.304	224.1	32.28	1.304	224.1	35.05	0	0.9	-274
60	2010	220	1800	08-Aug-10	-72.8	-4.53	1.5	275.4	25.2	1.5	275.4	27.93	0	0.896	-275
60	2010	220	1900	08-Aug-10	-72.8	-9.31	0.715	294.4	24.65	0.715	294.4	27.18	0	0.894	-318
60	2010	220	2000	08-Aug-10	-72.8	-13.15	0.79	304.5	20.52	0.79	304.5	23.7	0	0.884	-526
60	2010	220	2100	08-Aug-10	-72.8	-20.3	0.535	328.9	16.43	0.535	328.9	20.01	0	0.827	-285
60	2010	220	2200	08-Aug-10	-72.8	-28.65	0.479	354.1	11.58	0.479	354.1	20.94	0	0.193	-282
60	2010	220	2300	08-Aug-10	-72.8	-27.65	0.885	320.3	15.93	0.885	320.3	27.3	0	0.821	-320
60	2010	220	2400	08-Aug-10	-72.8	-25.29	0.688	323.7	11.09	0.688	323.7	15.77	0	0.828	-282
60	2010	221	100	09-Aug-10	-72.8	-24.85	0.404	325.4	12.09	0.404	325.4	22.08	0	0.828	-278
60	2010	221	200	09-Aug-10	-72.8	-27.23	0.587	343.8	9.57	0.587	343.8	16.41	0	0.831	-276
60	2010	221	300	09-Aug-10	-72.8	-30.36	0.352	340.8	7.65	0.352	340.8	10.53	0	0.847	-240
60	2010	221	400	09-Aug-10	-72.8	-32.99	0.554	354.2	9.12	0.554	354.2	12.2	0	0.847	-239
60	2010	221	500	09-Aug-10	-72.8	-11.08	1.273	322.8	22.91	1.273	322.8	27.73	0	0.881	-282
60	2010	221	600	09-Aug-10	-72.8	8.71	1.671	290.5	35.1	1.671	290.5	39.22	0	0.89	-243
60	2010	221	700	09-Aug-10	-72.8	14.2	2.54	262.7	25.6	2.54	262.7	27.38	0	0.857	-242
60	2010	221	800	09-Aug-10	-72.8	17.37	2.205	264.8	26.35	2.205	264.8	31.18	0	0.872	-208
60	2010	221	900	09-Aug-10	-72.8	19.99	2.513	256.4	24.33	2.513	256.4	27.55	0	0.859	-248
60	2010	221	1000	09-Aug-10	-72.8	21.02	2.468	268.2	30.3	2.468	268.2	33.15	0	2.66	0
60	2010	221	1100	09-Aug-10	-72.8	21.12	2.437	262.3	25.8	2.437	262.3	28.3	0	0.799	-287
60	2010	221	1200	09-Aug-10	-72.8	20.67	1.732	255	24.37	1.732	255	26.64	0	0.86	-238
60	2010	221	1300	09-Aug-10	-72.8	20.38	1.496	231.4	31.62	1.496	231.4	37.02	0	0.809	-349
60	2010	221	1400	09-Aug-10	-72.8	19.24	1.073	236.6	30.88	1.073	236.6	48.84	0	0.863	-398
60	2010	221	1500	09-Aug-10	-72.8	17.35	1.575	220.8	27.64	1.575	220.8	33.16	0	0.847	-365
60	2010	221	1600	09-Aug-10	-72.8	16.9	1.544	229.4	26.59	1.544	229.4	31.04	0	0.761	-355
60	2010	221	1700	09-Aug-10	-72.8	9.07	1.466	270.8	20.13	1.466	270.8	21.36	0	0.739	-271
60	2010	221	1800	09-Aug-10	-72.8	-10.29	0.807	318.1	15.68	0.807	318.1	26.85	0	0.686	-457
60	2010	221	1900	09-Aug-10	-72.8	-28.27	0.406	25.5	14.16	0.406	25.5	25.78	0	0.69	-243
60	2010	221	2000	09-Aug-10	-72.8	-34.74	0.363	16.01	10.24	0.363	16.01	21.28	0	0.822	-244
60	2010	221	2100	09-Aug-10	-72.8	-36.98	0.311	28.7	7.83	0.311	28.7	18.12	0	0.766	-282

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	221	2200	09-Aug-10	-72.8	-38.37	0.291	10.63	5.312	0.291	10.63	9.72	0	0.807	-363
60	2010	221	2300	09-Aug-10	-72.8	-39.43	0.262	19.02	5.316	0.262	19.02	10.06	0	0.678	-249
60	2010	221	2400	09-Aug-10	-72.8	-40.2	0.421	9.44	11.79	0.421	9.44	29.21	0	0.738	-245
60	2010	222	100	10-Aug-10	-72.8	-40.55	0.395	358	6.51	0.395	358	20.99	0	0.717	-555
60	2010	222	200	10-Aug-10	-72.8	-40.63	0.337	12.8	10.07	0.337	12.8	21.51	0	0.737	-284
60	2010	222	300	10-Aug-10	-72.8	-40.31	0.264	2.23	5.138	0.264	2.23	17.34	0	0.825	-433
60	2010	222	400	10-Aug-10	-72.8	-38.66	0.276	8.27	3.864	0.276	8.27	13.78	0	0.746	-252
60	2010	222	500	10-Aug-10	-72.8	-26.94	0.44	316.8	17.37	0.44	316.8	31.29	0	0.789	-454
60	2010	222	600	10-Aug-10	-72.8	7.43	1.039	244.9	29.23	1.039	244.9	32.74	0	0.849	-287
60	2010	222	700	10-Aug-10	-72.8	13.94	1.436	266.1	29.83	1.436	266.1	38.3	0	2.66	0
60	2010	222	800	10-Aug-10	-72.8	17.69	1.469	293.7	35.29	1.469	293.7	46.49	0	0.775	-283
60	2010	222	900	10-Aug-10	-72.8	21.3	1.287	121.2	34.04	1.287	121.2	53.74	0	0.858	-247
60	2010	222	1000	10-Aug-10	-72.8	24.16	1.766	263.8	30.79	1.766	263.8	41.08	0	0.89	-278
60	2010	222	1100	10-Aug-10	-72.8	26.22	1.805	247.4	37.62	1.805	247.4	49.35	0	0.871	-279
60	2010	222	1200	10-Aug-10	-72.8	28.36	2.098	247.7	31.16	2.098	247.7	34.56	0	0.903	-240
60	2010	222	1300	10-Aug-10	-72.8	28.31	1.71	223.4	27.5	1.71	223.4	32.94	0	0.883	-246
60	2010	222	1400	10-Aug-10	-72.8	26.22	1.765	239.5	25.18	1.765	239.5	30.88	0	0.881	-280
60	2010	222	1500	10-Aug-10	-72.8	22.27	2.815	266.7	21.68	2.815	266.7	22.27	0	0.7	-211
60	2010	222	1600	10-Aug-10	-72.8	19.64	2.119	261.8	23.64	2.119	261.8	24.73	0	0.876	-272
60	2010	222	1700	10-Aug-10	-72.8	13.67	1.306	271.7	23.23	1.306	271.7	24.25	0	0.859	-248
60	2010	222	1800	10-Aug-10	-72.8	7.29	0.995	289.5	24.06	0.995	289.5	26.26	0	0.77	-398
60	2010	222	1900	10-Aug-10	-72.8	0.053	1.437	285.4	19.63	1.437	285.4	22.08	0	0.725	-280
60	2010	222	2000	10-Aug-10	-72.8	-4.687	0.842	318.6	22.37	0.842	318.6	30.5	0	0.761	-287
60	2010	222	2100	10-Aug-10	-72.8	-20.89	0.5	15.73	17.34	0.5	15.73	23.92	0	0.71	-320
60	2010	222	2200	10-Aug-10	-72.8	-29.52	0.676	331.7	11.25	0.676	331.7	15.47	0	0.678	-212
60	2010	222	2300	10-Aug-10	-72.8	-31.79	0.527	327.7	13.95	0.527	327.7	18.77	0	0.675	-241
60	2010	222	2400	10-Aug-10	-72.8	-32.46	0.627	358	10.32	0.627	358	23.98	0	0.047	-320
60	2010	223	100	11-Aug-10	-72.8	-33.3	0.344	358.2	8.94	0.344	358.2	26.87	0	0.681	-282
60	2010	223	200	11-Aug-10	-72.8	-33.31	0.493	334.9	13.38	0.493	334.9	27.85	0	0.686	-294
60	2010	223	300	11-Aug-10	-72.8	-32.46	0.147	352.3	9.78	0.147	352.3	16.95	0	0.766	-273
60	2010	223	400	11-Aug-10	-72.8	-31.81	0.406	339.3	17.13	0.406	339.3	31.76	0	0.697	-273
60	2010	223	500	11-Aug-10	-72.8	-12.2	0.909	316.4	20.34	0.909	316.4	26.12	0	0.764	-401
60	2010	223	600	11-Aug-10	-72.8	14.91	1.296	285.3	30.59	1.296	285.3	39.07	0	0.858	-323
60	2010	223	700	11-Aug-10	-72.8	18.25	2.989	264.4	32.02	2.989	264.4	33.07	0	2.66	0
60	2010	223	800	11-Aug-10	-72.8	18.63	3.319	262	25.21	3.319	262	28.01	0	0.776	-327
60	2010	223	900	11-Aug-10	-72.8	20.8	2.818	264.5	27.66	2.818	264.5	30.2	0	2.66	0
60	2010	223	1000	11-Aug-10	-72.8	21.76	2.738	256.2	26.85	2.738	256.2	30.08	0	2.66	0
60	2010	223	1100	11-Aug-10	-72.8	23.92	2.765	237.3	31.13	2.765	237.3	35.75	0	2.66	0
60	2010	223	1200	11-Aug-10	-72.8	27.83	2.729	236.1	33.49	2.729	236.1	37.67	0	2.66	0
60	2010	223	1300	11-Aug-10	-72.8	28.55	2.96	239.2	29.88	2.96	239.2	34.11	0	2.66	0
60	2010	223	1400	11-Aug-10	-72.8	28.23	2.515	242.9	31.31	2.515	242.9	35.12	0	0.582	-198
60	2010	223	1500	11-Aug-10	-72.8	25.88	2.595	250.8	28.4	2.595	250.8	31.39	0	0.431	-239
60	2010	223	1600	11-Aug-10	-72.8	21.5	2.666	250.2	25.58	2.666	250.2	26.84	0	0.778	-281
60	2010	223	1700	11-Aug-10	-72.8	10.49	2.074	241.1	29.41	2.074	241.1	30.3	0	0.732	-276
60	2010	223	1800	11-Aug-10	-72.8	-6.983	1.049	268.9	29.96	1.049	268.9	36.64	0	0.813	-449
60	2010	223	1900	11-Aug-10	-72.8	-24.04	0.582	343.6	15.82	0.582	343.6	22.56	0	0.795	-323
60	2010	223	2000	11-Aug-10	-72.8	-34.19	0.364	13.67	19.54	0.364	13.67	35.26	0	0.809	-430
60	2010	223	2100	11-Aug-10	-72.8	-37.67	0.246	10.83	17.79	0.246	10.83	24.78	0	0.808	-291
60	2010	223	2200	11-Aug-10	-72.8	-38.33	0.837	330.9	18.22	0.837	330.9	22.46	0	0.798	-561
60	2010	223	2300	11-Aug-10	-72.8	-38.04	0.639	344.1	21.63	0.639	344.1	31.53	0	0.819	-328
60	2010	223	2400	11-Aug-10	-72.8	-38.35	0.671	358	15.54	0.671	358	18.22	0	0.825	-265
60	2010	224	100	12-Aug-10	-72.8	-38.79	0.377	0.771	13.68	0.377	0.771	23.65	0	0.813	-312
60	2010	224	200	12-Aug-10	-72.8	-39.42	0.667	2.98	12.25	0.667	2.98	15.91	0	0.824	-317
60	2010	224	300	12-Aug-10	-72.8	-38.95	0.756	0.607	18.91	0.756	0.607	31.98	0	0.826	-350
60	2010	224	400	12-Aug-10	-72.8	-36.94	0.79	345.1	11.77	0.79	345.1	20.17	0	0.837	-209
60	2010	224	500	12-Aug-10	-72.8	-19.33	1.214	323.8	18.08	1.214	323.8	21.13	0	0.85	-284
60	2010	224	600	12-Aug-10	-72.8	8.56	2.223	300.3	26.06	2.223	300.3	27.7	0	0.735	-290
60	2010	224	700	12-Aug-10	-72.8	11.22	2.671	267.2	27.32	2.671	267.2	31.5	0	0.862	-284
60	2010	224	800	12-Aug-10	-72.8	13.24	2.869	254.3	25.9	2.869	254.3	27.8	0	0.744	-275
60	2010	224	900	12-Aug-10	-72.8	18.08	3.141	255.3	24.89	3.141	255.3	26.47	0	2.66	0
60	2010	224	1000	12-Aug-10	-72.8	20.72	3.524	257.9	22.38	3.524	257.9	24.81	0	0.763	-239
60	2010	224	1100	12-Aug-10	-72.8	22.72	2.981	253.8	27.44	2.981	253.8	29.9	0	0.769	-471
60	2010	224	1200	12-Aug-10	-72.8	24.59	3.165	252.1	25.43	3.165	252.1	27.25	0	2.66	0
60	2010	224	1300	12-Aug-10	-72.8	24.3	3.532	253.6	23.64	3.532	253.6	27.36	0	0.783	-512
60	2010	224	1400	12-Aug-10	-72.8	22.6	3.574	259.8	22.11	3.574	259.8	23.73	0	2.66	0
60	2010	224	1500	12-Aug-10	-72.8	19.52	3.227	258	21.05	3.227	258	22.21	0	0.792	-314
60	2010	224	1600	12-Aug-10	-72.8	15.76	2.192	262.5	22.41	2.192	262.5	23.82	0	0.756	-282
60	2010	224	1700	12-Aug-10	-72.8	3.314	1.578	276.3	19.65	1.578	276.3	23.73	0	0.825	-366
60	2010	224	1800	12-Aug-10	-72.8	-19.97	0.515	338.6	11.77	0.515	338.6	20.13	0	0.751	-315
60	2010	224	1900	12-Aug-10	-72.8	-34.65	0.164	2.916	16.22	0.164	2.916	27.97	0	0.742	-326
60	2010	224	2000	12-Aug-10	-72.8	-39.56	0.405	354.6	15.96	0.405	354.6	26.67	0	0.767	-285
60	2010	224	2100	12-Aug-10	-72.8	-41.18	0.334	351	13.31	0.334	351	24.06	0	0.765	-317
60	2010	224	2200	12-Aug-10	-72.8	-41.69	0.446	15.93	9.22	0.446	15.93	20.37	0	0.783	-360
60	2010	224	2300	12-Aug-10	-72.8	-41.77	0.632	28.88	16.45	0.632	28.88	45.23	0	0.782	-391
60	2010	224	2400	12-Aug-10	-72.8	-41.75	0.294	356.4	6.57	0.294	356.4	18.58	0	0.79	-319
60	2010	225	100	13-Aug-10	-72.8	-41.91	0.263	12.26	11.7	0.263	12.26	22.78	0	0.804	-362
60	2010	225	200	13-Aug-10	-72.8	-42.04	0.26	5.242	7.16	0.26	5.242	16.91	0	0.808	-357
60	2010	225	300	13-Aug-10	-72.8	-42.01	0.316	353.8	11.41	0.316	353.8	20.51	0	0.82	-322
60	2010	225	400	13-Aug-10	-72.8	-40.89	0.237	357.3	5.257	0.237	357.3	19.42	0	0.826	-597
60	2010	225	500	13-Aug-10	-72.8	-29.41	0.199	356	8.86	0.199	356	12.37	0	0.797	-283
60	2010	225	600	13-Aug-10	-72.8	5.308	0.237	219.6	21.14	0.237	219.6	38.98	0	0.117	-360
60	2010	225	700	13-Aug-10	-72.8	9.62	1.269	185.6	27.07	1.269	185.6	35.18	0	0.75	-246
60	2010	225	800	13-Aug-10	-72.8	9.84	2.156	101.8	28.14	2.156	101.8	34.52	0	0.778	-412
60	2010	225	900	13-Aug-10	-72.8	15.39	1.232	134.3	45.09	1.232	134.3	58.44	0	0.843	-365
60	2010	225	1000	13-Aug-10	-72.8	19.31	1.246	168.6	38.28	1.246	168.6	52.79	0	0.755	-312
60	2010	225	1100	13-Aug-10	-72.8	21.14	1.389	198.8	37.7	1.389	198.8	62.83	0	2.66	0
60	2010	225	1200	13-Aug-10	-72.8	23.19	1.327	228	39.22	1.327	228	53	0	0.879	-366
60	2010	225	1300	13-Aug-10	-72.8	24.55	1.282	216.5	34.64	1.282	216.5	46.89	0	2.66	0
60	2010	225	1400	13-Aug-10	-72.8	24.59	1.513	262	29.09	1.513	262	39.94	0	0.782	-395
60	2010	225	1500	13-Aug-10	-72.8	23.22	1.464	245	22.9	1.464	245	28.93	0	0.889	-320
60	2010	225	1600	13-Aug-10	-72.8	20.5	0.686	232	23.91	0.686	232	31.86	0	0.779	-394
60	2010	225	1700	13-Aug-10	-72.8	6.076	0.248	344	9.9	0.248	344	14.26	0	0.844	-248

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	225	1800	13-Aug-10	-72.8	-16.93	0.781	46.81	19.69	0.781	46.81	33.97	0	0.844	-281
60	2010	225	1900	13-Aug-10	-72.8	-31.48	0.651	21.99	11.12	0.651	21.99	27.09	0	0.851	-284
60	2010	225	2000	13-Aug-10	-72.8	-37.33	0.467	14.28	5.196	0.467	14.28	12.33	0	0.851	-290
60	2010	225	2100	13-Aug-10	-72.8	-39.53	0.406	358.4	6.193	0.406	358.4	18.98	0	0.731	-360
60	2010	225	2200	13-Aug-10	-72.8	-40.42	0.289	355.3	5.558	0.289	355.3	16.11	0	0.786	-316
60	2010	225	2300	13-Aug-10	-72.8	-40.92	0.34	349.3	8.9	0.34	349.3	32.13	0	0.75	-318
60	2010	225	2400	13-Aug-10	-72.8	-40.98	0.235	344.6	3.28	0.235	344.6	7.77	0	0.777	-281
60	2010	226	100	14-Aug-10	-72.8	-40.9	0.223	348.9	4.425	0.223	348.9	8.74	0	0.779	-281
60	2010	226	200	14-Aug-10	-72.8	-40.74	0.236	347.3	1.997	0.236	347.3	8.26	0	0.797	-325
60	2010	226	300	14-Aug-10	-72.8	-40.62	0.258	336.6	0.084	0.258	336.6	0.123	0	0.781	-280
60	2010	226	400	14-Aug-10	-72.8	-39.23	0.222	336.6	0.061	0.222	336.6	0.081	0	0.793	-275
60	2010	226	500	14-Aug-10	-72.8	-25.93	0.174	331.1	2.74	0.174	331.1	6.623	0	0.852	-281
60	2010	226	600	14-Aug-10	-72.8	10.65	0.461	220.5	26.2	0.461	220.5	41.38	0	0.739	-313
60	2010	226	700	14-Aug-10	-72.8	14.46	0.83	196.8	30.53	0.83	196.8	41.36	0	0.751	-240
60	2010	226	800	14-Aug-10	-72.8	14.3	1.571	135.3	33.94	1.571	135.3	37.41	0	0.869	-273
60	2010	226	900	14-Aug-10	-72.8	17.6	1.849	142.3	30.58	1.849	142.3	34.03	0	0.806	-313
60	2010	226	1000	14-Aug-10	-72.8	22.58	1.62	135	32.76	1.62	135	43.38	0	2.66	0
60	2010	226	1100	14-Aug-10	-72.8	25.06	1.649	148.7	33.02	1.649	148.7	54.58	0	2.66	0
60	2010	226	1200	14-Aug-10	-72.8	26.64	1.54	164	42.43	1.54	164	55.06	0	0.829	-310
60	2010	226	1300	14-Aug-10	-72.8	27.05	1.634	180.5	31.25	1.634	180.5	38.86	0	0.898	-285
60	2010	226	1400	14-Aug-10	-72.8	26.49	1.329	171.4	30.03	1.329	171.4	44.19	0	0.876	-556
60	2010	226	1500	14-Aug-10	-72.8	25.32	1.197	174.8	34.5	1.197	174.8	63.26	0	0.797	-240
60	2010	226	1600	14-Aug-10	-72.8	21.88	1.144	127.7	30.02	1.144	127.7	38.12	0	0.801	-359
60	2010	226	1700	14-Aug-10	-72.8	8.94	0.596	67.2	16.34	0.596	67.2	19.98	0	0.801	-569
60	2010	226	1800	14-Aug-10	-72.8	-14.9	0.485	19.02	13.44	0.485	19.02	21.89	0	0.814	-276
60	2010	226	1900	14-Aug-10	-72.8	-29.79	0.629	20.32	8.08	0.629	20.32	12.03	0	0.738	-246
60	2010	226	2000	14-Aug-10	-72.8	-35.76	0.363	17.13	12.22	0.363	17.13	34.2	0	0.852	-322
60	2010	226	2100	14-Aug-10	-72.8	-38.66	0.359	359.9	14	0.359	359.9	19.24	0	0.865	-274
60	2010	226	2200	14-Aug-10	-72.8	-39.73	0.285	4.95	6.94	0.285	4.95	15.75	0	0.854	-285
60	2010	226	2300	14-Aug-10	-72.8	-40.11	0.301	352.2	8.05	0.301	352.2	18.05	0	0.737	-281
60	2010	226	2400	14-Aug-10	-72.8	-40.05	0.184	358.5	3.14	0.184	358.5	8.6	0	0.843	-312
60	2010	227	100	15-Aug-10	-72.8	-39.89	0.231	347.5	3.677	0.231	347.5	6.507	0	0.846	-270
60	2010	227	200	15-Aug-10	-72.8	-39.78	0.265	354.9	6.834	0.265	354.9	16.15	0	0.85	-244
60	2010	227	300	15-Aug-10	-72.8	-39.65	0.338	342.5	5.265	0.338	342.5	11.59	0	0.788	-313
60	2010	227	400	15-Aug-10	-72.8	-37.71	0.233	356.1	4.894	0.233	356.1	19.95	0	0.85	-250
60	2010	227	500	15-Aug-10	-72.8	-24.86	0.037	349.4	0.023	0.037	349.4	0.048	0	0.871	-398
60	2010	227	600	15-Aug-10	-72.8	12.8	0.329	208.1	23.39	0.329	208.1	33.47	0	0.783	-274
60	2010	227	700	15-Aug-10	-72.8	16.41	0.605	218.7	36.21	0.605	218.7	44.12	0	2.66	0
60	2010	227	800	15-Aug-10	-72.8	13.04	1.538	135.1	28.22	1.538	135.1	31.65	0	0.892	-271
60	2010	227	900	15-Aug-10	-72.8	16.38	1.925	139.3	25.48	1.925	139.3	26.77	0	2.66	0
60	2010	227	1000	15-Aug-10	-72.8	21.63	1.919	111.9	33.5	1.919	111.9	37.52	0	0.931	-239
60	2010	227	1100	15-Aug-10	-72.8	24.19	1.971	102.6	36.18	1.971	102.6	43.57	0	2.66	0
60	2010	227	1200	15-Aug-10	-72.8	25.85	1.689	95	43.89	1.689	95	53.44	0	0.789	-509
60	2010	227	1300	15-Aug-10	-72.8	25.38	1.498	82.4	47.26	1.498	82.4	56.77	0	0.91	-326
60	2010	227	1400	15-Aug-10	-72.8	24.26	1.82	111.6	33.82	1.82	111.6	41.93	0	0.801	-247
60	2010	227	1500	15-Aug-10	-72.8	21.32	1.768	121	24.56	1.768	121	29.87	0	0.806	-393
60	2010	227	1600	15-Aug-10	-72.8	15.13	1.058	234.6	32.38	1.058	234.6	38.16	0	0.704	-273
60	2010	227	1700	15-Aug-10	-72.8	0.912	0.446	352.3	12.4	0.446	352.3	19.11	0	0.797	-362
60	2010	227	1800	15-Aug-10	-72.8	-20.07	0.474	23.67	14.43	0.474	23.67	22.11	0	0.783	-287
60	2010	227	1900	15-Aug-10	-72.8	-32.17	0.837	37.26	20.61	0.837	37.26	27.75	0	0.77	-330
60	2010	227	2000	15-Aug-10	-72.8	-36.25	0.453	17.23	11.1	0.453	17.23	20.58	0	0.766	-366
60	2010	227	2100	15-Aug-10	-72.8	-38.13	0.467	14.44	15.02	0.467	14.44	24.18	0	0.853	-357
60	2010	227	2200	15-Aug-10	-72.8	-38.86	0.347	5.742	25.45	0.347	5.742	36.75	0	0.75	-447
60	2010	227	2300	15-Aug-10	-72.8	-38.86	0.272	354.4	13.94	0.272	354.4	19.95	0	0.769	-490
60	2010	227	2400	15-Aug-10	-72.8	-38.68	0.24	15.93	9.82	0.24	15.93	20.72	0	0.764	-326
60	2010	228	100	16-Aug-10	-72.8	-38.57	0.257	1.938	11.83	0.257	1.938	28.8	0	0.786	-537
60	2010	228	200	16-Aug-10	-72.8	-38.58	0.288	356.7	10.32	0.288	356.7	24.45	0	0.751	-454
60	2010	228	300	16-Aug-10	-72.8	-38.76	0.172	352.3	5.798	0.172	352.3	11.42	0	0.759	-281
60	2010	228	400	16-Aug-10	-72.8	-37.16	0.259	354.8	7.22	0.259	354.8	19.94	0	0.728	-325
60	2010	228	500	16-Aug-10	-72.8	-22.86	0.157	323.8	4.529	0.157	323.8	22.94	0	0.782	-247
60	2010	228	600	16-Aug-10	-72.8	15.99	0.539	259.8	21.52	0.539	259.8	31.53	0	0.713	-270
60	2010	228	700	16-Aug-10	-72.8	15.09	1.488	281.9	26.8	1.488	281.9	29.73	0	2.66	0
60	2010	228	800	16-Aug-10	-72.8	8.79	0.89	243.2	39	0.89	243.2	60.9	0	2.66	0
60	2010	228	900	16-Aug-10	-72.8	12.23	1.058	220.4	32.62	1.058	220.4	49.32	0	0.445	-285
60	2010	228	1000	16-Aug-10	-72.8	15.27	1.293	206.4	41.22	1.293	206.4	50.98	0	0.74	-316
60	2010	228	1100	16-Aug-10	-72.8	19.41	1.654	258.6	32.71	1.654	258.6	43.72	0	0.764	-289
60	2010	228	1200	16-Aug-10	-72.8	21.23	2.214	252.5	30.53	2.214	252.5	33.93	0	0.76	-235
60	2010	228	1300	16-Aug-10	-72.8	21	2.057	246.6	29.79	2.057	246.6	33.33	0	0.887	-278
60	2010	228	1400	16-Aug-10	-72.8	19.17	2.422	256.1	24.17	2.422	256.1	28.71	0	0.708	-301
60	2010	228	1500	16-Aug-10	-72.8	10.63	2.349	264.8	22.16	2.349	264.8	22.79	0	0.758	-248
60	2010	228	1600	16-Aug-10	-72.8	4.237	1.654	266	21.98	1.654	266	22.89	0	0.742	-281
60	2010	228	1700	16-Aug-10	-72.8	-11.21	0.379	353.1	12.88	0.379	353.1	19.68	0	0.766	-318
60	2010	228	1800	16-Aug-10	-72.8	-28.15	0.393	2.2	18.45	0.393	2.2	25.16	0	0.857	-327
60	2010	228	1900	16-Aug-10	-72.8	-36.53	0.647	8.41	11.76	0.647	8.41	17.01	0	0.713	-277
60	2010	228	2000	16-Aug-10	-72.8	-39.64	0.256	15.95	10.33	0.256	15.95	20.8	0	0.712	-353
60	2010	228	2100	16-Aug-10	-72.8	-41.52	0.438	5.171	13.96	0.438	5.171	18.91	0	0.706	-276
60	2010	228	2200	16-Aug-10	-72.8	-42.85	0.386	1.17	9.41	0.386	1.17	31.26	0	0.702	-280
60	2010	228	2300	16-Aug-10	-72.8	-43.3	0.308	353.4	8.3	0.308	353.4	13.49	0	0.695	-286
60	2010	228	2400	16-Aug-10	-72.8	-43.3	0.301	352.4	13.61	0.301	352.4	25.42	0	0.691	-324
60	2010	229	100	17-Aug-10	-72.8	-43.15	0.323	351.1	12.43	0.323	351.1	28.63	0	0.197	-321
60	2010	229	200	17-Aug-10	-72.8	-42.83	0.292	348.3	7.79	0.292	348.3	26.61	0	0.851	-279
60	2010	229	300	17-Aug-10	-72.8	-42.21	0.325	333.7	2.52	0.325	333.7	18.14	0	0.844	-434
60	2010	229	400	17-Aug-10	-72.8	-40.57	0.271	345.1	6.125	0.271	345.1	16.64	0	0.687	-248
60	2010	229	500	17-Aug-10	-72.8	-31.15	0.153	318.9	8.41	0.153	318.9	11.36	0	0.872	-415
60	2010	229	600	17-Aug-10	-72.8	3.656	1.054	257.3	19.55	1.054	257.3	23.57	0	0.496	-325
60	2010	229	700	17-Aug-10	-72.8	3.636	0.996	237.5	34.11	0.996	237.5	38.03	0	2.66	0
60	2010	229	800	17-Aug-10	-72.8	1.498	1.455	247.3	31.7	1.455	247.3	42.16	0	0.881	-278
60	2010	229	900	17-Aug-10	-72.8	5.843	1.133	227.4	34.67	1.133	227.4	41.42	0	2.66	0
60	2010	229	1000	17-Aug-10	-72.8	9.83	1.369	264.1	34.21	1.369	264.1	57.17	0	2.66	0
60	2010	229	1100	17-Aug-10	-72.8	13.55	1.458	275.8	34.47	1.458	275.8	46.32	0	0.745	-275
60	2010	229	1200	17-Aug-10	-72.8	16.96	1.172	228	43.78	1.172	228	56.16	0	0.793	-513
60	2010	229	1300	17-Aug-10	-72.8	18.63	1.701	242.9	30	1.701	242.9	41.3	0	0.756	-479

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	229	1400	17-Aug-10	-72.8	17.1	1.973	232.4	31.05	1.973	232.4	37.16	0	0.812	-241
60	2010	229	1500	17-Aug-10	-72.8	12.63	1.813	211.8	33.57	1.813	211.8	37.53	0	0.75	-578
60	2010	229	1600	17-Aug-10	-72.8	6.112	1.887	223.1	28.95	1.887	223.1	32.15	0	0.773	-252
60	2010	229	1700	17-Aug-10	-72.8	-9.01	0.946	283.2	27.65	0.946	283.2	36.56	0	0.869	-280
60	2010	229	1800	17-Aug-10	-72.8	-29.04	0.635	339.4	22.19	0.635	339.4	24.47	0	0.72	-286
60	2010	229	1900	17-Aug-10	-72.8	-38.11	0.701	11.86	11.22	0.701	11.86	23.07	0	0.854	-365
60	2010	229	2000	17-Aug-10	-72.8	-41.2	0.539	28.43	13.75	0.539	28.43	36.88	0	0.753	-356
60	2010	229	2100	17-Aug-10	-72.8	-42.59	0.535	28.27	9.74	0.535	28.27	13.4	0	0.759	-452
60	2010	229	2200	17-Aug-10	-72.8	-43.16	0.541	15.64	13.5	0.541	15.64	31.44	0	0.851	-275
60	2010	229	2300	17-Aug-10	-72.8	-43.2	0.433	15.86	12.38	0.433	15.86	31.71	0	0.849	-247
60	2010	229	2400	17-Aug-10	-72.8	-43.32	0.573	347	16.98	0.573	347	40.33	0	0.711	-250
60	2010	230	100	18-Aug-10	-72.8	-43.16	0.39	352	11.97	0.39	352	23.75	0	0.705	-275
60	2010	230	200	18-Aug-10	-72.8	-42.44	0.367	8.79	9.49	0.367	8.79	27.55	0	0.723	-285
60	2010	230	300	18-Aug-10	-72.8	-40.19	0.158	36.63	10	0.158	36.63	11.37	0	0.849	-243
60	2010	230	400	18-Aug-10	-72.8	-35.73	0.43	18.26	16.66	0.43	18.26	50.73	0	0.854	-355
60	2010	230	500	18-Aug-10	-72.8	-30.14	0.353	50.55	17.04	0.353	50.55	54.45	0	0.71	-244
60	2010	230	600	18-Aug-10	-72.8	-15.25	0.784	350.8	26.3	0.784	350.8	57.93	0	0.752	-277
60	2010	230	700	18-Aug-10	-72.8	10.19	1.265	121.8	31.61	1.265	121.8	45.9	0	0.766	-282
60	2010	230	800	18-Aug-10	-72.8	0.071	1.748	176.4	40.05	1.748	176.4	43.61	0	0.765	-289
60	2010	230	900	18-Aug-10	-72.8	-9.75	3.043	205.5	35.62	3.043	205.5	38.89	0	0.773	-246
60	2010	230	1000	18-Aug-10	-72.8	-17.13	2.726	188.5	38.03	2.726	188.5	40.03	0	0.779	-311
60	2010	230	1100	18-Aug-10	-72.8	-16.61	3.129	171.6	31.69	3.129	171.6	35.74	0	2.66	0
60	2010	230	1200	18-Aug-10	-72.8	-17.47	3.325	203.8	32.99	3.325	203.8	35.15	0	2.66	0
60	2010	230	1300	18-Aug-10	-72.8	-18.92	3.393	206.1	32.2	3.393	206.1	35.19	0	0.883	-283
60	2010	230	1400	18-Aug-10	-72.8	-23.23	3.407	207.9	33.59	3.407	207.9	37.41	0	0.705	-300
60	2010	230	1500	18-Aug-10	-72.8	-30.54	3.224	232.1	32.8	3.224	232.1	35.25	0	0.728	-274
60	2010	230	1600	18-Aug-10	-72.8	-37.26	3.899	251.6	25.28	3.899	251.6	26.39	0	0.746	-273
60	2010	230	1700	18-Aug-10	-72.8	-42.27	2.464	235.8	32.59	2.464	235.8	34.4	0	0.875	-321
60	2010	230	1800	18-Aug-10	-72.8	-44.62	1.967	235.9	32.63	1.967	235.9	35.2	0	0.718	-489
60	2010	230	1900	18-Aug-10	-72.8	-45.48	1.154	277.3	20.86	1.154	277.3	27.77	0	0.864	-291
60	2010	230	2000	18-Aug-10	-72.8	-45.96	1.207	303.2	18.2	1.207	303.2	20.21	0	0.753	-313
60	2010	230	2100	18-Aug-10	-72.8	-46.23	0.591	299.8	19	0.591	299.8	28.49	0	0.833	-362
60	2010	230	2200	18-Aug-10	-72.8	-46.08	1.156	292	19.94	1.156	292	25.5	0	0.837	-245
60	2010	230	2300	18-Aug-10	-72.8	-46.11	0.623	328.8	12.46	0.623	328.8	15.63	0	0.824	-241
60	2010	230	2400	18-Aug-10	-72.8	-46.21	0.686	344.3	7.53	0.686	344.3	21.42	0	0.82	-284
60	2010	231	100	19-Aug-10	-72.8	-45.99	0.821	319.8	13.7	0.821	319.8	16.31	0	0.822	-283
60	2010	231	200	19-Aug-10	-72.8	-45.42	0.641	342.9	8.31	0.641	342.9	16.66	0	0.821	-276
60	2010	231	300	19-Aug-10	-72.8	-45.18	0.549	344	11.32	0.549	344	21.83	0	0.821	-274
60	2010	231	400	19-Aug-10	-72.8	-44.67	0.564	353.7	9.17	0.564	353.7	15.4	0	0.826	-244
60	2010	231	500	19-Aug-10	-72.8	-42.01	0.879	302.5	19.36	0.879	302.5	21.43	0	0.843	-243
60	2010	231	600	19-Aug-10	-72.8	-34.97	1.537	288.2	29.64	1.537	288.2	36.7	0	0.714	-275
60	2010	231	700	19-Aug-10	-72.8	-34.07	2.237	273.7	28.45	2.237	273.7	34.56	0	0.84	-248
60	2010	231	800	19-Aug-10	-72.8	-37.19	2.078	253.9	26.67	2.078	253.9	31.67	0	0.736	-281
60	2010	231	900	19-Aug-10	-72.8	-39.8	1.907	251.4	27.36	1.907	251.4	33.95	0	0.856	-274
60	2010	231	1000	19-Aug-10	-72.8	-40.26	2.88	250.1	25.53	2.88	250.1	27.44	0	0.851	-276
60	2010	231	1100	19-Aug-10	-72.8	-36.63	2.904	240	29.43	2.904	240	31.62	0	0.748	-277
60	2010	231	1200	19-Aug-10	-72.8	-40.31	2.771	241	28.73	2.771	241	31.28	0	0.734	-243
60	2010	231	1300	19-Aug-10	-72.8	-41.15	2.506	250.6	25.53	2.506	250.6	28.72	0	0.852	-408
60	2010	231	1400	19-Aug-10	-72.8	-40.61	2.108	276	26.2	2.108	276	28.75	0	0.759	-320
60	2010	231	1500	19-Aug-10	-72.8	-41.5	2.167	260.6	26.7	2.167	260.6	29.34	0	0.753	-319
60	2010	231	1600	19-Aug-10	-72.8	-42.48	2.073	247.5	25.02	2.073	247.5	27.22	0	0.875	-285
60	2010	231	1700	19-Aug-10	-72.8	-44.08	1.623	260.8	29.64	1.623	260.8	31.92	0	0.74	-362
60	2010	231	1800	19-Aug-10	-72.8	-44.98	0.789	288.9	21.5	0.789	288.9	24.95	0	0.719	-359
60	2010	231	1900	19-Aug-10	-72.8	-45.66	0.481	341.6	11.82	0.481	341.6	20.06	0	0.836	-246
60	2010	231	2000	19-Aug-10	-72.8	-46.1	0.491	24.05	7.96	0.491	24.05	16.93	0	0.822	-250
60	2010	231	2100	19-Aug-10	-72.8	-46.19	0.459	15.78	12.03	0.459	15.78	19.54	0	0.825	-244
60	2010	231	2200	19-Aug-10	-72.8	-46.06	0.502	18.56	12.23	0.502	18.56	17.72	0	0.827	-238
60	2010	231	2300	19-Aug-10	-72.8	-45.65	0.161	357.4	5.157	0.161	357.4	16.7	0	0.829	-240
60	2010	231	2400	19-Aug-10	-72.8	-44.45	0.441	356.6	4.986	0.441	356.6	12.53	0	0.736	-315
60	2010	232	100	20-Aug-10	-72.8	-43.11	0.245	332.8	4.915	0.245	332.8	11.44	0	0.838	-238
60	2010	232	200	20-Aug-10	-72.8	-42.95	0.302	346.8	6.871	0.302	346.8	16.06	0	0.83	-237
60	2010	232	300	20-Aug-10	-72.8	-44.23	0.282	4.749	4.83	0.282	4.749	15.77	0	0.822	-239
60	2010	232	400	20-Aug-10	-72.8	-44.99	0.603	24.6	8.84	0.603	24.6	12.6	0	0.824	-239
60	2010	232	500	20-Aug-10	-72.8	-42.43	0.689	343.9	14.5	0.689	343.9	19.39	0	0.247	-318
60	2010	232	600	20-Aug-10	-72.8	-30.77	1.112	316.6	32.41	1.112	316.6	40.71	0	0.763	-241
60	2010	232	700	20-Aug-10	-72.8	-29.9	1.643	275.4	36.57	1.643	275.4	48.37	0	0.85	-215
60	2010	232	800	20-Aug-10	-72.8	-37.27	1.771	270.8	30.81	1.771	270.8	40.22	0	0.843	-240
60	2010	232	900	20-Aug-10	-72.8	-39.1	2.236	256.2	23.97	2.236	256.2	29	0	0.713	-322
60	2010	232	1000	20-Aug-10	-72.8	-38.72	1.145	266.8	36.59	1.145	266.8	62.67	0	0.741	-247
60	2010	232	1100	20-Aug-10	-72.8	-38.31	1.357	306.3	38.27	1.357	306.3	75.1	0	0.842	-274
60	2010	232	1200	20-Aug-10	-72.8	-38.31	1.275	262.5	28.45	1.275	262.5	60.7	0	0.724	-315
60	2010	232	1300	20-Aug-10	-72.8	-39.8	1.015	209.8	30.37	1.015	209.8	49.77	0	0.726	-249
60	2010	232	1400	20-Aug-10	-72.8	-40.58	0.895	229.6	29.03	0.895	229.6	53.41	0	0.737	-277
60	2010	232	1500	20-Aug-10	-72.8	-40.37	1.547	182.6	30.58	1.547	182.6	57.69	0	0.732	-278
60	2010	232	1600	20-Aug-10	-72.8	-41.24	0.624	211.6	17.04	0.624	211.6	46.4	0	0.715	-282
60	2010	232	1700	20-Aug-10	-72.8	-43.77	0.764	52.71	11.79	0.764	52.71	21.21	0	0.73	-315
60	2010	232	1800	20-Aug-10	-72.8	-45.48	1.279	52.69	18.14	1.279	52.69	24.69	0	0.827	-314
60	2010	232	1900	20-Aug-10	-72.8	-45.98	0.673	38.67	15.09	0.673	38.67	31.38	0	0.826	-357
60	2010	232	2000	20-Aug-10	-72.8	-45.69	0.636	27.22	12.08	0.636	27.22	27.12	0	0.832	-244
60	2010	232	2100	20-Aug-10	-72.8	-45.12	0.262	13.35	8.5	0.262	13.35	21.56	0	0.831	-273
60	2010	232	2200	20-Aug-10	-72.8	-44.64	0.442	328.9	11.73	0.442	328.9	21.33	0	0.835	-247
60	2010	232	2300	20-Aug-10	-72.8	-44.26	0.208	13.13	9.54	0.208	13.13	22.28	0	0.836	-211
60	2010	232	2400	20-Aug-10	-72.8	-44.08	0.31	358.9	9.01	0.31	358.9	31.76	0	0.831	-245
60	2010	233	100	21-Aug-10	-72.8	-44.07	0.102	0.991	1.873	0.102	0.991	3.767	0	0.828	-273
60	2010	233	200	21-Aug-10	-72.8	-44.33	0.202	8.57	7.53	0.202	8.57	12.88	0	0.734	-321
60	2010	233	300	21-Aug-10	-72.8	-44.63	0.281	356.7	5.408	0.281	356.7	16.3	0	0.823	-272
60	2010	233	400	21-Aug-10	-72.8	-43.76	0.203	10.93	5.05	0.203	10.93	15.65	0	0.836	-245
60	2010	233	500	21-Aug-10	-72.8	-39.82	0.303	270.7	14.16	0.303	270.7	21.58	0	0.847	-244
60	2010	233	600	21-Aug-10	-72.8	-28.84	0.951	285	27.74	0.951	285	34.22	0	2.66	0
60	2010	233	700	21-Aug-10	-72.8	-25.22	1.394	258.5	31.42	1.394	258.5	40.55	0	0.735	-325
60	2010	233	800	21-Aug-10	-72.8	-28.62	2.09	247.1	24.98	2.09	247.1	27.06	0	0.127	-319
60	2010	233	900	21-Aug-10	-72.8	-31.35	1.363	233.5	38.14	1.363	233.5	62.96	0	2.66	0

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	233	1000	21-Aug-10	-72.8	-32.68	1.499	179	30.37	1.499	179	43.46	0	2.66	0
60	2010	233	1100	21-Aug-10	-72.8	-36.23	1.428	141.8	27.57	1.428	141.8	40.57	0	2.66	0
60	2010	233	1200	21-Aug-10	-72.8	-38.29	1.153	215.5	29.47	1.153	215.5	41.74	0	0.849	-245
60	2010	233	1300	21-Aug-10	-72.8	-39.13	0.912	179.1	27.94	0.912	179.1	40.01	0	0.746	-277
60	2010	233	1400	21-Aug-10	-72.8	-38.21	1.12	187.4	31.74	1.12	187.4	40.9	0	0.865	-244
60	2010	233	1500	21-Aug-10	-72.8	-40.54	0.902	237.6	28.73	0.902	237.6	46.23	0	0.851	-312
60	2010	233	1600	21-Aug-10	-72.8	-41.63	1.307	277.8	18.49	1.307	277.8	22.64	0	0.712	-317
60	2010	233	1700	21-Aug-10	-72.8	-42.24	0.226	348.9	15.8	0.226	348.9	34.15	0	0.698	-322
60	2010	233	1800	21-Aug-10	-72.8	-42.57	0.976	310.7	18.39	0.976	310.7	21.18	0	0.716	-359
60	2010	233	1900	21-Aug-10	-72.8	-43.05	0.779	334.4	14.87	0.779	334.4	20.36	0	0.739	-355
60	2010	233	2000	21-Aug-10	-72.8	-43.51	0.228	5.077	2.195	0.228	5.077	4.989	0	0.837	-244
60	2010	233	2100	21-Aug-10	-72.8	-43.94	0.388	341.5	5.214	0.388	341.5	9.67	0	0.839	-241
60	2010	233	2200	21-Aug-10	-72.8	-43.99	0.278	339.2	10.9	0.278	339.2	14.85	0	0.837	-239
60	2010	233	2300	21-Aug-10	-72.8	-43.88	0.291	9.08	6.084	0.291	9.08	17.86	0	0.835	-244
60	2010	233	2400	21-Aug-10	-72.8	-43.76	0.286	334.3	10.98	0.286	334.3	14.03	0	0.834	-245
60	2010	234	100	22-Aug-10	-72.8	-43.57	0.238	7.26	5.859	0.238	7.26	13.67	0	0.829	-241
60	2010	234	200	22-Aug-10	-72.8	-43.97	0.24	0.992	4.869	0.24	0.992	27.26	0	0.822	-272
60	2010	234	300	22-Aug-10	-72.8	-44.66	0.285	354	5.618	0.285	354	15.64	0	0.818	-242
60	2010	234	400	22-Aug-10	-72.8	-44.57	0.519	321.7	12.71	0.519	321.7	31.24	0	0.819	-244
60	2010	234	500	22-Aug-10	-72.8	-42.55	0.308	348.2	9.11	0.308	348.2	16.94	0	0.842	-282
60	2010	234	600	22-Aug-10	-72.8	-25.23	1.443	288.8	30.82	1.443	288.8	40.05	0	0.71	-443
60	2010	234	700	22-Aug-10	-72.8	-20.65	2.207	274.8	26.32	2.207	274.8	30.63	0	2.66	0
60	2010	234	800	22-Aug-10	-72.8	-23.17	1.906	263.1	31.03	1.906	263.1	45.72	0	0.747	-280
60	2010	234	900	22-Aug-10	-72.8	-28.99	2.147	238.1	27	2.147	238.1	31.26	0	0.731	-278
60	2010	234	1000	22-Aug-10	-72.8	-31.62	1.814	288	30.66	1.814	288	34.56	0	0.692	-358
60	2010	234	1100	22-Aug-10	-72.8	-34.53	1.551	302.2	29.3	1.551	302.2	34.72	0	2.66	0
60	2010	234	1200	22-Aug-10	-72.8	-32.48	1.562	295.6	28.19	1.562	295.6	39.09	0	2.66	0
60	2010	234	1300	22-Aug-10	-72.8	-36	2.422	276.8	27.5	2.422	276.8	30.15	0	0.747	-318
60	2010	234	1400	22-Aug-10	-72.8	-37.4	3.034	263	23.56	3.034	263	25.6	0	2.66	0
60	2010	234	1500	22-Aug-10	-72.8	-38.88	2.265	264.6	26.36	2.265	264.6	28.48	0	0.713	-286
60	2010	234	1600	22-Aug-10	-72.8	-38.93	2.38	270.3	23.44	2.38	270.3	25.65	0	0.848	-397
60	2010	234	1700	22-Aug-10	-72.8	-40.76	1.286	256.7	22.44	1.286	256.7	29.75	0	0.849	-248
60	2010	234	1800	22-Aug-10	-72.8	-41.79	0.731	322.1	16.2	0.731	322.1	23.4	0	0.708	-409
60	2010	234	1900	22-Aug-10	-72.8	-42.88	0.669	341.1	19.04	0.669	341.1	23.19	0	0.837	-244
60	2010	234	2000	22-Aug-10	-72.8	-43.66	0.369	22.45	19.63	0.369	22.45	36.39	0	0.83	-238
60	2010	234	2100	22-Aug-10	-72.8	-44.67	0.575	40.25	7.25	0.575	40.25	13.76	0	0.824	-243
60	2010	234	2200	22-Aug-10	-72.8	-44.61	0.512	32.47	12.49	0.512	32.47	20.56	0	0.615	-200
60	2010	234	2300	22-Aug-10	-72.8	-44.39	0.549	30.39	11.72	0.549	30.39	22.42	0	0.812	-247
60	2010	234	2400	22-Aug-10	-72.8	-44.22	0.214	25.58	4.258	0.214	25.58	19.55	0	0.646	-325
60	2010	235	100	23-Aug-10	-72.8	-44.48	0.349	22.86	7.34	0.349	22.86	14.59	0	0.696	-485
60	2010	235	200	23-Aug-10	-72.8	-44.55	0.468	26.7	8.04	0.468	26.7	18.97	0	0.806	-276
60	2010	235	300	23-Aug-10	-72.8	-44.58	0.452	19.05	7.19	0.452	19.05	14.49	0	0.675	-362
60	2010	235	400	23-Aug-10	-72.8	-44.32	0.386	19.98	7.34	0.386	19.98	18.48	0	0.696	-327
60	2010	235	500	23-Aug-10	-72.8	-41.35	0.25	331.4	8.36	0.25	331.4	24.15	0	1.018	-287
60	2010	235	600	23-Aug-10	-72.8	-22.97	1.396	99.4	30.13	1.396	99.4	33.97	0	2.66	0
60	2010	235	700	23-Aug-10	-72.8	-20.89	2.327	113.1	29.32	2.327	113.1	31.67	0	0.327	-359
60	2010	235	800	23-Aug-10	-72.8	-26.12	2.118	100.4	30.7	2.118	100.4	34.69	0	0.655	-307
60	2010	235	900	23-Aug-10	-72.8	-32.86	1.386	99.6	29.7	1.386	99.6	31.04	0.254	0.67	-537
60	2010	235	1000	23-Aug-10	-72.8	-34.92	1.864	103	32.54	1.864	103	33.85	0.254	0.661	-215
60	2010	235	1100	23-Aug-10	-72.8	-32.34	1.83	100.7	31.81	1.83	100.7	34.28	0.254	0.843	-353
60	2010	235	1200	23-Aug-10	-72.8	-32.57	1.708	96.9	33.47	1.708	96.9	34.79	0.254	0.835	-283
60	2010	235	1300	23-Aug-10	-72.8	-31.42	1.865	96.4	32.96	1.865	96.4	33.7	0	0.846	-239
60	2010	235	1400	23-Aug-10	-72.8	-30.44	1.714	92.7	33.45	1.714	92.7	35.52	0	0.736	-321
60	2010	235	1500	23-Aug-10	-72.8	-29.41	1.726	94	36.75	1.726	94	37.3	0	0.74	-319
60	2010	235	1600	23-Aug-10	-72.8	-29.62	1.443	93.6	31.82	1.443	93.6	32.77	0	0.68	-282
60	2010	235	1700	23-Aug-10	-72.8	-29.6	1.564	93.3	29.78	1.564	93.3	29.9	0	0.72	-324
60	2010	235	1800	23-Aug-10	-72.8	-32.33	1.324	81.5	24.96	1.324	81.5	26.03	0.508	0.834	-247
60	2010	235	1900	23-Aug-10	-72.8	-31.78	1.441	87.4	27.82	1.441	87.4	28.05	0	0.838	-318
60	2010	235	2000	23-Aug-10	-72.8	-31.24	1.548	93.8	28.63	1.548	93.8	29.71	0	0.843	-240
60	2010	235	2100	23-Aug-10	-72.8	-29.62	1.903	96.3	27.71	1.903	96.3	28.66	0	0.841	-317
60	2010	235	2200	23-Aug-10	-72.8	-28.2	1.997	96.5	31.97	1.997	96.5	32.32	0	0.783	-279
60	2010	235	2300	23-Aug-10	-72.8	-27.27	1.853	103.9	29.76	1.853	103.9	30.45	0	0.83	-319
60	2010	235	2400	23-Aug-10	-72.8	-26.68	2.013	105.3	27.14	2.013	105.3	28.45	0	0.738	-274
60	2010	236	100	24-Aug-10	-72.8	-26.61	2.071	109.9	32.07	2.071	109.9	32.57	0	0.749	-272
60	2010	236	200	24-Aug-10	-72.8	-26.97	2.073	106.7	30.91	2.073	106.7	31.98	0	2.66	0
60	2010	236	300	24-Aug-10	-72.8	-26.19	2.267	102.3	30.68	2.267	102.3	31.11	0	0.636	-202
60	2010	236	400	24-Aug-10	-72.8	-24.93	2.042	114	34.04	2.042	114	34.54	0	0.735	-277
60	2010	236	500	24-Aug-10	-72.8	-23.23	2.153	105	31.67	2.153	105	32.58	0	2.66	0
60	2010	236	600	24-Aug-10	-72.8	-19.31	2.433	95.8	31.86	2.433	95.8	33.24	0	0.477	-232
60	2010	236	700	24-Aug-10	-72.8	-14.6	2.24	96.7	33.02	2.24	96.7	34.79	0	0.84	-317
60	2010	236	800	24-Aug-10	-72.8	-5.159	2.508	106.7	35.43	2.508	106.7	36.39	0	0.428	-244
60	2010	236	900	24-Aug-10	-72.8	0.66	2.556	110.4	35.49	2.556	110.4	36.3	0	0.745	-288
60	2010	236	1000	24-Aug-10	-72.8	-0.857	2.601	112.6	31.25	2.601	112.6	32.51	0	0.843	-355
60	2010	236	1100	24-Aug-10	-72.8	-3.489	2.666	106.1	34.58	2.666	106.1	34.82	0	0.654	-236
60	2010	236	1200	24-Aug-10	-72.8	3.366	3.117	107.7	28.47	3.117	107.7	30.01	0	0.855	-246
60	2010	236	1300	24-Aug-10	-72.8	4.596	2.989	104.8	32.01	2.989	104.8	33.53	0	2.66	0
60	2010	236	1400	24-Aug-10	-72.8	2.994	2.644	107.4	32.2	2.644	107.4	33.06	0	0.67	-238
60	2010	236	1500	24-Aug-10	-72.8	-3.542	2.372	98.7	30.29	2.372	98.7	31.32	0.254	0.853	-313
60	2010	236	1600	24-Aug-10	-72.8	-15.37	1.983	98.2	30.22	1.983	98.2	31.34	0	0.656	-287
60	2010	236	1700	24-Aug-10	-72.8	-18.38	1.74	89.1	28.46	1.74	89.1	29.2	0.508	0.667	-238
60	2010	236	1800	24-Aug-10	-72.8	-19.6	1.872	88.7	24.88	1.872	88.7	25.48	0	0.647	-199
60	2010	236	1900	24-Aug-10	-72.8	-20.67	1.289	83.5	21.51	1.289	83.5	23.09	0	0.652	-228
60	2010	236	2000	24-Aug-10	-72.8	-23.64	1.367	91.1	24.05	1.367	91.1	24.68	0	0.698	-443
60	2010	236	2100	24-Aug-10	-72.8	-23.53	1.252	89.7	25.23	1.252	89.7	26.58	0	0.77	-322
60	2010	236	2200	24-Aug-10	-72.8	-25.94	0.377	11.33	25.28	0.377	11.33	36.58	0	0.755	-281
60	2010	236	2300	24-Aug-10	-72.8	-32.16	0.404	353.9	8.76	0.404	353.9	27.96	0	0.731	-319
60	2010	236	2400	24-Aug-10	-72.8	-34.45	0.44	0.261	7.85	0.44	0.261	17.61	0	0.717	-276
60	2010	237	100	25-Aug-10	-72.8	-34.94	0.558	354.6	9.39	0.558	354.6	22.35	0	0.636	-232
60	2010	237	200	25-Aug-10	-72.8	-34.35	0.417	32.52	7.91	0.417	32.52	16.49	0	0.744	-249
60	2010	237	300	25-Aug-10	-72.8	-30.55	0.445	43.05	6.587	0.445	43.05	21.04	0	0.743	-241
60	2010	237	400	25-Aug-10	-72.8	-26.56	0.23	322.3	7.4	0.23	322.3	22.16	0.508	0.834	-283
60	2010	237	500	25-Aug-10	-72.8	-20.8	0.13	282.4	12.91	0.13	282.4	29.2	0.254	0.76	-317

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)				
60	2010	237	600	25-Aug-10	-72.8	-16.26	0.49	214.7	20.48	0.49	214.7	37.88	0	0.843	-243
60	2010	237	700	25-Aug-10	-72.8	-13.9	0.691	95.1	22.64	0.691	95.1	32.76	0	2.66	0
60	2010	237	800	25-Aug-10	-72.8	-9.16	1.372	238.4	30.63	1.372	238.4	40.92	0	0.767	-358
60	2010	237	900	25-Aug-10	-72.8	-8.92	1.204	256	22.76	1.204	256	27.13	0	0.698	-321
60	2010	237	1000	25-Aug-10	-72.8	5.802	1.185	211.3	34.94	1.185	211.3	44.06	0	0.723	-274
60	2010	237	1100	25-Aug-10	-72.8	5.131	1.56	245.3	27.37	1.56	245.3	43.94	3.556	0.853	-241
60	2010	237	1200	25-Aug-10	-72.8	-6.811	0.89	15.79	21.25	0.89	15.79	31.6	0	0.772	-326
60	2010	237	1300	25-Aug-10	-72.8	6.802	0.937	272.4	35.45	0.937	272.4	40.83	0	0.775	-281
60	2010	237	1400	25-Aug-10	-72.8	12.12	1.025	232	34.09	1.025	232	53.68	0	0.788	-309
60	2010	237	1500	25-Aug-10	-72.8	3.698	1.291	244.7	21.82	1.291	244.7	34.8	1.27	0.761	-209
60	2010	237	1600	25-Aug-10	-72.8	-15.38	0.549	355.8	18.41	0.549	355.8	41.49	0.508	0.766	-287
60	2010	237	1700	25-Aug-10	-72.8	-21.6	0.608	94.8	20.93	0.608	94.8	40.28	0	0.671	-253
60	2010	237	1800	25-Aug-10	-72.8	-28.81	0.87	63.13	21.39	0.87	63.13	41.78	0	0.742	-274
60	2010	237	1900	25-Aug-10	-72.8	-33.61	1.062	37.02	23.61	1.062	37.02	59.67	0	0.824	-245
60	2010	237	2000	25-Aug-10	-72.8	-32.8	0.425	36.58	18.82	0.425	36.58	36.9	0	0.811	-359
60	2010	237	2100	25-Aug-10	-72.8	-30.94	0.547	39.03	11.19	0.547	39.03	22.44	0	0.782	-371
60	2010	237	2200	25-Aug-10	-72.8	-33.48	0.585	23.23	7.58	0.585	23.23	36.31	0	0.76	-362
60	2010	237	2300	25-Aug-10	-72.8	-36.07	0.403	13.96	8.29	0.403	13.96	29.91	0	0.761	-398
60	2010	237	2400	25-Aug-10	-72.8	-33.51	0.444	341.2	7.8	0.444	341.2	14.67	0	0.812	-273
60	2010	238	100	26-Aug-10	-72.8	-31.08	0.473	39.94	7.79	0.473	39.94	21.02	0	0.826	-244
60	2010	238	200	26-Aug-10	-72.8	-28.46	0.211	16.3	3.101	0.211	16.3	8.96	0	0.82	-269
60	2010	238	300	26-Aug-10	-72.8	-26.46	0.289	352	4.971	0.289	352	10.17	0	0.826	-282
60	2010	238	400	26-Aug-10	-72.8	-24.12	0.215	325	11.47	0.215	325	18.2	0	0.828	-322
60	2010	238	500	26-Aug-10	-72.8	-20.36	0.501	285	17.02	0.501	285	21.56	0	0.822	-242
60	2010	238	600	26-Aug-10	-72.8	-9.72	1.202	296.2	27.72	1.202	296.2	33.33	0	0.837	-244
60	2010	238	700	26-Aug-10	-72.8	3.819	1.413	274.8	27.71	1.413	274.8	32.97	0	0.768	-209
60	2010	238	800	26-Aug-10	-72.8	6.935	1.481	263.4	23.64	1.481	263.4	30.29	0	0.764	-242
60	2010	238	900	26-Aug-10	-72.8	8.87	1.159	203.1	32.83	1.159	203.1	44.43	0	0.234	-279
60	2010	238	1000	26-Aug-10	-72.8	7.76	1.032	164.7	30.92	1.032	164.7	40.9	0	0.775	-239
60	2010	238	1100	26-Aug-10	-72.8	2.426	1.077	10.06	25.86	1.077	10.06	55.62	0.508	0.769	-238
60	2010	238	1200	26-Aug-10	-72.8	1.317	1.214	67.42	29.19	1.214	67.42	51.58	0	0.763	-283
60	2010	238	1300	26-Aug-10	-72.8	6.99	1.159	242.9	28.56	1.159	242.9	45.49	0	0.745	-316
60	2010	238	1400	26-Aug-10	-72.8	-0.957	1.602	278.4	24.35	1.602	278.4	32.68	0.254	0.758	-319
60	2010	238	1500	26-Aug-10	-72.8	-6.778	1.496	232.6	26.66	1.496	232.6	33.87	0	0.757	-446
60	2010	238	1600	26-Aug-10	-72.8	-7.23	1.409	247.5	28.98	1.409	247.5	34.01	0	0.74	-282
60	2010	238	1700	26-Aug-10	-72.8	-21.81	0.931	289.9	24.1	0.931	289.9	26.39	0	0.746	-270
60	2010	238	1800	26-Aug-10	-72.8	-36.66	0.469	350.9	14.36	0.469	350.9	20.93	0	0.738	-522
60	2010	238	1900	26-Aug-10	-72.8	-40.75	0.523	13.37	10.93	0.523	13.37	16.82	0	0.765	-436
60	2010	238	2000	26-Aug-10	-72.8	-42.35	0.56	34.3	7.08	0.56	34.3	11.11	0	0.728	-280
60	2010	238	2100	26-Aug-10	-72.8	-42.91	0.582	27.91	7.78	0.582	27.91	13.53	0	0.756	-320
60	2010	238	2200	26-Aug-10	-72.8	-42.93	0.414	20.95	8.42	0.414	20.95	21.15	0	0.728	-270
60	2010	238	2300	26-Aug-10	-72.8	-42.74	0.297	25.56	6.151	0.297	25.56	19.69	0	0.721	-244
60	2010	238	2400	26-Aug-10	-72.8	-42.57	0.302	21.29	9.93	0.302	21.29	17.28	0	0.698	-312
60	2010	239	100	27-Aug-10	-72.8	-42.39	0.311	17.83	12.62	0.311	17.83	22.95	0	0.701	-320
60	2010	239	200	27-Aug-10	-72.8	-42.13	0.275	7.07	7.01	0.275	7.07	17.22	0	0.816	-249
60	2010	239	300	27-Aug-10	-72.8	-40.59	0.194	0.708	4.727	0.194	0.708	14.87	0	0.815	-316
60	2010	239	400	27-Aug-10	-72.8	-38.34	0.121	26.07	3.819	0.121	26.07	10.19	0	0.816	-282
60	2010	239	500	27-Aug-10	-72.8	-34.98	0.098	34.61	4.756	0.098	34.61	7.29	0	0.634	-208
60	2010	239	600	27-Aug-10	-72.8	-27.72	0.078	211.5	13.58	0.078	211.5	25.76	0	0.276	-279
60	2010	239	700	27-Aug-10	-72.8	-13.8	1.099	286.4	30.48	1.099	286.4	43.16	0	0.818	-519
60	2010	239	800	27-Aug-10	-72.8	-0.82	1.894	283.9	25.22	1.894	283.9	29.44	0	0.655	-244
60	2010	239	900	27-Aug-10	-72.8	2.689	2.016	254	24.66	2.016	254	26.11	0	0.655	-450
60	2010	239	1000	27-Aug-10	-72.8	4.944	2.178	241.1	29.43	2.178	241.1	34.1	0	2.66	0
60	2010	239	1100	27-Aug-10	-72.8	9.33	2.67	253.6	26.9	2.67	253.6	33.87	0	2.66	0
60	2010	239	1200	27-Aug-10	-72.8	7.58	3.041	259.8	24.1	3.041	259.8	25.24	0	0.657	-194
60	2010	239	1300	27-Aug-10	-72.8	12.56	2.844	248.1	26.96	2.844	248.1	29.14	0	2.66	0
60	2010	239	1400	27-Aug-10	-72.8	10.15	2.808	244.4	28.28	2.808	244.4	30.07	0	0.659	-202
60	2010	239	1500	27-Aug-10	-72.8	9.59	2.971	243	28.01	2.971	243	30.3	0	0.885	-325
60	2010	239	1600	27-Aug-10	-72.8	2.73	1.969	243.2	29.04	1.969	243.2	31.25	0	0.242	-245
60	2010	239	1700	27-Aug-10	-72.8	-8.99	1.2	260.4	27.46	1.2	260.4	30.15	0	0.636	-206
60	2010	239	1800	27-Aug-10	-72.8	-29.66	0.468	330.9	13.67	0.468	330.9	22.19	0	0.614	-176
60	2010	239	1900	27-Aug-10	-72.8	-39.67	0.343	10.88	11.82	0.343	10.88	18.7	0	0.638	-292
60	2010	239	2000	27-Aug-10	-72.8	-42.05	0.549	15.42	5.375	0.549	15.42	14.87	0	0.619	-234
60	2010	239	2100	27-Aug-10	-72.8	-42.77	0.377	9.43	13.03	0.377	9.43	23.43	0	0.835	-284
60	2010	239	2200	27-Aug-10	-72.8	-43.16	0.231	353.7	6.244	0.231	353.7	17.62	0	0.642	-212
60	2010	239	2300	27-Aug-10	-72.8	-43.32	0.305	10.97	6.258	0.305	10.97	11.52	0	0.639	-245
60	2010	239	2400	27-Aug-10	-72.8	-43.09	0.348	12.84	11.35	0.348	12.84	17.57	0	0.634	-272
60	2010	240	100	28-Aug-10	-72.8	-42.56	0.317	9.71	18.95	0.317	9.71	28.45	0	0.645	-241
60	2010	240	200	28-Aug-10	-72.8	-42.03	0.354	19.14	13.03	0.354	19.14	25.7	0	0.658	-286
60	2010	240	300	28-Aug-10	-72.8	-42.06	0.2	0.303	6.497	0.2	0.303	19.66	0	0.677	-363
60	2010	240	400	28-Aug-10	-72.8	-41.57	0.227	1.421	12.46	0.227	1.421	25.59	0	0.621	-272
60	2010	240	500	28-Aug-10	-72.8	-37.6	0.44	359.3	17.13	0.44	359.3	36.06	0	0.628	-207
60	2010	240	600	28-Aug-10	-72.8	-19.26	0.83	348.6	23.5	0.83	348.6	38.52	0	0.648	-203
60	2010	240	700	28-Aug-10	-72.8	2.729	0.927	276.8	38.68	0.927	276.8	56.26	0	0.644	-204
60	2010	240	800	28-Aug-10	-72.8	10.07	1.726	258.7	31.47	1.726	258.7	45.69	0	0.68	-243
60	2010	240	900	28-Aug-10	-72.8	15.73	1.904	226.8	30.08	1.904	226.8	38.41	0	0.665	-195
60	2010	240	1000	28-Aug-10	-72.8	20.73	1.713	228.6	31.16	1.713	228.6	37.18	0	0.653	-196
60	2010	240	1100	28-Aug-10	-72.8	23.61	1.643	230.1	29.79	1.643	230.1	34.29	0	0.691	-255
60	2010	240	1200	28-Aug-10	-72.8	22.5	1.714	274.3	29.88	1.714	274.3	44.86	0	2.66	0
60	2010	240	1300	28-Aug-10	-72.8	20.82	0.971	231.5	27.81	0.971	231.5	38.18	0	0.672	-267
60	2010	240	1400	28-Aug-10	-72.8	18.68	1.587	186.7	24.18	1.587	186.7	41.14	0	0.8	-528
60	2010	240	1500	28-Aug-10	-72.8	6.623	1.23	98.3	26.07	1.23	98.3	39.42	0	2.66	0
60	2010	240	1600	28-Aug-10	-72.8	5.164	0.875	199.8	23.47	0.875	199.8	35.83	0	0.758	-319
60	2010	240	1700	28-Aug-10	-72.8	-5.829	2.782	334.9	25.35	2.782	334.9	29.01	0	0.753	-311
60	2010	240	1800	28-Aug-10	-72.8	-18.03	1.131	283.8	22.33	1.131	283.8	38.78	0	0.748	-284
60	2010	240	1900	28-Aug-10	-72.8	-27.35	0.683	66.06	19.36	0.683	66.06	56.21	0	0.661	-321
60	2010	240	2000	28-Aug-10	-72.8	-31.15	0.625	61.11	23.28	0.625	61.11	53.38	0	0.645	-275
60	2010	240	2100	28-Aug-10	-72.8	-32.1	0.296	9.85	9.79	0.296	9.85	32.27	0	0.643	-272
60	2010	240	2200	28-Aug-10	-72.8	-31.9	0.33	45.19	8.98	0.33	45.19	26.65	0	0.657	-240
60	2010	240	2300	28-Aug-10	-72.8	-32.14	0.309	27.77	4.505	0.309	27.77	19.25	0.254	0.64	-232
60	2010	240	2400	28-Aug-10	-72.8	-31.8	0.386	26.96	15.34	0.386	26.96	27.93	0	0.205	-357
60	2010	241	100	29-Aug-10	-72.8	-32.73	0.211	25.24	5.06	0.211	25.24	11.77	0	0.641	-276

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	241	200	29-Aug-10	-72.8	-37.13	0.277	14.38	6.678	0.277	14.38	17.92	0	0.83	-433
60	2010	241	300	29-Aug-10	-72.8	-40.75	0.196	6.283	9.29	0.196	6.283	12.66	0	0.635	-236
60	2010	241	400	29-Aug-10	-72.8	-39.78	0.466	14.19	10.32	0.466	14.19	17.5	0	0.62	-235
60	2010	241	500	29-Aug-10	-72.8	-31.79	0.431	30.35	7.25	0.431	30.35	18.16	0	0.64	-255
60	2010	241	600	29-Aug-10	-72.8	-11.06	0.128	34.13	18.25	0.128	34.13	34.97	0	0.633	-206
60	2010	241	700	29-Aug-10	-72.8	4.36	1.005	183	33.4	1.005	183	45.8	0	0.661	-234
60	2010	241	800	29-Aug-10	-72.8	6.318	0.66	29.28	22.73	0.66	29.28	46.71	0	0.65	-200
60	2010	241	900	29-Aug-10	-72.8	5.459	0.736	336	24.56	0.736	336	35.86	0	0.652	-181
60	2010	241	1000	29-Aug-10	-72.8	14.23	1.851	15.45	27.87	1.851	15.45	34.95	0	0.658	-199
60	2010	241	1100	29-Aug-10	-72.8	7.68	1.901	39.72	31.71	1.901	39.72	54.56	0	0.677	-245
60	2010	241	1200	29-Aug-10	-72.8	1.599	1.102	108	30.46	1.102	108	37.08	0	0.744	-316
60	2010	241	1300	29-Aug-10	-72.8	-7.33	0.762	49.42	22.26	0.762	49.42	61.79	0	0.644	-199
60	2010	241	1400	29-Aug-10	-72.8	-0.659	0.442	183.2	17.22	0.442	183.2	46.08	0	0.654	-196
60	2010	241	1500	29-Aug-10	-72.8	6.208	1.264	241.1	28.65	1.264	241.1	36.25	0	0.8	-282
60	2010	241	1600	29-Aug-10	-72.8	0.714	1.142	262.1	17.79	1.142	262.1	22.42	0	0.76	-277
60	2010	241	1700	29-Aug-10	-72.8	-12.57	0.339	337.5	8.49	0.339	337.5	23.15	0.254	0.659	-341
60	2010	241	1800	29-Aug-10	-72.8	-28.26	0.418	4.27	12.71	0.418	4.27	29.15	0	0.789	-326
60	2010	241	1900	29-Aug-10	-72.8	-36.67	0.396	359	11.16	0.396	359	22.83	0	0.795	-288
60	2010	241	2000	29-Aug-10	-72.8	-39	0.181	346.8	5.122	0.181	346.8	11.22	0	0.808	-287
60	2010	241	2100	29-Aug-10	-72.8	-40.11	0.265	353.7	5.906	0.265	353.7	13.19	0	0.653	-239
60	2010	241	2200	29-Aug-10	-72.8	-41.51	0.359	12.75	8.13	0.359	12.75	23.87	0	0.642	-210
60	2010	241	2300	29-Aug-10	-72.8	-42.34	0.373	354.3	6.131	0.373	354.3	20.06	0	0.764	-320
60	2010	241	2400	29-Aug-10	-72.8	-42.48	0.37	349.7	6.655	0.37	349.7	17.87	0	0.757	-250
60	2010	242	100	30-Aug-10	-72.8	-42.41	0.388	14.4	7.96	0.388	14.4	28.11	0	0.675	-315
60	2010	242	200	30-Aug-10	-72.8	-42.41	0.257	4.46	8.69	0.257	4.46	15.82	0	0.846	-320
60	2010	242	300	30-Aug-10	-72.8	-42.12	0.25	358.8	7.54	0.25	358.8	13.53	0	0.645	-279
60	2010	242	400	30-Aug-10	-72.8	-40.1	0.37	19.73	4.511	0.37	19.73	8.15	0	0.671	-308
60	2010	242	500	30-Aug-10	-72.8	-35.78	0.002	55.14	0.063	0.002	55.14	0.063	0	0.659	-243
60	2010	242	600	30-Aug-10	-72.8	-20.09	0.246	294.2	16.4	0.246	294.2	31.76	0	2.66	0
60	2010	242	700	30-Aug-10	-72.8	1.97	0.665	170.5	31.76	0.665	170.5	53.09	0	0.65	-207
60	2010	242	800	30-Aug-10	-72.8	10.35	1.056	143.7	32.02	1.056	143.7	47.81	0	2.66	0
60	2010	242	900	30-Aug-10	-72.8	14.07	1.524	127.6	28.52	1.524	127.6	41.14	0	0.662	-195
60	2010	242	1000	30-Aug-10	-72.8	15.57	1.691	90.7	35.06	1.691	90.7	38.29	0	0.648	-175
60	2010	242	1100	30-Aug-10	-72.8	3.882	1.334	103	29.15	1.334	103	33.2	0.254	0.864	-247
60	2010	242	1200	30-Aug-10	-72.8	10.83	1.163	85.2	31.42	1.163	85.2	41.43	0	0.661	-203
60	2010	242	1300	30-Aug-10	-72.8	13.1	1.463	247.6	24.27	1.463	247.6	28.22	0	0.85	-292
60	2010	242	1400	30-Aug-10	-72.8	5.599	1.554	255.8	23.84	1.554	255.8	28.51	0	0.654	-196
60	2010	242	1500	30-Aug-10	-72.8	5.342	1.318	116.4	28.72	1.318	116.4	36.41	0	0.772	-245
60	2010	242	1600	30-Aug-10	-72.8	0.052	1.207	136.5	24.08	1.207	136.5	36.22	0	0.798	-530
60	2010	242	1700	30-Aug-10	-72.8	-6.867	1.365	92.9	25.9	1.365	92.9	27.24	0	0.753	-272
60	2010	242	1800	30-Aug-10	-72.8	-21.31	1.407	66.82	20.48	1.407	66.82	34.34	1.27	0.655	-249
60	2010	242	1900	30-Aug-10	-72.8	-25.38	0.289	23.64	14.7	0.289	23.64	42.51	0	0.64	-207
60	2010	242	2000	30-Aug-10	-72.8	-26.37	0.165	16.29	3.189	0.165	16.29	5.119	0	0.814	-245
60	2010	242	2100	30-Aug-10	-72.8	-27.38	0.27	13.68	4.59	0.27	13.68	15.86	0	0.633	-202
60	2010	242	2200	30-Aug-10	-72.8	-26.83	0.812	95.8	13.48	0.812	95.8	15.95	0.254	0.629	-197
60	2010	242	2300	30-Aug-10	-72.8	-25.67	0.68	89.1	15.57	0.68	89.1	21.91	0	0.85	-324
60	2010	242	2400	30-Aug-10	-72.8	-26.45	0.489	25.35	19.82	0.489	25.35	41.73	0	0.645	-304
60	2010	243	100	31-Aug-10	-72.8	-27.31	0.706	72.3	13.75	0.706	72.3	20.2	0	0.662	-243
60	2010	243	200	31-Aug-10	-72.8	-25.99	0.271	79.7	14.91	0.271	79.7	16.6	2.286	0.835	-244
60	2010	243	300	31-Aug-10	-72.8	-25.2	1.185	101.1	24.99	1.185	101.1	26.22	2.54	0.823	-239
60	2010	243	400	31-Aug-10	-72.8	-24.94	0.59	89.4	21.65	0.59	89.4	25.96	0	0.657	-209
60	2010	243	500	31-Aug-10	-72.8	-23.18	0.246	99.8	23.59	0.246	99.8	38.28	0.254	0.65	-204
60	2010	243	600	31-Aug-10	-72.8	-18.07	1.752	109.4	30.2	1.752	109.4	31.81	0	0.749	-316
60	2010	243	700	31-Aug-10	-72.8	-8.37	2.126	100.5	32.15	2.126	100.5	33.46	0	0.855	-239
60	2010	243	800	31-Aug-10	-72.8	2.773	1.963	91.8	34.02	1.963	91.8	35.56	0	0.838	-281
60	2010	243	900	31-Aug-10	-72.8	6.97	2.19	92	30.15	2.19	92	30.38	0	0.658	-175
60	2010	243	1000	31-Aug-10	-72.8	4.126	2.061	114.1	25.81	2.061	114.1	44.24	2.286	0.767	-241
60	2010	243	1100	31-Aug-10	-72.8	-4.151	0.691	74.4	26.92	0.691	74.4	65.42	0	0.651	-194
60	2010	243	1200	31-Aug-10	-72.8	1.456	1.423	126.5	27.14	1.423	126.5	35.24	0.508	0.672	-441
60	2010	243	1300	31-Aug-10	-72.8	-9.33	1.118	193.3	22.46	1.118	193.3	29.9	0	0.652	-201
60	2010	243	1400	31-Aug-10	-72.8	-11.48	2.3	275.6	23.63	2.3	275.6	29.72	0	0.663	-281
60	2010	243	1500	31-Aug-10	-72.8	-17.49	0.513	344.7	20.1	0.513	344.7	32.97	1.016	0.688	-291
60	2010	243	1600	31-Aug-10	-72.8	-20.4	0.217	130	11.28	0.217	130	22.62	0	0.651	-247
60	2010	243	1700	31-Aug-10	-72.8	-21.95	0.906	59.17	11.73	0.906	59.17	20.47	0	0.652	-215
60	2010	243	1800	31-Aug-10	-72.8	-24.46	0.605	59.85	17.44	0.605	59.85	28.71	0	0.648	-255
60	2010	243	1900	31-Aug-10	-72.8	-26.11	0.415	50.77	12.44	0.415	50.77	37.29	0	0.654	-250
60	2010	243	2000	31-Aug-10	-72.8	-25.9	0.376	56.93	7.7	0.376	56.93	17.53	0	0.641	-207
60	2010	243	2100	31-Aug-10	-72.8	-24.8	0.395	57.78	12.68	0.395	57.78	45.24	0	0.652	-247
60	2010	243	2200	31-Aug-10	-72.8	-24.8	0.348	51.09	17.7	0.348	51.09	37.36	0	0.649	-280
60	2010	243	2300	31-Aug-10	-72.8	-28.75	0.424	33.9	13.13	0.424	33.9	30.38	0	0.646	-241
60	2010	243	2400	31-Aug-10	-72.8	-34.68	0.416	28.14	10.95	0.416	28.14	28.36	0	0.643	-450
60	2010	244	100	01-Sep-10	-72.8	-37.43	0.328	39.02	6.94	0.328	39.02	25.09	0	0.628	-239
60	2010	244	200	01-Sep-10	-72.8	-34.75	0.164	20.42	2.537	0.164	20.42	13.63	0	0.626	-204
60	2010	244	300	01-Sep-10	-72.8	-30.91	0.248	37.19	5.175	0.248	37.19	35.67	0	0.621	-203
60	2010	244	400	01-Sep-10	-72.8	-30.29	0.104	18.27	3.558	0.104	18.27	6.98	0	0.627	-201
60	2010	244	500	01-Sep-10	-72.8	-25.32	0.206	208.5	16.46	0.206	208.5	49.79	0	0.652	-236
60	2010	244	600	01-Sep-10	-72.8	-19.01	0.393	189.6	21.27	0.393	189.6	31.26	0	0.657	-213
60	2010	244	700	01-Sep-10	-72.8	-8.84	0.469	125	26.12	0.469	125	46.53	0	0.64	-196
60	2010	244	800	01-Sep-10	-72.8	4.675	0.616	186.2	37.11	0.616	186.2	63.47	0	0.785	-278
60	2010	244	900	01-Sep-10	-72.8	6.362	0.635	196.2	30.43	0.635	196.2	47.66	0	0.652	-220
60	2010	244	1000	01-Sep-10	-72.8	3.239	1.351	2.54	28.05	1.351	2.54	38.92	1.524	0.836	-329
60	2010	244	1100	01-Sep-10	-72.8	4.122	0.966	56.67	27.82	0.966	56.67	56.25	0	0.269	-211
60	2010	244	1200	01-Sep-10	-72.8	11.06	0.609	104.3	26.87	0.609	104.3	43.79	0	0.662	-206
60	2010	244	1300	01-Sep-10	-72.8	11.95	1.124	107.8	27.39	1.124	107.8	34.62	0	0.67	-239
60	2010	244	1400	01-Sep-10	-72.8	10.74	1.239	89.8	25.81	1.239	89.8	27.55	0	0.654	-197
60	2010	244	1500	01-Sep-10	-72.8	8.75	1.1	91.9	24.6	1.1	91.9	25.36	0	0.642	-210
60	2010	244	1600	01-Sep-10	-72.8	2.907	0.539	83	19.4	0.539	83	24.95	0	0.635	-202
60	2010	244	1700	01-Sep-10	-72.8	-7.62	0.463	35.69	10.66	0.463	35.69	15.01	0	0.651	-212
60	2010	244	1800	01-Sep-10	-72.8	-14.35	0.432	50.52	9.22	0.432	50.52	18.78	0	0.657	-244
60	2010	244	1900	01-Sep-10	-72.8	-17.61	0.957	32.63	26.57	0.957	32.63	62.88	0.508	0.655	-244
60	2010	244	2000	01-Sep-10	-72.8	-18.88	1.179	78.7	20.42	1.179	78.7	30.48	0.508	0.665	-247
60	2010	244	2100	01-Sep-10	-72.8	-20.53	0.713	59.54	15.06	0.713	59.54	18.03	1.016	0.849	-271

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	244	2200	01-Sep-10	-72.8	-22.27	0.387	57.83	11.44	0.387	57.83	15.55	0.254	0.84	-242
60	2010	244	2300	01-Sep-10	-72.8	-23.43	0.173	13.11	11.93	0.173	13.11	35.27	0.254	0.654	-278
60	2010	244	2400	01-Sep-10	-72.8	-0.774	0.403	72	18.55	0.403	72	23.55	0	0.85	-275
60	2010	245	100	02-Sep-10	-72.8	-4.998	0.278	49.93	12.63	0.278	49.93	31.54	0	0.865	-281
60	2010	245	200	02-Sep-10	-72.8	-7.57	0.305	102.8	25.68	0.305	102.8	45.81	0	0.643	-199
60	2010	245	300	02-Sep-10	-72.8	-12.06	0.814	108	32.95	0.814	108	47.34	0.254	0.651	-238
60	2010	245	400	02-Sep-10	-72.8	-17.07	1.359	109.6	30.58	1.359	109.6	32	0	0.863	-242
60	2010	245	500	02-Sep-10	-72.8	-16.52	1.995	105.2	29.34	1.995	105.2	30.56	0	0.663	-206
60	2010	245	600	02-Sep-10	-72.8	-10	2.294	95.2	30.41	2.294	95.2	31.37	0.254	0.648	-196
60	2010	245	700	02-Sep-10	-72.8	0.124	2.113	93.6	34.96	2.113	93.6	36.33	0	0.653	-197
60	2010	245	800	02-Sep-10	-72.8	9.71	2.256	102.5	37.88	2.256	102.5	38.7	0	0.65	-196
60	2010	245	900	02-Sep-10	-72.8	8.31	2.82	104.9	32.92	2.82	104.9	33.52	0	0.655	-178
60	2010	245	1000	02-Sep-10	-72.8	10.69	2.639	94.2	32.51	2.639	94.2	34.56	0	0.665	-200
60	2010	245	1100	02-Sep-10	-72.8	11.45	2.326	99.9	31.07	2.326	99.9	32.2	0	0.659	-200
60	2010	245	1200	02-Sep-10	-72.8	12.94	3.035	123	30.7	3.035	123	32.21	0	0.672	-203
60	2010	245	1300	02-Sep-10	-72.8	15.48	2.975	128.3	36.21	2.975	128.3	37.69	0	0.679	-200
60	2010	245	1400	02-Sep-10	-72.8	17.13	2.763	132.6	30.76	2.763	132.6	32.51	0	0.677	-199
60	2010	245	1500	02-Sep-10	-72.8	18.19	2.47	141.1	30.34	2.47	141.1	31.18	0	0.673	-229
60	2010	245	1600	02-Sep-10	-72.8	17.92	1.598	113.4	27.03	1.598	113.4	28.22	0	0.65	-200
60	2010	245	1700	02-Sep-10	-72.8	13.96	1.709	92	23.51	1.709	92	24.2	0	0.657	-202
60	2010	245	1800	02-Sep-10	-72.8	7.59	1.445	93.7	21.06	1.445	93.7	21.85	0	0.659	-200
60	2010	245	1900	02-Sep-10	-72.8	3.132	1.031	103.4	27.96	1.031	103.4	40.47	0	0.685	-308
60	2010	245	2000	02-Sep-10	-72.8	2.485	0.812	90	34.97	0.812	90	63.33	0	0.665	-414
60	2010	245	2100	02-Sep-10	-72.8	-13.86	0.531	345.8	28.26	0.531	345.8	48.83	0	0.657	-379
60	2010	245	2200	02-Sep-10	-72.8	-25.29	0.445	340.1	31.19	0.445	340.1	43.58	0	0.67	-282
60	2010	245	2300	02-Sep-10	-72.8	-30.17	0.344	346.4	20.38	0.344	346.4	28.83	0	0.623	-210
60	2010	245	2400	02-Sep-10	-72.8	-31.77	0.437	345.9	26.94	0.437	345.9	48.82	0	0.624	-199
60	2010	246	100	03-Sep-10	-72.8	-28.92	0.876	63.22	31.44	0.876	63.22	42.51	0	0.646	-212
60	2010	246	200	03-Sep-10	-72.8	-20.66	1.734	102.4	25.76	1.734	102.4	26.89	0	0.644	-198
60	2010	246	300	03-Sep-10	-72.8	-12.53	1.826	90.9	25.3	1.826	90.9	25.91	0	0.651	-203
60	2010	246	400	03-Sep-10	-72.8	-11.39	1.33	101.7	28.92	1.33	101.7	30.92	0	0.659	-234
60	2010	246	500	03-Sep-10	-72.8	-7.12	1.413	114.8	28.85	1.413	114.8	29.51	0	0.637	-199
60	2010	246	600	03-Sep-10	-72.8	-2.433	1.963	105	30.26	1.963	105	31.49	0	0.649	-230
60	2010	246	700	03-Sep-10	-72.8	-0.265	1.922	101	29.91	1.922	101	34.49	0	0.661	-208
60	2010	246	800	03-Sep-10	-72.8	1.137	2.021	102.5	33.69	2.021	102.5	43.57	0.508	0.845	-281
60	2010	246	900	03-Sep-10	-72.8	-11.86	0.953	71.8	18.58	0.953	71.8	47.75	0	0.835	-326
60	2010	246	1000	03-Sep-10	-72.8	-13.58	0.794	140.6	25.52	0.794	140.6	30.72	0	0.65	-254
60	2010	246	1100	03-Sep-10	-72.8	-3.411	1.144	139.9	29.35	1.144	139.9	40.31	0	0.647	-199
60	2010	246	1200	03-Sep-10	-72.8	6.424	2.041	233.1	28.66	2.041	233.1	33.59	0	0.648	-209
60	2010	246	1300	03-Sep-10	-72.8	7.71	1.267	293.8	37.38	1.267	293.8	53.21	0	0.654	-205
60	2010	246	1400	03-Sep-10	-72.8	13.43	1.819	174.9	32.57	1.819	174.9	43.94	0	0.653	-231
60	2010	246	1500	03-Sep-10	-72.8	6.471	2.691	260	26.39	2.691	260	33.31	0.508	0.915	-241
60	2010	246	1600	03-Sep-10	-72.8	-10.72	1.013	279.7	25.83	1.013	279.7	37.7	0	0.902	-279
60	2010	246	1700	03-Sep-10	-72.8	-25.09	0.566	24.73	11.4	0.566	24.73	29.14	0	0.614	-174
60	2010	246	1800	03-Sep-10	-72.8	-28.98	0.458	32.63	15.27	0.458	32.63	29.69	0	0.642	-211
60	2010	246	1900	03-Sep-10	-72.8	-28.01	0.522	339.5	12.36	0.522	339.5	16.56	0	0.742	-278
60	2010	246	2000	03-Sep-10	-72.8	-30.66	0.698	21.57	13.44	0.698	21.57	35.53	0	0.881	-278
60	2010	246	2100	03-Sep-10	-72.8	-35.32	0.477	8.62	11.51	0.477	8.62	26.64	0	0.624	-210
60	2010	246	2200	03-Sep-10	-72.8	-38.49	0.583	41.67	8.84	0.583	41.67	20.61	0	0.606	-200
60	2010	246	2300	03-Sep-10	-72.8	-40.2	0.581	34.35	16.44	0.581	34.35	46.54	0	0.613	-203
60	2010	246	2400	03-Sep-10	-72.8	-39.68	0.513	40.99	8.5	0.513	40.99	22.19	0	0.614	-207
60	2010	247	100	04-Sep-10	-72.8	-40.02	0.607	24.19	21.26	0.607	24.19	46.29	0	0.613	-203
60	2010	247	200	04-Sep-10	-72.8	-38.71	0.566	26.03	13.14	0.566	26.03	33.1	0	0.617	-208
60	2010	247	300	04-Sep-10	-72.8	-37.22	0.626	35.04	19.61	0.626	35.04	29.93	0	0.619	-207
60	2010	247	400	04-Sep-10	-72.8	-34.94	0.326	29.48	13.43	0.326	29.48	31.72	0	0.637	-236
60	2010	247	500	04-Sep-10	-72.8	-30.31	0.222	149.6	23.35	0.222	149.6	48	0	0.655	-282
60	2010	247	600	04-Sep-10	-72.8	-25.92	0.738	285.3	18.34	0.738	285.3	21.93	0.254	0.898	-241
60	2010	247	700	04-Sep-10	-72.8	-21.63	0.648	289.8	25.63	0.648	289.8	37.39	0	0.627	-197
60	2010	247	800	04-Sep-10	-72.8	-14.66	0.94	284	21.38	0.94	284	27.15	0	0.637	-199
60	2010	247	900	04-Sep-10	-72.8	-17.25	1.224	278.6	27.63	1.224	278.6	50.39	0.508	0.661	-276
60	2010	247	1000	04-Sep-10	-72.8	-20.52	0.235	334	16.61	0.235	334	38.73	0.254	0.654	-203
60	2010	247	1100	04-Sep-10	-72.8	-8.65	0.808	223.6	30.4	0.808	223.6	45.95	0	0.641	-199
60	2010	247	1200	04-Sep-10	-72.8	2.888	1.866	259.9	31.54	1.866	259.9	35.57	0	0.642	-208
60	2010	247	1300	04-Sep-10	-72.8	10.85	2.877	241.6	28.54	2.877	241.6	30.97	0	0.65	-199
60	2010	247	1400	04-Sep-10	-72.8	11.44	2.841	246.4	30.43	2.841	246.4	31.28	0	0.847	-483
60	2010	247	1500	04-Sep-10	-72.8	8.92	3.049	250.6	25.57	3.049	250.6	26.8	0	0.637	-177
60	2010	247	1600	04-Sep-10	-72.8	4.023	2.077	253.9	25.3	2.077	253.9	26.91	0	0.661	-239
60	2010	247	1700	04-Sep-10	-72.8	-4.632	1.539	270.7	24.83	1.539	270.7	28.47	0	0.67	-352
60	2010	247	1800	04-Sep-10	-72.8	-8.8	1.469	257.3	29.21	1.469	257.3	32.19	0	0.657	-357
60	2010	247	1900	04-Sep-10	-72.8	-12.77	0.962	274.3	23.45	0.962	274.3	26.06	0	0.809	-250
60	2010	247	2000	04-Sep-10	-72.8	-22.1	0.396	0.854	8.88	0.396	0.854	16.09	0	0.791	-276
60	2010	247	2100	04-Sep-10	-72.8	-30.54	1.114	314.8	16.79	1.114	314.8	19.57	0	0.679	-286
60	2010	247	2200	04-Sep-10	-72.8	-31.16	1.582	286	14.96	1.582	286	15.65	0	0.795	-283
60	2010	247	2300	04-Sep-10	-72.8	-32.9	1.385	293.4	13.7	1.385	293.4	16.02	0	0.635	-435
60	2010	247	2400	04-Sep-10	-72.8	-34.1	0.892	341.4	13.57	0.892	341.4	30.85	0	0.667	-323
60	2010	248	100	05-Sep-10	-72.8	-37.12	0.482	337.4	12.44	0.482	337.4	25.67	0	0.638	-312
60	2010	248	200	05-Sep-10	-72.8	-39.77	0.513	359.7	13.34	0.513	359.7	32.44	0	0.746	-286
60	2010	248	300	05-Sep-10	-72.8	-41.33	0.705	40.05	12.29	0.705	40.05	17.48	0	0.868	-276
60	2010	248	400	05-Sep-10	-72.8	-41.2	0.544	9.97	20.52	0.544	9.97	31.32	0	0.744	-283
60	2010	248	500	05-Sep-10	-72.8	-37.81	0.196	8.07	6.024	0.196	8.07	25.56	0	0.64	-228
60	2010	248	600	05-Sep-10	-72.8	-17.08	0.716	358.9	22.76	0.716	358.9	30.22	0	0.649	-202
60	2010	248	700	05-Sep-10	-72.8	1.065	1.614	258.8	28.25	1.614	258.8	32.82	0	0.649	-196
60	2010	248	800	05-Sep-10	-72.8	8.97	1.72	248.6	33.78	1.72	248.6	45.55	0	0.67	-283
60	2010	248	900	05-Sep-10	-72.8	13.19	1.281	252.4	37.19	1.281	252.4	48.25	0	0.656	-194
60	2010	248	1000	05-Sep-10	-72.8	15.62	1.662	263.8	30.44	1.662	263.8	39.45	0	0.647	-177
60	2010	248	1100	05-Sep-10	-72.8	16.62	0.762	192.7	33.15	0.762	192.7	65.62	0	0.657	-340
60	2010	248	1200	05-Sep-10	-72.8	14.7	0.852	218.4	27.48	0.852	218.4	44.22	0	0.672	-269
60	2010	248	1300	05-Sep-10	-72.8	16.75	1.488	182.8	33.18	1.488	182.8	43.3	0	0.653	-199
60	2010	248	1400	05-Sep-10	-72.8	17.21	1.702	166.8	28.07	1.702	166.8	31.13	0	0.644	-175
60	2010	248	1500	05-Sep-10	-72.8	12.21	1.193	226.2	33.02	1.193	226.2	37.09	0	0.659	-262
60	2010	248	1600	05-Sep-10	-72.8	5.166	1.209	258.7	21.12	1.209	258.7	23.08	0	0.648	-201
60	2010	248	1700	05-Sep-10	-72.8	-1.273	0.999	287.4	19.4	0.999	287.4	21.59	0	0.635	-207

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	248	1800	05-Sep-10	-72.8	-12.98	0.344	47.97	19.46	0.344	47.97	38.92	0.254	0.661	-419
60	2010	248	1900	05-Sep-10	-72.8	-21.97	0.357	72.8	22.03	0.357	72.8	38.61	0.762	0.877	-370
60	2010	248	2000	05-Sep-10	-72.8	-23.61	0.218	41.09	6.875	0.218	41.09	33.59	0.762	0.874	-282
60	2010	248	2100	05-Sep-10	-72.8	-24.49	0.138	44.79	3.99	0.138	44.79	7.23	0.254	0.649	-207
60	2010	248	2200	05-Sep-10	-72.8	-25.33	0.07	76.2	2.15	0.07	76.2	3.838	0.254	0.642	-207
60	2010	248	2300	05-Sep-10	-72.8	-25.73	0.163	49.46	7.11	0.163	49.46	15.65	0.254	0.654	-270
60	2010	248	2400	05-Sep-10	-72.8	-26.59	0.205	51.65	4.379	0.205	51.65	7.64	0.254	0.862	-361
60	2010	249	100	06-Sep-10	-72.8	-27.08	0.361	76.8	13.56	0.361	76.8	16.65	0.508	0.626	-201
60	2010	249	200	06-Sep-10	-72.8	-28.04	0.622	99.4	16.69	0.622	99.4	18.61	0.254	0.867	-317
60	2010	249	300	06-Sep-10	-72.8	-27.89	0.204	72.5	8.73	0.204	72.5	14.13	0	0.883	-323
60	2010	249	400	06-Sep-10	-72.8	-27.43	0.034	345.9	1.932	0.034	345.9	2.136	0.254	0.657	-242
60	2010	249	500	06-Sep-10	-72.8	-26.88	0.028	70.3	2.801	0.028	70.3	4.167	0	0.646	-212
60	2010	249	600	06-Sep-10	-72.8	-24.96	0.144	199.1	11.36	0.144	199.1	20.32	0.254	0.896	-278
60	2010	249	700	06-Sep-10	-72.8	-23.11	0.289	197.6	17.49	0.289	197.6	30.18	0.762	0.638	-197
60	2010	249	800	06-Sep-10	-72.8	-21.33	0.531	211.1	21.31	0.531	211.1	39.68	0.254	0.894	-290
60	2010	249	900	06-Sep-10	-72.8	-19.09	0.23	159.5	16.74	0.23	159.5	33.21	0.254	0.897	-245
60	2010	249	1000	06-Sep-10	-72.8	-14.24	0.396	189.4	28.78	0.396	189.4	50.23	0.254	0.904	-523
60	2010	249	1100	06-Sep-10	-72.8	-12.05	0.575	221.5	19.48	0.575	221.5	29.76	0	0.637	-204
60	2010	249	1200	06-Sep-10	-72.8	-12.67	0.73	136	20.7	0.73	136	38.97	0.508	0.852	-360
60	2010	249	1300	06-Sep-10	-72.8	-6.964	0.521	152.7	21.95	0.521	152.7	50.41	0	0.868	-322
60	2010	249	1400	06-Sep-10	-72.8	-6.229	0.503	111.4	16.25	0.503	111.4	26.68	0	0.645	-204
60	2010	249	1500	06-Sep-10	-72.8	-12.78	0.14	352.7	4.865	0.14	352.7	13.75	0	0.634	-204
60	2010	249	1600	06-Sep-10	-72.8	-14.53	0.145	279.7	6.409	0.145	279.7	16.53	0	0.639	-199
60	2010	249	1700	06-Sep-10	-72.8	-18.76	0.08	13.82	1.371	0.08	13.82	3.678	0	0.625	-202
60	2010	249	1800	06-Sep-10	-72.8	-22.06	0.139	11.8	7.99	0.139	11.8	34.45	0	0.619	-198
60	2010	249	1900	06-Sep-10	-72.8	-28.09	0.291	0.537	16.91	0.291	0.537	36.91	0	0.622	-201
60	2010	249	2000	06-Sep-10	-72.8	-32.1	0.324	19.55	8.91	0.324	19.55	28.91	0	0.636	-238
60	2010	249	2100	06-Sep-10	-72.8	-33.16	0.224	10.84	6.786	0.224	10.84	10.57	0	0.629	-329
60	2010	249	2200	06-Sep-10	-72.8	-33.08	0.272	28.13	9.72	0.272	28.13	23.42	0	0.632	-412
60	2010	249	2300	06-Sep-10	-72.8	-30.71	0.47	51.43	17.73	0.47	51.43	37.91	0	0.753	-528
60	2010	249	2400	06-Sep-10	-72.8	-28.23	0.294	18.66	14.52	0.294	18.66	28.64	0	0.832	-283
60	2010	250	100	07-Sep-10	-72.8	-26.94	0.145	5.084	11.16	0.145	5.084	21	0	0.647	-357
60	2010	250	200	07-Sep-10	-72.8	-27.25	0.594	333.6	15.93	0.594	333.6	26.01	0	0.64	-282
60	2010	250	300	07-Sep-10	-72.8	-27.83	0.286	24.74	7.62	0.286	24.74	18.78	0	0.632	-240
60	2010	250	400	07-Sep-10	-72.8	-32.4	0.34	33	7.9	0.34	33	22.69	0	0.613	-201
60	2010	250	500	07-Sep-10	-72.8	-31.36	0.553	337.3	11.97	0.553	337.3	30.81	0	0.65	-212
60	2010	250	600	07-Sep-10	-72.8	-22.4	0.701	287.9	17.13	0.701	287.9	32.36	0	0.642	-199
60	2010	250	700	07-Sep-10	-72.8	-12.04	0.401	190	29.83	0.401	190	49.37	0	0.64	-200
60	2010	250	800	07-Sep-10	-72.8	4.864	1.063	220.6	29.95	1.063	220.6	41.89	0	0.646	-210
60	2010	250	900	07-Sep-10	-72.8	9.04	1.582	301.9	34.06	1.582	301.9	38.34	0	0.661	-208
60	2010	250	1000	07-Sep-10	-72.8	12.87	1.413	294.6	44.69	1.413	294.6	53.43	0	0.646	-195
60	2010	250	1100	07-Sep-10	-72.8	13.57	1.624	285.6	29.58	1.624	285.6	52.95	0	0.657	-198
60	2010	250	1200	07-Sep-10	-72.8	14.98	1.312	263.2	26.21	1.312	263.2	49.45	0	0.655	-196
60	2010	250	1300	07-Sep-10	-72.8	16.34	1.583	247.8	30.37	1.583	247.8	62.92	0	0.731	-284
60	2010	250	1400	07-Sep-10	-72.8	17.2	1.488	300.6	33.16	1.488	300.6	58.94	0	0.66	-197
60	2010	250	1500	07-Sep-10	-72.8	16.49	0.735	292.2	18.65	0.735	292.2	25.25	0	0.654	-175
60	2010	250	1600	07-Sep-10	-72.8	9.93	0.686	42.09	14.53	0.686	42.09	32.83	0	0.651	-237
60	2010	250	1700	07-Sep-10	-72.8	-7.96	0.433	9.44	6.424	0.433	9.44	24.18	0	0.652	-270
60	2010	250	1800	07-Sep-10	-72.8	-16.31	0.439	25.3	6.739	0.439	25.3	20.22	0	0.627	-199
60	2010	250	1900	07-Sep-10	-72.8	-18.25	0.151	32.11	4.063	0.151	32.11	12.98	0	0.625	-178
60	2010	250	2000	07-Sep-10	-72.8	-19.06	0.253	34.65	9.12	0.253	34.65	19.01	0	0.628	-199
60	2010	250	2100	07-Sep-10	-72.8	-19.64	0.324	22.01	7.61	0.324	22.01	34.19	0	0.634	-206
60	2010	250	2200	07-Sep-10	-72.8	-22.34	0.382	26.05	5.558	0.382	26.05	10.62	0	0.759	-313
60	2010	250	2300	07-Sep-10	-72.8	-27.61	0.402	20.44	7.4	0.402	20.44	22.52	0	0.739	-288
60	2010	250	2400	07-Sep-10	-72.8	-32.57	0.239	12.87	7.9	0.239	12.87	24.49	0	0.745	-274
60	2010	251	100	08-Sep-10	-72.8	-34.92	0.316	17.72	5.423	0.316	17.72	16.45	0	0.629	-372
60	2010	251	200	08-Sep-10	-72.8	-33.96	0.242	357.8	9.15	0.242	357.8	15.7	0	0.628	-241
60	2010	251	300	08-Sep-10	-72.8	-30.79	0.342	346.4	9.96	0.342	346.4	17.07	0	0.626	-244
60	2010	251	400	08-Sep-10	-72.8	-28.78	0.4	21.16	8.99	0.4	21.16	20.16	0	0.749	-350
60	2010	251	500	08-Sep-10	-72.8	-26.57	0.278	29.56	11.4	0.278	29.56	41.59	0	0.622	-198
60	2010	251	600	08-Sep-10	-72.8	-8.3	0.299	344.9	15.05	0.299	344.9	30.57	0	0.645	-200
60	2010	251	700	08-Sep-10	-72.8	6.864	0.603	155.7	31.06	0.603	155.7	44.22	0	0.746	-286
60	2010	251	800	08-Sep-10	-72.8	11.34	1.267	125.8	37.71	1.267	125.8	51.25	0	0.648	-197
60	2010	251	900	08-Sep-10	-72.8	13.2	1.497	93.3	27.25	1.497	93.3	32.74	0	0.667	-245
60	2010	251	1000	08-Sep-10	-72.8	16.38	1.439	167.8	32.15	1.439	167.8	48.58	0	0.666	-204
60	2010	251	1100	08-Sep-10	-72.8	17.39	1.07	178.2	25.09	1.07	178.2	39.49	0	0.654	-196
60	2010	251	1200	08-Sep-10	-72.8	17.76	0.965	188.4	29.59	0.965	188.4	39.67	0	0.655	-199
60	2010	251	1300	08-Sep-10	-72.8	18.36	0.935	149	26.83	0.935	149	37.49	0	0.666	-199
60	2010	251	1400	08-Sep-10	-72.8	19.27	1.428	124.1	35.81	1.428	124.1	49.11	0	0.663	-200
60	2010	251	1500	08-Sep-10	-72.8	19.12	1.597	98.1	30.48	1.597	98.1	32.69	0	0.652	-195
60	2010	251	1600	08-Sep-10	-72.8	15.48	1.396	96.6	22.25	1.396	96.6	23.5	0	0.641	-197
60	2010	251	1700	08-Sep-10	-72.8	-2.002	1.127	87.5	14.26	1.127	87.5	15.41	0	0.655	-277
60	2010	251	1800	08-Sep-10	-72.8	-22.61	0.428	349.1	5.332	0.428	349.1	27.95	0	0.646	-324
60	2010	251	1900	08-Sep-10	-72.8	-32.87	0.494	354.5	5.181	0.494	354.5	13.64	0	0.768	-373
60	2010	251	2000	08-Sep-10	-72.8	-36.39	0.472	3.222	7.83	0.472	3.222	19.24	0	0.638	-337
60	2010	251	2100	08-Sep-10	-72.8	-37.79	0.571	22.39	5.682	0.571	22.39	22.98	0	0.653	-321
60	2010	251	2200	08-Sep-10	-72.8	-37.67	0.205	3.065	12.12	0.205	3.065	21.99	0	0.597	-199
60	2010	251	2300	08-Sep-10	-72.8	-38.4	0.26	359.6	7.82	0.26	359.6	13.63	0	0.74	-326
60	2010	251	2400	08-Sep-10	-72.8	-39.14	0.271	0.91	5.517	0.271	0.91	12.79	0	0.745	-283
60	2010	252	100	09-Sep-10	-72.8	-38.05	0.193	4.657	5.913	0.193	4.657	14.45	0	0.746	-278
60	2010	252	200	09-Sep-10	-72.8	-36.36	0.216	359.9	7.61	0.216	359.9	15.18	0	0.741	-317
60	2010	252	300	09-Sep-10	-72.8	-35.02	0.356	358	9.88	0.356	358	15.12	0	0.732	-355
60	2010	252	400	09-Sep-10	-72.8	-34.95	0.285	20.83	5.877	0.285	20.83	28.74	0	0.748	-271
60	2010	252	500	09-Sep-10	-72.8	-29.48	0.219	128	17.43	0.219	128	27.26	0	0.76	-273
60	2010	252	600	09-Sep-10	-72.8	-23.16	0.494	163.5	22.69	0.494	163.5	31.33	0	0.629	-204
60	2010	252	700	09-Sep-10	-72.8	-13.68	0.817	118.4	26.21	0.817	118.4	34.8	0	0.654	-200
60	2010	252	800	09-Sep-10	-72.8	6.303	1.956	119.1	29.54	1.956	119.1	32.62	0	0.661	-207
60	2010	252	900	09-Sep-10	-72.8	13.69	2.251	114.1	28.51	2.251	114.1	30.09	0	0.66	-197
60	2010	252	1000	09-Sep-10	-72.8	16.82	1.716	113.1	30.58	1.716	113.1	41.14	0	0.659	-225
60	2010	252	1100	09-Sep-10	-72.8	18.08	1.719	109.3	31.63	1.719	109.3	35.13	0	0.662	-196
60	2010	252	1200	09-Sep-10	-72.8	17.2	1.449	108.6	29.62	1.449	108.6	32.31	0	0.661	-195
60	2010	252	1300	09-Sep-10	-72.8	16.82	0.874	114.9	26.21	0.874	114.9	32.18	0	0.661	-195

Client = Pacific Booker Minerals

NOTE: HEADINGS NOT VERIFIED

Array ID	Year	Julian Day	Hour Minute	(Column added by KCB) Date	Hourly Average Air Temperature (Celsius)	Hourly Average Relative Humidity (%)	15 Minute Average Wind Speed (m/s)	15 Minute Average Wind Direction (degrees)	15 Minute Standard Deviation for Wind Direction (degrees)	Hourly Total Precipitation (mm)					
60	2010	252	1400	09-Sep-10	-72.8	14.39	0.486	96.9	22.1	0.486	96.9	25.25	0	0.648	-194
60	2010	252	1500	09-Sep-10	-72.8	8.73	0.618	308.7	19.87	0.618	308.7	36.21	0	0.652	-195
60	2010	252	1600	09-Sep-10	-72.8	4.684	0.493	80.6	32.72	0.493	80.6	59.13	0	0.652	-205
60	2010	252	1700	09-Sep-10	-72.8	-1.939	0.396	15.13	27.83	0.396	15.13	45.39	0	0.655	-232
60	2010	252	1800	09-Sep-10	-72.8	-3.839	1.671	273.8	23.41	1.671	273.8	25.08	0	0.649	-204
60	2010	252	1900	09-Sep-10	-72.8	-7.7	1.123	286.4	23.3	1.123	286.4	26.72	0	0.655	-245
60	2010	252	2000	09-Sep-10	-72.8	-18.63	0.42	321	17.88	0.42	321	24.92	0	0.639	-208
60	2010	252	2100	09-Sep-10	-72.8	-21.57	0.902	312.7	16.47	0.902	312.7	19.17	0	0.645	-242
60	2010	252	2200	09-Sep-10	-72.8	-23.25	0.682	323.4	17.51	0.682	323.4	19.49	0	0.673	-388
60	2010	252	2300	09-Sep-10	-72.8	-20.27	1.172	305.2	23.91	1.172	305.2	25.33	0	0.656	-284
60	2010	252	2400	09-Sep-10	-72.8	-22.2	0.655	328.8	17.31	0.655	328.8	21.05	0	0.659	-278
60	2010	253	100	10-Sep-10	-72.8	-29.03	0.392	10.01	13.37	0.392	10.01	21.78	0	0.655	-393
60	2010	253	200	10-Sep-10	-72.8	-32.02	0.606	35.27	18.08	0.606	35.27	26.6	0	0.644	-321
60	2010	253	300	10-Sep-10	-72.8	-32.83	0.395	40.14	8.56	0.395	40.14	16.32	0	0.655	-279
60	2010	253	400	10-Sep-10	-72.8	-32.45	0.197	29.25	4.358	0.197	29.25	9.2	0	0.658	-279
60	2010	253	500	10-Sep-10	-72.8	-30.79	0.167	35.39	9.72	0.167	35.39	17.98	0	0.647	-235
60	2010	253	600	10-Sep-10	-72.8	-22.3	0.214	61.56	16.1	0.214	61.56	46.16	0	0.656	-265
60	2010	253	700	10-Sep-10	-72.8	-0.642	0.84	134.5	39.88	0.84	134.5	66.24	0	0.638	-175
60	2010	253	800	10-Sep-10	-72.8	3.892	1.534	161.6	36.94	1.534	161.6	52.59	0	0.662	-214
60	2010	253	900	10-Sep-10	-72.8	7.98	1.546	259.7	22.92	1.546	259.7	30.76	0	0.652	-198
60	2010	253	1000	10-Sep-10	-72.8	10.83	1.671	165.6	30.52	1.671	165.6	43.61	0	0.633	-202
60	2010	253	1100	10-Sep-10	-72.8	12.3	1.367	126.7	35.58	1.367	126.7	47.86	0	0.647	-201
60	2010	253	1200	10-Sep-10	-72.8	15.32	1.269	95.6	36.75	1.269	95.6	51.27	0	0.661	-200
60	2010	253	1300	10-Sep-10	-72.8	11.37	1.549	89.5	31.37	1.549	89.5	51.29	0	0.645	-195
60	2010	253	1400	10-Sep-10	-72.8	-1.028	1.415	186.5	35.5	1.415	186.5	44.59	0	0.632	-194
60	2010	253	1500	10-Sep-10	-72.8	-5.016	0.369	58.34	20.33	0.369	58.34	39.26	0	0.629	-197
60	2010	253	1600	10-Sep-10	-72.8	-16.07	0.819	73.7	19.35	0.819	73.7	26.52	0	0.654	-434
60	2010	253	1700	10-Sep-10	-72.8	-25.19	0.465	50.7	10.59	0.465	50.7	22.51	0	0.658	-274
60	2010	253	1800	10-Sep-10	-72.8	-33.41	0.893	42.13	20.04	0.893	42.13	38.28	0	0.642	-266
60	2010	253	1900	10-Sep-10	-72.8	-37.84	0.484	23.77	9.84	0.484	23.77	24.91	0	0.74	-274
60	2010	253	2000	10-Sep-10	-72.8	-39.25	0.419	23.36	10.52	0.419	23.36	22.43	0	0.738	-357
60	2010	253	2100	10-Sep-10	-72.8	-37.36	0.453	13.24	8.19	0.453	13.24	20.66	0	0.735	-327
60	2010	253	2200	10-Sep-10	-72.8	-39.05	0.522	28.47	9.66	0.522	28.47	25.56	0	0.871	-286
60	2010	253	2300	10-Sep-10	-72.8	-40.99	0.25	10.31	6.469	0.25	10.31	17.15	0	0.649	-242
60	2010	253	2400	10-Sep-10	-72.8	-41.95	0.349	23.98	5.194	0.349	23.98	28.81	0	0.65	-209
60	2010	254	100	11-Sep-10	-72.8	-40.66	0.456	41.09	9.18	0.456	41.09	19.82	0	0.865	-280
60	2010	254	200	11-Sep-10	-72.8	-40.35	0.269	19.37	10.42	0.269	19.37	32.36	0	0.867	-278
60	2010	254	300	11-Sep-10	-72.8	-39.7	0.208	5.218	6.998	0.208	5.218	20.36	0	0.632	-239
60	2010	254	400	11-Sep-10	-72.8	-38.43	0.321	34.41	9.17	0.321	34.41	16.06	0	0.655	-271
60	2010	254	500	11-Sep-10	-72.8	-32.15	0.286	0.973	17.11	0.286	0.973	31.08	0	0.666	-281
60	2010	254	600	11-Sep-10	-72.8	-23.47	0.752	232.4	21.87	0.752	232.4	28.06	0	0.646	-405
60	2010	254	700	11-Sep-10	-72.8	-7.67	0.498	43.19	28.9	0.498	43.19	44.94	0	0.635	-198
60	2010	254	800	11-Sep-10	-72.8	-1.555	0.82	220.4	27.81	0.82	220.4	44.93	0	0.641	-197
60	2010	254	900	11-Sep-10	-72.8	6.381	1.255	239	32.97	1.255	239	57.6	0	0.64	-196
60	2010	254	1000	11-Sep-10	-72.8	7.81	1.252	237.2	36.03	1.252	237.2	55.01	0	2.66	0
60	2010	254	1100	11-Sep-10	-72.8	12.69	1.27	182.6	32.37	1.27	182.6	58.59	0	0.659	-220
60	2010	254	1200	11-Sep-10	-72.8	16.3	1.631	248	31.69	1.631	248	53.18	0	0.658	-243
60	2010	254	1300	11-Sep-10	-72.8	16.57	1.244	231.7	28.59	1.244	231.7	45.64	0	0.657	-289
60	2010	254	1400	11-Sep-10	-72.8	12.16	0.478	184.1	16.78	0.478	184.1	23.73	0	0.644	-174
60	2010	254	1500	11-Sep-10	-72.8	7.05	0.316	245.9	11.35	0.316	245.9	15.79	0	0.639	-192
60	2010	254	1600	11-Sep-10	-72.8	-3.2	0.592	313.8	13.2	0.592	313.8	19.79	0	0.652	-277
60	2010	254	1700	11-Sep-10	-72.8	-22.61	1.931	5.137	18.83	1.931	5.137	19.45	0	0.651	-261
60	2010	254	1800	11-Sep-10	-72.8	-25.47	2.449	8.15	20.75	2.449	8.15	21.72	0	0.654	-239
60	2010	254	1900	11-Sep-10	-72.8	-34.56	1.054	332.4	37.88	1.054	332.4	40.51	0	0.642	-246
60	2010	254	2000	11-Sep-10	-72.8	-39.04	0.919	318.8	37.3	0.919	318.8	63.21	0	0.615	-225
60	2010	254	2100	11-Sep-10	-72.8	-39.87	0.687	307.8	25.97	0.687	307.8	35.23	0	0.612	-196
60	2010	254	2200	11-Sep-10	-72.8	-38.01	0.269	334.2	16.96	0.269	334.2	33.63	0	0.612	-196
60	2010	254	2300	11-Sep-10	-72.8	-36.68	0.665	340	17.97	0.665	340	37.15	0	0.612	-196
60	2010	254	2400	11-Sep-10	-72.8	-35.48	0.263	2.609	13.79	0.263	2.609	34.68	0	0.609	-196
60	2010	255	100	12-Sep-10	-72.8	-32.53	1.585	53.32	40.09	1.585	53.32	43.45	0.508	2.66	0
60	2010	255	200	12-Sep-10	-72.8	-30.89	0.958	8.18	13.49	0.958	8.18	26.52	0	0.651	-274
60	2010	255	300	12-Sep-10	-72.8	-30.57	0.39	22.55	20.91	0.39	22.55	35.51	0.254	0.636	-262
60	2010	255	400	12-Sep-10	-72.8	-29.06	0.642	17.79	11.31	0.642	17.79	33.71	0.254	0.655	-416
60	2010	255	500	12-Sep-10	-72.8	-26.27	0.103	35.32	10.54	0.103	35.32	19.64	0	0.662	-283
60	2010	255	600	12-Sep-10	-72.8	-19.6	0.247	232	14.9	0.247	232	20.75	0	0.647	-288
60	2010	255	700	12-Sep-10	-72.8	-7.43	0.837	241.1	24.93	0.837	241.1	38.4	0	0.656	-229
60	2010	255	800	12-Sep-10	-72.8	-0.95	1.596	281.7	30.11	1.596	281.7	43.41	0	0.64	-194
60	2010	255	900	12-Sep-10	-72.8	-2.422	1.095	340.4	33.76	1.095	340.4	47.35	0	0.652	-239
60	2010	255	1000	12-Sep-10	-72.8	-5.704	0.682	71.3	27.83	0.682	71.3	57.28	0	0.655	-207
60	2010	255	1100	12-Sep-10	-72.8	2.277	1.456	18	40.84	1.456	18	62.12	0.254	0.643	-230
60	2010	255	1200	12-Sep-10	-72.8	-5.396	0.805	167.9	26.83	0.805	167.9	39.32	0	0.656	-214
60	2010	255	1300	12-Sep-10	-72.8	-3.612	0.963	179.6	24.37	0.963	179.6	36.48	0	0.641	-204
60	2010	255	1400	12-Sep-10	-72.8	-2.803	1.179	133.9	27.49	1.179	133.9	36.48	0	0.645	-196
60	2010	255	1500	12-Sep-10	-72.8	-4.567	0.92	129	33.19	0.92	129	59.49	0	0.637	-196
60	2010	255	1600	12-Sep-10	-72.8	-14.59	0.268	85.1	9.61	0.268	85.1	26.39	0	0.637	-201
60	2010	255	1700	12-Sep-10	-72.8	-23.22	0.246	32.48	5.125	0.246	32.48	20.95	0	0.623	-201
60	2010	255	1800	12-Sep-10	-72.8	-28.29	0.344	28.89	8.69	0.344	28.89	19.63	0	0.618	-200
60	2010	255	1900	12-Sep-10	-72.8	-29.85	0.268	8.71	8.23	0.268	8.71	26.42	0	0.621	-232
60	2010	255	2000	12-Sep-10	-72.8	-29.38	0.33	30.48	8.72	0.33	30.48	19.76	0	0.623	-224
60	2010	255	2100	12-Sep-10	-72.8	-29.47	0.236	351.5	9.15	0.236	351.5	21.38	0	0.623	-201
60	2010	255	2200	12-Sep-10	-72.8	-30.33	0.237	17.48	13.48	0.237	17.48	25.46	0	0.622	-201
60	2010	255	2300	12-Sep-10	-72.8	-32.85	0.27	350.3	19.22	0.27	350.3	30.07	0	0.618	-200
60	2010	255	2400	12-Sep-10	-72.8	-35.03	0.372	334.8	11.82	0.372	334.8	24.86	0	0.619	-203
60	2010	256	100	13-Sep-10	-72.8	-34.4	0.257	328	11.07	0.257	328	13.52	0	0.628	-208
60	2010	256	200	13-Sep-10	-72.8	-32.99	0.5	306.9	10.68	0.5	306.9	16.13	0	0.62	-201
60	2010	256	300	13-Sep-10	-72.8	-31.21	0.238	354	6.996	0.238	354	22.17	0	0.616	-199
60	2010	256	400	13-Sep-10	-72.8	-30.17	0.306	343.5	9.69	0.306	343.5	20.87	0	0.618	-200
60	2010	256	500	13-Sep-10	-72.8	-27.39	0.151	319.3	5.536	0.151	319.3	22.28	0	0.628	-199

Klohn Crippen Berger

MEMORANDUM

TO:	File cc: Don Betton, Pacific Booker Minerals	**DATE:**	December 9, 2010
FROM:	Mathew MacKinnon	**FILE NO:** **LOG NO:**	M09382A04.720
SUBJECT:	Morrison Lake Surface/Groundwater Baseline Monitoring Report October 19 – 25 , 2010		

1. PERSONNEL

Klohn Crippen Berger (KCB)
- Matt MacKinnon (MM)
- Neil Burk (NB)
- Mary Smulders (MS)

Lake Babine Nation (LBN)
- Eugene Alec (EA)
- Jason Michelle (JM)

Babine Barge (BB)
- James Godfrey (JG)

2. LOGISTICS

MM, NB, and MS flew to Smithers from Vancouver on October 19, 2010. Upon arrival in Smithers, two SUVs were rented and the crew picked up supplies and travelled approximately 100 kilometres southeast on Highway 16 to GranIsle. Water sample bottles were picked up in Houston en route to GranIsle. The KCB crew crossed Babine Lake via the Babine Lake Barge and drove to Babine Lake Camp, where they stayed for the duration of the trip. The Morrison Project site was accessed daily from camp by driving approximately 50 km north on the "Jinx" and "Hagen" service roads.

JG provided on-site assistance with miscellaneous field work from October 19 to October 22, 2010. EA and JM provided on-site assistance for the groundwater monitoring program during the trip.

Site work was generally completed between 07:00 and 16:30 each day, during daylight hours. The weather for the week was rainy and snowy with near freezing temperatures throughout the day and freezing temperatures at night.

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Field work was completed on the afternoon of October 24, 2010. The crews departed the Lake Babine Camp and boarded the barge on the morning of October 25, 2010. En route to Smithers on October 25, 2010, the KCB crew stopped in Houston and packaged and shipped the water samples to ALS Laboratories in Burnaby. The KCB crew flew from Smithers to Vancouver on the evening of October 25, 2010. The October 2010 monitoring sampling sites are illustrated in Figure 1.

3. SCOPE OF FIELD WORK

Photos of sampling activities are shown in Appendix I. The work performed on this field trip is as follows:

1. Meteorological

    a. MS and MM replaced the meteorological station snow sensor and attempted to re-program the temperature and humidity sensors. It appears that the temperature/humidity sensors have not functioned properly since 2006. KCB staff were unable to correct the problem with the temperature/humidity sensor on-site. KCB staff removed the sensor and control panel for further detailed reprogramming and repair by Campbell Scientific technicians.

    b. KCB staff collected weather station diagnostic readings from the weather station and downloaded available data, prior to removing the control panel and temperature/humidity sensor.

2. Baseline Data Collection

    a. MM and MS measured the Morrison Lake high water level as compared to the current low water lake level at several locations. The difference between low and high Morrison Lake water levels at the time of survey was 40 cm to 50 cm depending on shoreline characteristics.

    b. The thermocline depth in Morrison Lake was measured by MM and MS at sites A to E at 1.5 m intervals using a “YSI 600” probe (see Figure 1 for sampling locations). Thermocline temperatures of Morrison Lake (up to 25 m in depth) can be found in Figure 2.

    c. Surface and deep (1 m from the bottom) water samples were collected by MM and MS in Morrison Lake at sites A to E and in Booker Lake at one location. Water samples are being analyzed for general parameters, total and dissolved metals, nutrients, TOC and cyanide (WAD and SAD).

    d. An in situ vertical profile of Morrison Lake was completed by MM and MS at sites A to E by using the “YSI 600” probe at approximately 1.5 m intervals. Dissolved oxygen (DO) (% and mg/L) and pH were recorded at each depth

interval. DO and pH profile measurements of Morrison Lake can be found in Figure 3 and 4, respectively. Further assessment of the data is ongoing.

e. MM and MS determined hydrometric station MCS-8 was inoperable due to damage from wind-throw. The station requires re-installation (approximately 1 full-day of work). The transducer and logger box were removed and sent to Vancouver for repair and calibration.

   Data logger MCS-6 was re-established and a new transducer was installed. The station is now working and data was downloaded to verify functionality. The station was also calibrated with in-situ flow measurements using the Swoffer.

f. Surface water samples were collected at Morrison Creek (also known as Morrison River), MCS-4, MCS-5, MCS-6, MCS-7, MCS-8, and MCS-10. See sampling results for details (Appendix II). MCS-9 was visited but retained no water at the time of sampling. Surface water field measurements are presented in Table 1.

   Flow measurements and stream profiles were conducted at sites MCS-5, MCS-6, and Morrison Creek which retained sufficient flow to warrant accurate flow measurements using the Swoffer. At the aforementioned locations, stream depth and flow (at two-thirds of the stream depth) were measured. Total stream discharge was calculated from the area and velocity measurements. The raw flow and depth data from MCS-5, MCS-6 and Morrison Creek can be found in Table 2, while stream discharge calculations from the three sites are found in Table 3.

g. All groundwater well sites were visited by NB and the LBN team. Most sites were accessed by hiking and/or a 4-wheeler. Groundwater samples were collected from 21 of the 25 wells (see sampling results Appendix II) using Watera, bailer, or electric pump sample collection methodologies. Groundwater field measurements are presented in Table 4.

   Water samples could not be collected from MW07-07B and MW08-01B because of obstructions in the well casing (likely tubing, which was already installed in most of the wells). MW07-07A had a data logger installed in the well and access was not available.

h. Water quality samples for MLARD cubes #1, #2, #3, and #4 and MLARD barrels #1, and #2, were collected. See sampling results for details (Appendix II).

3. Fisheries Baseline

    a. MM and MS assessed Morrison Lake and Morrison Creek for salmon spawning activity by walking the shoreline along the southwest shore of the lake as well as upstream and downstream of the Morrison Creek bridge. A large number of whitefish and several rainbow trout were observed feeding on salmon eggs within Morrison Creek. Several spawning coho were also observed in Morrison Creek. No fish migration barriers were found in Morrison Creek. No sockeye spawning was observed in Morrison Lake during the walk of the southwest shoreline.

    b. MM and MS also discussed spawning activity in the Morrison watershed with Lonny, the LBN-hired biologist surveying Morrison Creek. Lonny provided photographs of coho and sockeye spawning and informed KCB that sockeye spawning began in late September, followed by coho.

4. Fish Habitat Compensation Plan

    a. Soil/sediment samples (up to 1.3 m in depth) were taken using an auger from two test pits near the proposed fish habitat compensation plan location. The first sample was taken along Morrison Lake's bank whereas the second sample was taken approximately 50 m inland from the Lake.

Z:\M\VCR\M09382A04 - Morrison EAC Support\400 Drawings\GIS\mxd\Oct_Sampling_Locations.mxd - 24/11/2010 @ 11:03:35 AM

667,500 670,000 672,500 675,000

6,130,000 6,127,500 6,125,000 6,122,500 6,120,000 6,117,500 6,115,000

Lake

Nak Lake 3

Nakinilerak Lake

N

Oval Lake

Nak Lake 2

Olympic Lake

Nakinilerak Tributary Lake

Nak Lake 1

Morrison E

MCS - 10

MW07-01(A,B)

DH06-12

Morrison Lake

MCS - 8

Morrison D

MW07-02(A,B)

DH06-7

MCS - 7

MW07-03(A,B)

MW07-04(A,B)

Morrison C

MET STN

MCS - 6

MW08-03(A,B)

MW07-08(A,B)

Morrison B

Booker Lake

MW07-07(A,B)

MW08-01(A,B)

MW07-05(A,B)

MCS - 5

MCS - 4

MW07-06(A,B)

Soil 1, 2

Morrison A

MCS - 1

667,500 670,000 672,500 675,000

Meteorological Station

Soil/sediment Sample Site

Water Quality Sample Site- Well

Water Quality Sample Site - Lake or Stream

Major Contours

Minor Contours

Rivers and Streams

Notes:
1. UTM Zone 9N, NAD83
2. Contour interval is 20m.
3. Map data is BC TRIM (1:20,000)

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN-CRIPPEN REPORT DATED _____

0 2,000 m

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CLIENT

pbm

Klohn Crippen Berger

PROJECT
MORRISON COPPER/GOLD PROJECT

TITLE
OCTOBER 2010
MONITORING SAMPLES SITES

PROJECT No. M09382A03

FIG No. 1.0

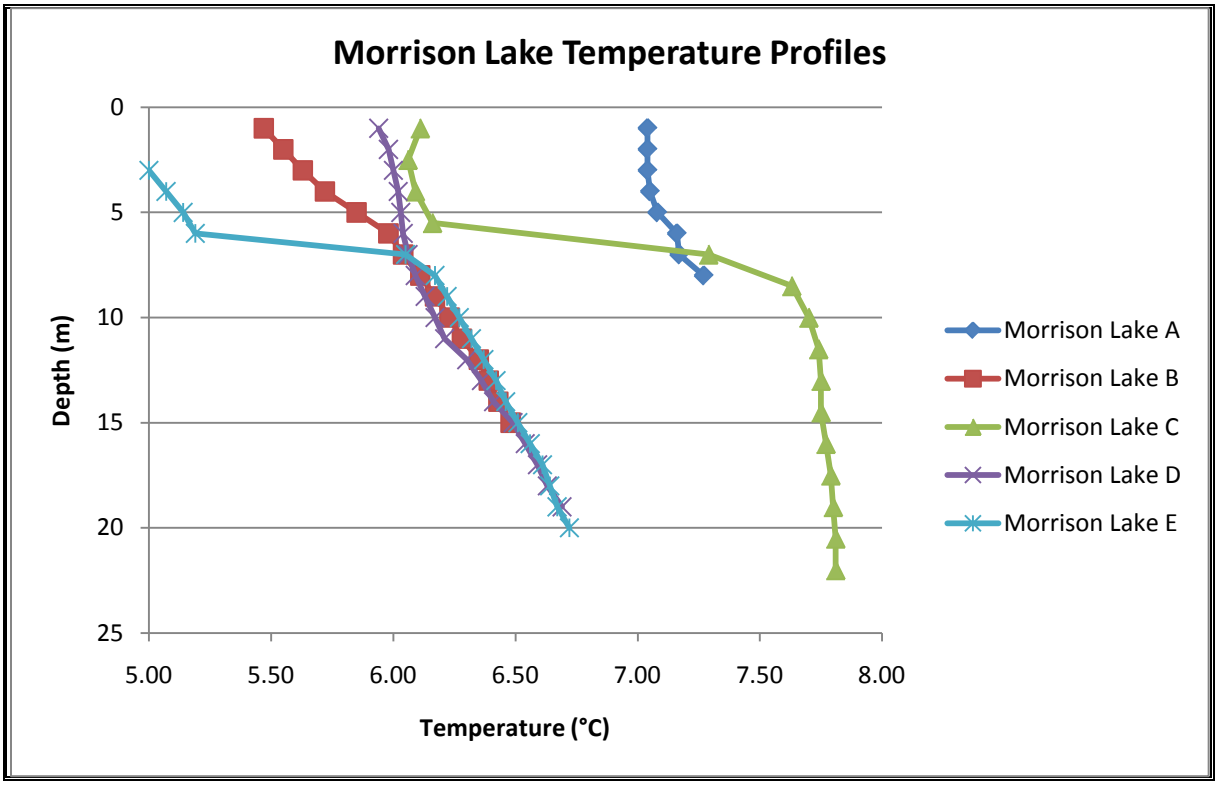

Figure 2 Morrison Lake Thermocline Depth

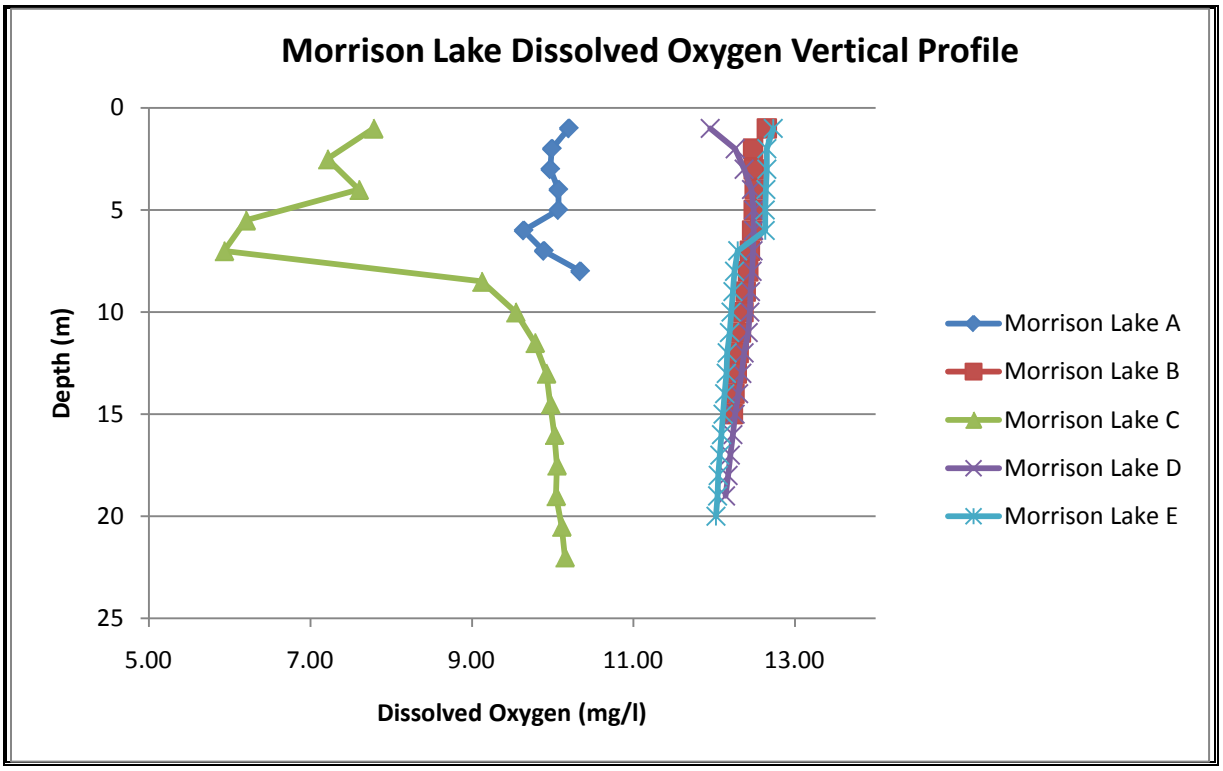

Figure 3 Morrison Lake Dissolved Oxygen Vertical Profile

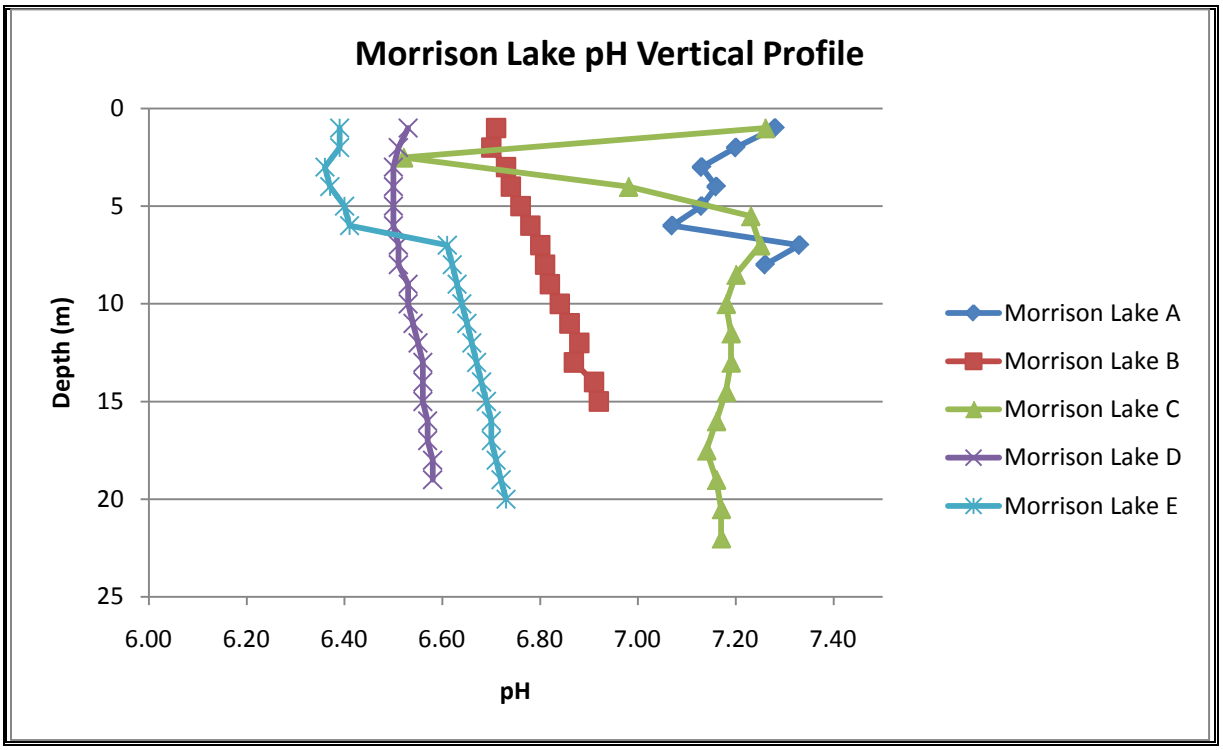

Figure 4 Morrison Lake pH Vertical Profile

Table 1 Surface Water Sampling Summary

NAME	SAMPLE DATE AND TIME	EASTING	NORTHING	SAMPLES TAKEN	LABORATORY ANALYSIS							IN SITU ANALYSIS			
					General Parameters	Dissolved Metals	Total Metals	TOC	Nutrients	Cyanide	Soil Composition	pH	Temperature	DO (%)	DO (mg/l)
MCS - 1	10-22-10 at 12:02	675488	6113935	Water Quality	X	X	X	X	X			X	X	X	X
MCS - 4	10-22-10 at 14:11	671590	6118581	Water Quality	X	X	X	X	X			X	X	X	X
MCS - 5	10-22-10 at 09:00	670645	6118684	Water Quality	X	X	X	X	X			X	X	X	X
MCS - 6	10-22-10 at 12:57	669874	6120905	Water Quality	X	X	X	X	X			X	X	X	X
MCS - 7	10-20-10 at 10:40	668996	6122404	Water Quality	X	X	X	X	X	X		X	X	X	X
MCS - 7 (upper)	10-23-10 at 13:20	670402	3123538	Water Quality	X	X	X	X	X						
MCS - 8	10-20-10 at 11:14	668449	6123847	Water Quality	X	X	X	X	X						
MCS - 10	10-24-10 at 12:10	672342	6126049	Water Quality	X	X	X	X	X	X					
Morrison Creek	10-22-10 at 10:04	670414	6118324	Water Quality	X	X	X	X	X			X	X	X	X
Booker Lake Surface	10-22-10 at 08:45	670682	6119983	Water Quality	X	X	X	X	X			X	X	X	X
Booker Lake Deep	10-22-10 at 08:45	670682	6119983	Water Quality	X	X	X	X	X			X	X	X	X
Cube 1	10-22-10 at 11:36	671557	6122480	Water Quality	X	X	X	X	X						
Cube 2	10-22-10 at 11:36	671557	6122480	Water Quality	X	X	X	X	X						
Cube 3	10-22-10 at 11:36	671557	6122480	Water Quality	X	X	X	X	X						
Cube 4	10-22-10 at 11:36	671557	6122480	Water Quality	X	X	X	X	X						
Barrel 1	10-22-10 at 11:36	671557	6122480	Water Quality	X	X	X	X	X						
Barrel 2	10-22-10 at 11:36	671557	6122480	Water Quality	X	X	X	X	X						
FHCP Soil 1	10-24-10 at 12:46	670829	6118456	Soil/sediment							X				
FHCP Soil 2	10-24-10 at 12:58	670792	6118478	Soil/sediment							X				

* Note: no water quality sample could be taken from MCS - 9 because the stream was dry

Table 2 Raw Stream Flow Measures

LOCATION	DISTANCE FROM BANK (m)	DEPTH (m)	FLOW (m/s)
MCS - 5	0.0	0.00	
	0.2	0.05	0.00
	0.4	0.05	0.00
	0.6	0.40	0.00
	0.8	0.40	0.26
	1.0	0.40	0.22
	1.2	0.40	0.00
	1.4	0.00	
MCS - 6	0.0	0.00	
	0.3	0.00	
	0.6	0.00	
	0.9	0.04	0.25
	1.2	0.07	0.38
	1.5	0.14	0.15
	1.8	0.13	0.20
	2.1	0.05	0.26
	2.4	0.05	0.31
	2.7	0.00	
	3.0	0.00	
Morrison Creek	1.0	0.18	0.00
	2.0	0.18	0.15
	3.0	0.26	0.01
	4.0	0.26	0.11
	5.0	0.18	0.14
	6.0	0.22	0.11
	7.0	0.24	0.05
	8.0	0.24	0.10
	9.0	0.25	0.11
	10.0	0.22	0.17
	11.0	0.27	0.12
	12.0	0.29	0.26
	13.0	0.26	0.10
	14.0	0.24	0.00
	15.0	0.22	0.14
	16.0	0.17	0.14
	17.0	0.13	0.00
	18.0	0.16	0.05
	19.0	0.31	0.02
	20.0	0.22	0.00

Table 3: Stream Discharge

LOCATION	SAMPLE DATE AND TIME	DISCHARGE (m^3/s)
MCS – 5	10-23-10 at 13:05	0.0384
MCS – 6	10-23-10 at 12:10	0.0336
Morrison Creek	10-23-10 at 14:21	0.4111

Note: Based on measurements in Table 2

Table 4 Groundwater Field Measurements

WELL	SAMPLE DATE	SWL (m)*	STICK UP (m)**	pH	CONDUCTIVITY (µS)	TEMPERATURE (Celsius)	COMMENTS
DH06-12	10-24-10	6.19	0.90	7.54	490	3.6	
DH06-7	10-23-10	-0.95	0.95	8.14	360	3.8	Water level is above ground surface
DH07-05B	10-23-10	NA	NM	NA	NA	NA	Unable to sample well because casing is 1 inch diameter and because we had to hike in to the well we only had a bailer that was too large
MW07-01A	10-24-10	flowing	0.95	8.10	820	3.3	Well was flowing approximately 1 liter per minute
MW07-01B	10-24-10	0.40	0.95	7.82	950	3.7	
MW07-02A	10-24-10	3.87	0.90	8.35	630	2.7	
MW07-02B	10-24-10	3.02	0.88	7.69	550	3.2	
MW07-03A	10-22-10	-0.85	0.85	8.62	560	NA	Water level is above ground surface; thermometer quit functioning
MW07-03B	10-22-10	2.81	0.95	7.42	430	NA	Thermometer quit functioning
MW07-04A	10-22-10	26.29	0.94	7.83	570	NA	Thermometer quit functioning
MW07-04B	10-22-10	1.65	0.97	7.46	1160	NA	Thermometer quit functioning
MW07-05A	10-21-10	24.57	0.93	NA	840	6.1	pH meter would not calibrate
MW07-05B	10-21-10	17.68	0.99	NA	1000	6.2	pH meter would not calibrate
MW07-06A	10-21-10	4.88	0.94	8.39	1110	6.8	pH meter would not calibrate with pH 10 solution, value likely inaccurate
MW07-06B	10-21-10	3.19	0.89	7.53	380	10.4	
MW07-07A	10-21-10	NA	NM	NA	NA	NA	Unable to collect samples; data logger installed in well

Table 4 Groundwater Field Measurements (cont'd)

WELL	SAMPLE DATE	SWL (m)*	STICK UP (m)**	pH	CONDUCTIVITY (µS)	TEMPERATURE (Celsius)	COMMENTS
MW07-07B	10-21-10	> 30.0	NM	NA	NA	NA	Unable to collect samples due to obstruction in well casing (likely tubing); well sounder not long enough to measure SWL
MW07-08A	10-22-10	1.69	0.93	7.70	1030	3.8	
MW07-08B	10-22-10	1.46	0.86	7.68	1530	NA	Thermometer quit functioning
MW08-01A	10-20-10	24.47	0.81	NA	NA	NA	Unable to collect samples due to obstruction in well casing (likely tubing)
MW08-01B	10-20-10	18.18	0.88	NA	NA	NA	Field instruments not working properly
MW08-02A	10-21-10	flowing	0.48	NA	730	7.4	Wells not labeled, assume flowing well is the deep well; pH meter would not calibrate
MW08-02B	10-21-10	7.83	0.88	NA	2.60 mS	7.0	pH meter would not calibrate
MW08-03A	10-22-10	14.03	0.93	8.64	690	NA	Thermometer quit functioning
MW08-03B	10-22-10	9.14	0.98	7.92	490	NA	Thermometer quit functioning

Notes: NA = Not available
NM = Not measured
*Static water level (SWL) is meters below casing stick up
**Stick up is meters above ground surface

Table 5 Surface Water Field Measurements

WELL	SAMPLE DATE	pH	TEMPERATURE (Celsius)	DISSOLVED OXYGEN	
				%	mg/L
Booker Lake (deep)	10-22-10	7.10	4.3	5.7	0.74
Booker Lake (surface)	10-22-10	7.4	5.9	92.7	11.56
Morrison Creek	10-22-10	6.9	4.7	71.1	9.11
MCS-1	10-22-10	7.33	3.3	111	15.08
MCS-4	10-22-10	7.38	4.1	138	17.98
MCS-6	10-22-10	7.44	3.6	166	21.94
MCS-7	10-23-10	8.54	2.4		
MCS-10	10-24-10	7.86	2.0		

APPENDIX I

Photos

Photo 1 Canoe Launch at Booker Lake

Photo 2 Stream Water Quality Sampling

Photo 3 MLARD Cubes and Barrel Sampling Location

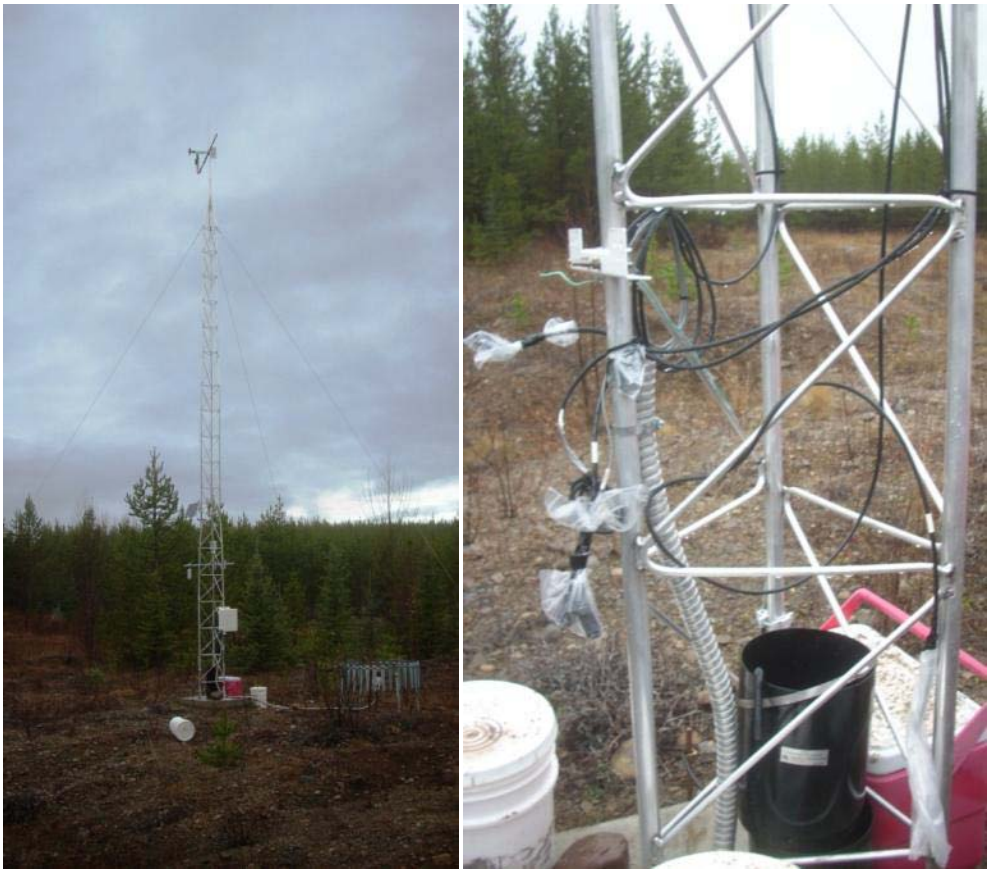

Photo 4 Weather Station (left) and Weather Station with Removed Control Panel (right)

APPENDIX II

October Water Quality Sampling Results

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 27-OCT-10
Report Date: 10-NOV-10 13:11 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L947744
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-031672

ERIN BOLSTER
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L947744-1 22-OCT-10 11:36 CUBE #1	L947744-2 22-OCT-10 11:36 CUBE #2	L947744-3 22-OCT-10 11:36 CUBE #3	L947744-4 22-OCT-10 11:36 CUBE #4	L947744-5 22-OCT-10 11:36 BARREL #1
WATER						
Physical Tests	Conductivity (uS/cm)	1590	1430	562	2160	1140
	Hardness (as CaCO3) (mg/L)	941	839	316	1420	592
	pH (pH)	8.15	8.04	8.34	7.91	7.62
	Total Suspended Solids (mg/L)	<3.0	<3.0	3.0	<3.0	<3.0
	Total Dissolved Solids (mg/L)	1430	1290	411	2180	982
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.9	3.2	<1.0	4.3	4.2
	Alkalinity, Total (as CaCO3) (mg/L)	111	72.0	84.1	81.9	23.8
	Ammonia as N (mg/L)	<0.0050	<0.0050	<0.0050	0.0181	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<1.0	<0.50
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<10	<5.0
	Fluoride (F) (mg/L)	<0.020	<0.020	0.089	<0.40	0.46
	Nitrate (as N) (mg/L)	0.117	0.293	2.44	6.69	4.31
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0047	<0.020	0.028
	Sulfate (SO4) (mg/L)	87.9	77.7	200	1340	588
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	3.51	2.82	4.06	5.91	12.3
Total Metals	Aluminum (Al)-Total (mg/L)	0.0136	0.0115	0.0243	0.0158	0.0137
	Antimony (Sb)-Total (mg/L)	0.00149	0.00122	0.00106	0.00132	0.00544
	Arsenic (As)-Total (mg/L)	0.00214	0.00145	0.00315	0.00227	0.00383
	Barium (Ba)-Total (mg/L)	0.0200	0.0294	0.0526	0.0347	0.00999
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.0076	0.0088	0.0072	0.0107	0.0311
	Cadmium (Cd)-Total (mg/L)	0.000040	0.000056	0.000038	0.000066	0.00599
	Calcium (Ca)-Total (mg/L)	159	180	85.6	366	110
	Chromium (Cr)-Total (mg/L)	0.00055	0.00032	0.00052	0.00047	0.00061
	Cobalt (Co)-Total (mg/L)	0.00049	0.00037	0.00012	0.00077	0.0425
	Copper (Cu)-Total (mg/L)	0.0144	0.0150	0.0221	0.0179	0.132
	Iron (Fe)-Total (mg/L)	0.018	0.053	0.032	0.099	0.076
	Lead (Pb)-Total (mg/L)	0.000110	<0.000050	0.000102	0.000114	0.000108
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	0.0073	0.0086
	Magnesium (Mg)-Total (mg/L)	145	101	23.4	132	80.3
	Manganese (Mn)-Total (mg/L)	0.0432	0.0133	0.00264	0.0265	2.64
	Mercury (Hg)-Total (mg/L)	0.000042	<0.000010	<0.000010	<0.000010	0.000011
	Molybdenum (Mo)-Total (mg/L)	0.00577	0.0284	0.0144	0.0157	0.00291
	Nickel (Ni)-Total (mg/L)	0.00773	0.0296	0.00389	0.0305	0.269
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947744-6	L947744-7	L947744-8		
	Description					
	Sampled Date	22-OCT-10	22-OCT-10	22-OCT-10		
	Sampled Time	11:36	09:00	12:02		
	Client ID	BARREL #2	MCS-5	MCS-1		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)		233	86.2		
	Hardness (as CaCO3) (mg/L)	133	115	36.5		
	pH (pH)		8.22	7.99		
	Total Suspended Solids (mg/L)		14.5	<3.0		
	Total Dissolved Solids (mg/L)		155	58		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)		1.4	2.0		
	Alkalinity, Total (as CaCO3) (mg/L)		108	35.2		
	Ammonia as N (mg/L)	0.0132	<0.0050	<0.0050		
	Bromide (Br) (mg/L)		<0.050	<0.050		
	Chloride (Cl) (mg/L)		<0.50	<0.50		
	Fluoride (F) (mg/L)		0.077	0.029		
	Nitrate (as N) (mg/L)		0.0330	0.0282		
	Nitrite (as N) (mg/L)		<0.0010	<0.0010		
	Sulfate (SO4) (mg/L)		16.2	7.03		
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	8.07	8.09	4.71		
Total Metals	Aluminum (Al)-Total (mg/L)		0.0314	0.0176		
	Antimony (Sb)-Total (mg/L)		<0.000050	<0.000050		
	Arsenic (As)-Total (mg/L)		0.00220	0.000109		
	Barium (Ba)-Total (mg/L)		0.0388	0.0181		
	Beryllium (Be)-Total (mg/L)		<0.00020	<0.00020		
	Bismuth (Bi)-Total (mg/L)		<0.00050	<0.00050		
	Boron (B)-Total (mg/L)		0.0117	0.0069		
	Cadmium (Cd)-Total (mg/L)		<0.000017	<0.000017		
	Calcium (Ca)-Total (mg/L)		34.0	11.9		
	Chromium (Cr)-Total (mg/L)		0.00039	0.00038		
	Cobalt (Co)-Total (mg/L)		<0.00010	<0.00010		
	Copper (Cu)-Total (mg/L)		0.00883	0.00086		
	Iron (Fe)-Total (mg/L)		0.084	0.011		
	Lead (Pb)-Total (mg/L)		<0.000050	<0.000050		
	Lithium (Li)-Total (mg/L)		<0.0050	<0.0050		
	Magnesium (Mg)-Total (mg/L)		8.15	2.51		
	Manganese (Mn)-Total (mg/L)		0.0173	0.000655		
	Mercury (Hg)-Total (mg/L)		<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)		0.000589	0.000081		
	Nickel (Ni)-Total (mg/L)		0.00096	0.00034		
	Phosphorus (P)-Total (mg/L)		<0.30	<0.30		

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947744-1	L947744-2	L947744-3	L947744-4	L947744-5
Description					
Sampled Date	22-OCT-10	22-OCT-10	22-OCT-10	22-OCT-10	22-OCT-10
Sampled Time	11:36	11:36	11:36	11:36	11:36
Client ID	CUBE #1	CUBE #2	CUBE #3	CUBE #4	BARREL #1
Grouping / **Analyte**					
WATER					
Total Metals Potassium (K)-Total (mg/L)	8.04	4.33	6.51	9.87	20.8
Selenium (Se)-Total (mg/L)	0.0102	0.0158	0.00306	0.0234	0.0112
Silicon (Si)-Total (mg/L)	0.584	0.803	1.17	0.939	1.46
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	0.000017	0.000011	0.000018
Sodium (Na)-Total (mg/L)	1.79	3.24	1.71	4.65	6.86
Strontium (Sr)-Total (mg/L)	0.811	1.61	2.25	5.57	0.485
Thallium (Tl)-Total (mg/L)	0.000221	<0.000050	<0.000050	0.000233	0.000161
Tin (Sn)-Total (mg/L)	0.00031	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	0.014	0.014	<0.010	0.017	0.011
Uranium (U)-Total (mg/L)	0.00459	0.00121	0.00495	0.00435	0.000617
Vanadium (V)-Total (mg/L)	0.000211	0.000093	0.000306	0.000128	0.000073
Zinc (Zn)-Total (mg/L)	0.102	0.0799	0.144	0.139	1.44
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	<0.0030	0.0037	<0.0030	0.0031	0.0064
Antimony (Sb)-Dissolved (mg/L)	0.00144	0.00117	0.00113	0.00138	0.00545
Arsenic (As)-Dissolved (mg/L)	0.00200	0.00111	0.00322	0.00207	0.00359
Barium (Ba)-Dissolved (mg/L)	0.0184	0.0283	0.0512	0.0348	0.00949
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)	0.0049	0.0080	0.0076	0.0102	0.0277
Cadmium (Cd)-Dissolved (mg/L)	0.000019	0.000056	0.000033	0.000057	0.00592
Calcium (Ca)-Dissolved (mg/L)	152	175	86.5	357	107
Chromium (Cr)-Dissolved (mg/L)	0.00025	0.00023	0.00031	0.00018	0.00028
Cobalt (Co)-Dissolved (mg/L)	0.00019	0.00030	<0.00010	0.00070	0.0421
Copper (Cu)-Dissolved (mg/L)	0.00723	0.0109	0.0194	0.0161	0.121
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	0.014
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	0.0072	0.0075
Magnesium (Mg)-Dissolved (mg/L)	136	97.7	24.2	129	78.9
Manganese (Mn)-Dissolved (mg/L)	0.00752	0.0103	0.000748	0.0229	2.59
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved (mg/L)	0.00479	0.0271	0.0147	0.0159	0.00265
Nickel (Ni)-Dissolved (mg/L)	0.00597	0.0285	0.00373	0.0293	0.265
Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)	7.54	4.23	6.70	10.0	20.7
Selenium (Se)-Dissolved (mg/L)	0.0102	0.0157	0.00310	0.0243	0.0115
Silicon (Si)-Dissolved (mg/L)	0.566	0.756	1.17	0.960	1.46
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947744-6	L947744-7	L947744-8		
	Description					
	Sampled Date	22-OCT-10	22-OCT-10	22-OCT-10		
	Sampled Time	11:36	09:00	12:02		
	Client ID	BARREL #2	MCS-5	MCS-1		
Grouping	**Analyte**					
WATER						
Total Metals	Potassium (K)-Total (mg/L)		1.03	0.262		
	Selenium (Se)-Total (mg/L)		<0.00010	<0.00010		
	Silicon (Si)-Total (mg/L)		2.99	2.74		
	Silver (Ag)-Total (mg/L)		<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)		2.82	1.43		
	Strontium (Sr)-Total (mg/L)		0.148	0.0330		
	Thallium (Tl)-Total (mg/L)		<0.000050	<0.000050		
	Tin (Sn)-Total (mg/L)		<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)		<0.010	<0.010		
	Uranium (U)-Total (mg/L)		0.000033	<0.000010		
	Vanadium (V)-Total (mg/L)		0.000173	0.000081		
	Zinc (Zn)-Total (mg/L)		<0.0030	<0.0030		
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0047	<0.0030	0.0103		
	Antimony (Sb)-Dissolved (mg/L)	0.000624	<0.000050	<0.000050		
	Arsenic (As)-Dissolved (mg/L)	0.00633	0.00195	0.000085		
	Barium (Ba)-Dissolved (mg/L)	0.00110	0.0369	0.0174		
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)	0.0225	0.0114	0.0063		
	Cadmium (Cd)-Dissolved (mg/L)	0.000018	<0.000017	<0.000017		
	Calcium (Ca)-Dissolved (mg/L)	27.4	32.6	10.8		
	Chromium (Cr)-Dissolved (mg/L)	0.00047	0.00016	0.00016		
	Cobalt (Co)-Dissolved (mg/L)	0.00028	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.0344	0.00664	0.00074		
	Iron (Fe)-Dissolved (mg/L)	0.010	0.024	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050		
	Magnesium (Mg)-Dissolved (mg/L)	15.7	8.11	2.34		
	Manganese (Mn)-Dissolved (mg/L)	0.00112	0.00174	0.000260		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00572	0.000575	0.000065		
	Nickel (Ni)-Dissolved (mg/L)	0.00610	0.00078	0.00029		
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)	23.0	1.03	0.255		
	Selenium (Se)-Dissolved (mg/L)	0.00238	<0.00010	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	0.603	2.85	2.71		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947744-1	L947744-2	L947744-3	L947744-4	L947744-5
Description					
Sampled Date	22-OCT-10	22-OCT-10	22-OCT-10	22-OCT-10	22-OCT-10
Sampled Time	11:36	11:36	11:36	11:36	11:36
Client ID	CUBE #1	CUBE #2	CUBE #3	CUBE #4	BARREL #1
Grouping / **Analyte**					
WATER					
Dissolved Metals Sodium (Na)-Dissolved (mg/L)	1.68	3.14	1.79	4.63	6.74
Strontium (Sr)-Dissolved (mg/L)	0.723	1.54	2.29	5.72	0.452
Thallium (Tl)-Dissolved (mg/L)	0.000194	<0.000050	<0.000050	0.000244	0.000152
Tin (Sn)-Dissolved (mg/L)	0.00024	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Dissolved (mg/L)	0.013	0.014	<0.010	0.017	0.011
Uranium (U)-Dissolved (mg/L)	0.00505	0.00118	0.00502	0.00445	0.000590
Vanadium (V)-Dissolved (mg/L)	0.000147	<0.000050	0.000236	<0.000050	<0.000050
Zinc (Zn)-Dissolved (mg/L)	0.0785	0.0727	0.142	0.136	1.45

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947744-6	L947744-7	L947744-8		
	Description					
	Sampled Date	22-OCT-10	22-OCT-10	22-OCT-10		
	Sampled Time	11:36	09:00	12:02		
	Client ID	BARREL #2	MCS-5	MCS-1		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	3.00	2.75	1.35		
	Strontium (Sr)-Dissolved (mg/L)	0.106	0.147	0.0315		
	Thallium (Tl)-Dissolved (mg/L)	0.000239	<0.000050	<0.000050		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.000398	0.000034	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	0.000253	0.000097	0.000070		
	Zinc (Zn)-Dissolved (mg/L)	0.0783	<0.0030	<0.0030		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			
HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United			

Reference Information

States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulphuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Reference Information

Chain of Custody Numbers:

10-031672

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory Gro
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

Short Holding Tim

in of Cu
Canad

Rush Processing

L947744-COFC

10-031672

Page ___ of ___

Report To	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company: Pacific Booker Minerals	Standard: ✓ Other (specify):	Regular (Standard Turnaround Times))
Contact: Don Betton	Select: PDF ✓ Excel ✓ Digital ✓ Fax	Priority, Date Req'd: _____ (Surcharges apply)
Address:	Email 1: d.betton@pacificbooker.com	Emergency (1 Business Day) - 100% Surcharge
	Email 2: mmacKinnon@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 250-860-7518 Fax:		Analysis Request
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order #, (lab use only) L947744	ALS Contact: Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General parameters	Dissolved metals	Total metals	Nutrients	TOC	Number of Containers
	Cube #1	22-Oct-10	11:36	H_2O	✓	✓	✓	✓	✓	5
	Cube #2	"	"	"	✓	✓	✓	✓	✓	5
	Cube #3	"	"	"	✓	✓	✓	✓	✓	5
	Cube #4	"	"	"	✓	✓	✓	✓	✓	5
	Barrel #1	"	"	"	✓	✓	✓	✓	✓	5
	Barrel #2	"	"	"		✓		✓	✓	3
	MCS-5	22-Oct-10	09:00	"	✓	✓	✓	✓	✓	5
	MCS-1	22-Oct-10	12:02	"	✓	✓	✓	✓	✓	5

Special Instructions / Regulations / Hazardous Details

Dissolved metals filter in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	10-24-10	17:00	SH	27Oct	10:35	5.6 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 27-OCT-10
Report Date: 10-NOV-10 16:21 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L947757
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-031769

ERIN BOLSTER
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-1	L947757-2	L947757-3	L947757-4	L947757-5
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	21-OCT-10
	Sampled Time	13:21	12:50	13:21	12:50	09:51
	Client ID	MORRISON LAKE A DEEP	MORRISON LAKE B DEEP	MORRISON LAKE A SURFACE	MORRISON LAKE B SURFACE	NAK LAKE 1 DEEP
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	62.8	62.8	62.4	62.2	72.8
	Hardness (as CaCO3) (mg/L)	29.3	29.4	30.2	30.0	33.1
	pH (pH)	7.86	7.80	7.81	7.79	7.87
	Total Suspended Solids (mg/L)	<3.0	5.0	5.0	<3.0	3.5
	Total Dissolved Solids (mg/L)	51	50	55	58	55
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.2	2.2	2.1	2.1	2.1
	Alkalinity, Total (as CaCO3) (mg/L)	28.3	28.2	28.0	28.1	33.0
	Ammonia as N (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.034	0.034	0.034	0.035	0.036
	Nitrate (as N) (mg/L)	0.0338	0.0390	0.0364	0.0396	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	2.41	2.40	2.42	2.40	3.17
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	7.62	9.61	8.07	9.67	7.71
Total Metals	Aluminum (Al)-Total (mg/L)	0.0355	0.0442	0.0540	0.0332	
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Arsenic (As)-Total (mg/L)	0.000336	0.000378	0.000346	0.000313	
	Barium (Ba)-Total (mg/L)	0.0165	0.0164	0.0179	0.0166	
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	0.0083	0.0085	0.0087	0.0084	
	Cadmium (Cd)-Total (mg/L)	<0.000017	<0.000017	0.000022	<0.000017	
	Calcium (Ca)-Total (mg/L)	8.47	8.65	8.90	8.74	
	Chromium (Cr)-Total (mg/L)	0.00048	0.00036	0.00050	0.00038	
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Total (mg/L)	0.00119	0.00151	0.00234	0.00092	
	Iron (Fe)-Total (mg/L)	0.104	0.137	0.139	0.096	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000229	<0.000050	
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Magnesium (Mg)-Total (mg/L)	1.97	1.94	1.99	1.98	
	Manganese (Mn)-Total (mg/L)	0.00493	0.00578	0.0150	0.00371	
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.000127	0.000127	0.000142	0.000122	
	Nickel (Ni)-Total (mg/L)	0.00049	0.00049	0.00062	0.00053	
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-6	L947757-7	L947757-8		
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10		
	Sampled Time	09:51	10:55	10:55		
	Client ID	NAK LAKE 1 SURFACE	NAK LAKE 2 SURFACE	NAK LAKE 2 DEEP		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	72.8	67.0	67.4		
	Hardness (as CaCO3) (mg/L)	34.6	32.4	31.7		
	pH (pH)	7.82	7.83	7.82		
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0		
	Total Dissolved Solids (mg/L)	55	49	50		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.6	2.1	2.1		
	Alkalinity, Total (as CaCO3) (mg/L)	33.0	30.4	30.5		
	Ammonia as N (mg/L)	0.0055	0.0056	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50		
	Fluoride (F) (mg/L)	0.036	0.035	0.035		
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010		
	Sulfate (SO4) (mg/L)	3.16	2.94	2.94		
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	6.91	6.82	6.98		
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-1	L947757-2	L947757-3	L947757-4	L947757-5
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	21-OCT-10
	Sampled Time	13:21	12:50	13:21	12:50	09:51
	Client ID	MORRISON LAKE A DEEP	MORRISON LAKE B DEEP	MORRISON LAKE A SURFACE	MORRISON LAKE B SURFACE	NAK LAKE 1 DEEP
Grouping	**Analyte**					
WATER						
Total Metals	Potassium (K)-Total (mg/L)	0.316	0.312	0.330	0.323	
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Total (mg/L)	2.42	2.40	2.49	2.41	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	1.99	1.95	2.00	2.00	
	Strontium (Sr)-Total (mg/L)	0.0489	0.0478	0.0498	0.0481	
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Vanadium (V)-Total (mg/L)	0.000104	0.000124	0.000152	0.000089	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0036	<0.0030	
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0239	0.0256	0.0256	0.0264	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Arsenic (As)-Dissolved (mg/L)	0.000308	0.000286	0.000332	0.000315	0.000193
	Barium (Ba)-Dissolved (mg/L)	0.0160	0.0160	0.0162	0.0160	0.0128
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.0084	0.0074	0.0078	0.0078	0.0069
	Cadmium (Cd)-Dissolved (mg/L)	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017
	Calcium (Ca)-Dissolved (mg/L)	8.57	8.59	8.91	8.86	10.2
	Chromium (Cr)-Dissolved (mg/L)	0.00021	0.00045	0.00022	0.00022	0.00015
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00098	0.00121	0.00088	0.00079	0.00052
	Iron (Fe)-Dissolved (mg/L)	0.066	0.069	0.067	0.069	0.027
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	1.93	1.92	1.93	1.92	1.84
	Manganese (Mn)-Dissolved (mg/L)	0.000255	0.000371	0.000275	0.000298	0.00110
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000111	0.000113	0.000119	0.000111	0.000101
	Nickel (Ni)-Dissolved (mg/L)	0.00045	0.00053	0.00060	0.00050	0.00024
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.304	0.319	0.377	0.318	0.286
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	2.34	2.36	2.34	2.34	2.10
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-6	L947757-7	L947757-8		
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10		
	Sampled Time	09:51	10:55	10:55		
	Client ID	NAK LAKE 1 SURFACE	NAK LAKE 2 SURFACE	NAK LAKE 2 DEEP		
Grouping	**Analyte**					
WATER						
Total Metals	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0035	0.0048	0.0042		
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Arsenic (As)-Dissolved (mg/L)	0.000205	0.000163	0.000197		
	Barium (Ba)-Dissolved (mg/L)	0.0125	0.0106	0.0109		
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)	0.0075	0.0068	0.0065		
	Cadmium (Cd)-Dissolved (mg/L)	<0.000017	<0.000017	<0.000017		
	Calcium (Ca)-Dissolved (mg/L)	10.7	10.0	9.75		
	Chromium (Cr)-Dissolved (mg/L)	0.00015	0.00015	0.00014		
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.00090	0.00052	0.00062		
	Iron (Fe)-Dissolved (mg/L)	0.024	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050		
	Magnesium (Mg)-Dissolved (mg/L)	1.90	1.78	1.78		
	Manganese (Mn)-Dissolved (mg/L)	0.000750	0.000162	0.000102		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000113	0.000079	0.000083		
	Nickel (Ni)-Dissolved (mg/L)	0.00028	0.00025	0.00022		
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)	0.326	0.283	0.277		
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	2.09	2.22	2.23		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-1	L947757-2	L947757-3	L947757-4	L947757-5
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	21-OCT-10
	Sampled Time	13:21	12:50	13:21	12:50	09:51
	Client ID	MORRISON LAKE A DEEP	MORRISON LAKE B DEEP	MORRISON LAKE A SURFACE	MORRISON LAKE B SURFACE	NAK LAKE 1 DEEP
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	1.93	1.96	2.05	1.97	1.93
	Strontium (Sr)-Dissolved (mg/L)	0.0468	0.0470	0.0470	0.0466	0.0505
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Dissolved (mg/L)	0.000078	0.000077	0.000080	0.000082	0.000129
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	0.0091	<0.0030	<0.0030

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-6	L947757-7	L947757-8		
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10		
	Sampled Time	09:51	10:55	10:55		
	Client ID	NAK LAKE 1 SURFACE	NAK LAKE 2 SURFACE	NAK LAKE 2 DEEP		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	2.02	1.92	1.92		
	Strontium (Sr)-Dissolved (mg/L)	0.0499	0.0485	0.0481		
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	0.000096	0.000061	0.000066		
	Zinc (Zn)-Dissolved (mg/L)	0.0043	<0.0030	<0.0030		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			
HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United			

Reference Information

States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulphuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Reference Information

Chain of Custody Numbers:

10-031769

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Labo
ANALYTICAL CHEMISTR
Environmenta

Short Holding Tim

Rush Processing

L947757-COFC

10-031769

Page ___ of ___

Report To	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company: PBM	Standard: ✓ Other (specify):	Regular (Standard Turnaround Times))
Contact: Don Betton	Select: PDF ✓ Excel ✓ Digital Fax	Priority, Date Req'd: _____ (Surcharges apply)
Address:	Email 1: d.betton@pacificbooker.com	Emergency (1 Business Day) - 100% Surcharge
	Email 2: mmackinnon@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 250-860-7518 Fax:		Analysis Request
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only): L947757	ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General parameters	Dissolved metals (F)	Total metals (P)	Nutrients (P)	TOC (P)							Number of Containers
	Morrison Lake A deep	20-Oct-10	13:21	H_2O	X	X	X	X	X							5
	Morrison Lake B deep	20-Oct-10	12:50	H_2O	X	X	X	X	X							5
	Morrison Lake A surface	20-Oct-10	13:21	H_2O	X	X	X	X	X							5
	Morrison Lake B surface	20-Oct-10	12:50	H_2O	X	X	X	X	X							5
	Nak Lake 1 deep	21-Oct-10	09:51	H_2O	X	X		X	X							4
	Nak Lake 1 surface	21-Oct-10	09:51	H_2O	X	X		X	X							4
	Nak Lake 2 surface	21-Oct-10	10:55	H_2O	X	X		X	X							4
	Nak Lake 2 deep	21-Oct-10	10:55	H_2O	X	X		X	X							4

Special Instructions / Regulations / Hazardous Details

Dissolved metals filter in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Matt Mackinnon	10-22-10	17:00	SH	27Oct	10:35	6.0 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY — GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 27-OCT-10
Report Date: 10-NOV-10 16:32 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L947772
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-031658

ERIN BOLSTER
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947772-1	L947772-2	L947772-3	L947772-4	L947772-5
Description					
Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10
Sampled Time	11:25	11:25	10:47	10:47	12:11
Client ID	MORRISON LAKE D DEEP WATER	MORRISON LAKE D SURFACE	MORRISON LAKE C SURFACE	MORRISON LAKE C DEEP	MORRISON LAKE E DEEP
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	62.3	62.1	62.4	63.0	62.7
Hardness (as CaCO3) (mg/L)	29.1	28.0	27.1	26.7	28.5
pH (pH)	7.71	7.78	7.76	7.75	7.69
Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	33.0	<3.0
Total Dissolved Solids (mg/L)	57	55	52	52	57
Anions and Nutrients Acidity (as CaCO3) (mg/L)	2.2	2.1	2.1	2.1	2.1
Alkalinity, Total (as CaCO3) (mg/L)	28.1	28.2	28.1	28.1	27.6
Ammonia as N (mg/L)	<0.0050	0.0058	0.0052	<0.0050	<0.0050
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F) (mg/L)	0.021	0.021	0.021	0.020	0.020
Nitrate (as N) (mg/L)	0.0679	0.0330	0.0339	0.0429	0.0651
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulfate (SO4) (mg/L)	2.36	2.40	2.40	2.40	2.36
Organic / Inorganic Carbon Total Organic Carbon (mg/L)	9.85	9.91	9.50	9.37	9.83
Total Metals Aluminum (Al)-Total (mg/L)	0.0380	0.0413	0.0296	0.109	0.0329
Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Arsenic (As)-Total (mg/L)	0.000273	0.000291	0.000284	0.000642	0.000305
Barium (Ba)-Total (mg/L)	0.0163	0.0170	0.0162	0.0183	0.0160
Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total (mg/L)	0.0098	0.0100	0.0101	0.0105	0.0098
Cadmium (Cd)-Total (mg/L)	<0.000017	<0.000017	<0.000017	0.000063	<0.000017
Calcium (Ca)-Total (mg/L)	8.63	7.82	8.33	7.94	7.97
Chromium (Cr)-Total (mg/L)	0.00050	0.00047	0.00050	0.00076	0.00046
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00113	0.00109	0.00090	0.00219	0.00143
Iron (Fe)-Total (mg/L)	0.104	0.108	0.098	0.342	0.103
Lead (Pb)-Total (mg/L)	<0.000050	0.000065	<0.000050	0.000251	<0.000050
Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total (mg/L)	1.81	1.79	1.75	1.71	1.79
Manganese (Mn)-Total (mg/L)	0.00313	0.00358	0.00266	0.0241	0.00276
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.000132	0.000142	0.000130	0.000136	0.000122
Nickel (Ni)-Total (mg/L)	0.00056	0.00086	0.00072	0.00084	0.00048
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947772-6	L947772-7	L947772-8		
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10		
	Sampled Time	12:11	10:40	11:17		
	Client ID	MORRISON LAKE E SURFACE	MCS-7	MCS-8		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	62.3	190	245		
	Hardness (as CaCO3) (mg/L)	25.5	76.3	103		
	pH (pH)	7.40	8.02	8.06		
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0		
	Total Dissolved Solids (mg/L)	54	116	150		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.8	2.5	2.6		
	Alkalinity, Total (as CaCO3) (mg/L)	28.0	90.5	114		
	Ammonia as N (mg/L)	<0.0050	<0.0050	0.0054		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50		
	Fluoride (F) (mg/L)	0.021	0.048	0.060		
	Nitrate (as N) (mg/L)	0.0359	0.113	0.330		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010		
	Sulfate (SO4) (mg/L)	2.40	11.6	12.5		
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	9.30	6.71	5.52		
Total Metals	Aluminum (Al)-Total (mg/L)	0.0328	0.0118	0.0220		
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Arsenic (As)-Total (mg/L)	0.000281	0.000201	0.000422		
	Barium (Ba)-Total (mg/L)	0.0162	0.0319	0.0553		
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020		
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Total (mg/L)	0.0097	0.0162	0.0179		
	Cadmium (Cd)-Total (mg/L)	<0.000017	<0.000017	<0.000017		
	Calcium (Ca)-Total (mg/L)	7.50	22.5	31.0		
	Chromium (Cr)-Total (mg/L)	0.00053	0.00041	0.00046		
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Total (mg/L)	0.00100	0.00073	0.00094		
	Iron (Fe)-Total (mg/L)	0.101	<0.010	0.073		
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000079		
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050		
	Magnesium (Mg)-Total (mg/L)	1.77	4.74	6.17		
	Manganese (Mn)-Total (mg/L)	0.00254	0.00219	0.0303		
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)	0.000127	0.000092	0.000139		
	Nickel (Ni)-Total (mg/L)	0.00043	0.00030	0.00047		
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30		

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947772-1	L947772-2	L947772-3	L947772-4	L947772-5
Description					
Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10
Sampled Time	11:25	11:25	10:47	10:47	12:11
Client ID	MORRISON LAKE D DEEP WATER	MORRISON LAKE D SURFACE	MORRISON LAKE C SURFACE	MORRISON LAKE C DEEP	MORRISON LAKE E DEEP
Grouping / **Analyte**					
WATER					
Total Metals Potassium (K)-Total (mg/L)	0.332	0.324	0.321	0.329	0.318
Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Total (mg/L)	2.62	2.28	2.28	2.39	2.51
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.78	1.76	1.72	1.69	1.74
Strontium (Sr)-Total (mg/L)	0.0486	0.0476	0.0477	0.0468	0.0480
Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000011	<0.000010
Vanadium (V)-Total (mg/L)	0.000085	0.000118	0.000085	0.000329	0.000096
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0289	0.0244	0.0251	0.0245	<0.0030
Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Arsenic (As)-Dissolved (mg/L)	0.000273	0.000303	0.000285	0.000254	0.000194
Barium (Ba)-Dissolved (mg/L)	0.0158	0.0161	0.0161	0.0175	0.0123
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)	0.0073	0.0102	0.0101	0.0071	0.0033
Cadmium (Cd)-Dissolved (mg/L)	<0.000017	<0.000017	<0.000017	0.000031	<0.000017
Calcium (Ca)-Dissolved (mg/L)	8.69	8.36	8.01	7.87	8.68
Chromium (Cr)-Dissolved (mg/L)	0.00019	0.00028	0.00030	0.00022	<0.00010
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00132	0.00097	0.00078	0.00125	0.00076
Iron (Fe)-Dissolved (mg/L)	0.077	0.071	0.071	0.071	0.112
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000053	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved (mg/L)	1.80	1.74	1.72	1.72	1.66
Manganese (Mn)-Dissolved (mg/L)	0.000363	0.000280	0.000273	0.000260	0.000319
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved (mg/L)	0.000107	0.000121	0.000118	0.000126	0.000098
Nickel (Ni)-Dissolved (mg/L)	0.00055	0.00071	0.00071	0.00058	0.00020
Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)	0.335	0.328	0.324	0.321	0.282
Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Dissolved (mg/L)	2.63	2.27	2.27	2.34	2.48
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947772-6	L947772-7	L947772-8		
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10		
	Sampled Time	12:11	10:40	11:17		
	Client ID	MORRISON LAKE E SURFACE	MCS-7	MCS-8		
Grouping	**Analyte**					
WATER						
Total Metals	Potassium (K)-Total (mg/L)	0.322	0.384	0.424		
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Total (mg/L)	2.30	2.48	4.09		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	1.72	5.63	5.34		
	Strontium (Sr)-Total (mg/L)	0.0485	0.0859	0.121		
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	<0.000010	0.000029	0.000033		
	Vanadium (V)-Total (mg/L)	0.000111	0.000074	0.000141		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030		
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0228	0.0101	0.0054		
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Arsenic (As)-Dissolved (mg/L)	0.000261	0.000199	0.000396		
	Barium (Ba)-Dissolved (mg/L)	0.0159	0.0303	0.0545		
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)	0.0089	0.0141	0.0184		
	Cadmium (Cd)-Dissolved (mg/L)	<0.000017	<0.000017	<0.000017		
	Calcium (Ca)-Dissolved (mg/L)	7.33	22.7	31.1		
	Chromium (Cr)-Dissolved (mg/L)	0.00039	0.00013	0.00022		
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.00077	0.00072	0.00061		
	Iron (Fe)-Dissolved (mg/L)	0.074	<0.010	0.028		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050		
	Magnesium (Mg)-Dissolved (mg/L)	1.74	4.78	6.14		
	Manganese (Mn)-Dissolved (mg/L)	0.000249	0.000185	0.00649		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000117	0.000076	0.000120		
	Nickel (Ni)-Dissolved (mg/L)	0.00049	0.00025	0.00041		
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)	0.319	0.388	0.436		
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	2.26	2.47	4.07		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947772-1	L947772-2	L947772-3	L947772-4	L947772-5
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10
	Sampled Time	11:25	11:25	10:47	10:47	12:11
	Client ID	MORRISON LAKE D DEEP WATER	MORRISON LAKE D SURFACE	MORRISON LAKE C SURFACE	MORRISON LAKE C DEEP	MORRISON LAKE E DEEP
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	1.76	1.75	1.70	1.72	1.68
	Strontium (Sr)-Dissolved (mg/L)	0.0471	0.0465	0.0465	0.0466	0.0494
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Dissolved (mg/L)	0.000066	0.000088	0.000100	0.000087	0.000092
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947772-6	L947772-7	L947772-8		
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10		
	Sampled Time	12:11	10:40	11:17		
	Client ID	MORRISON LAKE E SURFACE	MCS-7	MCS-8		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	1.72	5.62	5.37		
	Strontium (Sr)-Dissolved (mg/L)	0.0466	0.0832	0.117		
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	<0.000010	0.000029	0.000033		
	Vanadium (V)-Dissolved (mg/L)	0.000064	0.000093	0.000111		
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			
HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United			

Reference Information

States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulphuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Reference Information

Chain of Custody Numbers:

10-031658

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory
ANALYTICAL CHEMISTRY & TESTING SE

Environmental Division

Short Holding Tim

Rush Processing

L947772-COFC

10-031658

Page 1 of 1

Report To		Report		Service Requested: (Rush subject to availability)
Company:	PACIFIC BOOKER MINERALS	Standard: ✓ Other (specify):		Regular (Standard Turnaround Times))
Contact:	DON BETTON	Select: PDF ✓ Excel ✓ Digital Fax		Priority, Date Req'd: (Surcharges apply)
Address:		Email 1: d.betton@pacificbooker.com		Emergency (1 Business Day) - 100% Surcharge
		Email 2: mmacKinnon@klohn.com		For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-860-7518 Fax:			Analysis Request
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)
	Copy of Invoice with Report? (circle) Yes or No	Job #:		
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)	L947772	ALS Contact:	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	F Total Metals	P TOC	P General Parameters	F Nutrients	P Dissolved Metals								Number of Containers
	MORVISON LAKE D Deep water	20-OCT-10	11:25	H_2O	✓	✓	✓	✓	✓								5
	Morrison LAKE D surface	20-OCT-10	11:25	H_2O	✓	✓	✓	✓	✓								5
	Morrison LAKE C surface	20-OCT-10	10:47	H_2O	✓	✓	✓	✓	✓								5
	Morrison LAKE C DEEP	20-OCT-10	10:47	H_2O	✓	✓	✓	✓	✓								5
	Morrison LAKE E DEEP	20-OCT-10	12:11	H_2O	✓	✓	✓	✓	✓								5
	MORRISON LAKE E SURFACE	20-OCT-10	12:11	H_2O	✓	✓	✓	✓	✓								5
	MCS-7	20-OCT-10	10:46	H_2O	✓	✓	✓	✓	✓								5
	MCS-8	20-OCT-10	11:17	H_2O	✓	✓	✓	✓	✓								5

Special Instructions / Regulations / Hazardous Details

Dissolved Metals Filter in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	10-22-10	17:00	JH	27OCT	10:35	6.2 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 27-OCT-10
Report Date: 10-NOV-10 17:17 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L947774
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-031771

ERIN BOLSTER
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947774-1	L947774-2	L947774-3	L947774-4	L947774-5
Description					
Sampled Date	20-OCT-10	21-OCT-10	23-OCT-10	23-OCT-10	21-OCT-10
Sampled Time	14:00	11:20	12:00	13:20	13:30
Client ID	MW08-1B	MW07-06A	DH06-7	UPPER 7	MW08-02B
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	782	1020	413	103	1660
Hardness (as CaCO3) (mg/L)	171	39.6	127	40.6	431
pH (pH)	8.21	8.34	8.25	8.05	11.91
Total Suspended Solids (mg/L)	1580	142	<3.0	<3.0	166
Total Dissolved Solids (mg/L)	554	658	230	73	495
Anions and Nutrients Acidity (as CaCO3) (mg/L)	4.4	<1.0	<1.0	1.7	<1.0
Alkalinity, Total (as CaCO3) (mg/L)	412	499	185	47.5	370
Ammonia as N (mg/L)	0.0339	0.720	0.0065	<0.0050	0.0843
Bromide (Br) (mg/L)	<0.50	<0.50	<0.050	<0.050	<1.0
Chloride (Cl) (mg/L)	<5.0	9.5	<0.50	<0.50	<10
Fluoride (F) (mg/L)	<0.20	1.04	1.39	0.078	<0.40
Nitrate (as N) (mg/L)	<0.050	<0.050	<0.0050	0.0088	<0.10
Nitrite (as N) (mg/L)	<0.010	<0.010	<0.0010	<0.0010	<0.020
Sulfate (SO4) (mg/L)	15.6	53.1	15.5	4.36	29
Cyanides Cyanide, Weak Acid Diss (mg/L)		<0.0050			<0.0050
Cyanide, Total (mg/L)		<0.0050			<0.0050
Organic / Inorganic Carbon Total Organic Carbon (mg/L)	28.5	9.63	5.62	9.62	3.63
Total Metals Aluminum (Al)-Total (mg/L)	7.61	6.96	0.0680	0.0657	0.969
Antimony (Sb)-Total (mg/L)	0.00238	0.00232	<0.000050	<0.000050	0.00265
Arsenic (As)-Total (mg/L)	0.0349	0.00311	0.000360	0.000323	0.00804
Barium (Ba)-Total (mg/L)	0.422	0.338	0.0327	0.0155	0.987
Beryllium (Be)-Total (mg/L)	0.00023	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total (mg/L)	0.166	0.489	0.0844	0.0126	0.0094
Cadmium (Cd)-Total (mg/L)	0.000488	0.000645	0.000073	<0.000017	0.000228
Calcium (Ca)-Total (mg/L)	49.7	13.7	40.7	12.4	223
Chromium (Cr)-Total (mg/L)	0.0180	0.00362	0.00261	0.00041	0.0187
Cobalt (Co)-Total (mg/L)	0.0138	0.00267	<0.00010	<0.00010	0.00031
Copper (Cu)-Total (mg/L)	0.0157	0.0111	0.00126	0.00053	0.00917
Iron (Fe)-Total (mg/L)	31.7	4.84	0.090	0.191	0.743
Lead (Pb)-Total (mg/L)	0.00581	0.00343	0.000106	<0.000050	0.000779
Lithium (Li)-Total (mg/L)	0.0068	0.0124	0.0180	<0.0050	0.0145
Magnesium (Mg)-Total (mg/L)	15.6	2.83	7.69	2.72	8.64
Manganese (Mn)-Total (mg/L)	2.11	0.384	0.0723	0.00455	0.0231
Mercury (Hg)-Total (mg/L)	0.000052	0.000012	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.0824	0.00940	0.00205	0.000064	0.0127

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947774-6	L947774-7	L947774-8	L947774-9	
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10	21-OCT-10	
	Sampled Time	14:45	14:45	13:30	11:20	
	Client ID	MW07-05A	MW07-05B	MW08-02A	MW07-06B	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	693	961	654	342	
	Hardness (as CaCO3) (mg/L)	326	177	316	148	
	pH (pH)	8.04	8.05	8.00	7.93	
	Total Suspended Solids (mg/L)	19.0	42.5	<3.0	323	
	Total Dissolved Solids (mg/L)	416	638	432	209	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	5.2	4.6	4.6	3.9	
	Alkalinity, Total (as CaCO3) (mg/L)	320	345	248	169	
	Ammonia as N (mg/L)	0.105	0.0367	0.0415	0.0682	
	Bromide (Br) (mg/L)	<0.050	<0.50	<0.050	<0.050	
	Chloride (Cl) (mg/L)	2.55	<5.0	<0.50	<0.50	
	Fluoride (F) (mg/L)	0.164	0.35	0.193	0.075	
	Nitrate (as N) (mg/L)	<0.0050	<0.050	<0.0050	0.0066	
	Nitrite (as N) (mg/L)	<0.0010	<0.010	<0.0010	<0.0010	
	Sulfate (SO4) (mg/L)	76.8	171	120	16.6	
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	<0.0050	<0.0050			
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	4.39	12.7	2.63	7.34	
Total Metals	Aluminum (Al)-Total (mg/L)	0.300	1.75	0.0085	3.18	
	Antimony (Sb)-Total (mg/L)	0.00310	0.00145	0.000113	0.000424	
	Arsenic (As)-Total (mg/L)	0.0147	0.0160	0.0194	0.0190	
	Barium (Ba)-Total (mg/L)	0.0468	0.172	0.0291	0.167	
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	0.0252	0.0394	0.0199	0.0173	
	Cadmium (Cd)-Total (mg/L)	0.000298	0.000383	<0.000017	0.000399	
	Calcium (Ca)-Total (mg/L)	72.5	46.6	73.6	43.8	
	Chromium (Cr)-Total (mg/L)	0.00489	0.00909	0.00057	0.00397	
	Cobalt (Co)-Total (mg/L)	0.00147	0.00637	<0.00010	0.00721	
	Copper (Cu)-Total (mg/L)	0.00731	0.0222	0.00069	0.0635	
	Iron (Fe)-Total (mg/L)	1.02	5.40	1.54	7.36	
	Lead (Pb)-Total (mg/L)	0.00230	0.00385	<0.000050	0.00281	
	Lithium (Li)-Total (mg/L)	0.0134	0.0122	0.0105	<0.0050	
	Magnesium (Mg)-Total (mg/L)	32.1	15.9	34.9	11.3	
	Manganese (Mn)-Total (mg/L)	0.483	2.18	0.0964	4.58	
	Mercury (Hg)-Total (mg/L)	<0.000010	0.000061	<0.000010	0.000062	
	Molybdenum (Mo)-Total (mg/L)	0.00198	0.00648	0.00485	0.00206	

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Sample ID	L947774-1	L947774-2	L947774-3	L947774-4	L947774-5
Description					
Sampled Date	20-OCT-10	21-OCT-10	23-OCT-10	23-OCT-10	21-OCT-10
Sampled Time	14:00	11:20	12:00	13:20	13:30
Client ID	MW08-1B	MW07-06A	DH06-7	UPPER 7	MW08-02B
Grouping / **Analyte**					
WATER					
Total Metals Nickel (Ni)-Total (mg/L)	0.0304	0.00537	0.00027	0.00033	0.00153
Phosphorus (P)-Total (mg/L)	0.66	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total (mg/L)	3.70	6.34	0.167	0.210	4.78
Selenium (Se)-Total (mg/L)	0.00022	0.00015	<0.00010	<0.00010	0.00018
Silicon (Si)-Total (mg/L)	23.3	34.1	9.19	1.45	4.69
Silver (Ag)-Total (mg/L)	0.000060	0.000171	<0.000010	<0.000010	0.000054
Sodium (Na)-Total (mg/L)	103	204	27.9	4.49	32.8
Strontium (Sr)-Total (mg/L)	0.652	0.428	0.576	0.0565	1.30
Thallium (Tl)-Total (mg/L)	0.000188	0.000117	<0.000050	<0.000050	<0.000050
Tin (Sn)-Total (mg/L)	0.00134	0.00052	0.00028	<0.00010	0.00171
Titanium (Ti)-Total (mg/L)	0.354	0.904	<0.010	<0.010	0.035
Uranium (U)-Total (mg/L)	0.000808	0.00166	0.000023	<0.000010	0.000197
Vanadium (V)-Total (mg/L)	0.0218	0.0141	0.000168	0.000210	0.00192
Zinc (Zn)-Total (mg/L)	0.0449	0.0192	0.0185	<0.0030	0.0369
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0035	0.0335	<0.0030	0.0267	0.0742
Antimony (Sb)-Dissolved (mg/L)	0.000793	0.000971	<0.000050	<0.000050	0.00228
Arsenic (As)-Dissolved (mg/L)	0.0103	0.00197	0.000298	0.000269	0.000169
Barium (Ba)-Dissolved (mg/L)	0.259	0.195	0.0314	0.0146	0.368
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)	0.165	0.470	0.0780	0.0103	0.0064
Cadmium (Cd)-Dissolved (mg/L)	0.000024	0.000033	<0.000017	<0.000017	<0.000017
Calcium (Ca)-Dissolved (mg/L)	45.8	12.3	38.4	11.9	172
Chromium (Cr)-Dissolved (mg/L)	0.00017	0.00030	0.00031	0.00021	0.0139
Cobalt (Co)-Dissolved (mg/L)	0.00084	0.00069	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	0.00099
Iron (Fe)-Dissolved (mg/L)	0.251	0.016	0.036	0.134	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000230	<0.000050	<0.000050	0.000065
Lithium (Li)-Dissolved (mg/L)	<0.0050	0.0104	0.0183	<0.0050	0.0133
Magnesium (Mg)-Dissolved (mg/L)	13.8	2.15	7.58	2.65	0.0187
Manganese (Mn)-Dissolved (mg/L)	1.65	0.306	0.0677	0.00153	0.000074
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved (mg/L)	0.0579	0.00908	0.00197	0.000054	0.0121
Nickel (Ni)-Dissolved (mg/L)	0.00407	0.00279	<0.00010	0.00028	0.00022
Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)	2.88	5.64	0.094	0.218	4.81
Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00015

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947774-6	L947774-7	L947774-8	L947774-9	
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10	21-OCT-10	
	Sampled Time	14:45	14:45	13:30	11:20	
	Client ID	MW07-05A	MW07-05B	MW08-02A	MW07-06B	
Grouping	**Analyte**					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00658	0.0139	0.00027	0.0198	
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Total (mg/L)	3.29	4.90	2.03	1.29	
	Selenium (Se)-Total (mg/L)	<0.00010	0.00038	<0.00010	0.00013	
	Silicon (Si)-Total (mg/L)	4.93	9.73	5.93	9.19	
	Silver (Ag)-Total (mg/L)	0.000333	0.000147	0.000018	0.000165	
	Sodium (Na)-Total (mg/L)	24.7	133	6.47	3.80	
	Strontium (Sr)-Total (mg/L)	0.329	0.308	0.738	0.210	
	Thallium (Tl)-Total (mg/L)	<0.000050	0.000239	<0.000050	0.000150	
	Tin (Sn)-Total (mg/L)	0.00304	0.00106	<0.00010	0.00012	
	Titanium (Ti)-Total (mg/L)	0.021	0.088	<0.010	0.108	
	Uranium (U)-Total (mg/L)	0.00188	0.0119	0.000221	0.000163	
	Vanadium (V)-Total (mg/L)	0.00100	0.00759	0.000076	0.00856	
	Zinc (Zn)-Total (mg/L)	0.0568	0.0286	<0.0030	0.0288	
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	0.0066	
	Antimony (Sb)-Dissolved (mg/L)	0.00142	0.000505	0.000061	0.000071	
	Arsenic (As)-Dissolved (mg/L)	0.0115	0.00305	0.00933	0.00137	
	Barium (Ba)-Dissolved (mg/L)	0.0418	0.0726	0.0263	0.0814	
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Dissolved (mg/L)	0.0237	0.0378	0.0182	0.0144	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000017	<0.000017	<0.000017	0.000214	
	Calcium (Ca)-Dissolved (mg/L)	74.5	45.8	70.1	41.9	
	Chromium (Cr)-Dissolved (mg/L)	0.00062	0.00086	0.00019	0.00024	
	Cobalt (Co)-Dissolved (mg/L)	0.00073	0.00224	0.00015	0.00145	
	Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	0.0114	
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	0.013	
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000077	<0.000050	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0142	0.0115	0.0104	<0.0050	
	Magnesium (Mg)-Dissolved (mg/L)	34.0	15.3	34.2	10.6	
	Manganese (Mn)-Dissolved (mg/L)	0.524	1.98	0.0921	1.86	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	0.00146	0.00438	0.00482	0.000894	
	Nickel (Ni)-Dissolved (mg/L)	0.00442	0.00567	0.00035	0.00653	
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)	3.28	4.52	2.00	0.693	
	Selenium (Se)-Dissolved (mg/L)	<0.00010	0.00018	<0.00010	<0.00010	

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947774-1	L947774-2	L947774-3	L947774-4	L947774-5
	Description					
	Sampled Date	20-OCT-10	21-OCT-10	23-OCT-10	23-OCT-10	21-OCT-10
	Sampled Time	14:00	11:20	12:00	13:20	13:30
	Client ID	MW08-1B	MW07-06A	DH06-7	UPPER 7	MW08-02B
Grouping	**Analyte**					
WATER						
Dissolved Metals	Silicon (Si)-Dissolved (mg/L)	4.56	2.95	9.08	1.38	1.14
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	108	211	27.5	4.40	32.1
	Strontium (Sr)-Dissolved (mg/L)	0.605	0.369	0.563	0.0536	0.282
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	0.00011	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	0.015
	Uranium (U)-Dissolved (mg/L)	0.000518	0.00157	0.000020	<0.000010	<0.000010
	Vanadium (V)-Dissolved (mg/L)	0.000205	0.000911	0.000096	0.000116	0.000282
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	0.0046	<0.0030	<0.0030	<0.0030

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	Sample ID	L947774-6	L947774-7	L947774-8	L947774-9	
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10	21-OCT-10	
	Sampled Time	14:45	14:45	13:30	11:20	
	Client ID	MW07-05A	MW07-05B	MW08-02A	MW07-06B	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Silicon (Si)-Dissolved (mg/L)	4.79	6.40	5.81	4.32	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	27.6	135	6.28	3.57	
	Strontium (Sr)-Dissolved (mg/L)	0.347	0.303	0.720	0.203	
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	0.000052	
	Tin (Sn)-Dissolved (mg/L)	0.00026	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00198	0.0112	0.000218	0.000107	
	Vanadium (V)-Dissolved (mg/L)	0.000120	0.000119	<0.000050	0.000125	
	Zinc (Zn)-Dissolved (mg/L)	0.0043	0.0061	<0.0030	0.0045	

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method			

Reference Information

6010B).

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulphuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

Reference Information

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-031771

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory
ANALYTICAL CHEMISTRY & TESTING S

Environmental Divisio

Short Holding Tim

Rush Processing

L947774-COFC

10-031771

Page ____ of ____

Report To	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company: PBH	Standard: ✓ Other (specify):	Regular (Standard Turnaround Times))
Contact: Don Betton	Select: PDF ✓ Excel Digital Fax	Priority, Date Req'd: _____ (Surcharges apply)
Address:	Email 1: d.betton@pacificbooker.com	Emergency (1 Business Day) - 100% Surcharge
	Email 2: mmackinnon@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 250-860-7518 Fax:		Analysis Request
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only) L947774	ALS Contact:	Sampler: NB

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	G Parameters	D-Metals F	T-Metals F	Nutrients F	TOC F	Cyanide F							Number of Containers
	MW08-1B	20-Oct-10	1400	H2O	✓	✓	✓	✓	✓								5
	MW07-06A	21 Oct 10	1120	H2O	✓	✓	✓	✓	✓	✓							6
	DH06-7	23 Oct 10	1200	H2O	✓	✓	✓	✓	✓								5
	Upper 7	23 Oct 10	1320	H2O	✓	✓	✓	✓	✓								5
	MW08-02B	21 Oct 10	1330	H2O	✓	✓	✓	✓	✓	✓							6
	MW07-05A	21 Oct 10	1445	H2O	✓	✓	✓	✓	✓	✓							6
	MW07-05B	21 Oct 10	1445	H2O	✓	✓	✓	✓	✓	✓							6
	MW08-02A	21 Oct 10	1330	H2O	✓	✓	✓	✓	✓								5
	MW07-06B	21 Oct 10	1120	H2O	✓	✓	✓	✓	✓								5

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	24-Oct-10		SH	27 OCT	10:35	2.0 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 27-OCT-10
Report Date: 13-DEC-10 10:03 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L947779
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-031675, 10-031676

Andre Langlais
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L947779-15	L947779-16	L947779-17	L947779-18
	Sample ID	L947779-15	L947779-16	L947779-17	L947779-18
	Description				
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10	21-OCT-10
	Sampled Time				
	Client ID	NAK LAKE FISH 1 - MUSCLE	NAK LAKE FISH 2 - MUSCLE	NAK LAKE FISH 1 - LIVER	NAK LAKE FISH 2 - LIVER
TISSUE					
Physical Tests	% Moisture (%)	76.5	78.6	76.2	74.4
Metals	Aluminum (Al)-Total (mg/kg wwt)	<0.40	<0.40	0.67	5.05
	Antimony (Sb)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Arsenic (As)-Total (mg/kg wwt)	0.0093	0.0084	0.0545	0.0366
	Barium (Ba)-Total (mg/kg wwt)	<0.010	<0.010	0.045	0.045
	Beryllium (Be)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Bismuth (Bi)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Boron (B)-Total (mg/kg wwt)	<0.20	<0.20	0.97	<0.20
	Cadmium (Cd)-Total (mg/kg wwt)	0.0020	<0.0020	0.0729	0.0601
	Calcium (Ca)-Total (mg/kg wwt)	190	122	326	301
	Cesium (Cs)-Total (mg/kg wwt)	0.0062	0.0134	0.0052	0.0113
	Chromium (Cr)-Total (mg/kg wwt)	0.022	0.029	0.936	0.261
	Cobalt (Co)-Total (mg/kg wwt)	0.0063	<0.0040	0.0274	0.0224
	Copper (Cu)-Total (mg/kg wwt)	0.245	0.283	76.7	19.4
	Gallium (Ga)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040
	Iron (Fe)-Total (mg/kg wwt)	2.72	3.00	236	109
	Lead (Pb)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	0.0118
	Lithium (Li)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	<0.020
	Magnesium (Mg)-Total (mg/kg wwt)	257	245	269	213
	Manganese (Mn)-Total (mg/kg wwt)	0.0726	0.110	1.16	1.43
	Mercury (Hg)-Total (mg/kg wwt)	0.0753	0.231	0.058	0.290
	Molybdenum (Mo)-Total (mg/kg wwt)	<0.0040	<0.0040	0.239	0.180
	Nickel (Ni)-Total (mg/kg wwt)	<0.10 DLB	<0.10 DLB	0.49	0.17
	Phosphorus (P)-Total (mg/kg wwt)	2310	2130	3770	3680
	Potassium (K)-Total (mg/kg wwt)	4150	3800	4090	3830
	Rhenium (Re)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Rubidium (Rb)-Total (mg/kg wwt)	2.77	4.86	2.41	4.79
	Selenium (Se)-Total (mg/kg wwt)	0.178	0.193	7.86	1.26
	Sodium (Na)-Total (mg/kg wwt)	542	512	1400	932
	Strontium (Sr)-Total (mg/kg wwt)	0.188	0.098	0.498	0.252
	Tellurium (Te)-Total (mg/kg wwt)	<0.0040	<0.0040	<0.0040	<0.0040
	Thallium (Tl)-Total (mg/kg wwt)	0.00391	0.00658	0.0474	0.0397
	Thorium (Th)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	<0.0020
	Tin (Sn)-Total (mg/kg wwt)	0.0177	0.0174	0.509	0.133
	Titanium (Ti)-Total (mg/kg wwt)	<0.020	<0.020	<0.020	0.087
	Uranium (U)-Total (mg/kg wwt)	<0.00040	<0.00040	<0.00040	<0.00040
	Vanadium (V)-Total (mg/kg wwt)	<0.0040	<0.0040	0.0095	0.0208

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947779-15	L947779-16	L947779-17	L947779-18	
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10	21-OCT-10	
	Sampled Time					
	Client ID	NAK LAKE FISH 1 - MUSCLE	NAK LAKE FISH 2 - MUSCLE	NAK LAKE FISH 1 - LIVER	NAK LAKE FISH 2 - LIVER	
Grouping	**Analyte**					
TISSUE						
Metals	Yttrium (Y)-Total (mg/kg wwt)	<0.0020	<0.0020	<0.0020	0.0021	
	Zinc (Zn)-Total (mg/kg wwt)	7.25	3.55	111	42.8	
	Zirconium (Zr)-Total (mg/kg wwt)	<0.040	<0.040	<0.040	<0.040	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L947779-1	L947779-2	L947779-3	L947779-4	L947779-5
Sample ID		L947779-1	L947779-2	L947779-3	L947779-4	L947779-5
Description						
Sampled Date		20-OCT-10	20-OCT-10	21-OCT-10	21-OCT-10	20-OCT-10
Sampled Time		14:11	12:57	09:51	09:51	12:11
Client ID		MCS-4	MCS-6	NAK 3 SURFACE	NAK 3 DEEP	MORRISON LAKE E DEEP
WATER						
Physical Tests	Conductivity (uS/cm)	272	146			
	Hardness (as CaCO3) (mg/L)	118	57.7			
	pH (pH)	8.07	8.07			
	Total Suspended Solids (mg/L)	7.5	<3.0			
	Total Dissolved Solids (mg/L)	163	90			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.5	1.7			
	Alkalinity, Total (as CaCO3) (mg/L)	131	60.7			
	Ammonia as N (mg/L)	<0.0050	<0.0050			
	Bromide (Br) (mg/L)	<0.050	<0.050			
	Chloride (Cl) (mg/L)	<0.50	<0.50			
	Fluoride (F) (mg/L)	0.037	0.022			
	Nitrate (as N) (mg/L)	0.108	0.0381			
	Nitrite (as N) (mg/L)	<0.0010	<0.0010			
	Sulfate (SO4) (mg/L)	14.7	15.2			
Cyanides	Cyanide, Weak Acid Diss (mg/L)			<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)			<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	2.86	4.37			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0114	0.0092			
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050			
	Arsenic (As)-Total (mg/L)	0.000211	0.000126			
	Barium (Ba)-Total (mg/L)	0.0625	0.0222			
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	0.0104	0.0093			
	Cadmium (Cd)-Total (mg/L)	0.000065	<0.000017			
	Calcium (Ca)-Total (mg/L)	37.5	18.4			
	Chromium (Cr)-Total (mg/L)	0.00080	0.00029			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00087	<0.00050			
	Iron (Fe)-Total (mg/L)	0.012	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050			
	Magnesium (Mg)-Total (mg/L)	7.02	2.79			
	Manganese (Mn)-Total (mg/L)	0.00356	0.000592			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.000237	0.000100			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947779-6	L947779-7	L947779-8	L947779-9	L947779-10
Description					
Sampled Date	21-OCT-10		20-OCT-10	20-OCT-10	21-OCT-10
Sampled Time	10:55		10:47	10:40	10:55
Client ID	NAK 2 DEEP	MW07-06B	MORRISON C DEEP	MCS-7	NAK 2 SURFACE
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)					
Hardness (as CaCO3) (mg/L)	27.9				27.7
pH (pH)					
Total Suspended Solids (mg/L)					
Total Dissolved Solids (mg/L)					
Anions and Nutrients Acidity (as CaCO3) (mg/L)					
Alkalinity, Total (as CaCO3) (mg/L)					
Ammonia as N (mg/L)					
Bromide (Br) (mg/L)					
Chloride (Cl) (mg/L)					
Fluoride (F) (mg/L)					
Nitrate (as N) (mg/L)					
Nitrite (as N) (mg/L)					
Sulfate (SO4) (mg/L)					
Cyanides Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Cyanide, Total (mg/L)	0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Organic / Inorganic Carbon Total Organic Carbon (mg/L)					
Total Metals Aluminum (Al)-Total (mg/L)	0.0116				0.0153
Antimony (Sb)-Total (mg/L)	<0.000050				<0.000050
Arsenic (As)-Total (mg/L)	0.000188				0.000174
Barium (Ba)-Total (mg/L)	0.0106				0.0108
Beryllium (Be)-Total (mg/L)	<0.00020				<0.00020
Bismuth (Bi)-Total (mg/L)	<0.00050				<0.00050
Boron (B)-Total (mg/L)	0.0087				0.0087
Cadmium (Cd)-Total (mg/L)	<0.000017				<0.000017
Calcium (Ca)-Total (mg/L)	8.54				8.47
Chromium (Cr)-Total (mg/L)	0.00034				0.00042
Cobalt (Co)-Total (mg/L)	<0.00010				<0.00010
Copper (Cu)-Total (mg/L)	0.00052				0.00079
Iron (Fe)-Total (mg/L)	0.028				0.028
Lead (Pb)-Total (mg/L)	0.000057				0.000055
Lithium (Li)-Total (mg/L)	<0.0050				<0.0050
Magnesium (Mg)-Total (mg/L)	1.60				1.58
Manganese (Mn)-Total (mg/L)	0.00532				0.00505
Mercury (Hg)-Total (mg/L)	<0.000010				<0.000010
Molybdenum (Mo)-Total (mg/L)	0.000101				0.000097

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L947779-11 Description: Sampled Date: 21-OCT-10 Sampled Time: 09:51 Client ID: NAK 1 SURFACE	L947779-12 MW08-02A	L947779-13 20-OCT-10 10:47 MORRISON LAKE C SURFACE	L947779-14 21-OCT-10 09:51 NAK LAKE 1 DEEP	
WATER						
Physical Tests	Conductivity (uS/cm)					
	Hardness (as CaCO3) (mg/L)	31.0			32.7	
	pH (pH)					
	Total Suspended Solids (mg/L)					
	Total Dissolved Solids (mg/L)					
Anions and Nutrients	Acidity (as CaCO3) (mg/L)					
	Alkalinity, Total (as CaCO3) (mg/L)					
	Ammonia as N (mg/L)					
	Bromide (Br) (mg/L)					
	Chloride (Cl) (mg/L)					
	Fluoride (F) (mg/L)					
	Nitrate (as N) (mg/L)					
	Nitrite (as N) (mg/L)					
	Sulfate (SO4) (mg/L)					
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Cyanide, Total (mg/L)	<0.0050	<0.0050	0.0066	0.0058	
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (Al)-Total (mg/L)	0.0286			0.0390	
	Antimony (Sb)-Total (mg/L)	<0.000050			<0.000050	
	Arsenic (As)-Total (mg/L)	0.000218			0.000220	
	Barium (Ba)-Total (mg/L)	0.0131			0.0131	
	Beryllium (Be)-Total (mg/L)	<0.00020			<0.00020	
	Bismuth (Bi)-Total (mg/L)	<0.00050			<0.00050	
	Boron (B)-Total (mg/L)	0.0093			0.0087	
	Cadmium (Cd)-Total (mg/L)	0.000018			<0.000017	
	Calcium (Ca)-Total (mg/L)	9.58			10.2	
	Chromium (Cr)-Total (mg/L)	0.00042			0.00033	
	Cobalt (Co)-Total (mg/L)	<0.00010			<0.00010	
	Copper (Cu)-Total (mg/L)	0.00139			0.00073	
	Iron (Fe)-Total (mg/L)	0.089			0.110	
	Lead (Pb)-Total (mg/L)	0.000082			<0.000050	
	Lithium (Li)-Total (mg/L)	<0.0050			<0.0050	
	Magnesium (Mg)-Total (mg/L)	1.72			1.74	
	Manganese (Mn)-Total (mg/L)	0.00781			0.00829	
	Mercury (Hg)-Total (mg/L)	<0.000010			<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.000123			0.000116	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L947779-1 Description: Sampled Date: 20-OCT-10 Sampled Time: 14:11 Client ID: MCS-4	L947779-2 20-OCT-10 12:57 MCS-6	L947779-3 21-OCT-10 09:51 NAK 3 SURFACE	L947779-4 21-OCT-10 09:51 NAK 3 DEEP	L947779-5 20-OCT-10 12:11 MORRISON LAKE E DEEP
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00024	0.00025			
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30			
	Potassium (K)-Total (mg/L)	0.492	0.297			
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Total (mg/L)	4.52	1.96			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	2.31	2.01			
	Strontium (Sr)-Total (mg/L)	0.116	0.0488			
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	0.000056	0.000010			
	Vanadium (V)-Total (mg/L)	0.000079	0.000058			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.0030	0.0052			
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Arsenic (As)-Dissolved (mg/L)	0.000212	0.000132			
	Barium (Ba)-Dissolved (mg/L)	0.0595	0.0218			
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	0.0089	0.0102			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000017	<0.000017			
	Calcium (Ca)-Dissolved (mg/L)	36.1	18.5			
	Chromium (Cr)-Dissolved (mg/L)	0.00021	0.00015			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00068	<0.00050			
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050			
	Magnesium (Mg)-Dissolved (mg/L)	6.71	2.77			
	Manganese (Mn)-Dissolved (mg/L)	0.00183	0.000289			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000208	0.000087			
	Nickel (Ni)-Dissolved (mg/L)	0.00019	0.00017			
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30			
	Potassium (K)-Dissolved (mg/L)	0.463	0.286			
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L947779-6	L947779-7	L947779-8	L947779-9	L947779-10
Sample ID		L947779-6	L947779-7	L947779-8	L947779-9	L947779-10
Description						
Sampled Date		21-OCT-10		20-OCT-10	20-OCT-10	21-OCT-10
Sampled Time		10:55		10:47	10:40	10:55
Client ID		NAK 2 DEEP	MW07-06B	MORRISON C DEEP	MCS-7	NAK 2 SURFACE
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00047				0.00034
	Phosphorus (P)-Total (mg/L)	<0.30				<0.30
	Potassium (K)-Total (mg/L)	0.274				0.279
	Selenium (Se)-Total (mg/L)	<0.00010				<0.00010
	Silicon (Si)-Total (mg/L)	2.16				2.17
	Silver (Ag)-Total (mg/L)	<0.000010				<0.000010
	Sodium (Na)-Total (mg/L)	1.67				1.66
	Strontium (Sr)-Total (mg/L)	0.0483				0.0487
	Thallium (Tl)-Total (mg/L)	<0.000050				<0.000050
	Tin (Sn)-Total (mg/L)	<0.00010				<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010				<0.010
	Uranium (U)-Total (mg/L)	<0.000010				<0.000010
	Vanadium (V)-Total (mg/L)	0.000076				0.000078
	Zinc (Zn)-Total (mg/L)	<0.0030				<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					
	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					
	Selenium (Se)-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947779-11	L947779-12	L947779-13	L947779-14	
	Description					
	Sampled Date	21-OCT-10		20-OCT-10	21-OCT-10	
	Sampled Time	09:51		10:47	09:51	
	Client ID	NAK 1 SURFACE	MW08-02A	MORRISON LAKE C SURFACE	NAK LAKE 1 DEEP	
Grouping	**Analyte**					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00035			0.00028	
	Phosphorus (P)-Total (mg/L)	<0.30			<0.30	
	Potassium (K)-Total (mg/L)	0.337			0.299	
	Selenium (Se)-Total (mg/L)	<0.00010			<0.00010	
	Silicon (Si)-Total (mg/L)	2.15			2.18	
	Silver (Ag)-Total (mg/L)	<0.000010			<0.000010	
	Sodium (Na)-Total (mg/L)	1.76			1.74	
	Strontium (Sr)-Total (mg/L)	0.0515			0.0524	
	Thallium (Tl)-Total (mg/L)	<0.000050			<0.000050	
	Tin (Sn)-Total (mg/L)	<0.00010			<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010			<0.010	
	Uranium (U)-Total (mg/L)	<0.000010			<0.000010	
	Vanadium (V)-Total (mg/L)	0.000133			0.000160	
	Zinc (Zn)-Total (mg/L)	0.0038			<0.0030	
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					
	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					
	Selenium (Se)-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947779-1	L947779-2	L947779-3	L947779-4	L947779-5
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	21-OCT-10	21-OCT-10	20-OCT-10
	Sampled Time	14:11	12:57	09:51	09:51	12:11
	Client ID	MCS-4	MCS-6	NAK 3 SURFACE	NAK 3 DEEP	MORRISON LAKE E DEEP
Grouping	**Analyte**					
WATER						
Dissolved Metals	Silicon (Si)-Dissolved (mg/L)	4.38	1.96			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	2.17	2.01			
	Strontium (Sr)-Dissolved (mg/L)	0.110	0.0481			
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	0.000051	0.000011			
	Vanadium (V)-Dissolved (mg/L)	0.000053	<0.000050			
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947779-6	L947779-7	L947779-8	L947779-9	L947779-10
	Description					
	Sampled Date	21-OCT-10		20-OCT-10	20-OCT-10	21-OCT-10
	Sampled Time	10:55		10:47	10:40	10:55
	Client ID	NAK 2 DEEP	MW07-06B	MORRISON C DEEP	MCS-7	NAK 2 SURFACE
Grouping	**Analyte**					
WATER						
Dissolved Metals	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Thallium (Tl)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947779-11	L947779-12	L947779-13	L947779-14	
	Description					
	Sampled Date	21-OCT-10		20-OCT-10	21-OCT-10	
	Sampled Time	09:51		10:47	09:51	
	Client ID	NAK 1 SURFACE	MW08-02A	MORRISON LAKE C SURFACE	NAK LAKE 1 DEEP	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Thallium (Tl)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLB	Detection limit was raised due to detection of analyte at comparable level in Method Blank.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
		Hardness	APHA 2340B

Reference Information

HARDNESS-CALC-VA Water

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-WET-CVAFS-VA Tissue Mercury in Tissue by CVAFS EPA 200.3, EPA 245.7

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by atomic fluorescence spectrophotometry, adapted from US EPA Method 245.7. This digestion procedure was implemented on October 5, 2009.

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-WET-HRMS-VA Tissue Metals in Tissue by HR-ICPMS EPA 200.8

Trace metals in tissue are analyzed by high resolution inductively coupled plasma mass spectrometry (HR-ICPMS) modified from US EPA Method 200.8, (Revision 5.5). The sample preparation procedure is modified from US EPA 200.3. Analytical results are reported on wet weight basis.

MET-WET-ICP-VA Tissue Metals in Tissue by ICPOES EPA 200.3, EPA 6010B

This method is adapted from US EPA Method 200.3 "Sample Procedures for Spectrochemical Determination of Total Recoverable Elements in Biological Tissues" (1996). Tissue samples are homogenized and sub-sampled prior to hotblock digestion with nitric and hydrochloric acids, in combination with repeated additions of hydrogen peroxide. Analysis is by Inductively Coupled Plasma - Optical Emission Spectrophotometry, adapted from US EPA Method 6010B. This digestion procedure was implemented on October 5, 2009.

MOISTURE-TISS-VA Tissue % Moisture in Tissues ASTM METHOD D2974-00

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.

Reference Information

NH3-F-VA	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulphuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-031675 10-031676

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory
ANALYTICAL CHEMISTRY & TESTING SI

Environmental Divisio

Short Holding Tim

Cha

Rush Processing

L947779-COFC

10-031675

Page 1 of 2

Report To	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company: Pacific Booker Minerals	Standard: ✓ Other (specify):	Regular (Standard Turnaround Times))
Contact: Dan Betton	Select: PDF ✓ Excel ✓ Digital ✓ Fax	Priority, Date Req'd: _____ (Surcharges apply)
Address:	Email 1: d.betton@pacificbooker.com	Emergency (1 Business Day) - 100% Surcharge
	Email 2: mmacKinnon@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 250-860-7518 Fax:		Analysis Request
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only): L947779	ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General parameters	P Cyanide	P Tot. Nutrients	P Total metals	P Dissolved metals							Number of Containers
	MCS-4	22-OCT-10	14:11	H2O	✓		✓	✓	✓	✓						5
	MCS-6	22-OCT-10	12:57	"	✓		✓	✓	✓	✓						5
	Nak 3 Surface	21-OCT-10	9:51	"		✓										1
	Nak 3 Deep	"	"	"		✓										1
	Morrison Lake E deep	20-OCT-10	12:11	"		✓										1
	Nak 2 Deep	21-OCT-10	10:55	"		✓			✓							2
	MW07-06B	~~20-OCT-10~~	~~16:40~~	"		✓										1
	Morrison C Deep	20-OCT-10	10:47	"		✓										1
	MCS-7	20-OCT-10	16:40	"		✓										1
	Nak 2 surface	21-OCT-10	10:55	"		✓			✓							2
	Nak 1 Surface	21-OCT-10	9:51	"		✓			✓							2
	MW08-02A			"		✓										1

Special Instructions / Regulations / Hazardous Details

Dissolved metals filter in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	10-24-10	17:00	STI	27Oct	10:35	2.6 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

ALS Laboratory Group
ANALYTICAL CHEMISTRY & TESTING SERVICES

Environmental Division

10-031676

Page 2 of 2

Report To	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company: Pacific Booker Minerals	Standard: ____ Other (specify): ____	Regular (Standard Turnaround Times))
Contact: Don Betton	Select: PDF ____ Excel ____ Digital ____ Fax ____	Priority, Date Req'd: ____ (Surcharges apply)
Address:	Email 1:	Emergency (1 Business Day) - 100% Surcharge
	Email 2:	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 250-860-7518 Fax:		

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information
	Copy of Invoice with Report? (circle) Yes or No	Job #:
Company:		PO / AFE:
Contact:		LSD:
Address:		
Phone:	Fax:	Quote #:

Lab Work Order # (lab use only)	L947779	ALS Contact:	Sampler:

Analysis Request

(Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Cyanide (F/P)	Total metals (F/P)	Number of Containers
	Morrison Lake C Surface	21-OCT-10	9:55	H_2O	✓		1
	Nak Lake 1 deep	20-OCT-10	10:47	H_2O	✓	✓	2
	Nak Lake Fish 1	21-OCT-10		Fish			1
	Nak Lake Fish 2	21-OCT-10		Fish + liver			1

Special Instructions / Regulations / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			SH	27 Oct	10:35	2.6 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

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GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 27-OCT-10
Report Date: 10-NOV-10 17:30 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L947874
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-031677

ERIN BOLSTER
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947874-1	L947874-2	L947874-3	L947874-4	L947874-5
Description					
Sampled Date	24-OCT-10	24-OCT-10	24-OCT-10	24-OCT-10	24-OCT-10
Sampled Time	11:15	11:15	11:50	13:30	13:30
Client ID	DH06-12	MW07-01A	MW07-01B	MW07-02A	MW07-02B
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	642	860	950	637	570
Hardness (as CaCO3) (mg/L)	38.3	155	280	31.9	291
pH (pH)	8.37	8.26	7.95	8.35	8.15
Total Suspended Solids (mg/L)	11.5	5.0	30.0	185	57.0
Total Dissolved Solids (mg/L)	639	535	622	393	335
Anions and Nutrients Acidity (as CaCO3) (mg/L)	<1.0	<1.0	4.0	<1.0	3.2
Alkalinity, Total (as CaCO3) (mg/L)	284	333	552	276	283
Ammonia as N (mg/L)	0.0178	0.0802	0.0076	0.0359	0.0067
Bromide (Br) (mg/L)	<0.050	<0.50	<0.25	<0.050	<0.050
Chloride (Cl) (mg/L)	0.64	<5.0	<2.5	1.10	<0.50
Fluoride (F) (mg/L)	2.96	1.14	0.17	0.387	0.206
Nitrate (as N) (mg/L)	<0.0050	<0.050	<0.025	<0.0050	0.114
Nitrite (as N) (mg/L)	<0.0010	<0.010	<0.0050	<0.0010	<0.0010
Sulfate (SO4) (mg/L)	20.9	143	<2.5	59.0	40.9
Cyanides Cyanide, Weak Acid Diss (mg/L)					
Cyanide, Total (mg/L)					
Organic / Inorganic Carbon Total Organic Carbon (mg/L)	70.5	1.43	16.4	4.75	1.74
Total Metals Aluminum (Al)-Total (mg/L)	0.189	0.0098	0.0438	1.63	1.02
Antimony (Sb)-Total (mg/L)	0.000235	<0.000050	0.000093	0.000137	0.000085
Arsenic (As)-Total (mg/L)	0.000946	0.000231	0.0110	0.00613	0.00107
Barium (Ba)-Total (mg/L)	0.0290	0.0148	0.357	0.0405	0.0763
Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total (mg/L)	0.312	0.101	0.102	0.0739	0.0137
Cadmium (Cd)-Total (mg/L)	0.000054	0.000158	0.000280	0.000138	0.000147
Calcium (Ca)-Total (mg/L)	5.90	30.3	79.9	8.48	83.5
Chromium (Cr)-Total (mg/L)	0.00062	0.00092	0.00106	0.00143	0.00082
Cobalt (Co)-Total (mg/L)	0.00014	<0.00010	0.00028	0.00117	0.00160
Copper (Cu)-Total (mg/L)	<0.00050	0.00073	0.00055	0.00259	0.00121
Iron (Fe)-Total (mg/L)	0.180	0.342	10.2	0.944	1.42
Lead (Pb)-Total (mg/L)	0.000085	<0.000050	0.000185	0.000673	0.000928
Lithium (Li)-Total (mg/L)	0.214	0.127	<0.0050	0.227	0.0123
Magnesium (Mg)-Total (mg/L)	0.795	20.2	22.3	3.66	24.5
Manganese (Mn)-Total (mg/L)	0.0288	0.00636	3.21	0.194	0.329
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.00340	0.00158	0.00762	0.00265	0.00291

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947874-6				
	Description					
	Sampled Date	24-OCT-10				
	Sampled Time	12:10				
	Client ID	SITE 10				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	118				
	Hardness (as CaCO3) (mg/L)	48.2				
	pH (pH)	7.86				
	Total Suspended Solids (mg/L)	<3.0				
	Total Dissolved Solids (mg/L)	71				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.1				
	Alkalinity, Total (as CaCO3) (mg/L)	58.9				
	Ammonia as N (mg/L)	0.0274				
	Bromide (Br) (mg/L)	<0.050				
	Chloride (Cl) (mg/L)	<0.50				
	Fluoride (F) (mg/L)	0.045				
	Nitrate (as N) (mg/L)	0.0313				
	Nitrite (as N) (mg/L)	<0.0010				
	Sulfate (SO4) (mg/L)	4.99				
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050				
	Cyanide, Total (mg/L)	0.0079				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	7.80				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0613				
	Antimony (Sb)-Total (mg/L)	<0.000050				
	Arsenic (As)-Total (mg/L)	0.000804				
	Barium (Ba)-Total (mg/L)	0.0413				
	Beryllium (Be)-Total (mg/L)	<0.00020				
	Bismuth (Bi)-Total (mg/L)	<0.00050				
	Boron (B)-Total (mg/L)	0.0075				
	Cadmium (Cd)-Total (mg/L)	0.000373				
	Calcium (Ca)-Total (mg/L)	13.1				
	Chromium (Cr)-Total (mg/L)	0.00046				
	Cobalt (Co)-Total (mg/L)	0.00019				
	Copper (Cu)-Total (mg/L)	0.00085				
	Iron (Fe)-Total (mg/L)	1.24				
	Lead (Pb)-Total (mg/L)	0.000086				
	Lithium (Li)-Total (mg/L)	<0.0050				
	Magnesium (Mg)-Total (mg/L)	3.67				
	Manganese (Mn)-Total (mg/L)	0.289				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	0.000096				

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947874-1	L947874-2	L947874-3	L947874-4	L947874-5
Description					
Sampled Date	24-OCT-10	24-OCT-10	24-OCT-10	24-OCT-10	24-OCT-10
Sampled Time	11:15	11:15	11:50	13:30	13:30
Client ID	DH06-12	MW07-01A	MW07-01B	MW07-02A	MW07-02B
Grouping / **Analyte**					
WATER					
Total Metals Nickel (Ni)-Total (mg/L)	0.00056	0.00015	0.00062	0.00185	0.00210
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total (mg/L)	1.53	1.69	2.98	1.72	0.942
Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00010	0.00029
Silicon (Si)-Total (mg/L)	3.92	4.54	6.23	7.26	7.45
Silver (Ag)-Total (mg/L)	0.000057	<0.000010	0.000022	0.000060	<0.000010
Sodium (Na)-Total (mg/L)	160	141	120	129	9.65
Strontium (Sr)-Total (mg/L)	0.195	0.800	0.898	0.221	0.443
Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.000087	0.000057
Tin (Sn)-Total (mg/L)	0.00533	0.00010	0.00028	0.00016	0.00013
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	0.012	0.023	0.043
Uranium (U)-Total (mg/L)	0.000166	0.000029	0.000091	0.000925	0.000527
Vanadium (V)-Total (mg/L)	0.000282	0.000130	0.000398	0.110	0.00201
Zinc (Zn)-Total (mg/L)	0.0038	0.0031	0.0066	0.0206	0.0055
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0329	<0.0030	<0.0030	0.0097	<0.0030
Antimony (Sb)-Dissolved (mg/L)	0.000711	<0.000050	0.000061	0.000141	0.000081
Arsenic (As)-Dissolved (mg/L)	0.00100	0.000125	0.00408	0.00528	0.000529
Barium (Ba)-Dissolved (mg/L)	0.0233	0.0140	0.248	0.0309	0.0659
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)	0.195	0.0963	0.0991	0.0710	0.0118
Cadmium (Cd)-Dissolved (mg/L)	<0.000017	0.000131	0.000046	<0.000017	0.000083
Calcium (Ca)-Dissolved (mg/L)	12.8	29.4	76.1	7.29	76.3
Chromium (Cr)-Dissolved (mg/L)	0.00025	0.00024	0.00026	0.00012	0.00013
Cobalt (Co)-Dissolved (mg/L)	0.00019	<0.00010	0.00019	0.00029	0.00106
Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	0.020	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	0.000058	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	0.151	0.123	<0.0050	0.231	0.0124
Magnesium (Mg)-Dissolved (mg/L)	1.52	19.9	21.8	3.33	24.3
Manganese (Mn)-Dissolved (mg/L)	0.0716	0.00594	2.98	0.143	0.252
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved (mg/L)	0.00929	0.00149	0.00739	0.00210	0.00302
Nickel (Ni)-Dissolved (mg/L)	0.00060	<0.00010	0.00039	0.00084	0.00133
Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)	0.954	1.64	2.99	1.01	0.726
Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00026

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947874-6				
	Description					
	Sampled Date	24-OCT-10				
	Sampled Time	12:10				
	Client ID	SITE 10				
Grouping	**Analyte**					
WATER						
Total Metals	Nickel (Ni)-Total (mg/L)	0.00048				
	Phosphorus (P)-Total (mg/L)	<0.30				
	Potassium (K)-Total (mg/L)	0.392				
	Selenium (Se)-Total (mg/L)	<0.00010				
	Silicon (Si)-Total (mg/L)	1.85				
	Silver (Ag)-Total (mg/L)	0.000048				
	Sodium (Na)-Total (mg/L)	4.20				
	Strontium (Sr)-Total (mg/L)	0.0679				
	Thallium (Tl)-Total (mg/L)	<0.000050				
	Tin (Sn)-Total (mg/L)	<0.00010				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	<0.000010				
	Vanadium (V)-Total (mg/L)	0.000294				
	Zinc (Zn)-Total (mg/L)	0.0044				
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0246				
	Antimony (Sb)-Dissolved (mg/L)	<0.000050				
	Arsenic (As)-Dissolved (mg/L)	0.000666				
	Barium (Ba)-Dissolved (mg/L)	0.0397				
	Beryllium (Be)-Dissolved (mg/L)	<0.00020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	0.0061				
	Cadmium (Cd)-Dissolved (mg/L)	0.000123				
	Calcium (Ca)-Dissolved (mg/L)	13.3				
	Chromium (Cr)-Dissolved (mg/L)	0.00020				
	Cobalt (Co)-Dissolved (mg/L)	0.00016				
	Copper (Cu)-Dissolved (mg/L)	0.00052				
	Iron (Fe)-Dissolved (mg/L)	0.687				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0050				
	Magnesium (Mg)-Dissolved (mg/L)	3.64				
	Manganese (Mn)-Dissolved (mg/L)	0.286				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000070				
	Nickel (Ni)-Dissolved (mg/L)	0.00043				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	0.372				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947874-1	L947874-2	L947874-3	L947874-4	L947874-5
	Description					
	Sampled Date	24-OCT-10	24-OCT-10	24-OCT-10	24-OCT-10	24-OCT-10
	Sampled Time	11:15	11:15	11:50	13:30	13:30
	Client ID	DH06-12	MW07-01A	MW07-01B	MW07-02A	MW07-02B
Grouping	**Analyte**					
WATER						
Dissolved Metals	Silicon (Si)-Dissolved (mg/L)	3.31	4.40	5.64	3.24	5.43
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	110	138	118	130	9.56
	Strontium (Sr)-Dissolved (mg/L)	0.0945	0.778	0.850	0.213	0.456
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	0.00344	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	0.010
	Uranium (U)-Dissolved (mg/L)	0.000259	0.000027	0.000084	0.000799	0.000405
	Vanadium (V)-Dissolved (mg/L)	0.000276	<0.000050	0.000055	0.000390	0.000183
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947874-6				
	Description					
	Sampled Date	24-OCT-10				
	Sampled Time	12:10				
	Client ID	SITE 10				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Silicon (Si)-Dissolved (mg/L)	1.80				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	4.23				
	Strontium (Sr)-Dissolved (mg/L)	0.0664				
	Thallium (Tl)-Dissolved (mg/L)	<0.000050				
	Tin (Sn)-Dissolved (mg/L)	<0.00010				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	0.000140				
	Zinc (Zn)-Dissolved (mg/L)	<0.0030				

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method			

Reference Information

6010B).

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulphuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

Reference Information

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-031677

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Short Holding Tim

Rush Processing

L947874-COFC

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...0 668 9878
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10-031677

Page ___ of ___

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Company:	PBH	Standard: ✓	Other (specify):	Regular (Standard Turnaround Times))
Contact:	Don Betton	Select: PDF ✓	Excel Digital Fax	Priority, Date Req'd: _____ (Surcharges apply)
Address:		Email 1:	d.betton@pacificbooker.com	Emergency (1 Business Day) - 100% Surcharge
		Email 2:	mmackinnon@kloha.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	250-860-7518 Fax:			

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L947874	ALS Contact:	Sampler:

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	D-Metals	T-Metals (P)	Nutrients (P)	TOC (P)	Cyanide (P)							Number of Containers
	DH06-12	24-Oct-10	1115	H_2O	✓	✓	✓	✓	✓								
	MW07-01A	24-Oct-10	1115	H_2O	✓	✓	✓	✓	✓								
	MW07-01B	24-Oct-10	1150	H_2O	✓	✓	✓	✓	✓								
	MW07-02A	24-Oct-10	1330	H_2O	✓	✓	✓	✓	✓								
	MW07-02B	24-Oct-10	1330	H_2O	✓	✓	✓	✓	✓								
	Site 10	24-Oct-10	1210	H_2O	✓	✓	✓	✓	✓	✓							

Special Instructions / Regulations / Hazardous Details

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By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by: SH	Date: 27 Oct	Time: 10:35	Temperature: 3.6 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

GENF 18.01 Front

Klohn Crippen Berger

MEMORANDUM

TO:	Don Betton, Pacific Booker Minerals.	**DATE:**	November 25, 2010
FROM:	Mathew MacKinnon	**FILE NO:**	M09382A04.720
		LOG NO:	
SUBJECT:	PBM – Nakinilerak Lake Field Work Report - October 19 – 25 , 2010 (Rev. 1)		

1. PERSONNEL

Klohn Crippen Berger (KCB)
- Matt MacKinnon (MK)
- Neil Burk (NB)
- Mary Smulders (MS)

Babine Barge (BB)
- James Godfrey (JG)

2. LOGISTICS

Nakinilerak Lake field work was completed by MK and MS, with assistance from JG, on October 21, 2010. To access into Nakinilerak Lake, the crew drove along logging roads for approximately two hours from the Lake Babine Camp northeast towards the Lake. Due to road conditions (wet, muddy, overgrown), the crew travelled the remaining 50 minutes of the trip by an Arctic Cat. The road was clear of most major obstacles with the exception of a fallen tree that required removal via a chainsaw (Appendix I, Photo 1). The boat was launched at 9:27 am at the south end of Nakinilerak Lake (see launch access site Appendix I, Photo 2). The general and focused access route from the logging camp to Nakinilerak Lake is provided in Appendix II, in Figure 1 and 2 respectively.

To best characterize the lake, three locations (Nak Lake 1, 2, and 3) were sampled for water, sediments and benthic invertebrates (Appendix II, Figure 3). These sample locations were situated in the deepest areas of the lake. Nak Lake 1 was sampled at 09:51, Nak Lake 2 was sampled at 10:55 and Nak Lake 3 was sampled at 11:35. The weather on October 21 was rainy / snowy with near freezing temperatures throughout the day and freezing temperatures at night.

Water samples were packaged and shipped to ALS Laboratories in Burnaby from Houston on October 25 en route to Smithers.

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604.669.3800 t • 604.669.3835 f • www.klohn.com

3. SCOPE OF FIELD WORK

The work performed on this field trip is as follows, with comments:

1. Nakinilerak Lake Sampling (see summary in Table 1)

    a. Surface and deep (1 m from the bottom) water quality was sampled at the three locations. Water samples are being analyzed for general parameters, total and dissolved metals, nutrients, TOC and cyanide (WAD and SAD).

    b. Sediment samples were collected from Nak Lake 1 and 3 using an Ekman dredge. Nak Lake 2 could not be sampled as the substrate was composed of large rocks and cobble greater than 20 cm. Sediment samples from sites 1 and 3 are being analyzed for total metals, TOC, and nutrients (N and P forms).

    c. Benthic invertebrates were collected in the sediment samples from Nak Lake 1 and 3. Benthic samples are being analyzed for taxonomy, density (#/m^2), and diversity.

    d. Muscle and liver tissue samples were collected from two fish (one Rainbow Trout and one Lake Char). Fish were caught via angling between the Nak 1 and Nak 2 sample locations and appeared to be healthy and in good condition (Appendix I, Photo 3). No salmon were observed and are not known to occur in Nak Lake.

    e. An in situ vertical profile of Nakinilerak Lake was completed at the three sampling locations by using a "YSI 600" probe at approximately 1.5 m intervals. Temperature, dissolved oxygen (% and mg/l) and pH were recorded at each depth interval (for results, please see Figures 4, 5, and 6). Further assessment of the data is ongoing.

Table 1 Summary of Nakinilerak Lake Sampling

				Laboratory Analysis							In situ Analysis			
Name	Easting	Northing	Samples Taken	General Parameters	Dissolved Metals	Total Metals	TOC	Nutrients	Cyanide	Benthic Invertebrates	pH	Temperature	DO (%)	DO (mg/l)
Nak Lake 1	673856	6126522	Water Quality	X	X	X	X	X	X		X	X	X	X
			Sediment			X	X	X		X				
Nak Lake 2	673165	6128259	Water Quality	X	X	X	X	X	X		X	X	X	X
Nak Lake 3	671896	6130019	Water Quality	X	X	X	X	X	X		X	X	X	X
			Sediment			X	X	X		X				

* note: no sediment samples were taken at Nak Lake 2 because the substrate consisted of rocks and gravel

Appendix I

Photos

Photo 1 Road Barrier en Route to Nakinilerak Lake

Photo 2 Nakinilerak Lake Access Point

Photo 3 Fish Samples (left: Rainbow Trout, right: Lake Char)

Appendix II

Figures

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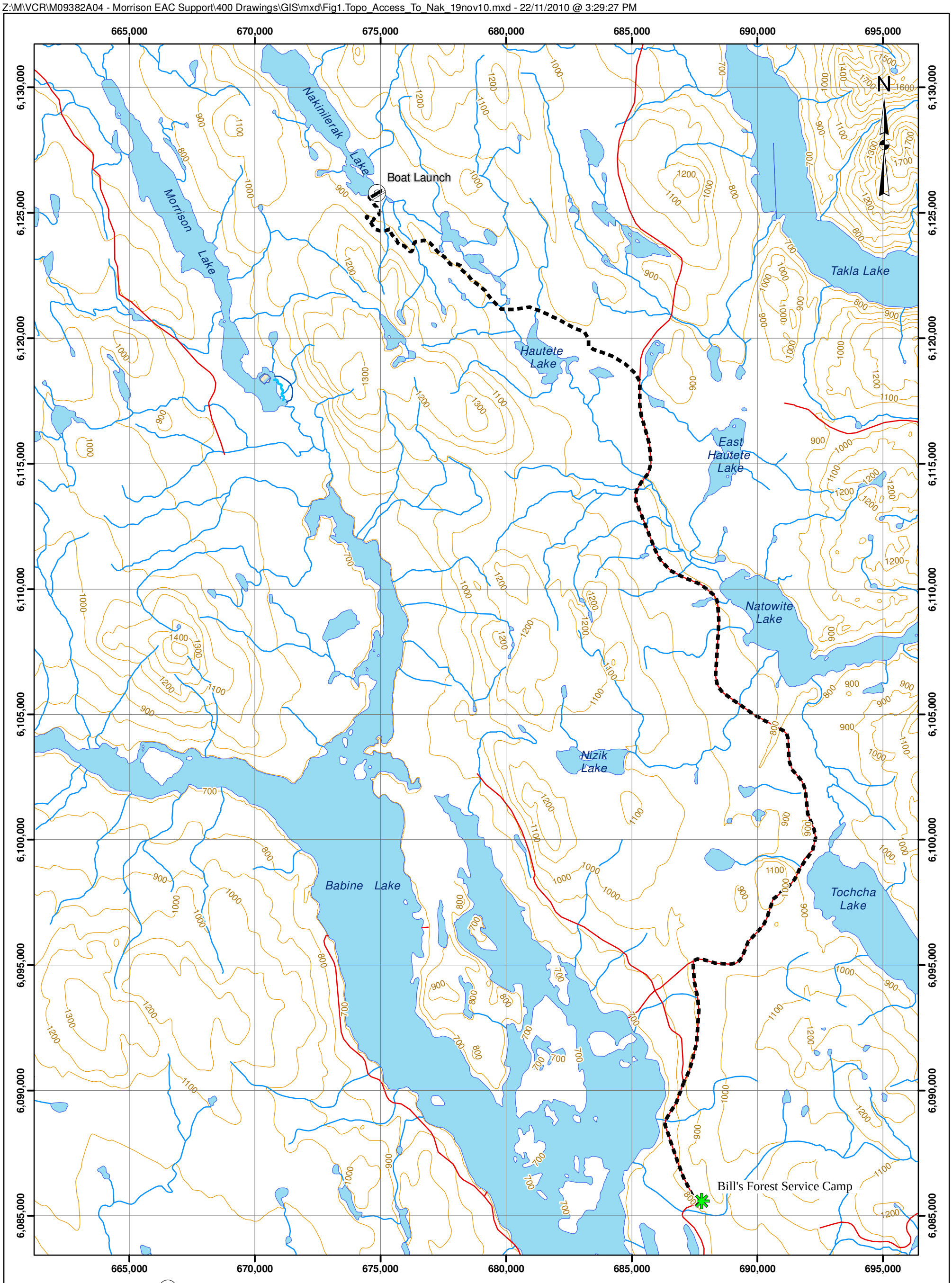

Boat Launch

Pacific Booker Mineral Camp

Access Route to Nakinilerak Lake

Road

Contours

Rivers and Streams

Lakes

Notes:
1. UTM Zone 9N, NAD83
2. Contour interval is 100m.
3. Waterbodies and roads from NTS (1:50,000)

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN-CRIPPEN REPORT DATED _____

0 5,000 m

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CLIENT

pbm

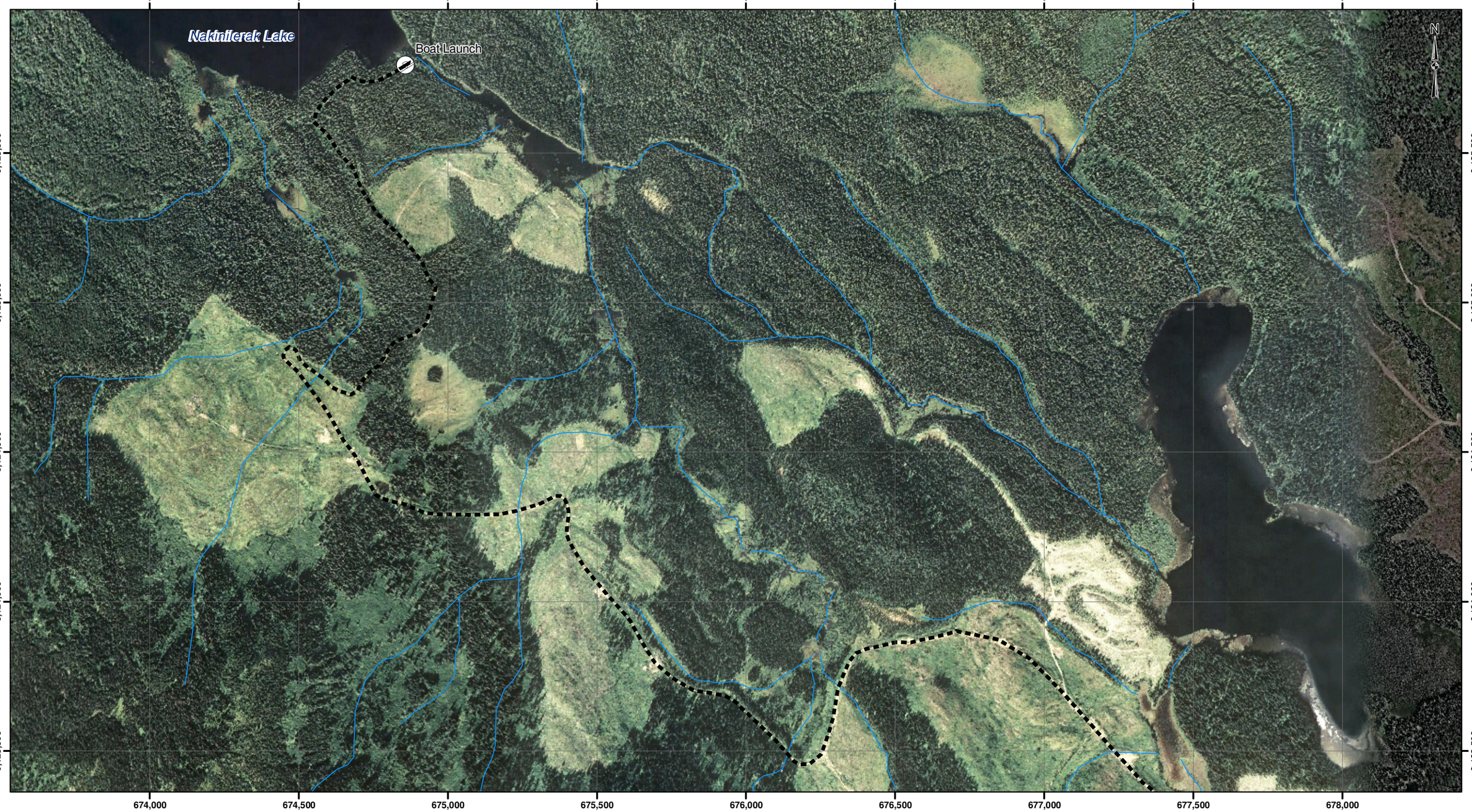
Klohn Crippen Berger

PROJECT
MORRISON COPPER/GOLD PROJECT
LAKE EFFECTS ASSESSMENT

TITLE
ACCESS ROUTE TO NAKINILERAK LAKE

PROJECT No. M09382A03

FIG No. 1



0 500 m

Boat Launch

Access Route to Nakinilerak Lake

Rivers and Streams

Notes:
1. UTM Zone 9N, WGS84
2. Imagery from Google Earth
3. Waterbodies is BC TRIM (1:20,000)

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Klohn Crippen Berger

PROJECT
MORRISON COPPER/GOLD PROJECT

TITLE
FOCUSED ACCESS ROUTE TO NAKINILERAK LAKE

PROJECT No. M09382A03

FIG No. 2

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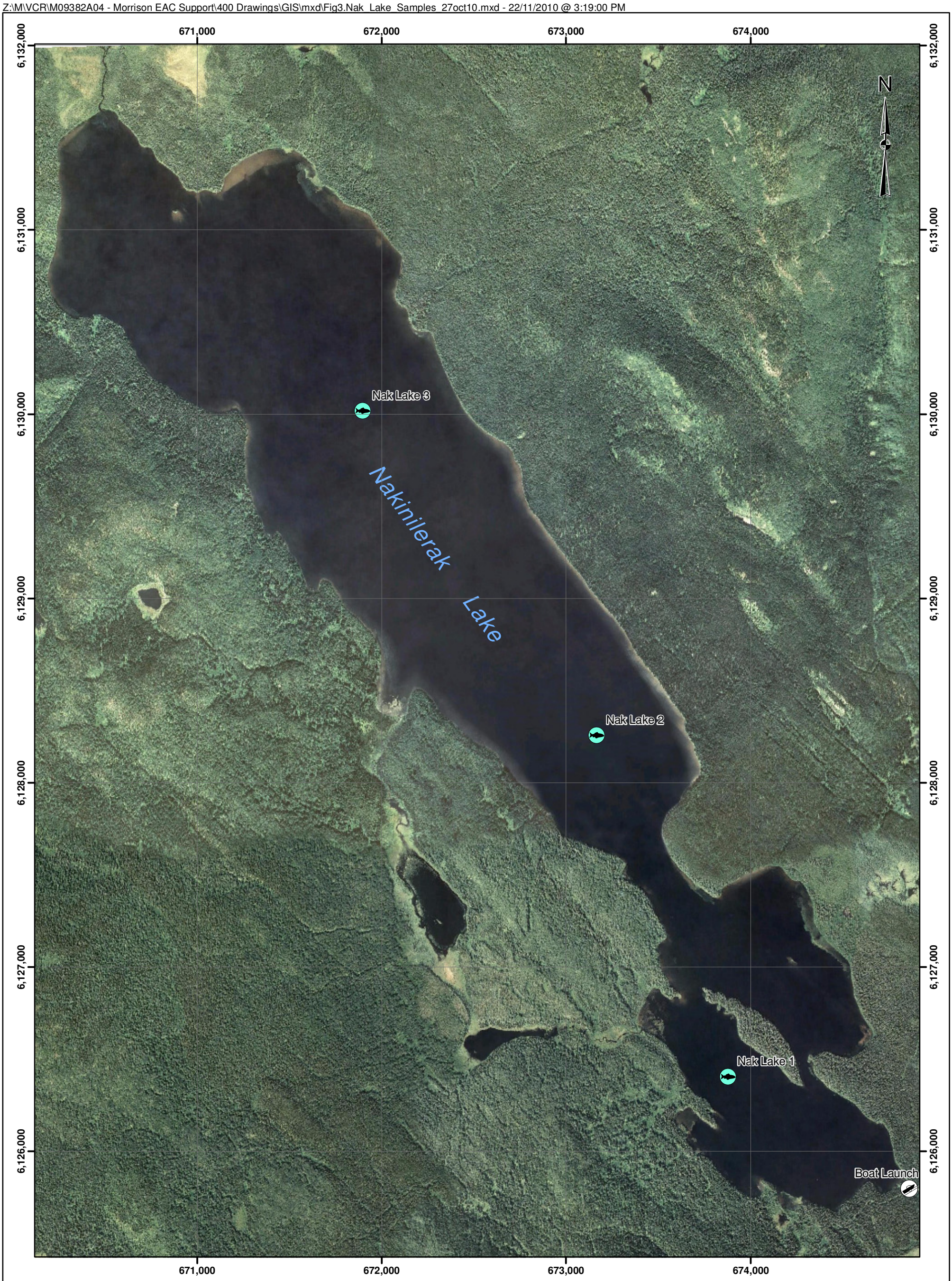

Boat Launch

Sampling Location

Notes:
1. UTM Zone 9N, NAD83
2. Imagery from Google Earth

NOT FOR CONSTRUCTION

TO BE READ WITH KLOHN-CRIPPEN REPORT DATED _____

0 1,000 m

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PROJECT
MORRISON COPPER/GOLD PROJECT

TITLE
NAKINILERAK LAKE
SAMPLING LOCATIONS

PROJECT No. M09382A04

FIG No. 3

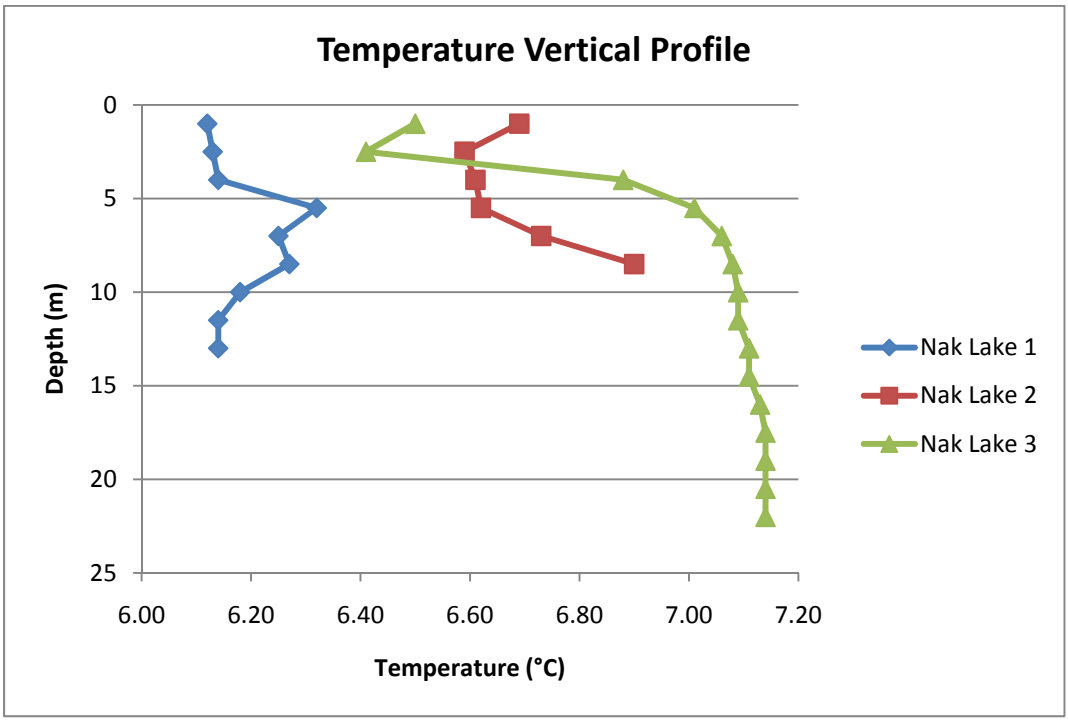

Figure 4 Nakinilerak Lake Temperature Vertical Profile

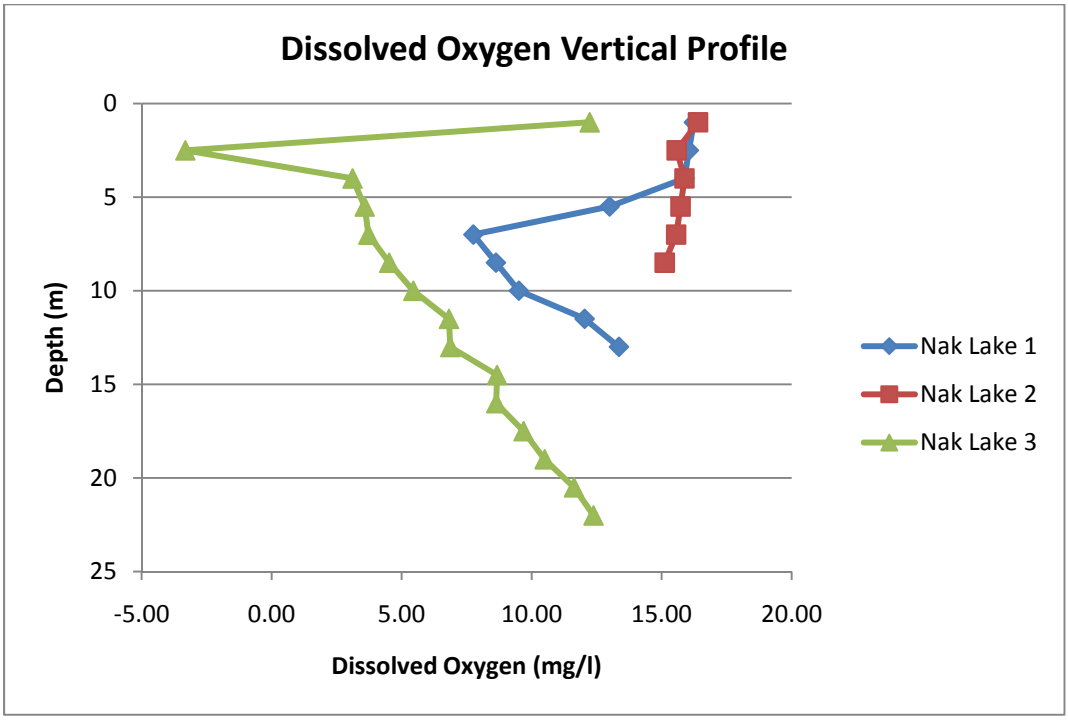

Figure 5 Nakinilerak Lake Dissolved Oxygen Vertical Profile

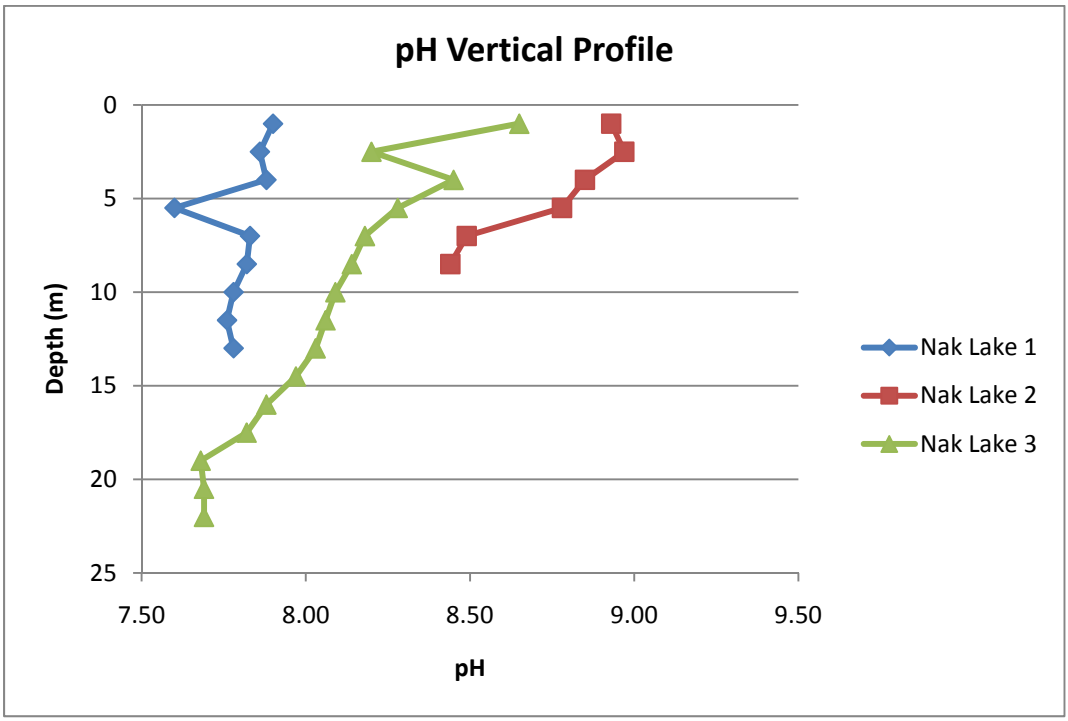

Figure 6 Nakinilerak Lake pH Vertical Profile

APPENDIX III

Water Quality Sampling Laboratory Results

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 27-OCT-10
Report Date: 08-NOV-10 14:31 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L947801
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-031671, 10-031679

Andre Langlais
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L947801-6 Description: NAK LAKE 1 Sampled Date Sampled Time Client ID	Sample ID: L947801-7 Description: NAK LAKE 3			
SOIL						
Physical Tests	pH (pH)	6.12	7.01			
Leachable Anions & Nutrients	Total Nitrogen by LECO (%)	1.42	0.734			
Organic / Inorganic Carbon	Total Organic Carbon (%)	15.7	8.52			
Plant Available Nutrients	Available Nitrate-N (mg/kg)	<23 DLM	11 DLM			
	Available Phosphate-P (mg/kg)	10.2 DLM	52.6 DLM			
Metals	Antimony (Sb) (mg/kg)	0.57	0.68			
	Arsenic (As) (mg/kg)	6.98	56.8			
	Barium (Ba) (mg/kg)	299	2470			
	Beryllium (Be) (mg/kg)	0.48	0.54			
	Cadmium (Cd) (mg/kg)	0.88	0.84			
	Chromium (Cr) (mg/kg)	24.7	19.5			
	Cobalt (Co) (mg/kg)	8.52	11.8			
	Copper (Cu) (mg/kg)	47.4	36.8			
	Lead (Pb) (mg/kg)	8.15	8.88			
	Mercury (Hg) (mg/kg)	0.296	0.464			
	Molybdenum (Mo) (mg/kg)	1.28	6.81			
	Nickel (Ni) (mg/kg)	26.7	29.0			
	Selenium (Se) (mg/kg)	1.82	1.81			
	Silver (Ag) (mg/kg)	0.44	0.39			
	Thallium (Tl) (mg/kg)	0.185	0.211			
	Tin (Sn) (mg/kg)	<2.0	<2.0			
	Uranium (U) (mg/kg)	0.577	0.401			
	Vanadium (V) (mg/kg)	35.6	46.1			
	Zinc (Zn) (mg/kg)	116	112			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947801-4	L947801-5	L947801-11	L947801-12	L947801-13
Description	NAK 3 SURFACE	NAK 3 DEEP	MORRISON CREEK	BOOKER LAKE SURFACE	BOOKER LAKE DEEP
Sampled Date					
Sampled Time					
Client ID					
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	66.1	67.0	66.2	198	200
Hardness (as CaCO3) (mg/L)	33.8	36.6	32.0	106	109
pH (pH)	6.70	8.05	8.10	8.04	8.10
Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	<3.0	<3.0
Total Dissolved Solids (mg/L)	55	55	61	133	132
Anions and Nutrients Acidity (as CaCO3) (mg/L)	8.4	5.3	4.8	8.4	6.1
Alkalinity, Total (as CaCO3) (mg/L)	30.5	30.5	29.6	101	102
Ammonia as N (mg/L)	<0.0050	<0.0050	0.0103	0.0068	0.0074
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
Fluoride (F) (mg/L)	0.023	0.023	0.020	0.046	0.048
Nitrate (as N) (mg/L)	<0.0050	<0.0050	0.0377	<0.0050	<0.0050
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Sulfate (SO4) (mg/L)	2.96	2.97	2.97	6.46	6.48
Organic / Inorganic Carbon Total Organic Carbon (mg/L)	8.00	7.10	9.50	10.1	12.1
Total Metals Aluminum (Al)-Total (mg/L)	0.0216	0.0132	0.103	0.0355	0.0588
Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000087
Arsenic (As)-Total (mg/L)	0.000187	0.000186	0.000444	0.000652	0.000683
Barium (Ba)-Total (mg/L)	0.0110	0.0111	0.0205	0.0385	0.0380
Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Total (mg/L)	0.0067	0.0065	0.0091	0.0123	0.0124
Cadmium (Cd)-Total (mg/L)	<0.000017	<0.000017	0.000043	0.00118	0.000040
Calcium (Ca)-Total (mg/L)	10.7	11.3	9.27	34.0	33.3
Chromium (Cr)-Total (mg/L)	0.00020	0.00013	0.00040	0.00024	0.00041
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	0.00010	<0.00010	<0.00010
Copper (Cu)-Total (mg/L)	0.00098	0.00090	0.00137	0.00105	0.00270
Iron (Fe)-Total (mg/L)	0.040	0.026	0.326	0.077	0.085
Lead (Pb)-Total (mg/L)	0.000203	<0.000050	0.000098	0.000168	0.000336
Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Total (mg/L)	1.68	1.79	1.98	5.69	5.63
Manganese (Mn)-Total (mg/L)	0.00666	0.00632	0.0258	0.0476	0.0478
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.000097	0.000085	0.000119	0.000097	0.000094
Nickel (Ni)-Total (mg/L)	0.00033	0.00025	0.00062	0.00054	0.00093
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L947801-4	L947801-5	L947801-11	L947801-12	L947801-13
Description	NAK 3 SURFACE	NAK 3 DEEP	MORRISON CREEK	BOOKER LAKE SURFACE	BOOKER LAKE DEEP
Sampled Date					
Sampled Time					
Client ID					
Grouping / **Analyte**					
WATER					
Total Metals Potassium (K)-Total (mg/L)	0.262	0.260	0.404	0.436	0.483
Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Total (mg/L)	2.36	2.31	2.28	2.36	2.28
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000014
Sodium (Na)-Total (mg/L)	1.79	1.85	1.87	2.54	2.59
Strontium (Sr)-Total (mg/L)	0.0494	0.0485	0.0484	0.0772	0.0733
Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	0.00011
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total (mg/L)	<0.000010	<0.000010	0.000054	0.000025	0.000025
Vanadium (V)-Total (mg/L)	0.000104	0.000081	0.000351	0.000252	0.000268
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	0.0030	0.0070
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0049	0.0047	0.0194	<0.0030	0.0070
Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000082
Arsenic (As)-Dissolved (mg/L)	0.000170	0.000165	0.000379	0.000670	0.000624
Barium (Ba)-Dissolved (mg/L)	0.0108	0.0108	0.0193	0.0365	0.0371
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)	0.0061	0.0065	0.0080	0.0114	0.0122
Cadmium (Cd)-Dissolved (mg/L)	<0.000017	<0.000017	<0.000017	<0.000017	0.000041
Calcium (Ca)-Dissolved (mg/L)	10.6	11.7	9.53	33.2	34.4
Chromium (Cr)-Dissolved (mg/L)	0.00031	0.00020	0.00022	0.00019	0.00029
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00059	0.00085	0.00088	0.00051	0.00208
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	0.155	<0.010	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved (mg/L)	1.76	1.79	2.00	5.62	5.58
Manganese (Mn)-Dissolved (mg/L)	0.000136	0.000151	0.0147	0.000313	0.000609
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved (mg/L)	0.000115	0.000083	0.000139	0.000088	0.000106
Nickel (Ni)-Dissolved (mg/L)	0.00034	0.00027	0.00072	0.00047	0.00094
Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)	0.269	0.263	0.384	0.426	0.533
Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Dissolved (mg/L)	2.29	2.38	2.35	2.33	2.29
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L947801-4 NAK 3 SURFACE	L947801-5 NAK 3 DEEP	L947801-11 MORRISON CREEK	L947801-12 BOOKER LAKE SURFACE	L947801-13 BOOKER LAKE DEEP
Sample ID		L947801-4	L947801-5	L947801-11	L947801-12	L947801-13
Description		NAK 3 SURFACE	NAK 3 DEEP	MORRISON CREEK	BOOKER LAKE SURFACE	BOOKER LAKE DEEP
Sampled Date						
Sampled Time						
Client ID						
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	1.83	1.85	1.92	2.58	2.66
	Strontium (Sr)-Dissolved (mg/L)	0.0474	0.0472	0.0488	0.0746	0.0735
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	0.000022	0.000023
	Vanadium (V)-Dissolved (mg/L)	0.000064	0.000070	0.000104	0.000143	0.000137
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	0.0062

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLM	Detection Limit Adjusted For Sample Matrix Effects

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2

This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.

ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

C-TOT-ORG-LECO-SK	Soil	Organic Carbon by combustion method	SSSA (1996) p. 973

Total Organic Carbon (C-TOT-ORG-LECO-SK, C-TOT-ORG-SK)

Total C and inorganic C are determined on separate samples. The total C is determined by combustion and thermal conductivity detection, while inorganic C is determined by weight lass after addition of hydrochloric acid. Organic C is calculated by the difference between these two determinations.

Reference for Total C:
Nelson, D.W. and Sommers, L.E. 1996. Total Carbon, organic carbon and organic matter. P. 961-1010 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

Reference for Inorganic C:
Loeppert, R.H. and Suarez, D.L. 1996. Gravimetric Method for Loss of Carbon Dioxide. P. 455-456 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)

This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

Reference Information

FE-TOT-LOW-ICP-VA Water Total Fe in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-CCME-CVAFS-VA Soil CVAFS Hg in Soil (CCME) BCMELP CSR SALM METHOD 8/EPA 245.7

This analysis is carried out using procedures from CSR Analytical Method 8 "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, Lands and Parks, 26 June 2001, and procedures adapted from "Test Methods for Evaluating Solid Waste", SW-846 Method 3050B United States Environmental Protection Agency (EPA). The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 90 degrees Celsius for 2 hours by block digester using a 1:1 ratio of concentrated nitric and hydrochloric acids. Instrumental analysis is by atomic fluorescence spectrophotometry (EPA Method 7000 series).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-200.2-CCMS-VA Soil Metals in Soil by CRC ICPMS EPA 200.2/6020A

This analysis is carried out using procedures from CSR Analytical Method: "Strong Acid Leachable Metals (SALM) in Soil", BC Ministry of Environment, 26 June 2009, and procedures adapted from EPA Method 200.2. The sample is manually homogenized, dried at 60 degrees Celsius, sieved through a 2 mm (10 mesh) sieve (this sieve step is omitted for international soil samples), and a representative subsample of the dry material is weighed. The sample is then digested at 95 degrees Celsius for 2 hours by block digester using concentrated nitric and hydrochloric acids. Instrumental analysis is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

Method Limitation: This method is not a total digestion technique. It is a very strong acid digestion that is intended to dissolve those metals that may be environmentally available. By design, elements bound in silicate structures are not normally dissolved by this procedure as they are not usually mobile in the environment.

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOT-LECO-SK Soil Total Nitrogen by combustion method SSSA (1996) p. 973-974

The sample is introduced into a quartz tube where it undergoes combustion at 900 C in the presence of oxygen.
Combustion gases are first carried through a catalyst bed in the bottom of the combustion tube, where oxidation is completed and then carried through a reducing agent (copper), where the nitrogen oxides are reduced to elemental nitrogen.
This mixture of N2, CO2, and H2O is then passed through an absorber column containing magnesium perchlorate to remove water. N2 and CO2 gases are then separated in a gas chromatographic column and detected by thermal conductivity.

Reference: Bremner, J.M. 1996. Nitrogen - Total (Dumas Methods). P. 1088 In: J.M. Bartels et al. (ed.) Methods of soil analysis: Part 3 Chemical methods. (3rd ed.) ASA and SSSA, Madison, WI. Book series no. 5

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulphuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NO3-AVAIL-SK Soil Available Nitrate-N CSSS (1993) 4.3

Available Nitrate and Nitrite are extracted from the soil using a dilute calcium chloride solution.
Nitrate is quantitatively reduced to nitrite by passage of the sample through a copperized cadmium column. The nitrite (reduced nitrate plus original nitrite) is then determined by diazotizing with sulfanilamide followed by coupling with N-(1-naphthyl) ethylenediamine dihydrochloride. The resulting water soluble dye has a magenta color which is measured at colorimetrically at 520nm.

Reference:
Carter, Martin. Soil Sampling and Methods of Analysis. Can. Soc. Soil Sci.(1993) method 4.3

PH-1:2-VA Soil CSR pH by 1:2 Water Leach BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-AVAIL-SK Soil Available Phosphate-P Comm. Soil Sci. Plant Anal. 25 (5&6)

Available orthophosphate P is extracted from the soil using Modified Kelowna extracting solution (0.025M HOAc, 0.25M NH4Oac, 0.015M NH4F at pH 4.5).
The orthophosphate ion reacts with ammonium molybdate and antimony potassium tartrate under acidic conditions to form a complex. This complex is reduced with ascorbic acid to form a blue complex which is measured colorimetrically by auto analysis at 880 nm.

Reference:
Communications in Soil Science and Plant Analysis, 25(5&6), 627-635 (1994).

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

Reference Information

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA
SK	ALS LABORATORY GROUP - SASKATOON, SASKATCHEWAN, CANADA

Chain of Custody Numbers:

10-031671 10-031679

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

PACIFIC BOOKER MINERALS INC.
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Date Received: 27-OCT-10
Report Date: 10-NOV-10 16:21 (MT)
Version: FINAL

Certificate of Analysis

Lab Work Order #: L947757
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-031769

ERIN BOLSTER
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-1	L947757-2	L947757-3	L947757-4	L947757-5
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	21-OCT-10
	Sampled Time	13:21	12:50	13:21	12:50	09:51
	Client ID	MORRISON LAKE A DEEP	MORRISON LAKE B DEEP	MORRISON LAKE A SURFACE	MORRISON LAKE B SURFACE	NAK LAKE 1 DEEP
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	62.8	62.8	62.4	62.2	72.8
	Hardness (as CaCO3) (mg/L)	29.3	29.4	30.2	30.0	33.1
	pH (pH)	7.86	7.80	7.81	7.79	7.87
	Total Suspended Solids (mg/L)	<3.0	5.0	5.0	<3.0	3.5
	Total Dissolved Solids (mg/L)	51	50	55	58	55
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.2	2.2	2.1	2.1	2.1
	Alkalinity, Total (as CaCO3) (mg/L)	28.3	28.2	28.0	28.1	33.0
	Ammonia as N (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.034	0.034	0.034	0.035	0.036
	Nitrate (as N) (mg/L)	0.0338	0.0390	0.0364	0.0396	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Sulfate (SO4) (mg/L)	2.41	2.40	2.42	2.40	3.17
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	7.62	9.61	8.07	9.67	7.71
Total Metals	Aluminum (Al)-Total (mg/L)	0.0355	0.0442	0.0540	0.0332	
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Arsenic (As)-Total (mg/L)	0.000336	0.000378	0.000346	0.000313	
	Barium (Ba)-Total (mg/L)	0.0165	0.0164	0.0179	0.0166	
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	0.0083	0.0085	0.0087	0.0084	
	Cadmium (Cd)-Total (mg/L)	<0.000017	<0.000017	0.000022	<0.000017	
	Calcium (Ca)-Total (mg/L)	8.47	8.65	8.90	8.74	
	Chromium (Cr)-Total (mg/L)	0.00048	0.00036	0.00050	0.00038	
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Total (mg/L)	0.00119	0.00151	0.00234	0.00092	
	Iron (Fe)-Total (mg/L)	0.104	0.137	0.139	0.096	
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000229	<0.000050	
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
	Magnesium (Mg)-Total (mg/L)	1.97	1.94	1.99	1.98	
	Manganese (Mn)-Total (mg/L)	0.00493	0.00578	0.0150	0.00371	
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Total (mg/L)	0.000127	0.000127	0.000142	0.000122	
	Nickel (Ni)-Total (mg/L)	0.00049	0.00049	0.00062	0.00053	
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-6	L947757-7	L947757-8		
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10		
	Sampled Time	09:51	10:55	10:55		
	Client ID	NAK LAKE 1 SURFACE	NAK LAKE 2 SURFACE	NAK LAKE 2 DEEP		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	72.8	67.0	67.4		
	Hardness (as CaCO3) (mg/L)	34.6	32.4	31.7		
	pH (pH)	7.82	7.83	7.82		
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0		
	Total Dissolved Solids (mg/L)	55	49	50		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.6	2.1	2.1		
	Alkalinity, Total (as CaCO3) (mg/L)	33.0	30.4	30.5		
	Ammonia as N (mg/L)	0.0055	0.0056	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50		
	Fluoride (F) (mg/L)	0.036	0.035	0.035		
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010		
	Sulfate (SO4) (mg/L)	3.16	2.94	2.94		
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	6.91	6.82	6.98		
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-1	L947757-2	L947757-3	L947757-4	L947757-5
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	21-OCT-10
	Sampled Time	13:21	12:50	13:21	12:50	09:51
	Client ID	MORRISON LAKE A DEEP	MORRISON LAKE B DEEP	MORRISON LAKE A SURFACE	MORRISON LAKE B SURFACE	NAK LAKE 1 DEEP
Grouping	**Analyte**					
WATER						
Total Metals	Potassium (K)-Total (mg/L)	0.316	0.312	0.330	0.323	
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Total (mg/L)	2.42	2.40	2.49	2.41	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	1.99	1.95	2.00	2.00	
	Strontium (Sr)-Total (mg/L)	0.0489	0.0478	0.0498	0.0481	
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Vanadium (V)-Total (mg/L)	0.000104	0.000124	0.000152	0.000089	
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0036	<0.0030	
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0239	0.0256	0.0256	0.0264	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Arsenic (As)-Dissolved (mg/L)	0.000308	0.000286	0.000332	0.000315	0.000193
	Barium (Ba)-Dissolved (mg/L)	0.0160	0.0160	0.0162	0.0160	0.0128
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.0084	0.0074	0.0078	0.0078	0.0069
	Cadmium (Cd)-Dissolved (mg/L)	<0.000017	<0.000017	<0.000017	<0.000017	<0.000017
	Calcium (Ca)-Dissolved (mg/L)	8.57	8.59	8.91	8.86	10.2
	Chromium (Cr)-Dissolved (mg/L)	0.00021	0.00045	0.00022	0.00022	0.00015
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00098	0.00121	0.00088	0.00079	0.00052
	Iron (Fe)-Dissolved (mg/L)	0.066	0.069	0.067	0.069	0.027
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	1.93	1.92	1.93	1.92	1.84
	Manganese (Mn)-Dissolved (mg/L)	0.000255	0.000371	0.000275	0.000298	0.00110
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000111	0.000113	0.000119	0.000111	0.000101
	Nickel (Ni)-Dissolved (mg/L)	0.00045	0.00053	0.00060	0.00050	0.00024
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.304	0.319	0.377	0.318	0.286
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	2.34	2.36	2.34	2.34	2.10
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-6	L947757-7	L947757-8		
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10		
	Sampled Time	09:51	10:55	10:55		
	Client ID	NAK LAKE 1 SURFACE	NAK LAKE 2 SURFACE	NAK LAKE 2 DEEP		
Grouping	**Analyte**					
WATER						
Total Metals	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0035	0.0048	0.0042		
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Arsenic (As)-Dissolved (mg/L)	0.000205	0.000163	0.000197		
	Barium (Ba)-Dissolved (mg/L)	0.0125	0.0106	0.0109		
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)	0.0075	0.0068	0.0065		
	Cadmium (Cd)-Dissolved (mg/L)	<0.000017	<0.000017	<0.000017		
	Calcium (Ca)-Dissolved (mg/L)	10.7	10.0	9.75		
	Chromium (Cr)-Dissolved (mg/L)	0.00015	0.00015	0.00014		
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.00090	0.00052	0.00062		
	Iron (Fe)-Dissolved (mg/L)	0.024	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050		
	Magnesium (Mg)-Dissolved (mg/L)	1.90	1.78	1.78		
	Manganese (Mn)-Dissolved (mg/L)	0.000750	0.000162	0.000102		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000113	0.000079	0.000083		
	Nickel (Ni)-Dissolved (mg/L)	0.00028	0.00025	0.00022		
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)	0.326	0.283	0.277		
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	2.09	2.22	2.23		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-1	L947757-2	L947757-3	L947757-4	L947757-5
	Description					
	Sampled Date	20-OCT-10	20-OCT-10	20-OCT-10	20-OCT-10	21-OCT-10
	Sampled Time	13:21	12:50	13:21	12:50	09:51
	Client ID	MORRISON LAKE A DEEP	MORRISON LAKE B DEEP	MORRISON LAKE A SURFACE	MORRISON LAKE B SURFACE	NAK LAKE 1 DEEP
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	1.93	1.96	2.05	1.97	1.93
	Strontium (Sr)-Dissolved (mg/L)	0.0468	0.0470	0.0470	0.0466	0.0505
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Dissolved (mg/L)	0.000078	0.000077	0.000080	0.000082	0.000129
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	0.0091	<0.0030	<0.0030

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L947757-6	L947757-7	L947757-8		
	Description					
	Sampled Date	21-OCT-10	21-OCT-10	21-OCT-10		
	Sampled Time	09:51	10:55	10:55		
	Client ID	NAK LAKE 1 SURFACE	NAK LAKE 2 SURFACE	NAK LAKE 2 DEEP		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	2.02	1.92	1.92		
	Strontium (Sr)-Dissolved (mg/L)	0.0499	0.0485	0.0481		
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	0.000096	0.000061	0.000066		
	Zinc (Zn)-Dissolved (mg/L)	0.0043	<0.0030	<0.0030		

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			
HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			
HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United			

Reference Information

States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulphuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Reference Information

Chain of Custody Numbers:

10-031769

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as receieved by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Labo
ANALYTICAL CHEMISTR
Environmenta

Short Holding Tim

Rush Processing

L947757-COFC

10-031769

Page ___ of ___

Report To	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company: PBM	Standard: ✓ Other (specify):	Regular (Standard Turnaround Times))
Contact: Don Betton	Select: PDF ✓ Excel ✓ Digital Fax	Priority, Date Req'd: _____ (Surcharges apply)
Address:	Email 1: d.betton@pacificbooker.com	Emergency (1 Business Day) - 100% Surcharge
	Email 2: mmackinnon@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 250-860-7518 Fax:		Analysis Request
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:	PO / AFE:	
Contact:	LSD:	
Address:		
Phone: Fax:	Quote #:	
Lab Work Order # (lab use only): L947757	ALS Contact:	Sampler:

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General parameters	Dissolved metals (F)	Total metals (P)	Nutrients (P)	TOC (P)							Number of Containers
	Morrison Lake A deep	20-Oct-10	13:21	H_2O	X	X	X	X	X							5
	Morrison Lake B deep	20-Oct-10	12:50	H_2O	X	X	X	X	X							5
	Morrison Lake A surface	20-Oct-10	13:21	H_2O	X	X	X	X	X							5
	Morrison Lake B surface	20-Oct-10	12:50	H_2O	X	X	X	X	X							5
	Nak Lake 1 deep	21-Oct-10	09:51	H_2O	X	X		X	X							4
	Nak Lake 1 surface	21-Oct-10	09:51	H_2O	X	X		X	X							4
	Nak Lake 2 surface	21-Oct-10	10:55	H_2O	X	X		X	X							4
	Nak Lake 2 deep	21-Oct-10	10:55	H_2O	X	X		X	X							4

Special Instructions / Regulations / Hazardous Details

Dissolved metals filter in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
Matt Mackinnon	10-22-10	17:00	SH	27Oct	10:35	6.0 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION — WHITE - LABORATORY COPY — YELLOW - CLIENT COPY — GENF 18.01 Front

Klohn Crippen Berger

MEMORANDUM

TO:	Don Betton, Pacific Booker Minerals	**DATE:**	March 4, 2011
FROM:	Bryn Laidlaw	**FILE NO:**	M09382A04.720
		LOG NO:	
SUBJECT:	Morrison/Nakinilerak Lake Water Quality Baseline Sampling Report January 10 – 26, 2011		

1. PERSONNEL

Klohn Crippen Berger (KCB)
Bryn Laidlaw
Babine Barge
Donald Dickson
Austin Adams
Reddog Logging
Dave Dickson

2. LOGISTICS

Bryn Laidlaw flew to Smithers from Vancouver on January 10, 2011. Upon arrival in Smithers one SUV was rented and Bryn travelled approximately 100 kilometres southeast on Highway 16 to Granisle. Water Sample bottles were picked up from Babine Barge company before travelling across Babine Lake via the Babine Lake Barge to the Babine Lake Logging Camp.

Fieldwork consisted of travelling by pickup to the gravel pit on the property, and travelling around the property on snowmobile. Sampling supplies were towed on a skimmer in coolers. Lake ice was cut with a chainsaw; stream ice was probed with an ice auger. Ice conditions were assessed prior to travelling on frozen lakes, and found to range from 7 inches to 10 inches on Morrison Lake and 6 inches to 8 inches on Nakinilerak Lake. Six inches was selected as the minimum ice thickness to travel and work on frozen lakes. Ponded water and slush was frequently encountered on top of lake ice.

Fieldwork ran from January 11 to 25, with one snow day on January 16. The work crew stayed at Reddog Angling Expeditions cabin on Nakinilerak Lake for January 18 to 21 to facilitate sampling this remote location. Water samples were shipped to ALS Laboratories via Bandstra in Houston on January 17 and January 26.

Klohn Crippen Berger Ltd. • 500 – 2955 Virtual Way • Vancouver BC V5M 4X6 • CANADA
604.669.3800 t • 604.669.3835 f • www.klohn.com

3. SCOPE OF FIELD WORK

The work performed on this field trip is detailed below. Water quality sample locations are detailed in Table 1; in situ physical parameters from lake sites are detailed in Table 2.

1. Meteorological

   a. On January 14, 2011 KCB re-installed the meteorological control unit and the temperature sensor. A diagnostic check of the station was completed on January 24, 2011 which included a check of the power, time and date. No data was downloaded from the station. Calibration certificates for the re-installed components are attached (Appendix III).

   b. The following records the model and serial number (where applicable) of all components currently installed in the meteorological station.

COMPONENT	MODEL NUMBER	SERIAL NUMBER
Internal Battery	PS100-8.5	6094
Control Unit	CR10X-55	44979
Temperature & RH Probe	HMP46C212	C1908
Wind Sensor	RM Young 05103	
Rain Gauge	TE525WS	
Data Logger Memory	SM4M-55	
Snowfall Gauge	cs705	

2. Baseline Data Collection

   a. Morrison Lake – water quality samples were taken from surface (2 m) and deep (30 m) waters on five locations on the lake, and a third set of samples were taken at a middle depth (15 m) at the proposed diffuser location. A YSI-600 probe was used to construct a vertical profile at each location of physical parameters (temperature, pH, EC, DO, TDS and ORP), but due to extreme cold the probe did not function as intended at sample locations B and D (diffuser).

   b. Nakinilerak Lake – water quality samples were taken from three lake sites and the outlet Hautete stream (Hautete 2). Poor ice quality on the lake prevented access to the major inlet stream. Physical parameters (temperature, pH, Ec, DO, TDS and ORP) were measured in profile at each lake sample location using the YSI-600 probe.

c. Monitoring Wells – Fourteen monitoring wells were scheduled to be sampled, however time constraints and difficulty of access prevented sampling at two sites (DH07-5B and MW07-03A, B). Water quality samples were taken from every well visited and in-situ pH and EC were measured, and turbidity level described qualitatively. Table 1 summarizes the samples collected and quantitative and qualitative observations.

d. Streams – Eleven natural streams were scheduled water quality sampling, however only six streams had enough free flowing water for sampling purposes. Table 1 summarizes observations with respect to stream flow. In situ pH and EC were measured when samples were collected, and stream flow was estimated. The installed stream flow gauge data were downloaded from four sites (MCS-1, 4, 5, 6), refer to data file under separate cover (2010 Transducer Data.xls); three stream flow gauges were not located due to heavy snow but are expected to continue collecting data for future retrieval.

e. ML-ARD Test Pad – Frozen water samples (in 4 and 5 gallon pails) were examined from four cubes and two barrels. The pails that collected the runoff from the four large cubes were full (approx. 15 litres) and the two pails for the barrels were each about 1/3 full (approx. 5 litres). Samples were not scheduled for collection at this time, but the pails were thawed over a few days and pH and EC were measured. The water was then discarded and the pails replaced so that fresh samples will be collected during the spring thaw.

3. QA/QC

a. Eight quality control samples were submitted to the lab. Four complete testing panels of de-ionized water (acidified as required for each particular test) were submitted as blanks, labelled as fictitious streams. Four duplicate testing panels were submitted: one each duplicate stream and lake samples, and two duplicate monitoring wells. Analysis of the QA/QC lab results show that the blank samples all returned null values and the duplicate samples had acceptably similar values.

Table 1 Water Quality Sampling Details

GROUNDWATER QUALITY	NOTES	WATER LEVEL (mbgs)	IN SITU PARAMETERS		TEST					
			pH	EC	General	Total Metal	Dissolved Metal	Nutrients	TOC	WAD/SAD Cyanide
DH07-5B	not sampled									
DH06-7	low turbidity	0.5 L/min artesian	8.41	430	1	1	1	1	1	
DH06-12	low turbidity	6.55	9.42	970	1	1	1	1	1	
MW07-01A	low turbidity	1.1 L/min artesian	8.82	940	1	1	1	1	1	
MW07-01B	turbid	1.73	8.4	1060	1	1	1	1	1	
MW07-02A	low turbidity	2.21	9.39	710	1	1	1	1	1	
MW07-02B	low turbidity	3.01	8.21	620	1	1	1	1	1	
MW07-03A	not sampled									
MW07-03B	not sampled									
MW07-04A	turbid	25.29	8.39	1050	1	1	1	1	1	
MW07-04B	mid/light turbid	0.91	7.86	1160	1	1	1	1	1	
MW07-05A	mid/light turbid	23.95	8.14	750	1	1	1	1	1	
MW07-05B	mid/light turbid	16.06	8.62	700	1	1	1	1	1	
MW07-06A	mid/light turbid	4.28	10.14	105	1	1	1	1	1	
MW07-06B	turbid	2.33	9.45	170	1	1	1	1	1	
MW07-07A	Solinst instrument	43.85	n/a	n/a						
MW07-07B	turbid	32.09	8.82	560	1	1	1	1	1	
MW07-08A	low turbidity	1.92	8.11	1120	1	1	1	1	1	
MW07-08B	low turbidity	1.73	8.71	600	1	1	1	1	1	
MW08-01A	low turbidity	16.5	8.23	740	1	1	1	1	1	
MW08-01B	turbid	23.74	8.67	830	1	1	1	1	1	
MW08-02A	low turbidity	5 L/min artesian	7.73	740	1	1	1	1	1	
MW08-02B	low turbidity	5.93	Frozen probe	1040	1	1	1	1	1	
MW08-03A	low turbidity	9.07	8.5	0	1	1	1	1	1	
MW08-03B	low turbidity	13.1	8.65	20	1	1	1	1	1	
					21	**21**	**21**	**21**	**21**	**0**

STREAM SAMPLES	STATUS	FLOW RATE (APPROX)	IN SITU PARAMETERS		TEST					
			pH	EC	General	Total Metal	Dissolved Metal	Nutrients	TOC	WAD/SAD Cyanide
MCS-1	frozen	0								
Morrison River	4" ice cover	?	7.95	340	1	1	1	1	1	1
MCS-4	open	<10L/min	7.93	300	1	1	1	1	1	
MCS-5	open	<5L/min	9.91	110	1	1	1	1	1	
MCS-6	open	>20L/min	10.05	40	1	1	1	1	1	1
MCS-7(upper)	95% frozen	<1L/min								
MCS-7(lower)	frozen	0								
MCS-8	frozen - 7"	0								
MCS-10	frozen	0								
Hautete1	open water - no access	?								
Hautete2	open		9.65	80	1	1	1	1	1	
					5	**5**	**5**	**5**	**5**	**2**

MORRISON LAKE (WQ SAMPLES AND PROFILE)	TEST					
	General	Total Metal	Dissolved Metal	Nutrients	TOC	WAD/SAD Cyanide
Site A - Shallow*	1	1	1	1	1	1
Site A - Bottom*	1	1	1	1	1	1
Site B – Shallow	1	1	1	1	1	
Site B – Bottom	1	1	1	1	1	1
Site C – Shallow	1	1	1	1	1	1
Site C – Bottom	1	1	1	1	1	
Site D – Shallow (@diffuser)	1	1	1	1	1	1
Site D – Thermocline (@diffuser)	1	1	1	1	1	
Site D – Bottom (@diffuser)	1	1	1	1	1	1
Site E – Shallow	1	1	1	1	1	
Site E – Bottom	1	1	1	1	1	
	11	**11**	**11**	**11**	**11**	**6**

NAKINILERAK LAKE (WQ SAMPLES AND PROFILE)	TEST					
	General	Total Metal	Dissolved Metal	Nutrients	TOC	WAD/SAD Cyanide
Nak 1- Shallow	1	1	1	1	1	1
Nak 1 - Mid	1	1	1	1	1	
Nak 1 - Deep	1	1	1	1	1	1
Nak 2 - Shallow	1	1	1	1	1	
Nak 2 - Deep	1	1	1	1	1	
Nak 3 - Shallow	1	1	1	1	1	
Nak 3 - Deep	1	1	1	1	1	
	7	**7**	**7**	**7**	**7**	**2**

CUBES AND BARRELS (In situ Parameters measured; No samples)	IN SITU PARAMETERS		TEST					
	pH	EC ($\mu S/cm^2$)	General	Total Metal	Dissolved Metal	Nutrients	TOC	WAD/SAD Cyanide
Cube 1	7.58	1123						
Cube 2	7.48	1617						
Cube 3	7.71	308						
Cube 4	7.58	834						
Barrel 1	7.18	1028						
Barrel 2	7.58	433						
			0	**0**	**0**	**0**	**0**	**0**

QA/QC Blanks (deionized water)	TEST					
	General	Total Metal	Dissolved Metal	Nutrients	TOC	WAD/SAD Cyanide
MCS-98	1	1	1	1	1	
MCS-99	1	1	1	1	1	
MCS-90	1	1	1	1	1	
MCS-91	1	1	1	1	1	
	4	**4**	**4**	**4**	**4**	**0**

DUPLICATES		TEST					
		General	Total Metal	Dissolved Metal	Nutrients	TOC	WAD/SAD Cyanide
MCS-6B	MCS-6	1	1	1	1	1	1
Nak 3 - Surface B	Nak 3 - Surface	1	1		1	1	
MW07-08C	MW07-08A	1	1	1	1	1	
MW07-02C	MW07-02A	1	1	1	1	1	
		4	**4**	**3**	**4**	**4**	**1**

TOTAL TESTS					
General	Total Metal	Dissolved Metal	Nutrients	TOC	WAD/SAD Cyanide
52	**52**	**51**	**52**	**52**	**11**

Table 2 Lake Water Physical Parameters

Morrison A

0.5	**m**		
0.74	°C	81.7	DO %
66	µS/cm^2	11.43	DO mg/L
36	µS/cm	7.89	pH
0.043	TDS g/L	74.2	ORP

3	**m**		
2.65	°C	37.3	DO %
67	µS/cm^2	4.79	DO mg/L
39	µS/cm	7.32	pH
0.044	TDS g/L	65.1	ORP

7	**m**		
2.46	°C	36.8	DO %
66	µS/cm^2	5.13	DO mg/L
38	µS/cm	7.15	pH
0.043	TDS g/L	67.8	ORP

9	**m**		
2.52	°C	42.3	DO %
67	µS/cm^2	5.8	DO mg/L
38	µS/cm	7	pH
0.043	TDS g/L	69.2	ORP

15	**m**		
2.61	°C	39.9	DO %
66	µS/cm^2	5.74	DO mg/L
39	µS/cm	7.11	pH
0.043	TDS g/L	68.2	ORP

25	**m**		
2.63	°C	41.2	DO %
67	µS/cm^2	5.83	DO mg/L
37	µS/cm	7.18	pH
0.043	TDS g/L	68.7	ORP

Morrison C

0.5	**m**		
0.54	°C		DO %
41	µS/cm^2	24.42	DO mg/L
22	µS/cm	6.79	pH
	TDS g/L	248	ORP

5	**m**		
2.85	°C		DO %
50	µS/cm^2	36.4	DO mg/L
26	µS/cm	6.93	pH
	TDS g/L	201.3	ORP

10	**m**		
3.01	°C		DO %
52	µS/cm^2	26.31	DO mg/L
24	µS/cm	6.75	pH
	TDS g/L	190.3	ORP

25	**m**		
3.35	°C		DO %
58	µS/cm^2	23.4	DO mg/L
27	µS/cm	6.45	pH
	TDS g/L	189.3	ORP

Morrison E

0.5	**m**		
0.55	°C		DO %
65	µS/cm^2	32.91	DO mg/L
35	µS/cm	7.2	pH
	TDS g/L	112.1	ORP

5	**m**		
3.05	°C		DO %
63	µS/cm^2	37.08	DO mg/L
37	µS/cm	7.78	pH
	TDS g/L	71.9	ORP

10	**m**		
3.12	°C		DO %
63	µS/cm^2	23.5	DO mg/L
37	µS/cm	7.11	pH
	TDS g/L	90.1	ORP

18	**m**		
3.74	°C		DO %
78	µS/cm^2	14.4	DO mg/L
46	µS/cm	6.68	pH
	TDS g/L	85.8	ORP

25	**m**		
3.62	°C		DO %
78	µS/cm^2	10.15	DO mg/L
46	µS/cm	6.53	pH
	TDS g/L	80.1	ORP

30	**m**		
3.51	°C		DO %
78	µS/cm^2	6.86	DO mg/L
46	µS/cm	6.54	pH
	TDS g/L	71.6	ORP

Nak 1

0.5	**m**		
1.76	°C	82.6	DO %
75	µS/cm^2	11.47	DO mg/L
42	µS/cm	8.11	pH
0.049	TDS g/L	47.9	ORP

4	**m**		
3.1	°C	58.4	DO %
74	µS/cm^2	7.9	DO mg/L
44	µS/cm	7.7	pH
0.049	TDS g/L	-4	ORP

Nak 2

0.5	**m**		
2.19	°C	68.1	DO %
70	µS/cm^2	9.33	DO mg/L
39	µS/cm	8.27	pH
0.016	TDS g/L	47.7	ORP

4	**m**		
2.88	°C	65.6	DO %
69	µS/cm^2	8.86	DO mg/L
40	µS/cm	7.98	pH
0.045	TDS g/L	54.6	ORP

20	**m**		
2.88	°C	65.6	DO %
69	µS/cm^2	8.86	DO mg/L
40	µS/cm	7.98	pH
0.045	TDS g/L	54.6	ORP

Nak 3

0.5	**m**		
1.88	°C	59.5	DO %
72	µS/cm^2	8.31	DO mg/L
40	µS/cm	8.53	pH
0.047	TDS g/L	49.9	ORP

8.5	**m**		
3.02	°C	47.1	DO %
71	µS/cm^2	6.72	DO mg/L
41	µS/cm	8.15	pH
0.046	TDS g/L	49.2	ORP

20	**m**		
2.99	°C	46.5	DO %
71	µS/cm^2	6.24	DO mg/L
41	µS/cm	7.96	pH
0.046	TDS g/L	44.6	ORP

APPENDIX I

Trip Photos

Photo 1 MW07-07-B on January 17th

Photo 2 Sampling MW07-07B

Photo 3 Six inches of blue lake ice on Nakinilerak Lake at site Nak 2

Photo 4 Sampling using Kemerrer Sample Tube at Morrison A

Photo 5 Re-installed weather station control unit

Photo 6 Hautete Creek, outlet of Nakinilerak Lake

Photo 7 MCS-6 from bridge

APPENDIX II

Analytical Results

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 19-JAN-11
Report Date: 28-FEB-11 10:56 (MT)
Version: FINAL REV. 3

Certificate of Analysis

Lab Work Order #: L971339
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-055788

Andre Langlais
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L971339-1	L971339-2	L971339-3	L971339-4	L971339-5
	Description					
	Sampled Date	12-JAN-11	12-JAN-11	11-JAN-11	11-JAN-11	12-JAN-11
	Sampled Time					
	Client ID	MORRISON B-SURFACE	MORRISON B-DEEP	MORRISON C-SURFACE	MORRISON C-DEEP	MORRISON D-SURFACE
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	61.4	66.0	67.9	63.1	68.8
	Hardness (as CaCO3) (mg/L)	30.0	31.4	33.0	30.0	31.7
	pH (pH)	7.40	7.79	7.83	7.84	7.85
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	<3.0	<3.0
	Total Dissolved Solids (mg/L)	50	54	35	44	51
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	4.4	3.9	3.9	3.8	3.7
	Alkalinity, Total (as CaCO3) (mg/L)	28.3	29.1	31.5	28.6	31.3
	Ammonia as N (mg/L)	<0.0050	0.0071	0.0129	0.0072	0.0078
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.029	0.028	0.026	0.026	0.028
	Nitrate (as N) (mg/L)	0.0605	0.0630	0.0650	0.0640	0.0679
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.244	0.298	0.277	0.335	0.297
	Total Nitrogen (mg/L)	0.210	0.250	0.230	0.210	0.250
	Total Phosphate as P (mg/L)	0.0056	0.0052	0.0051	0.0050	0.0053
	Sulfate (SO4) (mg/L)	2.36	2.54	2.64	2.42	2.65
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050		
	Cyanide, Total (mg/L)		<0.0050	<0.0050		
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	9.49	10.5	9.86	9.73	11.1
Total Metals	Aluminum (Al)-Total (mg/L)	0.0277	0.0338	0.0309	0.0278	0.0349
	Antimony (Sb)-Total (mg/L)	<0.000050	0.000105	<0.000050	<0.000050	<0.000050
	Arsenic (As)-Total (mg/L)	0.000274	0.000308	0.000306	0.000290	0.000296
	Barium (Ba)-Total (mg/L)	0.0160	0.0172	0.0172	0.0158	0.0177
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.0110	0.0094	0.0096	0.0094	0.0099
	Cadmium (Cd)-Total (mg/L)	0.0000054	0.0000155	0.0000348	0.0000074	0.0000175
	Calcium (Ca)-Total (mg/L)	8.43	9.08	9.19	8.18	9.31
	Chromium (Cr)-Total (mg/L)	0.00020	0.00033	0.00081	0.00025	0.00027
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00084	0.00281	0.00965	0.0459	0.00494
	Iron (Fe)-Total (mg/L)	0.083	0.091	0.107	0.080	0.087
	Lead (Pb)-Total (mg/L)	<0.000050	0.0314	0.000127	<0.000050	0.000081
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Total (mg/L)	1.87	2.02	2.04	1.90	2.15

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L971339-6	L971339-7	L971339-8	L971339-9	L971339-10
	Description					
	Sampled Date	12-JAN-11	12-JAN-11	11-JAN-11	11-JAN-11	12-JAN-11
	Sampled Time					
	Client ID	MORRISON D-15M	MORRISON D-DEEP	MORRISON E-SURFACE	MORRISON E-DEEP	MORRISON CREEK
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	62.5	63.1	73.3	71.3	67.5
	Hardness (as CaCO3) (mg/L)	29.1	27.6	30.6	28.2	30.2
	pH (pH)	7.90	7.86	7.86	7.86	7.86
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	<3.0	<3.0
	Total Dissolved Solids (mg/L)	39	52	54	51	45
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	3.5	3.6	3.5	3.5	3.6
	Alkalinity, Total (as CaCO3) (mg/L)	29.7	26.6	29.2	27.9	30.4
	Ammonia as N (mg/L)	0.0100	0.0115	0.0207	0.0127	0.0181
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	<0.50	2.41	2.30	<0.50
	Fluoride (F) (mg/L)	0.026	0.027	0.026	0.028	0.029
	Nitrate (as N) (mg/L)	0.0629	0.0663	0.0629	0.0643	0.0648
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.260	0.244	0.275	0.247	0.280
	Total Nitrogen (mg/L)	0.220	0.210	0.230	0.230	0.230
	Total Phosphate as P (mg/L)	0.0054	0.0062	0.0052	0.0056	0.0061
	Sulfate (SO4) (mg/L)	2.40	2.40	2.73	2.68	2.48
Cyanides	Cyanide, Weak Acid Diss (mg/L)					
	Cyanide, Total (mg/L)					
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	10.0	9.98	10.1	10.5	10.2
Total Metals	Aluminum (Al)-Total (mg/L)	0.0278	0.0372	0.0275	0.0281	0.0454
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000066
	Arsenic (As)-Total (mg/L)	0.000294	0.000288	0.000281	0.000285	0.000482
	Barium (Ba)-Total (mg/L)	0.0162	0.0163	0.0165	0.0160	0.0189
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.0100	0.0091	0.0102	0.0096	0.0095
	Cadmium (Cd)-Total (mg/L)	0.0000074	0.0000214	0.0000103	<0.0000050	0.0000142
	Calcium (Ca)-Total (mg/L)	8.56	8.07	8.46	7.69	8.44
	Chromium (Cr)-Total (mg/L)	0.00042	0.00027	0.00022	0.00020	0.00040
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00319	0.00219	0.0112	0.0426	0.00225
	Iron (Fe)-Total (mg/L)	0.087	0.099	0.091	0.095	0.246
	Lead (Pb)-Total (mg/L)	0.000185	0.000152	0.000174	<0.000050	0.000463
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Total (mg/L)	1.97	1.92	2.12	1.98	2.02

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L971339-1	L971339-2	L971339-3	L971339-4	L971339-5
	Description					
	Sampled Date	12-JAN-11	12-JAN-11	11-JAN-11	11-JAN-11	12-JAN-11
	Sampled Time					
	Client ID	MORRISON B-SURFACE	MORRISON B-DEEP	MORRISON C-SURFACE	MORRISON C-DEEP	MORRISON D-SURFACE
Grouping	**Analyte**					
WATER						
Total Metals	Manganese (Mn)-Total (mg/L)	0.00227	0.00168	0.00304	0.00220	0.00151
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000031	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000109	0.000127	0.000134	0.000116	0.000131
	Nickel (Ni)-Total (mg/L)	0.00045	0.00060	0.00054	0.00046	0.00056
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	0.321	0.343	0.338	0.319	0.371
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	2.43	2.56	2.44	2.41	2.67
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.84	1.97	1.99	1.87	2.07
	Strontium (Sr)-Total (mg/L)	0.0456	0.0491	0.0492	0.0467	0.0506
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Total (mg/L)	0.00099	0.00189	0.00048	0.00111	0.00017
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	0.000077	0.000084	0.000085	0.000087	0.000078
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	0.0038	<0.0030	0.0038
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0284	0.0288	0.0318	0.0284	0.0297
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Arsenic (As)-Dissolved (mg/L)	0.000312	0.000291	0.000280	0.000319	0.000315
	Barium (Ba)-Dissolved (mg/L)	0.0166	0.0170	0.0179	0.0166	0.0179
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.0061	0.0057	0.0059	0.0058	0.0059
	Cadmium (Cd)-Dissolved (mg/L)	0.0000114	0.0000064	0.0000267	0.0000094	0.0000114
	Calcium (Ca)-Dissolved (mg/L)	8.80	9.24	9.74	8.73	9.23
	Chromium (Cr)-Dissolved (mg/L)	0.00014	0.00017	0.00051	0.00025	0.00015
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00137	0.00134	0.00577	0.0473	0.0107
	Iron (Fe)-Dissolved (mg/L)	0.086	0.086	0.110	0.084	0.087
	Lead (Pb)-Dissolved (mg/L)	0.000195	0.000072	0.000125	0.000110	0.000063
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	1.94	2.01	2.10	2.00	2.10
	Manganese (Mn)-Dissolved (mg/L)	0.00238	0.00140	0.00320	0.00240	0.00143
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	0.000030	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000118	0.000113	0.000113	0.000104	0.000115
	Nickel (Ni)-Dissolved (mg/L)	0.00051	0.00056	0.00058	0.00049	0.00053

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L971339-6	L971339-7	L971339-8	L971339-9	L971339-10
Description					
Sampled Date	12-JAN-11	12-JAN-11	11-JAN-11	11-JAN-11	12-JAN-11
Sampled Time					
Client ID	MORRISON D-15M	MORRISON D-DEEP	MORRISON E-SURFACE	MORRISON E-DEEP	MORRISON CREEK
Grouping / **Analyte**					
WATER					
Total Metals Manganese (Mn)-Total (mg/L)	0.00212	0.00286	0.00180	0.00273	0.00975
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.000120	0.000119	0.000120	0.000117	0.000104
Nickel (Ni)-Total (mg/L)	0.00049	0.00061	0.00048	0.00046	0.00063
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total (mg/L)	0.317	0.316	0.377	0.332	0.327
Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Total (mg/L)	2.46	2.50	2.51	2.47	2.51
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.87	1.89	3.11	2.35	1.95
Strontium (Sr)-Total (mg/L)	0.0499	0.0468	0.0470	0.0462	0.0490
Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Tin (Sn)-Total (mg/L)	0.00032	0.00254	0.00511	0.00212	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000011
Vanadium (V)-Total (mg/L)	0.000077	0.000091	0.000091	0.000083	0.000138
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0294	0.0305	0.0278	0.0265	0.0364
Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Arsenic (As)-Dissolved (mg/L)	0.000285	0.000281	0.000289	0.000288	0.000400
Barium (Ba)-Dissolved (mg/L)	0.0161	0.0160	0.0168	0.0163	0.0189
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)	0.0053	0.0062	0.0062	0.0054	0.0057
Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	0.0000194	0.0000123	0.0000063	0.0000093
Calcium (Ca)-Dissolved (mg/L)	8.43	7.89	8.58	8.00	8.68
Chromium (Cr)-Dissolved (mg/L)	0.00020	0.00016	0.00012	0.00012	0.00020
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00311	0.00182	0.0109	0.0418	0.00120
Iron (Fe)-Dissolved (mg/L)	0.083	0.092	0.090	0.096	0.201
Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000108	0.000081	<0.000050	0.000167
Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved (mg/L)	1.96	1.91	2.23	2.00	2.07
Manganese (Mn)-Dissolved (mg/L)	0.00213	0.00263	0.00191	0.00282	0.00711
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	0.000012	<0.000010
Molybdenum (Mo)-Dissolved (mg/L)	0.000110	0.000107	0.000112	0.000102	0.000101
Nickel (Ni)-Dissolved (mg/L)	0.00048	0.00048	0.00050	0.00044	0.00056

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L971339-1	L971339-2	L971339-3	L971339-4	L971339-5
	Description					
	Sampled Date	12-JAN-11	12-JAN-11	11-JAN-11	11-JAN-11	12-JAN-11
	Sampled Time					
	Client ID	MORRISON B-SURFACE	MORRISON B-DEEP	MORRISON C-SURFACE	MORRISON C-DEEP	MORRISON D-SURFACE
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.325	0.341	0.340	0.329	0.358
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	2.44	2.59	2.51	2.47	2.70
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.89	1.96	2.02	1.94	2.03
	Strontium (Sr)-Dissolved (mg/L)	0.0487	0.0497	0.0493	0.0473	0.0510
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	0.00346	0.00176	0.00026	0.00213	0.00043
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Dissolved (mg/L)	0.000070	0.000101	0.000093	0.000068	0.000088
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L971339-6	L971339-7	L971339-8	L971339-9	L971339-10
Description					
Sampled Date	12-JAN-11	12-JAN-11	11-JAN-11	11-JAN-11	12-JAN-11
Sampled Time					
Client ID	MORRISON D-15M	MORRISON D-DEEP	MORRISON E-SURFACE	MORRISON E-DEEP	MORRISON CREEK
Grouping / **Analyte**					
WATER					
Dissolved Metals Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Dissolved (mg/L)	0.327	0.314	0.405	0.335	0.327
Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Dissolved (mg/L)	2.47	2.49	2.53	2.49	2.54
Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Dissolved (mg/L)	1.87	1.82	3.55	2.30	1.96
Strontium (Sr)-Dissolved (mg/L)	0.0464	0.0452	0.0492	0.0456	0.0501
Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Tin (Sn)-Dissolved (mg/L)	0.00029	0.00215	0.00342	0.00173	<0.00010
Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Vanadium (V)-Dissolved (mg/L)	0.000078	0.000096	0.000098	0.000098	0.000123
Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			

Reference Information

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA	Water	Diss. Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA	Water	Total Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOT-COMBUST-VA	Water	Total Nitrogen by Combustion	ASTM D5176-91, EN12260 (EU STD Method)

This analysis is carried out, on hydrochloric acid preserved samples, using procedures modified from ASTM Method D 5176-91 "Standard Test Method for Total Chemically Bound Nitrogen in Water by Pyrolysis and Chemiluminescence detection." Total Nitrogen is determined directly by pyrolysis with chemiluminescence detection using automated instrumentation.

NH3-F-VA	Water	Ammonia by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH

Reference Information

electrode

It is recommended that this analysis be conducted in the field.

PO4-T-COL-VA	Water	Total Phosphate P by Color	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-SIE-VA	Water	Total Kjeldahl Nitrogen by SIE	APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-055788

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laboratory
ANALYTICAL CHEMISTRY & TESTING

Environmental Divisio

Short Holding Time

Rush Processing

L971339-COFC

10-055788

Page 1 of 1

Report To:	Don Betton
Company:	Pacific Booker Minerals
Contact:	Don Betton
Address:	1166 Alberni St, Suite 1702 Vancouver
Phone:	604.681.8556 Fax: 604.687.5995
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)
	Copy of Invoice with Report? (circle) Yes or No
Company:	
Contact:	
Address:	
Phone:	Fax:
Lab Work Order # (lab use only)	L971339

Report Format / Distribution

Standard: X Other (specify):

Select: PDF X Excel X Digital Fax

Email 1: bythebridge@gmail.com

Email 2: blaidlaw@klohn.com

Client / Project Information

Job #:

PO / AFE:

LSD:

Quote #:

ALS Contact: Anglais

Sampler: B

Service Requested: (Rush subject to availability)

- ✓ Regular (Standard Turnaround Times))
- Priority, Date Req'd: _____ (Surcharges apply)
- Emergency (1 Business Day) - 100% Surcharge
- For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General	TOC (F)	Nutrients (P)	Total Metals (P)	Dissolved Metals (P)	SAD/WAD Cyanide							Number of Containers
	~~Morrison A - Surface~~			Water													
	~~Morrison A - Deep~~																
	Morrison B - Surface	12-Jan			1	1	1	1	1								5
	Morrison B - Deep	12-Jan			1	1	1	1	1	1							6
	Morrison C - Surface	11-Jan			1	1	1	1	1	1							6
	Morrison C - Deep	11-Jan			1	1	1	1	1								5
	Morrison D - Surface	12-Jan			1	1	1	1	1								5
	Morrison D - 15m	12-Jan			1	1	1	1	1								5
	Morrison D - Deep	12-Jan			1	1	1	1	1								5
	Morrison E - surface	11-Jan			1	1	1	1	1								5
	Morrison E - Deep	11-Jan			1	1	1	1	1								5
	Morrison Creek	12-Jan			1	1	1	1	1								5

Special Instructions / Regulations / Hazardous Details

Dissolved Metals → filter in Lab.

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by: JP	Date: Jan 19/11	Time: 10:00	Temperature: 4 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 19-JAN-11
Report Date: 28-FEB-11 10:56 (MT)
Version: FINAL REV. 3

Certificate of Analysis

Lab Work Order #: L971340
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-055787

Comments: Dissolved Metals analysis were done out of the un-preserved bottle.

Andre Langlais
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L971340-1	L971340-2	L971340-3	L971340-4	L971340-5
	Sample ID	L971340-1	L971340-2	L971340-3	L971340-4	L971340-5
	Description					
	Sampled Date	13-JAN-11	13-JAN-11	14-JAN-11	14-JAN-11	13-JAN-11
	Sampled Time					
	Client ID	MW07-06A	MW07-06B	MW08-03A	MW08-03B	MC5-5
WATER						
Physical Tests	Conductivity (uS/cm)	1010	322	916	499	249
	Hardness (as CaCO3) (mg/L)	43.3	161	18.3	158	128
	pH (pH)	8.13	7.53	8.64	8.08	7.97
	Total Suspended Solids (mg/L)	677	178	3030	1400	<3.0
	Total Dissolved Solids (mg/L)	640	223	574	353	166
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.6	10.0	<1.0	3.7	3.7
	Alkalinity, Total (as CaCO3) (mg/L)	504	156	376	253	117
	Ammonia as N (mg/L)	0.846	0.0742	0.390	0.166	0.0108
	Bromide (Br) (mg/L)	<0.50	<0.050	<0.50	<0.050	<0.050
	Chloride (Cl) (mg/L)	8.1	<0.50	<5.0	0.94	<0.50
	Fluoride (F) (mg/L)	0.88	0.079	1.32	0.246	0.079
	Nitrate (as N) (mg/L)	<0.050	0.0211	<0.050	<0.0050	0.260
	Nitrite (as N) (mg/L)	<0.010	<0.0010	<0.010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	1.33	0.567	0.541	1.36	0.344
	Total Nitrogen (mg/L)	0.960	1.38	0.330	0.99	0.440
	Total Phosphate as P (mg/L)	0.520	3.72	0.185	1.40	0.0120
	Sulfate (SO4) (mg/L)	51.2	20.4	113	28.7	17.1
Cyanides	Cyanide, Weak Acid Diss (mg/L)					
	Cyanide, Total (mg/L)					
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	11.0	11.3	2.24	16.7	9.99
Total Metals	Aluminum (Al)-Total (mg/L)	11.9	11.6	2.84	14.4	0.0379
	Antimony (Sb)-Total (mg/L)	0.000752	0.000351	0.000196	0.00108	0.000073
	Arsenic (As)-Total (mg/L)	0.00369	0.0149	0.00415	0.0141	0.00232
	Barium (Ba)-Total (mg/L)	0.884	0.621	0.205	0.731	0.0372
	Beryllium (Be)-Total (mg/L)	<0.00020	0.00060	<0.00020	0.00085	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.582	0.0291	0.566	0.129	0.0112
	Cadmium (Cd)-Total (mg/L)	0.000848	0.00273	0.0000551	0.00476	0.0000252
	Calcium (Ca)-Total (mg/L)	18.6	59.2	3.23	60.3	34.9
	Chromium (Cr)-Total (mg/L)	0.00845	0.0125	0.00416	0.0348	0.00032
	Cobalt (Co)-Total (mg/L)	0.0128	0.0470	0.00201	0.0311	0.00011
	Copper (Cu)-Total (mg/L)	0.0289	0.456	0.00407	0.0709	0.0109
	Iron (Fe)-Total (mg/L)	26.9	24.6	3.07	24.2	0.141
	Lead (Pb)-Total (mg/L)	0.00577	0.0258	0.000922	0.0315	0.000403
	Lithium (Li)-Total (mg/L)	0.0205	0.0092	0.0066	0.0144	<0.0050
	Magnesium (Mg)-Total (mg/L)	6.28	14.8	3.24	18.2	8.63

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L971340-6	L971340-7	L971340-8		
Description					
Sampled Date	13-JAN-11	13-JAN-11	14-JAN-11		
Sampled Time					
Client ID	MC5-6	MC5-6B	MC5-99		
Grouping / **Analyte**					
WATER					
Physical Tests					
Conductivity (uS/cm)	92.5	91.9	<2.0		
Hardness (as CaCO3) (mg/L)	43.0	43.0	<0.50		
pH (pH)	7.64	7.64	6.05		
Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0		
Total Dissolved Solids (mg/L)	62	54	<10		
Anions and Nutrients					
Acidity (as CaCO3) (mg/L)	3.3	3.4	2.6		
Alkalinity, Total (as CaCO3) (mg/L)	42.1	41.9	<2.0		
Ammonia as N (mg/L)	0.0148	0.0086	<0.0050		
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50		
Fluoride (F) (mg/L)	0.028	0.028	<0.020		
Nitrate (as N) (mg/L)	0.0774	0.0771	<0.0050		
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010		
Total Kjeldahl Nitrogen (mg/L)	0.160	0.136	<0.050		
Total Nitrogen (mg/L)	0.120	0.170	<0.050		
Total Phosphate as P (mg/L)	0.0027	0.0023	<0.0020		
Sulfate (SO4) (mg/L)	5.59	5.58	<0.50		
Cyanides					
Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050			
Cyanide, Total (mg/L)	<0.0050	<0.0050			
Organic / Inorganic Carbon					
Total Organic Carbon (mg/L)	3.54	5.08	<0.50		
Total Metals					
Aluminum (Al)-Total (mg/L)	0.0088	0.0173	<0.0030		
Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
Arsenic (As)-Total (mg/L)	0.000137	0.000147	<0.000030		
Barium (Ba)-Total (mg/L)	0.0135	0.0144	<0.000050		
Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020		
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050		
Boron (B)-Total (mg/L)	0.0090	0.0095	0.0022		
Cadmium (Cd)-Total (mg/L)	0.0000063	0.0000072	<0.0000050		
Calcium (Ca)-Total (mg/L)	13.2	13.6	<0.020		
Chromium (Cr)-Total (mg/L)	0.00014	0.00015	<0.00010		
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
Copper (Cu)-Total (mg/L)	0.00161	<0.00050	<0.00050		
Iron (Fe)-Total (mg/L)	<0.010	0.012	<0.010		
Lead (Pb)-Total (mg/L)	0.000156	<0.000050	0.000067		
Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050		
Magnesium (Mg)-Total (mg/L)	1.82	1.93	<0.0050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L971340-1	L971340-2	L971340-3	L971340-4	L971340-5
	Description					
	Sampled Date	13-JAN-11	13-JAN-11	14-JAN-11	14-JAN-11	13-JAN-11
	Sampled Time					
	Client ID	MW07-06A	MW07-06B	MW08-03A	MW08-03B	MC5-5
Grouping	**Analyte**					
WATER						
Total Metals	Manganese (Mn)-Total (mg/L)	0.745	14.0	0.0630	2.02	0.0364
	Mercury (Hg)-Total (mg/L)	0.000012	0.000603	<0.000010	0.000105	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.00396	0.000378	0.0286	0.00221	0.000439
	Nickel (Ni)-Total (mg/L)	0.0132	0.0715	0.00626	0.0779	0.00098
	Phosphorus (P)-Total (mg/L)	0.43	0.90	<0.30	0.75	<0.30
	Potassium (K)-Total (mg/L)	5.90	1.59	2.22	3.36	0.915
	Selenium (Se)-Total (mg/L)	<0.00010	0.00017	<0.00010	0.00027	<0.00010
	Silicon (Si)-Total (mg/L)	13.3	16.4	6.56	24.6	3.29
	Silver (Ag)-Total (mg/L)	0.000517	0.00115	0.000107	0.000187	0.000012
	Sodium (Na)-Total (mg/L)	206	3.51	198	53.5	2.83
	Strontium (Sr)-Total (mg/L)	0.531	0.244	0.0692	0.677	0.151
	Thallium (Tl)-Total (mg/L)	0.000270	0.000644	<0.000050	0.00102	<0.000050
	Tin (Sn)-Total (mg/L)	0.00015	<0.00010	0.00010	0.00041	<0.00010
	Titanium (Ti)-Total (mg/L)	0.024	0.072	0.064	0.167	<0.010
	Uranium (U)-Total (mg/L)	0.00165	0.000575	0.000643	0.00827	0.000047
	Vanadium (V)-Total (mg/L)	0.0295	0.0146	0.00746	0.0349	0.000184
	Zinc (Zn)-Total (mg/L)	0.0480	0.174	0.0186	0.130	0.0037
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0652	0.0146	0.0755	0.0168	<0.0030
	Antimony (Sb)-Dissolved (mg/L)	0.000744	0.000120	0.000232	0.00260	<0.000050
	Arsenic (As)-Dissolved (mg/L)	0.00178	0.000722	0.00309	0.00394	0.00191
	Barium (Ba)-Dissolved (mg/L)	0.219	0.0535	0.0250	0.160	0.0363
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.589	0.0153	0.589	0.122	0.0096
	Cadmium (Cd)-Dissolved (mg/L)	0.0000152	0.0000369	0.0000133	0.000393	0.0000083
	Calcium (Ca)-Dissolved (mg/L)	13.9	47.1	2.90	44.7	36.5
	Chromium (Cr)-Dissolved (mg/L)	0.00015	0.00021	0.00028	0.00025	0.00012
	Cobalt (Co)-Dissolved (mg/L)	0.00114	<0.00010	0.00024	0.00202	<0.00010
	Copper (Cu)-Dissolved (mg/L)	<0.00050	0.00772	0.00051	0.00168	0.00726
	Iron (Fe)-Dissolved (mg/L)	0.021	0.026	0.041	0.014	0.015
	Lead (Pb)-Dissolved (mg/L)	0.000091	<0.000050	<0.000050	0.000055	<0.000050
	Lithium (Li)-Dissolved (mg/L)	0.0122	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	2.09	10.5	2.68	11.3	8.94
	Manganese (Mn)-Dissolved (mg/L)	0.282	0.0130	0.0137	0.893	0.000519
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00990	0.000504	0.0369	0.0172	0.000555
	Nickel (Ni)-Dissolved (mg/L)	0.00284	0.00280	0.00107	0.0138	0.00066

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L971340-6	L971340-7	L971340-8		
	Sample ID	L971340-6	L971340-7	L971340-8		
	Description					
	Sampled Date	13-JAN-11	13-JAN-11	14-JAN-11		
	Sampled Time					
	Client ID	MC5-6	MC5-6B	MC5-99		
WATER						
Total Metals	Manganese (Mn)-Total (mg/L)	0.000875	0.00106	<0.000050		
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Total (mg/L)	0.000072	0.000071	<0.000050		
	Nickel (Ni)-Total (mg/L)	0.00013	0.00011	<0.00010		
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30		
	Potassium (K)-Total (mg/L)	0.172	0.187	<0.050		
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Total (mg/L)	1.97	2.08	<0.050		
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Total (mg/L)	1.48	1.63	<0.010		
	Strontium (Sr)-Total (mg/L)	0.0296	0.0313	<0.00010		
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050		
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010	<0.000010		
	Vanadium (V)-Total (mg/L)	<0.000050	0.000062	<0.000050		
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030		
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0051	0.0050	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Arsenic (As)-Dissolved (mg/L)	0.000139	0.000127	<0.000030		
	Barium (Ba)-Dissolved (mg/L)	0.0147	0.0146	<0.000050		
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Boron (B)-Dissolved (mg/L)	0.0105	0.0091	<0.0010		
	Cadmium (Cd)-Dissolved (mg/L)	<0.0000050	<0.0000050	<0.0000050		
	Calcium (Ca)-Dissolved (mg/L)	14.0	14.0	<0.020		
	Chromium (Cr)-Dissolved (mg/L)	0.00016	0.00012	<0.00010		
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050		
	Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050		
	Magnesium (Mg)-Dissolved (mg/L)	1.95	1.93	<0.0050		
	Manganese (Mn)-Dissolved (mg/L)	0.000182	0.000222	<0.000050		
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.000076	0.000077	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	0.00014	0.00016	<0.00010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L971340-1	L971340-2	L971340-3	L971340-4	L971340-5
	Sample ID	L971340-1	L971340-2	L971340-3	L971340-4	L971340-5
	Description					
	Sampled Date	13-JAN-11	13-JAN-11	14-JAN-11	14-JAN-11	13-JAN-11
	Sampled Time					
	Client ID	MW07-06A	MW07-06B	MW08-03A	MW08-03B	MC5-5
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	5.76	0.663	2.08	1.98	0.946
	Selenium (Se)-Dissolved (mg/L)	<0.00010	0.00014	0.00012	0.00060	<0.00010
	Silicon (Si)-Dissolved (mg/L)	3.01	3.93	2.94	4.11	3.36
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	225	3.36	204	53.3	2.93
	Strontium (Sr)-Dissolved (mg/L)	0.398	0.196	0.0637	0.573	0.158
	Thallium (Tl)-Dissolved (mg/L)	0.000131	0.000058	<0.000050	0.000300	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00012	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	0.011	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00158	0.000149	0.000520	0.00541	0.000047
	Vanadium (V)-Dissolved (mg/L)	0.000756	0.000135	0.00108	0.00190	0.000095
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	0.0062	<0.0030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L971340-6	L971340-7	L971340-8		
	Description					
	Sampled Date	13-JAN-11	13-JAN-11	14-JAN-11		
	Sampled Time					
	Client ID	MC5-6	MC5-6B	MC5-99		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30		
	Potassium (K)-Dissolved (mg/L)	0.183	0.183	<0.050		
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	2.10	2.08	<0.050		
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	1.62	1.62	<0.010		
	Strontium (Sr)-Dissolved (mg/L)	0.0331	0.0313	<0.00010		
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050		
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010		
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	0.000051	0.000053	<0.000050		
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the			

Reference Information

American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOT-COMBUST-VA Water Total Nitrogen by Combustion ASTM D5176-91, EN12260 (EU STD Method)

This analysis is carried out, on hydrochloric acid preserved samples, using procedures modified from ASTM Method D 5176-91 "Standard Test Method for Total Chemically Bound Nitrogen in Water by Pyrolysis and Chemiluminescence detection." Total Nitrogen is determined directly by pyrolysis with chemiluminescence detection using automated instrumentation.

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-MAN-VA Water pH by Manual Meter APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

Reference Information

It is recommended that this analysis be conducted in the field.

PH-MAN-VA Water pH by Manual Meter APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-T-COL-VA Water Total Phosphate P by Color APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-SIE-VA Water Total Kjeldahl Nitrogen by SIE APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-055787

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Laborato
ANALYTICAL CHEMISTRY & TESTING

Environmental Divisi

Chain of C
Cana

Short Holding Time

Rush Processing

10-055787

Page 1 of 1

Report To		Report Format / Distribution		Service Requested: (Rush subject to availability)
Company:	Pacific Booker Minerals	Standard: X	Other (specify):	Regular (Standard Turnaround Times))
Contact:	Don Batton	Select: PDF X	Excel X Digital Fax	Priority, Date Req'd: (Surcharges apply)
Address:	1166 Alberni St, Ste 1702 Vancouver	Email 1:	bythebridge@gmail.com	Emergency (1 Business Day) - 100% Surcharge
		Email 2:	blaidlaw@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	604.681.8556 Fax: 604.687.5995			
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		Analysis Request
	Copy of Invoice with Report? (circle) Yes or No	Job #:		(Indicate Filtered or Preserved, F/P)
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)	L971340	ALS Contact: Anglais	Sampler: B	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General	TOC	Nutrients	total metal	dissolved metal	WAD/SAD Cyanide							Number of Containers
	MW07-06A	13 Jan		water	1	1	1	1	1								5
	MW07-06B	13 Jan			1	1	1	1	1								5
	MW08-03A	14 Jan			1	1	1	1	1								5
	MW08-03B	14 Jan			1	1	1	1	1								5
	MCS-5	13 Jan			1	1	1	1	1								5
	MCS-6	13 Jan			1	1	1	1	1	1							6
	MCS-6B	13 Jan			1	1	1	1	1	1							6
	MCS-99	14 Jan			1	1	1	1	1								5

Special Instructions / Regulations / Hazardous Details

Dissolved Metal → filter in Lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
			JP	Jan 19/11	10:00	4 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
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VANCOUVER BC V6E 3Z3
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Date Received: 19-JAN-11
Report Date: 28-FEB-11 10:57 (MT)
Version: FINAL REV. 3

Certificate of Analysis

Lab Work Order #: L971345
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-055786

Comments: The Dissolved metals were analyzed out of the un-preserved bottle.

Andre Langlais
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L971345-1	L971345-2	L971345-3	L971345-4	
	Description					
	Sampled Date	15-JAN-11	15-JAN-11	15-JAN-11	15-JAN-11	
	Sampled Time					
	Client ID	MW07-05A	MW08-02A	MW08-02B	MCS-98	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	888	643	2880	<2.0	
	Hardness (as CaCO3) (mg/L)	479	338	597	<0.50	
	pH (pH)	7.36	7.65	11.98	6.05	
	Total Suspended Solids (mg/L)	52.2	<3.0	24.2	<3.0	
	Total Dissolved Solids (mg/L)	527	412	655	<10	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	24.9	11.0	<1.0	1.0	
	Alkalinity, Total (as CaCO3) (mg/L)	422	249	662	<2.0	
	Ammonia as N (mg/L)	0.0313	0.0368	0.222	<0.0050	
	Bromide (Br) (mg/L)	<0.50	<0.050	<1.0	<0.050	
	Chloride (Cl) (mg/L)	<5.0	<0.50	<10	<0.50	
	Fluoride (F) (mg/L)	<0.20	0.184	<0.40	<0.020	
	Nitrate (as N) (mg/L)	<0.050	<0.0050	<0.10	<0.0050	
	Nitrite (as N) (mg/L)	<0.010	<0.0010	<0.020	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	0.080	0.055	0.263	<0.050	
	Total Nitrogen (mg/L)	<0.050	<0.050	0.180	<0.050	
	Total Phosphate as P (mg/L)	0.0402	0.0062	0.0365	<0.0020	
	Sulfate (SO4) (mg/L)	125	124	<10	<0.50	
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	2.09	1.80	2.54	<0.50	
Total Metals	Aluminum (Al)-Total (mg/L)	0.744	<0.0030	0.774	<0.0030	
	Antimony (Sb)-Total (mg/L)	0.000317	0.000069	0.00137	<0.000050	
	Arsenic (As)-Total (mg/L)	0.0220	0.0158	0.00180	<0.000030	
	Barium (Ba)-Total (mg/L)	0.0595	0.0277	0.743	<0.000050	
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	0.0197	0.0179	0.0093	0.0018	
	Cadmium (Cd)-Total (mg/L)	0.000119	<0.0000050	0.0000296	<0.0000050	
	Calcium (Ca)-Total (mg/L)	95.6	74.6	222	<0.020	
	Chromium (Cr)-Total (mg/L)	0.00074	0.00013	0.0173	<0.00010	
	Cobalt (Co)-Total (mg/L)	0.00321	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Total (mg/L)	0.00221	<0.00050	0.00206	<0.00050	
	Iron (Fe)-Total (mg/L)	2.01	1.13	0.087	<0.010	
	Lead (Pb)-Total (mg/L)	0.00109	0.000074	0.000239	<0.000050	
	Lithium (Li)-Total (mg/L)	0.0105	0.0088	0.0211	<0.0050	
	Magnesium (Mg)-Total (mg/L)	51.2	34.3	3.13	<0.0050	
	Manganese (Mn)-Total (mg/L)	0.528	0.0937	0.0110	<0.000050	
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L971345-1	L971345-2	L971345-3	L971345-4	
	Description					
	Sampled Date	15-JAN-11	15-JAN-11	15-JAN-11	15-JAN-11	
	Sampled Time					
	Client ID	MW07-05A	MW08-02A	MW08-02B	MCS-98	
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.000491	0.00470	0.0100	<0.000050	
	Nickel (Ni)-Total (mg/L)	0.00843	<0.00010	0.00032	<0.00010	
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Total (mg/L)	2.99	1.91	7.20	<0.050	
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	0.00019	<0.00010	
	Silicon (Si)-Total (mg/L)	7.20	5.93	1.33	<0.050	
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Total (mg/L)	8.03	6.19	49.8	<0.010	
	Strontium (Sr)-Total (mg/L)	0.404	0.704	1.24	<0.00010	
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Tin (Sn)-Total (mg/L)	0.00015	<0.00010	0.00025	<0.00010	
	Titanium (Ti)-Total (mg/L)	0.024	<0.010	0.016	<0.010	
	Uranium (U)-Total (mg/L)	0.00198	0.000228	0.000103	<0.000010	
	Vanadium (V)-Total (mg/L)	0.000674	0.000055	0.000356	<0.000050	
	Zinc (Zn)-Total (mg/L)	0.0262	<0.0030	0.0066	<0.0030	
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	1.75	<0.0030	0.820	<0.0030	
	Antimony (Sb)-Dissolved (mg/L)	0.000068	0.000054	0.00140	<0.000050	
	Arsenic (As)-Dissolved (mg/L)	0.0221	0.0165	0.00196	<0.000030	
	Barium (Ba)-Dissolved (mg/L)	0.0624	0.0283	0.761	<0.000050	
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
	Boron (B)-Dissolved (mg/L)	0.0158	0.0134	0.0049	0.0016	
	Cadmium (Cd)-Dissolved (mg/L)	0.0000696	<0.0000050	0.000005	<0.0000050	
	Calcium (Ca)-Dissolved (mg/L)	102	77.5	234	<0.020	
	Chromium (Cr)-Dissolved (mg/L)	0.00047	<0.00010	0.0177	<0.00010	
	Cobalt (Co)-Dissolved (mg/L)	0.00273	<0.00010	<0.00010	<0.00010	
	Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.00050	0.00208	<0.00050	
	Iron (Fe)-Dissolved (mg/L)	2.27	1.15	0.103	<0.010	
	Lead (Pb)-Dissolved (mg/L)	0.000897	0.000068	0.000244	<0.000050	
	Lithium (Li)-Dissolved (mg/L)	0.0105	0.0086	0.0217	<0.0050	
	Magnesium (Mg)-Dissolved (mg/L)	54.5	35.0	3.24	<0.0050	
	Manganese (Mn)-Dissolved (mg/L)	0.549	0.0958	0.00436	<0.000050	
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Molybdenum (Mo)-Dissolved (mg/L)	0.000354	0.00474	0.00994	<0.000050	
	Nickel (Ni)-Dissolved (mg/L)	0.00783	<0.00010	0.00041	<0.00010	
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)	3.19	1.96	7.72	<0.050	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L971345-1	L971345-2	L971345-3	L971345-4	
	Description					
	Sampled Date	15-JAN-11	15-JAN-11	15-JAN-11	15-JAN-11	
	Sampled Time					
	Client ID	MW07-05A	MW08-02A	MW08-02B	MCS-98	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	0.00018	<0.00010	
	Silicon (Si)-Dissolved (mg/L)	9.02	6.08	1.33	<0.050	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	8.66	6.39	51.8	<0.010	
	Strontium (Sr)-Dissolved (mg/L)	0.436	0.731	1.25	<0.00010	
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	0.00025	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	0.037	<0.010	0.017	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00207	0.000225	0.000104	<0.000010	
	Vanadium (V)-Dissolved (mg/L)	0.000701	0.000061	0.000369	<0.000050	
	Zinc (Zn)-Dissolved (mg/L)	0.0239	<0.0030	0.0087	<0.0030	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			

Reference Information

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOT-COMBUST-VA Water Total Nitrogen by Combustion ASTM D5176-91, EN12260 (EU STD Method)

This analysis is carried out, on hydrochloric acid preserved samples, using procedures modified from ASTM Method D 5176-91 "Standard Test Method for Total Chemically Bound Nitrogen in Water by Pyrolysis and Chemiluminescence detection." Total Nitrogen is determined directly by pyrolysis with chemiluminescence detection using automated instrumentation.

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-MAN-VA Water pH by Manual Meter APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

It is recommended that this analysis be conducted in the field.

PH-MAN-VA Water pH by Manual Meter APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH

Reference Information

electrode.

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-T-COL-VA Water Total Phosphate P by Color APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-SIE-VA Water Total Kjeldahl Nitrogen by SIE APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-055786

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS La
ANALYTICAL CHE
Environm

Short Holding Time

Rush Processing

L971345-COFC

t Form
3

10-055786

Page 1 of 1

Report To		Report Format / Distribution		Service Requested: (Rush subject to availability)
Company:	Pacific Booker Minerals	Standard: X	Other (specify):	Regular (Standard Turnaround Times))
Contact:	Don Betton	Select: PDF X	Excel X Digital ___ Fax ___	Priority, Date Req'd: ___ (Surcharges apply)
Address:	~~#7~~ 1166 Alberni St, ste 1702 Vancouver	Email 1:	bythebridge@gmail.com	Emergency (1 Business Day) - 100% Surcharge
		Email 2:	blaidlaw@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	604.681.8556 Fax: 604.687.5995			

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L971345	ALS Contact: Anglais	Sampler: B

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General	TOC	Nutrients	total metal	dissolved metal								Number of Containers
						P	P	P	P								
	MW07-05 A	15 Jan		Water	1	1	1	1	1								5
	MW08-02A	15 Jan		↓	1	1	1	1	1								5
	MW08-02B	15 Jan		↓	1	1	1	1	1								5
	MCS-98	15 Jan		↓	1	1	1	1	1								5

Special Instructions / Regulations / Hazardous Details

Dissolved Metal → filter in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by: JP	Date: Jan 19/11	Time: 10:00	Temperature: 4 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 28-JAN-11
Report Date: 21-FEB-11 11:11 (MT)
Version: FINAL REV. 2

Certificate of Analysis

Lab Work Order #: L973962
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-055814

Andre Langlais
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L973962-1	L973962-2	L973962-3	L973962-4	L973962-5
Sample ID		L973962-1	L973962-2	L973962-3	L973962-4	L973962-5
Description						
Sampled Date		20-JAN-11	21-JAN-11	20-JAN-11	20-JAN-11	20-JAN-11
Sampled Time						
Client ID		NAK 1 - SURFACE	NAK 1 - MID	NAK 1 - DEEP	NAK 2 - SHALLOW	HAUTETE OUT
WATER						
Physical Tests	Conductivity (uS/cm)	73.3	73.1	74.8	68.8	73.3
	Hardness (as CaCO3) (mg/L)	35.5	34.8	35.6	34.1	30.4
	pH (pH)	7.53	7.53	7.51	7.59	7.60
	Total Suspended Solids (mg/L)	<3.0	<3.0	28.5	<3.0	5.5
	Total Dissolved Solids (mg/L)	46	41	48	46	44
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.6	1.8	2.1	1.6	1.9
	Alkalinity, Total (as CaCO3) (mg/L)	33.8	33.7	34.1	32.5	35.1
	Ammonia as N (mg/L)	0.0090	0.0077	0.0068	0.0113	0.0142
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	0.62	1.00	<0.50	<0.50
	Fluoride (F) (mg/L)	0.029	0.030	0.031	0.030	0.031
	Nitrate (as N) (mg/L)	0.0055	0.0055	0.0112	0.0123	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.277 AIN	0.245 AIN	0.335 AIN	0.289 AIN	0.432 AIN
	Total Nitrogen (mg/L)	0.170	0.270	0.180	0.160	0.220
	Total Phosphate as P (mg/L)	0.0052	0.0044	0.0305	0.0051	0.0117
	Sulfate (SO4) (mg/L)	3.21	3.24	3.39	3.11	3.28
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	7.40	7.22	7.17	7.47	7.76
Total Metals	Aluminum (Al)-Total (mg/L)	0.0066	0.0102	0.143	0.0054	0.0932
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000083
	Arsenic (As)-Total (mg/L)	0.000167	0.000199	0.000287	0.000184	0.000239
	Barium (Ba)-Total (mg/L)	0.0128	0.0130	0.0165	0.0125	0.0148
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)		<0.0080 DLB	<0.0080 DLB	<0.0080 DLB	0.0128
	Cadmium (Cd)-Total (mg/L)	0.000096	0.000080	0.000038	0.000045	.0000161
	Calcium (Ca)-Total (mg/L)	10.8	10.2	12.1	11.0	12.1
	Chromium (Cr)-Total (mg/L)		<0.00020 DLB	<0.00040 DLB	<0.00030 DLB	0.00040
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00241	0.00063	0.00118	0.00177	0.00104
	Iron (Fe)-Total (mg/L)	0.032	0.027	0.386	0.012	0.181
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000077	<0.000050	0.000337
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Total (mg/L)	1.94	1.94	2.01	1.88	2.08
	Manganese (Mn)-Total (mg/L)	0.00138	0.00147	0.0182	0.000924	0.0197
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973962-6	L973962-7			
	Description					
	Sampled Date	23-JAN-11	23-JAN-11			
	Sampled Time					
	Client ID	MW07-01A	MW07-01B			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	843	945			
	Hardness (as CaCO3) (mg/L)	168	295			
	pH (pH)	8.25	8.03			
	Total Suspended Solids (mg/L)	<3.0	204			
	Total Dissolved Solids (mg/L)	511	549			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.1	14.3			
	Alkalinity, Total (as CaCO3) (mg/L)	320	569			
	Ammonia as N (mg/L)					
	Bromide (Br) (mg/L)	<0.25	<0.25			
	Chloride (Cl) (mg/L)	<2.5	<2.5			
	Fluoride (F) (mg/L)	1.01	0.24			
	Nitrate (as N) (mg/L)	<0.025	<0.025			
	Nitrite (as N) (mg/L)	<0.0050	<0.0050			
	Total Kjeldahl Nitrogen (mg/L)					
	Total Nitrogen (mg/L)					
	Total Phosphate as P (mg/L)	0.0025	0.212			
	Sulfate (SO4) (mg/L)	145	<2.5			
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)					
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0060 DLA	3.51			
	Antimony (Sb)-Total (mg/L)	<0.00010 DLA	0.00073			
	Arsenic (As)-Total (mg/L)	0.000165	0.0215			
	Barium (Ba)-Total (mg/L)	0.0142	0.387			
	Beryllium (Be)-Total (mg/L)	<0.00040 DLA	<0.00040 DLA			
	Bismuth (Bi)-Total (mg/L)	<0.0010 DLA	<0.0010 DLA			
	Boron (B)-Total (mg/L)	0.0934	0.104			
	Cadmium (Cd)-Total (mg/L)	<0.000010 DLA	0.000426			
	Calcium (Ca)-Total (mg/L)	33.7	76.5			
	Chromium (Cr)-Total (mg/L)	<0.00020 DLA	0.00831			
	Cobalt (Co)-Total (mg/L)	<0.00020 DLA	0.0126			
	Copper (Cu)-Total (mg/L)	<0.0010 DLA	0.0095			
	Iron (Fe)-Total (mg/L)	0.144	22.5			
	Lead (Pb)-Total (mg/L)	<0.00010 DLA	0.00303			
	Lithium (Li)-Total (mg/L)	0.116	<0.010 DLA			
	Magnesium (Mg)-Total (mg/L)	21.5	23.5			
	Manganese (Mn)-Total (mg/L)	0.00485	2.69			
	Mercury (Hg)-Total (mg/L)	<0.000010	0.000054			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L973962-1	L973962-2	L973962-3	L973962-4	L973962-5
Sample ID		L973962-1	L973962-2	L973962-3	L973962-4	L973962-5
Description						
Sampled Date		20-JAN-11	21-JAN-11	20-JAN-11	20-JAN-11	20-JAN-11
Sampled Time						
Client ID		NAK 1 - SURFACE	NAK 1 - MID	NAK 1 - DEEP	NAK 2 - SHALLOW	HAUTETE OUT
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.000109	0.000105	0.000093	0.000081	0.000116
	Nickel (Ni)-Total (mg/L)	0.00031	0.00033	0.00045	0.00023	0.00042
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	0.318	0.327	0.350	0.317	0.407
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	2.38	2.32	2.60	2.38	2.29
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	2.17	2.07	2.42	2.05	2.49
	Strontium (Sr)-Total (mg/L)	0.0501	0.0483	0.0482	0.0475	0.0530
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010	0.000011	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	0.000090	0.000062	0.000385	0.000065	0.000279
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0046	0.0054	0.0470	0.0039	0.0255
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	0.000063
	Arsenic (As)-Dissolved (mg/L)	0.000201	0.000174	0.000227	0.000172	0.000199
	Barium (Ba)-Dissolved (mg/L)	0.0126	0.0129	0.0148	0.0122	0.0138
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.0059	0.0050	0.0037	0.0037	0.0048
	Cadmium (Cd)-Dissolved (mg/L)	0.000101	0.000084	0.000021	0.000044	0.000023
	Calcium (Ca)-Dissolved (mg/L)	11.0	10.8	11.1	10.6	9.16
	Chromium (Cr)-Dissolved (mg/L)	0.00012	0.00010	<0.00010	<0.00010	0.00015
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00288	0.00145	0.00215	0.00209	0.00100
	Iron (Fe)-Dissolved (mg/L)	0.027	0.025	0.157	<0.010	0.106
	Lead (Pb)-Dissolved (mg/L)	<0.000050	0.000078	0.000130	<0.000050	0.000097
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	1.93	1.91	1.90	1.85	1.83
	Manganese (Mn)-Dissolved (mg/L)	0.00133	0.00137	0.0127	0.000874	0.0160
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000088	0.000086	0.000073	0.000077	0.000098
	Nickel (Ni)-Dissolved (mg/L)	0.00037	0.00026	0.00030	0.00026	0.00035
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.323	0.312	0.315	0.312	0.339

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973962-6	L973962-7			
	Description					
	Sampled Date	23-JAN-11	23-JAN-11			
	Sampled Time					
	Client ID	MW07-01A	MW07-01B			
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.00136	0.00930			
	Nickel (Ni)-Total (mg/L)	<0.00020 DLA	0.0216			
	Phosphorus (P)-Total (mg/L)	<0.30	0.52			
	Potassium (K)-Total (mg/L)	1.65	3.38			
	Selenium (Se)-Total (mg/L)	<0.00020 DLA	<0.00020 DLA			
	Silicon (Si)-Total (mg/L)	4.60	12.7			
	Silver (Ag)-Total (mg/L)	<0.000020 DLA	0.000052			
	Sodium (Na)-Total (mg/L)	142	114			
	Strontium (Sr)-Total (mg/L)	0.706	0.857			
	Thallium (Tl)-Total (mg/L)	<0.00010 DLA	0.00016			
	Tin (Sn)-Total (mg/L)	<0.00020 DLA	0.00056			
	Titanium (Ti)-Total (mg/L)	<0.010	0.114			
	Uranium (U)-Total (mg/L)	0.000026	0.000615			
	Vanadium (V)-Total (mg/L)	<0.00010 DLA	0.0111			
	Zinc (Zn)-Total (mg/L)	<0.0060 DLA	0.0332			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.0060 DLA	1.95			
	Antimony (Sb)-Dissolved (mg/L)	<0.00010 DLA	0.00013			
	Arsenic (As)-Dissolved (mg/L)	0.000160	0.0135			
	Barium (Ba)-Dissolved (mg/L)	0.0137	0.404			
	Beryllium (Be)-Dissolved (mg/L)	<0.00040 DLA	<0.00040 DLA			
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 DLA	<0.0010 DLA			
	Boron (B)-Dissolved (mg/L)	0.0826	0.0973			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010 DLA	0.000334			
	Calcium (Ca)-Dissolved (mg/L)	32.8	79.0			
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 DLA	0.00629			
	Cobalt (Co)-Dissolved (mg/L)	<0.00020 DLA	0.0148			
	Copper (Cu)-Dissolved (mg/L)	<0.0010 DLA	<0.0010 DLA			
	Iron (Fe)-Dissolved (mg/L)	0.137	28.1			
	Lead (Pb)-Dissolved (mg/L)	<0.00010 DLA	0.00277			
	Lithium (Li)-Dissolved (mg/L)	0.112	<0.010 DLA			
	Magnesium (Mg)-Dissolved (mg/L)	21.0	23.8			
	Manganese (Mn)-Dissolved (mg/L)	0.00470	2.78			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	0.000049			
	Molybdenum (Mo)-Dissolved (mg/L)	0.00123	0.00185			
	Nickel (Ni)-Dissolved (mg/L)	<0.00020 DLA	0.0220			
	Phosphorus (P)-Dissolved (mg/L)	<0.30	0.48			
	Potassium (K)-Dissolved (mg/L)	1.62	3.05			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L973962-1	L973962-2	L973962-3	L973962-4	L973962-5
	Sample ID	L973962-1	L973962-2	L973962-3	L973962-4	L973962-5
	Description					
	Sampled Date	20-JAN-11	21-JAN-11	20-JAN-11	20-JAN-11	20-JAN-11
	Sampled Time					
	Client ID	NAK 1 - SURFACE	NAK 1 - MID	NAK 1 - DEEP	NAK 2 - SHALLOW	HAUTETE OUT
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	2.35	2.34	2.24	2.39	2.14
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	2.21	1.94	2.11	2.10	1.82
	Strontium (Sr)-Dissolved (mg/L)	0.0465	0.0452	0.0446	0.0443	0.0527
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Dissolved (mg/L)	0.000069	0.000069	0.000201	<0.000050	0.000163
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973962-6	L973962-7			
	Description					
	Sampled Date	23-JAN-11	23-JAN-11			
	Sampled Time					
	Client ID	MW07-01A	MW07-01B			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.00020 DLA	0.00055			
	Silicon (Si)-Dissolved (mg/L)	4.55	8.97			
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	<0.000020 DLA			
	Sodium (Na)-Dissolved (mg/L)	139	116			
	Strontium (Sr)-Dissolved (mg/L)	0.657	0.871			
	Thallium (Tl)-Dissolved (mg/L)	<0.00010 DLA	0.00013			
	Tin (Sn)-Dissolved (mg/L)	<0.00020 DLA	0.00038			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	0.020			
	Uranium (U)-Dissolved (mg/L)	0.000024	0.000771			
	Vanadium (V)-Dissolved (mg/L)	<0.00010 DLA	0.00938			
	Zinc (Zn)-Dissolved (mg/L)	<0.0060 DLA	0.0483			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
AIN	Approximate Result: Interference Suspected
DLA	Detection Limit Adjusted For required dilution
DLB	Detection limit was raised due to detection of analyte at comparable level in Method Blank.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Reference Information

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOT-COMBUST-VA Water Total Nitrogen by Combustion ASTM D5176-91, EN12260 (EU STD Method)

This analysis is carried out, on hydrochloric acid preserved samples, using procedures modified from ASTM Method D 5176-91 "Standard Test Method for Total Chemically Bound Nitrogen in Water by Pyrolysis and Chemiluminescence detection." Total Nitrogen is determined directly by pyrolysis with chemiluminescence detection using automated instrumentation.

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

Reference Information

It is recommended that this analysis be conducted in the field.

PO4-T-COL-VA Water Total Phosphate P by Color APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-SIE-VA Water Total Kjeldahl Nitrogen by SIE APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-055814

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Short Holding Time

Rush Processing

est Form
878

10-055814

Page ___ of ___

Re.	
Company:	Pacific Booker Minerals
Contact:	Don Bellon
Address:	1166 Alberni St, Ste 1702 Vancouver
Phone:	604.681.8556 Fax: 604.687.5995

Report Format / Distribution

Standard: ✓ Other (specify):

Select: PDF ✓ Excel ✓ Digital Fax

Email 1: bythebridge@gmail.com

Email 2: blaidlaw@klohn.com

Service Requested: (Rush subject to availability)

Regular (Standard Turnaround Times))

Priority, Date Req'd: _____ (Surcharges apply)

Emergency (1 Business Day) - 100% Surcharge

For Emergency < 1 Day, ASAP or Weekend - Contact ALS

Invoice To Same as Report ? (circle) Yes or No (if No, provide details)

Copy of Invoice with Report? (circle) Yes or No

Company:	
Contact:	
Address:	
Phone:	Fax:

Client / Project Information

Job #:

PO / AFE:

LSD:

Quote #:

Lab Work Order # (lab use only): L973962

ALS Contact: Anglais

Sampler: B

Analysis Request

(Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General	TOC (P)	Nutrients (P)	Total metals (P)	Dissolved metals (P)							Number of Containers
	Nak 1 - surface			Water	1	1	1	1	1							5
	Nak 1 - mid				1	1	1	1	1							5
	Nak 1 - deep				1	1	1	1	1							5
	Nak 2 - surface				1	1	1	1	1							5
	Hautete Out				1	1	1	1	1							5
	MW07-01A				1			1	1							3
	MW07-01B				1			1	1							3

Special Instructions / Regulations / Hazardous Details

Dissolved metal: filter in lab. Thx See also COD 10-055784

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
B. Laidlaw	26-Jan	1100	JP	Jan 28/14	9:45	9 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY

YELLOW - CLIENT COPY

GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 28-JAN-11
Report Date: 21-FEB-11 11:09 (MT)
Version: FINAL REV. 2

Certificate of Analysis

Lab Work Order #: L973964
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-055815

Andre Langlais
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L973964-1	L973964-2	L973964-3	L973964-4	L973964-5
	Sample ID	L973964-1	L973964-2	L973964-3	L973964-4	L973964-5
	Description					
	Sampled Date	12-JAN-11	12-JAN-11	22-JAN-11	22-JAN-11	13-JAN-11
	Sampled Time					
	Client ID	MORRISON A - SURFACE	MORRISON A - DEEP	MW08-01A	MW08-01B	MSC-4
WATER						
Physical Tests	Conductivity (uS/cm)	64.2	63.9	706	758	262
	Hardness (as CaCO3) (mg/L)	28.1	27.8	318	188	123
	pH (pH)	7.56	7.59	8.09	8.08	7.97
	Total Suspended Solids (mg/L)	<3.0	<3.0	12.0	12700	<3.0
	Total Dissolved Solids (mg/L)	45	47	434	481	143
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.9	1.9	4.2	6.4	3.2
	Alkalinity, Total (as CaCO3) (mg/L)	30.1	29.1	245	437	124
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	0.51	0.88	1.38	<0.50
	Fluoride (F) (mg/L)	0.026	0.026	0.123	0.113	0.039
	Nitrate (as N) (mg/L)	0.0572	0.0545	0.0880	<0.0050	0.184
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	0.0715	<0.0010	<0.0010
	Total Phosphate as P (mg/L)	0.0049	0.0065	0.0318	0.447	<0.0020
	Sulfate (SO4) (mg/L)	2.46	2.46	154	1.33	18.4
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050			<0.0050
	Cyanide, Total (mg/L)	0.0065	0.0066			<0.0050
Total Metals	Aluminum (Al)-Total (mg/L)	0.0289	0.126	0.297	122	0.0198
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	0.00158	0.00204	<0.000050
	Arsenic (As)-Total (mg/L)	0.000273	0.000705	0.0507	0.192	0.000228
	Barium (Ba)-Total (mg/L)	0.0170	0.0186	0.0213	3.10	0.0637
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	0.0057	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.0050 DLA	<0.00050
	Boron (B)-Total (mg/L)	<0.0090 DLB	<0.0090 DLB	0.0981	0.295	<0.0090 DLA
	Cadmium (Cd)-Total (mg/L)	.0000161	0.000033	0.000133	0.00396	0.000022
	Calcium (Ca)-Total (mg/L)	8.43	8.01	66.3	265	37.0
	Chromium (Cr)-Total (mg/L)	<0.00025 DLB	<0.00040 DLB	0.00089	0.410	<0.00020 DLA
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	0.00039	0.209	<0.00010
	Copper (Cu)-Total (mg/L)	0.00089	0.00248	0.00108	0.279	0.00079
	Iron (Fe)-Total (mg/L)	0.077	0.387	1.11	294	0.076
	Lead (Pb)-Total (mg/L)	<0.000050	0.000067	0.000418	0.0910	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	0.0181	0.095	<0.0050
	Magnesium (Mg)-Total (mg/L)	2.03	2.09	40.5	83.2	7.81
	Manganese (Mn)-Total (mg/L)	0.00108	0.0301	0.0345	15.4	0.0524
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	0.000018	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000143	0.000152	0.00282	0.0516	0.000251
	Nickel (Ni)-Total (mg/L)	0.00040	0.00063	0.00124	0.450	0.00021
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	7.59	<0.30

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973964-6	L973964-7			
	Description					
	Sampled Date	22-JAN-11				
	Sampled Time					
	Client ID	MORRISON D - SURFACE	MORRISON D - DEEP			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)					
	Hardness (as CaCO3) (mg/L)					
	pH (pH)					
	Total Suspended Solids (mg/L)					
	Total Dissolved Solids (mg/L)					
Anions and Nutrients	Acidity (as CaCO3) (mg/L)					
	Alkalinity, Total (as CaCO3) (mg/L)					
	Bromide (Br) (mg/L)					
	Chloride (Cl) (mg/L)					
	Fluoride (F) (mg/L)					
	Nitrate (as N) (mg/L)					
	Nitrite (as N) (mg/L)					
	Total Phosphate as P (mg/L)					
	Sulfate (SO4) (mg/L)					
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	0.0066	0.0071			
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					
	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973964-1	L973964-2	L973964-3	L973964-4	L973964-5
	Description					
	Sampled Date	12-JAN-11	12-JAN-11	22-JAN-11	22-JAN-11	13-JAN-11
	Sampled Time					
	Client ID	MORRISON A - SURFACE	MORRISON A - DEEP	MW08-01A	MW08-01B	MSC-4
Grouping	**Analyte**					
WATER						
Total Metals	Potassium (K)-Total (mg/L)	0.340	0.360	4.93	12.5	0.417
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.0020	<0.00010
	Silicon (Si)-Total (mg/L)	2.48	2.59	4.86	99.8	4.55
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	0.000017	0.00092	<0.000010
	Sodium (Na)-Total (mg/L)	1.85	2.26	36.9	114	2.22
	Strontium (Sr)-Total (mg/L)	0.0496	0.0504	1.53	1.54	0.121
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	0.00203	<0.000050
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	0.00053	0.0016	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	0.010	0.808	<0.010
	Uranium (U)-Total (mg/L)	<0.000010	0.000011	0.000564	0.00697	0.000064
	Vanadium (V)-Total (mg/L)	0.000085	0.000313	0.000629	0.413	0.000100
	Zinc (Zn)-Total (mg/L)	<0.0030	0.0031	0.0065	0.913	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0283	0.0493	0.145	0.034	0.0093
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	0.00103	0.00267	0.000054
	Arsenic (As)-Dissolved (mg/L)	0.000302	0.000489	0.0519	0.0184	0.000233
	Barium (Ba)-Dissolved (mg/L)	0.0169	0.0173	0.0192	0.456	0.0626
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.0020 DLA	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.0050 DLA	<0.00050
	Boron (B)-Dissolved (mg/L)	<0.0060 DLB	<0.0060 DLB	0.0915	0.197	<0.0060 DLA
	Cadmium (Cd)-Dissolved (mg/L)	0.000025	.0000101	0.000115	<0.00005 DLA	0.000018
	Calcium (Ca)-Dissolved (mg/L)	7.92	7.85	62.9	51.7	36.4
	Chromium (Cr)-Dissolved (mg/L)	0.00013	0.00014	0.00053	<0.0010 DLA	0.00017
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	0.00034	0.0023	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00120	0.00090	0.00073	<0.0050 DLA	0.00077
	Iron (Fe)-Dissolved (mg/L)	0.076	0.182	1.02	0.071	0.054
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	0.000401	<0.00050 DLA	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	0.0180	<0.050 DLA	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	2.03	1.98	39.1	14.3	7.69
	Manganese (Mn)-Dissolved (mg/L)	0.00122	0.0192	0.0325	1.27	0.0491
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	0.000029	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000120	0.000092	0.00247	0.0588	0.000232
	Nickel (Ni)-Dissolved (mg/L)	0.00047	0.00051	0.00092	0.0195	0.00025
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.344	0.322	4.73	3.31	0.413
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.0010 DLA	<0.00010
	Silicon (Si)-Dissolved (mg/L)	2.50	2.45	4.38	4.51	4.49
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.00010 DLA	<0.000010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973964-6	L973964-7			
	Description					
	Sampled Date	22-JAN-11				
	Sampled Time					
	Client ID	MORRISON D - SURFACE	MORRISON D - DEEP			
Grouping	**Analyte**					
WATER						
Total Metals	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					
	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					
	Selenium (Se)-Dissolved (mg/L)					
	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973964-1	L973964-2	L973964-3	L973964-4	L973964-5
	Description					
	Sampled Date	12-JAN-11	12-JAN-11	22-JAN-11	22-JAN-11	13-JAN-11
	Sampled Time					
	Client ID	MORRISON A - SURFACE	MORRISON A - DEEP	MW08-01A	MW08-01B	MSC-4
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	1.83	1.81	35.7	112	2.27
	Strontium (Sr)-Dissolved (mg/L)	0.0478	0.0466	1.47	0.592	0.115
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.00050 DLA	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	0.00038	<0.0010 DLA	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	0.000532	0.00272	0.000059
	Vanadium (V)-Dissolved (mg/L)	0.000082	0.000142	0.000389	0.00100	0.000082
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	0.0049	<0.030 DLA	<0.0030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973964-6	L973964-7			
	Description					
	Sampled Date	22-JAN-11				
	Sampled Time					
	Client ID	MORRISON D - SURFACE	MORRISON D - DEEP			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Thallium (Tl)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLB	Detection limit was raised due to detection of analyte at comparable level in Method Blank.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity

This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.

ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity

This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.

ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.

ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.

ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.

This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".

CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide

This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.

EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method

Reference Information

6010B).

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-T-COL-VA Water Total Phosphate P by Color APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is

Reference Information

determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-055815

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS Labor ANALYTICAL CHEMISTRY & Environmental

Short Holding Time

Rush Processing

Chai

L973964-COFC

10-055815

Page ___ of ___

Report To		Report Format / Distribution		Service Requested: (Rush subject to availability)
Company:	Pacific Booker Minerals	Standard: ✓ Other (specify):		Regular (Standard Turnaround Times))
Contact:	Don Bitton	Select: PDF ✓ Excel ✓ Digital Fax		Priority, Date Req'd: (Surcharges apply)
Address:	1166 Alberni St, ste 1702	Email 1: bythebridge@gmail.com		Emergency (1 Business Day) - 100% Surcharge
	Vancouver	Email 2: blaidlaw@klohn.com		For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	604.681.8556 Fax: 604.687.5995			

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L973964	ALS Contact: Anglais	Sampler: B

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General	TOC (P)	Nutrients (P)	total metal (P)	dissolved metal (P)	WAD/SAD cyanide (P)							Number of Containers
	Morrison A - surface			Water	1			1	1	1							4
	Morrison A - Deep				1			1	1	1							4
	MW08-01A				1			1	1								3
	MW08-01B				1			1	1								3
	MCS-4				1			1	1	1							4
	Morrison D - surface									1							1
	Morrison D - Deep									1							1

Special Instructions / Regulations / Hazardous Details

Dissolved Metal: filter in lab. (ii) see also COD 10-055784

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: B. Laidlaw	Date: 26-Jan	Time: 1100	Received by: JP	Date: Jan 28/11	Time: 9:45	Temperature: 9 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 28-JAN-11
Report Date: 21-FEB-11 11:10 (MT)
Version: FINAL REV. 2

Certificate of Analysis

Lab Work Order #: L973965
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-055816

Andre Langlais
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973965-1	L973965-2	L973965-3		
	Description					
	Sampled Date	15-JAN-11	15-JAN-11	25-JAN-11		
	Sampled Time					
	Client ID	MW07-05B	MW07-07B	MCS-91		
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	767	494	<2.0		
	Hardness (as CaCO3) (mg/L)	174	287	<0.50		
	pH (pH)	8.06	8.06	6.08		
	Total Suspended Solids (mg/L)	302	1660	<3.0		
	Total Dissolved Solids (mg/L)	505	303	<10		
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	6.1	5.1	<1.0		
	Alkalinity, Total (as CaCO3) (mg/L)	320	217	<2.0		
	Ammonia as N (mg/L)	0.0604	0.0277	<0.0050		
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050		
	Chloride (Cl) (mg/L)	1.59	1.25	<0.50		
	Fluoride (F) (mg/L)	0.418	0.344	<0.020		
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050		
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010		
	Total Kjeldahl Nitrogen (mg/L)	0.980	0.863	<0.050		
	Total Nitrogen (mg/L)	0.300 AIN	0.491 AIN	<0.050		
	Total Phosphate as P (mg/L)	0.295	0.667	<0.0020		
	Sulfate (SO4) (mg/L)	109	59.1	<0.50		
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	11.3	17.5	<0.50		
Total Metals	Aluminum (Al)-Total (mg/L)	3.17	26.3	<0.0030		
	Antimony (Sb)-Total (mg/L)	0.00176	0.00259	<0.000050		
	Arsenic (As)-Total (mg/L)	0.0114	0.0285	<0.000030		
	Barium (Ba)-Total (mg/L)	0.184	3.72	<0.000050		
	Beryllium (Be)-Total (mg/L)	<0.00040 DLA	0.00116	<0.00020		
	Bismuth (Bi)-Total (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.00050		
	Boron (B)-Total (mg/L)	0.0431	0.0274	0.0016		
	Cadmium (Cd)-Total (mg/L)	0.000603	0.000928	<0.000005		
	Calcium (Ca)-Total (mg/L)	42.5	74.7	<0.020		
	Chromium (Cr)-Total (mg/L)	0.00883	0.0769	<0.00010		
	Cobalt (Co)-Total (mg/L)	0.00556	0.0212	<0.00010		
	Copper (Cu)-Total (mg/L)	0.0243	6.28	<0.00050		
	Iron (Fe)-Total (mg/L)	4.58	38.7	<0.010		
	Lead (Pb)-Total (mg/L)	0.00495	0.0211	<0.000050		
	Lithium (Li)-Total (mg/L)	0.011	0.018	<0.0050		
	Magnesium (Mg)-Total (mg/L)	16.6	36.6	<0.0050		
	Manganese (Mn)-Total (mg/L)	2.55	2.48	<0.000050		
	Mercury (Hg)-Total (mg/L)	0.000071	0.000116	<0.000010		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973965-1	L973965-2	L973965-3		
	Description					
	Sampled Date	15-JAN-11	15-JAN-11	25-JAN-11		
	Sampled Time					
	Client ID	MW07-05B	MW07-07B	MCS-91		
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.00375	0.0503	<0.000050		
	Nickel (Ni)-Total (mg/L)	0.0124	0.0764	<0.00010		
	Phosphorus (P)-Total (mg/L)	<0.30	0.94	<0.30		
	Potassium (K)-Total (mg/L)	5.06	7.33	<0.050		
	Selenium (Se)-Total (mg/L)	0.00028	0.00196	<0.00010		
	Silicon (Si)-Total (mg/L)	11.8	53.5	<0.050		
	Silver (Ag)-Total (mg/L)	0.000069	0.00110	<0.000010		
	Sodium (Na)-Total (mg/L)	109	20.7	<0.010		
	Strontium (Sr)-Total (mg/L)	0.301	1.09	<0.00010		
	Thallium (Tl)-Total (mg/L)	0.00028	0.00038	<0.000050		
	Tin (Sn)-Total (mg/L)	0.00023	0.00251	<0.00010		
	Titanium (Ti)-Total (mg/L)	0.117	0.628	<0.010		
	Uranium (U)-Total (mg/L)	0.0116	0.00537	<0.000010		
	Vanadium (V)-Total (mg/L)	0.0106	0.0744	<0.000050		
	Zinc (Zn)-Total (mg/L)	0.0212	0.533	<0.0030		
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	1.11	6.68	<0.0030		
	Antimony (Sb)-Dissolved (mg/L)	0.00105	0.00118	<0.000050		
	Arsenic (As)-Dissolved (mg/L)	0.00694	0.0122	<0.000030		
	Barium (Ba)-Dissolved (mg/L)	0.148	1.91	<0.000050		
	Beryllium (Be)-Dissolved (mg/L)	<0.00040 DLA	0.00061	<0.00020		
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 DLA	<0.0010 DLA	<0.00050		
	Boron (B)-Dissolved (mg/L)	0.0352	0.0163	0.0015		
	Cadmium (Cd)-Dissolved (mg/L)	0.000502	0.000582	<0.000005		
	Calcium (Ca)-Dissolved (mg/L)	42.0	66.9	<0.020		
	Chromium (Cr)-Dissolved (mg/L)	0.00586	0.0286	<0.00010		
	Cobalt (Co)-Dissolved (mg/L)	0.00515	0.0104	<0.00010		
	Copper (Cu)-Dissolved (mg/L)	0.0144	2.81	<0.00050		
	Iron (Fe)-Dissolved (mg/L)	2.36	17.0	<0.010		
	Lead (Pb)-Dissolved (mg/L)	0.00452	0.0105	<0.000050		
	Lithium (Li)-Dissolved (mg/L)	<0.010 DLA	<0.010 DLA	<0.0050		
	Magnesium (Mg)-Dissolved (mg/L)	16.9	29.0	<0.0050		
	Manganese (Mn)-Dissolved (mg/L)	2.68	2.08	<0.000050		
	Mercury (Hg)-Dissolved (mg/L)	0.000072	0.000073	<0.000010		
	Molybdenum (Mo)-Dissolved (mg/L)	0.00088	0.0234	<0.000050		
	Nickel (Ni)-Dissolved (mg/L)	0.00962	0.0336	<0.00010		
	Phosphorus (P)-Dissolved (mg/L)	<0.30	0.51	<0.30		
	Potassium (K)-Dissolved (mg/L)	4.93	4.63	<0.050		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973965-1	L973965-2	L973965-3		
	Description					
	Sampled Date	15-JAN-11	15-JAN-11	25-JAN-11		
	Sampled Time					
	Client ID	MW07-05B	MW07-07B	MCS-91		
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.00020 DLA	<0.00020 DLA	<0.00010		
	Silicon (Si)-Dissolved (mg/L)	7.55	16.0	<0.050		
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	0.000021	<0.000010		
	Sodium (Na)-Dissolved (mg/L)	115	19.7	<0.010		
	Strontium (Sr)-Dissolved (mg/L)	0.273	0.964	<0.00010		
	Thallium (Tl)-Dissolved (mg/L)	0.00023	0.00014	<0.000050		
	Tin (Sn)-Dissolved (mg/L)	<0.00020 DLA	0.00141	<0.00010		
	Titanium (Ti)-Dissolved (mg/L)	0.041	0.140	<0.010		
	Uranium (U)-Dissolved (mg/L)	0.0107	0.00334	<0.000010		
	Vanadium (V)-Dissolved (mg/L)	0.00675	0.0301	<0.000050		
	Zinc (Zn)-Dissolved (mg/L)	0.0196	0.320	<0.0030		

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
AIN	Approximate Result: Interference Suspected
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			

Reference Information

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOT-COMBUST-VA Water Total Nitrogen by Combustion ASTM D5176-91, EN12260 (EU STD Method)

This analysis is carried out, on hydrochloric acid preserved samples, using procedures modified from ASTM Method D 5176-91 "Standard Test Method for Total Chemically Bound Nitrogen in Water by Pyrolysis and Chemiluminescence detection." Total Nitrogen is determined directly by pyrolysis with chemiluminescence detection using automated instrumentation.

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-MAN-VA Water pH by Manual Meter APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

It is recommended that this analysis be conducted in the field.

PH-MAN-VA Water pH by Manual Meter APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-T-COL-VA Water Total Phosphate P by Color APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-SIE-VA Water Total Kjeldahl Nitrogen by SIE APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-055816

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

AL ANALYT **Short Holding Time**

Envi *Rush Processing*

L973965-COFC

Form

10-055816

Page ____ of ____

Report		Report Format / Distribution		Service Requested: (Rush subject to availability)
Company:	Pacific Booker Minerals	Standard: ✓	Other (specify):	Regular (Standard Turnaround Times))
Contact:	Don Betton	Select: PDF ✓	Excel ✓ Digital Fax	Priority, Date Req'd: _____ (Surcharges apply)
Address:	1166 Alberni St, ste 1702 Vancouver	Email 1:	bythebridge@gmail.com	Emergency (1 Business Day) - 100% Surcharge
		Email 2:	blaidlaw@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	604.681.8556 Fax: 604.687.5995			

Invoice To	Same as Report ? (circle) Yes or No (If No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L973965	ALS Contact: Anglais	Sampler: B

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General	TOC (P)	Nutrients (P)	total metal (P)	dissolved metal (P)								Number of Containers
	MW07-05B			Water	1	1	1	1	1								5
	MW07-07B			↓	1	1	1	1	1								5
	MCS-91			↓	1	1	1	1	1								5

Special Instructions / Regulations / Hazardous Details

dissolved metal: filter in lab ☺

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: B Laidlaw	Date: 26 Jan	Time: 1100	Received by: JT	Date: Jan 28/11	Time: 9:45	Temperature: 9 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 28-JAN-11
Report Date: 21-FEB-11 11:09 (MT)
Version: FINAL REV. 2

Certificate of Analysis

Lab Work Order #: L973966
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-055784

Comments: Please note, a number of samples have been rechecked to confirm results of TKN>TN. A interference qualifer has been added to these samples.

ERIN BOLSTER
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L973966-1	L973966-2	L973966-3	L973966-4	L973966-5
Sample ID		L973966-1	L973966-2	L973966-3	L973966-4	L973966-5
Description						
Sampled Date		24-JAN-11	24-JAN-11	24-JAN-11	24-JAN-11	24-JAN-11
Sampled Time						
Client ID		MW07-02A	MW07-02B	MW07-02C	BH06-7	BH06-12
WATER						
Physical Tests	Conductivity (uS/cm)	602	563	603	363	894
	Hardness (as CaCO3) (mg/L)	69.3	291	43.1	140	12.8
	pH (pH)	8.37	8.01	8.39	8.20	8.81
	Total Suspended Solids (mg/L)	133	75.3	120	<3.0	<3.0
	Total Dissolved Solids (mg/L)	374	270	361	224	557
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0	7.6	<1.0	2.0	<1.0
	Alkalinity, Total (as CaCO3) (mg/L)	279	281	279	186	398
	Ammonia as N (mg/L)	0.0190	0.0077	0.0204	0.0058	0.0513
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.25
	Chloride (Cl) (mg/L)	0.81	<0.50	0.81	<0.50	<2.5
	Fluoride (F) (mg/L)	0.346	0.172	0.349	1.19	5.94
	Nitrate (as N) (mg/L)	<0.0050	0.162	<0.0050	<0.0050	<0.025
	Nitrite (as N) (mg/L)	<0.0010	0.0076	<0.0010	<0.0010	<0.0050
	Total Kjeldahl Nitrogen (mg/L)	0.188	0.094	0.191	0.187	0.331
	Total Nitrogen (mg/L)	0.115 AIN	0.190	0.107 AIN	0.050 AIN	0.160 AIN
	Total Phosphate as P (mg/L)	0.181	0.0208	0.172	<0.0020	0.0261
	Sulfate (SO4) (mg/L)	54.4	42.2	54.4	15.7	80.3
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	3.91	1.38	3.83	2.93	2.82
Total Metals	Aluminum (Al)-Total (mg/L)	5.32	0.782	5.27	0.0037	0.092
	Antimony (Sb)-Total (mg/L)	0.00024	0.000065	0.00026	<0.000050	<0.00025 DLA
	Arsenic (As)-Total (mg/L)	0.0123	0.00139	0.0113	0.000287	0.00078
	Barium (Ba)-Total (mg/L)	0.0683	0.0658	0.0595	0.0328	0.0232
	Beryllium (Be)-Total (mg/L)	0.00043	<0.00020	<0.00040 DLA	<0.00020	<0.0010 DLA
	Bismuth (Bi)-Total (mg/L)	<0.0010 DLA	<0.00050	<0.0010 DLA	<0.00050	<0.0025 DLA
	Boron (B)-Total (mg/L)	0.0781	0.0138	0.0795	0.0850	0.298
	Cadmium (Cd)-Total (mg/L)	0.000475	0.000091	0.000460	<0.000005	0.000118
	Calcium (Ca)-Total (mg/L)	19.3	76.5	15.0	42.2	3.17
	Chromium (Cr)-Total (mg/L)	0.00463	0.00059	0.00396	<0.00010	<0.00050 DLA
	Cobalt (Co)-Total (mg/L)	0.00273	0.00114	0.00258	<0.00010	<0.00050 DLA
	Copper (Cu)-Total (mg/L)	0.0159	0.00086	0.0150	<0.00050	<0.0025 DLA
	Iron (Fe)-Total (mg/L)	6.15	1.28	4.55	0.057	0.078
	Lead (Pb)-Total (mg/L)	0.00269	0.000610	0.00226	<0.000050	<0.00025 DLA
	Lithium (Li)-Total (mg/L)	0.224	0.0129	0.226	0.0181	0.249
	Magnesium (Mg)-Total (mg/L)	4.55	23.5	4.22	7.98	0.723
	Manganese (Mn)-Total (mg/L)	0.350	0.223	0.264	0.0702	0.0327
	Mercury (Hg)-Total (mg/L)	0.000021	<0.000010	0.000026	<0.000010	<0.000010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973966-6	L973966-7	L973966-8	L973966-9	L973966-10
	Description					
	Sampled Date	23-JAN-11	23-JAN-11	22-JAN-11	22-JAN-11	12-JAN-11
	Sampled Time					
	Client ID	MW07-01A	MW07-01B	MW08-01A	MW08-01B	MORRISON A - SURFACE
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)					
	Hardness (as CaCO3) (mg/L)					
	pH (pH)					
	Total Suspended Solids (mg/L)					
	Total Dissolved Solids (mg/L)					
Anions and Nutrients	Acidity (as CaCO3) (mg/L)					
	Alkalinity, Total (as CaCO3) (mg/L)					
	Ammonia as N (mg/L)	0.0662	0.0434	0.173	0.123	<0.0050
	Bromide (Br) (mg/L)					
	Chloride (Cl) (mg/L)					
	Fluoride (F) (mg/L)					
	Nitrate (as N) (mg/L)					
	Nitrite (as N) (mg/L)					
	Total Kjeldahl Nitrogen (mg/L)	0.134 AIN	2.76 AIN	0.218	4.63 AIN	0.314 AIN
	Total Nitrogen (mg/L)	0.070	0.779	0.200	1.52	0.230
	Total Phosphate as P (mg/L)					
	Sulfate (SO4) (mg/L)					
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	0.67	12.7	1.01	118	10.2
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973966-11	L973966-12			
	Description					
	Sampled Date	12-JAN-11	13-JAN-11			
	Sampled Time					
	Client ID	MORRISON A - DEEP	MCS-4			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)					
	Hardness (as CaCO3) (mg/L)					
	pH (pH)					
	Total Suspended Solids (mg/L)					
	Total Dissolved Solids (mg/L)					
Anions and Nutrients	Acidity (as CaCO3) (mg/L)					
	Alkalinity, Total (as CaCO3) (mg/L)					
	Ammonia as N (mg/L)	0.0055	<0.0050			
	Bromide (Br) (mg/L)					
	Chloride (Cl) (mg/L)					
	Fluoride (F) (mg/L)					
	Nitrate (as N) (mg/L)					
	Nitrite (as N) (mg/L)					
	Total Kjeldahl Nitrogen (mg/L)	0.283	0.116			
	Total Nitrogen (mg/L)	0.240	0.220			
	Total Phosphate as P (mg/L)					
	Sulfate (SO4) (mg/L)					
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	9.87	2.73			
Total Metals	Aluminum (Al)-Total (mg/L)					
	Antimony (Sb)-Total (mg/L)					
	Arsenic (As)-Total (mg/L)					
	Barium (Ba)-Total (mg/L)					
	Beryllium (Be)-Total (mg/L)					
	Bismuth (Bi)-Total (mg/L)					
	Boron (B)-Total (mg/L)					
	Cadmium (Cd)-Total (mg/L)					
	Calcium (Ca)-Total (mg/L)					
	Chromium (Cr)-Total (mg/L)					
	Cobalt (Co)-Total (mg/L)					
	Copper (Cu)-Total (mg/L)					
	Iron (Fe)-Total (mg/L)					
	Lead (Pb)-Total (mg/L)					
	Lithium (Li)-Total (mg/L)					
	Magnesium (Mg)-Total (mg/L)					
	Manganese (Mn)-Total (mg/L)					
	Mercury (Hg)-Total (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L973966-1	L973966-2	L973966-3	L973966-4	L973966-5
	Description:					
	Sampled Date:	24-JAN-11	24-JAN-11	24-JAN-11	24-JAN-11	24-JAN-11
	Sampled Time:					
	Client ID:	MW07-02A	MW07-02B	MW07-02C	BH06-7	BH06-12
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.00452	0.00263	0.00425	0.00216	0.00135
	Nickel (Ni)-Total (mg/L)	0.00385	0.00131	0.00356	<0.00010	<0.00050 DLA
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	2.71	0.815	2.79	0.088	0.79
	Selenium (Se)-Total (mg/L)	0.00035	0.00013	0.00031	<0.00010	<0.00050 DLA
	Silicon (Si)-Total (mg/L)	13.5	6.63	16.9	9.10	3.49
	Silver (Ag)-Total (mg/L)	0.000713	<0.000010	0.000620	<0.000010	<0.000050 DLA
	Sodium (Na)-Total (mg/L)	117	8.40	118	27.3	201
	Strontium (Sr)-Total (mg/L)	0.229	0.443	0.221	0.573	0.136
	Thallium (Tl)-Total (mg/L)	0.00021	<0.000050	0.00020	<0.000050	<0.00025 DLA
	Tin (Sn)-Total (mg/L)	0.00062	<0.00010	0.00079	<0.00010	0.00117
	Titanium (Ti)-Total (mg/L)	0.055	0.024	0.087	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.00117	0.000409	0.00106	0.000024	0.000062
	Vanadium (V)-Total (mg/L)	0.266	0.00195	0.291	0.000113	<0.00025 DLA
	Zinc (Zn)-Total (mg/L)	0.201	0.0050	0.154	<0.0030	<0.015 DLA
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	1.63	0.348	1.16	<0.0030	0.081
	Antimony (Sb)-Dissolved (mg/L)	<0.00010 DLA	<0.000050	<0.00010 DLA	<0.000050	<0.00025 DLA
	Arsenic (As)-Dissolved (mg/L)	0.00714	0.00111	0.00567	0.000299	0.00074
	Barium (Ba)-Dissolved (mg/L)	0.0602	0.0648	0.0423	0.0321	0.0220
	Beryllium (Be)-Dissolved (mg/L)	<0.00040 DLA	<0.00020	<0.00040 DLA	<0.00020	<0.0010 DLA
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 DLA	<0.00050	<0.0010 DLA	<0.00050	<0.0025 DLA
	Boron (B)-Dissolved (mg/L)	0.0716	0.0094	0.0698	0.0826	0.286
	Cadmium (Cd)-Dissolved (mg/L)	0.000140	0.000088	0.000071	0.0000138	0.000178
	Calcium (Ca)-Dissolved (mg/L)	20.6	77.8	11.4	43.2	3.94
	Chromium (Cr)-Dissolved (mg/L)	0.00176	0.00027	0.00076	<0.00010	<0.00050 DLA
	Cobalt (Co)-Dissolved (mg/L)	0.00091	0.00111	0.00065	<0.00010	<0.00050 DLA
	Copper (Cu)-Dissolved (mg/L)	<0.0010 DLA	0.00065	<0.0010 DLA	<0.00050	<0.0025 DLA
	Iron (Fe)-Dissolved (mg/L)	4.77	0.762	1.91	0.043	0.085
	Lead (Pb)-Dissolved (mg/L)	0.00151	0.000584	0.00085	<0.000050	<0.00025 DLA
	Lithium (Li)-Dissolved (mg/L)	0.230	0.0126	0.225	0.0178	0.242
	Magnesium (Mg)-Dissolved (mg/L)	4.34	23.6	3.57	7.89	0.725
	Manganese (Mn)-Dissolved (mg/L)	0.353	0.219	0.199	0.0689	0.0302
	Mercury (Hg)-Dissolved (mg/L)	0.000022	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.00133	0.00135	0.00159	0.00211	0.00148
	Nickel (Ni)-Dissolved (mg/L)	0.00235	0.00126	0.00145	0.00014	<0.00050 DLA
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	1.27	0.684	1.18	0.100	0.79

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973966-6	L973966-7	L973966-8	L973966-9	L973966-10
	Description					
	Sampled Date	23-JAN-11	23-JAN-11	22-JAN-11	22-JAN-11	12-JAN-11
	Sampled Time					
	Client ID	MW07-01A	MW07-01B	MW08-01A	MW08-01B	MORRISON A - SURFACE
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					
	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973966-11	L973966-12			
	Description					
	Sampled Date	12-JAN-11	13-JAN-11			
	Sampled Time					
	Client ID	MORRISON A - DEEP	MCS-4			
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)					
	Nickel (Ni)-Total (mg/L)					
	Phosphorus (P)-Total (mg/L)					
	Potassium (K)-Total (mg/L)					
	Selenium (Se)-Total (mg/L)					
	Silicon (Si)-Total (mg/L)					
	Silver (Ag)-Total (mg/L)					
	Sodium (Na)-Total (mg/L)					
	Strontium (Sr)-Total (mg/L)					
	Thallium (Tl)-Total (mg/L)					
	Tin (Sn)-Total (mg/L)					
	Titanium (Ti)-Total (mg/L)					
	Uranium (U)-Total (mg/L)					
	Vanadium (V)-Total (mg/L)					
	Zinc (Zn)-Total (mg/L)					
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)					
	Antimony (Sb)-Dissolved (mg/L)					
	Arsenic (As)-Dissolved (mg/L)					
	Barium (Ba)-Dissolved (mg/L)					
	Beryllium (Be)-Dissolved (mg/L)					
	Bismuth (Bi)-Dissolved (mg/L)					
	Boron (B)-Dissolved (mg/L)					
	Cadmium (Cd)-Dissolved (mg/L)					
	Calcium (Ca)-Dissolved (mg/L)					
	Chromium (Cr)-Dissolved (mg/L)					
	Cobalt (Co)-Dissolved (mg/L)					
	Copper (Cu)-Dissolved (mg/L)					
	Iron (Fe)-Dissolved (mg/L)					
	Lead (Pb)-Dissolved (mg/L)					
	Lithium (Li)-Dissolved (mg/L)					
	Magnesium (Mg)-Dissolved (mg/L)					
	Manganese (Mn)-Dissolved (mg/L)					
	Mercury (Hg)-Dissolved (mg/L)					
	Molybdenum (Mo)-Dissolved (mg/L)					
	Nickel (Ni)-Dissolved (mg/L)					
	Phosphorus (P)-Dissolved (mg/L)					
	Potassium (K)-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L973966-1 Description: Sampled Date: 24-JAN-11 Sampled Time: Client ID: MW07-02A	L973966-2 24-JAN-11 MW07-02B	L973966-3 24-JAN-11 MW07-02C	L973966-4 24-JAN-11 BH06-7	L973966-5 24-JAN-11 BH06-12
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.00020 DLA	0.00013	<0.00020 DLA	<0.00010	<0.00050 DLA
	Silicon (Si)-Dissolved (mg/L)	6.80	5.67	9.64	9.02	3.47
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA	<0.000010	0.000053	<0.000010	<0.000050 DLA
	Sodium (Na)-Dissolved (mg/L)	119	8.41	119	26.9	193
	Strontium (Sr)-Dissolved (mg/L)	0.232	0.435	0.211	0.560	0.132
	Thallium (Tl)-Dissolved (mg/L)	<0.00010 DLA	<0.000050	<0.00010 DLA	<0.000050	<0.00025 DLA
	Tin (Sn)-Dissolved (mg/L)	0.00028	<0.00010	<0.00020 DLA	<0.00010	0.00112
	Titanium (Ti)-Dissolved (mg/L)	0.021	0.011	0.050	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	0.00102	0.000390	0.000864	0.000021	0.000078
	Vanadium (V)-Dissolved (mg/L)	0.0506	0.00136	0.0397	0.000103	<0.00025 DLA
	Zinc (Zn)-Dissolved (mg/L)	0.103	0.0032	0.0370	<0.0030	<0.015 DLA

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973966-6	L973966-7	L973966-8	L973966-9	L973966-10
	Description					
	Sampled Date	23-JAN-11	23-JAN-11	22-JAN-11	22-JAN-11	12-JAN-11
	Sampled Time					
	Client ID	MW07-01A	MW07-01B	MW08-01A	MW08-01B	MORRISON A - SURFACE
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)					
	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Thallium (Tl)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973966-11	L973966-12			
	Description					
	Sampled Date	12-JAN-11	13-JAN-11			
	Sampled Time					
	Client ID	MORRISON A - DEEP	MCS-4			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)					
	Silicon (Si)-Dissolved (mg/L)					
	Silver (Ag)-Dissolved (mg/L)					
	Sodium (Na)-Dissolved (mg/L)					
	Strontium (Sr)-Dissolved (mg/L)					
	Thallium (Tl)-Dissolved (mg/L)					
	Tin (Sn)-Dissolved (mg/L)					
	Titanium (Ti)-Dissolved (mg/L)					
	Uranium (U)-Dissolved (mg/L)					
	Vanadium (V)-Dissolved (mg/L)					
	Zinc (Zn)-Dissolved (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
AIN	Approximate Result: Interference Suspected
DLA	Detection Limit Adjusted For required dilution

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.			

Reference Information

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOT-COMBUST-VA Water Total Nitrogen by Combustion ASTM D5176-91, EN12260 (EU STD Method)

This analysis is carried out, on hydrochloric acid preserved samples, using procedures modified from ASTM Method D 5176-91 "Standard Test Method for Total Chemically Bound Nitrogen in Water by Pyrolysis and Chemiluminescence detection." Total Nitrogen is determined directly by pyrolysis with chemiluminescence detection using automated instrumentation.

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-T-COL-VA Water Total Phosphate P by Color APHA 4500-P Phosphorous

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-SIE-VA	Water	Total Kjeldahl Nitrogen by SIE	APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-055784

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

ALS ANALYTICAL **Short Holding Time**

Envir

Rush Processing

10-055784

Page ___ of ___

Report To		Report Format / Distribution		Service Requested: (Rush subject to availability)
Company:	Pacific Booker Minerals	Standard: ✓ Other (specify):		Regular (Standard Turnaround Times))
Contact:	Don Betton	Select: PDF ✓ Excel ✓ Digital Fax		Priority, Date Req'd: _____ (Surcharges apply)
Address:	1166 Alberni St, Ste 1702	Email 1: bythebridge@gmail.com		Emergency (1 Business Day) - 100% Surcharge
	Vancouver	Email 2: blaidlaw@klohn.com		For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone:	604.681.8556 Fax: 604.687.5995			
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		Analysis Request
	Copy of Invoice with Report? (circle) Yes or No	Job #:		(Indicate Filtered or Preserved, F/P)
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)	L973966	ALS Contact: Anglais	Sampler: B	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General	TOC (P)	Nutrients (P)	total metal (P)	dissolved metal (P)								Number of Containers
	MW07-02A			Water	1	1	1	1	1								5
	MW07-02B				1	1	1	1	1								5
	MW07-02C				1	1	1	1	1								5
	DH06-7				1	1	1	1	1								5
	DH06-12				1	1	1	1	1								5
	MW07-01A					1	1										2
	MW07-01B					1	1										2
	MW08-01A					1	1										2
	MW08-01B					1	1										2
	Morrison A - surface				4	1	1	4	8								2
	Morrison A - Deep				4	1	1	8	4								2
	MCS-4					1	1										2

Special Instructions / Regulations / Hazardous Details

dissolved metal: filter in lab. Thx. See also COD 10-055814 & 10-055815

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
...ed by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
B Laidlaw	26 Jan	11:00	JP	Jan 28/4	9:45	8 °C				

...EFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 28-JAN-11
Report Date: 21-FEB-11 11:10 (MT)
Version: FINAL REV. 2

Certificate of Analysis

Lab Work Order #: L973967
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-055817

Andre Langlais
Account Manager

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ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973967-1	L973967-2	L973967-3	L973967-4	
	Description					
	Sampled Date	19-JAN-11	19-JAN-11	19-JAN-11	20-JAN-11	
	Sampled Time					
	Client ID	NAK 3- SURFACE	NAK 3- SURFACE B	NAK 3 - DEEP	NAK 2 - DEEP	
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	74.3	72.5	73.5	72.9	
	Hardness (as CaCO3) (mg/L)	34.3	34.4	32.7	31.7	
	pH (pH)	7.69	7.63	7.62	7.58	
	Total Suspended Solids (mg/L)	<3.0	<3.0	3.8	<3.0	
	Total Dissolved Solids (mg/L)	60	64	59	51	
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.6	2.5	1.8	2.1	
	Alkalinity, Total (as CaCO3) (mg/L)	32.8	32.7	31.2	31.5	
	Ammonia as N (mg/L)	0.0131	0.0130	0.0079	<0.0050	
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
	Chloride (Cl) (mg/L)	1.46	1.03	1.75	1.67	
	Fluoride (F) (mg/L)	0.030	0.032	0.029	0.031	
	Nitrate (as N) (mg/L)	0.0086	0.0078	0.0176	0.0194	
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
	Total Kjeldahl Nitrogen (mg/L)	0.239	0.258	0.248	0.235	
	Total Nitrogen (mg/L)	0.150 AIN	0.150 AIN	0.150 AIN	0.140 AIN	
	Total Phosphate as P (mg/L)	0.0051	0.0055	0.0146	0.0067	
	Sulfate (SO4) (mg/L)	3.23	3.21	3.18	3.21	
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050		<0.0050		
	Cyanide, Total (mg/L)	<0.0050		0.0050		
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	7.24	7.32	6.93	7.10	
Total Metals	Aluminum (Al)-Total (mg/L)	0.0056		0.0119	0.0165	
	Antimony (Sb)-Total (mg/L)	<0.000050		<0.000050	<0.000050	
	Arsenic (As)-Total (mg/L)	0.000195		0.000237	0.000226	
	Barium (Ba)-Total (mg/L)	0.0117		0.0115	0.0132	
	Beryllium (Be)-Total (mg/L)	<0.00020		<0.00020	<0.00020	
	Bismuth (Bi)-Total (mg/L)	<0.00050		<0.00050	<0.00050	
	Boron (B)-Total (mg/L)	<0.0090 DLB		<0.0070 DLB	<0.0070 DLB	
	Cadmium (Cd)-Total (mg/L)	0.0000108		0.0000068	0.000037	
	Calcium (Ca)-Total (mg/L)	10.7		10.6	10.0	
	Chromium (Cr)-Total (mg/L)	<0.00025 DLB		<0.00025 DLB	<0.00025 DLB	
	Cobalt (Co)-Total (mg/L)	<0.00010		<0.00010	<0.00010	
	Copper (Cu)-Total (mg/L)	0.00269		0.00373	0.00268	
	Iron (Fe)-Total (mg/L)	0.015		0.025	0.059	
	Lead (Pb)-Total (mg/L)	<0.000050		<0.000050	<0.000050	
	Lithium (Li)-Total (mg/L)	<0.0050		<0.0050	<0.0050	
	Magnesium (Mg)-Total (mg/L)	1.91		1.82	1.90	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Sample ID	L973967-1	L973967-2	L973967-3	L973967-4	
Description					
Sampled Date	19-JAN-11	19-JAN-11	19-JAN-11	20-JAN-11	
Sampled Time					
Client ID	NAK 3- SURFACE	NAK 3- SURFACE B	NAK 3 - DEEP	NAK 2 - DEEP	
Grouping / **Analyte**					
WATER					
Total Metals Manganese (Mn)-Total (mg/L)	0.00100		0.00829	0.0459	
Mercury (Hg)-Total (mg/L)	<0.000010		<0.000010	<0.000010	
Molybdenum (Mo)-Total (mg/L)	0.000091		0.000080	0.000089	
Nickel (Ni)-Total (mg/L)	0.00028		0.00026	0.00029	
Phosphorus (P)-Total (mg/L)	<0.30		<0.30	<0.30	
Potassium (K)-Total (mg/L)	0.337		0.306	0.335	
Selenium (Se)-Total (mg/L)	<0.00010		<0.00010	<0.00010	
Silicon (Si)-Total (mg/L)	2.32		2.26	2.40	
Silver (Ag)-Total (mg/L)	<0.000010		<0.000010	<0.000010	
Sodium (Na)-Total (mg/L)	2.98		2.32	2.91	
Strontium (Sr)-Total (mg/L)	0.0516		0.0441	0.0452	
Thallium (Tl)-Total (mg/L)	<0.000050		<0.000050	<0.000050	
Tin (Sn)-Total (mg/L)	<0.00010		<0.00010	<0.00010	
Titanium (Ti)-Total (mg/L)	<0.010		<0.010	<0.010	
Uranium (U)-Total (mg/L)	<0.000010		<0.000010	<0.000010	
Vanadium (V)-Total (mg/L)	0.000076		0.000070	0.000097	
Zinc (Zn)-Total (mg/L)	0.0030		<0.0030	<0.0030	
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0038	0.0041	0.0067	0.0083	
Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Arsenic (As)-Dissolved (mg/L)	0.000191	0.000181	0.000197	0.000201	
Barium (Ba)-Dissolved (mg/L)	0.0118	0.0119	0.0115	0.0129	
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Boron (B)-Dissolved (mg/L)	<0.0050 DLB	<0.0050 DLB	<0.0040 DLB	<0.0050 DLB	
Cadmium (Cd)-Dissolved (mg/L)	.0000088	.0000058	<0.000005	0.000037	
Calcium (Ca)-Dissolved (mg/L)	10.7	10.8	10.0	9.68	
Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.00015 DLB	<0.00010	<0.00010	
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Copper (Cu)-Dissolved (mg/L)	0.00421	0.00230	0.00298	0.00327	
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	0.019	0.040	
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
Magnesium (Mg)-Dissolved (mg/L)	1.83	1.84	1.86	1.82	
Manganese (Mn)-Dissolved (mg/L)	0.000789	0.000816	0.0103	0.0453	
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Molybdenum (Mo)-Dissolved (mg/L)	0.000085	0.000086	0.000073	0.000075	
Nickel (Ni)-Dissolved (mg/L)	0.00036	0.00027	0.00025	0.00023	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973967-1	L973967-2	L973967-3	L973967-4	
	Description					
	Sampled Date	19-JAN-11	19-JAN-11	19-JAN-11	20-JAN-11	
	Sampled Time					
	Client ID	NAK 3- SURFACE	NAK 3- SURFACE B	NAK 3 - DEEP	NAK 2 - DEEP	
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)	0.304	0.307	0.314	0.320	
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Dissolved (mg/L)	2.34	2.33	2.25	2.41	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	2.24	2.02	2.65	2.61	
	Strontium (Sr)-Dissolved (mg/L)	0.0492	0.0497	0.0431	0.0440	
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Vanadium (V)-Dissolved (mg/L)	0.000071	0.000062	0.000069	0.000076	
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
AIN	Approximate Result: Interference Suspected
DLB	Detection limit was raised due to detection of analyte at comparable level in Method Blank.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOT-COMBUST-VA Water Total Nitrogen by Combustion ASTM D5176-91, EN12260 (EU STD Method)

This analysis is carried out, on hydrochloric acid preserved samples, using procedures modified from ASTM Method D 5176-91 "Standard Test Method for Total Chemically Bound Nitrogen in Water by Pyrolysis and Chemiluminescence detection." Total Nitrogen is determined directly by pyrolysis with chemiluminescence detection using automated instrumentation.

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH

Reference Information

electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-T-COL-VA Water Total Phosphate P by Color APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-SIE-VA Water Total Kjeldahl Nitrogen by SIE APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-055817

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

AL ANAL

Short Holding Time

Rush Processing

Env

L973967-COFC

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'8

10-055817

Page ___ of ___

Repo	Report Format / Distribution	Service Requested: (Rush subject to availability)
Company: Pacific Booker Minerals	Standard: ✓ Other (specify):	Regular (Standard Turnaround Times))
Contact: Don Betton	Select: PDF ✓ Excel ✓ Digital Fax	Priority, Date Req'd: _____ (Surcharges apply)
Address: 1166 Alberni St, ste 1702	Email 1: bythebridge@gmail.com	Emergency (1 Business Day) - 100% Surcharge
Vancouver	Email 2: blaidlaw@klohn.com	For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 604.681.8556 Fax: 604.687.5995		

Invoice To	Client / Project Information
Same as Report ? (circle) Yes or No (if No, provide details)	
Copy of Invoice with Report? (circle) Yes or No	Job #:
Company:	PO / AFE:
Contact:	LSD:
Address:	
Phone: Fax:	Quote #:

Lab Work Order # (lab use only): L973967

ALS Contact: Anglais

Sampler: B

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General	TOC	Nutrients	total metal	dissolved metal								Number of Containers
						P	P	P	P								
	Nak 3- surface			Water	1	1	1	1	1								5
	Nak 3- surface B			↓	1	1	1		1								4
	Nak 3 - Deep			↓	1	1	1	1	1								5
	Nak 2 - Deep			↓	1	1	1	1	1								5

Special Instructions / Regulations / Hazardous Details

Dissolved Metal: filter in lab ☺

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: B. Laidlaw	Date: 26-Jan	Time: 1100	Received by: JP	Date: Jan 28/11	Time: 9:45	Temperature: 8 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

GENF 18.01 Front

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3
Phone: 604-681-8556

Date Received: 28-JAN-11
Report Date: 21-FEB-11 11:11 (MT)
Version: FINAL REV. 2

Certificate of Analysis

Lab Work Order #: L973983
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-055785

Andre Langlais
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	L973983-1	L973983-2	L973983-3	L973983-4	L973983-5
Sample ID		L973983-1	L973983-2	L973983-3	L973983-4	L973983-5
Description						
Sampled Date		25-JAN-11	25-JAN-11	25-JAN-11	25-JAN-11	25-JAN-11
Sampled Time						
Client ID		MCS-90	MW07-04A	MW07-04B	MW07-08A	MW07-08B
WATER						
Physical Tests	Conductivity (uS/cm)	<2.0	952	1060	1050	1460
	Hardness (as CaCO3) (mg/L)	<0.50	211	529	411	389
	pH (pH)	5.97	8.12	7.79	8.03	8.12
	Total Suspended Solids (mg/L)	<3.0	7880	297	12.3	67.5
	Total Dissolved Solids (mg/L)	<10	678	642	680	992
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	1.1	3.4	33.4	16.0	16.3
	Alkalinity, Total (as CaCO3) (mg/L)	<2.0	202	635	515	875
	Ammonia as N (mg/L)	<0.0050	0.197	0.0433	0.0710	0.265
	Bromide (Br) (mg/L)	<0.050	<0.25	<0.50	<0.25	<0.50
	Chloride (Cl) (mg/L)	<0.50	<2.5	<5.0	<2.5	10.2
	Fluoride (F) (mg/L)	<0.020	0.13	<0.20	0.48	<0.20
	Nitrate (as N) (mg/L)	<0.0050	<0.025	<0.050	<0.025	0.082
	Nitrite (as N) (mg/L)	<0.0010	<0.0050	<0.010	<0.0050	<0.010
	Total Kjeldahl Nitrogen (mg/L)	<0.050	3.94	2.36	0.254	1.92
	Total Nitrogen (mg/L)	<0.050	1.90 AIN	1.63 AIN	0.130 AIN	1.09 AIN
	Total Phosphate as P (mg/L)	<0.0020	0.126	0.202	0.308	0.516
	Sulfate (SO4) (mg/L)	<0.50	310	15.2	115	5.9
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	<0.50	41.1	17.5	4.73	40.8
Total Metals	Aluminum (Al)-Total (mg/L)	<0.0030	109	1.46	0.0538	0.178
	Antimony (Sb)-Total (mg/L)	<0.000050	0.00067	0.000723	0.000223	0.00045
	Arsenic (As)-Total (mg/L)	<0.000030	0.0992	0.0192	0.00659	0.0309
	Barium (Ba)-Total (mg/L)	<0.000050	1.60	0.690	0.129	0.210
	Beryllium (Be)-Total (mg/L)	<0.00020	0.0041	<0.00020	<0.00020	<0.0010 DLA
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.0050 DLA	<0.00050	<0.00050	<0.0025 DLA
	Boron (B)-Total (mg/L)	0.0016	0.205	0.122	0.128	0.203
	Cadmium (Cd)-Total (mg/L)	<0.000005	0.00463	0.000352	0.000050	0.000211
	Calcium (Ca)-Total (mg/L)	0.023	180	87.0	90.3	93.7
	Chromium (Cr)-Total (mg/L)	<0.00010	0.163	0.00378	<0.00060 DLB	0.00065
	Cobalt (Co)-Total (mg/L)	<0.00010	0.108	0.0180	0.00061	0.00571
	Copper (Cu)-Total (mg/L)	<0.00050	0.375	0.00672	0.00075	<0.0025 DLA
	Iron (Fe)-Total (mg/L)	<0.010	202	24.4	3.72	13.3
	Lead (Pb)-Total (mg/L)	<0.000050	0.0824	0.00292	0.000799	0.00122
	Lithium (Li)-Total (mg/L)	<0.0050	0.077	<0.0050	0.0227	<0.025 DLA
	Magnesium (Mg)-Total (mg/L)	<0.0050	69.7	73.9	44.1	38.8
	Manganese (Mn)-Total (mg/L)	<0.000050	7.25	2.84	2.65	1.53
	Mercury (Hg)-Total (mg/L)	<0.000010	0.000191	0.000018	<0.000010	<0.000010

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973983-6				
	Description					
	Sampled Date	25-JAN-11				
	Sampled Time					
	Client ID	MW07-08C				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	1060				
	Hardness (as CaCO3) (mg/L)	402				
	pH (pH)	8.04				
	Total Suspended Solids (mg/L)	10.3				
	Total Dissolved Solids (mg/L)	678				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	15.3				
	Alkalinity, Total (as CaCO3) (mg/L)	513				
	Ammonia as N (mg/L)	0.0793				
	Bromide (Br) (mg/L)	<0.25				
	Chloride (Cl) (mg/L)	<2.5				
	Fluoride (F) (mg/L)	0.47				
	Nitrate (as N) (mg/L)	<0.025				
	Nitrite (as N) (mg/L)	<0.0050				
	Total Kjeldahl Nitrogen (mg/L)	0.271				
	Total Nitrogen (mg/L)	0.210				
	Total Phosphate as P (mg/L)	0.291				
	Sulfate (SO4) (mg/L)	114				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	5.71				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0568				
	Antimony (Sb)-Total (mg/L)	0.000255				
	Arsenic (As)-Total (mg/L)	0.00704				
	Barium (Ba)-Total (mg/L)	0.134				
	Beryllium (Be)-Total (mg/L)	<0.00020				
	Bismuth (Bi)-Total (mg/L)	<0.00050				
	Boron (B)-Total (mg/L)	0.135				
	Cadmium (Cd)-Total (mg/L)	0.000058				
	Calcium (Ca)-Total (mg/L)	87.4				
	Chromium (Cr)-Total (mg/L)	0.00196				
	Cobalt (Co)-Total (mg/L)	0.00059				
	Copper (Cu)-Total (mg/L)	0.00100				
	Iron (Fe)-Total (mg/L)	3.69				
	Lead (Pb)-Total (mg/L)	0.000486				
	Lithium (Li)-Total (mg/L)	0.0234				
	Magnesium (Mg)-Total (mg/L)	45.7				
	Manganese (Mn)-Total (mg/L)	2.76				
	Mercury (Hg)-Total (mg/L)	<0.000010				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973983-1	L973983-2	L973983-3	L973983-4	L973983-5
	Description					
	Sampled Date	25-JAN-11	25-JAN-11	25-JAN-11	25-JAN-11	25-JAN-11
	Sampled Time					
	Client ID	MCS-90	MW07-04A	MW07-04B	MW07-08A	MW07-08B
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	<0.000050	0.00561	0.00903	0.000488	0.00207
	Nickel (Ni)-Total (mg/L)	<0.00010	0.224	0.0223	0.00073	0.00637
	Phosphorus (P)-Total (mg/L)	<0.30	5.52	0.35	0.30	0.60
	Potassium (K)-Total (mg/L)	<0.050	9.44	2.52	1.45	3.54
	Selenium (Se)-Total (mg/L)	<0.00010	0.0017	0.00029	<0.00010	<0.00050 DLA
	Silicon (Si)-Total (mg/L)	<0.050	93.6	9.93	10.2	9.33
	Silver (Ag)-Total (mg/L)	<0.000010	0.00121	0.000026	<0.000010	<0.000050 DLA
	Sodium (Na)-Total (mg/L)	0.013	102	39.3	76.1	234
	Strontium (Sr)-Total (mg/L)	<0.00010	1.06	1.06	1.12	0.915
	Thallium (Tl)-Total (mg/L)	<0.000050	0.00182	0.000104	<0.000050	<0.00025 DLA
	Tin (Sn)-Total (mg/L)	<0.00010	<0.0010 DLA	0.00025	0.00027	<0.00050 DLA
	Titanium (Ti)-Total (mg/L)	<0.010	0.640	0.040	<0.010	<0.010
	Uranium (U)-Total (mg/L)	<0.000010	0.00729	0.00356	0.00222	0.000233
	Vanadium (V)-Total (mg/L)	<0.000050	0.316	0.00439	0.000489	0.00143
	Zinc (Zn)-Total (mg/L)	<0.0030	0.676	0.0190	0.0062	<0.015 DLA
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.0030	<0.030 DLA	0.477	0.0325	0.076
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.00050 DLA	0.000263	0.000110	0.00026
	Arsenic (As)-Dissolved (mg/L)	<0.000030	0.00305	0.0160	0.00660	0.0282
	Barium (Ba)-Dissolved (mg/L)	<0.000050	0.0842	0.672	0.133	0.217
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.0020 DLA	<0.00020	<0.00020	<0.0010 DLA
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.0050 DLA	<0.00050	<0.00050	<0.0025 DLA
	Boron (B)-Dissolved (mg/L)	0.0012	0.169	0.111	0.119	0.211
	Cadmium (Cd)-Dissolved (mg/L)	<0.000005	<0.00005 DLA	0.000168	0.000037	.000068 DLA
	Calcium (Ca)-Dissolved (mg/L)	<0.020	58.1	88.2	89.0	91.0
	Chromium (Cr)-Dissolved (mg/L)	<0.00010	<0.0010 DLA	0.00178	0.00023	<0.00050 DLA
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.0010 DLA	0.0150	0.00059	0.00588
	Copper (Cu)-Dissolved (mg/L)	<0.00050	<0.0050 DLA	0.00213	<0.00050	<0.0025 DLA
	Iron (Fe)-Dissolved (mg/L)	<0.010	0.029	0.043	3.60	13.9
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.00050 DLA	0.00246	0.000289	0.00110
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.050 DLA	<0.0050	0.0229	<0.025 DLA
	Magnesium (Mg)-Dissolved (mg/L)	<0.0050	16.1	75.1	45.9	39.4
	Manganese (Mn)-Dissolved (mg/L)	<0.000050	0.884	3.01	2.74	1.57
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	0.000022	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.00529	0.00354	0.000376	0.00165
	Nickel (Ni)-Dissolved (mg/L)	<0.00010	0.0021	0.0201	0.00056	0.00654
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	0.30	0.60
	Potassium (K)-Dissolved (mg/L)	<0.050	2.56	2.39	1.52	3.68

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973983-6				
	Description					
	Sampled Date	25-JAN-11				
	Sampled Time					
	Client ID	MW07-08C				
Grouping	**Analyte**					
WATER						
Total Metals	Molybdenum (Mo)-Total (mg/L)	0.000537				
	Nickel (Ni)-Total (mg/L)	0.00142				
	Phosphorus (P)-Total (mg/L)	0.30				
	Potassium (K)-Total (mg/L)	1.57				
	Selenium (Se)-Total (mg/L)	<0.00010				
	Silicon (Si)-Total (mg/L)	10.3				
	Silver (Ag)-Total (mg/L)	<0.000010				
	Sodium (Na)-Total (mg/L)	77.9				
	Strontium (Sr)-Total (mg/L)	1.13				
	Thallium (Tl)-Total (mg/L)	<0.000050				
	Tin (Sn)-Total (mg/L)	0.00030				
	Titanium (Ti)-Total (mg/L)	<0.010				
	Uranium (U)-Total (mg/L)	0.00222				
	Vanadium (V)-Total (mg/L)	0.000503				
	Zinc (Zn)-Total (mg/L)	0.0079				
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0338				
	Antimony (Sb)-Dissolved (mg/L)	0.000109				
	Arsenic (As)-Dissolved (mg/L)	0.00685				
	Barium (Ba)-Dissolved (mg/L)	0.133				
	Beryllium (Be)-Dissolved (mg/L)	<0.00020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	0.116				
	Cadmium (Cd)-Dissolved (mg/L)	0.000041				
	Calcium (Ca)-Dissolved (mg/L)	86.2				
	Chromium (Cr)-Dissolved (mg/L)	0.00028				
	Cobalt (Co)-Dissolved (mg/L)	0.00040				
	Copper (Cu)-Dissolved (mg/L)	<0.00050				
	Iron (Fe)-Dissolved (mg/L)	3.50				
	Lead (Pb)-Dissolved (mg/L)	0.000487				
	Lithium (Li)-Dissolved (mg/L)	0.0221				
	Magnesium (Mg)-Dissolved (mg/L)	45.3				
	Manganese (Mn)-Dissolved (mg/L)	2.70				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000342				
	Nickel (Ni)-Dissolved (mg/L)	0.00043				
	Phosphorus (P)-Dissolved (mg/L)	0.30				
	Potassium (K)-Dissolved (mg/L)	1.52				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L973983-1	L973983-2	L973983-3	L973983-4	L973983-5
	Description:					
	Sampled Date:	25-JAN-11	25-JAN-11	25-JAN-11	25-JAN-11	25-JAN-11
	Sampled Time:					
	Client ID:	MCS-90	MW07-04A	MW07-04B	MW07-08A	MW07-08B
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.0010 DLA	0.00034	0.00011	0.00133
	Silicon (Si)-Dissolved (mg/L)	<0.050	5.43	7.10	10.2	9.07
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.00010 DLA	<0.000010	<0.000010	<0.000050 DLA
	Sodium (Na)-Dissolved (mg/L)	<0.010	101	40.8	79.5	236
	Strontium (Sr)-Dissolved (mg/L)	<0.00010	0.558	1.01	1.10	0.962
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.00050 DLA	0.000067	<0.000050	<0.00025 DLA
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.0010 DLA	<0.00010	0.00016	<0.00050 DLA
	Titanium (Ti)-Dissolved (mg/L)	<0.010	0.011	0.012	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	0.00199	0.00380	0.00215	0.000244
	Vanadium (V)-Dissolved (mg/L)	<0.000050	0.00211	0.00226	0.000457	0.00165
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.030 DLA	0.0113	0.0038	<0.015 DLA

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS LABORATORY GROUP ANALYTICAL REPORT

	Sample ID	L973983-6				
	Description					
	Sampled Date	25-JAN-11				
	Sampled Time					
	Client ID	MW07-08C				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	Silicon (Si)-Dissolved (mg/L)	10.4				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	78.0				
	Strontium (Sr)-Dissolved (mg/L)	1.06				
	Thallium (Tl)-Dissolved (mg/L)	<0.000050				
	Tin (Sn)-Dissolved (mg/L)	0.00014				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	0.00214				
	Vanadium (V)-Dissolved (mg/L)	0.000416				
	Zinc (Zn)-Dissolved (mg/L)	0.0045				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
AIN	Approximate Result: Interference Suspected
DLA	Detection Limit Adjusted For required dilution
DLB	Detection limit was raised due to detection of analyte at comparable level in Method Blank.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 "Alkalinity"
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ALK-PCT-VA	Water	Alkalinity by Auto. Titration	APHA 2320 Alkalinity
This analysis is carried out using procedures adapted from APHA Method 2320 "Alkalinity". Total alkalinity is determined by potentiometric titration to a pH 4.5 endpoint. Bicarbonate, carbonate and hydroxide alkalinity are calculated from phenolphthalein alkalinity and total alkalinity values.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrite detection is by UV absorbance and not conductivity.			
ANIONS-NO3-IC-VA	Water	Nitrate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Specifically, the nitrate detection is by UV absorance and not conductivity.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Reference Information

Hardness is calculated from Calcium and Magnesium concentrations, and is expressed as calcium carbonate equivalents.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

N-TOT-COMBUST-VA Water Total Nitrogen by Combustion ASTM D5176-91, EN12260 (EU STD Method)

This analysis is carried out, on hydrochloric acid preserved samples, using procedures modified from ASTM Method D 5176-91 "Standard Test Method for Total Chemically Bound Nitrogen in Water by Pyrolysis and Chemiluminescence detection." Total Nitrogen is determined directly by pyrolysis with chemiluminescence detection using automated instrumentation.

NH3-F-VA Water Ammonia by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

PH-MAN-VA Water pH by Manual Meter APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

It is recommended that this analysis be conducted in the field.

PH-MAN-VA Water pH by Manual Meter APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode.

Reference Information

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-T-COL-VA Water Total Phosphate P by Color APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". All forms of phosphate are determined by the ascorbic acid colourimetric method. Dissolved ortho-phosphate (dissolved reactive phosphorous) is determined by direct measurement. Total phosphate (total phosphorous) is determined after persulphate digestion of a sample. Total dissolved phosphate (total dissolved phosphorous) is determined by filtering a sample through a 0.45 micron membrane filter followed by persulfate digestion of the filtrate.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-SIE-VA Water Total Kjeldahl Nitrogen by SIE APHA 4500-Norg (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 367 celcius with analysis using an ammonia selective electrode.

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS LABORATORY GROUP - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-055785

GLOSSARY OF REPORT TERMS

Surrogate A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg milligrams per kilogram based on dry weight of sample.
mg/kg wwt milligrams per kilogram based on wet weight of sample.
mg/kg lwt milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L milligrams per litre.
< - Less than.
D.L. The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

AL ANALY **Short Holding Time**

Env

Rush Processing

L973983-COFC

10-055785

Page 1 of 1

Report		Report Format / Distribution		Service Requested: (Rush subject to availability)
Company: Pacific Booker Minerals		Standard: X Other (specify):		Regular (Standard Turnaround Times))
Contact: Don Betton		Select: PDF X Excel X Digital Fax		Priority, Date Req'd: (Surcharges apply)
Address: 1166 Alberni St. Ste 1702 Vancouver		Email 1: bythebridge@gmail.com		Emergency (1 Business Day) - 100% Surcharge
		Email 2: blaidlaw@klohn.com		For Emergency < 1 Day, ASAP or Weekend - Contact ALS
Phone: 604.681.8556 Fax: 604.687.5995				Analysis Request
Invoice To Same as Report ? (circle) Yes or No (if No, provide details)		Client / Project Information		(Indicate Filtered or Preserved, F/P)
Copy of Invoice with Report? (circle) Yes or No		Job #:		
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone: Fax:		Quote #:		
Lab Work Order # (lab use only)	973983	ALS Contact: Anglais	Sampler: B	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General	TOC	Nutrients	total metal	dissolved metal							Number of Containers
	MCS-90	25-Jan		water	1	1	1	1	1							5
	MW07-04A	↓		↓	1	1	1	1	1							5
	MW07-04B				1	1	1	1	1							5
	MW07-08A				1	1	1	1	1							5
	MW07-08B				1	1	1	1	1							5
	MW07-08C				1	1	1	1	1							5

Special Instructions / Regulations / Hazardous Details

dissolved metals: Filter in lab. ☺

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: BLaidlaw	Date: 26Jan	Time: 1100	Received by: JP	Date: Jan 28/14	Time: 9:45	Temperature: 9 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

APPENDIX III

Calibration Record

Certificate of NIST Calibration

Campbell Scientific Certificate No: 274

Equipment:

Model:	CR10X
Model Description:	Datalogger
Serial Number:	44979
Calibration Procedures:	CR10X/500/510 Calibration Procedure Rev 2
	TST5662C

Customer:

RMA Number:	ER19941
Company Name:	Klohn Crippen Berger Ltd.
Address:	Suite 500, 2955 Virtual Way
	Vancouver, BC V5M 4X6
	CANADA

Instrument Calibration Condition

Received: In tolerance: ☐ Out of tolerance: ☐ Operational Failure: ☐

Returned: In tolerance: ☑

Before Values Requested: ☐

Recommended Calibration Schedule

If the customer has not requested a calibration interval, a non-mandatory recommended interval is provided. Based on past experience and assumed normal usage, it is recommended that this instrument be calibrated by due date stated below to ensure sustained accuracy and reliable performance.

Calibration Date: November 9, 2010 **Manufacturer's suggested recalibration date:** November 9, 2012

Report of Calibration Standards Used

(NIST traceable through certified documents on file)

Model Description	Serial No.	Calibration Due Date	Certificate Number
DC Calibrator Source	6059452	January 8, 2011	563574-00-1
Precision Oscillator	320984	February 2, 2011	320984-100202

CSC certifies the above instrument(s) meet or exceed published specifications and have been calibrated using standards and instruments whose accuracies are traceable to the National Institute of Standards and Technology, an accepted value of a natural physical constant or a ratio calibration technique. The collective measurement uncertainly of the calibration process exceeds a 4:1 ratio. The calibration of this instrument was performed in accordance with Campbell Scientific procedures. Measurements and information provided on this report are valid at the time of calibration only.

Responsible for content of certificate: Len Richter

Based on Report option requested by the client, some fields are intentionally left blank.

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11564 - 149 street - edmonton - alberta - T5M 1W7
tel 780.454.2505 fax 780.454.2655
www.campbellsci.ca

Instrument Data Report

Analog Inputs

Single-Ended (Full Scale)

Range	INPUT	TOLERANCE	MEASURED BEFORE CALIBRATION	MEASURED AFTER CALIBRATION
5 (2500mV)	+2500mV	+2497.5mV ⇔ +2502.5mV	☐	2501.5mV ☐
5 (2500mV)	-2500mV	-2497.5mV ⇔ -2502.5mV	☐	-2499.6mV ☐
4 (250mV)	+250mV	+249.75mV ⇔ +250.25mV	☐	250.11mV ☐
3 (25mV)	+25mV	+24.975mV ⇔ +25.025mV	☐	25.009mV ☐
2 (7.5mV)	+7.5mV	+7.4925mV ⇔ +7.5075mV	☐	7.5047mV ☐
1 (2.5mV)	+2.5mV	+2.4975mV ⇔ +2.5025mV	☐	2.5014mV ☐
1 (2.5mV)	-2.5mV	-2.4975mV ⇔ -2.5025mV	☐	-2.5011mV ☐

Differential (Full Scale)

5 2500mV	+2500mV	+2497.5mV ⇔ +2502.5mV	☐	2500.3mV ☐
5 (2500mV)	-2500mV	-2497.5mV ⇔ -2502.5mV	☐	-2500.2mV ☐
4 (250mV)	+250mV	+249.75mV ⇔ +250.25mV	☐	250.08mV ☐
3 (25mV)	+25mV	+24.975mV ⇔ +25.025mV	☐	25.015mV ☐
2 (7.5mV)	+7.5mV	+7.4925mV ⇔ +7.5075mV	☐	7.5027mV ☐
1 (2.5mV)	+2.5mV	+2.4975mV ⇔ +2.5025mV	☐	2.5011mV ☐
1 (2.5mV)	-2.5mV	-2.4975mV ⇔ -2.5025mV	☐	-2.5011mV ☐

Note: ☑ = Out of Tolerance or Operational Failure.

Real-Time Clock

TOLERANCE	MEASURED BEFORE CALIBRATION	MEASURED AFTER CALIBRATION
±23ppm	☐	0ppm ☐

Note: ☑ = Out of Tolerance or Operational Failure.

Additional Functions Tested Per Test Document

Analog:	Frequency:	Other:		
Excitation Channels	Pulse Counters	Power Supplies	Control Ports	
Analog Input Channels	Period	Serial I/O	Memory	

Laboratory temperature and relative humidity at time of calibration

Temperature: 22.1°C **Relative Humidity:** 26.3%

General Comments: _____

Calibrated by: Michael Dar

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Performance Evaluation Certificate

Equipment:	
Model:	HMP45C212
Model Description:	Temperature & RH Probe
Serial No:	C1908
Cable Length:	10FT
RMA#:	ER19941

Pre-adjustment check requested ☐
Probe tested with integral cable ☒
Probe tested with in-house cable ☐

READINGS PRIOR TO ADJUSTMENT				
Humidity Setpoint	**Probe Output RH**		**Allowable Range**	**Probe Output Temperature**
25%	24.1%	☐	23% ⇔ 27%	23.8°C
50%	49.3%	☐	48% ⇔ 52%	23.8°C
75%	74.4%	☐	73% ⇔ 77%	23.8°C
READINGS AFTER ADJUSTMENT				
Humidity Setpoint	**Probe Output RH**		**Allowable Range**	**Probe Output Temperature**
25%	25.0%	☐	23% ⇔ 27%	23.8°C
50%	50.1%	☐	48% ⇔ 52%	23.8°C
75%	75.0%	☐	73% ⇔ 77%	23.8°C

Note: ☒ = **Out of Tolerance or Operational Failure.**

General Comments: _____

Test Equipment	Serial #
Hygrogen Temp RH generator	122419
CR10X	44979

Date: November 16, 2010 **It is recommended that the sensor be checked every 12 months.**

Tested by:
Michael Dar

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June 30, 2011

Pacific Booker Minerals Inc.
#1702 - 1166 Alberni Street
Vancouver, British Columbia
V6E 3Z3

Mr. Don Betton
Project Manager

Dear Mr. Betton:

Morrison Copper/Gold Project
Spring 2011 Field Trip Report

The following report provides an overview of the spring field program conducted from May 31 to June 9, 2011. The purpose of this field program was to capture the 2011 spring freshet and lake turn-over in Morrison and Nakinilerak lakes.

We trust this field trip report provides the necessary level of detail and all data collected is appended and will be provided electronically. Should you have any questions regarding this report, please do not hesitate to contact Martine Long at (604) 251-8564 or mlong@klohn.com.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

DRAFT

Martine Long, R.P. Bio., P.Biol. (AB)
Project Manager

Klohn Crippen Berger Ltd. • 500 – 2955 Virtual Way • Vancouver BC V5M 4X6 • CANADA
604.669.3800 t • 604.669.3835 f • www.klohn.com

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1. INTRODUCTION

This report provides the details of the Pacific Booker Minerals (PBM) environmental spring field program from May 31 to June 9, 2011, conducted by Klohn Crippen Berger (KCB). The purpose of this field program was to target the spring freshet for water quality sampling and lake-turnover. The focus areas of this program included Morrison Lake and its tributaries and Nakinilerak Lake, including the inlet and outlet streams.

1.1 Personnel

Klohn Crippen Berger:	Martine Long (ML) Matt Mackinnon (MM) (June 6 to June 9)
Babine Barge:	James Godfrey (JG)
Lake Babine Nation:	Erica Austin (EA)

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1.2 Logistics

The field crew (ML, MM and EA) stayed at the Babine Lake Logging Camp from June 1 to June 9, 2011. MM stayed in camp from June 6 to June 9, 2011. JG commuted daily from Granisle via boat (provided by Babine Barge). Crew travelled daily from the Babine Lake Logging Camp via the Jinx and Hagan logging roads to Morrison Lake, and travelled via the Jinx and Nakinilerak logging roads when accessing Nakinilerak Lake. Crews travelled to site in two pick-up trucks and transferred into the ATV's and boat, as required.

Water samples were shipped to ALS via Purolator from Houston on June 6, 2011 and June 9, 2011.

1.2.1 Transport

Transport for the field program included:

- Rental truck from Smithers (full-size diesel truck with canopy) (KCB)
- Pick-up truck provided by Babine Barge
- Side-by-side (4-wheeler) provided by Babine Barge (June 1 to June 8, 2011)
- Boat with outboard engine provided by Babine Barge (June 1 to June 8, 2011)
- ATV provided by Babine Barge (June 6 to June 8)
- Jet boat provided by Babine Barge (JG travelled daily across Babine Lake)

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2. FIELD DATA COLLECTION

2.1 Meteorological Station

On June 7, 2011 KCB performed a diagnostic check of the weather station and the data logger was removed and replaced. The meteorological data is presented in Appendix I. During the diagnostic check the snow sensor did not appear to be working, it was removed and will be sent to Campbell Scientific for assessment. The diagnostic check on the weather station included the following:

- Date and time – both correct
- Julian day – 158
- Data logger time – correct
- Program signature – correct (01:4212.9)
- Battery voltage – good (12.743)
- Ambient air temperature – the sensor was not connected, this was re-connected and appeared to be correct (18.9°C)
- Relative humidity – correct (49.146%)
- Wind speed – working
- Wind direction – working
- Precipitation – tipping bucket was working and registering on sensor (0.254 for each tip)
- Snow depth gauge – did not appear to be working (was recording 0.99999) it was removed and bought back to Vancouver
- Snow depth – as above.

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2.2 Surface Water Quality and Hydrology

2.2.1 Morrison Lake

Morrison Lake was sampled for water quality and depth profiling on June 1 and June 2, 2011. Water quality samples were collected from five locations on the lake (Sites A, B, C, D and E) (Figure 1) from the surface (~50 cm) and deep (~30 m) and a third set of samples were collected from mid-depth (~15 m) at Site D (the proposed diffuser location). The water quality results are presented in Appendix II.

A YSI-600 probe was used to construct a vertical profile at each site on Morrison Lake. Physical parameters collected included temperature, pH, specific conductance, dissolved oxygen (% and mg/l), total dissolved solids (TDS) and oxygen reducing potential (ORP). The results are summarized in Table 2.1 and presented in Appendix III.

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Table 2.1 Summary of Depth Profile, Morrison Lake, June 2011

Site	Depth	Temp (°C)	pH	Spec. Cond (µs/cm)	TDS g/L	Salinity
Morrison A	Surface (0.5 m)	11.55	7.6	0.059	0.038	0.03
	Bottom (12 m)	5.19	7.37	0.089	0.058	0.04
Morrison B	Surface (0.5 m)	10.24	7.61	0.053	0.034	0.02
	Bottom (19.5 m)	4.18	7.67	0.065	0.042	0.03
Morrison C	Surface (0.5 m)	11.35	8	0.05	0.033	0.02
	Bottom (30 m)	4.05	7.46	0.06	0.039	0.03
Morrison D	Surface (0.5 m)	10.31	7.83	0.049	0.032	0.02
	Bottom (30 m)	3.92	7.31	0.061	0.04	0.03
Morrison E	Surface (0.5 m)	9.52	8.16	0.053	0.034	0.02
	Bottom (30 m)	4.22	7.42	0.076	0.049	0.04

Secchi depth (a measure of water transparency) was also recorded for each Morrison Lake site (Table 2.2).

Table 2.2 Transparency in Morrison Lake, June 2011

Site	Secchi Depth (m)
Morrison A	1.77
Morrison B	1.95
Morrison C	1.74
Morrison D	1.75
Morrison E	1.70

2.2.2 Nakinilerak Lake

Nakinilerak Lake was sampled for surface water quality and depth profiling on June 5, 2011. Water quality samples were collected from three locations on the lake (Nak 1, 2 and 3) (Figure 2) from the surface (~50 cm) and deep (12 m to 30 m) and a third set of samples were collected from mid-depth at Nak 2 (~5 m). Water quality was also collected from the inlet and outlet stream (Hautete Creek 1 and Hautete Creek 2) and Stream 10-2 (Figure 2). The water quality results are presented in Appendix II.

A YSI-600 probe was used to construct a vertical profile at each site on Nakinilerak Lake. Physical parameters collected included temperature, pH, specific conductance, dissolved oxygen (% and mg/l), TDS and ORP. The results are summarized in Table 2.3 and presented in Appendix III.

Table 2.3 Summary of Depth Profile, Nakinilerak Lake, June 2011

Site	Depth	Temp (°C)	DO %	DO mg/l	ORP	pH	Spec. Cond (µs/cm)	TDS g/L	Salinity
Nak 1	Surface (0.5 m)	11.24	101.5	11.11	208.3	8.88	0.062	0.041	0.03
	Bottom (12 m)	4.63	58.4	7.45	210.7	8.79	0.083	0.049	0.04
Nak 2	Surface (0.5 m)	9.57	98.9	11.28	150.2	9.25	0.059	0.039	0.03
	Bottom (24 m)	4.55	73.7	9.26	34.1	8.91	0.071	0.04	0.04
Nak 3	Surface (0.5 m)	7.54	92.2	11.04	145.1	9.21	0.059	0.038	0.03
	Bottom (28.5 m)	4.52	68.8	8.31	141.2	8.87	0.07	0.044	0.04

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The secchi depth was also recorded for each Nakinilerak Lake site (Table 2.4).

Table 2.4 Transparency in Nakinilerak Lake, June 2011

Site	Secchi Depth (m)
Nak 1	2.75
Nak 2	3.05
Nak 3	3.14

2.2.3 Streams and Rivers

Eight streams were sampled for water quality and all streams were scheduled for manual flow measurements. All hydrometric stations were downloaded (MCS-1, MCS-4, MCS-5, MCS-6, MCS-7, MCS-10 and Morrison River) (data provided electronically). The hydrometric station at Stream 5 (MCS-5) had been buried by a debris torrent and the creek diverted. The station was however downloaded and re-located (Appendix VII: Photo 32).

Water quality samples were collected for Stream 7 (upper and lower), Stream 8, Stream 9, Stream 10 (upper and lower), Hautete Creek 1 and 2, and the results are presented in Appendix II.

Manual flow measurements were scheduled to be collected at each of the above listed stream locations, however manual flow measurements were not collected from Morrison River, Hautete Creek 1 and 2 and lower Stream 10 due to high water. The inlet and outlet creeks to Nakinilerak Lake (Hautete 1 and 2 and lower Stream 10: Appendix VII: Photos 20-23) were 1.5 m to 2.5 m deep and could therefore not be measured for flow. Manual flow measurements for all other locations are presented in Appendix IV.

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2.3 Groundwater Wells

Twelve groundwater wells were selected to be sampled, all but two wells (MW07-07A and MW07-05B) were sampled for water quality and water level. Well MW07-07A was unable to be sampled as this well requires a different sampling method (i.e., typhoon pump) and MW07-05B the waterra tubing was stuck down in the well and could not be retrieved. Table 2.5 summarizes the wells sampled, water level, if water quality was collected and additional comments and observations. Water quality results are presented in Appendix II.

Table 2.5 Summary of Groundwater Wells, June 2011

Well No.	Water Level (m) (top of casing)	Stick-up (m)	Water Quality	Comments
MW08-02A	5.0	0.91	Y	
MW08-02B	0	0.9	Y	Artesian, well was overflowing
MW07-05A	22.6	0.92	Y	No waterra valve in tubing, sampled with a bailer
MW07-05B	-	-	N	Tubing stuck down in well, could not be retrieved.
MW07-08A	-	-	Y	No water level
MW07-08B	-	-	Y	No water level
MW08-03A	12.82	0.91	Y	
MW08-03B	-	-	N	Not sampled, very turbid
MW07-03A	0	0.89	Y	Sampled with bailer, need smaller sized waterra valve. Water level to top of casing
MW07-07B	30.7	0.97	Y	
MW08-01A	24.7	0.85	Y	
MW08-01B	20.9	0.85	N	Very turbid (see photo X) not sampled
MW07-01A	9.83	0.93	Y	
MW07-01B	0	0.90	Y	Overflowing

2.4 Cubes and Barrels

Cubes 1 to 4 and Barrels 1 and 2 were sampled for water quality and *in situ* measurements of temperature (°C), EC and pH recorded.

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Table 2.6 *In situ* Water Quality Measurements for Cubes and Barrels, June 2011

Cube/Barrel	Temp (°C)	EC	pH
Cube 1	9.2	1360	8.8
Cube 2	9.9	1350	8.7
Cube 3	9.4	480	9.0
Cube 4	9.5	1850	8.64
Barrel 1 (green)	9.8	230	9.69
Barrel 2 (blue)	10	700	8.32

2.5 Fish and Fish Habitat

Stream habitat cards (RISC) were completed for each stream in the project area, with the exception of Morrison River. The water level of Morrison River was very high and the substrate was not visible. Stream cards are presented in Appendix V. Fish assessments were conducted in the Nakinilerak Lake watershed. Minnow trapping was conducted in lower Stream 10 and Nakinilerak Lake outlet (Hautete 2), gill netting was conducted in Nakinilerak Lake and electrofishing was conducted in upper Stream 10. It was planned to conduct electrofishing in the Nakinilerak Lake inlet and outlet and lower Stream 10, however, water levels were too high and the streams were in flood. The following sections provide a summary of the fish capture efforts.

2.5.1 Minnow Trapping

Minnow trapping was conducted June 5, 2011 in lower Stream 10 (10-2) and Hautete 2 (outlet Nakinilerak Lake). Four minnow traps were set in lower Stream 10 and two in Hautete 2. Traps were baited with dry cat food in small ziplock bags and set overnight. In lower Stream 10, 37 redside shiner (*Richardsonius balteatus*) were captured ranging from 65 mm to 104 mm length and two northern pike minnow (*Ptychocheilus oregonensis*) ranging from 148 mm to 153 mm. No fish were captured in Hautete 2, this stream was in flood and there was limited refuge habitat available for juvenile fish at the time of

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sampling. Length and weight data are presented in Appendix VI and trapping specifications presented in Table 2.7.

Table 2.7 Minnow Trapping Specifications, June 2011

Trap No.	Location	UTM	Depth (m)	Habitat	Set-time (June 5)	Trap – out (June 6)	No. of fish/trap
1	Stream 10-2	09U 673279, 6126612	0.8	Pool	14:20	11:30	6
2	Stream 10-2	09U 673291, 6126622	0.6	Pool	14:25	11:45	21
3	Stream 10-2	09U 673353, 6126661	0.4	Pool	14:40	12:00	8
4	Stream 10-2	09U 673399, 6126644	0.8	Pool	14:45	12:10	3
5	Hautete 2	09U 674913, 6125811	0.3	LWD	16:15	16:30	0
6	Hautete 2	09U 674913, 6125811	0.45	Pool	16:18	16:35	0

2.5.2 Electrofishing

Electrofishing was planned for Hautete Creek 1 and 2 and lower Stream 10, however, these streams were in flood with water depths ranging from 1.5 m to 2.5 m. It was therefore not feasible to electrofish in these conditions. Electrofishing was conducted on June 8, 2011 in upper Stream 10 (MCS-10). The site was fished for just over 200 m for 216 seconds, no fish were caught. Many sections of the stream were sub-surface, and upstream of a large beaver dam.

2.5.3 Gill Netting

One gill net set was conducted on Nakinilerak Lake (UTM: 09U 673655, 6126860). It was set at 11:10 am and picked up at 12:15 pm. Seven adult rainbow trout (*Oncorhynchus mykiss*) were captured, ranging in length from 240 mm to 300 mm (Appendix VI).

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2.5.4 Angling

Angling was conducted when moving from site to site and while conducting the water quality sampling and profiling during the lake sampling. No fish were caught.

2.6 QA/QC

Four duplicate samples were submitted for QA/QC purposes. One stream, two lake and one groundwater well was tested for all parameters. In addition a complete set of de-ionized water samples were submitted and acidified in the field as well as a complete set of travel blanks which remained unopened.

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3. OTHER/LESSONS LEARNED

3.1 Staff Gauges

Staff gauges were established at the boat launch site on both Morrison Lake and Nakinilerak Lake. Although, no points of known elevation were located (Rescan benchmark at Morrison Lake) these gauges will provide a relative lake depth comparison between site visits. They were established as far out into the lake as possible as water levels were high, they were fixed into the substrate with a piece of angle iron and tied off to stumps/trees where possible.

3.2 Lessons Learned

The purpose of this section of the field work report is to document any lessons learnt from this field program to continually improve for future trips. Included are aspects that worked well, along with areas for improvement.

The following lists logistical aspects of the field program which worked well and are recommended for future trips:

- Pre-programming waypoints into the GPS;
- Having the Babine Barge personnel travel independently from the barge – this allowed for longer field days;
- Renting a full-size diesel truck with a canopy (camp has more diesel fuel for filling up than regular gas);
- Two KCB personnel – reduced the amount of time required in the field as we could split into two groups;

The following lists aspects of the field program that could have been improved with recommendations for future trips:

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- Have ALS send a copy of the documental transmittal of the bottle order to KCB/PBM so it can be reviewed prior to arriving in the field;

- Pre-fill out an example of the Chain-of-Custody form, to ensure all tests are accounted for;

- Investigate more accurate road maps for the Project area. Contact Western Forest Products for more recent/accurate maps;

- Ship as much gear ahead of time to reduce excess baggage charges. This proves difficult with rental gear, however, if some personal items (i.e., waders, etc) can be shipped ahead of time this reduces the number of items to be checked for the flight; and

- Investigate different/stronger string for tying off the tubing inside the groundwater well casing. The string had frayed and let go in some of the wells, in one instance the tubing was retrieved, but in another the tubing had slipped too far inside the well to be recovered.

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4. CLOSURE

This field work report is an instrument of service of Klohn Crippen Berger Ltd. The field work report has been prepared for the exclusive use of Pacific Booker Minerals inc. for specific application to the Morrison Copper/Gold Project. The contents of this document should not be used by any other party without the express written permission of Klohn Crippen Berger. Klohn Crippen Berger makes no warranty, expressed or implied, in relation to this field work report.

We trust the information contained in this field work report meets your present requirements. Please contact us if you have any questions or concerns regarding the above.

Yours truly,

KLOHN CRIPPEN BERGER LTD.

Martine Long, R.P.Bio, P.Biol (AB)
Project Manager

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FIGURES

Figure 1 Sampling Locations Spring Field Program, June 2011

Figure 2 Nakinilerak Lake Sampling Locations, June 2011

Z:\M\VCR\M09382A04 - Morrison EAC Support\400 Drawings\GIS\mxd\Spring_Sampling\Fig3.Sampling_Locations.mxd - 25/04/2011 @ 11:04:01 AM

665,000 667,500 670,000 672,500 675,000 677,500

6,130,000 6,127,500 6,125,000 6,122,500 6,120,000 6,117,500 6,115,000 6,112,500

N

Hautête 1
Tahlo Tributary Lake
Nak Lake 3
Nakinilerak Lake
Oval Lake
Nak Lake 2
Olympic Lake
Nakinilerak Tributary Lake
Olympic Lake
Stream 9
Morrison E
Stream 10-2
MCS - 10
MW07-01(A,B)
Stream 10-1
Nak Lake 1
Hautête 2
Morrison Lake
Pond Y
DH06-12
Pond Z
MCS - 8
Morrison D
Upper 7
MW07-02(A,B,C)
DH06-7
MCS - 7
MW07-03(A)
MW07-04(A,B)
Cubes & Barrels
Morrison C
MET STN
MCS - 6
MW07-08(A,C)
MW08-03(A)
Morrison B
Booker Lake
MW08-01(A,B)
MW07-07(A)
Pond X
MW07-05(A,B)
Ore Pond
MW08-02(A)
MCS - 5
MCS - 4
MW07-06(A,B)
Morrison A
Morrison River
MCS - 1

Yukon Territory
Northwest Territories
British Columbia
Alberta
Project Site
Pacific Ocean

Water Qaulity - Well
Water Quality - Lake or Stream
Hydrometric Station, Flow Sampling
No Spring Sampling
Meteorological Station
Cubes & Barrels

Major Contours
Minor Contours
Rivers and Streams
Detailed_Extent

NOT FOR CONSTRUCTION

0 2,500 m

Notes:
1. UTM Zone 9N, NAD83
2. Contour interval is 20m.
3. Map data is BC TRIM (1:20,000)

AS A MUTUAL PROTECTION TO OUR CLIENT, THE PUBLIC AND OURSELVES, ALL REPORTS AND DRAWINGS ARE SUBMITTED FOR THE CONFIDENTIAL INFORMATION OF OUR CLIENT FOR A SPECIFIC PROJECT AND AUTHORIZATION FOR USE AND/OR PUBLICATION OF DATA, STATEMENTS, CONCLUSIONS OR ABSTRACTS FROM OR REGARDING OUR REPORTS AND DRAWINGS IS RESERVED PENDING OUR WRITTEN APPROVAL.

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PROJECT
MORRISON COPPER/GOLD PROJECT

TITLE
2011 SPRING BASELINE MONITORING PROGRAM SAMPLING LOCATIONS

PROJECT No. M09382A04

FIG No. 1

Z:\M\VCR\M09382A04 - Morrison EAC Support\400 Drawings\GIS\mxd\Nak_Lake\Fig5.Nak_Lake_Samples_25apr11.mxd - 25/04/2011 @ 10:44:50 AM

Sampling Location

NOT FOR CONSTRUCTION

0 1,000 m

Notes:
1. UTM Zone 9N, NAD83
2. Imagery from Google Earth
3. Nak Lake 4 Sample location has been approximated but will be between Nak Lake 2 and 3 locations.

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Klohn Crippen Berger

PROJECT
MORRISON COPPER/GOLD PROJECT

TITLE
NAKINILERAK LAKE
PROPOSED SAMPLING LOCATIONS

PROJECT No. M09382A04

FIG No. 2

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APPENDIX I

Meteorological Data

Array ID	Year	Julian Day	Hour Minute	Air Temperature (Celsius) daily average	Relative Humidity (%) hourly average	Wind Speed (m/s) two-minute average	Wind Direction (degrees) two-minute vector average	Wind Direction Standard Deviation (degrees)	Wind Speed (m/s) hourly average	Wind Direction (degrees) hourly vector average	Wind Direction Standard Deviation (degrees)	Precipitation (mm) hourly total	Snow depth (m)	Quality for snow depth readings
60	2011	14	1200	-22.87	14.23	1.033	16.84	25.76	1.033	16.84	33.6	0	6999	0
60	2011	14	1300	-22.85	14.24	0.76	130.2	31.67	0.76	130.2	47.24	0	6999	0
60	2011	14	1400	-22.44	14.34	1.266	28.7	33.81	1.266	28.7	50.54	0	6999	0
60	2011	14	1500	-22.44	14.37	1.095	34.88	43.72	1.095	34.88	52.41	0	6999	0
60	2011	14	1600	-22.4	14.4	0.892	74.4	28.58	0.892	74.4	33.65	0	6999	0
60	2011	14	1700	-22.55	14.43	0.368	127.8	16.21	0.368	127.8	35.37	0	6999	0
60	2011	14	1800	-22.45	14.49	0.809	57.5	28.23	0.809	57.5	36.06	0	6999	0
60	2011	14	1900	-23	14.43	0.506	67.92	25.36	0.506	67.92	29.43	0	6999	0
60	2011	14	2000	-23.07	14.45	0.298	116.9	10.81	0.298	116.9	17.52	0	6999	0
60	2011	14	2100	-23.17	14.46	0.226	113.9	9.6	0.226	113.9	18.61	0	6999	0
60	2011	14	2200	-23.13	14.5	0	92.1	0.112	0	92.1	0.112	0	6999	0
60	2011	14	2300	-22.98	14.56	0.035	356	8.15	0.035	356	28.35	0	6999	0
60	2011	14	2400	-22.73	14.63	0.166	58.65	9.92	0.166	58.65	34.69	0	6999	0
411	2011	14	2400	4213	1.1	6999	12.12	2243	12.49	1119	0.562	5.174	1353	0
60	2011	15	100	-22.66	14.68	0.029	347.5	2.215	0.029	347.5	5.39	0	6999	0
60	2011	15	200	-22.61	14.73	0.105	110.9	6.04	0.105	110.9	9.27	0	6999	0
60	2011	15	300	-22.52	14.76	0.315	101.8	16.26	0.315	101.8	19.39	0	6999	0
60	2011	15	400	-22.39	14.82	0.303	89.6	17.35	0.303	89.6	23.28	0	6999	0
60	2011	15	500	-22.22	14.87	0.598	82.6	21.18	0.598	82.6	25.41	0	6999	0
60	2011	15	600	-22.12	14.91	0.627	94.7	18.65	0.627	94.7	22.92	0	6999	0
60	2011	15	700	-22.1	14.96	0.515	99.1	18.63	0.515	99.1	27.65	0	6999	0
60	2011	15	800	-21.89	15.12	0.567	94.5	22.58	0.567	94.5	32.17	0	6999	0
60	2011	15	900	-21.96	15.18	0.57	96.8	23.44	0.57	96.8	28.39	0	6999	0
60	2011	15	1000	-22.12	15.18	0.582	89.5	25.72	0.582	89.5	29.92	0	6999	0
60	2011	15	1100	-21.93	15.37	0.418	87.1	19.3	0.418	87.1	23.24	0	6999	0
60	2011	15	1200	-21.66	15.56	0.781	114.3	23.26	0.781	114.3	30.63	0	6999	0
60	2011	15	1300	-21.32	15.71	0.654	109.7	23.35	0.654	109.7	31.92	0	6999	0
60	2011	15	1400	-20.88	15.85	0.801	115.2	22.1	0.801	115.2	30.85	0	6999	0
60	2011	15	1500	-20.64	15.96	0.578	118.1	18.94	0.578	118.1	32.65	0	6999	0
60	2011	15	1600	-20.56	16.06	0.652	125.1	21.88	0.652	125.1	29.57	0	6999	0
60	2011	15	1700	-20.64	16.11	0.579	136.3	20.36	0.579	136.3	27.87	0	6999	0
60	2011	15	1800	-20.76	16.16	0.449	134.6	18.5	0.449	134.6	42.16	0	6999	0
60	2011	15	1900	-20.76	16.22	0.506	96.8	19.09	0.506	96.8	25.34	0	6999	0
60	2011	15	2000	-20.59	16.31	0.715	76.3	18.25	0.715	76.3	24.25	0	6999	0
60	2011	15	2100	-20.61	16.35	0.629	67.04	17.67	0.629	67.04	22.74	0	6999	0
60	2011	15	2200	-20.57	16.43	0.471	64.93	17.76	0.471	64.93	23.98	0	6999	0
60	2011	15	2300	-20.56	16.48	0.128	330.4	7.2	0.128	330.4	33.72	0	6999	0
60	2011	15	2400	-20.56	16.54	0.174	33.16	8.35	0.174	33.16	24.33	0	6999	0
411	2011	15	2400	4213	1.1	6999	12.12	40	12.19	1521	0.489	2.372	859	91.9
60	2011	16	100	-20.52	16.59	0.268	232.4	11.23	0.268	232.4	27.31	0	6999	0
60	2011	16	200	-20.69	16.61	0.198	102.3	15.22	0.198	102.3	17.52	0	6999	0
60	2011	16	300	-20.68	16.64	0.083	121.7	11.73	0.083	121.7	20.62	0	6999	0
60	2011	16	400	-20.76	16.66	0	300.4	0	0	300.4	0	0	6999	0
60	2011	16	500	-20.55	16.78	0	258.5	0.001	0	258.5	0.001	0	6999	0
60	2011	16	600	-20.27	16.88	0	0	0	0	0	0	0	6999	0
60	2011	16	700	-19.95	17.02	0.158	96.5	9.36	0.158	96.5	12.82	0	6999	0
60	2011	16	800	-19.87	17.09	0.039	224.6	7.87	0.039	224.6	13.71	0	6999	0
60	2011	16	900	-19.59	17.23	0.626	89.3	17.27	0.626	89.3	23.9	0	6999	0
60	2011	16	1000	-19.33	17.33	0.368	124.1	19	0.368	124.1	34.17	0	6999	0
60	2011	16	1100	-19	17.48	0.298	129.8	14.04	0.298	129.8	34.04	0	6999	0
60	2011	16	1200	-18.84	17.58	0.141	125.6	11.24	0.141	125.6	25.24	0	6999	0
60	2011	16	1300	-17.87	17.87	0.462	96.9	17.72	0.462	96.9	25.61	0	6999	0
60	2011	16	1400	-16.25	18.27	0.827	95.3	27.42	0.827	95.3	30.43	0	6999	0
60	2011	16	1500	-15.9	18.38	0.831	111	24.63	0.831	111	30.32	0	6999	0
60	2011	16	1600	-15.72	18.53	0.584	101.9	21.39	0.584	101.9	28.92	0	6999	0

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APPENDIX II

Water Quality Results (Summary of Tests and ALS Laboratory Results)

[Note: Some lab results not yet available]

STREAM	AVERAGE FLOW (m/s)	STAFF GAUGE (m)	IN SITU PARAMETERS			TEST					
			Temp (°C)	pH	EC (µs/cm)	General Parameters	Total Metals	Dissolved Metals	Nutrients	TOC	WAD/SAD Cyanide
MCS-1	0.92	0.34	5.2	7.67	40	-	-	-	-	-	-
Morrison River	-	*	13.2	7.62	70	-	-	-	-	-	-
MCS-4	0.45	0.15	6.2	7.61	150	-	-	-	-	-	-
MCS-5	0.23	0.38**	13.8	8.15	180	-	-	-	-	-	-
MCS-6	1.26	0.31	6.9	7.52	50	-	-	-	-	-	-
Stream 7 (upper)	0.73	0.2***	8.5	7.82	60	1	1	1	1	1	1
MCS-7 (lower)	0.49	0.35	8.5	7.81	70	1	1	1	1	1	
MCS-8	0.09	0.34	-	-	-	1	1	1	1	1	1
Stream 9	0.4	0.12***	14.2	7.95	110	1	1	1	1	1	1
Stream 10-2 (lower)	-	~1.5	15.1	7.38	70	1	1	1	1	1	1
MCS-10	0.12	0.07	9.1	7.06	30	1	1	1	1	1	
Hautete 1	-	~2.5-4	10.2	7.39	60	1	1	1	1	1	1
Hautete 2	-	~1.5	13.2	7.62	70	1	1	1	1	1	1
					Sub-total	**8**	**8**	**8**	**8**	**8**	**6**

*Morrison River in flood, water level approximately 15 cm over-top of staff gauge
**Hydrometric station buried by debris torrent, water level represents new position
***No staff gauge at this site, average depth

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MORRISON LAKE (WQ AND PROFILE)	TEST					
	General Parameters	**Total Metals**	**Dissolved Metals**	**Nutrients**	**TOC**	**WAD/SAD Cyanide**
Site A - Shallow	1	1	1	1	1	1
Site A - Deep	1	1	1	1	1	1
Site B - Shallow	1	1	1	1	1	
Site B - Deep	1	1	1	1	1	1
Site C – Shallow	1	1	1	1	1	1
Site C - Deep	1	1	1	1	1	
Site D – Shallow (@ diffuser)	1	1	1	1	1	1
Site D – Thermocline (@ diffuser)	1	1	1	1	1	
Site D – Deep (@ diffuser)	1	1	1	1	1	1
Site E - Shallow	1	1	1	1	1	
Site E - Deep	1	1	1	1	1	
Sub-total	**11**	**11**	**11**	**11**	**11**	**6**

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NAKINILERAK LAKE (WQ AND PROFILE)	TEST					
	General Parameters	Total Metals	Dissolved Metals	Nutrients	TOC	WAD/SAD Cyanide
Nak 1 – Shallow	1	1	1	1	1	1
Nak 1 - Mid	1	1	1	1	1	
Nak 1 - Deep	1	1	1	1	1	1
Nak 2 - Shallow	1	1	1	1	1	
Nak 2 - Deep	1	1	1	1	1	
Nak 3 - Shallow	1	1	1	1	1	1
Nak 3 - Deep	1	1	1	1	1	
Sub-total	**7**	**7**	**7**	**7**	**7**	**3**

CUBES AND BARRELS	IN SITU PARAMETERS			TEST					
	Temp (°C)	pH	EC (µs/cm)	General Parameters	Total Metals	Dissolved Metals	Nutrients	TOC	WAD/SAD Cyanide
Cube 1	9.2	8.80	1360	1	1	1		1	
Cube 2	9.9	8.70	1350	1	1	1		1	
Cube 3	9.4	9.0	480	1	1	1		1	
Cube 4	9.5	8.64	1850	1	1	1		1	
Barrel 1	9.8	9.69	230	1	1	1		1	
Barrel 2	10.0	8.32	700	1	1	1		1	
Sub-total				**6**	**6**	**6**		**6**	

DRAFT

GROUNDWATER WELLS	WATER LEVEL (m) (mbgs)	TEST					
		General Parameters	Total Metals	Dissolved Metals	Nutrients	TOC	WAD/SAD Cyanide
MW08-02A	4.09	1	1	1	1	1	
MW08-02B	0 (artesian)	1	1	1	1	1	
MW07-05A	21.68	1	1	1	1	1	
MW07-05B	-	0	0	0	0	0	
MW07-08A	-	1	1	1	1	1	
MW07-08B	-	1	1	1	1	1	
MW08-03A	11.91	1	1	1	1	1	
MW08-03B	-	0	0	0	0	0	
MW07-03A	0 (artesian)	1	1	1	1	1	
MW07-07B	29.73	1	1	1	1	1	
MW08-01B	20.05	1	1	1	1	1	
MW07-01A	8.9	1	1	1	1	1	
MW07-01B	0 (artesian)	1	1	1	1	1	
	Sub-total	**11**	**11**	**11**	**11**	**11**	

DRAFT

QA/QC	TEST					
	General Parameters	**Total Metals**	**Dissolved Metals**	**Nutrients**	**TOC**	**WAD/SAD Cyanide**
Blanks (deionized water)						
Field Blank	1	1	1	1	1	1
Travel Blank	1	1	1	1	1	1
Duplicates						
MCS-10 (D)	1	1	1	1	1	
Nak 3 – Surface B (B)	1	1	1	1	1	
Morrison – Shallow B (B)	1	1	1	1	1	
MW07-07A (D)	1	1	1	1	1	
Sub-total	**6**	**6**	**6**	**6**	**6**	**2**

TOTAL TESTS					
General Parameters	**Total Metals**	**Dissolved Metals**	**Nutrients**	**TOC**	**WAD/SAD Cyanide**
50	50	50	44	50	17

DRAFT

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3

Date Received: 08-JUN-11
Report Date: 24-JUN-11 16:26 (MT)
Version: FINAL

Client Phone: 604-681-8556

Certificate of Analysis

Lab Work Order #: L1014712
Project P.O. #: NOT SUBMITTED
Job Reference:
Legal Site Desc:
C of C Numbers: 10-154758

Andre Langlais
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1014712-1	L1014712-2	L1014712-3	L1014712-4	
Description	WATER	WATER	WATER	WATER	
Sampled Date	05-JUN-11	05-JUN-11	05-JUN-11	05-JUN-11	
Sampled Time	15:25	16:30	15:35	14:30	
Client ID	NAK 1 DEEP	HAUTETE 2	NAK 1 SHALLOW	NAK 1 MID	
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	80.0	63.7	65.1	65.0	
Hardness (as CaCO3) (mg/L)	39.3	29.6	30.4	30.1	
pH (pH)	7.68	8.00	7.96	7.98	
Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	<3.0	
Total Dissolved Solids (mg/L)	63	57	56	58	
Anions and Nutrients Acidity (as CaCO3) (mg/L)	5.0	3.7	2.6	3.7	
Alkalinity, Total (as CaCO3) (mg/L)	36.3	27.6	28.3	28.8	
Ammonia (as N) (mg/L)	0.0103	<0.0050	0.0095	<0.0050	
Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	
Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	
Fluoride (F) (mg/L)	0.033	0.033	0.033	0.034	
Nitrate (as N) (mg/L)	0.0774	<0.0050	<0.0050	<0.0050	
Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	
Total Kjeldahl Nitrogen (mg/L)	0.280	0.359	0.421	0.311	
Total Nitrogen (mg/L)	0.357	0.359	0.421	0.311	
Phosphorus (P)-Total (mg/L)	0.0095	0.0086	0.0088	0.0092	
Sulfate (SO4) (mg/L)	3.56	3.64	3.66	3.61	
Cyanides Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050	<0.0050		
Cyanide, Total (mg/L)	0.0052	<0.0050	<0.0050		
Organic / Inorganic Carbon Total Organic Carbon (mg/L)	5.38	6.82	6.73	7.20	
Total Metals Aluminum (Al)-Total (mg/L)	0.0365	0.0387	0.0438	0.0434	
Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	0.000101	<0.000050	
Arsenic (As)-Total (mg/L)	0.000194	0.000183	0.000177	0.000189	
Barium (Ba)-Total (mg/L)	0.0143	0.0121	0.0118	0.0122	
Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Boron (B)-Total (mg/L)	0.0077	0.0083	0.0078	0.0081	
Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Calcium (Ca)-Total (mg/L)	12.6	9.38	9.41	9.45	
Chromium (Cr)-Total (mg/L)	0.00021	0.00020	0.00023	0.00020	
Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Copper (Cu)-Total (mg/L)	0.00067	0.00083	0.00072	0.00081	
Iron (Fe)-Total (mg/L)	0.149	0.097	0.094	0.098	
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
Magnesium (Mg)-Total (mg/L)	2.09	1.73	1.69	1.75	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1014712-1	L1014712-2	L1014712-3	L1014712-4	
Description	WATER	WATER	WATER	WATER	
Sampled Date	05-JUN-11	05-JUN-11	05-JUN-11	05-JUN-11	
Sampled Time	15:25	16:30	15:35	14:30	
Client ID	NAK 1 DEEP	HAUTETE 2	NAK 1 SHALLOW	NAK 1 MID	
Grouping / **Analyte**					
WATER					
Total Metals Manganese (Mn)-Total (mg/L)	0.0499	0.00864	0.00901	0.0100	
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Molybdenum (Mo)-Total (mg/L)	0.000087	0.000134	0.000134	0.000121	
Nickel (Ni)-Total (mg/L)	0.00026	0.00029	0.00026	0.00026	
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	
Potassium (K)-Total (mg/L)	0.327	0.315	0.299	0.305	
Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Silicon (Si)-Total (mg/L)	2.96	2.56	2.50	2.57	
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Sodium (Na)-Total (mg/L)	1.79	1.77	1.71	1.79	
Strontium (Sr)-Total (mg/L)	0.0477	0.0457	0.0454	0.0460	
Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Tin (Sn)-Total (mg/L)	0.00020	<0.00010	<0.00010	0.00044	
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	
Uranium (U)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Vanadium (V)-Total (mg/L)	0.000141	0.000123	0.000152	0.000134	
Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0157	0.0203	0.0201	0.0209	
Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Arsenic (As)-Dissolved (mg/L)	0.000177	0.000166	0.000186	0.000185	
Barium (Ba)-Dissolved (mg/L)	0.0134	0.0114	0.0116	0.0115	
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	
Boron (B)-Dissolved (mg/L)	0.0069	0.0070	0.0072	0.0065	
Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Calcium (Ca)-Dissolved (mg/L)	12.4	9.16	9.43	9.29	
Chromium (Cr)-Dissolved (mg/L)	0.00012	0.00013	0.00014	0.00017	
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
Copper (Cu)-Dissolved (mg/L)	0.00050	0.00065	0.00069	0.00076	
Iron (Fe)-Dissolved (mg/L)	0.050	0.038	0.037	0.036	
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	
Magnesium (Mg)-Dissolved (mg/L)	2.00	1.64	1.68	1.67	
Manganese (Mn)-Dissolved (mg/L)	0.00415	0.000882	0.000768	0.000594	
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
Molybdenum (Mo)-Dissolved (mg/L)	0.000089	0.000117	0.000125	0.000136	
Nickel (Ni)-Dissolved (mg/L)	0.00022	0.00025	0.00023	0.00021	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1014712-1 WATER 05-JUN-11 15:25 NAK 1 DEEP	L1014712-2 WATER 05-JUN-11 16:30 HAUTETE 2	L1014712-3 WATER 05-JUN-11 15:35 NAK 1 SHALLOW	L1014712-4 WATER 05-JUN-11 14:30 NAK 1 MID	
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)	0.316	0.291	0.303	0.288	
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	
	Silicon (Si)-Dissolved (mg/L)	2.88	2.42	2.46	2.42	
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Sodium (Na)-Dissolved (mg/L)	1.71	1.69	1.70	1.73	
	Strontium (Sr)-Dissolved (mg/L)	0.0474	0.0446	0.0450	0.0449	
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	
	Tin (Sn)-Dissolved (mg/L)	0.00048	<0.00010	<0.00010	0.00035	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	
	Vanadium (V)-Dissolved (mg/L)	0.000073	0.000077	0.000085	0.000076	
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method			

Reference Information

6010B).

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA	Water	Diss. Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA	Water	Total Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-L-CFA-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

P-T-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-L-CFA-ED	Water	TKN in Water by Colour	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.

TN-CALC-VA	Water	Total Nitrogen (Calculation)	BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-154758

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

10-154758

L1014712-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
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Page ____ of ____

Report To		Report Format / Distribution		Service Request:(Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Booker Minerals	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	Don Betton	Select: PDF ✓	Excel ✓ Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni st	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	mlong@4clohn.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	206 905 9518 Fax:				

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L1014712	ALS Contact:	Sampler:

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Total Metals (P)	Diss. metals*	Nutrients COD/TKN/NH3 (P)	Cyanides WAD SAD (P)							Number of Containers
	Nak 1 Deep	05/06/11	15:25	Water	✓	✓	✓	✓	✓							5
	Hautete 2	"	16:30	"	✓	✓	✓	✓	✓							5
	Nak 1 Shallow	"	15:35	"	✓	✓	✓	✓	✓							5
	Nak 1 Mid	"	14:30	"	✓	✓	✓	✓	~~✓~~							4

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

* Filter Dissolved Metals in Lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. Long	June 6, 2011	07:00	Shayna	June 8	12:35	13 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

GENF 18.01 Front

WHITE PAPER CO. 604 951-3900

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3

Date Received: 08-JUN-11
Report Date: 24-JUN-11 16:32 (MT)
Version: FINAL

Client Phone: 604-681-8556

Certificate of Analysis

Lab Work Order #: L1014718
Project P.O. #: NOT SUBMITTED
Job Reference: M09382A05
Legal Site Desc:
C of C Numbers: 10-154757

Comments:

Andre Langlais
Account Manager

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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1014718-1	L1014718-2	L1014718-3	L1014718-4	L1014718-5
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	04-JUN-11	04-JUN-11	04-JUN-11	03-JUN-11	04-JUN-11
Sampled Time	09:30	09:20	09:25	16:50	09:15
Client ID	BARREL 1	CUBE 3	CUBE 4	MCS-7 LOWER	CUBE 2
Grouping / **Analyte**					
WATER					
Physical Tests Conductivity (uS/cm)	202	428	2000	63.2	1240
Hardness (as CaCO3) (mg/L)	79.4	211	1080	31.4	724
pH (pH)	8.64	8.46	8.23	8.16	8.23
Total Suspended Solids (mg/L)	<3.0	<3.0	4.0	<3.0	<3.0
Total Dissolved Solids (mg/L)	127	300	1990	69	1090
Anions and Nutrients Acidity (as CaCO3) (mg/L)	<1.0	<1.0	3.2	3.2	2.4
Alkalinity, Total (as CaCO3) (mg/L)	35.7	86.7	85.9	27.5	83.2
Ammonia (as N) (mg/L)	<0.0050	<0.0050	<0.0050	0.0076	<0.0050
Bromide (Br) (mg/L)	<0.050	<0.050	<1.0	<0.25	<0.50
Chloride (Cl) (mg/L)	<0.50	<0.50	<10	<2.5	<5.0
Fluoride (F) (mg/L)	0.087	0.098	0.43	0.11	0.25
Nitrate (as N) (mg/L)	<0.0050	0.939	3.47	<0.025	1.25
Nitrite (as N) (mg/L)	<0.0010	0.0332	0.045	<0.0050	0.041
Total Kjeldahl Nitrogen (mg/L)				0.240	
Total Nitrogen (mg/L)				0.240	
Phosphorus (P)-Total (mg/L)				0.0088	
Sulfate (SO4) (mg/L)	59.0	132	1310	<2.5	694
Cyanides Cyanide, Weak Acid Diss (mg/L)					
Cyanide, Total (mg/L)					
Organic / Inorganic Carbon Total Organic Carbon (mg/L)				14.9	
Total Metals Aluminum (Al)-Total (mg/L)	0.0139	0.0121	0.0189	0.119	0.0123
Antimony (Sb)-Total (mg/L)	0.000351	0.00130	0.00160	<0.000050	0.00120
Arsenic (As)-Total (mg/L)	0.00491	0.00408	0.00253	0.000319	0.00179
Barium (Ba)-Total (mg/L)	0.00451	0.0372	0.0342	0.0149	0.0206
Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00040 DLA	<0.00020	<0.00020
Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.0010 DLA	<0.00050	<0.00050
Boron (B)-Total (mg/L)	0.0136	0.0076	0.0108	0.0111	0.0096
Cadmium (Cd)-Total (mg/L)	0.000011	0.000037	0.000054	0.000023	0.000081
Calcium (Ca)-Total (mg/L)	16.5	53.4	242	10.3	152
Chromium (Cr)-Total (mg/L)	0.00028	0.00031	0.00024	0.00032	0.00020
Cobalt (Co)-Total (mg/L)	0.00036	<0.00010	0.00076	<0.00010	0.00065
Copper (Cu)-Total (mg/L)	0.0217	0.0246	0.0145	0.00141	0.0169
Iron (Fe)-Total (mg/L)	0.016	<0.010	0.059	0.121	0.019
Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	<0.00010 DLA	<0.000050	<0.000050
Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.010 DLA	<0.0050	0.0052
Magnesium (Mg)-Total (mg/L)	9.58	19.4	114	1.90	86.1

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014718-6	L1014718-7			
	Description	WATER	WATER			
	Sampled Date	03-JUN-11	04-JUN-11			
	Sampled Time	12:50	09:35			
	Client ID	STREAM 7 UPPER	BARREL 2			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	53.5	627			
	Hardness (as CaCO3) (mg/L)	27.0	304			
	pH (pH)	8.15	7.65			
	Total Suspended Solids (mg/L)	<3.0	<3.0			
	Total Dissolved Solids (mg/L)	64	474			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	3.3	5.7			
	Alkalinity, Total (as CaCO3) (mg/L)	22.9	21.8			
	Ammonia (as N) (mg/L)	0.0078	0.0082			
	Bromide (Br) (mg/L)	<0.25	<0.050			
	Chloride (Cl) (mg/L)	<2.5	0.66			
	Fluoride (F) (mg/L)	0.12	0.377			
	Nitrate (as N) (mg/L)	<0.025	1.90			
	Nitrite (as N) (mg/L)	<0.0050	0.0290			
	Total Kjeldahl Nitrogen (mg/L)	0.214				
	Total Nitrogen (mg/L)	0.214				
	Phosphorus (P)-Total (mg/L)	0.0067				
	Sulfate (SO4) (mg/L)	<2.5	294			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050				
	Cyanide, Total (mg/L)	0.0105				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	14.2				
Total Metals	Aluminum (Al)-Total (mg/L)	0.119	0.0197			
	Antimony (Sb)-Total (mg/L)	<0.000050	0.00399			
	Arsenic (As)-Total (mg/L)	0.000301	0.00264			
	Barium (Ba)-Total (mg/L)	0.0129	0.00775			
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	0.0083	0.0192			
	Cadmium (Cd)-Total (mg/L)	<0.000010	0.00273			
	Calcium (Ca)-Total (mg/L)	8.40	56.7			
	Chromium (Cr)-Total (mg/L)	0.00031	0.00029			
	Cobalt (Co)-Total (mg/L)	<0.00010	0.0213			
	Copper (Cu)-Total (mg/L)	0.00106	0.0790			
	Iron (Fe)-Total (mg/L)	0.135	0.035			
	Lead (Pb)-Total (mg/L)	<0.000050	0.000109			
	Lithium (Li)-Total (mg/L)	<0.0050	0.0060			
	Magnesium (Mg)-Total (mg/L)	1.57	43.5			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1014718-1	L1014718-2	L1014718-3	L1014718-4	L1014718-5
Description	WATER	WATER	WATER	WATER	WATER
Sampled Date	04-JUN-11	04-JUN-11	04-JUN-11	03-JUN-11	04-JUN-11
Sampled Time	09:30	09:20	09:25	16:50	09:15
Client ID	BARREL 1	CUBE 3	CUBE 4	MCS-7 LOWER	CUBE 2
Grouping / **Analyte**					
WATER					
Total Metals Manganese (Mn)-Total (mg/L)	0.00648	0.00192	0.0719	0.00382	0.0341
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.00440	0.0148	0.0150	0.000076	0.0183
Nickel (Ni)-Total (mg/L)	0.00363	0.00367	0.0314	0.00099	0.0396
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total (mg/L)	11.0	5.92	8.71	0.222	3.51
Selenium (Se)-Total (mg/L)	0.00128	0.00188	0.0149	<0.00010	0.0114
Silicon (Si)-Total (mg/L)	0.340	1.22	1.15	2.65	0.810
Silver (Ag)-Total (mg/L)	<0.000010	0.000017	<0.000020 DLA	<0.000010	0.000012
Sodium (Na)-Total (mg/L)	1.30	1.30	4.16	1.88	2.61
Strontium (Sr)-Total (mg/L)	0.0675	1.74	4.32	0.0351	1.35
Thallium (Tl)-Total (mg/L)	0.000129	<0.000050	0.00023	<0.000050	<0.000050
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00010	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	0.014	<0.010	0.011
Uranium (U)-Total (mg/L)	0.000469	0.00629	0.00445	0.000012	0.00161
Vanadium (V)-Total (mg/L)	0.000434	0.000328	0.00018	0.000240	0.000090
Zinc (Zn)-Total (mg/L)	0.0377	0.0927	0.0998	<0.0030	0.133
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0042	<0.0030	<0.0060 DLA	0.108	0.0044
Antimony (Sb)-Dissolved (mg/L)	0.000347	0.00132	0.00156	<0.000050	0.00123
Arsenic (As)-Dissolved (mg/L)	0.00476	0.00394	0.00216	0.000275	0.00166
Barium (Ba)-Dissolved (mg/L)	0.00429	0.0369	0.0347	0.0140	0.0201
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00040 DLA	<0.00020	<0.00020
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.0010 DLA	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)	0.0121	0.0061	0.0098	0.0102	0.0078
Cadmium (Cd)-Dissolved (mg/L)	<0.000010	0.000032	0.000073	<0.000010	0.000071
Calcium (Ca)-Dissolved (mg/L)	16.5	53.7	244	9.59	153
Chromium (Cr)-Dissolved (mg/L)	0.00020	0.00023	<0.00020 DLA	0.00026	0.00013
Cobalt (Co)-Dissolved (mg/L)	0.00015	<0.00010	0.00066	<0.00010	0.00058
Copper (Cu)-Dissolved (mg/L)	0.0182	0.0216	0.0121	0.00126	0.0140
Iron (Fe)-Dissolved (mg/L)	<0.010	<0.010	<0.010	0.101	<0.010
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.00010 DLA	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.010 DLA	<0.0050	<0.0050
Magnesium (Mg)-Dissolved (mg/L)	9.28	18.7	115	1.82	83.2
Manganese (Mn)-Dissolved (mg/L)	0.00104	0.000399	0.0639	0.00114	0.0321
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved (mg/L)	0.00429	0.0147	0.0147	<0.000050	0.0178
Nickel (Ni)-Dissolved (mg/L)	0.00319	0.00336	0.0308	0.00082	0.0371

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014718-6	L1014718-7			
	Description	WATER	WATER			
	Sampled Date	03-JUN-11	04-JUN-11			
	Sampled Time	12:50	09:35			
	Client ID	STREAM 7 UPPER	BARREL 2			
Grouping	**Analyte**					
WATER						
Total Metals	Manganese (Mn)-Total (mg/L)	0.00558	1.44			
	Mercury (Hg)-Total (mg/L)	<0.000010	0.000012			
	Molybdenum (Mo)-Total (mg/L)	0.000055	0.00170			
	Nickel (Ni)-Total (mg/L)	0.00084	0.130			
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30			
	Potassium (K)-Total (mg/L)	0.140	11.7			
	Selenium (Se)-Total (mg/L)	<0.00010	0.00497			
	Silicon (Si)-Total (mg/L)	2.29	1.04			
	Silver (Ag)-Total (mg/L)	<0.000010	0.000018			
	Sodium (Na)-Total (mg/L)	1.49	3.19			
	Strontium (Sr)-Total (mg/L)	0.0278	0.249			
	Thallium (Tl)-Total (mg/L)	<0.000050	0.000085			
	Tin (Sn)-Total (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	<0.000010	0.000885			
	Vanadium (V)-Total (mg/L)	0.000183	0.000107			
	Zinc (Zn)-Total (mg/L)	<0.0030	0.679			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0860	0.0083			
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	0.00399			
	Arsenic (As)-Dissolved (mg/L)	0.000257	0.00202			
	Barium (Ba)-Dissolved (mg/L)	0.0125	0.00708			
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	0.0078	0.0173			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	0.00248			
	Calcium (Ca)-Dissolved (mg/L)	8.35	56.1			
	Chromium (Cr)-Dissolved (mg/L)	0.00020	0.00011			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	0.0192			
	Copper (Cu)-Dissolved (mg/L)	0.00080	0.0638			
	Iron (Fe)-Dissolved (mg/L)	0.090	<0.010			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.0050	0.0058			
	Magnesium (Mg)-Dissolved (mg/L)	1.50	39.7			
	Manganese (Mn)-Dissolved (mg/L)	0.00110	1.30			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	<0.000050	0.00167			
	Nickel (Ni)-Dissolved (mg/L)	0.00080	0.118			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1014718-1 WATER 04-JUN-11 09:30 BARREL 1	L1014718-2 WATER 04-JUN-11 09:20 CUBE 3	L1014718-3 WATER 04-JUN-11 09:25 CUBE 4	L1014718-4 WATER 03-JUN-11 16:50 MCS-7 LOWER	L1014718-5 WATER 04-JUN-11 09:15 CUBE 2
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	10.7	5.75	8.90	0.216	3.44
	Selenium (Se)-Dissolved (mg/L)	0.00128	0.00187	0.0157	<0.00010	0.0111
	Silicon (Si)-Dissolved (mg/L)	0.311	1.18	1.12	2.56	0.776
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000020 DLA	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.27	1.26	4.12	1.82	2.54
	Strontium (Sr)-Dissolved (mg/L)	0.0659	1.75	4.29	0.0323	1.32
	Thallium (Tl)-Dissolved (mg/L)	0.000124	<0.000050	0.00023	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00020 DLA	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	0.013	<0.010	0.012
	Uranium (U)-Dissolved (mg/L)	0.000466	0.00636	0.00439	<0.000010	0.00156
	Vanadium (V)-Dissolved (mg/L)	0.000412	0.000308	0.00011	0.000222	0.000072
	Zinc (Zn)-Dissolved (mg/L)	0.0242	0.0880	0.0955	<0.0030	0.128

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014718-6	L1014718-7			
	Description	WATER	WATER			
	Sampled Date	03-JUN-11	04-JUN-11			
	Sampled Time	12:50	09:35			
	Client ID	STREAM 7 UPPER	BARREL 2			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30			
	Potassium (K)-Dissolved (mg/L)	0.126	10.6			
	Selenium (Se)-Dissolved (mg/L)	<0.00010	0.00484			
	Silicon (Si)-Dissolved (mg/L)	2.24	1.01			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	1.42	2.91			
	Strontium (Sr)-Dissolved (mg/L)	0.0277	0.247			
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	0.000082			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	<0.000010	0.000840			
	Vanadium (V)-Dissolved (mg/L)	0.000117	0.000059			
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	0.622			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			

Reference Information

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-L-CFA-ED Water Ammonia in Water by Colour APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

P-T-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

Reference Information

It is recommended that this analysis be conducted in the field.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-L-CFA-ED	Water	TKN in Water by Colour	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.

TN-CALC-VA	Water	Total Nitrogen (Calculation)	BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-154757

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

10-154757

L10147 18-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 1

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Booker Minerals	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	Don BeMon	Select: PDF ✓	Excel ✓ Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni st (# 1702)	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	mlong@klohm.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	2069059518 Fax:			Analysis Request	
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	M09382N05		
Company:		PO / AFE:			
Contact:		LSD:			
Address:					
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)	L1014718	ALS Contact:	Can Dang	Sampler:	M. Long

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General parameters	Dissolved Metals ✓	F Total Metals	F Nutrients (NH3/TKN)	F WAD Cyanides SOO							Number of Containers
	Barrel 1	04/06/11	09:30	Water	✓	✓	✓	✓								4
	CUBE 3	"	09:20	"	✓	✓	✓	✓								4
	CUBE 4	"	09:25	"	✓	✓	✓	✓								4
	MCS-7 Lower	03/06/11	16:50	"	✓	✓	✓	✓								4
	CUBE 2	04/06/11	09:15	"	✓	✓	✓	✓								4
	Stream 7 Upper	03/06/11	12:50	"	✓	✓	✓	✓	✓							5
	Barrel 2	04/06/11	09:35	"	✓	✓	✓	✓								4

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

✓ Filter Dissolved Metals in Lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. Long	June 6, 2011	07:00		June 8	12:40	11 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

WHITE PAPER CO. 604 961-3900

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3

Date Received: 08-JUN-11
Report Date: 24-JUN-11 16:21 (MT)
Version: FINAL REV. 2

Client Phone: 604-681-8556

Certificate of Analysis

Lab Work Order #: L1014719
Project P.O. #: NOT SUBMITTED
Job Reference: M09382A05
Legal Site Desc:
C of C Numbers: 10-154765, 10-154766, 10-154767

Comments:

24-JUN-11: Revised Report.
The Cadmium detection lmit is now reported at 0.00001 mg/L. No other data have changed.

Anna-Maria Karout

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1014719-1 02-JUN-11 14:24 MORRISON SITE B "SHALLOW" (A)	L1014719-2 02-JUN-11 14:30 MORRISON SITE B "SHALLOW" (B)	L1014719-3 02-JUN-11 13:30 MORRISON SITE C "SHALLOW"	L1014719-4 02-JUN-11 14:15 MORRISON SITE B "DEEP"	L1014719-5 02-JUN-11 10:05 STREAM 9
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Physical Tests	Conductivity (uS/cm)	55.2	56.2	51.4	58.7	96.7
	Hardness (as CaCO3) (mg/L)	26.3	26.1	24.5	28.5	49.2
	pH (pH)	8.08	7.98	7.93	7.61	7.97
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	<3.0	<3.0
	Total Dissolved Solids (mg/L)	60	64	62	52	82
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	3.4	4.0	2.4	5.3	3.0
	Alkalinity, Total (as CaCO3) (mg/L)	23.6	24.1	21.7	26.4	44.9
	Ammonia (as N) (mg/L)	0.0116	0.0076	0.0096	0.0137	0.0170
	Bromide (Br) (mg/L)	<0.25	<0.25	<0.25 DLM	<0.25	<0.25
	Chloride (Cl) (mg/L)	<2.5	<2.5	<2.5 DLM	<2.5	<2.5
	Fluoride (F) (mg/L)	<0.10	<0.10	<0.10 DLM	<0.10	0.13
	Nitrate (as N) (mg/L)	0.025	0.025	<0.025 DLM	0.042	<0.025
	Nitrite (as N) (mg/L)	<0.0050	<0.0050	<0.0050 DLM	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (mg/L)	0.412	0.473	0.541	0.379	0.481
	Total Nitrogen (mg/L)	0.438	0.498	0.541	0.421	0.481
	Phosphorus (P)-Total (mg/L)	0.0125	0.0093	0.0111	0.0103	0.0095
	Sulfate (SO4) (mg/L)	<2.5	2.5	<2.5 DLM	2.7	4.0
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050	<0.0050	<0.0050	<0.0050
	Cyanide, Total (mg/L)		0.0076	0.0074	0.0061	0.0068
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)					
	Total Organic Carbon (mg/L)	9.61	17.3	13.8	11.3	10.8
Total Metals	Aluminum (Al)-Total (mg/L)	0.157	0.169	0.157	0.113	0.0979
	Antimony (Sb)-Total (mg/L)	<0.000050	0.000084	0.000132	<0.000050	0.000052
	Arsenic (As)-Total (mg/L)	0.000336	0.000346	0.000320	0.000324	0.000731
	Barium (Ba)-Total (mg/L)	0.0175	0.0181	0.0171	0.0174	0.0377
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.0091	0.0092	0.0082	0.0094	0.0141
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	7.71	7.78	7.09	8.53	14.8
	Chromium (Cr)-Total (mg/L)	0.00042	0.00044	0.00035	0.00027	0.00026
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00107	0.00131	0.00150	0.00117	0.00122
	Iron (Fe)-Total (mg/L)	0.310	0.322	0.317	0.224	0.231
	Lead (Pb)-Total (mg/L)	0.000053	0.000077	0.000079	<0.000050	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014719-6	L1014719-7			
	Description					
	Sampled Date	02-JUN-11	02-JUN-11			
	Sampled Time	13:25	13:25			
	Client ID	MORRISON SITE C "DEEP"	FIELD BLANK			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	62.2	<2.0			
	Hardness (as CaCO3) (mg/L)	29.1	<0.50			
	pH (pH)	7.97	5.60			
	Total Suspended Solids (mg/L)	<3.0	<3.0			
	Total Dissolved Solids (mg/L)	62	<10			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	3.6	3.0			
	Alkalinity, Total (as CaCO3) (mg/L)	27.1	<2.0			
	Ammonia (as N) (mg/L)	0.0085	<0.0050			
	Bromide (Br) (mg/L)	<0.25	<0.050			
	Chloride (Cl) (mg/L)	<2.5	<0.50			
	Fluoride (F) (mg/L)	<0.10	<0.020			
	Nitrate (as N) (mg/L)	0.053	<0.0050			
	Nitrite (as N) (mg/L)	<0.0050	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	0.314	<0.050			
	Total Nitrogen (mg/L)	0.367	<0.0025			
	Phosphorus (P)-Total (mg/L)	0.0077	<0.0020			
	Sulfate (SO4) (mg/L)	2.7	<0.50			
Cyanides	Cyanide, Weak Acid Diss (mg/L)		<0.0050			
	Cyanide, Total (mg/L)		<0.0050			
Organic / Inorganic Carbon	Dissolved Organic Carbon (mg/L)		<0.50			
	Total Organic Carbon (mg/L)	10.1	0.51			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0766	<0.0030			
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050			
	Arsenic (As)-Total (mg/L)	0.000301	<0.000030			
	Barium (Ba)-Total (mg/L)	0.0176	<0.000050			
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	0.0092	<0.0050			
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Total (mg/L)	8.92	<0.020			
	Chromium (Cr)-Total (mg/L)	0.00028	<0.00010			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00112	<0.00050			
	Iron (Fe)-Total (mg/L)	0.169	<0.010			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L1014719-1	L1014719-2	L1014719-3	L1014719-4	L1014719-5
Description					
Sampled Date	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11
Sampled Time	14:24	14:30	13:30	14:15	10:05
Client ID	MORRISON SITE B "SHALLOW" (A)	MORRISON SITE B "SHALLOW" (B)	MORRISON SITE C "SHALLOW"	MORRISON SITE B "DEEP"	STREAM 9
Grouping **Analyte**					
WATER					
Total Metals Magnesium (Mg)-Total (mg/L)	1.72	1.75	1.65	1.83	2.59
Manganese (Mn)-Total (mg/L)	0.0115	0.0113	0.0112	0.00994	0.0111
Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Total (mg/L)	0.000118	0.000116	0.000098	0.000118	0.000098
Nickel (Ni)-Total (mg/L)	0.00089	0.00081	0.00078	0.00065	0.00090
Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
Potassium (K)-Total (mg/L)	0.376	0.376	0.369	0.346	0.276
Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Silicon (Si)-Total (mg/L)	2.71	2.72	2.71	2.64	2.80
Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Sodium (Na)-Total (mg/L)	1.79	1.80	1.75	1.82	2.11
Strontium (Sr)-Total (mg/L)	0.0415	0.0425	0.0398	0.0443	0.0530
Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Tin (Sn)-Total (mg/L)	<0.00010	<0.00010	<0.00010	0.00030	<0.00010
Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
Uranium (U)-Total (mg/L)	0.000011	0.000012	0.000011	<0.000010	0.000012
Vanadium (V)-Total (mg/L)	0.000369	0.000402	0.000354	0.000253	0.000366
Zinc (Zn)-Total (mg/L)	<0.0030	0.0046	<0.0030	<0.0030	<0.0030
Dissolved Metals Aluminum (Al)-Dissolved (mg/L)	0.0666	0.0625	0.0750	0.0457	0.0428
Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Arsenic (As)-Dissolved (mg/L)	0.000274	0.000275	0.000270	0.000275	0.000634
Barium (Ba)-Dissolved (mg/L)	0.0163	0.0164	0.0160	0.0166	0.0364
Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
Boron (B)-Dissolved (mg/L)	0.0081	0.0081	0.0079	0.0078	0.0138
Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Calcium (Ca)-Dissolved (mg/L)	7.75	7.72	7.16	8.49	15.4
Chromium (Cr)-Dissolved (mg/L)	0.00023	0.00017	0.00022	0.00019	0.00020
Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
Copper (Cu)-Dissolved (mg/L)	0.00100	0.00109	0.00114	0.00101	0.00113
Iron (Fe)-Dissolved (mg/L)	0.139	0.140	0.153	0.106	0.127
Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Magnesium (Mg)-Dissolved (mg/L)	1.69	1.66	1.60	1.78	2.61
Manganese (Mn)-Dissolved (mg/L)	0.00175	0.00177	0.00230	0.00122	0.000947
Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
Molybdenum (Mo)-Dissolved (mg/L)	0.000104	0.000101	0.000106	0.000108	0.000088

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014719-6	L1014719-7			
	Description					
	Sampled Date	02-JUN-11	02-JUN-11			
	Sampled Time	13:25	13:25			
	Client ID	MORRISON SITE C "DEEP"	FIELD BLANK			
Grouping	**Analyte**					
WATER						
Total Metals	Magnesium (Mg)-Total (mg/L)	1.89	<0.0050			
	Manganese (Mn)-Total (mg/L)	0.0100	<0.000050			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.000120	<0.000050			
	Nickel (Ni)-Total (mg/L)	0.00072	<0.00010			
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30			
	Potassium (K)-Total (mg/L)	0.354	<0.050			
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Total (mg/L)	2.59	<0.050			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	1.85	<0.010			
	Strontium (Sr)-Total (mg/L)	0.0469	<0.00010			
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050			
	Tin (Sn)-Total (mg/L)	0.00050	<0.00010			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010			
	Vanadium (V)-Total (mg/L)	0.000180	<0.000050			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0394				
	Antimony (Sb)-Dissolved (mg/L)	<0.000050				
	Arsenic (As)-Dissolved (mg/L)	0.000270				
	Barium (Ba)-Dissolved (mg/L)	0.0165				
	Beryllium (Be)-Dissolved (mg/L)	<0.00020				
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050				
	Boron (B)-Dissolved (mg/L)	0.0083				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010				
	Calcium (Ca)-Dissolved (mg/L)	8.66				
	Chromium (Cr)-Dissolved (mg/L)	0.00017				
	Cobalt (Co)-Dissolved (mg/L)	<0.00010				
	Copper (Cu)-Dissolved (mg/L)	0.00098				
	Iron (Fe)-Dissolved (mg/L)	0.089				
	Lead (Pb)-Dissolved (mg/L)	<0.000050				
	Lithium (Li)-Dissolved (mg/L)	<0.0050				
	Magnesium (Mg)-Dissolved (mg/L)	1.82				
	Manganese (Mn)-Dissolved (mg/L)	0.00130				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.000111				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L1014719-1 02-JUN-11 14:24 MORRISON SITE B "SHALLOW" (A)	L1014719-2 02-JUN-11 14:30 MORRISON SITE B "SHALLOW" (B)	L1014719-3 02-JUN-11 13:30 MORRISON SITE C "SHALLOW"	L1014719-4 02-JUN-11 14:15 MORRISON SITE B "DEEP"	L1014719-5 02-JUN-11 10:05 STREAM 9
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
WATER						
Dissolved Metals	Nickel (Ni)-Dissolved (mg/L)	0.00069	0.00058	0.00074	0.00059	0.00077
	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.359	0.358	0.361	0.339	0.273
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	2.48	2.48	2.50	2.45	2.66
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.77	1.71	1.74	1.77	2.15
	Strontium (Sr)-Dissolved (mg/L)	0.0420	0.0415	0.0395	0.0438	0.0540
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	0.00027	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000011
	Vanadium (V)-Dissolved (mg/L)	0.000154	0.000128	0.000160	0.000121	0.000225
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Aggregate Organics	COD (mg/L)					

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014719-6	L1014719-7			
	Description					
	Sampled Date	02-JUN-11	02-JUN-11			
	Sampled Time	13:25	13:25			
	Client ID	MORRISON SITE C "DEEP"	FIELD BLANK			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Nickel (Ni)-Dissolved (mg/L)	0.00057				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	0.343				
	Selenium (Se)-Dissolved (mg/L)	<0.00010				
	Silicon (Si)-Dissolved (mg/L)	2.48				
	Silver (Ag)-Dissolved (mg/L)	<0.000010				
	Sodium (Na)-Dissolved (mg/L)	1.81				
	Strontium (Sr)-Dissolved (mg/L)	0.0450				
	Thallium (Tl)-Dissolved (mg/L)	<0.000050				
	Tin (Sn)-Dissolved (mg/L)	0.00046				
	Titanium (Ti)-Dissolved (mg/L)	<0.010				
	Uranium (U)-Dissolved (mg/L)	<0.000010				
	Vanadium (V)-Dissolved (mg/L)	0.000106				
	Zinc (Zn)-Dissolved (mg/L)	<0.0030				
Aggregate Organics	COD (mg/L)		<20			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLM	Detection Limit Adjusted For Sample Matrix Effects
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-DOC-VA	Water	Dissolved organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)". Dissolved carbon (DOC) fractions are determined by filtering the sample through a 0.45 micron membrane filter prior to analysis.			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND
This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B

Reference Information

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

FE-TOT-LOW-ICP-VA Water Total Fe in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

HARDNESS-CALC-VA Water Hardness APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-DIS-LOW-CVAFS-VA Water Dissolved Mercury in Water by CVAFS(Low) EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA Water Total Mercury in Water by CVAFS(Low) EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA Water Dissolved Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA Water Diss. Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA Water Total Metals in Water by ICPMS(Low) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA Water Total Metals in Water by ICPMS (Ultra) EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-L-CFA-ED Water Ammonia in Water by Colour APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

P-T-COL-VA Water Total P in Water by Colour APHA 4500-P Phosphorous

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA Water Total Dissolved Solids by Gravimetric APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-L-CFA-ED Water TKN in Water by Colour APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.

TN-CALC-VA Water Total Nitrogen (Calculation) BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

TSS-VA Water Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-154765 10-154766 10-154767

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

10-154767

L1014719-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Booker Minerals	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	Don Betton	Select: PDF ✓ Excel ✓ Digital Fax			Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni street (#1702)	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	~~martine_long@hotmail~~ mlong@klohn.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	206 905 9518 Fax:				

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	M09382A05
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)	L1014719	ALS Contact: Can Dang	Sampler: M. Long

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	GEN. PARAMETERS	Dissolved Metals*	Total Metals	Nutrients COD/NH3/TKN	Cyanide (WAD/SAD)								Number of Containers
	MORRISON SITE B "Shallow" (A)	02/06/11	14:24	~~General~~ Water	✓												
	" " "Filter" in Lab"	"	"	Water		✓											
	" " " "	"	"	Water			✓										
	" " " "	"	"	"				✓									
	Morrison SITE B "Shallow" (B)	"	14:30	"	✓												
	" " " "	"	"	"					✓								
	" " → Filter in LAB	"	"	"		✓											
	" " " "	"	"	"			✓										
	" " " "	"	"	"				✓									
	MORRISON SITE C SHALLOW	"	13:30	"	✓												
	" " "	"	"	"		✓											
	" " "	"	"	"					✓								

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Filter dissolved metals in LAB

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: M. Long	Date: June 3 2011	Time: 07:00	Received by: Shayna	Date: June 8	Time: 12:26	Temperature: 13 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

WHITE PAPER CO. 604 951-3900

10-154766

ALS Environmental

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Booker Minerals	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	Don Bottom	Select: PDF ✓	Excel ✓ Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni St (#1702)	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	mlong@klohn.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	206 905 9518 Fax:			Analysis Request	
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	M09382A05		
Company:		PO / AFE:			
Contact:		LSD:			
Address:					
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: M. Long		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Dissolved Metals *	Total Metals P	Nutrients COD/NH3/TKN P	Cyanide (WAD/SAD) P	Number of Containers
	MORRISON SITE C SHALLOW	02/06/11	13:30	Water			✓			
	" " "	"	"	"				✓		
	MORRISON SITE B Deep	"	14:15	"	✓					
	" " "	"	"	"					✓	
	" " " Filter in lab	"	"	"		✓				
	" " "	"	"	"				✓		
	" " "	"	"	"			✓			
	STREAM 9	"	10:05	"	✓					
	"	"	"	"				✓		
	"	"	"	"			✓			
	" Filter in lab	"	"	"		✓				
	"	"	"	"					✓	

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

* Filter dissolved Metals in Lab *

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. Long	June 3, 2011	07:00	Shayna	June 8	12:26	13 °C				

WHITE PAPER CO. 604-951-3900

10-154765

ALS Environmental

L10147190-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Booker Minerals	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	Don Bethon	Select: PDF ✓	Excel ✓ Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni St (#1702)	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	mlong@klohn.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	2069059518 Fax:			Analysis Request	
Invoice To	Same as Report ? (circle) (Yes) or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) (Yes) or No	Job #:	M09382A05		
Company:		PO / AFE:			
Contact:		LSD:			
Address:					
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: M. Long		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Dissolved Metals *	Total Metals	Nutrients CoD/NH3/TKN	Cyanide WAD/SAD	DOC	COD/TKN	TOC/TN					Number of Containers
	MORRISON SITE C "DEEP"	02/06/11	13:25	Water	✓		✓										
	" "	"	"	"			✓										
	" " Filter in lab	"	"	"		✓											
	" "	"	"	"				✓									
	Field Blank			"	✓												
	" "			"					✓								
	" "						✓										
	" "									✓							
	" "										✓						
	" "											✓					

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

* Filter Dissolved Metals in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. LONG	June 3, 2011	07:00	Shayne	June 8	12:26	13 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY GENF 18.01 Front

WHITE PAPER CO. 604 951-3900

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3

Date Received: 08-JUN-11
Report Date: 24-JUN-11 16:24 (MT)
Version: FINAL REV. 2

Client Phone: 604-681-8556

Certificate of Analysis

Lab Work Order #: L1014720
Project P.O. #: NOT SUBMITTED
Job Reference: M09382A09
Legal Site Desc:
C of C Numbers: 10-154762, 10-154763, 10-154764

Comments:

24-JUN-11: Revised Report.
The Cadmium detection lmit is now reported at 0.00001 mg/L. No other data have changed.

Anna-Maria Karaut

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014720-1	L1014720-2	L1014720-3	L1014720-4	L1014720-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11
	Sampled Time	12:15	11:06	11:21	12:44	12:40
	Client ID	MORRISON SITE D "DEEP"	MORRISON SITE E "DEEP"	MORRISON SITE E "SHALLOW"	MORRISON SITE D "SHALLOW"	MORRISON SITE D " THERMOCLINE"
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	57.0	61.9	54.4	52.0	58.2
	Hardness (as CaCO3) (mg/L)	29.3	29.1	27.0	24.7	27.6
	pH (pH)	7.95	7.94	7.92	7.90	7.92
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	<3.0	<3.0
	Total Dissolved Solids (mg/L)	59	61	65	60	62
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	3.9	2.7	4.1	2.7	4.0
	Alkalinity, Total (as CaCO3) (mg/L)	24.9	27.7	23.2	22.1	25.8
	Ammonia (as N) (mg/L)	0.0204	0.0075	0.0086	0.0118	0.0119
	Bromide (Br) (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	Chloride (Cl) (mg/L)	<2.5	<2.5	<2.5	<2.5	<2.5
	Fluoride (F) (mg/L)	<0.10	<0.10	<0.10	0.10	0.10
	Nitrate (as N) (mg/L)	0.036	0.062	0.028	<0.025	0.048
	Nitrite (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Total Kjeldahl Nitrogen (mg/L)	0.305	0.615	0.522	0.548	0.310
	Total Nitrogen (mg/L)	0.341	0.677	0.550	0.548	0.358
	Phosphorus (P)-Total (mg/L)	0.0096	0.0069	0.0109	0.0122	0.0098
	Sulfate (SO4) (mg/L)	<2.5	2.6	2.5	<2.5	<2.5
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050			<0.0050	
	Cyanide, Total (mg/L)	0.0054			0.0086	
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	8.75	7.96	13.3	10.2	10.3
Total Metals	Aluminum (Al)-Total (mg/L)	0.0563	0.0834	0.151	0.167	0.131
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Arsenic (As)-Total (mg/L)	0.000289	0.000887	0.000316	0.000324	0.000340
	Barium (Ba)-Total (mg/L)	0.0186	0.0192	0.0177	0.0175	0.0181
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.0093	0.0096	0.0090	0.0091	0.0085
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	0.000013
	Calcium (Ca)-Total (mg/L)	8.89	8.71	7.65	7.31	8.33
	Chromium (Cr)-Total (mg/L)	0.00029	0.00027	0.00037	0.00036	0.00035
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00155	0.00099	0.00114	0.00118	0.00115
	Iron (Fe)-Total (mg/L)	0.148	0.330	0.322	0.343	0.262
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050	0.000050	0.000063	<0.000050
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Total (mg/L)	2.04	1.88	1.75	1.68	1.87

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014720-6	L1014720-7			
	Description	WATER	WATER			
	Sampled Date	01-JUN-11	01-JUN-11			
	Sampled Time	14:30	14:30			
	Client ID	MORRISON SITE A "DEEP"	MORRISON SITE A "SHALLOW"			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	65.6	60.0			
	Hardness (as CaCO3) (mg/L)	30.9	28.3			
	pH (pH)	7.92	7.94			
	Total Suspended Solids (mg/L)	14.7	<3.0			
	Total Dissolved Solids (mg/L)	63	62			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	2.7	3.8			
	Alkalinity, Total (as CaCO3) (mg/L)	28.2	26.2			
	Ammonia (as N) (mg/L)	0.0175	0.0092			
	Bromide (Br) (mg/L)	<0.25	<0.25			
	Chloride (Cl) (mg/L)	<2.5	<2.5			
	Fluoride (F) (mg/L)	<0.10	<0.10			
	Nitrate (as N) (mg/L)	0.061	<0.025			
	Nitrite (as N) (mg/L)	<0.0050	<0.0050			
	Total Kjeldahl Nitrogen (mg/L)	0.433	0.524			
	Total Nitrogen (mg/L)	0.493	0.524			
	Phosphorus (P)-Total (mg/L)	0.0286	0.0155			
	Sulfate (SO4) (mg/L)	3.0	2.6			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050	<0.0050			
	Cyanide, Total (mg/L)	0.0080	0.0080			
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	9.17	10.1			
Total Metals	Aluminum (Al)-Total (mg/L)	0.373	0.129			
	Antimony (Sb)-Total (mg/L)	0.000081	<0.000050			
	Arsenic (As)-Total (mg/L)	0.00145	0.000380			
	Barium (Ba)-Total (mg/L)	0.0233	0.0183			
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	0.0091	0.0089			
	Cadmium (Cd)-Total (mg/L)	0.000015	<0.000010			
	Calcium (Ca)-Total (mg/L)	9.15	8.52			
	Chromium (Cr)-Total (mg/L)	0.00061	0.00035			
	Cobalt (Co)-Total (mg/L)	0.00018	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00225	0.00146			
	Iron (Fe)-Total (mg/L)	0.931	0.265			
	Lead (Pb)-Total (mg/L)	0.000244	0.000052			
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050			
	Magnesium (Mg)-Total (mg/L)	2.06	1.87			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014720-1	L1014720-2	L1014720-3	L1014720-4	L1014720-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11
	Sampled Time	12:15	11:06	11:21	12:44	12:40
	Client ID	MORRISON SITE D "DEEP"	MORRISON SITE E "DEEP"	MORRISON SITE E "SHALLOW"	MORRISON SITE D "SHALLOW"	MORRISON SITE D " THERMOCLINE"
Grouping	**Analyte**					
WATER						
Total Metals	Manganese (Mn)-Total (mg/L)	0.00522	0.0399	0.0115	0.0117	0.00978
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000126	0.000120	0.000112	0.000102	0.000124
	Nickel (Ni)-Total (mg/L)	0.00063	0.00058	0.00071	0.00071	0.00071
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	0.364	0.340	0.383	0.373	0.371
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	2.49	2.52	2.67	2.71	2.71
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	2.06	1.89	1.81	1.74	1.90
	Strontium (Sr)-Total (mg/L)	0.0487	0.0476	0.0416	0.0406	0.0447
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Total (mg/L)	0.00071	0.00048	<0.00010	<0.00010	0.00145
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	<0.000010	0.000011	0.000010	0.000011	<0.000010
	Vanadium (V)-Total (mg/L)	0.000134	0.000232	0.000338	0.000399	0.000330
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0299	0.0313	0.0664	0.0731	0.0546
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Arsenic (As)-Dissolved (mg/L)	0.000268	0.000340	0.000295	0.000287	0.000276
	Barium (Ba)-Dissolved (mg/L)	0.0167	0.0169	0.0167	0.0159	0.0165
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.0091	0.0080	0.0084	0.0078	0.0078
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	8.69	8.60	8.03	7.21	8.13
	Chromium (Cr)-Dissolved (mg/L)	0.00018	0.00016	0.00019	0.00022	0.00017
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00125	0.00086	0.00096	0.00104	0.00096
	Iron (Fe)-Dissolved (mg/L)	0.080	0.088	0.149	0.162	0.120
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	1.85	1.84	1.68	1.62	1.77
	Manganese (Mn)-Dissolved (mg/L)	0.000779	0.00236	0.00204	0.00234	0.00180
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000117	0.000111	0.000101	0.000098	0.000108
	Nickel (Ni)-Dissolved (mg/L)	0.00049	0.00052	0.00057	0.00059	0.00060

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014720-6	L1014720-7			
	Description	WATER	WATER			
	Sampled Date	01-JUN-11	01-JUN-11			
	Sampled Time	14:30	14:30			
	Client ID	MORRISON SITE A "DEEP"	MORRISON SITE A "SHALLOW"			
Grouping	**Analyte**					
WATER						
Total Metals	Manganese (Mn)-Total (mg/L)	0.0388	0.0111			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.000155	0.000118			
	Nickel (Ni)-Total (mg/L)	0.00094	0.00061			
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30			
	Potassium (K)-Total (mg/L)	0.407	0.374			
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Total (mg/L)	3.20	2.61			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	2.09	1.84			
	Strontium (Sr)-Total (mg/L)	0.0481	0.0457			
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050			
	Tin (Sn)-Total (mg/L)	0.00062	0.00017			
	Titanium (Ti)-Total (mg/L)	0.013	<0.010			
	Uranium (U)-Total (mg/L)	0.000019	<0.000010			
	Vanadium (V)-Total (mg/L)	0.000891	0.000291			
	Zinc (Zn)-Total (mg/L)	0.0037	<0.0030			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0371	0.0490			
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Arsenic (As)-Dissolved (mg/L)	0.000361	0.000293			
	Barium (Ba)-Dissolved (mg/L)	0.0191	0.0168			
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	0.0083	0.0088			
	Cadmium (Cd)-Dissolved (mg/L)	0.000014	<0.000010			
	Calcium (Ca)-Dissolved (mg/L)	8.94	8.35			
	Chromium (Cr)-Dissolved (mg/L)	0.00018	0.00019			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00149	0.00126			
	Iron (Fe)-Dissolved (mg/L)	0.106	0.114			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050			
	Magnesium (Mg)-Dissolved (mg/L)	2.08	1.82			
	Manganese (Mn)-Dissolved (mg/L)	0.00270	0.00111			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000119	0.000112			
	Nickel (Ni)-Dissolved (mg/L)	0.00053	0.00061			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014720-1	L1014720-2	L1014720-3	L1014720-4	L1014720-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11	02-JUN-11
	Sampled Time	12:15	11:06	11:21	12:44	12:40
	Client ID	MORRISON SITE D "DEEP"	MORRISON SITE E "DEEP"	MORRISON SITE E "SHALLOW"	MORRISON SITE D "SHALLOW"	MORRISON SITE D " THERMOCLINE"
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.351	0.334	0.358	0.346	0.347
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	2.41	2.42	2.44	2.48	2.44
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.87	1.87	1.75	1.73	1.80
	Strontium (Sr)-Dissolved (mg/L)	0.0469	0.0467	0.0432	0.0398	0.0438
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	0.00063	0.00041	<0.00010	<0.00010	0.00130
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Dissolved (mg/L)	0.000089	0.000094	0.000136	0.000160	0.000123
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014720-6	L1014720-7			
	Description	WATER	WATER			
	Sampled Date	01-JUN-11	01-JUN-11			
	Sampled Time	14:30	14:30			
	Client ID	MORRISON SITE A "DEEP"	MORRISON SITE A "SHALLOW"			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30			
	Potassium (K)-Dissolved (mg/L)	0.383	0.396			
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Dissolved (mg/L)	2.44	2.39			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	2.17	1.82			
	Strontium (Sr)-Dissolved (mg/L)	0.0470	0.0443			
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050			
	Tin (Sn)-Dissolved (mg/L)	0.00054	0.00016			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010			
	Vanadium (V)-Dissolved (mg/L)	0.000171	0.000132			
	Zinc (Zn)-Dissolved (mg/L)	<0.0030	<0.0030			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method			

Reference Information

6010B).

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA	Water	Diss. Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA	Water	Total Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-L-CFA-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

P-T-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-L-CFA-ED	Water	TKN in Water by Colour	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.

TN-CALC-VA	Water	Total Nitrogen (Calculation)	BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-154762 10-154763 10-154764

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

10-154764

L10147 20-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Page 1 of 3

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)
Company:	Pacific Boulder Minerals	Standard: ✓	Other (specify):	✓ Regular (Standard Turnaround Times - Business Days)
Contact:	Dan Betton	Select: PDF ✓	Excel ✓ Digital Fax	Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni St (# 702)	Email 1:	bythebridge@gmail.com	Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
		Email 2:	mlong@ycloth.com	Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	206 905 9518 Fax:			**Analysis Request**
Invoice To	Same as Report ? (circle) (Yes) or No (if No, provide details)	**Client / Project Information**		(Indicate Filtered or Preserved, F/P)
	Copy of Invoice with Report? (circle) (Yes) or No	Job #:	M09382A05	
Company:		PO / AFE:		
Contact:		LSD:		
Address:				
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)	L1014720	**ALS Contact:**	**Sampler:** M. Long	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General parameters	Dissolved Metals *	P Total Metals	P Nutrients COD NH3 TKN	P Cyanide WAD	Number of Containers
	MORRISON SITE D "DEEP"	02/06/11	12:15	Water	✓					
	" " "	"	"	"					✓	
	" " " Filter in lab	"	"	"		✓				
	" " "	"	"	"				✓		
	" " "	"	"	"			✓			
	MORRISON SITE E "DEEP"	"	11:06	"	✓					
	" " " Filter in lab	"	"	"		✓				
	" " "	"	"	"			✓			
	" " "	"	"	"				✓		
	MORRISON SITE E "SHALLOW"	"	11:21	"	✓					
	" " "	"	"	"			✓			
	" " " Filter in lab	"	"	"		✓				

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

* Filter Dissolved metals in lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. Long	June 3, 2011	0700	Shayna D.	June 8	12:38	13 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION | WHITE - LABORATORY COPY | YELLOW - CLIENT COPY | GENF 18.01 Front

WHITE PAPER CO. 604 951-3900

10-154763

ALS Environmental

L1014720-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Booker Minerals	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	Don Betton	Select: PDF ✓	Excel ✓ Digital Fax		Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni St (#1702)	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	rklong@yclotn.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	206 905 9518 Fax:				

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		ALS Contact:	Sampler: M. Long

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Dissolved Metals *	Total Metals P	Nutrients Cob/NH3/TKN P	Cyanide WAD SAD P								Number of Containers
	MORRISON SITE E "Shallow"	02/06/11	11:21	Water	✓												
	" " "	"	"	"			✓										
	" " "	"	"	"		✓											
	" " "	"	"	"				✓									
	MORRISON SITE D Shallow	"	12:44	"	✓												
	" " "	"	"	"					✓								
	" " "	"	"	"			✓										
	" " "	"	"	"		✓											
	" " "	"	"					✓									
	MORRISON SITE D Thermocline	"	12:40	"	✓												
	" " "	"	"	"		✓											
	" " "	"	"				✓										

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

* Filter Dissolved Metals in Lab *

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: M. Long	Date: June 3, 2011	Time: 0700	Received by: Shayna	Date: June 8	Time: 12:38	Temperature: 13 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

WHITE PAPER CO. 604 951-3900

10-154762

ALS Environmental

L1D14720-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Booker Minerals	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	Dan Bethan	Select: PDF ✓	Excel ✓ Digital Fax		Priority (2-4 Business Days) - 50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni St	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days) - 100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	mlong@klohn.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	Fax:			Analysis Request	
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	M09382A05		
Company:		PO / AFE:			
Contact:		LSD:			
Address:					
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)		ALS Contact:	Sampler:		

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Dissolved Metals &	Total Metals	Nutrients (CoD/NH3/TKN)	Cyanide WAD								Number of Containers
	Morrison SITE D Thermocline	02/06/11	12:40	Water				F									
	Morrison SITE A Deep	01/06/11	14:30	"	F												
	" " "	"	"	"					F								
	" " "	"	"	"			F										
	" " " Filter inlab	"	"	"		F											
	" " "	"	"					F									
	Morrison SITE A Shallow	"	"	"	F												
	" " "	"	"	"					F								
	" " "	"	"	"			F										
	" " "	"	"	"		F											
	" " "	"	"	"				F									

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

* Filter Dissolved Metals in Lab *

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SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. Long	June 3 2011	07:00	Shayne	June 8	12:38	13 °C				

WHITE PAPER CO. 604 951-3900

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3

Date Received: 08-JUN-11
Report Date: 24-JUN-11 16:25 (MT)
Version: FINAL REV. 2

Client Phone: 604-681-8556

Certificate of Analysis

Lab Work Order #:	**L1014721**
Project P.O. #:	NOT SUBMITTED
Job Reference:	M09382A05
Legal Site Desc:	
C of C Numbers:	10-154759, 10-154760, 10-154761

Comments:

24-JUN-11: Revised Report.
The Cadmium detection lmit is now reported at 0.00001 mg/L. No other data have changed.

Anna-Maria Karaut

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ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014721-1	L1014721-2	L1014721-3	L1014721-4	L1014721-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	05-JUN-11	05-JUN-11	05-JUN-11	05-JUN-11	05-JUN-11
	Sampled Time	14:10	13:35	13:30	12:40	12:35
	Client ID	STREAM 10-2	NAK 2 SHALLOW	NAK 2 DEEP	NAK 3 SHALLOW (B)	NAK 3 SHALLOW (A)
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	59.4	61.6	64.4	63.1	63.2
	Hardness (as CaCO3) (mg/L)	29.9	28.8	29.7	28.9	29.2
	pH (pH)	7.89	7.97	7.93	7.98	7.96
	Total Suspended Solids (mg/L)	<3.0	<3.0	<3.0	<3.0	<3.0
	Total Dissolved Solids (mg/L)	66	55	60	50	56
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	3.0	3.6	3.2	3.2	2.8
	Alkalinity, Total (as CaCO3) (mg/L)	27.3	27.2	28.6	27.8	27.7
	Ammonia (as N) (mg/L)	0.0155	<0.0050	<0.0050	0.0060	0.0074
	Bromide (Br) (mg/L)	<0.050	<0.050	<0.050	<0.050	<0.050
	Chloride (Cl) (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50
	Fluoride (F) (mg/L)	0.042	0.032	0.032	0.033	0.033
	Nitrate (as N) (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Nitrite (as N) (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Total Kjeldahl Nitrogen (mg/L)	0.529	0.244	0.262	0.337	0.355
	Total Nitrogen (mg/L)	0.529	0.244	0.262	0.337	0.355
	Phosphorus (P)-Total (mg/L)	0.0177	0.0073	0.0063	0.0064	0.0072
	Sulfate (SO4) (mg/L)	2.30	3.03	3.04	3.01	3.01
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050				<0.0050
	Cyanide, Total (mg/L)	0.0088				0.0050
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	13.2	8.21	7.39	8.43	7.73
Total Metals	Aluminum (Al)-Total (mg/L)	0.132	0.0361	0.0252	0.0325	0.0315
	Antimony (Sb)-Total (mg/L)	0.000072	<0.000050	0.000091	<0.000050	0.000531
	Arsenic (As)-Total (mg/L)	0.000366	0.000174	0.000167	0.000168	0.000192
	Barium (Ba)-Total (mg/L)	0.0200	0.0112	0.0115	0.0113	0.0112
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Total (mg/L)	0.0072	0.0076	0.0076	0.0077	0.0074
	Cadmium (Cd)-Total (mg/L)	0.000014	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Total (mg/L)	9.06	8.83	9.26	9.10	8.82
	Chromium (Cr)-Total (mg/L)	0.00035	0.00017	0.00031	0.00018	0.00024
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Total (mg/L)	0.00114	0.00063	0.00064	0.00061	0.00064
	Iron (Fe)-Total (mg/L)	0.201	0.068	0.059	0.065	0.064
	Lead (Pb)-Total (mg/L)	0.000070	<0.000050	0.000085	<0.000050	0.000155
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Total (mg/L)	1.88	1.62	1.73	1.70	1.64

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014721-6	L1014721-7			
	Description	WATER	WATER			
	Sampled Date	05-JUN-11	05-JUN-11			
	Sampled Time	11:35	12:30			
	Client ID	HAUTETE 1	NAK 3 DEEP			
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	52.2	66.7			
	Hardness (as CaCO3) (mg/L)	24.2	30.6			
	pH (pH)	7.88	7.90			
	Total Suspended Solids (mg/L)	<3.0	<3.0			
	Total Dissolved Solids (mg/L)	54	57			
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	3.9	2.9			
	Alkalinity, Total (as CaCO3) (mg/L)	22.6	29.9			
	Ammonia (as N) (mg/L)	0.0066	0.0097			
	Bromide (Br) (mg/L)	<0.25	<0.050			
	Chloride (Cl) (mg/L)	<2.5	<0.50			
	Fluoride (F) (mg/L)	0.10	0.034			
	Nitrate (as N) (mg/L)	<0.025	0.0088			
	Nitrite (as N) (mg/L)	<0.0050	<0.0010			
	Total Kjeldahl Nitrogen (mg/L)	0.332	0.251			
	Total Nitrogen (mg/L)	0.332	0.260			
	Phosphorus (P)-Total (mg/L)	0.0061	0.0061			
	Sulfate (SO4) (mg/L)	<2.5	3.13			
Cyanides	Cyanide, Weak Acid Diss (mg/L)	<0.0050				
	Cyanide, Total (mg/L)	0.0071				
Organic / Inorganic Carbon	Total Organic Carbon (mg/L)	10.3	7.28			
Total Metals	Aluminum (Al)-Total (mg/L)	0.0335	0.0225			
	Antimony (Sb)-Total (mg/L)	<0.000050	<0.000050			
	Arsenic (As)-Total (mg/L)	0.000146	0.000172			
	Barium (Ba)-Total (mg/L)	0.0111	0.0117			
	Beryllium (Be)-Total (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Total (mg/L)	<0.00050	<0.00050			
	Boron (B)-Total (mg/L)	0.0087	0.0080			
	Cadmium (Cd)-Total (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Total (mg/L)	7.39	9.37			
	Chromium (Cr)-Total (mg/L)	0.00015	0.00014			
	Cobalt (Co)-Total (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Total (mg/L)	0.00055	0.00054			
	Iron (Fe)-Total (mg/L)	0.099	0.054			
	Lead (Pb)-Total (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Total (mg/L)	<0.0050	<0.0050			
	Magnesium (Mg)-Total (mg/L)	1.27	1.74			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014721-1	L1014721-2	L1014721-3	L1014721-4	L1014721-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	05-JUN-11	05-JUN-11	05-JUN-11	05-JUN-11	05-JUN-11
	Sampled Time	14:10	13:35	13:30	12:40	12:35
	Client ID	STREAM 10-2	NAK 2 SHALLOW	NAK 2 DEEP	NAK 3 SHALLOW (B)	NAK 3 SHALLOW (A)
Grouping	**Analyte**					
WATER						
Total Metals	Manganese (Mn)-Total (mg/L)	0.0195	0.00548	0.0126	0.00767	0.00727
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Total (mg/L)	0.000056	0.000085	0.000081	0.000082	0.000083
	Nickel (Ni)-Total (mg/L)	0.00061	0.00026	0.00034	0.00031	0.00029
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Total (mg/L)	0.140	0.296	0.300	0.298	0.292
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Total (mg/L)	2.71	2.37	2.42	2.41	2.34
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Total (mg/L)	1.45	1.75	1.85	1.85	1.77
	Strontium (Sr)-Total (mg/L)	0.0320	0.0443	0.0465	0.0460	0.0446
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Total (mg/L)	<0.00010	0.00042	0.00265	<0.00010	<0.00010
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Total (mg/L)	0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Total (mg/L)	0.000334	0.000118	0.000102	0.000116	0.000112
	Zinc (Zn)-Total (mg/L)	0.0033	<0.0030	<0.0030	<0.0030	<0.0030
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0814	0.0166	0.0118	0.0138	0.0127
	Antimony (Sb)-Dissolved (mg/L)	0.000054	<0.000050	<0.000050	<0.000050	<0.000050
	Arsenic (As)-Dissolved (mg/L)	0.000339	0.000160	0.000158	0.000158	0.000159
	Barium (Ba)-Dissolved (mg/L)	0.0184	0.0110	0.0109	0.0107	0.0108
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
	Boron (B)-Dissolved (mg/L)	0.0061	0.0071	0.0075	0.0070	0.0077
	Cadmium (Cd)-Dissolved (mg/L)	0.000018	<0.000010	<0.000010	<0.000010	<0.000010
	Calcium (Ca)-Dissolved (mg/L)	8.98	8.87	9.14	8.90	9.01
	Chromium (Cr)-Dissolved (mg/L)	0.00023	0.00013	0.00011	<0.00010	0.00011
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Copper (Cu)-Dissolved (mg/L)	0.00105	0.00054	0.00060	0.00052	0.00054
	Iron (Fe)-Dissolved (mg/L)	0.118	0.026	0.020	0.024	0.024
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
	Magnesium (Mg)-Dissolved (mg/L)	1.82	1.62	1.66	1.63	1.62
	Manganese (Mn)-Dissolved (mg/L)	0.00406	0.000812	0.00151	0.000909	0.000810
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Molybdenum (Mo)-Dissolved (mg/L)	0.000054	0.000077	0.000076	0.000077	0.000080
	Nickel (Ni)-Dissolved (mg/L)	0.00048	0.00031	0.00028	0.00026	0.00027

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014721-6	L1014721-7			
	Description	WATER	WATER			
	Sampled Date	05-JUN-11	05-JUN-11			
	Sampled Time	11:35	12:30			
	Client ID	HAUTETE 1	NAK 3 DEEP			
Grouping	**Analyte**					
WATER						
Total Metals	Manganese (Mn)-Total (mg/L)	0.0173	0.0182			
	Mercury (Hg)-Total (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Total (mg/L)	0.000052	0.000079			
	Nickel (Ni)-Total (mg/L)	0.00032	0.00024			
	Phosphorus (P)-Total (mg/L)	<0.30	<0.30			
	Potassium (K)-Total (mg/L)	0.171	0.297			
	Selenium (Se)-Total (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Total (mg/L)	2.33	2.53			
	Silver (Ag)-Total (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Total (mg/L)	1.66	1.86			
	Strontium (Sr)-Total (mg/L)	0.0367	0.0471			
	Thallium (Tl)-Total (mg/L)	<0.000050	<0.000050			
	Tin (Sn)-Total (mg/L)	<0.00010	0.00196			
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010			
	Uranium (U)-Total (mg/L)	<0.000010	<0.000010			
	Vanadium (V)-Total (mg/L)	0.000110	0.000105			
	Zinc (Zn)-Total (mg/L)	<0.0030	<0.0030			
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	0.0267	0.0095			
	Antimony (Sb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Arsenic (As)-Dissolved (mg/L)	0.000148	0.000162			
	Barium (Ba)-Dissolved (mg/L)	0.0110	0.0111			
	Beryllium (Be)-Dissolved (mg/L)	<0.00020	<0.00020			
	Bismuth (Bi)-Dissolved (mg/L)	<0.00050	<0.00050			
	Boron (B)-Dissolved (mg/L)	0.0084	0.0069			
	Cadmium (Cd)-Dissolved (mg/L)	<0.000010	<0.000010			
	Calcium (Ca)-Dissolved (mg/L)	7.60	9.43			
	Chromium (Cr)-Dissolved (mg/L)	0.00016	<0.00010			
	Cobalt (Co)-Dissolved (mg/L)	<0.00010	<0.00010			
	Copper (Cu)-Dissolved (mg/L)	0.00052	0.00072			
	Iron (Fe)-Dissolved (mg/L)	0.064	0.018			
	Lead (Pb)-Dissolved (mg/L)	<0.000050	<0.000050			
	Lithium (Li)-Dissolved (mg/L)	<0.0050	<0.0050			
	Magnesium (Mg)-Dissolved (mg/L)	1.26	1.72			
	Manganese (Mn)-Dissolved (mg/L)	0.00344	0.00141			
	Mercury (Hg)-Dissolved (mg/L)	<0.000010	<0.000010			
	Molybdenum (Mo)-Dissolved (mg/L)	0.000057	0.000081			
	Nickel (Ni)-Dissolved (mg/L)	0.00032	0.00024			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014721-1	L1014721-2	L1014721-3	L1014721-4	L1014721-5
	Description	WATER	WATER	WATER	WATER	WATER
	Sampled Date	05-JUN-11	05-JUN-11	05-JUN-11	05-JUN-11	05-JUN-11
	Sampled Time	14:10	13:35	13:30	12:40	12:35
	Client ID	STREAM 10-2	NAK 2 SHALLOW	NAK 2 DEEP	NAK 3 SHALLOW (B)	NAK 3 SHALLOW (A)
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30	<0.30	<0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	0.131	0.285	0.291	0.287	0.294
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010
	Silicon (Si)-Dissolved (mg/L)	2.55	2.27	2.31	2.30	2.29
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Sodium (Na)-Dissolved (mg/L)	1.43	1.75	1.78	1.77	1.76
	Strontium (Sr)-Dissolved (mg/L)	0.0311	0.0439	0.0459	0.0442	0.0450
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
	Tin (Sn)-Dissolved (mg/L)	<0.00010	0.00014	0.00118	<0.00010	<0.00010
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	<0.010	<0.010	<0.010
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
	Vanadium (V)-Dissolved (mg/L)	0.000240	0.000067	0.000060	0.000063	0.000075
	Zinc (Zn)-Dissolved (mg/L)	0.0031	<0.0030	<0.0030	<0.0030	<0.0030

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014721-6	L1014721-7			
	Description	WATER	WATER			
	Sampled Date	05-JUN-11	05-JUN-11			
	Sampled Time	11:35	12:30			
	Client ID	HAUTETE 1	NAK 3 DEEP			
Grouping	**Analyte**					
WATER						
Dissolved Metals	Phosphorus (P)-Dissolved (mg/L)	<0.30	<0.30			
	Potassium (K)-Dissolved (mg/L)	0.187	0.296			
	Selenium (Se)-Dissolved (mg/L)	<0.00010	<0.00010			
	Silicon (Si)-Dissolved (mg/L)	2.30	2.47			
	Silver (Ag)-Dissolved (mg/L)	<0.000010	<0.000010			
	Sodium (Na)-Dissolved (mg/L)	1.69	1.82			
	Strontium (Sr)-Dissolved (mg/L)	0.0375	0.0474			
	Thallium (Tl)-Dissolved (mg/L)	<0.000050	<0.000050			
	Tin (Sn)-Dissolved (mg/L)	<0.00010	0.00258			
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010			
	Uranium (U)-Dissolved (mg/L)	<0.000010	<0.000010			
	Vanadium (V)-Dissolved (mg/L)	0.000091	0.000062			
	Zinc (Zn)-Dissolved (mg/L)	0.0044	<0.0030			

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
CARBONS-TOC-VA	Water	Total organic carbon by combustion	APHA 5310 TOTAL ORGANIC CARBON (TOC)
This analysis is carried out using procedures adapted from APHA Method 5310 "Total Organic Carbon (TOC)".			
CN-T-MID-HH-COL-VA	Water	Total Cyanide by HH Distillation	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Total or strong acid dissociable (SAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
CN-WAD-MID-COL-VA	Water	Weak Acid Dissociable Cyanide by Dist.	APHA 4500-CN Cyanide
This analysis is carried out using procedures adapted from APHA Method 4500-CN "Cyanide". Weak acid dissociable (WAD) cyanide are determined by sample distillation and analysis using the chloramine-T colourimetric method.			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method			

Reference Information

6010B).

HARDNESS-CALC-VA	Water	Hardness	APHA 2340B

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA	Water	Diss. Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA	Water	Total Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-L-CFA-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

P-T-COL-VA	Water	Total P in Water by Colour	APHA 4500-P Phosphorous

This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Total Phosphorous is determined colourimetrically after persulphate digestion of the sample.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

Reference Information

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TKN-L-CFA-ED	Water	TKN in Water by Colour	APHA 4500-NORG (TKN)

This analysis is carried out using procedures adapted from APHA Method 4500-Norg "Nitrogen (Organic)". Total Kjeldahl Nitrogen is determined by sample digestion at 380 celcius with analysis using an automated colourimetric finish.

TN-CALC-VA	Water	Total Nitrogen (Calculation)	BC MOE LABORATORY MANUAL (2005)

Total Nitrogen is a calculated parameter. Total Nitrogen = Total Kjeldahl Nitrogen + [Nitrate and Nitrite (as N)]

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

10-154759 10-154760 10-154761

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

10-154761

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

L10147121-COFC

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Boolcer Minerals	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	Don Bctton	Select: PDF ✓	Excel ✓ Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni St (#1702)	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	mlong@klohn.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	206 905 9518 Fax:			Analysis Request	
Invoice To	Same as Report ? (circle) (Yes) or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) (Yes) or No	Job #:	M09382A05		
Company:		PO / AFE:			
Contact:		LSD:			
Address:					
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)	L10147121	ALS Contact:	Dang	Sampler:	M. Long

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Total Metals	Diss. Metals *	Nutrients COD TKN/NH3	Cyanides WAD SAD	Number of Containers
	Stream 10-2	05/06/11	14:10	Water	✓	✓	✓	✓		
	" "	"	"	"		✓				
	" "	"	"	"			✓			
	" "	"	"	"				✓		
	" "	"	"	"					✓	
	Nak 2 Shallow	"	13:35	"	✓					
	" "	"	"	"		✓				
	" "	"	"	"			✓			
	" "	"	"	"				✓		
	Nak 2 Deep	"	13:30	"	✓					
	" "	"	"	"		✓				
	" "	"	"	"			✓			

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

* Dissolved Metals Filter in Lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. Long	June 6, 2011	07:00	Shayna	June 8	12:28	12 °C				

WHITE PAPER CO. 604 951-3900

10-154760

ALS E

L1014721-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Booker Minerals	Standard: ✓	Other (specify):	✓	Regular (Standard Turnaround Times - Business Days)
Contact:	Don Betton	Select: PDF ✓	Excel ✓ Digital Fax		Priority(2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni St (# 1702)	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	mlong@klohn.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	206 9059518 Fax:				

Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	M09382A05
Company:		PO / AFE:	
Contact:		LSD:	
Address:			
Phone:	Fax:	Quote #:	
Lab Work Order # (lab use only)		ALS Contact: Can Dang	Sampler: M. Long

Analysis Request (Indicate Filtered or Preserved, F/P)

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Gen. Parameters	Total Metals (P)	Diss. Metals*	Nutrients COD/TKN/NH3 (P)	Cyanides WAD SAD (P)								Number of Containers
	Nak 2 beep	05/06/11	13:30	Water				✓									
	Nak 3 Shallow (B)	"	12:40	"	✓												
	" "	"	"	"		✓											
	" "	"	"	"			✓										
	" "	"	"	"				✓									
	Nak 3 Shallow (A)	"	12:35	"	✓												
	" "	"	"	"		✓											
	" "	"	"	"			✓										
	" "	"	"	"				✓									
	" "	"	"	"					✓								
	Hautete 1	"	11:35	"	✓												
	" "	"	"	"		✓											

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

* Dissolved Metals Filter in Lab

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: M. Long	Date: June 6, 2011	Time: 07:00	Received by: Shayna	Date: June 8	Time: 12:28	Temperature: 12 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

WHITE PAPER CO. 604 951-3900

10-154759

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

Report To		Report Format / Distribution		Service Request: (Rush subject to availability - Contact ALS to confirm TAT)	
Company:	Pacific Boolcer Minerals	Standard: ✓	Other (specify):		Regular (Standard Turnaround Times - Business Days)
Contact:	Don Bolton	Select: PDF ✓	Excel ✓ Digital Fax		Priority (2-4 Business Days)-50% surcharge - Contact ALS to confirm TAT
Address:	1166 Alberni st	Email 1:	bythebridge@gmail.com		Emergency (1-2 Business Days)-100% Surcharge - Contact ALS to confirm TAT
	Vancouver BC V6E 3Z3	Email 2:	mlong@klohtd.com		Same Day or Weekend Emergency - Contact ALS to confirm TAT
Phone:	206 905 9518 Fax:			Analysis Request	
Invoice To	Same as Report ? (circle) Yes or No (if No, provide details)	Client / Project Information		(Indicate Filtered or Preserved, F/P)	
	Copy of Invoice with Report? (circle) Yes or No	Job #:	M09382A05		
Company:		PO / AFE:			
Contact:		LSD:			
Address:					
Phone:	Fax:	Quote #:			
Lab Work Order # (lab use only)		ALS Contact:	Can Dang	Sampler:	M. Long

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	General Parameters	Dissolved Metals	Total Metals	Nutrients Con/NH3/TKN	Cyanides WAD SAD	Number of Containers
	Hautete 1	05/06/11	11:35	Water		✓		✓		1
	" "	"	"	"				✓		1
	" "	"	"	"					✓	1
	Nak 3 Deep	"	12:30	"	✓	✓	✓	✓		4

Special Instructions / Regulation with water or land use (CCME- Freshwater Aquatic Life/BC CSR-Commercial/AB Tier 1-Natural/ETC) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as specified on the back page of the white - report copy.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date:	Time:	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
M. Long	June 6 2011	09:00	Shayna	June 8	12:28	12 °C				

REFER TO BACK PAGE FOR ALS LOCATIONS AND SAMPLING INFORMATION

WHITE - LABORATORY COPY YELLOW - CLIENT COPY

GENF 18.01 Front

WHITE PAPER CO. 604 951-3900

PACIFIC BOOKER MINERALS INC.
ATTN: Don Betton
1702 - 1166 ALBERNI ST.
VANCOUVER BC V6E 3Z3

Date Received: 08-JUN-11
Report Date: 24-JUN-11 16:23 (MT)
Version: FINAL REV. 2

Client Phone: 604-681-8556

Certificate of Analysis

Lab Work Order #: L1014932
Project P.O. #: NOT SUBMITTED
Job Reference: MORRISON M09382A05
Legal Site Desc:
C of C Numbers: 1

Comments:

24-JUN-11: Revised Report.
The Cadmium detection lmit is now reported at 0.00001 mg/L unless dillution required before analysis.
No other data have changed.

Anna-Maria Karaut

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014932-1				
	Description					
	Sampled Date	04-JUN-11				
	Sampled Time	09:10				
	Client ID	CUBE1				
Grouping	**Analyte**					
WATER						
Physical Tests	Conductivity (uS/cm)	1270				
	Hardness (as CaCO3) (mg/L)	756				
	pH (pH)	8.39				
	Total Suspended Solids (mg/L)	<3.0				
	Total Dissolved Solids (mg/L)	1100				
Anions and Nutrients	Acidity (as CaCO3) (mg/L)	<1.0				
	Alkalinity, Total (as CaCO3) (mg/L)	135				
	Ammonia (as N) (mg/L)	<0.0050				
	Bromide (Br) (mg/L)	<0.50				
	Chloride (Cl) (mg/L)	<5.0				
	Fluoride (F) (mg/L)	0.27				
	Nitrate (as N) (mg/L)	0.965				
	Nitrite (as N) (mg/L)	0.034				
	Sulfate (SO4) (mg/L)	709				
Total Metals	Aluminum (Al)-Total (mg/L)	0.0084				
	Antimony (Sb)-Total (mg/L)	0.00160				
	Arsenic (As)-Total (mg/L)	0.00185				
	Barium (Ba)-Total (mg/L)	0.0151				
	Beryllium (Be)-Total (mg/L)	<0.00040 DLA				
	Bismuth (Bi)-Total (mg/L)	<0.0010 DLA				
	Boron (B)-Total (mg/L)	<0.0080 DLB				
	Cadmium (Cd)-Total (mg/L)	<0.000020 DLA				
	Calcium (Ca)-Total (mg/L)	132				
	Chromium (Cr)-Total (mg/L)	0.00025				
	Cobalt (Co)-Total (mg/L)	<0.00020 DLA				
	Copper (Cu)-Total (mg/L)	0.0097				
	Iron (Fe)-Total (mg/L)	<0.010				
	Lead (Pb)-Total (mg/L)	<0.00010 DLA				
	Lithium (Li)-Total (mg/L)	<0.010 DLA				
	Magnesium (Mg)-Total (mg/L)	110				
	Manganese (Mn)-Total (mg/L)	0.00564				
	Mercury (Hg)-Total (mg/L)	<0.000010				
	Molybdenum (Mo)-Total (mg/L)	0.00522				
	Nickel (Ni)-Total (mg/L)	0.00821				
	Phosphorus (P)-Total (mg/L)	<0.30				
	Potassium (K)-Total (mg/L)	6.22				
	Selenium (Se)-Total (mg/L)	0.00569				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014932-1				
	Description					
	Sampled Date	04-JUN-11				
	Sampled Time	09:10				
	Client ID	CUBE1				
Grouping	**Analyte**					
WATER						
Total Metals	Silicon (Si)-Total (mg/L)	0.612				
	Silver (Ag)-Total (mg/L)	<0.000020 DLA				
	Sodium (Na)-Total (mg/L)	1.27				
	Strontium (Sr)-Total (mg/L)	0.656				
	Thallium (Tl)-Total (mg/L)	0.00019				
	Tin (Sn)-Total (mg/L)	0.00022				
	Titanium (Ti)-Total (mg/L)	0.011				
	Uranium (U)-Total (mg/L)	0.00428				
	Vanadium (V)-Total (mg/L)	0.00019				
	Zinc (Zn)-Total (mg/L)	0.0418				
Dissolved Metals	Aluminum (Al)-Dissolved (mg/L)	<0.0060 DLA				
	Antimony (Sb)-Dissolved (mg/L)	0.00166				
	Arsenic (As)-Dissolved (mg/L)	0.00192				
	Barium (Ba)-Dissolved (mg/L)	0.0149				
	Beryllium (Be)-Dissolved (mg/L)	<0.00040 DLA				
	Bismuth (Bi)-Dissolved (mg/L)	<0.0010 DLA				
	Boron (B)-Dissolved (mg/L)	<0.0060 DLB				
	Cadmium (Cd)-Dissolved (mg/L)	<0.000020 DLA				
	Calcium (Ca)-Dissolved (mg/L)	129				
	Chromium (Cr)-Dissolved (mg/L)	<0.00020 DLA				
	Cobalt (Co)-Dissolved (mg/L)	<0.00020 DLA				
	Copper (Cu)-Dissolved (mg/L)	0.0087				
	Iron (Fe)-Dissolved (mg/L)	<0.010				
	Lead (Pb)-Dissolved (mg/L)	<0.00010 DLA				
	Lithium (Li)-Dissolved (mg/L)	<0.010 DLA				
	Magnesium (Mg)-Dissolved (mg/L)	105				
	Manganese (Mn)-Dissolved (mg/L)	0.00364				
	Mercury (Hg)-Dissolved (mg/L)	<0.000010				
	Molybdenum (Mo)-Dissolved (mg/L)	0.00503				
	Nickel (Ni)-Dissolved (mg/L)	0.00802				
	Phosphorus (P)-Dissolved (mg/L)	<0.30				
	Potassium (K)-Dissolved (mg/L)	5.98				
	Selenium (Se)-Dissolved (mg/L)	0.00600				
	Silicon (Si)-Dissolved (mg/L)	0.599				
	Silver (Ag)-Dissolved (mg/L)	<0.000020 DLA				
	Sodium (Na)-Dissolved (mg/L)	1.18				
	Strontium (Sr)-Dissolved (mg/L)	0.619				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L1014932-1				
	Description					
	Sampled Date	04-JUN-11				
	Sampled Time	09:10				
	Client ID	CUBE1				
Grouping	**Analyte**					
WATER						
Dissolved Metals	Thallium (Tl)-Dissolved (mg/L)	0.00018				
	Tin (Sn)-Dissolved (mg/L)	0.00021				
	Titanium (Ti)-Dissolved (mg/L)	0.011				
	Uranium (U)-Dissolved (mg/L)	0.00416				
	Vanadium (V)-Dissolved (mg/L)	0.00017				
	Zinc (Zn)-Dissolved (mg/L)	0.0383				

* Please refer to the Reference Information section for an explanation of any qualifiers detected.

Reference Information

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit Adjusted For required dilution
DLB	Detection limit was raised due to detection of analyte at comparable level in Method Blank.
MB-LOR	Method Blank exceeds ALS DQO. LORs adjusted for samples with positive hits below 5 times blank level. Please contact ALS if re-analysis is required.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 "Acidity"
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ACY-PCT-VA	Water	Acidity by Automatic Titration	APHA 2310 Acidity
This analysis is carried out using procedures adapted from APHA Method 2310 "Acidity". Acidity is determined by potentiometric titration to a specified endpoint.			
ALK-COL-VA	Water	Alkalinity by Colourimetric (Automated)	APHA 310.2
This analysis is carried out using procedures adapted from EPA Method 310.2 "Alkalinity". Total Alkalinity is determined using the methyl orange colourimetric method.			
ANIONS-BR-IC-VA	Water	Bromide by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-CL-IC-VA	Water	Chloride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-F-IC-VA	Water	Fluoride by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
ANIONS-NO2-IC-VA	Water	Nitrite in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrite is detected by UV absorbance.			
ANIONS-NO3-IC-VA	Water	Nitrate in Water by Ion Chromatography	EPA 300.0
This analysis is carried out using procedures adapted from EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography". Nitrate is detected by UV absorbance.			
ANIONS-SO4-IC-VA	Water	Sulfate by Ion Chromatography	APHA 4110 B.
This analysis is carried out using procedures adapted from APHA Method 4110 B. "Ion Chromatography with Chemical Suppression of Eluent Conductivity" and EPA Method 300.0 "Determination of Inorganic Anions by Ion Chromatography".			
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.			
FE-DIS-LOW-ICP-VA	Water	Dissolved Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
FE-TOT-LOW-ICP-VA	Water	Total Fe in Water by ICPOES	EPA SW-846 3005A/6010B
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.			
HG-DIS-LOW-CVAFS-VA	Water	Dissolved Mercury in Water by CVAFS(Low)	EPA SW-846 3005A & EPA 245.7
This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).			

Reference Information

HG-TOT-LOW-CVAFS-VA	Water	Total Mercury in Water by CVAFS(Low)	EPA 245.7

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry (EPA Method 245.7).

MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-DIS-LOW-MS-VA	Water	Dissolved Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-DIS-ULTRA-MS-VA	Water	Diss. Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures involves preliminary sample treatment by filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

MET-TOT-LOW-MS-VA	Water	Total Metals in Water by ICPMS(Low)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

MET-TOT-ULTRA-MS-VA	Water	Total Metals in Water by ICPMS (Ultra)	EPA SW-846 3005A/6020A

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven, or filtration (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - mass spectrometry (EPA Method 6020A).

NH3-L-CFA-ED	Water	Ammonia in Water by Colour	APHA 4500 NH3-NITROGEN (AMMONIA)

This analysis is carried out using procedures adapted from APHA Method 4500 NH3 "NITROGEN (AMMONIA)". Ammonia is determined using the automated phenate colourimetric method.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value

This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

TDS-VA	Water	Total Dissolved Solids by Gravimetric	APHA 2540 C - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Dissolved Solids (TDS) are determined by filtering a sample through a glass fibre filter, TDS is determined by evaporating the filtrate to dryness at 180 degrees celsius.

TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location

Reference Information

ED	ALS ENVIRONMENTAL - EDMONTON, ALBERTA, CANADA
VA	ALS ENVIRONMENTAL - VANCOUVER, BC, CANADA

Chain of Custody Numbers:

1

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.
mg/kg - milligrams per kilogram based on dry weight of sample.
mg/kg wwt - milligrams per kilogram based on wet weight of sample.
mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.
mg/L - milligrams per litre.
< - Less than.
D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).
N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.
UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.
Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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APPENDIX III

Depth Profile: Morrison and Nakinilerak Lakes

Morrison Lake Temperature and DO Profile, June 2011

Site	Depth	Temp	DO %	DO mg/L	ORP
	m	°C	%	mg/L	
A	0.5	11.55	86.3	9.41	181
	1.5	10.24	83.8	9.35	178.4
	3	9.08	80.6	9.28	182.5
	4.5	6.86	73.4	8.94	186.3
	6	6.19	71.1	8.78	182.9
	7.5	5.79	69.1	8.62	182.6
	9	5.3	66.4	8.34	186.2
	10.5	5.18	54.5	6.62	55.2
	12	5.19	26.3	3.27	25.5
B	0.5	10.24	86.6	9.64	177.8
	1.5	8.54	85.1	9.92	182
	3	6.94	81.5	9.91	185.2
	4.5	6.43	79.1	9.71	184.5
	6	5.83	76.8	9.58	186.2
	7.5	5.64	75.1	9.42	183.6
	9	5.4	73.6	9.3	183.2
	10.5	4.83	72.1	9.21	186.1
	12	4.59	69.8	8.98	185.3
	13.5	4.39	67.5	8.75	184.2
	15	4.23	66.2	8.63	188.7
	16.5	4.15	64.1	8.31	186.4
	18	4.15	61.1	7.84	96.4
	19.5	4.18	49.7	5.96	60.4
C	0.5	11.35	86.9	9.49	248.7
	1.5	10.64	86.2	9.57	246.4
	3	9.61	84.4	9.61	246.9
	4.5	9	82	9.57	246.9
	6	7.41	79.8	9.54	245.2
	7.5	6.5	76.5	9.36	246.4
	9	6.23	74.5	9.22	249.3
	10.5	5.73	72.9	9.13	249.1
	12	5.37	71.4	9.03	250.1
	13.5	5.31	70.5	8.93	249.4
	15	5.24	69.9	8.87	247.5
	16.5	5.16	69.5	8.83	249.6

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Site	Depth	Temp	DO %	DO mg/L	ORP
	m	°C	%	mg/L	
	18	4.92	69	8.83	247.6
	19.5	4.33	67.6	8.79	244.7
	21	4.19	67.1	8.74	248.1
	22.5	4.26	67	8.72	244.9
	24	4.17	66.8	8.7	244.6
	25.5	4.41	66.9	8.69	244.6
	27	4.39	66.9	8.7	246.1
	28.5	4.23	66.8	8.71	246.1
	30	4.05	66.5	8.7	243.2
D	0.5	10.31	81.9	9.18	190.3
	1.5	9.82	81.1	9.18	187.9
	3	8.77	79.6	9.22	192.1
	4.5	8.65	78.2	9.11	192.7
	6	8.51	77.6	9.09	193.8
	7.5	7.24	76	9.14	196
	9	7.03	75.2	9.09	192.6
	10.5	5.46	72.8	9.11	193.7
	12	4.61	67.7	8.74	196.2
	13.5	4.39	66.6	8.64	196.5
	15	4.3	65.9	8.5	197.1
	16.5	4.19	65.2	8.5	197.1
	18	4.08	64.7	8.46	197.1
	19.5	4.05	64.3	8.41	196.3
	21	4.04	64.1	8.39	196.7
	22.5	4.01	63.9	8.38	195.3
	24	4.01	63.8	8.36	198.7
	25.5	4	63.7	8.36	197.1
	27	3.96	63.7	8.36	198.1
	28.5	3.93	63.4	8.33	195.1
	30	3.92	63.1	8.28	196.7
E	0.5	9.52	78.7	8.99	166.2
	1.5	7.73	76.3	9.03	168.7
	3	6.7	74	9.03	171.5
	4.5	6.58	72.8	8.93	173.5
	6	5.84	70.9	8.84	172.3
	7.5	5.46	69.2	8.72	171.6

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Site	Depth	Temp	DO %	DO mg/L	ORP
	m	°C	%	mg/L	
	9	5.36	68.3	8.63	169.7
	10.5	5.25	67.8	8.59	169.4
	12	5.28	67.4	8.54	169.2
	13.5	5.19	67.4	8.55	171.4
	15	4.75	66.5	8.53	170.9
	16.5	4.51	65.3	8.44	169.1
	18	4.43	64.6	8.36	168.7
	19.5	4.28	64	8.33	171.2
	21	4.22	62.3	7.98	43.8
	22.5	4.22	54.3	7	34.8
	24	4.22	52.2	6.8	27.9
	25.5	4.22	51.9	6.77	21.2
	27	4.22	51.7	6.73	19.5
	28.5	4.22	51	6.65	18.7
	30	4.22	50.5	6.57	13.7

Nakinilerak Lake Temperature and DO Profile

Site	Depth	Temp	DO %	DO mg/L	ORP
	m	°C	%	mg/L	
Nak 1	0.5	11.24	101.5	11.11	208.3
	1.5	11.12	100.6	11.06	211.5
	3	10.93	100.1	11.06	211.7
	4.5	10.65	99.5	11.06	208.5
	6	6.88	91.2	11.93	209.4
	7.5	5.22	73	9.26	212.2
	9	4.98	67.1	8.57	210.1
	10.5	4.69	62.3	7.93	210.6
	12	4.63	58.4	7.45	210.7
Nak 2	0.5	9.57	98.9	11.28	150.2
	1.5	9.56	98.2	11.2	153.8
	3	9.5	97.8	11.18	156.1
	4.5	9.48	97.6	11.16	152.9
	6	8.95	96.3	11.14	148.1
	7.5	6.46	92.6	11.4	149.1
	9	6.19	89.7	11.11	148.7

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Site	Depth	Temp	DO %	DO mg/L	ORP
	m	°C	%	mg/L	
	10.5	5.94	87.8	10.93	149.9
	12	5.48	86	10.82	151.2
	13.5	5.21	84.3	10.68	148.4
	15	5.06	82.4	10.49	151.6
	16.5	4.94	81.2	10.37	149.4
	18	4.69	79.7	10.26	152.6
	19.5	4.6	78.2	10.06	149.8
	21	4.57	76.7	9.91	150.6
	22.5	4.56	76	9.81	152.8
	24	4.55	73.7	9.26	34.1
Nak 3	0.5	7.54	92.2	11.04	145.1
	1.5	7.5	92	11.04	143.7
	3	7.45	91.7	11.03	140.9
	4.5	7.4	91.7	11.04	143.5
	6	7.31	91.8	11.06	141.2
	7.5	7	91.1	11.03	139.7
	9	6.84	90	10.96	139.5
	10.5	5.38	85.8	10.85	145.7
	12	5.34	83.5	10.54	142.6
	13.5	5.3	82.1	10.41	144.4
	15	5.26	81.3	10.32	143.9
	16.5	5.14	80.6	10.27	142.5
	18	4.85	79.2	10.14	145.6
	19.5	4.8	78.1	10.02	143.4
	21	4.79	77.5	9.95	145.9
	22.5	4.71	76.9	9.89	143.7
	24	4.65	76.3	9.82	143.5
	25.5	4.6	75.6	9.75	144.6
	27	4.53	75.1	9.69	143.1
	28.5	4.52	68.8	8.31	141.2

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APPENDIX IV

Manual Flow Measurements

STREAM	DISTANCE FROM BANK (m)	DEPTH (m)	SUBSTRATE	VELOCITY (m/s)
MCS-1	0	0.13	fines	0
	0.2	0.13	gravel	0.03
	0.4	0.24	cobble	1.14
	0.6	0.32	cobble	2.23
	0.8	0.2	cobble	1.35
	1	0.27	cobble	1.35
	1.1	0.3	cobble	1.33
	1.3	0.33	cobble	1.43
	1.5	0.32	cobble	0.7
	1.7	0.23	cobble	1.22
	1.8	0.15	gravel	0.22
	2.1	0.12	gravel	0.08
MCS-4	0.1	0.18	gravel	0.36
	0.3	0.18	gravel	0.19
	0.5	0.16	gravel	0.33
	0.7	0.12	gravel	0.34
	0.9	0.1	gravel	0.47
	1	0.1	gravel	0.61
	1.1	0.11	gravel	0.72
	1.2	0.08	gravel	0.64
	1.3	0.06	gravel	0.64
	1.4	0.05	gravel	0.4
	1.6	0.06	gravel	0.2
MCS-5	0.3	0.15	gravel	0
	0.4	0.03	gravel	0
	0.5	0.09	gravel	0.13
	0.6	0.12	gravel	0.16
	0.7	0.11	gravel	0.2
	0.8	0.1	gravel	0.23
	0.9	0.1	gravel	0.27
	1	0.08	gravel	0.27
	1.1	0.06	gravel	0.31
	1.2	0.06	gravel	0.42
	1.3	0.05	gravel	0.5
	1.4	0.04	gravel	0.3

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STREAM	DISTANCE FROM BANK (m)	DEPTH (m)	SUBSTRATE	VELOCITY (m/s)
MCS-6	0	0.3	gravel	0.3
	0.1	0.35	gravel	0.92
	0.3	0.35	gravel	1.61
	0.5	0.3	gravel	1.39
	0.7	0.31	gravel	1.24
	0.9	0.27	cobble	1.3
	1.1	0.18	cobble	1.46
	1.3	0.3	cobble	1.41
	1.6	0.22	cobble	1.73
	1.9	0.25	gravel	1.11
	2.1	0.28	gravel	1.39
	2.3	0.25	gravel	1.4
	2.5	0.2	gravel	1.5
	2.7	0.25	gravel	1.5
	2.9	0.18	gravel	1.15
	3.1	0.15	gravel	0.69
MCS-7	0	0.35	gravel	0.35
	0.2	0.38	gravel	0.72
	0.4	0.4	gravel	0.46
	0.6	0.45	gravel	0.35
	0.8	0.39	gravel	0.35
	1	0.35	gravel	0.59
	1.2	0.32	small cobble	0.58
	1.4	0.27	small cobble	0.48
	1.6	0.25	small cobble	0.87
	1.8	0.25	small cobble	0.93
	2	0.22	gravel	0.86
	2.2	0.15	gravel	0.7
	2.4	0.15	gravel	0.39
	2.6	0.12	gravel	0.23
	2.8	0.1	fines	0.01
	3.1	0.01	fines	0
Upper 7	0	0.14	fines	0
	0.3	0.12	fines	0.09
	0.6	0.16	cobble	0.67

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STREAM	DISTANCE FROM BANK (m)	DEPTH (m)	SUBSTRATE	VELOCITY (m/s)
	0.8	0.38	cobble	0.81
	1	0.34	cobble	0.56
	1.2	0.26	cobble	0.65
	1.4	0.28	cobble	0.98
	1.6	0.26	cobble	1.05
	1.8	0.28	cobble	1.34
	2	0.27	cobble	1.22
	2.2	0.25	cobble	0.96
	2.4	0.21	cobble	0.72
	2.6	0.15	cobble	0.46
Stream 8	0.1	0.28		0
	0.2	0.29		0.03
	0.3	0.31		0.07
	0.4	0.34		0.07
	0.5	0.32		0.08
	0.6	0.33		0.09
	0.7	0.3		0.1
	0.8	0.3		0.12
	0.9	0.27		0.12
	1	0.23		0.13
	1.1	0.23		0.12
	1.2	0.21		0.11
	1.3	0.18		0.07
	1.4	0.19		0.08
	1.5	0.21		0.09
	1.6	0.21		0.1
	1.7	0.24		0.13
Stream 9	0	0.02	fines	0
	0.3	0.08	fines	0.26
	0.5	0.15	cobble	0.45
	0.7	0.16	cobble	0.29
	0.8	0.14	cobble	0.37
	1	0.15	cobble	0.39
	1.1	0.13	cobble	0.48
	1.3	0.1	cobble	0.58

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STREAM	DISTANCE FROM BANK (m)	DEPTH (m)	SUBSTRATE	VELOCITY (m/s)
	1.5	0.07	cobble	0.95
	1.7	0.06	cobble	0.7
	2	0.09	cobble	0.31
	2.3	0.1	cobble	0.17
	2.5	0.4	cobble	0.36
	2.7	0.12	cobble	0.49
	2.9	0.13	cobble	0.49
	3.1	0.1	cobble	0.44
	3.3	0.08	cobble	0.41
	3.5	0.09	gravel	0.2
	3.8	0.06	gravel	0.17
MCS-10	0.1	0.07	gravel	0.17
	0.2	0.1	gravel	0.22
	0.3	0.13	gravel	0.25
	0.4	0.14	gravel	0.2
	0.5	0.12	gravel	0.17
	0.6	0.12	gravel	0.24
	0.7	0.06	gravel	0.05
	0.8	0.08	gravel	0
	0.9	0	gravel	0
	1	0.08	gravel	0
	1.1	0.05	gravel	0

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APPENDIX V

Stream Cards

SITE CARD

STREAM NAME (gaz.) MCS 1 (local)

WATERSHED CODE

ILP MAP # ILP # NID MAP # NID #

REACH # - SITE # FIELD UTM WAYPT MCS-1 SITE LG 50m ACCESS Truck

DATE 20110610H TIME 1110 AGENCY KCB CREW ML EA JG FISH FORM Y (N)

CHANNEL	mthd								GRADIENT %
CHANNEL WIDTH (m)	MS	2H	2.6	3.2					3%
WETTED WIDTH (m)	MS	2.1	2.4	3.0					
RES. POOL DEPTH (m)	0.5								
W_b Dp (m)	0.4	0.3	0.3						

STAGE L (M) H — No Vis. Ch. DW — Dry/Int. Tribs.

COVER Total 15%

Type	SWD	LWD	B	U	DP	OV	IV
AMT	20	20	5	25	5	25	
LOC							

CROWN CLOSURE: 0 | 1-20% | 21-40% (2) | 41-70% | 71-90% | >90%: 0 | 1 | 2 | 3 | 4 | 5

LWD FNC N (F) A — DIST (C) E

INSTREAM VEG (N) A M V

LB SHP (U) V S O — RB SHP (U) V S O

TEXTURE F (G) C B R A — TEXTURE F (G) C B R A

RIP. VEG. N G (S) C D M W — RIP. VEG. N G (S) C D M W

STAGE INIT SHR PS (YF) MF NA — STAGE INIT SHR PS (YF) MF NA

EMS — REQ. # —

TEMP 5.2 °C — COND. 110 µS/cm

pH 7.67 — TURB. T (M) L C

FLD SNS

BED MATERIAL Dominant Gr Subdom. SC

D95 (cm) 15 D (cm) 25 Morph. RPa

DISTURBANCE INDICATORS

beavdam	aban ch	ambk	anul	SWD	LWD	jam
O1	B1	B2	B3	D1	D2	D3

ex rif	no pl	step br	mult ch	dis line	horn bd	fingor	lg wdg	ex bar	ex bd sed
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

PATTERN TM ME (IM) IR SI ST

ISLANDS (N) O I F S AN

BARS N SIDE DIAG MID SPAN BR

COUPLING (DC) PC CO

CONFINEMENT EN CO FC OC (UN) N/A

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R___ F___		
						R___ F___		
						R___ F___		
						R___ F___		

SITE CARD

STREAM NAME (gaz.) MCS-4 (local)

WATERSHED CODE 255099

ILP MAP # ILP # NID MAP # NID #

REACH # - SITE # FIELD UTM WYPT - MCS-4 SITE LG 20m ACCESS Trail

DATE 20110604 TIME 1300 AGENCY KCB CREW ML EA JG FISH FORM Y (N)

CHANNEL	mthd								GRADIENT %
CHANNEL WIDTH (m)	MS	2.1	2.4	3.4					2%
WETTED WIDTH (m)	MS	1.6	1.8	2.2					
RES. POOL DEPTH (m)	MS	0.1	0.1	0.1					
W_b Dp (m)	0.2	0.2	0.2						

STAGE L (M) H — No Vis. Ch. DW — Dry/Int. Tribs.

COVER Total 35%

Type	SWD	LWD	B	U	DP	OV	IV
AMT	10	40	-	10	15	25	
LOC							

CROWN CLOSURE: 0 | 1-20% | 21-40% (2) | 41-70% | 71-90% | >90%: 0 | 1 | 2 | 3 | 4 | 5

LWD FNC N (F) A — DIST (C) E

INSTREAM VEG (N) A M V

LB SHP U V (S) O — RB SHP U V (S) O

TEXTURE (F) G C B R A — TEXTURE (F) G C B R A

RIP. VEG. N G (S) C D M W — RIP. VEG. N G (S) C D M W

STAGE INIT SHR PS YF (MF) NA — STAGE INIT SHR PS YF (MF) NA

EMS — REQ. # —

TEMP 6.2 °C — COND. 150 µS/cm

pH 7.61 — TURB. T (M) L C

FLD SNS

BED MATERIAL Dominant LG Subdom. SG

D95 (cm) 10 D (cm) 15 Morph. RPg

DISTURBANCE INDICATORS

beavdam	aban ch	ambk	anul	SWD	LWD	jam
O1	B1	B2	B3	D1	D2	D3

ex rif	no pl	step br	mult ch	dis line	horn bd	fingor	lg wdg	ex bar	ex bd sed
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

PATTERN TM ME IM (IR) SI ST

ISLANDS (N) O I F S AN

BARS N SIDE DIAG MID SPAN BR

COUPLING (DC) PC CO

CONFINEMENT EN CO FC OC (UN) N/A

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R___ F___		
						R___ F___		
						R___ F___		
						R___ F___		

Substrate

Fines : 10%		Run	75%
sm gr	55	Pool	10%
Lg gr	20	Riffle	15
Sm Rubble	10%		
Lge rubble	5%	Water level :	0.15m
Boulder	0%		
Bedrock : 0%			

h-SDM

ROLL #	#	FOC LG	DIR	COMMENTS
				Photo : u/s , d/s.
				(R) bank (L) bank

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

C		C	

Apr 1998

Substrate:

Fines	5	Run	15
sm gravel	10	Riffle	80
Lg Gravel	35	Pool	5
Sm Rubble	25		
Lge Cobble	15	Water Level	0.34 m
Boulder	10		
Bedrock	0		

1-SDM

ROLL #	#	FOC LG	DIR	COMMENTS
				Photo: Upstream / Downstream.

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

C		C	

Apr 1998

SITE CARD

STREAM NAME (gaz.) MCS-6 (local)
WATERSHED CODE 50000 HRP10
ILP MAP # ILP # NID MAP # NID #
REACH # - SITE # FIELD UTM WYPT MCS-6 SITE LG 20m ACCESS Trail
DATE 20 11 06 04 TIME 1505 AGENCY KCB CREW ML HA FISH FORM Y (N)

CHANNEL

	mthd									
CHANNEL WIDTH (m)	MT	3.4	3.1	3.0						
WETTED WIDTH (m)	MT	3.1	2.9	3.3						
RES. POOL DEPTH (m)		0.2	0.2	0.2						
W_b Dp (m)		0.3	0.5	0.6						

GRADIENT % 3%

STAGE L (M) H — No Vis. Ch. DW — Dry/Int. Tribs.

COVER Total 20%

Type	SWD	LWD	B	U	DP	OV	IV
AMT	15	25	10	15		25	
LOC							

CROWN CLOSURE: 0 | 1 (1-20%) | 2 (21-40%) | (3) (41-70%) | 4 (71-90%) | 5 (>90%)

LWD FNC N (F) A DIST (C) E

LB SHP	U	V	(S)	O		
TEXTURE	F	(G)	C	B	R	A
RIP. VEG.	N	G	(S)	C	D	M W
STAGE	INIT	SHR	PS	YF	(MF)	NA

INSTREAM VEG N A M V

RB SHP	U	V	(S)	O		
TEXTURE	F	(G)	C	B	R	A
RIP. VEG.	N	G	(S)	C	D	M W
STAGE	INIT	SHR	PS	YF	(MF)	NA

EMS
TEMP 6.9 °C
pH 7.52
REQ. #
COND. 50 µS/cm
TURB. T (M) L C

FLD SNS
BED MATERIAL Dominant SC Subdom. Gr
D95 (cm) 20 D (cm) 25 Morph. Rpa

DISTURBANCE INDICATORS

beavdam	aban ch	erdbk	avul	SWD	LWD	jam
O1	B1	B2	B3	D1	D2	D3

ex rif	no pl	slev br	mult ch	de line	hom bd	linger	lg wdg	ex bar	ex bd acc
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

PATTERN	TM	ME	IM	(IR)	SI	ST
ISLANDS	(N)	O	I	F	S	AN
BARS	N	(SIDE)	DIAG	MID	SPAN	BR
COUPLING	(DC)	PC	CO			
CONFINEMENT	EN	CO	FC	OC	(UN)	N/A

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R___ F___		
						R___ F___		
						R___ F___		
						R___ F___		

SITE CARD

STREAM NAME (gaz.) MCS-5 (local)
WATERSHED CODE 79900
ILP MAP # ILP # NID MAP # NID #
REACH # - SITE # FIELD UTM WYPT MCS-5 SITE LG 60m ACCESS 4WD
DATE 20 11 09 07 TIME 11 40 AGENCY KCB CREW ML MM EM FISH FORM Y (N)

CHANNEL

	mthd									
CHANNEL WIDTH (m)	MS	1.5	2.0	1.5						
WETTED WIDTH (m)	MS	1.0	0.8	1.2						
RES. POOL DEPTH (m)	MS	0.4	0.4	0.1						
W_b Dp (m)		0.2	0.2	0.2						

GRADIENT % 3%

STAGE L (M) H — No Vis. Ch. DW — Dry/Int. Tribs.

COVER Total 20%

Type	SWD	LWD	B	U	DP	OV	IV
AMT	40	10	10	10	20	10	
LOC							

CROWN CLOSURE: 0 | 1 (1-20%) | (2) (21-40%) | 3 (41-70%) | 4 (71-90%) | 5 (>90%)

LWD FNC N (F) A DIST (C) E

LB SHP	U	V	(S)	O		
TEXTURE	(F)	G	C	B	R	A
RIP. VEG.	N	G	(S)	C	D	M W
STAGE	INIT	SHR	PS	YF	(MF)	NA

INSTREAM VEG (N) A M V

RB SHP	U	V	(S)	O		
TEXTURE	(F)	G	C	B	R	A
RIP. VEG.	N	G	(S)	C	D	M W
STAGE	INIT	SHR	PS	YF	(MF)	NA

EMS ~~Lab~~
TEMP 13.8 °C
pH 8.15
REQ. #
COND. 180 µS/cm
TURB. T M (F) C

FLD SNS
BED MATERIAL Dominant Grsm Subdom. Lgr Gr
D95 (cm) 10 D (cm) 25 Morph. Rpgr

DISTURBANCE INDICATORS

beavdam	aban ch	erdbk	avul	SWD	LWD	jam
O1	B1	(B2)	B3	D1	D2	D3

ex rif	no pl	slev br	mult ch	de line	hom bd	linger	lg wdg	ex bar	ex bd acc
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

PATTERN	TM	ME	IM	IR	(SI)	ST
ISLANDS	N	(O)	I	F	S	AN
BARS	N	(SIDE)	DIAG	(MID)	SPAN	BR
COUPLING	DC	(PC)	CO			
CONFINEMENT	EN	CO	FC	OC	(UN)	N/A

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R___ F___		
						R___ F___		
						R___ F___		
						R___ F___		

S-SW

HABITAT QUALITY

Substrate:

Fines	10%
sm gravel	45
Lge gravel	25
sm. cobble	15
lge cobble	5
Boulder	5

Run 30
Riffle 10
Pool 60%

Rip veg:
Elderberry, fireweed, horsetail, bracken fern, alder, white fir, salmonberry, false solomonseal, cottonwood, Devils club, stinging nettle, paper birch, gooseberry

FSZ

Water level 0.38m

PHOTO DOCUMENTATION

ROLL #	#	FOC LG	DIR	COMMENTS
				Photos: u/s, d/s
				(R) bank
				(L) bank

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C		C	

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9-SW

HABITAT QUALITY

Substrate

Fines	5%
sm gr	10%
Lge gr	15%
sm cobble	35%
Lge cobble	25%
Boulder	10%
Bedrock	0%

Run 80%
Riffle 20%
Pool –

Water level: 0.31m

FSZ

PHOTO DOCUMENTATION

ROLL #	#	FOC LG	DIR	COMMENTS
				Photos: u/s, d/s
				(R) bank
				(L) bank

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C		C	

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SITE CARD

STREAM NAME (gaz.) Stream 7 (Upper) (local)
WATERSHED CODE 53400
ILP MAP # | ILP # | NID MAP # | NID #
REACH # - | SITE # | FIELD UTM 094 670541 6123850 | SITE LG 50m | ACCESS B/hike
DATE 20110603 | TIME 1220 | AGENCY KCB | CREW ML EA JG | FISH FORM Y (N)

CHANNEL

	mthd							
CHANNEL WIDTH (m)	MT	1.1	2.4	0.8				
WETTED WIDTH (m)	MS	2.2	2.6	1.7				
RES. POOL DEPTH (m)	GE	0.2	0.2	0.2				

GRADIENT % 5%

W_b Dp (m) 1.5 1.8 2.0 | STAGE L (M) H | No Vis. Ch. DW | Dry/Int. Tribs.

WATER

EMS — | REQ. # —
TEMP 8.5 °C | COND. 60 µS/cm
pH 7.82 | TURB. T (M) L C
FLD SNS

MORPHOLOGY

BED MATERIAL Dominant SC | Subdom. Gr
D95 (cm) 15 | D (cm) 25 | Morph. Rpg

DISTURBANCE INDICATORS: beavdam O1, aban ch B1, erdbk B2, avul B3, SWD D1, LWD D2, jam D3; ex rif C1, no pl C2, elev br C3, mult ch C4, dis line C5, horn bd S1, finger S2, lg wdg S3, ex bar S4, ex bd scr S5

PATTERN TM ME (IM) IR SI ST
ISLANDS N O (I) F S AN
BARS N (SIDE) DIAG MID SPAN BR
COUPLING DC PC (CO)
CONFINEMENT EN CO (FC) OC UN N/A

COVER

COVER Total 40%

Type	SWD	LWD	B	U	DP	OV	IV
AMT	30	35	5	10	5	15	
LOC							

CROWN CLOSURE: 0 | 1-20% | 21-40% | 41-70% | 71-90% | > 90%; 0 | 1 | (2) | 3 | 4 | 5

LWD FNC N (F) A | DIST (C) E | INSTREAM VEG (N) A M V
LB SHP U V (S) O | RB SHP U V (S) O
TEXTURE F (G) C B R A | TEXTURE F (G) C B R A
RIP. VEG. N G (S) C D M W | RIP. VEG. N G (S) C D M W
STAGE INIT SHR PS YF (MF) NA | STAGE INIT SHR PS YF (MF) NA

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R___ F___		
						R___ F___		
						R___ F___		
						R___ F___		

SITE CARD

STREAM NAME (gaz.) MCS-7 (local)
WATERSHED CODE 53400
ILP MAP # | ILP # | NID MAP # | NID #
REACH # - | SITE # | FIELD UTM 094 660053 6122374 | SITE LG 100m | Boat
DATE 20110603 | TIME 1630 | AGENCY KCB | CREW ML EA JG | FISH FORM Y (N)

CHANNEL

	mthd							
CHANNEL WIDTH (m)	MS	3.3	3.0	3.5				
WETTED WIDTH (m)	MT	3.1	2.8	3.3				
RES. POOL DEPTH (m)	GE	0.2	0.2	0.2				

GRADIENT %

W_b Dp (m) 0.4 0.3 0.4 | STAGE L (M) H | No Vis. Ch. DW | Dry/Int. Tribs.

WATER

EMS — | REQ. #
TEMP 8.5 °C | COND. 70 µS/cm
pH 7.81 | TURB. T M (L) C
FLD SNS

MORPHOLOGY

BED MATERIAL Dominant SmCo | Subdom. Lg Gr
D95 (cm) 15 | D (cm) 15 | Morph. Rpar

DISTURBANCE INDICATORS: beavdam O1, aban ch B1, erdbk B2, avul B3, SWD D1, LWD D2, jam D3; ex rif C1, no pl C2, elev br C3, mult ch C4, dis line C5, horn bd S1, finger S2, lg wdg S3, ex bar S4, ex bd scr S5

PATTERN TM ME (M) IR SI ST
ISLANDS N O I (F) S AN
BARS N (SIDE) DIAG MID SPAN BR
COUPLING (DC) PC CO
CONFINEMENT EN CO FC OC (UN) N/A

COVER

COVER Total 25%

Type	SWD	LWD	B	U	DP	OV	IV
AMT	30	35	5	10	5	15	—
LOC							

CROWN CLOSURE: 0 | 1-20% | 21-40% | 41-70% | 71-90% | > 90%; 0 | 1 | (2) | 3 | 4 | 5

LWD FNC N (F) A | DIST C (E) | INSTREAM VEG (N) A M V
LB SHP (U) V S O | RB SHP U V (S) O
TEXTURE F (G) C B R A | TEXTURE F (G) C B R A
RIP. VEG. N G (S) C D M W | RIP. VEG. N G (S) C D M W
STAGE INIT SHR PS YF (MF) NA | STAGE INIT SHR PS YF (MF) NA

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R___ F___		
						R___ F___		
						R___ F___		
						R___ F___		

Cover

HABITAT QUALITY

Fines - 5%
Sm gravel - 10
Lge gravel - 30
Sm cobble - 40
Lge cobble - 10
Boulder 5
Bedrock - 0

Run 75
Riffle 20
Pool 5

Av. Depth 0.2m
Water level: 0.355m - staff gauge.

t-SDW

FSZ

PHOTO DOCUMENTATION

ROLL #	#	FOC LG	DIR	COMMENTS
				Photos: u/s, d/s
				(R) bank
				(L) bank.

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C		C	

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Substrate

Fines 2%
Sm gravel 5%
Lge gravel 10%
Sm cobble 50
Lge cobble 28%
Boulder 5
Bed-rock. 0

Cover %

Run 65%
Riffle 25%
Pool 10%

Depth 0.2m

(upper) Stream

HABITAT QUALITY

FSZ

PHOTO DOCUMENTATION

ROLL #	#	FOC LG	DIR	COMMENTS
				Photos: u/s d/s
				(L) + (R) bank.

WILDLIFE

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

COMMENTS

C		C	

Rev Apr. 1998

SITE CARD

STREAM NAME (gaz.) Stream 9 (local)

WATERSHED CODE 77809

ILP MAP # | ILP # | NID MAP # | NID #

REACH # - | SITE # | FIELD UTM 094 | 0666069 | 6126321 | SITE LG 50m | ACCESS B

DATE 20 | 11 | 06 | 02 | TIME 19:50 | AGENCY KCB | CREW ML, EA, SG | FISH FORM Y (N)

CHANNEL

	mthd									
CHANNEL WIDTH (m)	MT	4.9	4.8	4.5						
WETTED WIDTH (m)	MT	3.9	3.7	3.4						
RES. POOL DEPTH (m)	GE	0.1	0.2	0.1						

W_b Dp (m) 0.2 | 0.2 | 0.8 | 0.3 STAGE L (M) H

No Vis. Ch. DW | Dry/Int. Tribs.

GRADIENT % 2%

EMS | TEMP 14.2 °C | pH 7.95

REQ. # | COND. 110 µS/cm | TURB. T (M) L C

FLD SNS

BED MATERIAL Dominant LC | Subdom. SC

D95 (cm) 20 | D (cm) 25 | Morph. RPC

COVER

Total 20%

Type	SWD	LWD	B	U	DP	OV	IV
AMT	10	15	15	5	—	35	—
LOC							

CROWN CLOSURE

0	1-20%	21-40%	41-70%	71-90%	>90%
0	1	(2)	3	4	5

LWD FNC N (F) A | DIST (C) E

LB SHP U V (S) O | TEXTURE (F) (G) C B R A | RIP. VEG. N G (S) C D M W | STAGE INIT SHR PS YF (MF) NA

INSTREAM VEG (N) A M V

RB SHP U V (S) O | TEXTURE (F) (G) C B R A | RIP. VEG. N G (S) C D M W | STAGE INIT SHR PS YF (MF) NA

DISTURBANCE INDICATORS

beavdam	aband ch	ambk	anvil	SWD	LWD	jam
D1	B1	B2	B3	D1	D2	D3

ex nf	ne pl	slev br	mult ch	dis line	hom bd	fingpl	lg wdg	ex bar	ex bd act
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

PATTERN TM ME (IM) IR SI ST

ISLANDS (N) O I F S AN

BARS N (SIDE) DIAG MID SPAN BR

COUPLING (DC) PC CO

CONFINEMENT EN CO FC OC (UN) N/A

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R___ F___		
						R___ F___		
						R___ F___		
						R___ F___		

SITE CARD

STREAM NAME (gaz.) MCS-10 (local)

WATERSHED CODE 6070

ILP MAP # | ILP # | NID MAP # | NID #

REACH # - | SITE # | FIELD UTM WMPT MCS-10 | SITE LG 200m | ACCESS ATV

DATE 30 | 11 | 06 | 08 | TIME 16:30 | AGENCY KCB | CREW ML, MM | FISH FORM (Y) N

CHANNEL

	mthd									
CHANNEL WIDTH (m)	MT	0.8	0.9	1.3						
WETTED WIDTH (m)	MT	0.5	0.8	1.1						
RES. POOL DEPTH (m)	GE	0.1	0.1	0.1						

W_b Dp (m) 0.2 | 0.25 | 0.3 STAGE L (M) H

No Vis. Ch. DW | Dry/Int. Tribs.

GRADIENT % 2%

EMS | TEMP 9.1 °C | pH 7.06

REQ. # | COND. 30 µS/cm | TURB. T M L (C)

FLD SNS

BED MATERIAL Dominant Lg Gr | Subdom. Sm Gr

D95 (cm) 10 | D (cm) 18 | Morph. RPA

COVER

Total 25%

Type	SWD	LWD	B	U	DP	OV	IV
AMT	20	10	—	20	25	25	
LOC							

CROWN CLOSURE

0	1-20%	21-40%	41-70%	71-90%	>90%
0	1	(2)	3	4	5

LWD FNC N (F) A | DIST (C) E

LB SHP U V (S) O | TEXTURE F (G) C B R A | RIP. VEG. N G (S) C D M W | STAGE INIT SHR PS YF (MF) NA

INSTREAM VEG N A (M) V

RB SHP U V (S) O | TEXTURE F (G) C B R A | RIP. VEG. N G (S) C D M W | STAGE INIT SHR PS YF (MF) NA

DISTURBANCE INDICATORS

beavdam	aband ch	ambk	anvil	SWD	LWD	jam
D1	B1	B2	B3	D1	D2	D3

ex nf	ne pl	slev br	mult ch	dis line	hom bd	fingpl	lg wdg	ex bar	ex bd act
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

PATTERN TM ME IM (IR) SI ST

ISLANDS (N) O I F S AN

BARS N (SIDE) DIAG MID SPAN BR

COUPLING (DC) PC CO

CONFINEMENT EN CO FC OC (UN) N/A

FEATURES

C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R___ F___		
						R___ F___		
						R___ F___		
						R___ F___		

Substrate

Fines	10%	Run	65
sm gravel	35%	Riffle	25
Lge gravel	35	Pool	10
sm cobble	15%		
Lge cobble	5%		
Boulder	0%		

MCS-10

ROLL #	#	FOC LG	DIR	COMMENTS
				Photo: u/s, d/s
				(R) + (L) bank

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

C		C	

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Substrate

		Cover %	
Fines:	5	Pool:	—
sm gravel:	5	Riffle:	15
Lge gravel:	5	Run:	75
sm Cobble:	15		
Lge Cobble:	60		
Boulder:	10		
Bedrock:	0		

6 transects

ROLL #	#	FOC LG	DIR	COMMENTS
				Photos - u/s, d/s
				(L) bank, (R) bank.

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS
	Eagles land at site		

C		C	

Apr 1998

SITE CARD

STREAM NAME (gaz.)	Stream 10-2	(local)	
WATERSHED CODE	6070		
ILP MAP #		ILP #	
NID MAP #		NID #	
REACH #	-	SITE #	
FIELD UTM	094 0673419 6126651	SITE LG	200m
ACCESS	Boat		
DATE	20110605	TIME	1350
AGENCY	KCB	CREW	ML EA JG
FISH FORM	(Y) N		

CHANNEL	mthd		GRADIENT %
CHANNEL WIDTH (m)	GE	20m	0%
WETTED WIDTH (m)	GE	20m	
RES. POOL DEPTH (m)			
W_b Dp (m)	20		

STAGE L M (H) — No Vis. Ch. DW — Dry/Int. Tribs.

WATER			
EMS		REQ. #	
TEMP	15.1 °C	COND.	70 µS/cm
pH	7.38	TURB.	T M L C

FLD SNS

BED MATERIAL Dominant F Subdom. —

D95 (cm) — D (cm) — Morph. Pool

COVER							
Type	SWD	LWD	B	U	DP	OV	IV
AMT	—	—	—	—	95	5	—
LOC							

Total

CROWN CLOSURE

0	1-20%	21-40%	41-70%	71-90%	> 90%
0	(1)	2	3	4	5

DISTURBANCE INDICATORS

beavdam	aban ch	ordbk	avul	SWD	LWD	jam
O1	B1	B2	B3	D1	D2	D3

ex nf	no pl	slsv br	mult ch	dis line	hom bd	fingcr	lg wdg	ex bar	ex bd scr
C1	C2	C3	C4	C5	S1	S2	S3	S4	S5

LWD FNC	(N) F A	DIST	C E	INSTREAM VEG	N A M (V)		
LB SHP	U V S O N/A	RB SHP	U V S O N/A				
TEXTURE	F G C B R A N/A	TEXTURE	F G C B R A N/A				
RIP. VEG.	N G (S) C D M W	RIP. VEG.	N G (S) C D M W				
STAGE	INIT SHR PS YF (MF) NA	STAGE	INIT SHR PS YF (MF) NA				

MORPHOLOGY							
PATTERN	TM	ME	IM	IR	SI	ST	N/A
ISLANDS	(N)	O	I	F	S	AN	
BARS	(N)	SIDE	DIAG	MID	SPAN	BR	
COUPLING	(DC)	PC	CO				
CONFINEMENT	EN	CO	FC	OC	(UN)	N/A	

FEATURES C	NID MAP #	NID #	TYPE	HT / LG (m)	mthd	PHOTO	COMMENTS	UTM
						R___ F___		
						R___ F___		
						R___ F___		
						R___ F___		

Substrate 100% Fines C-01
Area flooded into riparian vegetation.
Approx. 2m deep

Photos - U/S, D/S

Z

ROLL #	#	FOC LG	DIR	COMMENTS

GROUP	WILDLIFE OBSERVATIONS	GROUP	WILDLIFE OBSERVATIONS

C		C	

Apr 1998

DRAFT

APPENDIX VI

Length and Weight Data

TRAP NO.	*SPECIES	LENGTH (mm)	WEIGHT (g)	COMMENTS
1	RSD	82	5.41	
	RSD	75	4.57	
	RSD	79	4.64	
	RSD	72	6.14	
	RSD	80	5.56	
	NPM	148	31.23	
2	RSD	82	5.63	
	RSD	78	5.17	
	RSD	91	7.68	photo
	RSD	82	5.68	
	RSD	82	6.65	
	RSD	91	7.26	
	RSD	65	3.45	
	RSD	90	9.32	
	RSD	75	5.53	
	RSD	86	7.73	
	RSD	102	15.53	
	RSD	79	5.63	
	RSD	80	4.84	
	RSD	82	6.03	
	RSD	74	4.07	
	RSD	77	4.71	
	RSD	81	5.32	
	RSD	67	2.73	
	RSD	81	6.27	
	RSD	69	3.26	
	RSD	84	6.63	
3	RSD	100	13.36	photo
	RSD	82	7.38	
	RSD	104	12.63	
	RSD	94	8.98	
	RSD	90	9.68	
	RSD	94	9.89	
	RSD	78	5.83	
	RSD	101	14.73	
4	RSD	78	5.47	
	NPM	153	38.31	
	RSD	81	5.72	
	RSD	80	6.37	
5	NFC			
6	NFC			
Total		**39**		

*RSD – Redside shiner; NPM – Northern pike minnow; NFC – No fish caught

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APPENDIX VII

Site Photographs

Photo 1: Morrison Lake, June 2011

Photo 2: Eagle Nest, Morrison Lake

Photo 3: Stream 9, Downstream toward Outlet to Morrison Lake, 2 June 2011

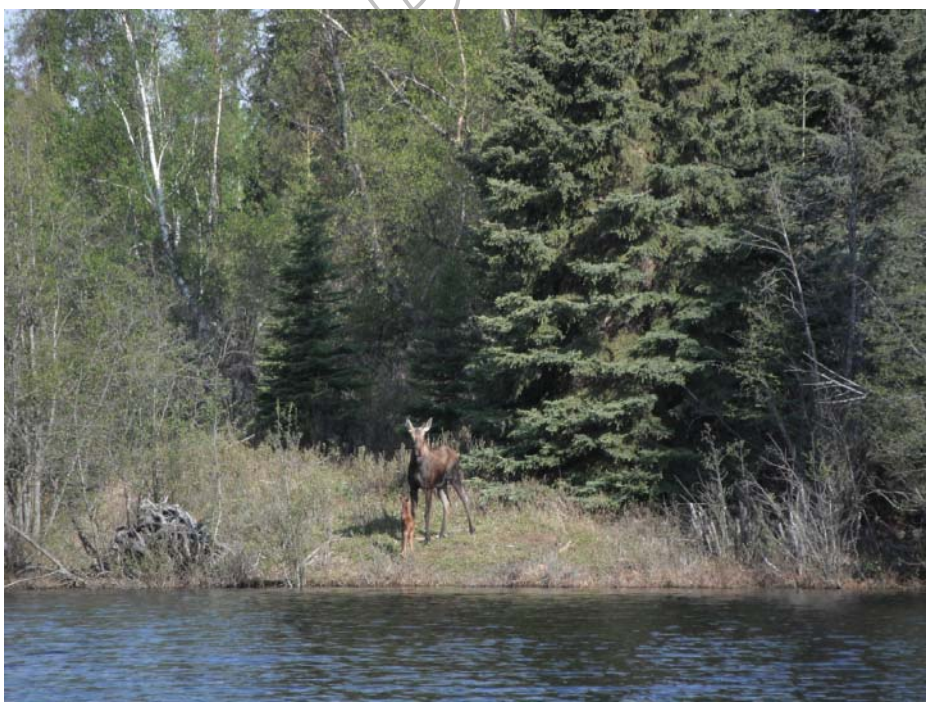

Photo 4: Female Moose with Young-of-Year Calf, Morrison Lake, 3 June 2011

Photo 5: Stream 7, Upstream, 3 June 2011

Photo 6: Stream 7, Debris Jam, 3 June 2011

Photo 7: Upper Stream 7, Downstream, 3 June 2011

Photo 8: Upper Stream 7, Confined Canyon Walls Approximately 200 m Downstream from Upper Stream 7, 3 June 2011

Photo 9: Cubes, 4 June 2011

Photo 10: Barrels, Note: Green Barrel noted as "Barrel 1" and Blue Barrel as "Barrel 2", 4 June 2011

Photo 11: MCS-1 Upstream, 4 June 2011

Photo 12: MCS-1 Staff Gauge, 4 June 2011

Photo 13: Morrison River Downstream, 4 June 2011

Photo 14: Morrison River, Water Level ~15 cm above Staff Gauge, 4 June 2011

Photo 15: MCS-4 Downstream , 4 June 2011

Photo 16: MCS-4 Staff Gauge, 4 June 2011

Photo 17: MCS-6 Downstream, 4 June 2011

Photo 18: MCS-6 Staff Gauge, 4 June 2011

Photo 19: Nakinilerak Lake, 5 June 2011

Photo 20: Nakinilerak Lake Inlet Upstream– Hautete Creek 1, 5 June 2011

Photo 21: Nakinilerak Lake Inlet Downstream at Outlet– Hautete Creek 1, 5 June 2011

Photo 22: Stream 10-2 Upstream, 5 June 2011

Photo 23: Nakinilerak Lake Outlet - Hautete Creek 2 Downstream, 5 June 2011

Photo 24: Minnow Trap Hautete Creek 2, 5 June 2011

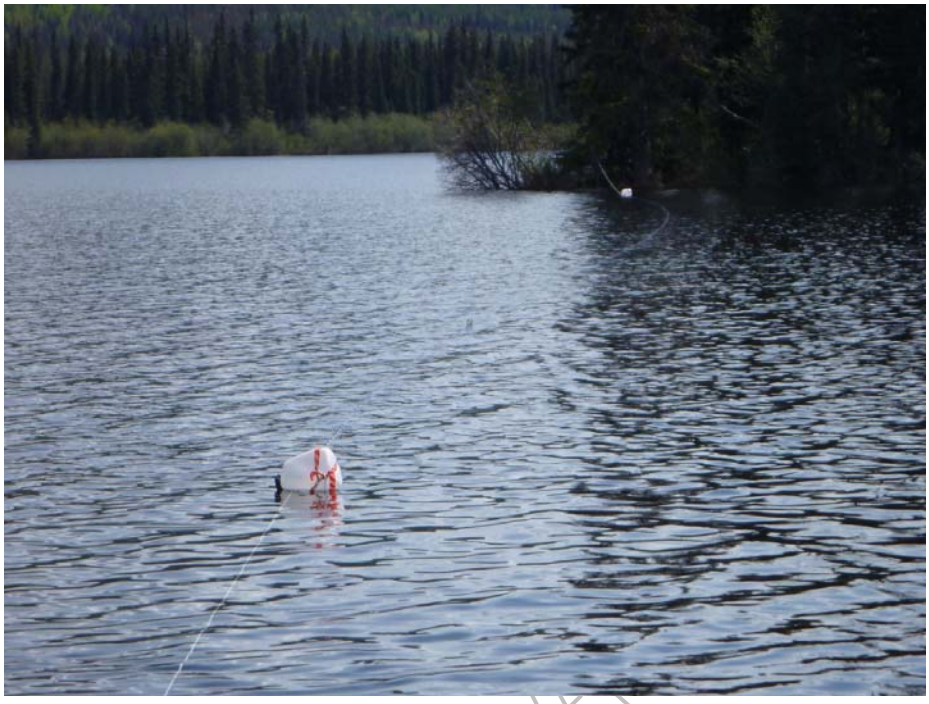

Photo 25: Gill Net Set, Nakinilerak Lake, 6 June 2011

Photo 26: Red-Sided Shiner, Stream 10-2, 6 June 2011

Photo 27: NPM, Stream 10-2, 6 June 2011

Photo 28: Rainbow Trout, Nakinilerak Lake Gill Net set, 6 June 2011

Photo 29: Nakinilerak Lake, New Staff Gauge at Boat Launch, 6 June 2011

Photo 30: MCS-5, LWD from Debris Torrent, Creek Diverted, 7 June 2011

Photo 31: MCS-5 Hydrometric Station Buried from Debris Torrent, 7 June 2011

Photo 32: MCS-5 Hydrometric Station Re-Installed in Pool, 7 June 2011

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Photo 33: Well Not Sampled Due to Highly Turbid Water, 8 June 2011

Photo 34: MCS-10, Hydrometric Station, 8 June 2011

ENVIRONMENTAL DYNAMICS INC.

SUITE 201 – 1110 SIXTH AVENUE
PRINCE GEORGE, BC V2L 3M6
P: (250) 562-5412 ▪ F: (250) 562-5413

April 8, 2011

EDI Job Number: 10-VC-0591

Pacific Booker Minerals
1702-1166 Alberni Street
Vancouver, B.C.
V6E 3Z3

Attention: Don Betton

Re: Spring 2011 Snowpack Survey, Morrison Project

In late March of 2011 Pacific Booker Minerals (Pacific Booker) retained EDI Environmental Dynamics Inc. to conduct a snowpack survey at the existing meteorological station on the Pacific Booker property. The intent of the snowpack survey was to attempt to capture peak snowpack and to describe the existing snow conditions. On April 1, EDI conducted a snowpack survey at the meteorological station. This document presents a summary of survey methods and data collected onsite.

The meteorological station was located approximately 1.3 km northwest of Booker Lake (UTM Zone 9U 670060E 6121337N). The station is situated on the east side of Morrison Lake at an elevation roughly 800 m above sea level, within the watershed of stream 50000-48010 (Rescan 2008). Access to the site was obtained by snowmobile from KM 25 on the Hagen Road. Photos of the site are provided in Attachment I.

The snow survey was conducted in the morning (8:30 am) under frozen conditions. The temperature at the time of the survey was -3°C. The daily freeze/thaw process had created a strong frozen crust on the snow, and snow shoes were not required to walk around the site. There had been no recent snow accumulation.

The snow survey followed the procedures outlined in the *Snow Survey Sampling Guide* (MOE 1981). The measurements were made using a "Standard Federal Snow Sampler" which consists of graduated aluminum tubes with a cutter bit affixed to the first section of the tubing. For this sampling event two tube lengths were used. Prior to taking the first core sample, the empty sampler was weighed using a scale specially

calibrated in centimeters of water. Care was taken to ensure that the scale slid freely in the barrel and it was held correctly to prevent binding.

Holding the sampler vertical, the tube was driven through the snow to the ground in a single continuous motion. Snow depth was recorded to the nearest cm. Carefully the snow core was extracted and core length was recorded. The cutter end of the sampler was inspected for dirt and litter. Non-snow material was carefully removed from the core and the thickness of the "dirt plug" was subtracted from the total snow depth. The tubes and core were then weighed. The snow water equivalent is difference between the empty weight of the sampler and the weight of the sampler and snow core. Prior to taking the next sample, snow was emptied from the core tube. Due to the coarse crystalline structure of the snow, accumulations of residual snow were not a problem. In total, ten snow core samples were taken in a circular fashion around the meteorological station. Each sample location was approximately 5 m apart.

The following quality control methods were used during the sampling process. The pre-sample weighing procedure was performed twice to make certain measurements were consistent. Between each sample the inside of the corer was visually inspected. Any residual snow or ice was cleaned from the inside of the sampler using a cleaning tool. As suggested in the guide, the weight of the empty tube was rechecked on the fifth sample to ensure accuracy of measurements.

Measurements were recorded in the format of the snow survey form provided in the provincial guide. The results of the snow survey are provided in Table 1. The average snow depth at the time of the survey was 65.5 cm and the average water equivalent was 20.2 cm.

Table 1. Numerical results of the snow survey.

Station	Snow Depth With Dirt Plug (cm)	Snow Depth Without Dirt Plug (cm)	Core Length (cm)	Weight of Tube & Core*	Weight of Tube*	Water Equivalent (cm)	Percent Density
1	71	70	57	69	44	25	35.71
2	67	66	47	64	44	20	30.30
3	62	62	53	65	44	21	33.87
4	67	67	57	64	44	20	29.85
5	66	66	47	65	44	21	31.82
6	68	66	46	63	44	19	28.79
7	62	62	55	66	44	22	35.48
8	67	67	37	62	44	18	26.87
9	69	69	37	60	44	16	23.19
10	60	60	48	64	44	20	33.33
	Total	**655**			**Total**	**202**	
	Average	**65.5**			**Average**	**20.2**	

*scale specially calibrated in centimeters of water

Typically, snowpack is measured at the same location throughout the winter. Sampling frequency and location can vary depending on the reason for the collection of data. In this case, one of the reasons for

collection the snow information was to record the maximum snowpack at the site. The maximum snow depth reading at most provincial snow survey sites occurs near the beginning of April (MOE 2011). However, it is unlikely that the snow depth recorded at the site represents the maximum snowpack. Daytime temperatures had been above zero degrees for a number of 2-3 weeks prior to the survey, with little to no precipitation. Based on observations the snow had been melting during the day and freezing at night for some time. The snowpack was greatly diminished on open south facing slopes.

Depending on the end use of the snowpack survey data, additional surveys may be required to monitor the rate of spring snow melt. To determine water balance equations, a single sample event is not likely sufficient. A hydrologist should be consulted to determine if additional sampling is warranted, based on the needs of Pacific Booker. Please let me know if you have any question regarding the information provided, or require additional detail.

Yours truly,
EDI ENVIRONMENTAL DYNAMICS INC.

Tim Antill, M.Sc., R.P.Bio., P.Ag.
Senior Biologist

Attachments:

- Appendix I – Site Photos

References:

MOE (BC Ministry of Environment). 1981. Snow survey sampling guide. BC Ministry of Environment – Water Management Branch: Surface Water Section. Victoria, BC. 27pp.

MOE (BC Ministry of Environment). 2011. About snow surveys. BC Ministry of Environment - River Forecast Center. Available at: http://bcrfc.env.gov.bc.ca/about/ Accessed April 5, 2011.

Rescan. 2008. Morrison Copper/Gold Project Fisheries Baseline Report (2006-2008). Prepared by Rescan Environmental Services Ltd. for Pacific Booker Minerals. December 2008.

Photo 1. View of the meteorological station and snow conditions at the time of the snow survey.

Photo 2. View of the meteorological station and snow conditions at the time of the snow survey. Note that the snow crust was strong enough to support the weight of crew members

APPENDIX II

Hydrogeology Model Outputs

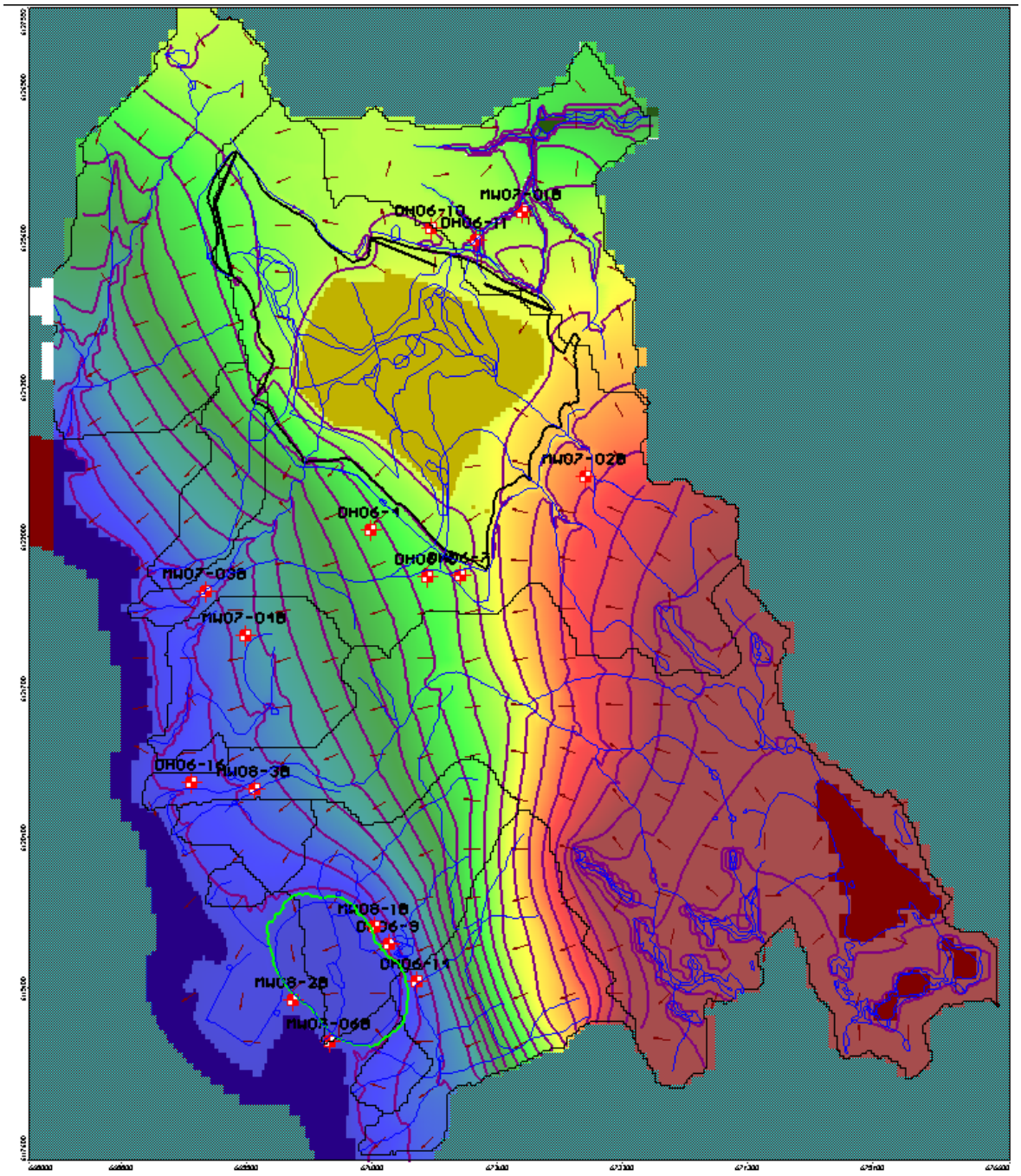

Figure II-1 Equipotential Contours and Flow Velocity Vectors

Expected Case Model (Updated Rescan Figure 4.5-2)

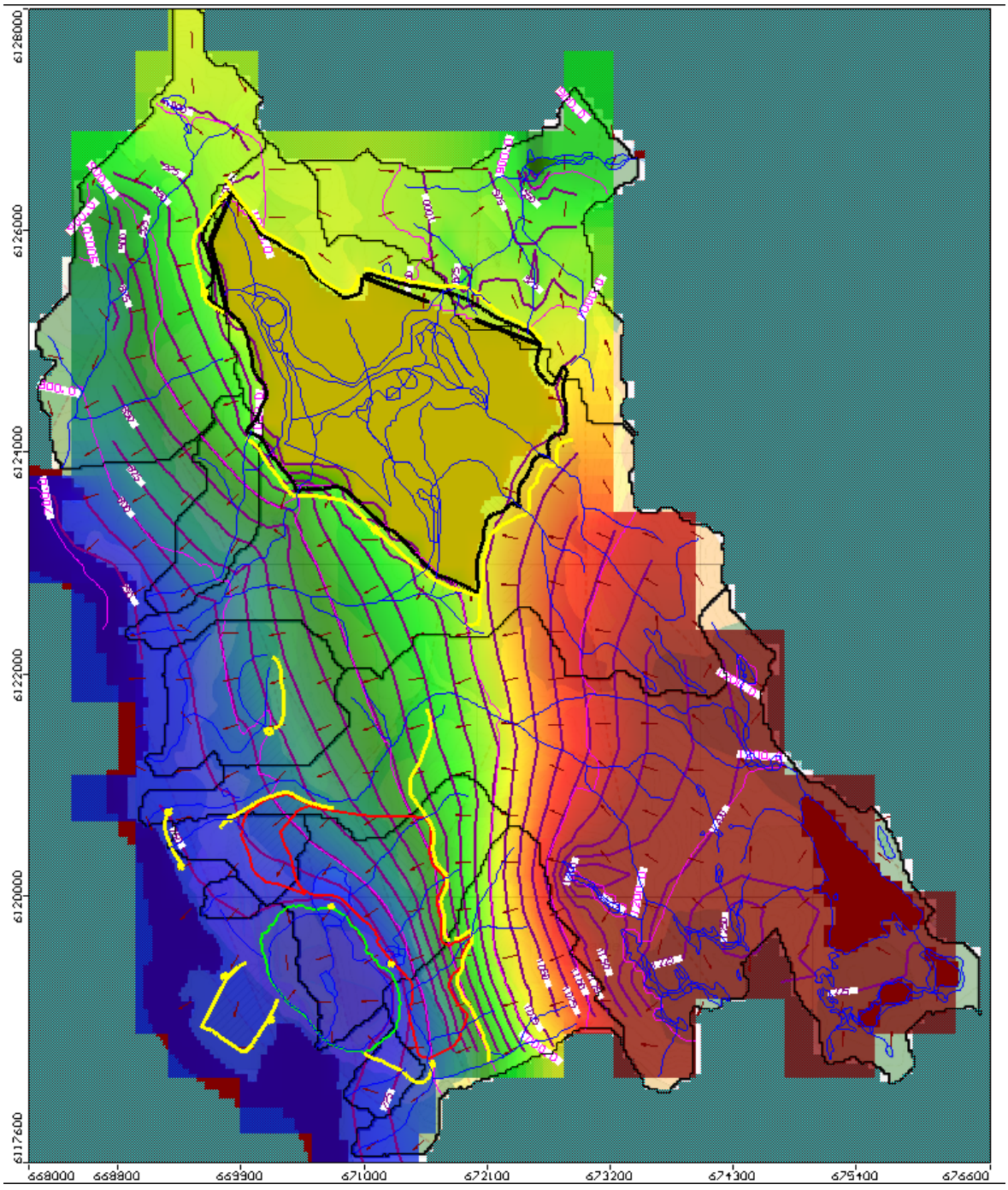

Figure II-2 Equipotential Contours and Flow Velocity Vectors

Upper Bound Model (Updated Rescan Figure 4.5-2)

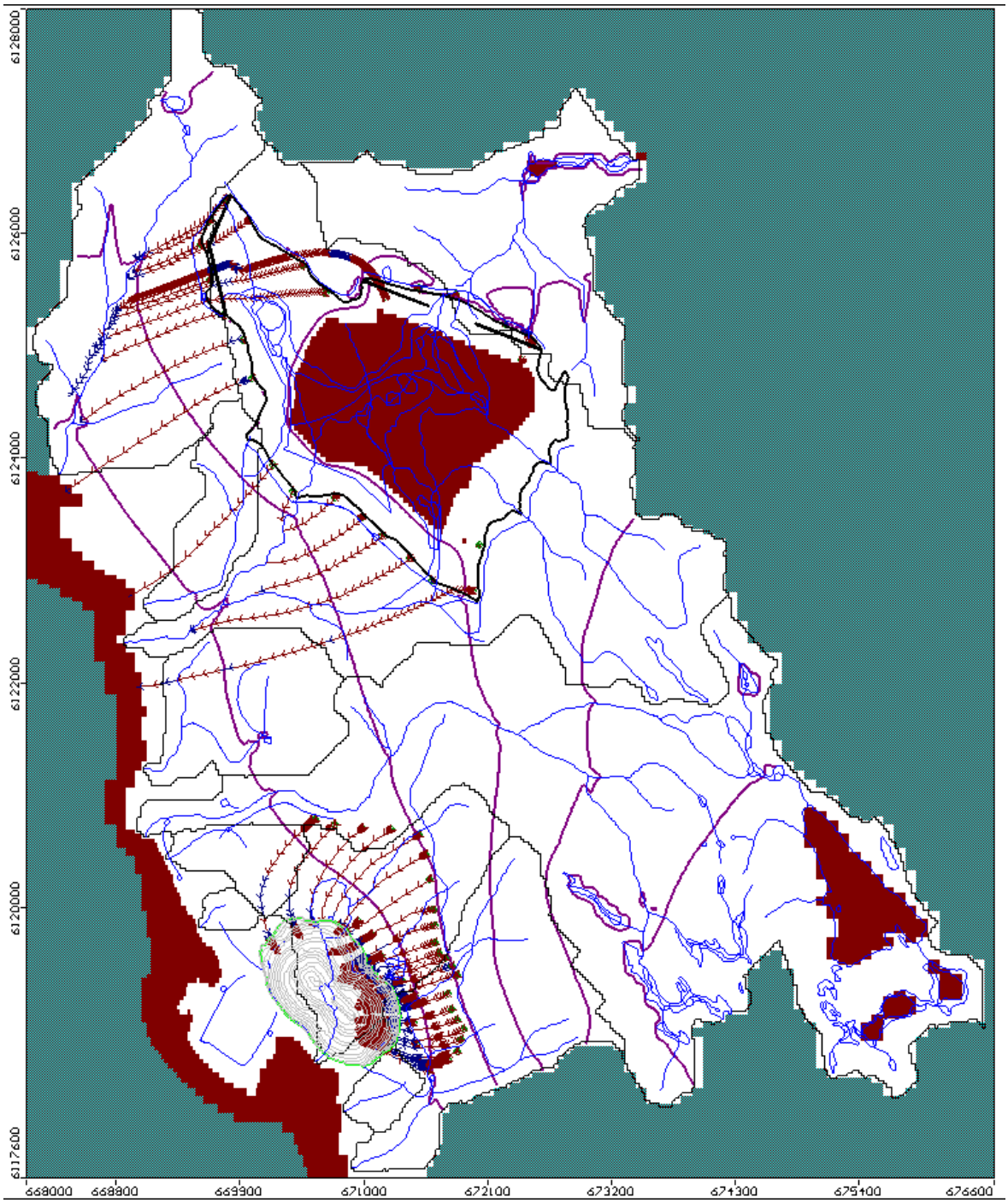

Figure II-3 Particle Tracking Flow Pathlines

Expected Case Model (Updated Rescan Figure 4.5-1)

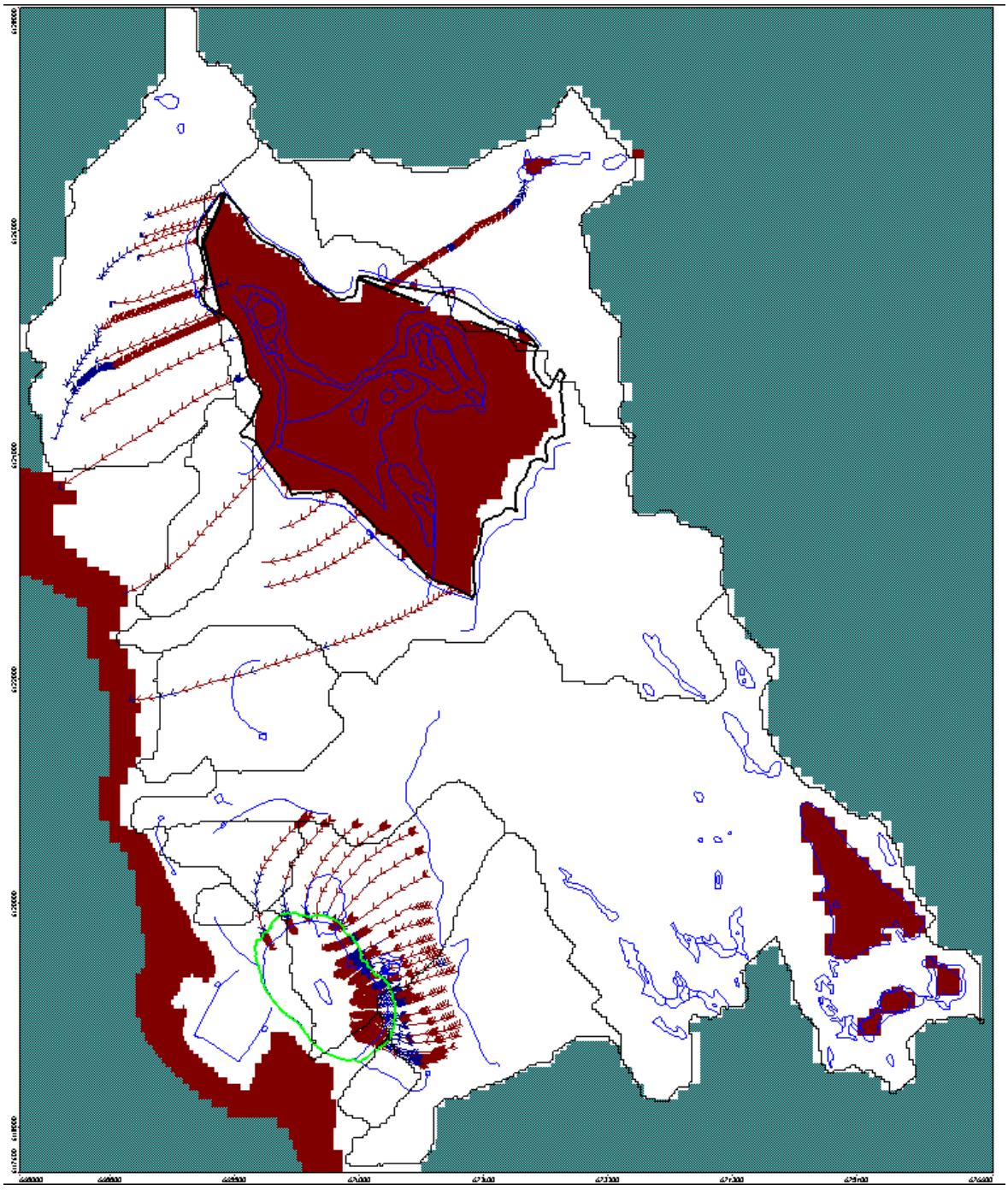

Figure II-4 Particle Tracking Flow Pathlines

Upper Bound Model (Updated Rescan Figure 4.5-1)

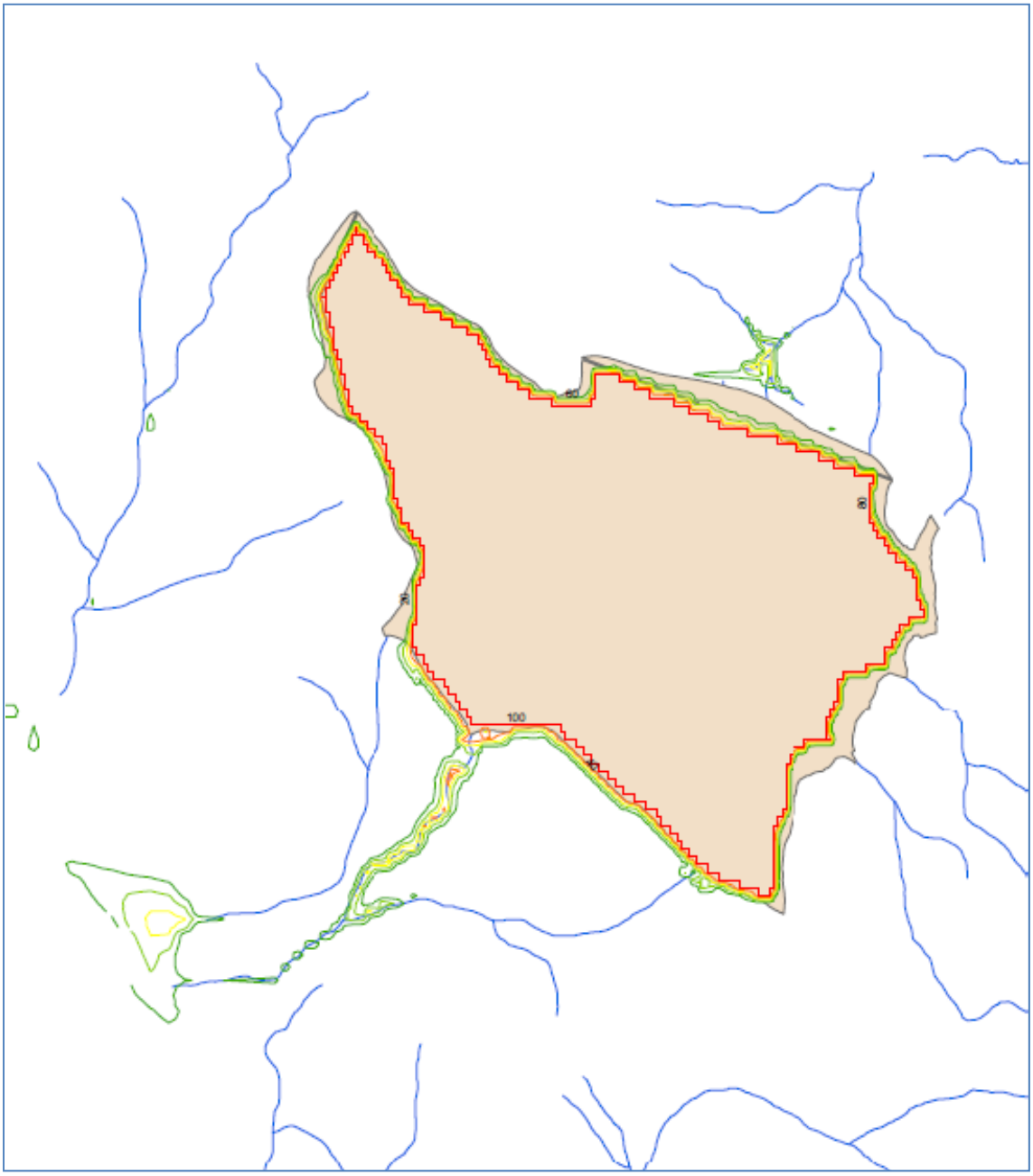

Figure II-5 Solute concentration isopleths in TSF area (Expected Case, layer 1- Plan view)

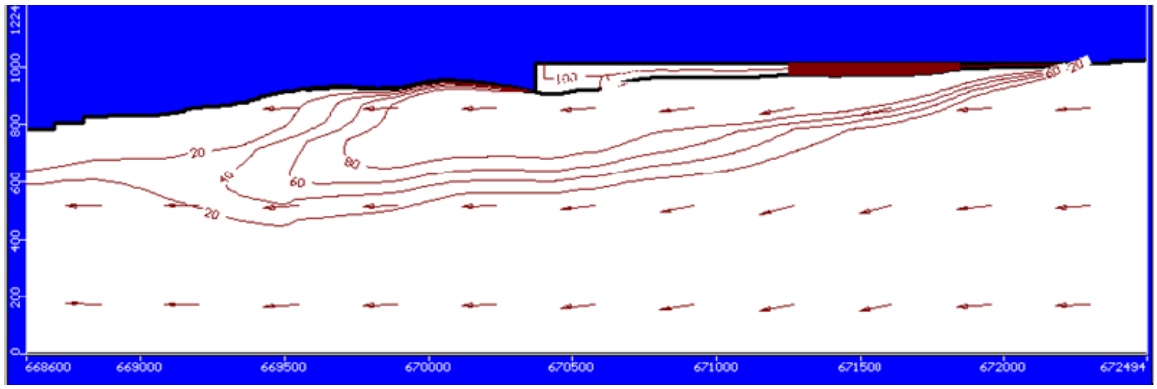

Figure II-6 Row 86 – Predicted Solute concentraiton Isopleths in TSF Area (Expected Case)

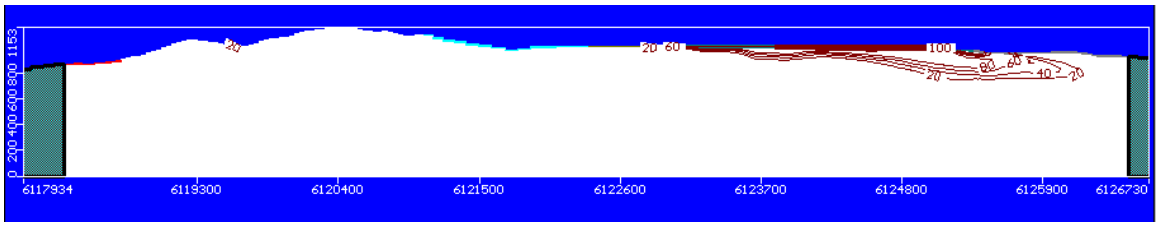

Figure II-7 Column 155 – Predicted Solute concentraiton Isopleths in TSF Area (Expected Case)

APPENDIX III

Water Balance – Life of Mine Spreadsheets

Summary - Expected Condition

Annual Precipitation (mm)	550
Annual Evaporation (mm)	389
Undisturbed (Diverted) Land Runoff Coefficient	0.5
TSF	
Tailings pond area (sq. km)	varies
Undiverted Catchment runoff area (sq.km.)	varies
Diverted uphill catchment area (sq.km.)	varies
% Diversion ditch seepage	10%
Ultimate Tailings pond area (sq. km)	5.1

Process Plant	
Waste Dump/Plant Site Runoff Coefficient	0.7
Open Pit Runoff Coefficient	1.0
Processes %Availability	92.0%
Undiverted WRD/Plant Site Catchment Area (sq.km)	varies
Diverted WRD/Plant Site Catchment Area (sq.km)	varies
% Diversion ditch seepage	10%
Open Pit Area (sq.km)	1.1

Tailings		tpd	% Solids	
Total Daily Tonnage		29,621	Transport	InSitu
9%	Rougher	27,003	35.61%	72.2%
91%	Cleaner	2,619	22.76%	72.2%
Cyclone Efficiency		85%		
24%	Cyclone U/F	7,157		85.0%
76%	Cyclone O/F	22,465		72.2%

	Parameter	unit		Construction	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 20.5
DATA	Annual precipitation	mm	550																						
	Annual evaporation	mm	389																						
TSF Area	Diverted catchment area (external to TSF)	km^2		4.07	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80
	Diverted Within TSF				2.10	2.10	2.10	2.10	2.10	1.25	1.25	1.25	1.25	1.25	0.70	0.70	0.70	0.70	0.70	0.00	0.00	0.00	0.00	0.00	0.00
	Diverted runoff coefficient	%	0.5																						
	Diversion ditch efficiency	%	90%		Yr 5 footprint Diversion					Yr 10 footprint diversion					Yr 15 footprint diversion					UTSF diversion					
	Undiverted catchment area (not including TSF)	km^2		6.47	1.80	1.08	0.72	0.36	0.00	0.68	0.51	0.34	0.17	0.00	0.44	0.33	0.22	0.11	0.00	0.56	0.42	0.28	0.14	0.00	0.00
	Undiverted runoff coefficient	%	0.5																						
	TSF impoundment area	km^2		1.20	1.20	1.92	2.28	2.64	3.00	3.17	3.34	3.51	3.68	3.85	3.96	4.07	4.18	4.29	4.40	4.54	4.68	4.82	4.96	5.10	5.10
	TSF impoundment runoff coefficient	%	1.0																						

			Transport	In Situ
Mine Area	Rougher Tailings Density	% solids	35.61%	72.2%
	Cleaner Tailings Density		22.76%	72.2%
	Cyclone Underflow	% solids	-	85.0%
	Cyclone Overflow	% solids	-	72.2%

	Diverted LGO/WRD/Plantsite area	km^2		0.62	1.7	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	0.00	0.00	0.00
	Diverted runoff coefficient	%	0.5																						
	Diversion ditch efficiency	%	90%																						
	Undiverted LGO/WRD/Plantsite area	km^2		2.52	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	0.00	0.00	0.00
	LGO/WRD/Plantsite runoff coefficient	%	0.7																						
	Open pit area	km^2	1.1																						
	Open pit runoff coefficient	%	1.0																						
INFLOWS																									
TSF Area	Runoff from undiverted catchment	m^3/hr		206	57	34	23	11	0	22	16	11	5	0	14	11	7	4	0	18	13	9	4	0	0
	Leakage from Diversion Ditches			0	50	50	50	50	50	45	45	45	45	45	41	41	41	41	41	37	37	37	37	37	34
	Precipitation on TSF Impoundment			76	76	122	145	168	191	202	213	223	234	245	252	259	266	273	280	289	298	307	316	325	279
	Cleaner Tailings Water (direct discharge)			0	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	0	0	0
	Rougher Tailings Water (direct discharge)			0	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034
	Seepage reclaim			0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	SUBTOTAL - TSF Inflows			**282**	**2593**	**2616**	**2627**	**2639**	**2650**	**2677**	**2682**	**2688**	**2693**	**2699**	**2716**	**2720**	**2723**	**2727**	**2730**	**2752**	**2757**	**2761**	**2396**	**2400**	**2352**
Mine Area	Runoff from LGO/WRD plantsite area	m^3/hr		0	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	0	0	0
	Leakage from diversion ditches			0	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	0	0	0
	Precipitation/Runoff into open pit			0	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	69	0	0	0
	Open pit dewatering			0	5	14	22	31	39	48	56	65	73	82	90	99	107	116	124	133	141	150	140	140	140
	Fresh water makeup			0	45	45	45	45	45	45	45	45	45	45	45	45	77	87	87	87	87	87	87	87	87
	Ore rock moisture			0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
	SUBTOTAL - Mine Inflows			**0**	301	310	318	327	335	344	353	361	370	378	387	395	436	454	463	471	480	488	266	266	266
OUTFLOWS																									
	Evaporation from TSF impoundment	m^3/hr		54	54	86	103	119	135	143	150	158	166	173	178	183	188	193	198	204	210	217	223	229	208
	TSF seepage			5	10	15	19	24	29	34	38	43	48	53	57	62	67	72	76	81	86	91	95	100	100
	Tailings void loss - whole			0	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	206	433	433	433
	-overflow			0	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204	204	0	0	0
	-underflow (cyclone sand)			0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0
	Dust Suppression			21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	17
	Concentrate Load Out			0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Potable Water			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Reclaim Water			0	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2328	2318	2318	2318	2318	2318	2318	2318	2318
	Discharge to Environment			125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SUBTOTAL - Outflows			**207**	2888	2926	2946	2967	2988	3001	3013	3025	3038	3050	3060	3070	3047	3047	3057	3068	3079	3090	3094	3105	3079
NET	**Net Flow**			**75**	6	0	-1	-2	-3	20	22	23	25	27	43	45	112	134	136	156	158	160	-432	-439	-461
	Net Annual Volume	m^3		655,551	49,395	- 318	- 8,564	- 16,809	- 25,054	178,184	191,825	205,466	219,107	232,747	375,980	396,532	977,724	1,173,477	1,194,029	1,367,264	1,384,360	1,401,457	- 3,788,543	- 3,846,164	- 2,019,379
CUMULATIVE	**Cumulative Volume**	m^3		655,551	704,946	704,627	696,064	679,255	654,201	832,386	1,024,211	1,229,676	1,448,783	1,681,531	2,057,511	2,454,043	3,431,767	4,605,244	5,799,272	7,166,536	8,550,897	9,952,354	6,163,811	2,317,647	298,268
	Cumulative Volume	Mm^3		0.66	0.70	0.70	0.70	0.68	0.65	0.83	1.02	1.23	1.45	1.68	2.06	2.45	3.43	4.61	5.80	7.17	8.55	9.95	6.16	2.32	0.30
MAXIMUM	**LOM Max Pond Volume**	9.95	Mm^3																						
END	**End of Mine Pond Volume:**	0.30	Mm^3																						

Construction

Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	No	No	No	No	No	No	No	No	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	128	108	91	76	250	498	405	287	198	152	136	142	**206**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	-
Precipitation on TSF Impoundment	94	64	50	39	62	86	81	78	81	92	94	98	**76**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Seepage reclaim	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	221	172	141	115	312	584	486	365	278	243	230	240	**282**
Plant Area = Process Plant & Site, Open Pit, Waste Dump, Ore Stockpile													
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0.00	0	0	0	0	0	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Fresh Water Make-up	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Ore Void Water (3% MC)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	**0**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	129	164	163	131	60	0	0	0	**54**
Seepage	5	5	5	5	5	5	5	5	5	5	5	5	**5**
Tailing voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cyclone Overflow Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	0	0	0	0	0	0	0	0	0	0	0	0	-
Discharge to Environment	0	0	0	0	0	0	140	365	278	243	230	240	**125**
Subtotal	8	8	8	8	187	222	361	554	397	251	238	248	**207**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**213**	**164**	**133**	**107**	**125**	**362**	**125**	**(189)**	**(118)**	**(8)**	**(8)**	**(8)**	**75**
Net Water Surplus (Deficit) (m^3)	**155582**	**120048**	**96976**	**78110**	**91217**	**264392**	**91045**	**(137943)**	**(86355)**	**(5840)**	**(5840)**	**(5840)**	**655,551**
Pond Size (m^3)	**155582**	**275630**	**372606**	**450716**	**541933**	**806325**	**897370**	**759426**	**673071**	**667231**	**661391**	**655551**	

Year 1

Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	36	30	25	21	69	139	113	80	55	42	38	39	**57**
Leakage from Diversion Ditches	31	26	22	19	61	122	99	70	48	37	33	35	**50**
Precipitation on TSF Impoundment	94	64	50	39	62	86	81	78	81	92	94	98	**76**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2569	2529	2506	2487	2601	2755	2701	2636	2593	2580	2574	2581	**2,593**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	5	5	5	5	5	5	5	5	5	5	5	5	**5**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	221	201	183	168	346	603	507	385	293	245	230	235	**301**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	129	164	163	131	60	0	0	0	**54**
Seepage	10	10	10	10	10	10	10	10	10	10	10	10	**10**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2849	2849	2796	2796	2975	3010	3009	2977	2906	2796	2849	2849	**2,888**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(59)**	**(119)**	**(107)**	**(141)**	**(27)**	**348**	**199**	**44**	**(21)**	**29**	**(46)**	**(33)**	**6**
Net Water Surplus (Deficit) (m^3)	**(43321)**	**(86673)**	**(78000)**	**(102866)**	**(19783)**	**253784**	**145208**	**32260**	**(15285)**	**21302**	**(33337)**	**(23895)**	**49,395**
Pond Size (m^3)	**612230**	**525557**	**447557**	**344692**	**324908**	**578692**	**723900**	**756160**	**740875**	**762178**	**728841**	**704946**	

Year 2
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	21	18	15	13	42	83	68	48	33	25	23	24	**34**
Leakage from Diversion Ditches	31	26	22	19	61	122	99	70	48	37	33	35	**50**
Precipitation on TSF Impoundment	150	103	79	62	100	138	129	125	129	147	150	157	**122**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2611	2556	2525	2502	2611	2751	2704	2651	2619	2618	2614	2624	**2,616**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	14	14	14	14	14	14	14	14	14	14	14	14	**14**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	229	209	192	176	355	611	516	393	301	254	238	244	**310**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	206	262	261	210	96	0	0	0	**86**
Seepage	15	15	15	15	15	15	15	15	15	15	15	15	**15**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2854	2854	2801	2801	3057	3113	3112	3060	2947	2801	2854	2854	**2,926**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(14)**	**(88)**	**(84)**	**(123)**	**(91)**	**249**	**108**	**(16)**	**(27)**	**71**	**(1)**	**14**	**(0)**
Net Water Surplus (Deficit) (m^3)	**(9968)**	**(64596)**	**(60971)**	**(89449)**	**(66503)**	**181990**	**78813**	**(11500)**	**(19644)**	**51892**	**(699)**	**10314**	**- 318**
Pond Size (m^3)	**694978**	**630382**	**569412**	**479963**	**413460**	**595450**	**674263**	**662762**	**643119**	**695011**	**694313**	**704627**	

Year 3

Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	14	12	10	9	28	55	45	32	22	17	15	16	**23**
Leakage from Diversion Ditches	31	26	22	19	61	122	99	70	48	37	33	35	**50**
Precipitation on TSF Impoundment	178	122	94	73	118	164	153	148	153	174	178	186	**145**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2632	2569	2535	2509	2616	2750	2706	2659	2632	2637	2635	2646	**2,627**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	22	22	22	22	22	22	22	22	22	22	22	22	**22**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	238	218	200	185	363	620	524	402	310	263	247	252	**318**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	245	312	310	249	115	0	0	0	**103**
Seepage	19	19	19	19	19	19	19	19	19	19	19	19	**19**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2858	2858	2805	2805	3101	3167	3166	3104	2970	2805	2858	2858	**2,946**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**11**	**(71)**	**(70)**	**(111)**	**(121)**	**202**	**64**	**(44)**	**(28)**	**94**	**23**	**39**	**(1)**
Net Water Surplus (Deficit) (m^3)	**8093**	**(52173)**	**(51072)**	**(81356)**	**(88478)**	**147477**	**46999**	**(31996)**	**(20439)**	**68572**	**17005**	**28803**	**- 8,564**
Pond Size (m^3)	**712721**	**660548**	**609476**	**528120**	**439642**	**587119**	**634118**	**602122**	**581683**	**650255**	**667260**	**696064**	

Year 4

Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	7	6	5	4	14	28	23	16	11	8	8	8	**11**
Leakage from Diversion Ditches	31	26	22	19	61	122	99	70	48	37	33	35	**50**
Precipitation on TSF Impoundment	206	141	109	85	137	190	177	171	177	202	206	216	**168**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2653	2582	2545	2516	2621	2748	2708	2666	2645	2656	2655	2667	**2,639**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	31	31	31	31	31	31	31	31	31	31	31	31	**31**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	246	226	209	193	372	628	533	410	318	271	255	261	**327**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	284	361	359	288	133	0	0	0	**119**
Seepage	24	24	24	24	24	24	24	24	24	24	24	24	**24**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2863	2863	2810	2810	3144	3221	3220	3148	2993	2810	2863	2863	**2,967**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**36**	**(54)**	**(56)**	**(100)**	**(151)**	**155**	**21**	**(72)**	**(29)**	**117**	**48**	**65**	**(2)**
Net Water Surplus (Deficit) (m^3)	**26155**	**(39750)**	**(41173)**	**(73263)**	**(110453)**	**112964**	**15185**	**(52492)**	**(21234)**	**85251**	**34709**	**47292**	**- 16,809**
Pond Size (m^3)	**722218**	**682468**	**641295**	**568032**	**457579**	**570543**	**585729**	**533237**	**512003**	**597254**	**631963**	**679255**	

Year 5

Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	31	26	22	19	61	122	99	70	48	37	33	35	**50**
Precipitation on TSF Impoundment	234	160	124	96	156	215	202	195	202	229	234	245	**191**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2674	2596	2555	2524	2626	2746	2709	2674	2659	2675	2676	2689	**2,650**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	255	235	217	202	381	637	541	419	327	280	264	269	**335**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	323	410	408	327	151	0	0	0	**135**
Seepage	29	29	29	29	29	29	29	29	29	29	29	29	**29**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2868	2868	2815	2815	3187	3275	3273	3192	3016	2815	2868	2868	**2,988**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**61**	**(37)**	**(43)**	**(89)**	**(181)**	**107**	**(23)**	**(100)**	**(30)**	**140**	**72**	**90**	**(3)**
Net Water Surplus (Deficit) (m^3)	**44216**	**(27327)**	**(31274)**	**(65170)**	**(132429)**	**78452**	**(16628)**	**(72988)**	**(22029)**	**101930**	**52412**	**65781**	**- 25,054**
Pond Size (m^3)	**723471**	**696144**	**664870**	**599699**	**467270**	**545722**	**529094**	**456106**	**434077**	**536008**	**588420**	**654201**	

Year 6
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Leakage from Diversion Ditches	28	24	20	17	54	109	88	62	43	33	30	31	**45**
Precipitation on TSF Impoundment	247	170	131	102	165	228	213	206	213	242	247	259	**202**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2697	2613	2569	2535	2654	2797	2753	2707	2686	2700	2700	2714	**2,677**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	48	48	48	48	48	48	48	48	48	48	48	48	**48**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	263	243	226	211	389	645	550	427	335	288	272	278	**344**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	341	433	432	346	159	0	0	0	**143**
Seepage	34	34	34	34	34	34	34	34	34	34	34	34	**34**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2873	2873	2820	2820	3211	3303	3301	3216	3029	2820	2873	2873	**3,001**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**88**	**(16)**	**(25)**	**(74)**	**(167)**	**139**	**1**	**(81)**	**(8)**	**168**	**100**	**119**	**20**
Net Water Surplus (Deficit) (m^3)	**63998**	**(11692)**	**(18130)**	**(54018)**	**(122192)**	**101827**	**916**	**(59205)**	**(5785)**	**122912**	**72701**	**86853**	**178,184**
Pond Size (m^3)	**718199**	**706507**	**688377**	**634359**	**512167**	**613994**	**614910**	**555705**	**549920**	**672832**	**745532**	**832386**	

Year 7
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	10	9	7	6	20	39	32	23	16	12	11	11	**16**
Leakage from Diversion Ditches	28	24	20	17	54	109	88	62	43	33	30	31	**45**
Precipitation on TSF Impoundment	260	179	138	107	173	240	225	217	225	255	260	273	**213**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2707	2619	2574	2539	2656	2796	2754	2711	2692	2709	2709	2724	**2,682**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	56	56	56	56	56	56	56	56	56	56	56	56	**56**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	272	252	234	219	398	654	558	436	344	297	281	286	**353**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	359	457	455	365	168	0	0	0	**150**
Seepage	38	38	38	38	38	38	38	38	38	38	38	38	**38**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2877	2877	2824	2824	3234	3331	3329	3239	3042	2824	2877	2877	**3,013**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**101**	**(6)**	**(16)**	**(67)**	**(180)**	**119**	**(17)**	**(92)**	**(6)**	**181**	**113**	**133**	**22**
Net Water Surplus (Deficit) (m^3)	**73988**	**(4364)**	**(11995)**	**(48735)**	**(131108)**	**86990**	**(12646)**	**(67422)**	**(4699)**	**132249**	**82522**	**97045**	**191,825**
Pond Size (m^3)	**906373**	**902009**	**890014**	**841279**	**710171**	**797162**	**784516**	**717093**	**712394**	**844643**	**927165**	**1024211**	

Year 8
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Leakage from Diversion Ditches	28	24	20	17	54	109	88	62	43	33	30	31	**45**
Precipitation on TSF Impoundment	273	188	145	113	182	252	236	228	236	268	273	287	**223**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2717	2626	2578	2542	2659	2795	2754	2714	2698	2718	2719	2734	**2,688**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	65	65	65	65	65	65	65	65	65	65	65	65	**65**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	280	260	243	228	406	662	567	444	352	305	289	295	**361**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	377	480	478	383	176	0	0	0	**158**
Seepage	43	43	43	43	43	43	43	43	43	43	43	43	**43**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2882	2882	2829	2829	3257	3359	3357	3262	3056	2829	2882	2882	**3,025 Net**
Net Water Surplus (Deficit) (m^3/hr)	**115**	**4**	**(8)**	**(60)**	**(192)**	**99**	**(36)**	**(104)**	**(5)**	**194**	**126**	**147**	**23**
Net Water Surplus (Deficit) (m^3)	**83978**	**2963**	**(5859)**	**(43453)**	**(140024)**	**72154**	**(26208)**	**(75640)**	**(3613)**	**141587**	**92343**	**107237**	**205,466**
Pond Size (m^3)	**1108188**	**1111152**	**1105293**	**1061840**	**921816**	**993970**	**967762**	**892122**	**888509**	**1030096**	**1122439**	**1229676**	

Year 9

Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	3	3	2	2	7	13	11	8	5	4	4	4	**5**
Leakage from Diversion Ditches	28	24	20	17	54	109	88	62	43	33	30	31	**45**
Precipitation on TSF Impoundment	287	197	152	118	191	264	247	239	247	281	287	301	**234**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2727	2632	2583	2545	2661	2795	2755	2718	2704	2727	2729	2744	**2,693**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	73	73	73	73	73	73	73	73	73	73	73	73	**73**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	289	269	251	236	415	671	575	453	361	314	298	303	**370**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	396	503	501	402	185	0	0	0	**166**
Seepage	48	48	48	48	48	48	48	48	48	48	48	48	**48**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2887	2887	2834	2834	3280	3387	3385	3286	3069	2834	2887	2887	**3,038**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**129**	**14**	**0**	**(52)**	**(204)**	**79**	**(54)**	**(115)**	**(3)**	**207**	**140**	**161**	**25**
Net Water Surplus (Deficit) (m^3)	**93968**	**10291**	**277**	**(38170)**	**(148940)**	**57317**	**(39770)**	**(83857)**	**(2527)**	**150924**	**102164**	**117430**	**219,107**
Pond Size (m^3)	**1323644**	**1333935**	**1334212**	**1296042**	**1147102**	**1204419**	**1164650**	**1080792**	**1078265**	**1229189**	**1331354**	**1448783**	

Year 10

Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	28	24	20	17	54	109	88	62	43	33	30	31	**45**
Precipitation on TSF Impoundment	300	206	159	124	200	276	259	250	259	294	300	315	**245**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2737	2638	2587	2549	2663	2794	2756	2721	2711	2736	2738	2754	**2,699**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	82	82	82	82	82	82	82	82	82	82	82	82	**82**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	297	277	260	245	423	679	584	461	370	322	306	312	**378**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	414	526	524	420	193	0	0	0	**173**
Seepage	53	53	53	53	53	53	53	53	53	53	53	53	**53**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2891	2891	2839	2839	3303	3415	3413	3309	3082	2839	2891	2891	**3,050**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**142**	**24**	**9**	**(45)**	**(216)**	**58**	**(73)**	**(126)**	**(2)**	**220**	**153**	**175**	**27**
Net Water Surplus (Deficit) (m^3)	**103958**	**17618**	**6412**	**(32887)**	**(157856)**	**42481**	**(53332)**	**(92075)**	**(1442)**	**160262**	**111985**	**127622**	**232,747**
Pond Size (m^3)	**1552741**	**1570359**	**1576772**	**1543885**	**1386029**	**1428509**	**1375178**	**1283103**	**1281662**	**1441923**	**1553909**	**1681531**	

Year 11
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	9	7	6	5	17	34	28	20	13	10	9	10	**14**
Leakage from Diversion Ditches	26	22	18	15	50	100	81	58	40	30	27	28	**41**
Precipitation on TSF Impoundment	309	212	163	127	206	284	266	257	266	303	309	324	**252**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2752	2650	2597	2556	2682	2827	2784	2743	2728	2752	2754	2771	**2,716**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	90	90	90	90	90	90	90	90	90	90	90	90	**90**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	306	286	268	253	432	688	592	470	378	331	315	321	**387**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	426	541	539	432	199	0	0	0	**178**
Seepage	57	57	57	57	57	57	57	57	57	57	57	57	**57**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2896	2896	2843	2843	3319	3435	3433	3326	3092	2843	2896	2896	**3,060** **Net**
Net Water Surplus (Deficit) (m^3/hr)	**161**	**39**	**22**	**(34)**	**(206)**	**80**	**(56)**	**(113)**	**14**	**239**	**173**	**195**	**43**
Net Water Surplus (Deficit) (m^3)	**117735**	**28712**	**15894**	**(24694)**	**(150255)**	**58583**	**(41002)**	**(82179)**	**10046**	**174815**	**126091**	**142233**	**375,980**
Pond Size (m^3)	**1799266**	**1827978**	**1843872**	**1819179**	**1668924**	**1727507**	**1686505**	**1604325**	**1614372**	**1789187**	**1915277**	**2057511**	

Year 12
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	7	6	5	4	13	25	21	15	10	8	7	7	**11**
Leakage from Diversion Ditches	26	22	18	15	50	100	81	58	40	30	27	28	**41**
Precipitation on TSF Impoundment	317	218	168	131	211	292	274	264	274	311	317	333	**259**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2758	2654	2600	2559	2683	2826	2784	2745	2732	2758	2760	2777	**2,720**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	99	99	99	99	99	99	99	99	99	99	99	99	**99**
Fresh Water Make-up	45	45	45	45	45	45	45	45	45	45	45	45	**45**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	314	294	277	262	440	696	601	479	387	339	324	329	**395**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	438	556	554	444	205	0	0	0	**183**
Seepage	62	62	62	62	62	62	62	62	62	62	62	62	**62**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	2360	**2,360**
Subtotal	2901	2901	2848	2848	3336	3454	3452	3342	3103	2848	2901	2901	**3,070** **Net**
Net Water Surplus (Deficit) (m^3/hr)	**171**	**47**	**29**	**(28)**	**(212)**	**68**	**(67)**	**(119)**	**16**	**249**	**183**	**205**	**45**
Net Water Surplus (Deficit) (m^3)	**125176**	**34431**	**20842**	**(20298)**	**(155047)**	**49960**	**(48800)**	**(86519)**	**11726**	**181834**	**133423**	**149805**	**396,532**
Pond Size (m^3)	**2182687**	**2217118**	**2237960**	**2217661**	**2062614**	**2112574**	**2063774**	**1977255**	**1988981**	**2170815**	**2304237**	**2454043**	

Year 13
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	4	4	3	3	8	17	14	10	7	5	5	5	**7**
Leakage from Diversion Ditches	26	22	18	15	50	100	81	58	40	30	27	28	**41**
Precipitation on TSF Impoundment	326	224	172	134	217	300	281	271	281	319	326	342	**266**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2764	2658	2603	2561	2685	2826	2785	2748	2736	2764	2766	2784	**2,723**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	107	107	107	107	107	107	107	107	107	107	107	107	**107**
Fresh Water Make-up	77	77	77	77	77	77	77	77	77	77	77	77	**77**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	355	335	318	302	481	737	641	519	427	380	364	370	**436**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	449	571	569	456	210	0	0	0	**188**
Seepage	67	67	67	67	67	67	67	67	67	67	67	67	**67**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2328	2328	2328	2328	2328	2328	2328	2328	2328	2328	2328	2328	**2,328**
Subtotal	2874	2874	2821	2821	3320	3442	3440	3327	3081	2821	2874	2874	**3,047** **Net**
Net Water Surplus (Deficit) (m^3/hr)	**246**	**119**	**99**	**42**	**(155)**	**121**	**(14)**	**(60)**	**82**	**323**	**257**	**280**	**112**
Net Water Surplus (Deficit) (m^3)	**179338**	**86869**	**72509**	**30817**	**(113119)**	**88057**	**(9879)**	**(44139)**	**60126**	**235573**	**187475**	**204098**	**977,724**
Pond Size (m^3)	**2633381**	**2720250**	**2792759**	**2823576**	**2710457**	**2798514**	**2788635**	**2744496**	**2804622**	**3040195**	**3227670**	**3431767**	

Year 14
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	2	2	2	1	4	8	7	5	3	3	2	2	**4**
Leakage from Diversion Ditches	26	22	18	15	50	100	81	58	40	30	27	28	**41**
Precipitation on TSF Impoundment	334	229	177	138	223	308	288	279	288	328	334	351	**273**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2771	2662	2606	2563	2686	2825	2785	2750	2740	2770	2773	2790	**2,727**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	116	116	116	116	116	116	116	116	116	116	116	116	**116**
Fresh Water Make-up	87	87	87	87	87	87	87	87	87	87	87	87	**87**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	373	354	336	321	499	755	660	538	446	398	383	388	**454**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	461	586	584	468	216	0	0	0	**193**
Seepage	72	72	72	72	72	72	72	72	72	72	72	72	**72**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	**2,318**
Subtotal	2868	2868	2816	2816	3327	3452	3450	3334	3081	2816	2868	2868	**3,047**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**276**	**147**	**126**	**68**	**(142)**	**129**	**(4)**	**(46)**	**105**	**352**	**287**	**310**	**134**
Net Water Surplus (Deficit) (m^3)	**201379**	**107188**	**92056**	**49813**	**(103311)**	**94034**	**(3077)**	**(33879)**	**76406**	**257192**	**209407**	**226270**	**1,173,477**
Pond Size (m^3)	**3633146**	**3740334**	**3832390**	**3882203**	**3778892**	**3872926**	**3869849**	**3835970**	**3912375**	**4169568**	**4378974**	**4605244**	

Year 15
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	26	22	18	15	50	100	81	58	40	30	27	28	**41**
Precipitation on TSF Impoundment	343	235	182	141	229	316	296	286	296	336	343	360	**280**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2777	2666	2609	2565	2687	2825	2786	2752	2744	2775	2779	2797	**2,730**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	124	124	124	124	124	124	124	124	124	124	124	124	**124**
Fresh Water Make-up	87	87	87	87	87	87	87	87	87	87	87	87	**87**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	382	362	345	329	508	764	669	546	454	407	391	397	**463**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	473	601	599	480	221	0	0	0	**198**
Seepage	76	76	76	76	76	76	76	76	76	76	76	76	**76**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	**2,318**
Subtotal	2873	2873	2820	2820	3343	3472	3469	3351	3091	2820	2873	2873	**3,057**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**286**	**155**	**133**	**74**	**(148)**	**117**	**(15)**	**(52)**	**107**	**362**	**297**	**320**	**136**
Net Water Surplus (Deficit) (m^3)	**208820**	**112906**	**97004**	**54208**	**(108103)**	**85411**	**(10875)**	**(38219)**	**78085**	**264211**	**216739**	**233842**	**1,194,029**
Pond Size (m^3)	**4814064**	**4926970**	**5023974**	**5078182**	**4970079**	**5055490**	**5044615**	**5006396**	**5084481**	**5348692**	**5565431**	**5799272**	

Year 16
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	11	9	8	7	22	43	35	25	17	13	12	12	**18**
Leakage from Diversion Ditches	23	19	16	14	45	89	73	51	35	27	24	25	**37**
Precipitation on TSF Impoundment	354	243	187	146	236	326	305	295	305	347	354	371	**289**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2796	2680	2620	2575	2711	2867	2822	2780	2766	2796	2799	2818	**2,752**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	133	133	133	133	133	133	133	133	133	133	133	133	**133**
Fresh Water Make-up	87	87	87	87	87	87	87	87	87	87	87	87	**87**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	391	371	353	338	516	773	677	555	463	415	400	405	**471**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	488	621	618	495	228	0	0	0	**204**
Seepage	81	81	81	81	81	81	81	81	81	81	81	81	**81**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	**2,318**
Subtotal	2878	2878	2825	2825	3363	3496	3493	3371	3103	2825	2878	2878	**3,068**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**309**	**173**	**148**	**88**	**(136)**	**144**	**6**	**(36)**	**126**	**386**	**320**	**345**	**156**
Net Water Surplus (Deficit) (m^3)	**225600**	**126271**	**108316**	**63881**	**(99184)**	**105150**	**4062**	**(26380)**	**91951**	**281978**	**233935**	**251683**	**1,367,264**
Pond Size (m^3)	**6024872**	**6151143**	**6259460**	**6323340**	**6224157**	**6329306**	**6333368**	**6306988**	**6398939**	**6680918**	**6914853**	**7166536**	

Year 17

Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	8	7	6	5	16	32	26	19	13	10	9	9	**13**
Leakage from Diversion Ditches	23	19	16	14	45	89	73	51	35	27	24	25	**37**
Precipitation on TSF Impoundment	365	250	193	150	243	336	315	304	315	358	365	383	**298**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2805	2685	2624	2578	2713	2866	2822	2783	2772	2803	2807	2826	**2,757**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	141	141	141	141	141	141	141	141	141	141	141	141	**141**
Fresh Water Make-up	87	87	87	87	87	87	87	87	87	87	87	87	**87**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	399	379	362	346	525	781	686	563	471	424	408	414	**480**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	503	640	637	511	235	0	0	0	**210**
Seepage	86	86	86	86	86	86	86	86	86	86	86	86	**86**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	**2,318**
Subtotal	2883	2883	2830	2830	3383	3519	3517	3391	3115	2830	2883	2883	**3,079** **Net**
Net Water Surplus (Deficit) (m^3/hr)	**321**	**182**	**156**	**94**	**(145)**	**128**	**(9)**	**(45)**	**128**	**397**	**332**	**357**	**158**
Net Water Surplus (Deficit) (m^3)	**234316**	**132794**	**113858**	**68720**	**(106038)**	**93420**	**(6618)**	**(32659)**	**93334**	**290157**	**242512**	**260565**	**1,384,360**
Pond Size (m^3)	**7400852**	**7533646**	**7647504**	**7716224**	**7610186**	**7703606**	**7696987**	**7664329**	**7757663**	**8047819**	**8290331**	**8550897**	

Year 18
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	6	5	4	3	11	22	18	12	9	7	6	6	**9**
Leakage from Diversion Ditches	23	19	16	14	45	89	73	51	35	27	24	25	**37**
Precipitation on TSF Impoundment	376	258	199	155	250	346	324	313	324	368	376	394	**307**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2813	2691	2628	2580	2715	2866	2823	2786	2777	2811	2815	2834	**2,761**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	150	150	150	150	150	150	150	150	150	150	150	150	**150**
Fresh Water Make-up	87	87	87	87	87	87	87	87	87	87	87	87	**87**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	408	388	370	355	533	790	694	572	480	432	417	422	**488**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	518	659	656	526	242	0	0	0	**217**
Seepage	91	91	91	91	91	91	91	91	91	91	91	91	**91**
Whole Tailing voids	475	475	71	71	71	71	71	71	71	71	475	475	**206**
Cyclone Overflow Voids	0	0	306	306	306	306	306	306	306	306	0	0	**204**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	**2,318**
Subtotal	2887	2887	2835	2835	3403	3543	3541	3411	3127	2835	2887	2887	**3,090**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**333**	**191**	**164**	**101**	**(155)**	**112**	**(24)**	**(53)**	**130**	**409**	**344**	**369**	**160**
Net Water Surplus (Deficit) (m^3)	**243031**	**139317**	**119399**	**73559**	**(112892)**	**81690**	**(17298)**	**(38937)**	**94717**	**298335**	**251089**	**269448**	**1,401,457**
Pond Size (m^3)	**8793928**	**8933245**	**9052645**	**9126203**	**9013311**	**9095002**	**9077703**	**9038766**	**9133482**	**9431817**	**9682906**	**9,952,354**	

Year 19
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	No	No	No	No	No	No	No	No	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	3	2	2	2	5	11	9	6	4	3	3	3	**4**
Leakage from Diversion Ditches	23	19	16	14	45	89	73	51	35	27	24	25	**37**
Precipitation on TSF Impoundment	386	265	205	159	258	356	333	322	333	379	386	405	**316**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2451	2325	2261	2213	2346	2495	2453	2418	2412	2448	2452	2472	**2,396**
Plant Area													
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0.00	0	0	0	0	0	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	140	140	140	140	140	140	140	140	140	140	140	140	**140**
Fresh Water Make-up	87	87	87	87	87	87	87	87	87	87	87	87	**87**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	266	266	266	266	266	266	266	266	266	266	266	266	**266**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	533	678	675	541	249	0	0	0	**223**
Seepage	95	95	95	95	95	95	95	95	95	95	95	95	**95**
Rougher (Whole) Tailing voids	433	433	433	433	433	433	433	433	433	433	433	433	**433**
Cyclone Overflow Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	**2,318**
Subtotal	2850	2850	2850	2850	3433	3578	3575	3441	3149	2850	2850	2850	**3,094**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(134)**	**(259)**	**(323)**	**(371)**	**(821)**	**(817)**	**(856)**	**(757)**	**(472)**	**(136)**	**(132)**	**(112)**	**(432)**
Net Water Surplus (Deficit) (m^3)	**(97502)**	**(188848)**	**(235587)**	**(270955)**	**(599437)**	**(596726)**	**(624949)**	**(552843)**	**(344396)**	**(99494)**	**(96211)**	**(81593)**	**- 3,788,543**
Pond Size (m^3)	**9854851**	**9666003**	**9430416**	**9159461**	**8560024**	**7963298**	**7338349**	**6785506**	**6441110**	**6341616**	**6245404**	**6,163,811**	

Year 20
Expected Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	No	No	No	No	No	No	No	No	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	23	19	16	14	45	89	73	51	35	27	24	25	**37**
Precipitation on TSF Impoundment	397	273	210	164	265	366	343	331	343	390	397	417	**325**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2459	2331	2265	2216	2348	2494	2454	2421	2417	2455	2460	2481	**2,400**
Plant Area													
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0.00	0	0	0	0	0	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	140	140	140	140	140	140	140	140	140	140	140	140	**140**
Fresh Water Make-up	87	87	87	87	87	87	87	87	87	87	87	87	**87**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	266	266	266	266	266	266	266	266	266	266	266	266	**266**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	548	697	694	557	256	0	0	0	**229**
Seepage	100	100	100	100	100	100	100	100	100	100	100	100	**100**
Rougher (Whole) Tailing voids	433	433	433	433	433	433	433	433	433	433	433	433	**433**
Cyclone Overflow Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Reclaim Water	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	2318	**2,318**
Subtotal	2855	2855	2855	2855	3453	3602	3599	3461	3161	2855	2855	2855	**3,105**
Plant Transport Water Shortage (m^3/hr)													**Net**
Net Water Surplus (Deficit) (m^3/hr)	**(130)**	**(258)**	**(324)**	**(373)**	**(839)**	**(842)**	**(879)**	**(774)**	**(478)**	**(134)**	**(129)**	**(108)**	**(439)**
Net Water Surplus (Deficit) (m^3)	**(95013)**	**(188552)**	**(236272)**	**(272342)**	**(612518)**	**(614682)**	**(641856)**	**(565348)**	**(349239)**	**(97543)**	**(93861)**	**(78938)**	**- 3,846,164**
Pond Size (m^3)	**6068798**	**5880246**	**5643974**	**5371632**	**4759114**	**4144432**	**3502576**	**2937228**	**2587989**	**2490446**	**2396585**	**2317647**	

Year 21

Expected Condition

Month	Jan.	Feb	March	April	May	June	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	
Cyclone Sand Operating?	No	No	No	No	No	No	
INFLOWS (m^3/hr)							
TSF Area							**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	-
Leakage from Diversion Ditches	23	19	16	14	45	89	**34**
Precipitation on TSF Impoundment	397	273	210	164	265	366	**279**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4
Subtotal	2459	2331	2265	2216	2348	2494	**2,352**
Plant Area							
Runoff from undiverted catchment	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0.00	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	140	140	140	140	140	140	**140**
Fresh Water Make-up	87	87	87	87	87	87	**87**
Ore Void Water (3% MC)	39	39	39	39	39	39	**39**
Subtotal	266	266	266	266	266	266	**266**
OUTFLOWS (m^3/hr)							
TSF Area Pond Evaporation	0	0	0	0	548	697	**208**
Seepage	100	100	100	100	100	100	**100**
Rougher (Whole) Tailing voids	433	433	433	433	433	433	**433**
Cyclone Overflow Voids	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	**17**
Concentrate Load Out	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	**3**
Reclaim Water	2318	2318	2318	2318	2318	2318	**2,318**
Subtotal	2855	2855	2855	2855	3453	3602	**3,079**
Plant Transport Water Shortage (m^3/hr)							**Net**
Net Water Surplus (Deficit) (m^3/hr)	**(130)**	**(258)**	**(324)**	**(373)**	**(839)**	**(842)**	**(461)**
Net Water Surplus (Deficit) (m^3)	**(95013)**	**(188552)**	**(236272)**	**(272342)**	**(612518)**	**(614682)**	**- 2,019,379**
Pond Size (m^3)	**2222634**	**2034082**	**1797811**	**1525468**	**912950**	**298,268**	

Summary - Upper Bound Condition

* Annual Precipitation (mm)	550
Annual Evaporation (mm)	389
Undisturbed (Diverted) Land Runoff Coefficien	0.5
TSF	
Tailings pond area (sq. km)	varies
Undiverted Catchment runoff area (sq.km.)	varies
Diverted uphill catchment area (sq.km.)	varies
% Diversion ditch seepage	20%
Ultimate Tailings pond area (sq. km)	5.1

Process Plant	
Waste Dump/Plant Site Runoff Coefficient	0.7
Open Pit Runoff Coefficient	1.0
Processes %Availability	92.0%
Undiverted WRD/Plant Site Catchment Area (sq.km)	varies
Diverted WRD/Plant Site Catchment Area (sq.km)	varies
% Diversion ditch seepage	20%
Open Pit Area (sq.km)	1.1

Tailings		tpd	% Solids	
Total Daily Tonnage		29,621	Transport	InSitu
91%	Rougher	27,003	35.61%	73.7%
9%	Cleaner	2,619	22.76%	73.7%
Cyclone Efficiency		85%		
24%	Cyclone U/F	7,157		85.0%
76%	Cyclone O/F	22,465		73.7%

* *10-yr wet year*

DATA	Parameter	unit		Construction	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 20.5
	Annual precipitation	mm	550											733											
	Annual evaporation	mm	389																						
TSF Area	Diverted catchment area (external to TSF)	km^2		4.07	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80
	Diverted Within TSF				2.10	2.10	2.10	2.10	2.10	1.25	1.25	1.25	1.25	1.25	0.70	0.70	0.70	0.70	0.70	0.00	0.00	0.00	0.00	0.00	0.00
	Diverted runoff coefficient	%	0.5																						
	Diversion ditch efficiency	%	80%		Yr 5 footprint Diversion					Yr 10 footprint diversion					Yr 15 footprint diversion					UTSF diversion					
	Undiverted catchment area (not including TSF)	km^2		6.47	1.80	1.08	0.72	0.36	0.00	0.68	0.51	0.34	0.17	0.00	0.44	0.33	0.22	0.11	0.00	0.56	0.42	0.28	0.14	0.00	0.00
	Undiverted runoff coefficient	%	0.5																						
	TSF impoundment area	km^2		1.20	1.20	1.92	2.28	2.64	3.00	3.17	3.34	3.51	3.68	3.85	3.96	4.07	4.18	4.29	4.40	4.54	4.68	4.82	4.96	5.10	5.10
	TSF impoundment runoff coefficient	%	1.0																						

Mine Area			Transport	In Situ
	Rougher Tailings Density	% solids	35.61%	73.7%
	Cleaner Tailings Density		22.76%	73.7%
	Cyclone Underflow	% solids	-	85.0%
	Cyclone Overflow	% solids	-	73.7%

	Diverted LGO/WRD/Plantsite area	km^2		0.62	1.7	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	0.00	0.00	0.00
	Diverted runoff coefficient	%	0.5																						
	Diversion ditch efficiency	%	80%																						
	Undiverted LGO/WRD/Plantsite area	km^2		2.52	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	0.00	0.00	0.00
	LGO/WRD/Plantsite runoff coefficient	%	0.7																						
	Open pit area	km^2	1.1																						
	Open pit runoff coefficient	%	1.0																						

INFLOWS																									
TSF Area	Runoff from undiverted catchment			206	57	34	23	11	0	22	16	11	5	0	14	11	7	4	0	18	13	9	4	0	0
	Leakage from Diversion Ditches			0	101	101	101	101	101	90	90	90	90	120	83	83	83	83	83	74	74	74	74	74	69
	Precipitation on TSF Impoundment			76	76	122	145	168	191	202	213	223	234	327	252	259	266	273	280	289	298	307	316	325	279
	Cleaner Tailings Water (direct discharge)	m^3/hr		0	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	0	0	0
	Rougher Tailings Water (direct discharge)			0	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034
	Seepage reclaim			0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	SUBTOTAL - TSF Inflows			282	2643	2666	2677	2689	2700	2722	2727	2733	2738	2855	2758	2761	2765	2768	2772	2789	2794	2798	2432	2437	2386
Mine Area	Runoff from LGO/WRD plantsite area			0	133	133	133	133	133	133	133	133	133	177	133	133	133	133	133	133	133	133	0	0	0
	Leakage from diversion ditches			0	22	22	22	22	22	22	22	22	22	29	22	22	22	22	22	22	22	22	0	0	0
	Precipitation/Runoff into open pit			0	69	69	69	69	69	69	69	69	69	92	69	69	69	69	69	69	69	69	0	0	0
	Open pit dewatering	m^3/hr		0	5	19	34	48	63	77	91	106	120	135	149	164	178	192	207	221	236	250	250	250	250
	Fresh water makeup			0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Ore rock moisture			0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
	SUBTOTAL - Mine Inflows			**0**	270	285	299	313	328	342	357	371	385	474	414	429	443	458	472	486	501	515	292	292	292
OUTFLOWS																									
	Evaporation from TSF impoundment			54	54	86	103	119	135	143	150	158	166	173	178	183	188	193	198	204	210	217	223	229	208
	TSF seepage			5	10	12	14	16	18	21	23	25	27	29	31	33	35	37	39	42	44	46	48	50	50
	Tailings void loss - whole			0	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	401	440	440
	-overflow			0	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	0	0	0
	-underflow (cyclone sand)			0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0
	Dust Suppression			21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	17
	Concentrate Load Out			0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Potable Water			3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Mitigation / Discharge			119	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Reclaim Water			0	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402
	SUBTOTAL - Outflows			**202**	2900	2935	2953	2972	2990	3000	3009	3019	3029	3039	3046	3053	3060	3067	3074	3082	3091	3099	3099	3146	3120
NET	**Net Flow**	m^3/hr		**80**	13	16	23	31	38	65	75	85	95	290	126	137	148	159	170	193	204	214	-375	-417	-442
	Net Annual Volume			703,001	111,065	135,934	202,271	268,608	334,945	565,365	653,588	741,811	830,034	2,544,715	1,105,401	1,200,536	1,295,670	1,390,804	1,485,938	1,694,721	1,786,399	1,878,078	- 3,281,288	- 3,656,972	- 1,935,798
CUMULATIVE	**Cumulative Volume**	**m^3**		703,001	814,066	950,000	1,152,271	1,420,878	1,755,823	2,321,188	2,974,777	3,716,588	4,546,622	7,091,337	8,196,738	9,397,274	10,692,943	12,083,747	13,569,685	15,264,406	17,050,805	18,928,883	15,647,595	11,990,623	10,054,826
	Cumulative Volume	Mm^3		0.70	0.81	0.95	1.15	1.42	1.76	2.32	2.97	3.72	4.55	7.09	8.20	9.40	10.69	12.08	13.57	15.26	17.05	18.93	15.65	11.99	10.05
MAXIMUM	**LOM Max Pond Volume**	18.93	Mm^3																						
END	**End of Mine Pond Volume**	10.05	Mm^3																						

Construction

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	No	No	No	No	No	No	No	No	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	128	108	91	76	250	498	405	287	198	152	136	142	**206**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	-
Precipitation on TSF Impoundment	94	64	50	39	62	86	81	78	81	92	94	98	**76**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Seepage reclaim	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	221	172	141	115	312	584	486	365	278	243	230	240	**282**
Plant Area													
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0.00	0	0	0	0	0	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Fresh Water Make-up	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Ore Void Water (3% MC)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	**0**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	129	164	163	131	60	0	0	0	**54**
Seepage	5	5	5	5	5	5	5	5	5	5	5	5	**5**
Tailing voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cyclone Overflow Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Discharge to Environment	0	0	0	0	0	0	75	365	278	243	230	240	**119**
Reclaim Water	0	0	0	0	0	0	0	0	0	0	0	0	-
Subtotal	8	8	8	8	187	222	296	554	397	251	238	248	**202**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**213**	**164**	**133**	**107**	**125**	**362**	**190**	**(189)**	**(118)**	**(8)**	**(8)**	**(8)**	**80**
Net Water Surplus (Deficit) (m^3)	**155582**	**120048**	**96976**	**78110**	**91217**	**264392**	**138495**	**(137943)**	**(86355)**	**(5840)**	**(5840)**	**(5840)**	**703,001**
Pond Size (m^3)	**155,582**	**275630**	**372606**	**450716**	**541933**	**806325**	**944820**	**806876**	**720521**	**714681**	**708841**	**703001**	

Year 1

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	36	30	25	21	69	139	113	80	55	42	38	39	**57**
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	94	64	50	39	62	86	81	78	81	92	94	98	**76**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2600	2556	2528	2506	2662	2877	2800	2706	2641	2617	2607	2616	**2,643**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	5	5	5	5	5	5	5	5	5	5	5	5	**5**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	185	164	146	130	318	587	486	358	261	211	195	201	**270**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	129	164	163	131	60	0	0	0	**54**
Seepage	10	10	10	10	10	10	10	10	10	10	10	10	**10**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2856	2856	2810	2810	2989	3024	3024	2991	2921	2810	2856	2856	**2,900**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(71)**	**(136)**	**(136)**	**(175)**	**(9)**	**439**	**263**	**73**	**(19)**	**18**	**(54)**	**(40)**	**13**
Net Water Surplus (Deficit) (m^3)	**(51668)**	**(99210)**	**(99422)**	**(127504)**	**(6914)**	**320465**	**191827**	**53168**	**(13695)**	**12967**	**(39777)**	**(29170)**	**111,065**
Pond Size (m^3)	**651333**	**552123**	**452700**	**325196**	**318282**	**638746**	**830573**	**883741**	**870046**	**883013**	**843236**	**814066**	**814,066**

Year 2

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	21	18	15	13	42	83	68	48	33	25	23	24	**34**
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	150	103	79	62	100	138	129	125	129	147	150	157	**122**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2642	2582	2548	2520	2672	2873	2803	2721	2667	2655	2648	2659	**2,666**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	19	19	19	19	19	19	19	19	19	19	19	19	**19**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	200	179	160	144	332	601	501	372	276	226	209	215	**285**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	206	262	261	210	96	0	0	0	**86**
Seepage	12	12.1052632	12.10526	12.1052632	12.1052632	12.1052632	12.105263	12.1052632	12.1052632	12.1052632	12.1052632	12.1052632	**12**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2858	2858	2813	2813	3069	3125	3124	3072	2959	2813	2858	2858	**2,935**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(17)**	**(97)**	**(104)**	**(148)**	**(65)**	**349**	**180**	**21**	**(16)**	**68**	**(1)**	**15**	**16**
Net Water Surplus (Deficit) (m^3)	**(12100)**	**(70918)**	**(76178)**	**(107872)**	**(47419)**	**254886**	**131646**	**15623**	**(11839)**	**49773**	**(923)**	**11254**	**135,934**
Pond Size (m^3)	**801966**	**731049**	**654871**	**546999**	**499580**	**754466**	**886112**	**901735**	**889896**	**939669**	**938746**	**950000**	**950,000**

Year 3

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	14	12	10	9	28	55	45	32	22	17	15	16	**23**
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	178	122	94	73	118	164	153	148	153	174	178	186	**145**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2663	2596	2558	2528	2677	2871	2805	2729	2680	2674	2668	2680	**2,677**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	34	34	34	34	34	34	34	34	34	34	34	34	**34**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	214	193	175	159	346	616	515	387	290	240	224	230	**299**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	245	312	310	249	115	0	0	0	**103**
Seepage	14	14.2105263	14.21053	14.2105263	14.2105263	14.2105263	14.210526	14.2105263	14.2105263	14.2105263	14.2105263	14.2105263	**14**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2860	2860	2815	2815	3110	3176	3175	3113	2979	2815	2860	2860	**2,953**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**17**	**(72)**	**(82)**	**(128)**	**(87)**	**310**	**145**	**2**	**(9)**	**100**	**32**	**49**	**23**
Net Water Surplus (Deficit) (m^3)	**12177**	**(52280)**	**(60064)**	**(93564)**	**(63179)**	**226588**	**106048**	**1342**	**(6419)**	**72667**	**22995**	**35958**	**202,271**
Pond Size (m^3)	**962176**	**909897**	**849833**	**756269**	**693090**	**919678**	**1025726**	**1027068**	**1020650**	**1093317**	**1116312**	**1152271**	

Year 4

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	7	6	5	4	14	28	23	16	11	8	8	8	**11**
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	206	141	109	85	137	190	177	171	177	202	206	216	**168**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2684	2609	2567	2535	2682	2869	2807	2736	2694	2693	2689	2702	**2,689**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	48	48	48	48	48	48	48	48	48	48	48	48	**48**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	229	208	189	173	361	630	530	401	304	255	238	244	**313**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	284	361	359	288	133	0	0	0	**119**
Seepage	16	16.3157895	16.31579	16.3157895	16.3157895	16.3157895	16.315789	16.3157895	16.3157895	16.3157895	16.3157895	16.3157895	**16**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2862	2862	2817	2817	3151	3228	3226	3155	2999	2817	2862	2862	**2,972**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**50**	**(46)**	**(60)**	**(109)**	**(108)**	**272**	**110**	**(18)**	**(1)**	**131**	**64**	**83**	**31**
Net Water Surplus (Deficit) (m^3)	**36453**	**(33642)**	**(43950)**	**(79256)**	**(78939)**	**198291**	**80449**	**(12939)**	**(999)**	**95562**	**46914**	**60662**	**268,608**
Pond Size (m^3)	**1188724**	**1155082**	**1111132**	**1031876**	**952937**	**1151228**	**1231677**	**1218738**	**1217740**	**1313302**	**1360216**	**1420878**	

Year 5

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	234	160	124	96	156	215	202	195	202	229	234	245	**191**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2705	2622	2577	2542	2686	2867	2808	2744	2707	2712	2709	2723	**2,700**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	63	63	63	63	63	63	63	63	63	63	63	63	**63**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	243	222	204	188	375	644	544	415	319	269	253	258	**328**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	323	410	408	327	151	0	0	0	**135**
Seepage	18	18.4210526	18.42105	18.4210526	18.4210526	18.4210526	18.421053	18.4210526	18.4210526	18.4210526	18.4210526	18.4210526	**18**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2865	2865	2819	2819	3191	3279	3277	3196	3020	2819	2865	2865	**2,990 Net**
Net Water Surplus (Deficit) (m^3/hr)	**83**	**(21)**	**(38)**	**(89)**	**(130)**	**233**	**75**	**(37)**	**6**	**162**	**97**	**117**	**38**
Net Water Surplus (Deficit) (m^3)	**60729**	**(15004)**	**(27836)**	**(64948)**	**(94699)**	**169993**	**54851**	**(27219)**	**4422**	**118456**	**70833**	**85367**	**334,945**
Pond Size (m^3)	**1481608**	**1466604**	**1438768**	**1373820**	**1279121**	**1449114**	**1503965**	**1476746**	**1481167**	**1599624**	**1670456**	**1755823**	

Year 6

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Leakage from Diversion Ditches	56	47	40	33	109	217	177	125	86	66	59	62	**90**
Precipitation on TSF Impoundment	247	170	131	102	165	228	213	206	213	242	247	259	**202**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2725	2637	2589	2552	2708	2906	2841	2770	2729	2733	2730	2745	**2,722**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	77	77	77	77	77	77	77	77	77	77	77	77	**77**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	257	236	218	202	390	659	558	430	333	284	267	273	**342**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	341	433	432	346	159	0	0	0	**143**
Seepage	21	20.5263158	20.52632	20.5263158	20.5263158	20.5263158	20.526316	20.5263158	20.5263158	20.5263158	20.5263158	20.5263158	**21**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2867	2867	2821	2821	3212	3304	3303	3217	3030	2821	2867	2867	**3,000 Net**
Net Water Surplus (Deficit) (m^3/hr)	**115**	**7**	**(14)**	**(67)**	**(114)**	**260**	**97**	**(17)**	**32**	**196**	**130**	**151**	**65**
Net Water Surplus (Deficit) (m^3)	**84278**	**4770**	**(10229)**	**(49048)**	**(83035)**	**190030**	**70834**	**(12721)**	**23091**	**142742**	**94720**	**109934**	**565,365**
Pond Size (m^3)	**1840101**	**1844871**	**1834642**	**1785594**	**1702559**	**1892590**	**1963423**	**1950702**	**1973793**	**2116535**	**2211255**	**2321188**	

Year 7

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	10	9	7	6	20	39	32	23	16	12	11	11	**16**
Leakage from Diversion Ditches	56	47	40	33	109	217	177	125	86	66	59	62	**90**
Precipitation on TSF Impoundment	260	179	138	107	173	240	225	217	225	255	260	273	**213**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2735	2643	2594	2555	2711	2905	2842	2773	2735	2742	2739	2755	**2,727**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	91	91	91	91	91	91	91	91	91	91	91	91	**91**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	272	251	232	216	404	673	573	444	348	298	281	287	**357**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	359	457	455	365	168	0	0	0	**150**
Seepage	23	22.6315789	22.63158	22.6315789	22.6315789	22.6315789	22.631579	22.6315789	22.6315789	22.6315789	22.6315789	22.6315789	**23**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2869	2869	2823	2823	3232	3330	3328	3238	3041	2823	2869	2869	**3,009 Net**
Net Water Surplus (Deficit) (m^3/hr)	**138**	**25**	**3**	**(51)**	**(117)**	**249**	**87**	**(20)**	**42**	**217**	**152**	**173**	**75**
Net Water Surplus (Deficit) (m^3)	**100484**	**18312**	**2122**	**(37550)**	**(85736)**	**181409**	**63487**	**(14724)**	**30392**	**158294**	**110756**	**126341**	**653,588**
Pond Size (m^3)	**2421672**	**2439985**	**2442106**	**2404556**	**2318820**	**2500229**	**2563717**	**2548993**	**2579385**	**2737680**	**2848436**	**2974777**	

Year 8

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Leakage from Diversion Ditches	56	47	40	33	109	217	177	125	86	66	59	62	**90**
Precipitation on TSF Impoundment	273	188	145	113	182	252	236	228	236	268	273	287	**223**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2745	2649	2598	2559	2713	2904	2843	2777	2741	2751	2749	2765	**2,733**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	106	106	106	106	106	106	106	106	106	106	106	106	**106**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	286	265	247	231	418	688	587	459	362	312	296	302	**371**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	377	480	478	383	176	0	0	0	**158**
Seepage	25	24.7368421	24.73684	24.7368421	24.7368421	24.7368421	24.736842	24.7368421	24.7368421	24.7368421	24.7368421	24.7368421	**25**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2871	2871	2825	2825	3253	3355	3353	3258	3052	2825	2871	2871	**3,019 Net**
Net Water Surplus (Deficit) (m^3/hr)	**160**	**44**	**20**	**(36)**	**(121)**	**237**	**77**	**(23)**	**52**	**238**	**174**	**196**	**85**
Net Water Surplus (Deficit) (m^3)	**116689**	**31855**	**14473**	**(26052)**	**(88437)**	**172788**	**56140**	**(16726)**	**37693**	**173847**	**126793**	**142748**	**741,811**
Pond Size (m^3)	**3091466**	**3123321**	**3137793**	**3111741**	**3023305**	**3196092**	**3252233**	**3235507**	**3273200**	**3447047**	**3573840**	**3716588**	

Year 9

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	3	3	2	2	7	13	11	8	5	4	4	4	**5**
Leakage from Diversion Ditches	56	47	40	33	109	217	177	125	86	66	59	62	**90**
Precipitation on TSF Impoundment	287	197	152	118	191	264	247	239	247	281	287	301	**234**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2754	2656	2603	2562	2715	2903	2843	2780	2747	2760	2759	2775	**2,738**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	120	120	120	120	120	120	120	120	120	120	120	120	**120**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	301	280	261	245	433	702	602	473	376	327	310	316	**385**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	396	503	501	402	185	0	0	0	**166**
Seepage	27	26.8421053	26.84211	26.8421053	26.8421053	26.8421053	26.842105	26.8421053	26.8421053	26.8421053	26.8421053	26.8421053	**27**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2873	2873	2827	2827	3273	3380	3378	3279	3062	2827	2873	2873	**3,029 Net**
Net Water Surplus (Deficit) (m^3/hr)	**182**	**62**	**37**	**(20)**	**(125)**	**225**	**67**	**(26)**	**62**	**259**	**196**	**218**	**95**
Net Water Surplus (Deficit) (m^3)	**132894**	**45398**	**26823**	**(14554)**	**(91138)**	**164166**	**48794**	**(18728)**	**44994**	**189400**	**142829**	**159155**	**830,034**
Pond Size (m^3)	**3849482**	**3894880**	**3921703**	**3907149**	**3816011**	**3980178**	**4028972**	**4010244**	**4055238**	**4244637**	**4387466**	**4546622**	

Year 10

10-year wet year applied this year.

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	74.8	51.3	39.6	30.8	49.8	68.9	64.5	62.3	64.5	73.3	74.8	78.4	**733**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	74	63	53	44	145	289	236	167	115	88	79	82	**120**
Precipitation on TSF Impoundment	400	274	212	165	267	368	345	333	345	392	400	419	**327**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2883	2746	2673	2618	2820	3066	2989	2908	2868	2889	2888	2910	**2,855**
Plant Area													
Runoff from undiverted catchment	110	93	78	66	215	428	348	246	170	130	117	122	**177**
Leakage from Diversion Ditches	18	15	13	11	35	70	57	40	28	21	19	20	**29**
Precipitation Over Open Pit	56.78	48	41	34	111	222	180	128	88	68	61	63	**92**
Open Pit Groundwater Dewatering	135	135	135	135	135	135	135	135	135	135	135	135	**135**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	361	333	309	287	537	896	762	591	462	396	374	382	**474**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	414	526	524	420	193	0	0	0	**173**
Seepage	29	28.9473684	28.94737	28.9473684	28.9473684	28.9473684	28.947368	28.9473684	28.9473684	28.9473684	28.9473684	28.9473684	**29**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2875	2875	2829	2829	3293	3406	3404	3300	3073	2829	2875	2875	**3,039 Net**
Net Water Surplus (Deficit) (m^3/hr)	**369**	**204**	**153**	**76**	**64**	**557**	**348**	**200**	**258**	**455**	**386**	**417**	**290**
Net Water Surplus (Deficit) (m^3)	**269069**	**148912**	**111464**	**55182**	**46879**	**406522**	**253955**	**145828**	**188081**	**332401**	**282084**	**304337**	**2,544,715**
Pond Size (m^3)	**4815691**	**4964602**	**5076066**	**5131248**	**5178128**	**5584650**	**5838605**	**5984433**	**6172514**	**6504915**	**6787000**	**7091337**	

Year 11

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	9	7	6	5	17	34	28	20	13	10	9	10	**14**
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	309	212	163	127	206	284	266	257	266	303	309	324	**252**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2777	2671	2615	2572	2732	2927	2865	2801	2768	2783	2781	2799	**2,758**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	149	149	149	149	149	149	149	149	149	149	149	149	**149**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	329	308	290	274	462	731	631	502	405	356	339	345	**414**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	426	541	539	432	199	0	0	0	**178**
Seepage	31	31.0526316	31.05263	31.0526316	31.0526316	31.0526316	31.052632	31.0526316	31.0526316	31.0526316	31.0526316	31.0526316	**31**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2877	2877	2832	2832	3307	3423	3421	3314	3080	2832	2877	2877	**3,046 Net**
Net Water Surplus (Deficit) (m^3/hr)	**229**	**103**	**74**	**14**	**(114)**	**235**	**75**	**(11)**	**93**	**307**	**243**	**267**	**126**
Net Water Surplus (Deficit) (m^3)	**167508**	**74906**	**53738**	**10403**	**(83121)**	**171681**	**54960**	**(8178)**	**67546**	**223837**	**177492**	**194630**	**1,105,401**
Pond Size (m^3)	**7258845**	**7333751**	**7387488**	**7397891**	**7314770**	**7486452**	**7541411**	**7533233**	**7600779**	**7824616**	**8002108**	**8196738**	

Year 12

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	7	6	5	4	13	25	21	15	10	8	7	7	**11**
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	317	218	168	131	211	292	274	264	274	311	317	333	**259**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2784	2675	2618	2574	2733	2927	2866	2803	2772	2788	2788	2806	**2,761**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	164	164	164	164	164	164	164	164	164	164	164	164	**164**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	344	323	305	288	476	745	645	516	420	370	353	359	**429**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	438	556	554	444	205	0	0	0	**183**
Seepage	33	33.1578947	33.15789	33.1578947	33.1578947	33.1578947	33.157895	33.1578947	33.1578947	33.1578947	33.1578947	33.1578947	**33**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2879	2879	2834	2834	3321	3440	3438	3328	3088	2834	2879	2879	**3,053 Net**
Net Water Surplus (Deficit) (m^3/hr)	**248**	**119**	**89**	**29**	**(112)**	**232**	**73**	**(9)**	**103**	**325**	**262**	**286**	**137**
Net Water Surplus (Deficit) (m^3)	**181164**	**86840**	**64900**	**21013**	**(81698)**	**169273**	**53377**	**(6303)**	**75441**	**237072**	**191039**	**208417**	**1,200,536**
Pond Size (m^3)	**8377902**	**8464742**	**8529642**	**8550656**	**8468958**	**8638231**	**8691608**	**8685305**	**8760746**	**8997817**	**9188857**	**9397274**	

Year 13

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	4	4	3	3	8	17	14	10	7	5	5	5	**7**
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	326	224	172	134	217	300	281	271	281	319	326	342	**266**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2790	2679	2621	2576	2735	2926	2866	2805	2776	2794	2794	2812	**2,765**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	178	178	178	178	178	178	178	178	178	178	178	178	**178**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	358	337	319	303	490	760	659	531	434	384	368	374	**443**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	449	571	569	456	210	0	0	0	**188**
Seepage	35	35.2631579	35.26316	35.2631579	35.2631579	35.2631579	35.263158	35.2631579	35.2631579	35.2631579	35.2631579	35.2631579	**35**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2881	2881	2836	2836	3335	3457	3455	3342	3096	2836	2881	2881	**3,060 Net**
Net Water Surplus (Deficit) (m^3/hr)	**267**	**135**	**104**	**43**	**(110)**	**229**	**71**	**(6)**	**114**	**343**	**280**	**304**	**148**
Net Water Surplus (Deficit) (m^3)	**194821**	**98773**	**76063**	**31624**	**(80274)**	**166866**	**51794**	**(4428)**	**83336**	**250306**	**204587**	**222204**	**1,295,670**
Pond Size (m^3)	**9592094**	**9690868**	**9766930**	**9798554**	**9718280**	**9885145**	**9936939**	**9932511**	**10015847**	**10266153**	**10470739**	**10692943**	

Year 14

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	2	2	2	1	4	8	7	5	3	3	2	2	**4**
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	334	229	177	138	223	308	288	279	288	328	334	351	**273**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2796	2683	2624	2578	2736	2925	2867	2807	2780	2800	2800	2819	**2,768**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	192	192	192	192	192	192	192	192	192	192	192	192	**192**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	373	352	333	317	505	774	674	545	448	399	382	388	**458**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	461	586	584	468	216	0	0	0	**193**
Seepage	37	37.3684211	37.36842	37.3684211	37.3684211	37.3684211	37.368421	37.3684211	37.3684211	37.3684211	37.3684211	37.3684211	**37**
Whole Tailing voids	**440**	**440**	**66**	**66**	**66**	**66**	**66**	**66**	**66**	**66**	**440**	**440**	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2884	2884	2838	2838	3349	3474	3472	3356	3103	2838	2884	2884	**3,067**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**286**	**152**	**119**	**58**	**(108)**	**225**	**69**	**(3)**	**125**	**361**	**299**	**323**	**159**
Net Water Surplus (Deficit) (m^3)	**208477**	**110707**	**87225**	**42235**	**(78851)**	**164458**	**50210**	**(2553)**	**91231**	**263540**	**218134**	**235991**	**1,390,804**
Pond Size (m^3)	**10901421**	**11012128**	**11099353**	**11141587**	**11062736**	**11227194**	**11277404**	**11274851**	**11366082**	**11629622**	**11847756**	**12083747**	

Year 15

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	343	235	182	141	229	316	296	286	296	336	343	360	**280**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2803	2688	2627	2581	2738	2925	2867	2810	2784	2806	2806	2825	**2,772**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	207	207	207	207	207	207	207	207	207	207	207	207	**207**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	387	366	348	332	519	789	688	560	463	413	397	402	**472**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	473	601	599	480	221	0	0	0	**198**
Seepage	39	39.4736842	39.47368	39.4736842	39.4736842	39.4736842	39.473684	39.4736842	39.4736842	39.4736842	39.4736842	39.4736842	**39**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2886	2886	2840	2840	3363	3491	3489	3370	3111	2840	2886	2886	**3,074 Net**
Net Water Surplus (Deficit) (m^3/hr)	**304**	**168**	**135**	**72**	**(106)**	**222**	**67**	**(1)**	**136**	**379**	**317**	**342**	**170**
Net Water Surplus (Deficit) (m^3)	**222134**	**122641**	**98388**	**52845**	**(77428)**	**162050**	**48627**	**(678)**	**99126**	**276774**	**231681**	**249779**	**1,485,938**
Pond Size (m^3)	**12305881**	**12428522**	**12526909**	**12579754**	**12502326**	**12664376**	**12713003**	**12712326**	**12811451**	**13088226**	**13319907**	**13569685**	

Year 16

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	11	9	8	7	22	43	35	25	17	13	12	12	**18**
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	354	243	187	146	236	326	305	295	305	347	354	371	**289**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2819	2700	2637	2588	2756	2956	2894	2831	2802	2823	2823	2843	**2,789**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	221	221	221	221	221	221	221	221	221	221	221	221	**221**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	401	381	362	346	534	803	703	574	477	428	411	417	**486**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	488	621	618	495	228	0	0	0	**204**
Seepage	42	41.5789474	41.57895	41.5789474	41.5789474	41.5789474	41.578947	41.5789474	41.5789474	41.5789474	41.5789474	41.5789474	**42**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2888	2888	2842	2842	3380	3513	3510	3388	3120	2842	2888	2888	**3,082**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**333**	**192**	**157**	**92**	**(91)**	**247**	**87**	**18**	**159**	**409**	**346**	**372**	**193**
Net Water Surplus (Deficit) (m^3)	**243113**	**140510**	**114473**	**67525**	**(66237)**	**180137**	**63375**	**12847**	**116086**	**298360**	**252938**	**271596**	**1,694,721**
Pond Size (m^3)	**13812798**	**13953308**	**14067781**	**14135305**	**14069068**	**14249205**	**14312580**	**14325427**	**14441513**	**14739872**	**14992810**	**15264406**	

Year 17

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	8	7	6	5	16	32	26	19	13	10	9	9	**13**
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	365	250	193	150	243	336	315	304	315	358	365	383	**298**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2827	2705	2640	2591	2758	2956	2895	2834	2807	2831	2831	2851	**2,794**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	236	236	236	236	236	236	236	236	236	236	236	236	**236**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	416	395	377	360	548	817	717	588	492	442	425	431	**501**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	503	640	637	511	235	0	0	0	**210**
Seepage	44	43.6842105	43.68421	43.6842105	43.6842105	43.6842105	43.684211	43.6842105	43.6842105	43.6842105	43.6842105	43.6842105	**44**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2890	2890	2844	2844	3397	3534	3531	3405	3129	2844	2890	2890	**3,091**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**353**	**210**	**173**	**108**	**(92)**	**239**	**81**	**18**	**169**	**428**	**367**	**393**	**204**
Net Water Surplus (Deficit) (m^3)	**258043**	**153248**	**126229**	**78579**	**(66876)**	**174622**	**58910**	**12784**	**123684**	**312753**	**267730**	**286693**	**1,786,399**
Pond Size (m^3)	**15522449**	**15675698**	**15801927**	**15880506**	**15813630**	**15988252**	**16047162**	**16059946**	**16183630**	**16496383**	**16764112**	**17050805**	

Year 18

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	6	5	4	3	11	22	18	12	9	7	6	6	**9**
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	376	258	199	155	250	346	324	313	324	368	376	394	**307**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2836	2710	2644	2594	2759	2955	2896	2837	2812	2838	2839	2860	**2,798**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	42.61	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	250	250	250	250	250	250	250	250	250	250	250	250	**250**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	430	409	391	375	563	832	731	603	506	456	440	446	**515**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	518	659	656	526	242	0	0	0	**217**
Seepage	46	45.7894737	45.78947	45.7894737	45.7894737	45.7894737	45.789474	45.7894737	45.7894737	45.7894737	45.7894737	45.7894737	**46**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2892	2892	2846	2846	3414	3555	3552	3422	3138	2846	2892	2892	**3,099 Net**
Net Water Surplus (Deficit) (m^3/hr)	**374**	**227**	**189**	**123**	**(92)**	**232**	**75**	**17**	**180**	**448**	**387**	**413**	**214**
Net Water Surplus (Deficit) (m^3)	**272974**	**165986**	**137986**	**89633**	**(67515)**	**169108**	**54445**	**12720**	**131282**	**327147**	**282522**	**301790**	**1,878,078**
Pond Size (m^3)	**17323779**	**17489766**	**17627752**	**17717385**	**17649870**	**17818978**	**17873423**	**17886143**	**18017425**	**18344571**	**18627093**	**18928883**	

Year 19

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	No	No	No	No	No	No	No	No	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	3	2	2	2	5	11	9	6	4	3	3	3	**4**
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	386	265	205	159	258	356	333	322	333	379	386	405	**316**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2473	2345	2278	2227	2391	2584	2526	2469	2447	2475	2477	2498	**2,432**
Plant Area													
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0.00	0	0	0	0	0	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	250	250	250	250	250	250	250	250	250	250	250	250	**250**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	292	292	292	292	292	292	292	292	292	292	292	292	**292**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	533	678	675	541	249	0	0	0	**223**
Seepage	48	48	48	48	48	48	48	48	48	48	48	48	**48**
Rougher (Whole) Tailing voids	401	401	401	401	401	401	401	401	401	401	401	401	**401**
Cyclone Overflow Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2855	2855	2855	2855	3438	3583	3580	3446	3154	2855	2855	2855	**3,099**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(90)**	**(218)**	**(285)**	**(336)**	**(755)**	**(707)**	**(762)**	**(685)**	**(415)**	**(88)**	**(86)**	**(65)**	**(375)**
Net Water Surplus (Deficit) (m^3)	**(65480)**	**(159357)**	**(208313)**	**(245624)**	**(551446)**	**(516223)**	**(556567)**	**(499994)**	**(303219)**	**(64313)**	**(63037)**	**(47715)**	**- 3,281,288**
Pond Size (m^3)	**18863403**	**18704046**	**18495733**	**18250109**	**17698663**	**17182440**	**16625873**	**16125879**	**15822660**	**15758347**	**15695310**	**15647595**	

Year 20

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	No	No	No	No	No	No	No	No	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	397	273	210	164	265	366	343	331	343	390	397	417	**325**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2482	2350	2282	2229	2393	2583	2527	2472	2452	2482	2485	2506	**2,437**
Plant Area													
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0.00	0	0	0	0	0	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	250	250	250	250	250	250	250	250	250	250	250	250	**250**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	292	292	292	292	292	292	292	292	292	292	292	292	**292**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	548	697	694	557	256	0	0	0	**229**
Seepage	50	50	50	50	50	50	50	50	50	50	50	50	**50**
Whole Tailing voids	440	440	440	440	440	440	440	440	440	440	440	440	**440**
Cyclone Overflow Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2896	2896	2896	2896	3494	3643	3641	3503	3202	2896	2896	2896	**3,146**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(123)**	**(254)**	**(323)**	**(375)**	**(810)**	**(768)**	**(822)**	**(738)**	**(458)**	**(122)**	**(119)**	**(98)**	**(417)**
Net Water Surplus (Deficit) (m^3)	**(89496)**	**(185566)**	**(235503)**	**(273517)**	**(591031)**	**(560685)**	**(599979)**	**(539005)**	**(334568)**	**(88867)**	**(87192)**	**(71565)**	**- 3,656,972**
Pond Size (m^3)	**15558099**	**15372533**	**15137030**	**14863513**	**14272482**	**13711797**	**13111819**	**12572814**	**12238246**	**12149380**	**12062188**	**11990623**	

Year 21

Upper Bound Condition

Month	Jan.	Feb	March	April	May	June	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	**43%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	**237**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	**47%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	**45%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	**176**
Cyclone Sand Operating?	No	No	No	No	No	No	
INFLOWS (m^3/hr)							
TSF Area							**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	-
Leakage from Diversion Ditches	46	39	33	27	90	179	**69**
Precipitation on TSF Impoundment	397	273	210	164	265	366	**279**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4
Subtotal	2482	2350	2282	2229	2393	2583	**2,386**
Plant Area							
Runoff from undiverted catchment	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0.00	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	250	250	250	250	250	250	**250**
Fresh Water Make-up	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	**39**
Subtotal	292	292	292	292	292	292	**292**
OUTFLOWS (m^3/hr)							
TSF Area Pond Evaporation	0	0	0	0	548	697	**208**
Seepage	50	50	50	50	50	50	**50**
Whole Tailing voids	440	440	440	440	440	440	**440**
Cyclone Overflow Voids	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	**17**
Concentrate Load Out	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2896	2896	2896	2896	3494	3643	**3,120**
Net Water Surplus (Deficit) (m^3/hr)	**(123)**	**(254)**	**(323)**	**(375)**	**(810)**	**(768)**	**(442)**
Net Water Surplus (Deficit) (m^3)	**(89496)**	**(185566)**	**(235503)**	**(273517)**	**(591031)**	**(560685)**	**- 1,935,798**
Pond Size (m^3)	**11901127**	**11715561**	**11480058**	**11206542**	**10615510**	**10054826**	

Summary - Upper Bound Condition Managed

* Annual Precipitation (mm)	550
Annual Evaporation (mm)	389
Undisturbed (Diverted) Land Runoff Coefficien	0.5
TSF	
Tailings pond area (sq. km)	varies
Undiverted Catchment runoff area (sq.km.)	varies
Diverted uphill catchment area (sq.km.)	varies
% Diversion ditch seepage	20%
Ultimate Tailings pond area (sq. km)	5.1

Process Plant	
Waste Dump/Plant Site Runoff Coefficient	0.7
Open Pit Runoff Coefficient	1.0
Processes %Availability	92.0%
Undiverted WRD/Plant Site Catchment Area (sq.km)	varies
Diverted WRD/Plant Site Catchment Area (sq.km)	varies
% Diversion ditch seepage	20%
Open Pit Area (sq.km)	1.1

Tailings		tpd	% Solids	
Total Daily Tonnage		29,621	Transport	InSitu
91%	Rougher	27,003	35.61%	73.7%
9%	Cleaner	2,619	22.76%	73.7%
Cyclone Efficiency		85%		
24%	Cyclone U/F	7,157		85.0%
76%	Cyclone O/F	22,465		73.7%

* *10-yr wet year*

DATA	Parameter	unit		Construction	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Year 20.5
	Annual precipitation	mm	550											733											
	Annual evaporation	mm	389																						
TSF Area	Diverted catchment area (external to TSF)	km^2		4.07	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80	5.80
	Diverted Within TSF	km^2			2.10	2.10	2.10	2.10	2.10	1.25	1.25	1.25	1.25	1.25	0.70	0.70	0.70	0.70	0.70	0.00	0.00	0.00	0.00	0.00	0.00
	Diverted runoff coefficient	%	0.5																						
	Diversion ditch efficiency	%	80%		Yr 5 footprint Diversion					Yr 10 footprint diversion					Yr 15 footprint diversion					UTSF diversion					
	Undiverted catchment area (not including TSF)	km^2		6.47	1.80	1.08	0.72	0.36	0.00	0.68	0.51	0.34	0.17	0.00	0.44	0.33	0.22	0.11	0.00	0.56	0.42	0.28	0.14	0.00	0.00
	Undiverted runoff coefficient	%	0.5																						
	TSF impoundment area	km^2		1.20	1.20	1.92	2.28	2.64	3.00	3.17	3.34	3.51	3.68	3.85	3.96	4.07	4.18	4.29	4.40	4.54	4.68	4.82	4.96	5.10	5.10
	TSF impoundment runoff coefficient	%	1.0																						

Mine Area			Transport	In Situ
	Rougher Tailings Density	% solids	35.61%	73.7%
	Cleaner Tailings Density		22.76%	73.7%
	Cyclone Underflow		-	85.0%
	Cyclone Overflow		-	73.7%

	Diverted LGO/WRD/Plantsite area	km^2		0.62	1.7	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	0.00	0.00	0.00
	Diverted runoff coefficient	%	0.5																						
	Diversion ditch efficiency	%	80%																						
	Undiverted LGO/WRD/Plantsite area	km^2		2.52	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	2.98	0.00	0.00	0.00
	LGO/WRD/Plantsite runoff coefficient	%	0.7																						
	Open pit area	km^2	1.1																						
	Open pit runoff coefficient	%	1.0																						

INFLOWS

TSF Area	Runoff from undiverted catchment	m^3/hr	206	57	34	23	11	0	22	16	11	5	0	14	11	7	4	0	18	13	9	4	0	0
	Leakage from Diversion Ditches		0	101	101	101	101	101	90	90	90	90	120	83	83	83	83	83	74	74	74	74	74	69
	Precipitation on TSF Impoundment		76	76	122	145	168	191	202	213	223	234	327	252	259	266	273	280	289	298	307	316	325	279
	Cleaner Tailings Water (direct discharge)		0	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	370	0	0	0
	Rougher Tailings Water (direct discharge)		0	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034
	Seepage reclaim		0	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	SUBTOTAL - TSF Inflows		282	2643	2666	2677	2689	2700	2722	2727	2733	2738	2855	2758	2761	2765	2768	2772	2789	2794	2798	2432	2437	2386
Mine Area	Runoff from LGO/WRD plantsite area	m^3/hr	0	133	133	133	133	133	133	133	133	133	177	133	133	133	133	133	133	133	133	0	0	0
	Leakage from diversion ditches		0	22	22	22	22	22	22	22	22	22	29	22	22	22	22	22	22	22	22	0	0	0
	Precipitation/Runoff into open pit		0	69	69	69	69	69	69	69	69	69	92	69	69	69	69	69	69	69	69	0	0	0
	Open pit dewatering		0	5	19	34	48	63	77	91	106	120	135	149	164	178	192	207	221	236	250	250	250	250
	Fresh water makeup		0	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Ore rock moisture		0	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
	SUBTOTAL - Mine Inflows		**0**	270	285	299	313	328	342	357	371	385	474	414	429	443	458	472	486	501	515	292	292	292

OUTFLOWS

	Evaporation from TSF impoundment	m^3/hr	54	54	86	103	119	135	143	150	158	166	173	178	183	188	193	198	204	210	217	223	229	208
	TSF seepage		5	10	12	14	16	18	21	23	25	27	29	31	33	35	37	39	42	44	46	48	50	50
	Tailings void loss - whole		0	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	191	401	440	440
	-overflow		0	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	189	0	0	0
	-underflow (cyclone sand)		0	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0
	Dust Suppression		21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	17
	Concentrate Load Out		0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Potable Water		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	Mitigation / Discharge		119	0	0	0	0	0	0	0	0	0	0	68	110	110	110	110	110	110	110	110	110	110
	Reclaim Water		0	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402
	SUBTOTAL - Outflows		**202**	2900	2935	2953	2972	2990	3000	3009	3019	3029	3039	3114	3163	3170	3177	3184	3192	3201	3209	3209	3256	3230
NET	**Net Flow**		**80**	13	16	23	31	38	65	75	85	95	290	58	27	38	49	60	83	94	104	-485	-527	-552
	Net Annual Volume		703,001	111,065	135,934	202,271	268,608	334,945	565,365	653,588	741,811	830,034	2,544,715	509,721	236,936	332,070	427,204	522,338	731,121	822,799	914,478	- 4,244,888	- 4,620,572	- 2,417,598
CUMULATIVE	**Cumulative Volume**	**m^3**	703,001	814,066	950,000	1,152,271	1,420,878	1,755,823	2,321,188	2,974,777	3,716,588	4,546,622	7,091,337	7,601,058	7,837,994	8,170,063	8,597,267	9,119,605	9,850,726	10,673,525	11,588,003	7,343,115	2,722,543	304,946
	Cumulative Volume	Mm^3	0.70	0.81	0.95	1.15	1.42	1.76	2.32	2.97	3.72	4.55	7.09	7.60	7.84	8.17	8.60	9.12	9.85	10.67	11.59	7.34	2.72	0.30
MAXIMUM	**LOM Max Pond Volume**	11.59 Mm^3																						
END	**End of Mine Pond Volume**	0.30 Mm^3																						

Construction

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	No	No	No	No	No	No	No	No	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	128	108	91	76	250	498	405	287	198	152	136	142	**206**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	-
Precipitation on TSF Impoundment	94	64	50	39	62	86	81	78	81	92	94	98	**76**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Seepage reclaim	0	0	0	0	0	0	0	0	0	0	0	0	0
Subtotal	221	172	141	115	312	584	486	365	278	243	230	240	**282**
Plant Area = Process Plant & Site, Open Pit, Waste Dump, Ore Stockpile													
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Fresh Water Make-up	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Ore Void Water (3% MC)	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Subtotal	0	0	0	0	0	0	0	0	0	0	0	0	**0**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	129	164	163	131	60	0	0	0	**54**
Seepage	5	5	5	5	5	5	5	5	5	5	5	5	**5**
Tailing voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cyclone Overflow Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	0	0	0	0	0	0	0	0	0	0	0	0	-
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Discharge to Environment	0	0	0	0	0	0	75	365	278	243	230	240	**119**
Reclaim Water	0	0	0	0	0	0	0	0	0	0	0	0	-
Subtotal	8	8	8	8	187	222	296	554	397	251	238	248	**202**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**213**	**164**	**133**	**107**	**125**	**362**	**190**	**(189)**	**(118)**	**(8)**	**(8)**	**(8)**	**80**
Net Water Surplus (Deficit) (m^3)	**155582**	**120048**	**96976**	**78110**	**91217**	**264392**	**138495**	**(137943)**	**(86355)**	**(5840)**	**(5840)**	**(5840)**	**703,001**
Pond Size (m^3)	**155,582**	**275630**	**372606**	**450716**	**541933**	**806325**	**944820**	**806876**	**720521**	**714681**	**708841**	**703001**	

Year 1

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	36	30	25	21	69	139	113	80	55	42	38	39	**57**
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	94	64	50	39	62	86	81	78	81	92	94	98	**76**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2600	2556	2528	2506	2662	2877	2800	2706	2641	2617	2607	2616	**2,643**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	5	5	5	5	5	5	5	5	5	5	5	5	**5**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	185	164	146	130	318	587	486	358	261	211	195	201	**270**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	129	164	163	131	60	0	0	0	**54**
Seepage	10	10	10	10	10	10	10	10	10	10	10	10	**10**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2856	2856	2810	2810	2989	3024	3024	2991	2921	2810	2856	2856	**2,900**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(71)**	**(136)**	**(136)**	**(175)**	**(9)**	**439**	**263**	**73**	**(19)**	**18**	**(54)**	**(40)**	**13**
Net Water Surplus (Deficit) (m^3)	**(51668)**	**(99210)**	**(99422)**	**(127504)**	**(6914)**	**320465**	**191827**	**53168**	**(13695)**	**12967**	**(39777)**	**(29170)**	**111,065**
Pond Size (m^3)	**651333**	**552123**	**452700**	**325196**	**318282**	**638746**	**830573**	**883741**	**870046**	**883013**	**843236**	**814066**	**814,066**

Year 2

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	21	18	15	13	42	83	68	48	33	25	23	24	**34**
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	150	103	79	62	100	138	129	125	129	147	150	157	**122**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2642	2582	2548	2520	2672	2873	2803	2721	2667	2655	2648	2659	**2,666**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	19	19	19	19	19	19	19	19	19	19	19	19	**19**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	200	179	160	144	332	601	501	372	276	226	209	215	**285**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	206	262	261	210	96	0	0	0	**86**
Seepage	12	12	12	12	12	12	12	12	12	12	12	12	**12**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2858	2858	2813	2813	3069	3125	3124	3072	2959	2813	2858	2858	**2,935**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(17)**	**(97)**	**(104)**	**(148)**	**(65)**	**349**	**180**	**21**	**(16)**	**68**	**(1)**	**15**	**16**
Net Water Surplus (Deficit) (m^3)	**(12100)**	**(70918)**	**(76178)**	**(107872)**	**(47419)**	**254886**	**131646**	**15623**	**(11839)**	**49773**	**(923)**	**11254**	**135,934**
Pond Size (m^3)	**801966**	**731049**	**654871**	**546999**	**499580**	**754466**	**886112**	**901735**	**889896**	**939669**	**938746**	**950000**	**950,000**

Year 3

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	14	12	10	9	28	55	45	32	22	17	15	16	**23**
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	178	122	94	73	118	164	153	148	153	174	178	186	**145**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2663	2596	2558	2528	2677	2871	2805	2729	2680	2674	2668	2680	**2,677**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	34	34	34	34	34	34	34	34	34	34	34	34	**34**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	214	193	175	159	346	616	515	387	290	240	224	230	**299**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	245	312	310	249	115	0	0	0	**103**
Seepage	14	14	14	14	14	14	14	14	14	14	14	14	**14**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2860	2860	2815	2815	3110	3176	3175	3113	2979	2815	2860	2860	**2,953**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**17**	**(72)**	**(82)**	**(128)**	**(87)**	**310**	**145**	**2**	**(9)**	**100**	**32**	**49**	**23**
Net Water Surplus (Deficit) (m^3)	**12177**	**(52280)**	**(60064)**	**(93564)**	**(63179)**	**226588**	**106048**	**1342**	**(6419)**	**72667**	**22995**	**35958**	**202,271**
Pond Size (m^3)	**962176**	**909897**	**849833**	**756269**	**693090**	**919678**	**1025726**	**1027068**	**1020650**	**1093317**	**1116312**	**1152271**	

Year 4

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	7	6	5	4	14	28	23	16	11	8	8	8	**11**
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	206	141	109	85	137	190	177	171	177	202	206	216	**168**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2684	2609	2567	2535	2682	2869	2807	2736	2694	2693	2689	2702	**2,689**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	48	48	48	48	48	48	48	48	48	48	48	48	**48**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	229	208	189	173	361	630	530	401	304	255	238	244	**313**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	284	361	359	288	133	0	0	0	**119**
Seepage	16	16	16	16	16	16	16	16	16	16	16	16	**16**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2862	2862	2817	2817	3151	3228	3226	3155	2999	2817	2862	2862	**2,972**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**50**	**(46)**	**(60)**	**(109)**	**(108)**	**272**	**110**	**(18)**	**(1)**	**131**	**64**	**83**	**31**
Net Water Surplus (Deficit) (m^3)	**36453**	**(33642)**	**(43950)**	**(79256)**	**(78939)**	**198291**	**80449**	**(12939)**	**(999)**	**95562**	**46914**	**60662**	**268,608**
Pond Size (m^3)	**1188724**	**1155082**	**1111132**	**1031876**	**952937**	**1151228**	**1231677**	**1218738**	**1217740**	**1313302**	**1360216**	**1420878**	

Year 5

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	62	53	45	37	122	243	198	140	96	74	67	69	**101**
Precipitation on TSF Impoundment	234	160	124	96	156	215	202	195	202	229	234	245	**191**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2705	2622	2577	2542	2686	2867	2808	2744	2707	2712	2709	2723	**2,700**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	63	63	63	63	63	63	63	63	63	63	63	63	**63**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	243	222	204	188	375	644	544	415	319	269	253	258	**328**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	323	410	408	327	151	0	0	0	**135**
Seepage	18	18	18	18	18	18	18	18	18	18	18	18	**18**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2865	2865	2819	2819	3191	3279	3277	3196	3020	2819	2865	2865	**2,990**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**83**	**(21)**	**(38)**	**(89)**	**(130)**	**233**	**75**	**(37)**	**6**	**162**	**97**	**117**	**38**
Net Water Surplus (Deficit) (m^3)	**60729**	**(15004)**	**(27836)**	**(64948)**	**(94699)**	**169993**	**54851**	**(27219)**	**4422**	**118456**	**70833**	**85367**	**334,945**
Pond Size (m^3)	**1481608**	**1466604**	**1438768**	**1373820**	**1279121**	**1449114**	**1503965**	**1476746**	**1481167**	**1599624**	**1670456**	**1755823**	

Year 6

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Leakage from Diversion Ditches	56	47	40	33	109	217	177	125	86	66	59	62	**90**
Precipitation on TSF Impoundment	247	170	131	102	165	228	213	206	213	242	247	259	**202**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2725	2637	2589	2552	2708	2906	2841	2770	2729	2733	2730	2745	**2,722**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	77	77	77	77	77	77	77	77	77	77	77	77	**77**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	257	236	218	202	390	659	558	430	333	284	267	273	**342**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	341	433	432	346	159	0	0	0	**143**
Seepage	21	21	21	21	21	21	21	21	21	21	21	21	**21**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2867	2867	2821	2821	3212	3304	3303	3217	3030	2821	2867	2867	**3,000 Net**
Net Water Surplus (Deficit) (m^3/hr)	**115**	**7**	**(14)**	**(67)**	**(114)**	**260**	**97**	**(17)**	**32**	**196**	**130**	**151**	**65**
Net Water Surplus (Deficit) (m^3)	**84278**	**4770**	**(10229)**	**(49048)**	**(83035)**	**190030**	**70834**	**(12721)**	**23091**	**142742**	**94720**	**109934**	**565,365**
Pond Size (m^3)	**1840101**	**1844871**	**1834642**	**1785594**	**1702559**	**1892590**	**1963423**	**1950702**	**1973793**	**2116535**	**2211255**	**2321188**	

Year 7

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	10	9	7	6	20	39	32	23	16	12	11	11	**16**
Leakage from Diversion Ditches	56	47	40	33	109	217	177	125	86	66	59	62	**90**
Precipitation on TSF Impoundment	260	179	138	107	173	240	225	217	225	255	260	273	**213**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2735	2643	2594	2555	2711	2905	2842	2773	2735	2742	2739	2755	**2,727**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	91	91	91	91	91	91	91	91	91	91	91	91	**91**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	272	251	232	216	404	673	573	444	348	298	281	287	**357**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	359	457	455	365	168	0	0	0	**150**
Seepage	23	23	23	23	23	23	23	23	23	23	23	23	**23**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2869	2869	2823	2823	3232	3330	3328	3238	3041	2823	2869	2869	**3,009**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**138**	**25**	**3**	**(51)**	**(117)**	**249**	**87**	**(20)**	**42**	**217**	**152**	**173**	**75**
Net Water Surplus (Deficit) (m^3)	**100484**	**18312**	**2122**	**(37550)**	**(85736)**	**181409**	**63487**	**(14724)**	**30392**	**158294**	**110756**	**126341**	**653,588**
Pond Size (m^3)	**2421672**	**2439985**	**2442106**	**2404556**	**2318820**	**2500229**	**2563717**	**2548993**	**2579385**	**2737680**	**2848436**	**2974777**	

Year 8

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	7	6	5	4	13	26	21	15	10	8	7	7	**11**
Leakage from Diversion Ditches	56	47	40	33	109	217	177	125	86	66	59	62	**90**
Precipitation on TSF Impoundment	273	188	145	113	182	252	236	228	236	268	273	287	**223**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2745	2649	2598	2559	2713	2904	2843	2777	2741	2751	2749	2765	**2,733**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	106	106	106	106	106	106	106	106	106	106	106	106	**106**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	286	265	247	231	418	688	587	459	362	312	296	302	**371**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	377	480	478	383	176	0	0	0	**158**
Seepage	25	25	25	25	25	25	25	25	25	25	25	25	**25**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2871	2871	2825	2825	3253	3355	3353	3258	3052	2825	2871	2871	**3,019**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**160**	**44**	**20**	**(36)**	**(121)**	**237**	**77**	**(23)**	**52**	**238**	**174**	**196**	**85**
Net Water Surplus (Deficit) (m^3)	**116689**	**31855**	**14473**	**(26052)**	**(88437)**	**172788**	**56140**	**(16726)**	**37693**	**173847**	**126793**	**142748**	**741,811**
Pond Size (m^3)	**3091466**	**3123321**	**3137793**	**3111741**	**3023305**	**3196092**	**3252233**	**3235507**	**3273200**	**3447047**	**3573840**	**3716588**	

Year 9

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	3	3	2	2	7	13	11	8	5	4	4	4	**5**
Leakage from Diversion Ditches	56	47	40	33	109	217	177	125	86	66	59	62	**90**
Precipitation on TSF Impoundment	287	197	152	118	191	264	247	239	247	281	287	301	**234**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2754	2656	2603	2562	2715	2903	2843	2780	2747	2760	2759	2775	**2,738**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	120	120	120	120	120	120	120	120	120	120	120	120	**120**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	301	280	261	245	433	702	602	473	376	327	310	316	**385**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	396	503	501	402	185	0	0	0	**166**
Seepage	27	27	27	27	27	27	27	27	27	27	27	27	**27**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2873	2873	2827	2827	3273	3380	3378	3279	3062	2827	2873	2873	**3,029**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**182**	**62**	**37**	**(20)**	**(125)**	**225**	**67**	**(26)**	**62**	**259**	**196**	**218**	**95**
Net Water Surplus (Deficit) (m^3)	**132894**	**45398**	**26823**	**(14554)**	**(91138)**	**164166**	**48794**	**(18728)**	**44994**	**189400**	**142829**	**159155**	**830,034**
Pond Size (m^3)	**3849482**	**3894880**	**3921703**	**3907149**	**3816011**	**3980178**	**4028972**	**4010244**	**4055238**	**4244637**	**4387466**	**4546622**	

Year 10

10-year wet year applied this year.

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	74.8	51.3	39.6	30.8	49.8	68.9	64.5	62.3	64.5	73.3	74.8	78.4	**733**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	74	63	53	44	145	289	236	167	115	88	79	82	**120**
Precipitation on TSF Impoundment	400	274	212	165	267	368	345	333	345	392	400	419	**327**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2883	2746	2673	2618	2820	3066	2989	2908	2868	2889	2888	2910	**2,855**
Plant Area													
Runoff from undiverted catchment	110	93	78	66	215	428	348	246	170	130	117	122	**177**
Leakage from Diversion Ditches	18	15	13	11	35	70	57	40	28	21	19	20	**29**
Precipitation Over Open Pit	57	48	41	34	111	222	180	128	88	68	61	63	**92**
Open Pit Groundwater Dewatering	135	135	135	135	135	135	135	135	135	135	135	135	**135**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	361	333	309	287	537	896	762	591	462	396	374	382	**474**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	414	526	524	420	193	0	0	0	**173**
Seepage	29	29	29	29	29	29	29	29	29	29	29	29	**29**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	0	0	0	0	0	0	0	0	0	0	0	0	-
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2875	2875	2829	2829	3293	3406	3404	3300	3073	2829	2875	2875	**3,039**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**369**	**204**	**153**	**76**	**64**	**557**	**348**	**200**	**258**	**455**	**386**	**417**	**290**
Net Water Surplus (Deficit) (m^3)	**269069**	**148912**	**111464**	**55182**	**46879**	**406522**	**253955**	**145828**	**188081**	**332401**	**282084**	**304337**	**2,544,715**
Pond Size (m^3)	**4815691**	**4964602**	**5076066**	**5131248**	**5178128**	**5584650**	**5838605**	**5984433**	**6172514**	**6504915**	**6787000**	**7091337**	

Year 11

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	9	7	6	5	17	34	28	20	13	10	9	10	**14**
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	309	212	163	127	206	284	266	257	266	303	309	324	**252**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2777	2671	2615	2572	2732	2927	2865	2801	2768	2783	2781	2799	**2,758**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	149	149	149	149	149	149	149	149	149	149	149	149	**149**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	329	308	290	274	462	731	631	502	405	356	339	345	**414**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	426	541	539	432	199	0	0	0	**178**
Seepage	31	31	31	31	31	31	31	31	31	31	31	31	**31**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	68	68	68	68	68	68	68	68	68	68	68	68	**68**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2945	2945	2900	2900	3375	3491	3489	3382	3148	2900	2945	2945	**3,114**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**161**	**35**	**6**	**(54)**	**(182)**	**167**	**7**	**(79)**	**25**	**239**	**175**	**199**	**58**
Net Water Surplus (Deficit) (m^3)	**117868**	**25266**	**4098**	**(39237)**	**(132761)**	**122041**	**5320**	**(57818)**	**17906**	**174197**	**127852**	**144990**	**509,721**
Pond Size (m^3)	**7209205**	**7234471**	**7238568**	**7199331**	**7066570**	**7188612**	**7193931**	**7136113**	**7154019**	**7328216**	**7456068**	**7601058**	

Year 12

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	7	6	5	4	13	25	21	15	10	8	7	7	**11**
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	317	218	168	131	211	292	274	264	274	311	317	333	**259**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2784	2675	2618	2574	2733	2927	2866	2803	2772	2788	2788	2806	**2,761**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	164	164	164	164	164	164	164	164	164	164	164	164	**164**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	344	323	305	288	476	745	645	516	420	370	353	359	**429**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	438	556	554	444	205	0	0	0	**183**
Seepage	33	33	33	33	33	33	33	33	33	33	33	33	**33**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2989	2989	2944	2944	3431	3550	3548	3438	3198	2944	2989	2989	**3,163**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**138**	**9**	**(21)**	**(81)**	**(222)**	**122**	**(37)**	**(119)**	**(7)**	**215**	**152**	**176**	**27**
Net Water Surplus (Deficit) (m^3)	**100864**	**6540**	**(15400)**	**(59287)**	**(161998)**	**88973**	**(26923)**	**(86603)**	**(4859)**	**156772**	**110739**	**128117**	**236,936**
Pond Size (m^3)	**7701922**	**7708462**	**7693062**	**7633776**	**7471778**	**7560751**	**7533828**	**7447225**	**7442366**	**7599137**	**7709877**	**7837994**	

Year 13

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	4	4	3	3	8	17	14	10	7	5	5	5	**7**
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	326	224	172	134	217	300	281	271	281	319	326	342	**266**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2790	2679	2621	2576	2735	2926	2866	2805	2776	2794	2794	2812	**2,765**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	178	178	178	178	178	178	178	178	178	178	178	178	**178**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	358	337	319	303	490	760	659	531	434	384	368	374	**443**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	449	571	569	456	210	0	0	0	**188**
Seepage	35	35	35	35	35	35	35	35	35	35	35	35	**35**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2991	2991	2946	2946	3445	3567	3565	3452	3206	2946	2991	2991	**3,170**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**157**	**25**	**(6)**	**(67)**	**(220)**	**119**	**(39)**	**(116)**	**4**	**233**	**170**	**194**	**38**
Net Water Surplus (Deficit) (m^3)	**114521**	**18473**	**(4237)**	**(48676)**	**(160574)**	**86566**	**(28506)**	**(84728)**	**3036**	**170006**	**124287**	**141904**	**332,070**
Pond Size (m^3)	**7952514**	**7970988**	**7966750**	**7918074**	**7757500**	**7844065**	**7815559**	**7730831**	**7733867**	**7903873**	**8028159**	**8170063**	

Year 14

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	2	2	2	1	4	8	7	5	3	3	2	2	**4**
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	334	229	177	138	223	308	288	279	288	328	334	351	**273**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2796	2683	2624	2578	2736	2925	2867	2807	2780	2800	2800	2819	**2,768**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	192	192	192	192	192	192	192	192	192	192	192	192	**192**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	373	352	333	317	505	774	674	545	448	399	382	388	**458**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	461	586	584	468	216	0	0	0	**193**
Seepage	37	37	37	37	37	37	37	37	37	37	37	37	**37**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2994	2994	2948	2948	3459	3584	3582	3466	3213	2948	2994	2994	**3,177 Net**
Net Water Surplus (Deficit) (m^3/hr)	**176**	**42**	**9**	**(52)**	**(218)**	**115**	**(41)**	**(113)**	**15**	**251**	**189**	**213**	**49**
Net Water Surplus (Deficit) (m^3)	**128177**	**30407**	**6925**	**(38065)**	**(159151)**	**84158**	**(30090)**	**(82853)**	**10931**	**183240**	**137834**	**155691**	**427,204**
Pond Size (m^3)	**8298241**	**8328648**	**8335573**	**8297507**	**8138356**	**8222514**	**8192424**	**8109571**	**8120502**	**8303742**	**8441576**	**8597267**	

Year 15

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	51	44	37	31	100	200	163	115	79	61	55	57	**83**
Precipitation on TSF Impoundment	343	235	182	141	229	316	296	286	296	336	343	360	**280**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2803	2688	2627	2581	2738	2925	2867	2810	2784	2806	2806	2825	**2,772**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	207	207	207	207	207	207	207	207	207	207	207	207	**207**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	387	366	348	332	519	789	688	560	463	413	397	402	**472**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	473	601	599	480	221	0	0	0	**198**
Seepage	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2996	2996	2950	2950	3473	3601	3599	3480	3221	2950	2996	2996	**3,184**
Net Water Surplus (Deficit) (m^3/hr)	**194**	**58**	**25**	**(38)**	**(216)**	**112**	**(43)**	**(111)**	**26**	**269**	**207**	**232**	**Net 60**
Net Water Surplus (Deficit) (m^3)	**141834**	**42341**	**18088**	**(27455)**	**(157728)**	**81750**	**(31673)**	**(80978)**	**18826**	**196474**	**151381**	**169479**	**522,338**
Pond Size (m^3)	**8739101**	**8781442**	**8799529**	**8772074**	**8614346**	**8696096**	**8664423**	**8583446**	**8602271**	**8798746**	**8950127**	**9119605**	

Year 16

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	11	9	8	7	22	43	35	25	17	13	12	12	**18**
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	354	243	187	146	236	326	305	295	305	347	354	371	**289**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2819	2700	2637	2588	2756	2956	2894	2831	2802	2823	2823	2843	**2,789**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	221	221	221	221	221	221	221	221	221	221	221	221	**221**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	401	381	362	346	534	803	703	574	477	428	411	417	**486**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	488	621	618	495	228	0	0	0	**204**
Seepage	42	42	42	42	42	42	42	42	42	42	42	42	**42**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2998	2998	2952	2952	3490	3623	3620	3498	3230	2952	2998	2998	**3,192**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**223**	**82**	**47**	**(18)**	**(201)**	**137**	**(23)**	**(92)**	**49**	**299**	**236**	**262**	**83**
Net Water Surplus (Deficit) (m^3)	**162813**	**60210**	**34173**	**(12775)**	**(146537)**	**99837**	**(16925)**	**(67453)**	**35786**	**218060**	**172638**	**191296**	**731,121**
Pond Size (m^3)	**9282418**	**9342628**	**9376801**	**9364025**	**9217488**	**9317325**	**9300400**	**9232947**	**9268733**	**9486792**	**9659430**	**9850726**	

Year 17

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	8	7	6	5	16	32	26	19	13	10	9	9	**13**
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	365	250	193	150	243	336	315	304	315	358	365	383	**298**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2827	2705	2640	2591	2758	2956	2895	2834	2807	2831	2831	2851	**2,794**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	236	236	236	236	236	236	236	236	236	236	236	236	**236**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	416	395	377	360	548	817	717	588	492	442	425	431	**501**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	503	640	637	511	235	0	0	0	**210**
Seepage	44	44	44	44	44	44	44	44	44	44	44	44	**44**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	3000	3000	2954	2954	3507	3644	3641	3515	3239	2954	3000	3000	**3,201**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**243**	**100**	**63**	**(2)**	**(202)**	**129**	**(29)**	**(92)**	**59**	**318**	**257**	**283**	**94**
Net Water Surplus (Deficit) (m^3)	**177743**	**72948**	**45929**	**(1721)**	**(147176)**	**94322**	**(21390)**	**(67516)**	**43384**	**232453**	**187430**	**206393**	**822,799**
Pond Size (m^3)	**10028469**	**10101418**	**10147347**	**10145626**	**9998450**	**10092772**	**10071382**	**10003866**	**10047250**	**10279703**	**10467132**	**10673525**	

Year 18

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	6	5	4	3	11	22	18	12	9	7	6	6	**9**
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	376	258	199	155	250	346	324	313	324	368	376	394	**307**
Cleaner Tailings Water (direct discharge)	370	370	370	370	370	370	370	370	370	370	370	370	**370**
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2836	2710	2644	2594	2759	2955	2896	2837	2812	2838	2839	2860	**2,798**
Plant Area													
Runoff from undiverted catchment	82	70	59	49	161	321	261	185	127	98	88	91	**133**
Leakage from Diversion Ditches	13	11	10	8	26	52	43	30	21	16	14	15	**22**
Precipitation Over Open Pit	43	36	30	26	83	166	135	96	66	51	46	47	**69**
Open Pit Groundwater Dewatering	250	250	250	250	250	250	250	250	250	250	250	250	**250**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	430	409	391	375	563	832	731	603	506	456	440	446	**515**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	518	659	656	526	242	0	0	0	**217**
Seepage	46	46	46	46	46	46	46	46	46	46	46	46	**46**
Whole Tailing voids	440	440	66	66	66	66	66	66	66	66	440	440	**191**
Cyclone Overflow Voids	0	0	284	284	284	284	284	284	284	284	0	0	**189**
Cycloned Sand Voids	0	0	45	45	45	45	45	45	45	45	0	0	**30**
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	3002	3002	2956	2956	3524	3665	3662	3532	3248	2956	3002	3002	**3,209 Net**
Net Water Surplus (Deficit) (m^3/hr)	**264**	**117**	**79**	**13**	**(202)**	**122**	**(35)**	**(93)**	**70**	**338**	**277**	**303**	**104**
Net Water Surplus (Deficit) (m^3)	**192674**	**85686**	**57686**	**9333**	**(147815)**	**88808**	**(25855)**	**(67580)**	**50982**	**246847**	**202222**	**221490**	**914,478**
Pond Size (m^3)	**10866199**	**10951886**	**11009572**	**11018905**	**10871090**	**10959898**	**10934043**	**10866463**	**10917445**	**11164291**	**11366513**	**11588003**	

Year 19

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	No	No	No	No	No	No	No	No	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	3	2	2	2	5	11	9	6	4	3	3	3	**4**
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	386	265	205	159	258	356	333	322	333	379	386	405	**316**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2473	2345	2278	2227	2391	2584	2526	2469	2447	2475	2477	2498	**2,432**
Plant Area													
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	250	250	250	250	250	250	250	250	250	250	250	250	**250**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	292	292	292	292	292	292	292	292	292	292	292	292	**292**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	533	678	675	541	249	0	0	0	**223**
Seepage	48	48	48	48	48	48	48	48	48	48	48	48	**48**
Rougher (Whole) Tailing voids	401	401	401	401	401	401	401	401	401	401	401	401	**401**
Cyclone Overflow Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	2965	2965	2965	2965	3548	3693	3690	3556	3264	2965	2965	2965	**3,209**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(200)**	**(328)**	**(395)**	**(446)**	**(865)**	**(817)**	**(872)**	**(795)**	**(525)**	**(198)**	**(196)**	**(175)**	**(485)**
Net Water Surplus (Deficit) (m^3)	**(145780)**	**(239657)**	**(288613)**	**(325924)**	**(631746)**	**(596523)**	**(636867)**	**(580294)**	**(383519)**	**(144613)**	**(143337)**	**(128015)**	**- 4,244,888**
Pond Size (m^3)	**11442223**	**11202566**	**10913953**	**10588029**	**9956283**	**9359760**	**8722893**	**8142599**	**7759080**	**7614467**	**7471130**	**7343115**	

Year 20

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	14.1	13.4	9.4	3.8	-2.9	-8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	9%	9%	9%	10%	10%	11%	**100%**
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	48.4	46.8	48.4	55.0	56.1	58.9	**550**
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	16%	12%	8%	6%	6%	6%	**100%**
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	25%	20%	9%	0%	0%	0%	**100%**
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	98.0	78.6	36.2	0	0	0	**389**
Cyclone Sand Operating?	No	No	No	No	No	No	No	No	No	No	No	No	
INFLOWS (m^3/hr)													
TSF Area													**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	-
Leakage from Diversion Ditches	46	39	33	27	90	179	145	103	71	54	49	51	**74**
Precipitation on TSF Impoundment	397	273	210	164	265	366	343	331	343	390	397	417	**325**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4	4	4	4	4	4	4
Subtotal	2482	2350	2282	2229	2393	2583	2527	2472	2452	2482	2485	2506	**2,437**
Plant Area													
Runoff from undiverted catchment	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0	0	0	0	0	0	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	250	250	250	250	250	250	250	250	250	250	250	250	**250**
Fresh Water Make-up	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	39	39	39	39	39	39	**39**
Subtotal	292	292	292	292	292	292	292	292	292	292	292	292	**292**
OUTFLOWS (m^3/hr)													
TSF Area Pond Evaporation	0	0	0	0	548	697	694	557	256	0	0	0	**229**
Seepage	50	50	50	50	50	50	50	50	50	50	50	50	**50**
Whole Tailing voids	440	440	440	440	440	440	440	440	440	440	440	440	**440**
Cyclone Overflow Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	50	50	50	0	0	0	**21**
Concentrate Load Out	1	1	1	1	1	1	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	3006	3006	3006	3006	3604	3753	3751	3613	3312	3006	3006	3006	**3,256**
													Net
Net Water Surplus (Deficit) (m^3/hr)	**(233)**	**(364)**	**(433)**	**(485)**	**(920)**	**(878)**	**(932)**	**(848)**	**(568)**	**(232)**	**(229)**	**(208)**	**(527)**
Net Water Surplus (Deficit) (m^3)	**(169796)**	**(265866)**	**(315803)**	**(353817)**	**(671331)**	**(640985)**	**(680279)**	**(619305)**	**(414868)**	**(169167)**	**(167492)**	**(151865)**	**- 4,620,572**
Pond Size (m^3)	**7173319**	**6907453**	**6591650**	**6237833**	**5566502**	**4925517**	**4245239**	**3625934**	**3211066**	**3041900**	**2874408**	**2722543**	

Year 21

Upper Bound Condition - Managed

Month	Jan.	Feb	March	April	May	June	Annual
Mean Monthly Temperature	-12.3	-7.1	-3	2.5	7.7	11.8	
Monthly percent of annual precip.	10%	7%	5%	4%	7%	9%	
Average Monthly Precipitation (mm)	56.1	38.5	29.7	23.1	37.4	51.7	
Average monthly runoff (% of annual)	5%	4%	4%	3%	10%	20%	
Monthly percent of annual evap.	0%	0%	0%	0%	20%	25%	
Monthly Pond Evaporation (mm)	0	0	0	0	77.4	98.4	
Cyclone Sand Operating?	No	No	No	No	No	No	
INFLOWS (m^3/hr)							
TSF Area							**Averages**
Runoff from undiverted catchment	0	0	0	0	0	0	-
Leakage from Diversion Ditches	46	39	33	27	90	179	**69**
Precipitation on TSF Impoundment	397	273	210	164	265	366	**279**
Cleaner Tailings Water (direct discharge)	0	0	0	0	0	0	-
Rougher Tailings Water (direct discharge)	2034	2034	2034	2034	2034	2034	**2,034**
Seepage reclaim	4	4	4	4	4	4	4
Subtotal	2482	2350	2282	2229	2393	2583	**2,386**
Plant Area							
Runoff from undiverted catchment	0	0	0	0	0	0	**0**
Leakage from Diversion Ditches	0	0	0	0	0	0	**0**
Precipitation Over Open Pit	0	0	0	0	0	0	**0**
Open Pit Groundwater Dewatering	250	250	250	250	250	250	**250**
Fresh Water Make-up	3	3	3	3	3	3	**3**
Ore Void Water (3% MC)	39	39	39	39	39	39	**39**
Subtotal	292	292	292	292	292	292	**292**
OUTFLOWS (m^3/hr)							
TSF Area Pond Evaporation	0	0	0	0	548	697	**208**
Seepage	50	50	50	50	50	50	**50**
Whole Tailing voids	440	440	440	440	440	440	**440**
Cyclone Overflow Voids	0	0	0	0	0	0	-
Cycloned Sand Voids	0	0	0	0	0	0	-
Plant Area Dust Suppression	0	0	0	0	50	50	**17**
Concentrate Load Out	1	1	1	1	1	1	**1**
Freshwater to Potable Water	3	3	3	3	3	3	**3**
Mitigation	110	110	110	110	110	110	**110**
Reclaim Water	2402	2402	2402	2402	2402	2402	**2,402**
Subtotal	3006	3006	3006	3006	3604	3753	**3,230**
							Net
Net Water Surplus (Deficit) (m^3/hr)	**(233)**	**(364)**	**(433)**	**(485)**	**(920)**	**(878)**	**(552)**
Net Water Surplus (Deficit) (m^3)	**(169796)**	**(265866)**	**(315803)**	**(353817)**	**(671331)**	**(640985)**	**- 2,417,598**
Pond Size (m^3)	**2552747**	**2286881**	**1971078**	**1617262**	**945930**	**304946**	

APPENDIX IV

Updated Effects Assessment Tables

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
Climate Effects Assessment	Direct GHG emissions from fossil fuel burning in internal combustion engines; indirect GHG emissions from electrical use (short term)	Mine site and tailings impoundment; utilities, new and existing haul roads, access road, waste rock pile	Construction	Adverse	Negligible	Hydro-electrical use and fuel and energy conservation	Yes	GHG will be released	Negligible	Trans- boundary	Short-term	Continuous	Reversible Short-term	High resilience	Negligible Adverse	Not Significant	High	Intermediate
	Total (direct and indirect) GHG emissions of 30 kt C02e per year, 3.06 kt C02e per Mt ore produced, and 0.026 kt C02e per consumed terajoule energy	Mine site and tailings impoundment; utilities, new and existing haul roads, access road, waste rock pile	Operations and Maintenance	Adverse	Medium	Electrical use and fuel and energy conservation	Yes	GHG will be released	Medium	Trans- boundary	Medium-term	Continuous	Reversible Short-term	High resilience	Minor Adverse	Not Significant	High	Intermediate
	Direct GHG emissions from fossil fuel burning in internal combustion engines; indirect GHG emissions from electrical use	Mine site and tailings impoundment; utilities, new and existing haul roads, access road~~, waste rock pile~~	Closure	Adverse	Negligible	Fuel and energy conservation	Yes	GHG will be released	Negligible	Trans- boundary	Medium-term	Sporadic	Reversible Short-term	High resilience	Negligible Adverse	Not Significant	High	Intermediate
Surface Water Quality Effects Assessment	Surface runoff and siltation contaminant loading.	Mine Site	Construction and Operations	Adverse	Moderate	Silt fences, best management practices; environmental monitoring; erosion management plan	Yes	Increase in total suspended solids and potential contaminants resulting in degraded water quality, more prominent during freshet and rain events.	Medium	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Medium	High
		Access Road/Transmission Line	Construction and Operations	Adverse	Moderate	Silt fences, best management practices, environmental monitoring; erosion management plan	Yes	Increase in total suspended solids and potential contaminants resulting in degraded water quality, more prominent during freshet and rain events.	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Mine Site/AccessRoad/Transmission Line	Closure and Post-closure	Adverse	Negligible	Silt fences, best management practices; environmental monitoring; erosion management plan	Yes	Increase in total suspended solids and potential contaminants resulting in degraded water quality, more prominent during freshet and rain events.	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Airborne contaminant loading from blasting, rock crushing, etc.	Mine Site	Construction and Operations	Adverse	Minor	Best management practices, dust suppression, environmental monitoring	Yes	Increase in total suspended solids and potential contaminants resulting in degraded water quality	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Mine Site	Closure and Post-closure	Adverse	Negligible	Best management practices, dust suppression, environmental monitoring	Yes	Increase in total suspended solids and potential contaminants resulting in degraded water quality	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Access Road/Transmission Line	Construction and Operations, Closure and Post-closure	Adverse	Negligible	Best management practices, dust suppression, environmental monitoring	Yes	Increase in total suspended solids and potential contaminants resulting in degraded water quality	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Leaching of nitrogen residues from blasting	Mine Site	Construction and Operations, Closure and Post-closure	Adverse	Minor	Proper storage and handling of blasting materials away from waterways, regular maintenance of facility, environmental monitoring	Yes	Increase in nitrogen loadings (blasting residues) resulting in degraded water quality	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Loom	High
		Access Road/Transmission Line	Construction and Operations, Closure and Post-closure	Adverse	Negligible	Proper storage and handling of blasting materials away from waterways, regular mainteniance of facility, environmental monitoring	Yes	Increase in nitrogen loadings (blasting residues) resulting in degraded water quality	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Metal leaching and Acid Rock Drainage (ML/ARD) contamination	Mine Site	Construction and Operations, Closure and Post-closure	Adverse	Major	ML/ARD assessment of rock and substrates, appropriate use/storage of excavated materials, avoiding acid-generating sources, environmental monitoring.	Yes	ML/ARD resulting in degraded water quality	Medium	Local	Long-term	Sporadic	Reversible Long-term	Neutral	Minor	Not Significant	Medium	Low
		Access Road/Transmission Line	Construction and Operations, Closure and Post-closure	Adverse	Negligible	ML/ARD assessment of rock and substrates, appropriate use/storage of excavated materials, avoiding acid-generating sources, environmental monitoring.	Yes	ML/ARD resulting in degraded water quality	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Discharges and spills and associated water chemistry effects	Mine Site	Construction and Operations	Adverse	Moderate	Best management practices, environmental monitoring, spill contingency plan, water treatment	Yes	Release of potential contaminants resulting in degraded water quality	Medium	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	High	Low
		Mine Site	Closure and Post-Closure	Adverse	Major	Best management practices, environmental monitoring, spill contingency plan, water treatment if needed	Yes	Release of potential contaminants resulting in degraded water quality	Medium	Local	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	High	Low
		Access Road/Transmission Line	Construction and Operations, Closure and Post-closure	Adverse	Negligible	Best management practices, environmental monitoring, spill contingency plan	Yes	Release of potential contaminants resulting in degraded water quality	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
Surface Water Quantity Effects Assessment	MCS-4a	Clean water diversion~~, waste rock dump~~	Construction, Operations, Closure/Decommissioning, Post-Closure	Adverse	Major	N/A	Yes	36% reduction in watershed area and pit dewatering will result in decreased flow rates	High	Local	Far Future	Continuous	Irreversible	High	Major	Not Significant	High	Intermediate
	MCS-6	Clean water diversion~~, waste rock dump~~	Construction, Operations, Closure/Decommissioning, Post-Closure	Adverse	Moderate	N/A	Yes	2% reduction in watershed area and pit dewatering will result in decreased flow rates	Medium	Local	Far Future	Continuous	Irreversible	High	Moderate	Not Significant	High	Intermediate
	MCS-7	Clean water diversion; TSF	Construction, Operations, Closure/Decommissioning, Post-Closure	Adverse	~~Major~~ Moderate	~~N/A~~ 50% riparian baseflow maintained. Fish habitat compensation	Yes	~~78% reduction in watershed area will result in decreased flow rates. Increased groundwater recharge will augment flow during low flow periods.~~ Decrease flows by 50% loss of aquatic habitat (HADD)	~~High~~ Low	Local	~~Far Future.~~ Medium-term	Continuous	Reversible ~~Long-term.~~ Short-term	High	~~Major~~ Minor	Not Significant	High	~~Intermediate.~~ High
	MCS-8	Clean water diversion; TSF	Operations	Beneficial	Minor	N/A	No	Increased watershed area caused by clean water diversions										
	MCS-10a	Clean water diversion; TSF	Construction, Operations	Adverse	~~Moderate~~ Minor	~~N/A.~~ Fish habitat compensation	Yes	~~22% reduction in watershed through production as size of TSF increases.~~ Decrease flows by 17%. Loss of aquatic habitat (HADD)	Low	Local	~~Far Future.~~ Medium-term	Continuous	Reversible Long-term Short-term	High	~~Minor~~ Negligible	Not Significant	High	~~Intermediate.~~ High
	Morrison Lake	All Project components	Construction	Beneficial	Negligible	N/A	No	Increased flow caused by dewatering of Booker Lake and Ore Pond										
	Morrison Lake	All Project components	Operations	Adverse	Negligible	N/A	No	Up to 10% decrease in flow caused by loss of watershed area and pit dewatering.										
	Morrison Lake	All Project components	Post-Closure	Neutral	Negligible	N/A	No	Slight decrease in flow during fallwinter, slight increase in flow during spring/summer										
Groundwater Quality Effects Assessment	Seepage to groundwater from the TSF	TSF	Operation	Adverse	Moderate	Monitoring of groundwater around TSF area. Seepage mitigation in TSF. Seepage collection. Site Specific Water Quality Objectives	Yes	Increased ~~levels of chloride, ammonia, nitrate, nitrite, molybdenum, and potassium to groundwater.~~ concentrations of metals and sulphate	Medium	Local	Long-term	Continuous	~~Irreversible~~ Reversible (long-term)	Neutral	Moderate	Not Significant	~~High.~~ Medium	Intermediate
			Closure	Adverse	Moderate	Monitoring of groundwater around TSF area. Seepage mitigation in TSF. Seepage collection. Site Specific Water Quality Objectives	Yes	Increased ~~levels of chloride, ammonia, nitrate, nitrite, molybdenum, and potassium to groundwater.~~ concentrations of metals and sulphate	Medium	Local	~~Short term.~~ Long-term	Continuous	~~Irreversible~~ Reversible (long-term)	Neutral	Moderate	Not Significant	~~High.~~ Medium	Intermediate
			Post-Closure	Adverse	Moderate	Monitoring of groundwater around TSF area	Yes	Increased ~~levels of chloride, ammonia, nitrate, nitrite, molybdenum, and potassium to groundwater.~~ concentrations of metals and sulphate	Medium	Local	Far Future	Continuous	Irreversible	Neutral	Moderate	Not Significant	High	Intermediate
	Seepage to groundwater from Waste Rock Dump and Low Grade Ore Stock Pile	Waste Rock Dump, Open Pit, Low Grade Ore, Stockpile	Operation	Adverse	Moderate	Most seepage drains to the open pit. This water is pumped to the TSF during operation. Methods will be investigated for preventing seepage from the low grade are stockpile from entering the groundwater system, as this seepage could bypass the pit and move toward Morrison Lake.	Yes	Residual seepage from low grade ore stockpile enters groundwater during operation (source is removed at closure).	Low	Local	Long-term	Continuous	Reversible Long-term	Neutral	Minor	Not Significant	Medium	Intermediate
		~~Post-Closure~~	~~Neutral~~	~~Minor~~	~~All seepage from the waste rock dump will drain to the open pit. Excess water will be treated, then released to Morrison Lake.~~	~~No~~												

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	Spills of solvents, oils and fuels	All	Construction	Adverse Short-term	Minor	Management plans for materials handling and spill response, standard operating procedures; staff training	Yes	Introduction of contaminants to groundwater	Low	Local	Short-term	Sporadic	Reversible	Neutral	Negligible	Not Significant	High	Intermediate
			Operation	Adverse	Minor	Management plans for materials handling and spill response, standard operating procedures; staff training	Yes	Introduction of contaminants to groundwater	Low	Local	Short-term	Sporadic	Reversible Short-term	Neutral	Negligible	Not Significant	High	Intermediate
			Closure	Adverse	Minor	Management plans for materials handling and spill response, standard operating procedures; staff training	Yes	Introduction of contaminants to groundwater	Low	Local	Short-term	Sporadic	Reversible Short-term	Neutral	Negligible	Not Significant	High	Intermediate
Groundwater Quantity Effects Assessment	Decrease in groundwater table adjacent to the open pit.	Open Pit dewatering	Operation	Adverse	Major	Optimize pit dewatering rates via pre-operation hydrogeological field studies and operations monitoring and adaptive management.	Yes	At year 19, the groundwater table drawdown extends a maximum of 2 km from the pit and at the pit to maximum depth of 372 mbgs	Medium	Local	Medium-term	Continuous	Reversible	High	Major	Not Significant	High	Intermediate
	Increase in groundwater table in and adjacent to the open pit to near pre-mining baseline.	Open Pit refilling	Closure Decommissioning	Beneficial	Major	Groundwater table returns back to near baseline after pumping stops. None required.	No	Groundwater table returns to elevation slightly lower than baseline groundwater table.	Medium	Local	Short-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
			Post-Closure	Beneficial	Major	Groundwater table returns back to near baseline after pit dewatering pumping stops. Maintain pit lake level once pit refills.	Yes	Groundwater table returns to elevation slightly lower than baseline groundwater table.	Medium	Local	Far Future	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
	Increase in groundwater table and flows beneath and surrounding the TSF.	TSF seepage into groundwater	Operation	Neutral	Minor	Maintain water cover in TSF.	Yes	Groundwater table rises above baseline permanently.	Low	Local	Medium-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
			Closure Decommissioning	Neutral	Minor	Maintain water cover in TSF.	Yes	Groundwater table rises above baseline permanently.	Low	Local	Short-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
			Post-Closure	Neutral	Minor	Maintain water cover in TSF.	Yes	Groundwater table rises above baseline permanently.	Low	Local	Far Future	Continuous	Irreversible	High	Moderate	Not Significant	High	Intermediate
	Minor local changes in groundwater table caused by surface water management (collection & diversion)	Diversion/collection ditches	Construction	Neutral	Minor	None required.	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Short-term	Continuous	Reversible	High	Negligible	Not Significant	Medium	Intermediate
			Operation	Neutral	Minor	None required.	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Medium-term	Continuous	Reversible	High	Negligible	Not Significant	Medium	Intermediate
			Closure Decommissioning	Neutral	Minor	Decommission collection/diversion ditches if no longer required.	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
			Post-Closure	Neutral	Minor	Decommission collection/diversion ditches if no longer required.	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Far Future	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
Effects on Groundwater Flow Patterns	Increase and change of direction of groundwater flows towards the open pit.	Open Pit dewatering	Operation	Adverse	Moderate	Optimize pit dewatering rates via pre-operation hydrogeological field studies and operations monitoring and adaptive management.	Yes	At year 19, the pit dewatering cone of depression extents to a maximum distance of 2 km from the ultimate pit rim.	Medium	Local	Medium-term	Continuous	Reversible	High	Major	Not Significant	High	Intermediate
	Increase and change of direction of groundwater flows towards the open pit.	Open Pit refilling	Closure Decommissioning	Beneficial	Moderate	Groundwater table returns back to near baseline after pit dewatering pumping stops. None required.	No	Groundwater table returns to elevation slightly lower than baseline groundwater table.	Medium	Local	Short-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
			Post-Closure	Beneficial	Minor	Groundwater table returns back to near baseline after pit dewatering pumping stops. Maintain pit lake level once pit refills.	Yes	Groundwater table returns to elevation slightly lower than baseline groundwater table.	Medium	Local	Far Future	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
	Change in groundwater flow patterns beneath and surrounding the TSF.	TSF seepage to groundwater	Operation	Neutral	Minor	None required.	Yes	Groundwater table rises above baseline permanently.	Low	Local	Medium-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
Groundwater Quantity Effects Assessment			Closure Decommissioning	Neutral	Minor	None required.	Yes	Groundwater table rises above baseline permanently.	Low	Local	Short-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
			Post-Closure	Neutral	Minor	None required.	Yes	Groundwater table rises above baseline permanently.	Low	Local	Far Future	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
	Minor local changes in groundwater table caused by surface water management (collection and diversion).	Diversion/collection ditches	Construction	Adverse	Minor	None required.	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
			Operation	Adverse	Minor	None required.	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Medium-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
			Closure Decommissioning	Adverse	Minor	Decommission collection / diversion ditches if no longer required	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
			Post-Closure	Neutral	Minor	Decommission collection / diversion ditches if no longer required	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Far Future	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
Effects on Groundwater Aquifer Storage	Net decrease in aquifer storage surrounding the open pit.	Open Pit dewatering	Operation	Adverse	Major	Optimize pit dewatering rates via pre-operation hydrogeological field studies and operations monitoring and adaptive management	Yes	At year 19, the maximum pit dewatering rate is 291 m3/hr. The groundwater contribution is 91% or 264 m3/hr.	Medium	Local	Medium-term	Continuous	Reversible Short-term	High	Major	Not Significant	High	Intermediate
Groundwater Quantity Effects Assessment	Net decrease in aquifer storage surrounding the open pit.	Open Pit refilling	Closure Decommissioning	Beneficial	Major	Groundwater table returns back to near baseline after pumping stops. None required.	No		Medium	Local	Short-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
			Post-Closure	Beneficial	Major	Groundwater table returns back to near baseline after pit dewatering pumping stops. Maintain pit lake level once pit refills.	Yes		Medium	Local	Medium-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
	Net increase in groundwater aquifer storage beneath and surrounding the TSF.	TSF seepage to groundwater	Operation	Neutral	Minor	Maintain water cover in TSF.	Yes	Groundwater table rises above baseline permanently.	Low	Local	Medium-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
			Closure Decommissioning	Neutral	Minor	Maintain water cover in TSF.	Yes	Groundwater table rises above baseline permanently.	Low	Local	Short-term	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
			Post-Closure	Neutral	Minor	Maintain water cover in TSF.	Yes	Groundwater table rises above baseline permanently.	Low	Local	Far Future	Continuous	Irreversible	High	Negligible	Not Significant	High	Intermediate
	Minor local changes in groundwater aquifer storage caused by surface water management (collection and diversion).	Diversion/collection ditches	Construction	Adverse	Minor	None required.	Yes		Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
			Operation	Adverse	Minor	None required.	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Medium-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
			Closure Decommissioning	Adverse	Minor	Decommission collection / diversion ditches if no longer required	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
			Post-Closure	Neutral	Minor	Decommission collection/ diversion ditches if no longer required.	Yes	Localized minor groundwater table changes near surface water collection / diversion ditches.	Low	Local	Far Future	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
Quality Effects Assessment	Surface runoff and siltation contaminant loading.	Mine site	Construction and Operations	Adverse	Minor	Silt fences, best management practices; environmental monitoring; erosion management plan	Yes	Introduced materials/chemicals changing the substrate and resulting in degraded sediment quality	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Mine site	Closure and Post-Closure	Adverse	Negligible	Silt fences, best management practices; environmental monitoring; erosion management plan	Yes	~~Introduced materials/chemicals changing the substrate and resulting in degraded sediment quality.~~ Submersion of waste rock in the open pit.	~~Negligible~~ Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Silt fences, best management practices; environmental monitoring; erosion management plan	Yes	Introduced materials/chemicals changing the substrate and resulting in degraded sediment quality	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High

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	Metal leaching and Acid Rock Drainage (ML/ARD) contamination	Mine site	Construction, Operations, Closure and Post-Closure	Adverse	Low	~~ML/ARD assessment of rock and substrates, appropriate use/storage of excavated materials, avoiding acid-generating sources, environmental monitoring.~~Excavated materials to be placed back into open pit	Yes	~~ML/ARD resulting in degraded sediment quality.~~Waste rock dump eliminated, placed back into open pit	~~Low~~ Negligible	Local	~~Medium-term~~ Short-term	Sporadic	Reversible Long-term	Neutral	~~Minor~~ Negligible	Not Significant	Low	~~Intermediate.~~ High
		Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	ML/ARD assessment of rock and substrates, appropriate use/storage of excavated materials, avoiding acid-generating sources, environmental monitoring.	Yes	ML/ARD resulting in degraded sediment quality	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Discharges and spills and associated water chemistry effects	Mine site	Construction, Operations, Closure and Post-Closure	Adverse	Moderate	Best management practices, environmental monitoring, spill contingency plan	Yes	Increase in nutrients and potential toxins resulting in degraded sediment quality	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	Intermediate
		Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Best management practices, environmental monitoring, spill contingency plan	Yes	Increase in nutrients and potential toxins resulting in degraded sediment quality	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
Aquatic Resources Effects Assessment	Surface runoff and siltation and contaminant loading.	Mine Site	Construction and Operations	Adverse	Moderate	Silfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mrotality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Low	High
		Mine Site	Closure and Post-Closure	Adverse	Negligible	Silfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mortality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival. Waste rock dump eliminated, placed back into open pit.	~~Negligible~~ Low	Local	Short-term	Sporadic	Reversible Short-term	High	~~Minor~~ Negligible	Not Significant	Low	High
		Access Road	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Silfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mrotality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Silfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mrotality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Airborne contaminant loading from blasting rock crushing, incinerating garbage	Mine Site/Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Best management practices, dust suppression, environmental monitoring	Yes	Increase in suspended particles causing some mortality, sublethal effects through repiratory inhibition, reduced photosynthesis caused by shading/increased turbidity	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Leaching of nitrogen residues from blasting	Mine Site	Construction, Operations, Closure and Post-Closure	Adverse	Minor	Proper storage and handling of blasting materials away from waterways, regular maintenance of facility, environmental monitoring	Yes	Increase in nitrogen loadings (blasting residues) increasing algal production, community shift altering ecosystem structure and function	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Proper storage and handling of blasting materials away from waterways, regular maintenance of facility, environmental monitoring	Yes	Increase in nitrogen loadings (blasting residues) increasing algal production, community shift altering ecosystem structure and function	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Metal leaching and Acid Rock Drainage (ML/ARD) contamination	Mine Site	Construction, Operations, Closure and Post-Closure	Adverse	Major	~~ML/ARD assessment of rock and substrates, appropriate use/storage of excavated materials, avoiding acid-generating sources, environmental monitoring.~~ Excavated materials to be placed back into open pit	Yes	ML/ARD resulting in mortality and sublethal toxic effects to biota. Waste rock dump eliminated, placed back into open pit	Low	Local	Long-term	Sporadic	Reversible Long-term	Neutral	~~Minor~~ Negligible	Not Significant	~~Medium~~ Low	Low
		Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	ML/ARD assessment of rock and substrates, appropriate use/storage of excavated materials, avoiding acid-generating sources, environmental monitoring.	Yes	ML/ARD resulting in mortality and sublethal toxic effects to biota	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Discharges and spills and associated water chemistry effects	Mine Site	Construction, Operations	Adverse	Moderate	Best management practices, environmental monitoring, spill contingency plan	Yes	Release of potential toxins resulting in mortality and sublethal toxic effects to biota	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	High	Low
	Discharges and spills and associated water chemistry effects	Mine Site	Closure and Post-closure	Adverse	Major	Best management practices, environmental monitoring, spill contingency plan	Yes	Release of potential toxins resulting in mortality and sublethal toxic effects to biota	Medium	Local	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	High	Low
		Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Best management practices, environmental monitoring, spill contingency plan	Yes	Release of potential toxins resulting in mortality and sublethal toxic effects to biota	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Habitat loss as a result of draining or burial with tailings	Mine Site	Construction, Operations, Closure and Post-Closure	Adverse	Major	None	Yes	Lake/pond in pit area will be drained and ponds/wetlands in the tailings facility footprint will be covered by tailings	High	Local	~~Far Future~~ Long-term	One Time	~~Irreversible~~ Reversible Long-term	Low	~~Major~~ Moderate	Not Significant	High	High
	Surface runoff and siltation and contaminant loading.	Mine Site	Construction and Operations	Adverse	Moderate	Silfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mrotality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Low	High
		Mine Site	Closure and Post-Closure	Adverse	Negligible	Silfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mrotality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival. Submersion of waste rock in the open pit	~~Negligible~~ Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Access Road	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Silfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mrotality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Surface runoff and siltation and contaminant loading.	Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Silfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mrotality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Airborne contaminant loading from blasting, rock crushing, incinerating garbage	Mine Site/Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Best management practices, environmental monitoring, spill contingency plan	Yes	Increase in suspended particles causing some mortality, sublethal effects through repiratory inhibition, reduced photosynthesis caused by shading/increased turbidity	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Leaching of nitrogen residues from blasting	Mine Site	Construction, Operations, Closure and Post-Closure	Adverse	Minor	Proper storage and handling of blasting materials away from waterways, regular maintenance of facility, environmental monitoring	Yes	Increase in nitrogen loadings (blasting residues) increasing algal production, community shift altering ecosystem structure and function	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	Proper storage and handling of blasting materials away from waterways, regular maintenance of facility, environmental monitoring	Yes	Increase in nitrogen loadings (blasting residues) increasing algal production, community shift altering ecosystem structure and function	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High

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	Metal leaching and Acid Rock Drainage (ML/ARD) contamination	Mine Site	Construction, Operations, Closure and Post-Closure	Adverse	Major	~~ML/ARD assessment of rock and substrates, appropriate use/storage of excavated materials, avoiding acid-generating sources, environmental monitoring~~. Excavated materials to be placed back into open pit	Yes	ML/ARD resulting in mortality and sublethal toxic effects to biota. Waste rock dump eliminated, placed back into open pit	Low	Local	Long-term	Sporadic	Reversible Long-term	Neutral	~~Minor~~ Negligible	Not Significant	~~Medium~~ Low	Low
		Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Negligible	ML/ARD assessment of rock and substrates, appropriate use/storage of excavated materials, avoiding acid-generating sources, environmental monitoring.	Yes	ML/ARD resulting in mortality and sublethal toxic effects to biota	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Discharges and spills and associated water chemistry effects	Mine Site	Construction, Operations	Adverse	Moderate	Best management practices, environmental monitoring, spill contingency plan	Yes	Release of potential toxins resulting in mortality and sublethal toxic effects to biota	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	High	Low
		Mine Site	Closure and Post-Closure	Adverse	Major	Best management practices, environmental monitoring, spill contingency plan	Yes	Release of potential toxins resulting in mortality and sublethal toxic effects to biota	Medium	Local	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	High	Low
		Access Road/Transmission Line	Construction, Operations, Closure and Post-Closure	Adverse	Major	Best management practices, environmental monitoring, spill contingency plan	Yes	Release of potential	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Habitat loss as a result of draining or burial with tailings	Mine Site	Construction, Operations, Closure and Post-Closure	Adverse	Major	~~None.~~ Reclamation of TSF and areas of the open pit	Yes	~~Lake/pond in pit area will be drained and ponds/wetlands in the tailings facility footprint will be covering by tailings.~~ Reclamation of 305 ha of habitat in the TSF, including approximately 1.7 km2 of ponded area, with 67.5 ha of wetland; and, 68 ha of wetland in the open pit	~~High~~ Medium	Local	~~Far Future~~ Medium Term	One Time	~~Irreversible~~ Reversible Long-term	Low	~~Major~~ Moderate	Not Significant	~~High~~ Low	High
	Surface runoff and siltation and contaminant loading.	Mine Site	Construction and Operations	Adverse	Moderate	Siltfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mrotality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Low	High
		Mine Site	Closure and Post-closure	Adverse	Negligible	Siltfences; best management practices; environmental monitoring; erosion management plan	Yes	Pulses of total suspended solids causing some mrotality reduced growth through respiratory inhibition, reduced photosynthesis caused by shading/increased turbidity, reduced egg survival	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
Lake Trout Effects Assessment	Sedimentation from construction activities, blasting, drainage ditches, and stream redirection causing lethal smothering or sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Sediment and Erosion Control Plan, site isolation, settling pond and diversion	Yes	Turbid water may flow into Morrison Lake: Minor sedimentation of shoreline spawning areas possible	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Sedimentation from resurfacing and road upgrades including new stream crossings and ditches causing lethal smothering or sublethal effects	Access Road/Transmission Line	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Sediment and Erosion Control Plan and site isolation	Yes	Turbid water may flow into Babine Lake: Minor sedimentation of shoreline spawning areas possible	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Noise from Blasting and construction activities causing mortality or behavioural changes	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters; Sediment and Erosion Control Plan	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Particulates and residue from trucks, construction, equipment activity, and blasting increasing TSS and causing sublethal effects	Mine Site, Access Road	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters; Sediment and Erosion Control Plan	Yes	Elevated dust generation because mine site area and access road not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	High
	ML/ARD from exposed rock causing sublethal behavioural effects	Mine Site, Access Road	Construction, Operations, Closure and Decommissioning, Post-Closure	Adverse	Minor	Impremention of ML/ARD Predicting and Prevention Management Plan, and Environmental Effects Monitoring Program	Yes	ML/ARD resulting in behavioural changes and physiological stress	Low	Landscape / Watershed	Far Future	Sporadic	Reversible Long-term	High	Negligible	Not Significant	Medium	Low
	ML/ARD from exposed rock causing sublethal behavioural effects	Transmission Line	Construction, Operations, Closure and Decommissioning, Post-Closure	Adverse	Minor	Impremention of ML/ARD Predicting and Prevention Management Plan, and Environmental Effects Monitoring Program	Yes	ML/ARD resulting in behavioural changes and physiological stress	Negligible	Landscape / Watershed	Far Future	Sporadic	Reversible Long-term	High	Negligible	Not Significant	Medium	Low
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Mine Site, Access Road	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Spills from equipment causing mortality or sublethal effects	Transmission Line	Constructon	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Rupture of tailings dam or pipeline containing tailings, filter plant effluent, and sewage effluent causing lethal and sublethal effects	Mine Site	Operations, Closure and Decommissioning, Post-Closure	Adverse	Moderate	Dam and pipeline engineering, pressure sensors, implementation of Environmental Effects Monitoring Program	Yes	Increase in sediments and potential toxins leading to mortality, or physiological stress and stress and behavioural changes	Medium	Landscape / Watershed	Short-term	One Time	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Water loss in Morrison Lake from seepage into open pit, water intake, and loss of upper watersheds in tailings and waste rock areas causing winter mortality or sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Sealing pitwall according to best management practices and not exceeding water withdrawal specifications	Yes	Lower water levels in Morrison Lake, Morrison Creek, and Tahlo Creek reducing fish habitat and potentiating winter freezing	Medium	Landscape / Watershed	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	Intermediate
Dolly Varden Effects Assessment	Sedimentation from erosion of road resurfacing and upgrades including new stream crossings and ditches causing lethal smothering or sublethal effects	Access Road	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Sediment and Erosion Control Plan and site isolation	Yes	Turbid water will flow into streams and lakes with minor sedimentation possible	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Sedimentation from construction activities and erosion causing lethal smothering or sublethal effects	Transmission Line	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Sediment and Erosion Control Plan and site isolation	Yes	Turbid water will flow into streams and lakes with minor sedimentation possible	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Noise from blasting, construction activities, and tuck hauling causing mortality or behavioural changes	Access Road	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	Low
	Noise from Blasting and construction activities causing mortality or behavioural changes	Transmission Line	Construction	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	Low
	Particulates and residue from trucks, construction, equipment activity, and blasting increasing TSS and causing sublethal effects	Access Road	Construction	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters, Sediment and Erosion Control Plan	Yes	Elevated dust generation because access road not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	High
	Particulates and residue from trucks, construction, equipment activity, and blasting increasing TSS and causing sublethal effects	Access Road	Operations, Closure and Decommissioning	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters, Sediment and Erosion Control Plan	Yes	Elevated dust generation because access road not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	High
	ML/ARD from exposed rock causing sublethal behavioural effects	Access Road	Construction, Operations, Closure and Decommissioning, Post-Closure	Adverse	Minor	Implementation of ML/ARD Prediction and Prevention Management Plan, and Environmental Effects Monitoring Program	Yes	ML/ARD resulting in behavioural changes and physiological stress	Low	Landscape / Watershed	Far Future	Sporadic	Reversible Long-term	High	Negligible	Not Significant	Medium	Low
	ML/ARD from exposed rock causing sublethal behaviouiral effects	Transmission Line	Construction, Operations, Closure and Decommissioning, Post-Closure	Adverse	Minor	Implementation of ML/ARD Prediction and Prevention Management Plan, and Environmental Effects Monitoring Program	Yes	ML/ARD resulting in behavioural changes and physiological stress	Negligible	Landscape / Watershed	Far Future	Sporadic	Reversible	High	Negligible	Not Significant	Medium	Low
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Access Road	Construction, Operations	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Medium	High
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Access Road	Closure and Decommissioning	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Spills from equipment causing mortality or sublethal effects	Transmission Line	Construction	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	Sedimentation from construction activities, blasting, drainage ditches, and stream redirection causing lethal smothering or sublethal effects	Mine Site	Construction	Adverse	Moderate	Sediment and Erosion Control Plan, site isolation, settling pond and diversion	Yes	Turbid water may flow into streams and lakes with minor sedimentation possible	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Medium	High
Rainbow Trout Effects Assessment	Sedimentation from blasting, drainage ditches, and stream redirection causing lethal smothering or sublethal effects	Mine Site	Operations, Closure and Decommissioning	Adverse	Moderate	Sediment and Erosion Control Plan and site isolation, settlilng pond and diversion	Yes	Turbid water may flow into streams and lakes; Minor sedimentation of shoreline spawning areas possible	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Sedimentation from construction, erosion of road resurfacing, and upgrades including new stream crossings and ditches causing lethal smothering or sublethal effects	Access Road, Transmission Line	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Sediment and Erosion Control Plan and site isolation	Yes	Turbid water may flow into streams and lakes with minor sedimentation possible	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Noise from Blasting and construction activities causing mortality or behavioural changes	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Avoid blasting during spring Spawning, thermal atmospheric inversions, low cloud cover, or fog conditions; Blasting mats; Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Noise from blasting, construction activities, and truck hauling causing mortality or behavioural changes	Access Road	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Avoid blasting during spring Spawning, thermal atmospheric inversions, low cloud cover, or fog conditions; Blasting mats; Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	Low
	Noise from Blasting and construction activities causing mortality or behavioural changes	Transmission Line	Construction	Adverse	Minor	Avoid blasting during spring Spawning, thermal atmospheric inversions, low cloud cover, or fog conditions; Blasting mats; Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	Low
	Particulates and residue from trucks, construction, equipment activity, and blasting increasing TSS and causing sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Avoid blasting during spring Spawning, thermal atmospheric inversions, low cloud cover, or fog conditions; Blasting mats; Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Elevated dust generation because mine site area not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	High
		Access Road	Construction	Adverse	Minor	Avoid blasting during spring Spawning, thermal atmospheric inversions, low cloud cover, or fog conditions; Blasting mats; Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Elevated dust generation because mine site area not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	High
		Access Road	Operations, Closure and Decommissioning	Adverse	Minor	Avoid blasting during spring Spawning, thermal atmospheric inversions, low cloud cover, or fog conditions; Blasting mats; Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Elevated dust generation because mine site area not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	High
	ML/ARD from exposed rock causing sublethal behavioural effects	Mine Site, Access Road, Transmission Line	Construction, Operations, Closure and Decommissioning, Post-Closure	Adverse	Minor	Implementation of ML/ARD Prediction and Prevention Management Plan, and Environmental Effects Monitoring Program	Yes	ML/ARD resulting in behavioural changes and phsyiological stress	Low	Landscape / Watershed	Far Future	Sporadic	Reversible Long-term	High	Negligible	Not Significant	Medium	Low
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Access Road	Construction, Operations	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Medium	High
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Access Road	Closure and Decommissioning	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Spills from equipment causing mortality or sublethal effects	Transmission Line	Constructon	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Rupture of tailings dam or pipeline containing tailings, filter plant effluent, and sewage effluent causing lethal and sublethal effects	Mine Site	Operations, Closure and Decommissioning, Post-Closure	Adverse	Moderate	Dam and pipeline engineering, pressure sensors, implementation of Environmental Effects Monitoring Program	Yes	Increase in sediments and potential toxins leading to mortality, or physiological stress and stress and behavioural changes	Medium	Landscape / Watershed	Short-term	One Time	Reversible Short-term	High	Moderate	Not Significant	Low	High
	Water loss in Morrison Lake from seepage into open pit, water intake, and loss of upper watersheds in tailings and waste rock areas causing winter mortality or sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Sealing pitwall according to best management practices and not exceeding water withdrawal specifications	Yes	Lower water levels in Morrison Lake, Morrison Creek, and Tahlo Creek reducing fish habitat and potentiating winter freezing	Medium	Landscape / Watershed	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	Intermediate
	Water loss in Morrison Lake tributaries from loss of upper watersheds in tailings, waste rock, and open pit areas causing winter mortality, sublethal effects, and lost habitat	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Diversion channels to maintain some upper watershed flow	Yes	Lower water levels in streams 25500 and 44300, and altered flow in stream 53400 reducing total fish habitat and potentiating winter freezing	Medium	Landscape / Watershed	Far Future	Continuous	Irreversible	High	Moderate	Not Significant	High	High
Pacific Salmon Effects Assessment	Sedimentation from construction activities, blasting, drainage ditches, and stream redirection causing lethal smothering or sublethal effects	Mine Site	Construction	Adverse	Moderate	Sediment and Erosion Control Plan, site isolation, settling pond and diversion	Yes	Turbid water may flow into streams and lakes; Minor sedimentation of shoreline spawning areas possible	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Medium	High
	Sedimentation from blasting, drainage ditches, and stream redirection causing lethal smothering or sublethal effects	Mine Site	Operations, Closure and Decommissioning	Adverse	Moderate	Sediment and Erosion Control Plan, site isolation, settling pond and diversion	Yes	Turbid water may flow into streams and lakes; Minor sedimentation of shoreline spawning areas possible	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Sedimentation from erosion of road resurfacing and upgrades including new stream crossings and ditches causing lethal smothering or sublethal effects	Access Road, Transmission Line	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Sediment and Erosion Control Plan and site isolation	Yes	Turbid water may flow into steams and lakes; Minor sedimentation of shoreline spawning areas possible	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Noise from Blasting and construction activities causing mortality or behavioural changes	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Noise from blasting, construction activities, and truck hauling causing mortality or behavioural changes	Access Road	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	Low
	Noise from Blasting and construction activities causing mortality or behavioural changes	Transmission Line	Construction	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	Low
	Particulates and residue from trucks, construction, equipment activity, and blasting increasing TSS and causing sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters, Sediment and Erosion Control Plan	Yes	Elevated dust generation because mine site area not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Particulates and residue from trucks, construction, equipment activity, and blasting increasing TSS and causing sublethal effects	Access Road	Construction	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters, Sediment and Erosion Control Plan	Yes	Elevated dust generation because mine site area not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	High
	Particulates from trucks and equipment activity increasing TSS and causing sublethal effects	Access Road	Operations, Closure and Decommissioning	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters, Sediment and Erosion Control Plan	Yes	Elevated dust generation because mine site area not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low High	

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	ML/ARD from exposed rock causing sublethal behavioural effects	Mine Site, Access Road, Transmission Line	Construction, Operations, Closure and Decommissioning, Post-Closure	Adverse	Minor	Implementation of ML/ARD Prediction and Prevention Management Plan, and Environmental Effects Monitoring Program	Yes	ML/ARD resulting in behavioural changes and phsyiological stress	Low	Landscape / Watershed	Far Future	Sporadic	Reversible Long-term	High	Negligible	Not Significant	Medium Low	
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium High	
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Access Road	Construction, Operations	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Medium High	
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Access Road	Closure and Decommissioning	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium High	
	Spills from equipment causing mortality or sublethal effects	Transmission Line	Contruction	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality, or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low High	
	Rupture of tailings dam or pipeline containing tailings, filter plant effluent, and sewage effluent causing lethal and sublethal effects	Mine Site	Operations, Closure and Decommissioning	Adverse	Moderate	Dam and pipeline engineering, pressure sensors, implementation of Environmental Effects Monitoring Program	Yes	Increase in sediments and potential toxins leading to mortality, or physiological stress and behavioural changes	Medium	Landscape / Watershed	Short-term	One Time	Reversible Short-term	High	Moderate	Not Significant	Low High	
	Water loss in Morrison Lake from seepage into open pit, water intake, and loss of upper watersheds in tailings and waste rock areas causing winter mortality or sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Sealing pitwall according to best management practices and not exceeding water withdrawal specifications	Yes	Lower water levels in Morrison Lake, Morrison Creek, and Tahlo Creek reducing fish habitat and potentiating winter freezing	Medium	Landscape / Watershed	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	Intermediate
	Water loss in Morrison Lake tributaries from loss of upper watersheds in tailings, waste rock, and open pit areas causing winter mortality, sublethal effects, and lost habitat	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Diversion channels to maintain some upper watershed flow	Yes	Lower water levels in streams 25500 and 44300, and altered flow in stream 53400 reducing total fish habitat and potentiating winter freezing	Medium	Landscape / Watershed	Far Future	Continuous	Irreversible	High	Moderate	Not Significant	High	High
Other Fish Species Effects Assessment	Sedimentation from construction activities, blasting, drainage ditches, and stream redirection causing lethal smothering or sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Sediment and Erosion Control Plan, site isolation, settling pond and diversion	Yes	Turbid water may flow into Morrison Lake; Minor sedimentation of streams and shoreline areas possible	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Sedimentation from construction, resurfacing, and road upgrades including new stream crossings and ditches causing lethal smothering or sublethal effects	Access Road, Transmission Line	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Sediment and Erosion Control Plan and site isolation	Yes	Turbid water may flow into Babine Lake; Minor sedimentation of streams and shoreline areas possible	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Noise from Blasting and construction activities causing mortality or behavioural changes	Mine Site	Construction,	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters	Yes	Blunt tissue trauma causing mortality to all life stages, sublethal behavioural changes and physiological stress	High	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Particulates and residue from trucks, construction, equipment activity, and blasting increasing TSS and causing sublethal effects	Mine Site, Access Road	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters, Sediment and Erosion Control Plan	Yes	Elevated dust generation because mine site area not wetted during summer, Nitrogen residues from blasting	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	High
	ML/ARD from exposed rock causing sublethal behavioural effects	Mine Site, Access Road, Transmission Line	Construction, Operations, Closure and Decommissioning, Post-Closure	Adverse	Moderate	Implementation of ML/ARD Prediction and Prevention Management Plan, and Environmental Effects Monitoring Program	Yes	ML/ARD resulting in behavioural changes and phsyiological stress	Low	Landscape / Watershed	Far Future	Sporadic	Reversible Long-term	High	Negligible	Not Significant	Medium	Low
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Mine Site, Access Road	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Spills from equipment, hauled fuels and cargos, and waste products causing mortality or sublethal effects	Transmission Line	Construction	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Increase in potential contaminants leading to mortality or physiological stress and behavioural changes	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Rupture of tailings dam or pipeline containing tailings, filter plant effluent, and sewage effluent causing lethal and sublethal effects	Mine Site	Operations, Closure and Decommissioning	Adverse	Moderate	Dam and pipeline engineering, pressure sensors, implementation of Environmental Effects Monitoring Program	Yes	Increase in sediments and potential toxins leading to mortality, or physiological stress and stress and behavioural changes	Medium	Landscape / Watershed	Short-term	One Time	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Water loss in Morrison Lake from seepage into open pit, water intake, and loss of upper watersheds in tailings and waste rock areas causing winter mortality or sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Sealing pitwall according to best management practices and not exceeding water withdrawal specifications	Yes	Lower water levels in Morrison Lake, Morrison Creek, and Tahlo Creek reducing fish habitat and potentiating winter freezing	Medium	Landscape / Watershed	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	Intermediate
	Water loss in Morrison Lake from seepage into open pit, water intake, and loss of upper watersheds in tailings and waste rock areas causing winter mortality or sublethal effects	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Sealing pitwall according to best management practices and not exceeding water withdrawal specifications	Yes	Lower water levels in Morrison Lake, Morrison Creek, and Tahlo Creek reducing fish habitat and potentiating winter freezing	Medium	Landscape / Watershed	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	Intermediate
Fish Habitat Effects Assessment	Direct habitat loss (water) of stream 53400 upper reach due to tailings storage facility and stream 29000 lower reach due to open pit, and partial water loss in streams 25500 and 44000.	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Fish Salvage prior to dewatering in streams 29000 and 53400. Potential rerouting of aversion channels to maintain some upper watershed flow (see Fish and Fish Habitat Compensation Plan for details).	Yes	Direct loss of fish-bearing habitat in stream 29000 and stream 53400	High	Landscape / Watershed	Far Future	One Time	Irreversible	Low	Moderate	Not Significant	High	High
	Direct habitat loss (food production) from loss of upper stream reaches due to tailings storage facility and waste rock dump	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Diversion channel will maintain nutrient and organic matter transport	Yes	Decreased primary and secondary production	Low	Landscape / Watershed	Far Future	One Time	Reversible Long-term	Low	Minor	Not Significant	High	High
	Sedimentation from construction activities, blasting, drainage ditches, and stream redirection causing increases in TSS reducing sunlight and affecting food resources or covering substrate and reducing habitat	Mine Site	Construction	Adverse	Moderate	Sediment and Erosion Control Plan, site isolation, settling pond and diversion	Yes	Habitat loss, increased TSS above background, and decreased primary and secondary production	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Medium	High
	Sedimentation from construction activities, snow removal, blasting, drainage ditches, and stream redirection causing increases in TSS reducing sunlight and affecting food resources or covering substrate and reducing habitat	Mine Site	Operations, Closure and Decommissioning	Adverse	Moderate	Sediment and Erosion Control Plan, site isolation, settling pond and diversion	Yes	Habitat loss,increased TSS above background, and decreased primary and secondary production	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Sedimentation from truck hauling, construction activities, and blasting causing increases in TSS reducing sunlight and affecting food resources or covering substrate and reducing habitat	Access Road	Construction	Adverse	Minor	Sediment and Erosion Control Plan, site isolation	Yes	Habitat loss, increased TSS above background, and decreased primary and secondary production	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Medium	High
	Sedimentation from truck hauling, snow removal, construction activities, and blasting causing increases in TSS reducing sunlight and affecting food resources or covering substrate and reducing habitat	Access Road	Operations, Closure, and Decommissioning	Adverse	Minor	Sediment and Erosion	Yes	Habitat loss, increased TSS above background, and decreased primary and secondary production	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Sedimentation from construction activities, blasting, snow removal, culvert removal and contouring causing increases in TSS reducing sunlight and affecting food resources or covering substrate and reducing habitat	Transmission Line	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Control Plan and site isolation	Yes	Habitat loss, increased TSS above background, and decreased primary and secondary production	Negligible	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High
	Particulates and residue from trucks, construction, equipment activity, and blasting increasing TSS reducing sunlight and affecting food resources	Mine Site, Access Road	Construction, Operations, Closure and Decommissioning	Adverse	Minor	Sediment and Erosion Control Plan and site isolation	Yes	Increased TSS above background and decreased primary and secondary production	Low	Local	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	High
	ML/ARD from exposed rock affecting fish food sources	Mine Site, Access Road, Transmission Line	Construction, Operations, Closure and Decommissioning, Post-Closure	Adverse	Minor	Follow DFO Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters, Sediment and Erosion Control Plan	Yes	Decreased primary and secondary production	Low	Landscape / Watershed	Far Future	Sporadic	Reversible Long-term	High	Negligible	Not Significant	Medium	Low
	Spills from equipment, hauled fuels and cargos, and waste products and waste products affecting fish food resources	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Implementation of ML/ARD Prediction and Prevention Management Plan, and Environmental Effects Monitoring Program	Yes	Decreased primary and secondary production	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Spills from equipment, hauled fuels and cargos, and waste products affecting fish food resources	Access Road	Construction, Operations	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Decreased primary and secondary production	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Minor	Not Significant	Medium	High
	Spills from equipment, hauled fuels and cargos, and waste products affecting fish food resources	Access Road	Closure and Decommissioning	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Decreased primary and secondary production	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Medium	High
	Spills from equipment affecting fish food resources	Transmission Line	Construction	Adverse	Moderate	Spill kits, equipment maintenance, implementation of Spill contingency and Emergency Response Plan	Yes	Decreased primary and secondary production	Low	Local	Short-term	Sporadic	Reversible Short-term	High	Negligible	Not Significant	Low	High

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	Rupture of tailings dam or pipeline containing tailings, filter plant effluent, and sewage effluent affecting fish habitat and food resources	Mine Site	Operations, Closure and Decommissioning, Post-Closure	Adverse	Moderate	Dam and pipeline engineering, pressure sensors, implementation of Environmental Effects Monitoring Program	Yes	Potential downstream habitat loss, increased TSS above background, and decreased primary and secondary production	Medium	Landscape / Watershed	Short-term	One Time	Reversible Short-term	High	Moderate	Not Significant	Low	High
	Water loss in Morrison Lake from seepage into open pit, water intake, and loss of upper watersheds in tailings and waste rock areas reducing fish habitat	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Sealing pitwall according to best management practices and not exceeding water withdrawal specifications	Yes	Habitat loss	Medium	Landscape / Watershed	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Low	Intermediate
	Water loss in Morrison Lake tributaries from loss of upper watersheds in tailings, waste rock, and open pit areas causing winter mortality, sublethal effects, and lost habitat	Mine Site	Construction, Operations, Closure and Decommissioning	Adverse	Moderate	Diversion channels to maintain some upper watershed flow	Yes	Lower water levels in streams 25500 and 44300, and altered flow in stream 53400 reducing total fish habitat and potentiating winter freezing	Medium	Landscape / Watershed	Far Future	Continuous	Irreversible	High	Moderate	Not Significant	High	High
Wetlands Effects Assessment	Loss of Wetland Extent and Function	Roads	Construction and Operation	Adverse	Negligible		No											
	Loss of Wetland Extent and Function	Roads	Closure, Decommissioning, and Post-Closure	Beneficial	Negligible	Monitor to identify if areas may be suitable for wetland development	Yes	Possibility for depressions created during operation to become wetland communities	Low	Local	Medium-term	One Time		Neutral	Minor	Not Significant	Medium	Intermediate
	Loss of Wetland Extent and Function	Transmission Line	Construction and Operation	Adverse	Negligible	Avoid driving through or physically altering wetlands and monitor degraded areas to ensure no negative effect from Project on wetlands	Yes	Possible change of community structure to wetlands in degraded area.	Low	Local	Medium-term	One Time	Reversible Short-term	Neutral	Minor	Not Significant	Low	Intermediate
	Loss of Wetland Extent and Function	Transmission Line	Closure, Decommissioning, and Post-Closure	Neutral	Negligible	Monitor degraded areas to ensure no negative effect from Project on wetlands	No											
	Loss of Wetland Extent and Function	Tailings Storage Facility	Construction and Operation	Adverse	Major	Blue-listed Wb01 bog ecosystem will be lost but a larger area of Wm01 marshes and shallow open water wetlands can be created in the TSF post-closure	Yes	Loss of 26 .65 ha of blue-listed Wb01.	High	Landscape / Watershed	Far Future	One Time	Reversible Long-term	Low	Major	Not Significant	High	High
	Loss of Wetland Extent and Function	Tailings Storage Facility	Closure, Decommissioning, and Post-Closure	Adverse	Major	Construct littoral marsh wetland communities around perimeter of TSF ~~along the beaches of the TSF and shallow open water wetlands in the TSF where water is <2 m deep.~~	Yes	Loss of 26 .65 ha of blue-listed Wb01. ~~However, could be C~~ompensated with the creation of ~~39~~ 50 ha submergent ~~sedge~~-wetland and ~~100~~ 17.5 ha of ~~shallow open water emergent~~-wetland in TSF	High	Landscape / Watershed	Far Future	One Time	Reversible Long-term	Low	~~Major~~-Moderate	Not Significant	Medium	Intermediate
	Loss of Wetland Extent and Function	Waste Dumps	Construction and Operation	Adverse	Negligible		No											
	~~Loss of Wetland Extent and Function~~	~~Waste Dumps~~	~~Closure, Decommissioning, and Post-Closure~~	~~Adverse~~	~~Negligible~~		~~No~~											
	Loss of Wetland Extent and Function	Water Management	Construction and Operation	Adverse	Negligible		No											
	Loss of Wetland Extent and Function	Water Management	Closure, Decommissioning, and Post-Closure	Beneficial	Negligible	Monitor to identify if areas may be suitable for wetland development	Yes	Possibility for depressions created during operation to become wetland communities	Low	Local	Medium-term	One Time	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
	Loss of Wetland Extent and Function	Materials Storage and Borrow Areas	Construction and Operation	Adverse	Negligible		No											
	Loss of Wetland Extent and Function	Materials Storage and Borrow Areas	Closure, Decommissioning, and Post-Closure	Adverse	Negligible		No											
	Loss of Wetland Extent and Function	Plant Site Area	Construction and Operation	Adverse	Negligible		No											
	Loss of Wetland Extent and Function	Plant Site Area	Closure, Decommissioning, and Post-Closure	Beneficial	Negligible	Monitor to identify if areas may be suitable for wetland development	Yes	Possibility for depressions created during operation to become wetland communities	Low	Local	Medium-term	One Time	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
	Loss of Wetland Extent and Function	Pit Area	Construction and Operation	Adverse	Major	Include areas lost into compensation plan for TSF	Yes	Loss of 0.4 ha Ws01 swamp in pit	High	Local	Long-term	One Time	Irreversible	Neutral	Moderate	Not Significant	High	High
	Loss of Wetland Extent and Function	Pit Area	Closure, Decommissioning, and Post-Closure	Adverse	Major	~~Include areas lost into~~ Areas lost included in non fish-bearing loss in Fish Habitat Compensation Plan ~~for TSF~~	Yes	~~Upland beach areas in TSF could be planted with willow swamp species to compensate for lost willow swamps in Pit Extent and TSF.~~ Loss of 0.4 ha Ws01 swamp in pit. Compensated with the creation of 68 ha of wetland habitat in open pit	Medium	Local	Long-term	One Time	~~Irreversible~~ Reversible Short Term	Neutral	~~Moderate~~ Minor	Not Significant	Medium	Intermediate
	Loss of Wetland Extent and Function	Dams	Construction and Operation	Adverse	Negligible	Monitor degraded areas to ensure no negative effect from Project on wetlands	Yes	Degraded areas could become affected areas and should be monitored during construction and operations	Low	Local	Medium-term	Sporadic	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
	Loss of Wetland Extent and Function	Dams	Closure, Decommissioning, and Post-Closure	Adverse	Negligible	Monitor to identify if areas may be suitable for wetland development	Yes	Degraded areas could become affected areas and should be monitored during construction and operations	Low	Local	Medium-term	Sporadic	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
Soils Effects Assessment	Pit	Alteration of landscape and loss of soils due to excavation	Construction; Operations	Adverse	Major	Salvage/stockpile soil and suitable overburden from footprint prior to are extraction	No											
	TSF	Burial, flooding, and partial excavation of soils	Construction; Operations	Adverse	Major	Salvage/stockpile soil from dam and infrastructure footprint (ditches, roads, collection ponds, pipelines), salvage as needed from remainder of TSF pond area, dust control program required;	No											
	Waste Rock Dump	Burial and partial excavation of soils	Construction; Operations	Adverse	Major	Salvage/stockpile soil from footprint prior to placement of rock waste (with 'progressive' reclamation during operations)	No											
	Low Grade Stockpile	Excavation, temporary burial, degradation (potential metal contamination) of soils	Operations	Adverse	Major	Salvage/stockpile soil in footprint prior to placement of low grade ore stockpile	No											
	Organic Bearing Material (Soil) & Overburden Stockpiles	Excavation under overburden pile, degradation (compaction) of soils	Construction; Operations	Adverse	Major	Salvage/stockpile soil from footprint (except soil pile), implement erosion control and weed control programs	No											
	Plant Site	Excavation (cuts/fills) of soils	Construction	Adverse	Major	Salvage/stockpile soil in footprint prior to disturbance	No											
	Borrow Areas Aggregate	Excavation and loss of surficial material (aggregate)	Construction; Operations	Adverse	Major	Salvage/stockpile soil in footprint prior to disturbance	No											
	Borrow Areas Till	Excavation and loss of surficial material (till) and soils	Construction; Operations	Adverse	Major	Salvage/stockpile soil in footprint prior to disturbance	No											
	TLROW - Access Roads: construction/maintenance	Site clearing: degradation (compaction, erosion, dust), access trail - degradation (soil scalping - minor cuts/fills, compaction) of soils	Construction; Operations	Adverse	Minor	Alternative selection of preferred mute alignment salvage/stockpile soil from footprint of new or widened access roads/ditches and borrow areas, implement erosion and weed control programs	No											
	Linear Facilities (diversion ditches, roads, pipelines, on-site TL)	Excavation (trenching; cuts/fills); degradation from clearing (compaction and soil scalping)	Construction; Operations: Closure/Decommissioning	Adverse	Major	Salvage/stockpile soil from footprint of new or widened access roads; implement erosion control and weed control programs	No											
	Mine Site, Access Road	Excavation (trenching, cuts/fills) degradation from clearing (compaction and soil scalping)	Construction; Operations	Adverse	Moderate	Salvage/stockpile soil from footprint of new or widened access roads; implement erosion control and weed control programs	Yes	~~Pit area will remain an open water/steep, unstable rock land complex; 108 ha~~ Pit backfilled with waste rock and reclaimed with vegetation around perimter, and wetlands established within berm	High	Landscape	Far Future	Continuous	Irreversible	Low	Major	Not Significant	High	Intermediate
	Pit	Partial flooding	Closure/Decommissioning, Post-Closure	Adverse	~~Major~~ Minor	~~Revegetation of exposed overburden along pit edge~~ Backfilling pit with waste rock	Yes	Pit backfilled with waste rock and reclaimed with vegetation around perimter, and wetlands established within berm	Medium	Local	Medium Term	Continuous	Reversible Short-term	Low	~~Major~~ Minor	Not Significant	High	High

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	TSF	Flooding	Closure/Decommissioning, Post-Closure	Adverse	Major	Flooding TSF	Yes	~~Open water (~ 470 ha) on TSF surface; rock lined spillways and channels, loss of soil function including organic soil, until far future~~ Smaller ponded area, reclaimed areas along exposed beaches and on dams	~~High~~ Medium	~~Regional~~ Local	~~Far Future, Medium Term~~	Continuous	~~Irreversible~~ Reversible Short-term	Low	Minor	Not Significant	High	High
	TSF	Soil absent on dam slopes &crests	Closure/Decommissioning, Post-Closure	Neutral	Moderate	Upland reclamation of the dam faces and crest	Yes	Higher% of drier, steeply sloping (33% gradient) land	Low	Landscape	Far Future	Continuous	Irreversible	Neutral	Minor	Not Significant	High	High
	TSF	Soil absent on tailings beach	Closure/Decommissioning, Post-Closure	Neutral	Major	Assuming good water and sediment quality*, terrestrial reclamation of the lowland/wetland beaches; beach reclamation to include replacement of soil material over a variety of potential materials (coarse or coarse non-pyritic tailings, NAG rock and or glacial till)	Yes	Non-forested	Low	Landscape	Far Future	Continuous	Irreversible	Low	Minor	Not Significant	High	High
	Waste Rock Dump	Soils absent	Closure/Decommissioning, Post-Closure	Neutral	Moderate	Reclaim; ~~reslope and apply capping material~~ and replace soil as surfaces become available	Yes	Higher% of drier, steeply sloping (40% gradient) land	Low	Regional	Far Future	Continuous	Irreversible	High	Negligible	Not Significant	High	High
	Low Grade Ore Stockpile	Degradation (potential metal contamination) of soils	Closure/Decommissioning, Post-Closure	Neutral	Moderate	Remove all potentially contaminated material, regrade, rip, replace soil capping and revegetate	No	No Residual Effect										
	Organic Bearing Material (Soil) & Overburden Stockpiles	Exposed soils	Closure/Decommissioning, Post-Closure	Neutral	Moderate	Reslope (replace soil on remnant overburden or bare base area), rip where compacted, revegetate	No	No Residual Effect										
	Plant site (water management/ overburden, and exposed power facilities) bedrock	Soil absent, compact	Closure/Decommissioning, Post-Closure	Neutral	Moderate	Remove any potentially contaminated material, regrade, rip, and replace soil capping and revegetate, except in 5 ha area of long-term use for water management and site power	Yes	Partial area to remain for long-term water management to far future	Low	Local	Far Future	Continuous	Reversible Long-term	High	Negligible	Not Significant	High	High
	Borrow Areas Aggregate	Exposed erodable surface	Closure/Decommissioning, Post-Closure	Neutral	Moderate	Reclaim(recontoure and add soil material for revegetation)	Yes	Material consumed by project; landscape will remain a steep sided depression	Negligible	Local	Far Future	Continuous	Irreversible	High	Negligible	Not Significant	High	High
	Borrow Areas Till	Exposed erodable surface	Closure/Decommissioning, Post-Closure	Neutral	Moderate	Reclaim(recontour and cover with soil material for revegetation)	Yes	Material consumed by project; portion of reclaimed landscape will remain steep sided (18 ha buried by TSF tailings)	Negligible	Local	Far Future	Continuous	Irreversible	High	Negligible	Not Significant	Medium	High
	Linear Facilities (diversion ditches, roads, pipelines, on-site TL)	Potential disturbance associated with maintenance activities (compaction, vegetation loss)	Closure/Decommissioning, Post-Closure	Neutral	Moderate	Recontour, rip, replace soil material and revegetate, re-establish vegetation on areas disturbed for maintenance	Yes	Some to remain for long-term; maintenance through Post-Closure (long-term water manage ent potential for water management pipeline leaks)	Low	Local	Far Future	Continuous	Reversible Long-term	High				
	TLROW - Access Roads: construction/maintenance	Potential disturbance associated with maintenance activities (compaction, vegetation loss)	Closure/Decommissioning, Post-Closure	Neutral	Minor	Recontour, rip, replace soil material and revegetate, re-establish vegetation on areas disturbed for maintenance	Yes	Required for continued use at site (to support water management), may possibly be used by others, if not, areas are to be reclaimed, with stockpiled soil at closure	Low	Local	Far Future	Continuous	Reversible Long-term	High	Negligible	Not Significant	Medium	High
	Mine Site, Access Road	Potential disturbance associated with maintenance activities (compaction, vegetation loss)	Closure/Decommissioning, Post-Closure			Recontour, rip, replace soil material and revegetate, re-establish vegetation on areas disturbed for maintenance	Yes	Required for long-term site access	Low	Local	Far Future	Continuous	Reversible Long-term	High	Negligible	Not Significant	Medium	High
Terrain Effects Assessment	Soil slope failure due to road construction on gentle to moderate slope	Mine haul roads and access road	Construction, operation, and decommissioning	Adverse	Very Low to Low	Minimize excavation, control surface water, maintain culverts and ditches, deactivate at mine closure	No											
	Soil slope failure due to road construction on gentle to moderate slope	Permanent access roads	Post-closure	Adverse	Low	Maintain culverts and ditches	Yes	Road washout, saturation of road base	Low	Local	Long-term	Sporadic	Reversible Short-term	Neutral	Minor	Not Significant	Low	High
	Soil slope failure due to road construction on moderately steep to steep slope	Mine haul roads and access road	Construction, operation, and decommissioning	Adverse	Moderate	Design cut and fill slopes to maximize stability, control surface water, maintain culverts and ditches, deactivate at mine closure	No											
	Soil slope failure due to road construction on moderately steep to steep slope	Permanent access roads	Post-closure	Adverse	Moderate	Maintain culverts and ditches	Yes	Saturation of fill slopes and/or soil erosion leading to local landslide	Medium	Local	Long-term	Sporadic	Reversible Short-term	Low	Moderate	Not Significant	Medium	Low
	Soil slope failure due to logging on moderately steep to steep slope	Mine site and transmission line corridor	Construction, operation, and post-closure	Adverse	Moderate	Assess stability prior to logging, reclaim disturbed areas, monitor	No											
	Soil slope failure due to mine development stockpiles, borrow pits and dams)	Mine site (including waste rock dump, stockpiles, borrow pits and dams)	Construction and operation	Adverse	Low	Design fill slopes, monitor stability of major structures, construct and maintain diversion ditches	No											
	Soil slope failure due to mine development stockpiles, borrow pits and dams)	Mine site (including waste rock dump, stockpiles, borrow pits and dams)	Post-closure	Adverse	Moderate	Design fill slopes, monitor stability of major structures, re-establish original surface drainages or maintain diversion ditches	Yes	Surface erosion, internal piping or saturation of fill slopes leading to slope failure	Medium	Local	Long-term	Sporadic	Reversible Short-term	Low	Moderate	Not Significant	Low	High
	Rock slope failure due to surface disturbance	Mine site, transmission corridor	Construction, operation, and post-closure	Adverse	Very Low	Design excavations to maximize stability, construct surface water diversions	No											
	Rock slope failure due to mining	Open pit	Operation	Adverse	Low	Design pit wall, control surface water and groundwater, monitor stability	No											
	Rock slope failure due to mining	Open pit	Post-closure	Neutral	Moderate	~~Design final pit walls for long-term stability~~ Pit backfilled with wasterock	Yes	~~Weathering, and rock ravelling~~ Pit backfilled, reduce height of exposed walls	Low	Local	Far Future	Sporadic	Irreversible	Low	Minor	Not Significant	High	Low
	Creek bank failure due to Project construction	Mine site, transmission line corridor, and roads	Construction and operation	Adverse	Low	Avoid unstable creek banks, design creek crossings based on debris flow potential	No											
	Creek bank failure due to Project construction	Mine site, transmission line corridor, and roads	Post-closure	Adverse	Low	Remove road bridges and culverts	No											
Ecosystems and Vegetation Effects Assessment	**LOST-PERMANENT**																	
	1) Vegetation replaced by permanent Infrastructure																	
	VEC-Terrestrial Ecosystems (all types)	Mine facilities area (MFA; pit and tailings storage facility (TSF)) and transmission line (tower footprint)	Construction	Adverse	Major	Salvage and stockpile soil and suitable overburden wherever possible	Yes	Vegetation permanently replace by infrastructure	High	Local	Far future (>100 years)	One time	Irreversible	Low	Major	Not Significant	High	High
	2) Clearing forests and replacing with shrubs in right-of-way (ROW)																	
	VEC - Forested Ecosystems	Transmission line	Construction	Adverse	Major	Progressive reclamation; suitable top soil will be used at an adequate rooting depth; invasive plant management, dust control	Yes	Forested ecosystems lost and replaced with early seral stages to remain indefinitely	Moderate	Local	Far future (>100 years)	One time	Irreversible	Neutral	Moderate	Not Significant	High	High
	VEC - Ecosystems of Interest															Not Significant		
	3) Clearing non-forested vegetation (shrubs, meadows, etc.) in the ROW																	
	VEC - Non-forested ecosystems	Transmission Line	Construction	Adverse	Moderate	Progressive reclamation; suitable top soil will be used at an adequate rooting depth; invasive plant management, dust control	Yes	Ecosystems lost	Low	Local	Medium term (20-25 years)	One time	Reversible Short-term	High	Negligible	Not Significant	High	High
	VEC - Country food plants (most country food plants are shrubs)	Transmission Line	Operation	Beneficial	Minor	n/a	No											
	LOST-TEMPORARY																	
	1) Vegetation replaced by infrastructure but will be reclaimed either progressively or at closure																	
	VEC -Terrestrial ecosystems (undesignated) and country food plants	MFA	Construction	Adverse	Major	Soil salvage, progressive reclamation; suitable top soil will be used at an adequate rooting depth	Yes	Vegetation replaced by infrastructure; reclaimed vegetation may not re-establish to the same level as pre-operation	High	Local	Far future (>50 years)	One time	Reversible Long-term	Neutral	Moderate	Not Significant	High	High
	VEC- Ecosystems of interest	MFA	Construction	Adverse	Major	Soil salvage, progressive reclamation; suitable top soil will be used at an adequate rooting depth	Yes	Vegetation replaced by infrastructure; reclaimed vegetation may not re-establish to the same level as pre-operation	High	Local	Far future (>50 years)	One time	Reversible Long-term	Neutral	Moderate	Not Significant	High	High
	DEGRADATION																	
	1) **Introduction of invasive plants, dust deposition on plants, alteration of microclim ate, fragmentation**																	
	VEC-Terrestrial ecosystems, ecosystems of interest, country foods	MFA, Transmission Line, Roads	Construction, Operation	Adverse	Moderate	Invasive plant management, dust control, progressive reclamation	Yes	Vegetation may be degraded by edge effects	High	Local	Far future (>50 years)	One time	Reversible Long-term	Low	Major	Not Significant	High	High
	1.The definition of nature and extent varies for different topic areas. This is simply a description of the predicted nature and extent of the effect, prior to mitigation (more information on factors to include in the descriptor are in the methodology text).																	
	2. Assumes mitigation measures are effective as planned and implemented.																	

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	3. Assumes reclamation measures are effective as planned and implemented.																	
	4. Ecosystem s of interest would have a lower resilience.																	
Grizzly Bear Effects Assessment	Habitat Loss or Alteration	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Prohibit mine-related human activity within potential habitat corridor between Morrison and Babine lakes and reduce the speed of vehicles travelling across this area. This may allow for easier grizzly bear movement between the west and east sides of the Project area. Grizzly bears can thereby travel to new habitat if required (e.g., if sufficient habitat required to sustain them is no longer present for a season for the density of bears using it), or if they are displaced from the LSA.	Yes	The functional percentage of suitable grizzly bear habitat lost or heavily degraded from the LSA and RSA in each season is: spring: 9.2% (LSA), 1.7% (RSA); summer: 9.0% (LSA), 1.9% (RSA), fall: 9.4% (LSA), 1.7% (RSA)	Medium	Local	Long-term	Continuous	Reversible Long-term	Neutral	Negligible	Not Significant	Medium	High
						Reclaim disturbed habitat to reflect pre-disturbance values after mine closure												
	Physical Hazards - Mortality (Direct and Indirect)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Moderate	Conduct employee education programs for working around wildlife.	Yes	Mortality from the possibility of grizzly bear collisions with Project vehicles and from interactions with humans.	Medium	Regional	Medium-term	Sporadic	Reversible Long-term	Low	Minor	Not Significant	Medium	High
						Avoid trapping wildlife on the access road by managing bank height.		Increased human presence and activity resulting in unregulated bear hunting.										
						Minimize potential vehicle-related wildlife mortalities (speed limits and signage in areas of grizzly bear crosssing)												
						Document cases and locations where collisions between wildlife and vehicles have occurred or have a higher likelihood of occurring (i.e., locations where wildlife are attracted to the haul road for foraging, travel, or crossing)												
						Minimize potential wildlife attraction to the road, thereby reducing the risk of conflicts between vehicles and wildlife.												
						Prohibit hunting in the Project area.												
						Limit public access to the Project area.												
						Avoid human activity near identified key wildlife habitats during sensitive wildlife periods (e.g., denning).												
						Prohibit littering in the Project area.												
						Prohibit feeding wildlife.												
						Store and remove all waste and wildlife attractants.												
	Physical Hazards - Disruption of Movement	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Prohibit human activity in identified key wildlife habitats and movement corridors (particularly between Morrison and Babine lakes).	Yes	Decreased movement across the mine site and access road	Low	Landscape / Watershed	Medium-term	Regular	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
						Manage road-side vegetation re-growth to minimize attractiveness to grizzly bears.												
						Minimize potential vehicle-related wildlife mortalities (e.g., speed limits and signage in areas of grizzly bear crossing).												
						Decrease speed limits along the access road where it bisects the potential land corridor between Morrison and Dabine lakes.												
						Document cases and locations where collisions between wildlife and vehicles have occurred or have a higher likelihood of occurring (i.e., locations where wildlife are attracted to the haul road for foraging, travel, or crossing).												
						Minimize potential wildlife attraction to the road (removing road carrion), thereby reducing the risk vehicle strikes.												
	Chemical Hazards and Attractants	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible	If wildlife is found to be drinking, eating, or using water or vegetation within the TSF during the closure or post-closure phases, invertebrate tissue and wetlands will be monitored and compared to the monitoring criteria. In the event that metals concentrations are observed to approach the monitoring criteria, adaptive management would then be initiated to minimize the risk of metal uptake to wildlife.	No												
	Sensory Disturbance	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Moderate	Conduct an employee education program for working around wildlife.	Yes	Disturbance to behaviour and distribution of grizzly bears in the RSA as a result of combined anthropogenic disturbances (i.e., noise, visual and odour).	Low	Local	Medium-term	Regular	Reversible Long-term	Neutral	Minor	Not Significant	Low	Intermediate
						Limit public access to the Project area.												
						Prohibit domestic animals In the Project area.												
						Prohibit human activity in identified key wildlife habitats, near den sites, and movement corridors												
						Minimize fugitive dust and noise associated with haul truck traffic.												
						Use a precautionary approach and scan for bear dens before blasting/avalanche control.												
	Combined Effects of the Project (Population level impacts)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure	Adverse											Minor	Not Significant		
Moose Effects Assessment	Habitat Loss or Alteration	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure	Adverse	Moderate	Prohibit mine-related human activity within a potential habitat corridor between Morrison and Babine lakes and reduce the speed of vehicles travelling across this area. This may allow for easier movement between the west and east sides of the Project area.	Yes	Loss or alteration of suitable winter habitat in the LSA (32%) and RSA (5.8%)	Medium	Local	Long-term	Continuous	Reversible Long-term	Neutral	Moderate	Not Significant	Medium	Intermediate
						Reclaim disturbed habitat to reflect pre-disturbance values after mine closure.												

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	Physical Hazards - Mortality (Direct and Indirect)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure	Adverse	Moderate	Conduct employee education programs for working and living around wildlife.	Yes	Mortality from the possibility of moose collissions with Project vehicles	Medium	Local	Medium-term	Sporadic	Reversible Long-term	Neutral	Minor	Not Significant	High	Intermediate
						Avoid trapping wildlife on the haul road by managing bank height or creating gaps in the banks (i.e., escape pathways).		Increased human presence and activity resulting in increased moose hunting.										
						Minimize potential vehicle-related wildlife mortalities (e.g., wildlife right-of-way, speed limits, and signage in areas of moose crossing).		Attraction to roads because of easier movement (or road salts if used), resulting in increased vehicle-related mortality.										
						Minimize potential wildlife attraction to the road (e.g., avoid road salts and manage roadside vegetation), thereby reducing the risk of vehicle strikes.											
						Limit public access to the mine area.												
						Prohibit hunting within the mine area.												
						Prohibit domestic animals in the mine area												
						Avoid human activity near identified key wildlife habitats during sensitive wildlife periods (e.g., calving).												
						Prohibit feeding wildlife in the Project area.												
						Store and remove all waste and wildlife attractants.												
	Physical Hazards - Disruption of Movement	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Prohibit human activity in identified key moose habitats and movement corridors.	Yes	Land between the south end of Morison Lake and the north end of Babine Lake may act as an east-west travel corridor for moose. The combination of increased traffic through the potential movement corridor, and plowing the road during winter (creating snow banks), may alter moose crossing behaviour from baseline conditions.	Low	Landscape / Watershed	Medium-term	Regular	Reversible Long-term	Neutral	Negligible	Not Significant	Low	Intermediate
						Avoid trapping moose on the haul road by managing bank height and creating escape pathways (i. e., gaps) in snowbanks.												
						Minimize potential vehicle-related moose mortalities (e.g., vildlife right-of-way, speed limits and signage in areas of moose crossing)												
						Apply tighter speed limit restrictions along part of the access road that bisects potential movement corridor.												
						Document cases and locations where collisions between moose and vehicles have occurred or have a higher likelihood of occurring (i.e., locations where moose are attracted to the haul mad for foraging, travel, or crossing).												
	Chemical Hazards and Attractants	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible	If wildlife is found to be drinking, eating, or using water or vegetation within the TSF during the closure or post-closure phases, invertebrate tissue and wetlands will be monitored and compared to the monitoring criteria. In the event that metal concentrations are observed to approach the monitoring criteria, adaptive management would then be initiated to minimize the risk of metal uptake to wildlife.	No												
	Sensory Disturbance	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Conduct an employee education program for working around wildlife.	Yes	Individual moose will likely avoid the immediate Project area because of noise and human presence but continue to occupy the regional study area.	Low	Local	Medium-term	Regular	Reversible Long-term	Neutral	Minor	Not Significant	Low	Intermediate
						Limit public access to the Project area												
						Prohibit domestic animals In the Project area.												
						Prohibit human activity in identified key wildlife habitats and movement corridors												
						Minimize sources of noise through noise control measures												
						Minimize fugitive dust and noise associated with haul truck traffic.												
	Combined Effects of the Project (Population level impacts)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure												Moderate	Not Significant	Medium	Intermediate
Mule Deer Effects Assessment	Habitat Loss or Alteration	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Maintain and prohibit mine- related human activity within a potential habitat corridor between Morrison and Babine lakes and reduce the speed of vehicles travelling across this area. This may allow for easier movement of mule deer between the west and east sides of the Project area and minimize habitat fragmentation.	Yes	Potential loss of mule deer habitat.	Low	Local	Long-term	Continuous	Reversible Long-term	Neutral	Negligible	Not Significant	Low	Low
						Identify pockets of occupied winter habitat for mule deer in conjunction with moose monitoring aerial surveys (Section 14.9).												
						Limit disturbance, including noise and sensory, vdthin and nearby occupied writer range (if identified) that may degrade habitat value.												
						Reclaim disturbed habitat to reflect pre-disturbance values after mine closure.												
	Physical Hazards - Mortality (Direct and Indirect)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Conduct employee education programs for working and living around wildlife.												
						Avoid trapping wildlife on the haul road by managing bank height or creating gaps in the banks (i.e., escape pathways).												
						Minimize potential vehicle-related wildlife mortalities (eg wildlife right-of-way, speed limits, and signage in areas of mule deer crossing).	Yes	Mortality from the possibility of mule deer collisions with Project vehicles.	Medium	Landscape	Medium-term	Sporadic	Reversible Long-term	Neutral	Minor	Not Significant	Low	Intermediate
						Minimize potential wildlife attraction to the mad (eh., avoid road salts and manage roadside vegetation), thereby reducing the risk of vehicle strikes.		Increased human presence and activity resulting in increased illegal mule deer hunting										

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
						Limit public access to the mine area;		Attraction to roads because of easier movement (or road salts if used), resulting in increased vehicle-related mortality.										
						Prohibit hunting within the mine area,												
						Prohibit domestic animals in the mine area,.												
						Avoid human activity near identified key wildlife habitats during sensitive wildlife periods (e.g., calving),												
						Prohibit feeding wildlife in the Project area;												
						Store and remove all waste and wildlife attractants.												
	Physical Hazards - Disruption of Movement	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Prohibit mine-related human activity within a potential habitat corridor between Morrison and Babine lakes and reduce the speed of vehicles travelling across this area. This may allow for easier mule deer movement between the west and east sides of the Project area and minimize habitat fragmentation.	Yes	The predicted increase in vehicle traffic along the Project roads may at times deter mule deer from crossing, particularly in the presence of oncoming traffic.	Low	Landscape / Watershed	Long-term	Regular	Reversible Long-term	High	Negligible	Not Significant	Low	Intermediate
						Aid mule deer crossing the haul mad by managing bank height and creating escape pathways (i.e., gaps) in snowbanks and restrict vehicle speed limits.												
						Apply tighter speed limit restrictions along part of the access road that bisects potential movement corridor.												
						Document cases and locations of mule deer observations, potential risks of collisions, or possible movement areas (i.e., locations where mule deer are attracted to the haul road for foraging, travel, or crossing) have a higher likelihood of occurring.												
	Chemical Hazards and Attractants	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible	If wildlife is found to be drinking, eating, or using water or vegetation within the TSF during the closure or post-closure phases, invertebrate tissue and wetlands will be monitored and compared to the monitoring criteria. In the event that metal concentrations are observed to approach the monitoring criteria, adaptive management would then be initiated to minimize the risk of metal uptake to wildlife.	No											
	Sensory Disturbance	Mine Site, Access Road, Transmission Line	Construction, Operations, Decommissioning	Adverse	Minor	Limit public access to the mine area	Yes	Human activity and noise from traffic, mine site, and blasting events resulting in avoidance or elevated stress	Low	Local	Medium-term	Regular	Reversible Long-term	High	Negligible	Not Significant	Low	Intermediate
						Prohibit domestic animals in the mine area.												
						Avoid human activity and noise in identified pockets of suitable winter habitat for mule deer(assessed in conjunction with moose monitoring aerial surveys, Section 14.9).												
						Prohibit human activity in identified habitat corridor.												
						Minimize sources of noise through noise control measures.												
						Minimize fugitive dust and noise associated with haul truck traffic.												
	Combined Effects of the Project (Population level impacts)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure	Adverse											Negligible	Not Significant	Medium	Low
American Marten Effects Assessment	Habitat Loss or Alteration	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Prohibit mine-related human activity within potential habitat corridor between Morrison and Babine lakes and reduce the speed of vehicles travelling across this area. This will minimize potential disturbance to this area, as well as reduce possible vehicle strikes.	Yes	Suitable winter habitat lost or heavily degraded because of the Project Includes 10.6% of the LSA and 1.8% of the RSA.	Low	Local	Long-term	Continuous	Reversible Long-term	Neutral	Minor	Not Significant	Medium	Intermediate
						Reclaim disturbed habitat to reflect pre-disturbance values after mine closure												
	Physical Hazards - Mortality (Direct and Indirect)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible													
	Physical Hazards - Disruption of Movement	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Prohibit mine-related human activity within potential habitat corridor between Morrison and Babine lakes and reduce the speed of vehicles travelling across this area. This will minimize potential disturbance to this area, as well as reduce possible vehicle strikes	Yes	Development of mine roads, infrastructure, and the transmission line, along with increased traffic and human activity, may create a barrier to local marten movement.	Medium	Landscape	Medium-term	Regular	Reversible	Neutral	Minor	Not Significant	Medium	Intermediate
						Maintain existing road culverts to facilitate habitat connectivity for martens.	Watershed	Long-term										
						Document cases and locations where collisions between wildlife and vehicles have occurred or have a higher likelihood of occurring (i.e., locations vhere vildlife are attracted to the access road for foraging, travel, or crossing) and allowing for adaptive management where possible (providing additional road culverts in high incident areas).												
	Chemical Hazards and Attractants	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible	If wildlife is found to be drinking, eating, or using water or vegetation within the TSF during the closure or post-closure phases, invertebrate tissue and wetlandswil be monitored and compared to the monitoring criteria. In the event that metal concentrations are observed to approach the monitoring criteria, adaptive management would then be initiated to minimize the risk of metal uptake to wildlife.	No											
	Sensory Disturbance	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Limit public a ccess to the Project area.	Yes	Areas with a high degree of Project-related noise will likely be avoided	Low	Local	Medium-term	Regular	Reversible Long-term	High	Negligible	Not Significant	Low	Intermediate

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
						Prohibit human activity in identified key wildlife habitats, breeding sites, and movement corridors;												
						Minimize sources of noise through noise control measures;												
						Minimize noise associated with haul truck traffic.												
	Combined Effects of the Project (Population level impacts)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure	Adverse											Negligible	Not Significant	Low	Intermediate
Fisher Effects Assessmen	Habitat Loss or Alteration	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Prohibit mine-related human activity within identified high quality areas outside of the Project footprint, particularly within riparian areas with old stands of cottonwoods.	Yes	The amount of suitable fisher habitat that will be temporarily or permanently lost or degraded as a result of Project development represents 1.8% (classified as lost or heavily degraded) of the total amount of suitable habitat available in the RSA.	Low	Local	Long-term	Continuous	Reversible Long-term	Low	Minor	Not Significant	High	Intermediate
						Reclaim disturbed habitat to reflect pre-disturbance values after mine closure.												
	Physical Hazards - Mortality (Direct and Indirect)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Conduct employee education programs for working and living around wildlife.	Yes	Clearing trees could cause some incidental mortality of females or offspring.	Low	Local	Long-term	Sporadic	Reversible Short-term	Low	Negligible	Not Significant	Low	Intermediate
						Minimize potential wildlife attraction to the road (e.g., remove road carrion and manage roadside vegetation), thereby reducing the risk of vehicle strikes.		Mortality from vehicle strikes										
						Limit public access to the mine area.												
						Prohibit hunting and trapping within the mine area.												
						Prohibit domestic animals in the mine area.												
						Avoid human activity near identfied key wildlife habitats outside of the Pmjectfootpnnt during sensitive wildlife periods (e.g., old cottonwood stands in riparian areas).												
						Prohibit feeding wildlife in the Project area.												
						Store and remove all waste and wildlife attractants.												
	Physical Hazards - Disruption of Movement	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Prohibit mine-related human activity within potential habitat corridor between Morrison and Babine lakes and reduce the speed of vehicles travelling across this area. This will minimize potential disturbance to this area, as well as reduce possible vehicle strikes.	Yes	Fisher may be reluctant to cross gaps/fragments in forest cover (mine site, transmission line corridor, and/or roads), limiting east-west movement	Medium	Landscape / Watershed	Medium-term	Regular	Reversible Long-term	Low	Minor	Not Significant	Medium	Intermediate
						Document cases and locations where collisions between wildlife and vehicles have occurred or have a higher likelihood of occurring (i.e., locations where wildlife are attracted to the access road for foraging, travel, or crossing) and allowing for adaptive management where possible (providing additional road culverts in high incident areas).												
	Chemical Hazards and Attractants	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible	If wildlife are found to be drinking, eating, or using water or vegetation within the TSF during the closure or post-closure phases, wetlands and invertebrate tissue will be monitored and compared to the monitoring criteria. In the event that metals concentrations are observed to approach the monitoring criteria, adaptive management would then be initiated to minimize the risk of metal uptake to wildlife												
	Sensory Disturbance	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Limit public access to the Project area.	Yes	Elevated stress levels and/or habitat avoidance in areas of high noise and human disturbance.	Low	Local	Medium-term	Regular	Reversible Long-term	Low	Negligible	Not Significant	Medium	Intermediate
						Prohibit human activity in identified key wildlife habitats, breeding sites, and movement corridors outside of the Project footprint.												
						Minimize sources of noise through noise control measures.												
						Minimize noise associated with haul truck traffic.												
	Combined Effects of the Project (Population Level Impacts)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure															
Western Toad Effects Assessment	Habitat Loss or Alteration	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Moderate	Avoid human activity in identified key wildlife habitats during sensitive periods, such as toad breeding sites and migration areas, outside of the Project footprint. Buffer zones around wetlands and riparian areas recommended by the BC Ministry of Environment should also be designated and avoided.	Yes	Loss of identified breeding pond		Local	Long-term	Regular	Irreversible	Neutral	Minor	Not Significant	Medium	Low
						Roadside ditches in the mine site should be constructed and maintained to minimize standing water to prevent toad breeding.												
						Road dust production will be minimized through road watering (generally only in the summer months), regular road surface mainteriance, and speed limits.												
	Physical Hazards - Mortality (Direct and Indirect)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Minimize potential vehicle-related wildlife mortalities (e.g. speed limits, adaptive management).	Yes	Potential toad mortality associated with incidental traffic interactions.	Low	Local	Medium-term	Regular	Reversible Long-term	Low	Negligible	Not Significant	Medium	Low
						Document cases and locations where collisions between western toad and vehicles have occurred or have a higher likelihood of occurring (i.e., locations where western toad migrate across the road).												
						Avoid human activity near identified breeding and migration corridors outside of the Protect footprint, particularly during sensitive periods.												

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
						Prohibit littering in the Project area.												
	Physical Hazards - Disruption of Movement	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Minimize potential vehicle-related wildlife mortalities (e.g. speed limits, adaptive management).	Yes	Roads and infrastructure may limit toad movement between terrestrial and wetland habitats	Low	Local	Medium-	Regular	Reversible	Neutral	Negligible	Not Significant	Low	Low
						Document cases and locations where collisions between western toad and vehicles have occurred or have a higher likelihood of occurring (i.e., locations where western toad migrations cross the road).												
	Chemical Hazards and Attractants	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Minimize attractiveness of poor quality water sources by removing standing water or vegetation.	Yes	Potential breeding or use of low water quality habitats in the local area.	Negligible	Local	Medium-term	Regular	Reversible Long-term	Low	Negligible	Not Significant	Medium	Low
						Record incidental sightings of the presence of western toads and breeding activity in proximity to the TSF.												
						Monitor unanticipated attractants associated with the TSF and area to implement adaptive management (e.g. formation of small ponds near the TSF requiring diversion)												
	Sensory Disturbance	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible		No											
	Combined Effects of the Project (Population level impacts)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure												Minor	Not Significant	Medium	Low
Waterfowl Effects Assessment	Habitat Loss or Alteration	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Avoid open water areas and breeding sites during the waterfowl breeding season (April 1 to July 31).	Yes	Loss or alteration of waterfowl habitat within the local and regional study areas.	Low	Local	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	High	High
						Design reclamation during mine closure to restore affected waterbodies or riparian habitat lost during mine development and operation, where possible. Where water quality or chemical uptake by aquatic vegetation alongside polluted water is an issue, the attractiveness of poor water quality sites will be minimized.												
	Physical Hazards - Mortality (Direct and Indirect)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible		No											
	Physical Hazards - Disruption of Movement	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible		No											
	Chemical Hazards and Attractants	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible	If wildlife is found to be drinking, eating, or using water or vegetation with the RSF during the closure or post-closure phses, invertebrate tissue and wetlands will be monitored and compared to the monitoring criteria. In the event that metal concentrations are observed to approach the monitoring criteria, adaptive management would then be initiated to minimize the risk of metal uptake to wildlife	No											
	Sensory Disturbance	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Limit public access to the Project area.	Yes	Noise associated with the mine (machinery, infastructure, traffic, blasting) may disturb waterfowl, potentially causing habitat avoidance, increased stress during breeding periods possibly decreasing reproductive success. However, some acclimation to noise anticipated.	Low	Local	Short-term	Regular	Reversible Short-term	Neutral	Minor	Not Significant	High	Intermediate
						Prohibit human activity along lake and wetland shorelines outside of the Project footprint during the bird breeding season (April 1 to July 31).												
						Minimize sources of noise through noise control measures.												
						Minimize noise associated with haul truck traffic.												
	Combined Effects of the Project (Population level impacts)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure	Adverse											Minor	Not Significant		
Forest Birds Effects Assessment	Habitat Loss or Alteration	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Avoid construction during breeding season (April 1 to July 31). Otherwise pre-construction bird surveys will be conducted to identify and avoid nesting sites.	Yes	Some loss of the nesting territories and habitat of individual birds will occur, but the habitat loss is not expected to affect the population-level carrying capacity of the landscape.	Low	Local	Short-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Intermediate
						Retain snags, downed logs, stumps and other forest features along the transmission line right-of-way to enhance wildlife habitat. Top hazardous trees within or along the transmission line right-of-way or other sites to provide"wildlife trees" for birds.												
						Where possible, design reclamation during mine closure to restore habitat of comparable value to that lost during mine development and operation.												
	Physical Hazards - Mortality (Direct and Indirect)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Moderate	Avoid construction during breeding season (April 1 to July 31). Otherwise pre-construction bird surveys will be conducted to identify and avoid nesting sites.	Yes	Mitigation greatly reduces the risk of however, mortality still may occur from vehicle strikes and construction clearing.	Low	Local	Short-term	Sporadic	Reversible Long-term	Neutral	Negligible	Not Significant	Low	Intermediate
						Minimize potential vehicle-related wildlife mortalities (e.g., speed limits).												
						Limit public access to the mine area.												
						Prohibit grouse hunting within the mine area.												
						Prohibit domestic animals in the mine area.												
						Store and remove all waste and wildlife attractants.												
	Physical Hazards - Disruption of Movement	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Limit human activity to Project footprint area.	Yes	Reluctance for understorey birds to cross paths in forest cover (transmission line corridor, mine roads).	Negligible	Local	Long-term	Sporadic	Reversible Long-term	Neutral	Negligible	Not Significant	Low	Intermediate

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
						Retain snags, downed logs, stumps, and other forest features along the transmission line right-of-way to enhance wildlife habitat. Top hazardous trees within or along the transmission line right-of-way or other sites to provide "wildlife trees" for birds.												
						Where possible, design reclamation during mine closure to restore habitat of comparable value to that lost dunng mine development and operation.												
	Chemical Hazards and Attractants	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible	If wildlife is found to be drinking, eating, or using water or vegetation within the TSF during the closure or post closure phases, invertebrate tissue and wetlands will be monitored and compared to the monitoring cntena. In the event that metal concentrations are observed to approach the monitoring criteria, adaptive management would then be initiated to minimize the risk of metal uptake to wildlife.	No											
	Sensory Disturbance	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Avoid construction during breeding season (April 1 to July 31). Otherwise pre-construction bird surveys will be conducted to identify and avoid nesting sites.	Yes	Some habitat avoidance surrounding areas of high noise/human use.	Negligible	Local	Short-term	Sporadic	Reversible Short-term	Neutral	Negligible	Not Significant	Low	High
						Set buffer distance around identified nest sites to minimize construction or mine activity disturbance.												
						Limit public access to the Project area.												
						Prohibit unnecessary human activity outside of the Project footprint, particularly during the bind breeding season (April 1 to July 31).												
						Minimize sources of noise through noise control measures.												
						Minimize noise associated vwth haul truck traffic.												
						Direct lighting to minimize potential attractiveness to birds to reduce bird strikes against lit infrastructure.												
	Combined Effects of the Project (Population level impacts)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning												Negligible	Not Significant		
	Habitat Loss or Alteration	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Conduct a survey for raptors nests before construction and site clearing of the mine area and new roads to identify and avoid raptor nests, and avoid contravening the BC *Wildlife Act* Section 34(1b).	Yes	Loss or alteration of habitat	Low	Local	Long-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Intermediate
						Retain snags, downed logs, stumps, and other forest features along the transmission line right-of-way to enhance wildlife habitat. Top hazardous trees within or along the transmission line right-of--way or other sites to provide "wildlife trees" for birds.												
						Where possible, design reclamation during mine closure to restore habitat of comparable value to that lost during mine development and operation.												
	Physical Hazards - Mortality (Direct and Indirect)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Conduct a survey for raptor nests before construction and site clearing of the mine area and new roads to identify and avoid clearing a tree containing a raptor nest, and avoid contravening the BC Wildlife Act, Section 34(1b)	Yes	Electrocutions with transmission line expected at low levels post mitigation; possible vehicle strikes with mitigation.	Negligible	Local	Long-term	Sporadic	Reversible Long-term	Low	Negligible	Not Significant	Low	Intermediate
						Minimize potential vehicle-related raptor mortalities through speed limits, no littering policy, and road carrion removal.												
						Minimize bird electrocutions by deterring nest building or perching on power poles through design considerations.												
						Limit public access to the mine area.												
						Prohibit domestic animals in the mine area.												
						Store and remove all waste and wildlife attractants.												
	Physical Hazards - Disruption of Movement	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible		No											
	Chemical Hazards and Attractants	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Negligible	If wildlife is found to be drinking, eating, or using water or vegetation within the TSF during the closure or post-closure phases, invertebrate Issue and wetlands will be monitored and compared to the monitoring criteria. In the event that metal concentrations are observed to approach the monitoring criteria, adaptive management would then be initiated to minimize the risk of metal uptake to wildlife.	No											
	Sensory Disturbance	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning	Adverse	Minor	Conduct breeding bird pre-construction surveys to identify and avoid raptor nesting sites. Set BC Ministry of Environment recommended buffer zones around identified nest sites to minimize construction or mine activity disturbance.	Yes	Intermittent and loud noise may cause raptors to flush from nest	Low	Local	Short-term	Regular	Reversible Short-term	Neutral	Negligible	Not Significant	Low	Intermediate
						Limit public access to the Project area.												
						Prohibit human activity along lake and wetland shorelines outside of the Project footprint during the raptor breeding season (May to August).												
						Minimize sources of noise through noise control measures.												
						Minimize noise associated with haul truck traffic.												

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
						Monitor open it walls during operations to detect and deter potential raptor nesting or nesting activity. If a nest is established along it walls, mining activity (especially blasting) may need to be halted to ensure compliance with the BC Wildlife Act and minimize disturbance to nestng raptors.												
	Combined Effects of the Project (Population level impacts)	Mine Site, Access Road, Transmission Line	Construction, operations, decommissioning, post-closure															
Archaeology Effects Assessment	Potential effects to archaeological site GhSn-3	Mine site	Construction / operations	Neutral	Negligible	This site has been heavily affected by past logging activities, is in poor condition, and is not protected by the. HCA. No further work required.	No											
	Potential effects to archaeological site GhSn-4	Mine site	Construction / operations	Neutral	Negligible		No											
	Potential effects to archaeological site GhSn-5	Transmission Line	Construction / operations	Neutral	Negligible	This site has been heavily affected by past logging activities, is in poor condition, and is not protected by the. HCA. No further work required.	No											
	Potential effects to archaeological site GhSn-7	Mine site	Construction / operations	Adverse	Major	Systematic data recovery will be required at this site prior to construction activities in the TSF.	No											
	Potential effects to as-yet unrecorded archaeological/heritage resources	Mine Site, Access Road, Transmission Line	Construction, operations, closure, post-closure	Adverse	Negligible	Archaeological Chance Find Procedure and Heritage Awareness Training	Yes	Increased human presence near archaeological and heritage sites, both recorded and as yet unrecorded, which could result in adverse effects to the integrity of those sites	Negligible	Local	Long-term	Sporadic	Irreversible	Low	Negligible	Not Significant	Low	High
Land Use Access Effects Assessment	**Lake Babine Nation**																	
	Improved access to part of traditional territory (including consistent year-round accessibility)	Access road	Operations, Post-closure	Beneficial	Minor	None	Yes	Improved access to part of Lake Babine Nation traditional territory during operations and post-closure.	Low	Landscape	Longterm	Continuous	Irreversible	High	Minor	Not Significant	Medium	Intermediate
	Limitations to access part of traditional territory	Access road	Construction, Closure	Adverse	Minor	None	Yes	Use of the access road may be delayed or temporarily closed during road upgrading, and construction/closure at the mine site.	Low	Landscape	Short-term	Sporadic	Reversible short-term	High	Minor	Not Significant	High	High
	Prohibited access to part of traditional territory	Mine site	All phases	Adverse	Minor	None	Yes	Access to the Lake Babine Nation traditional territory that overlaps with the mine lease will be restricted for the life of the Project.	Medium	Local	Long-term	Continuous	Irreversible	High	Moderate	Not Significant	High	High
	Increased road hazards when using access road	Access road	Construction, Operations, Closure	Adverse	Minor	None	Yes	Road upgrading and mine site construction/closure may increase road hazards for Lake Babine Nation road users.	Low	Landscape	Short-term	Continuous	Reversible short-term	High	Minor	Not Significant	Medium	Intermediate
			Post-closure	Adverse	Negligible	None	No	Project-related traffic and road hazards will be minimal during post-closure										
	Canfor																	
	Improved access to forest tenure areas (including consistent year-round accessibility)	Access road	Operations, Post-closure	Beneficial	Moderate	None	Yes	Improved road conditions when accessing tenure areas during operations and post-closure.	Low	Landscape	Long-term	Continuous	Irreversible	High	Minor	Not Significant	High	High
	Limitations to access forest tenure areas	Access road	Construction, Closure	Adverse	Major	None	Yes	Use of the access road may be delayed or temporarily closed during road upgrading, and construction/closure at the mine site.	Low	Landscape	Short-term	Sporadic	Reversible short-term	High	Minor	Not Significant	High	High
	Prohibited access to part of forest tenure (278 ha of strategic blocks)	Mine site	All phases	Adverse	Major		Yes	Inability to access the part of Canfor's tenure overlapping with the mine site due to security and safety.	High	Local	Longterm	Continuous	Irreversible	Low	Major	Not Significant	High	High
	Increased road hazards when using access road	Access road	Construction, Operations, Closure	Adverse	Minor	None	Yes	Road upgrading and mine site construction/closure may increase road hazards for other forestry companies.	Low	Landscape	Short-term	Continuous	Reversible short-term	High	Minor	Not Significant	High	High
			Post-closure		Negligible	None	No	Project-related traffic and road hazards will be minimal during monitoring.										
	Tukii Lodge Hunting Camp																	
	Improved access to Tukii Hunting Camp and tenured outfitting area (including consistent year-round accessibility)	Access road	Operations, Post-closure	Beneficial	Minor	None	Yes	Improved road conditions and consistent year-round access to tenured outfitting area	Low	Landscape	Long-term	Continuous	Irreversible	High	Minor	Not Significant	Medium	Intermediate
	Limitations to access to Tukii Hurling Camp and tenured oufftifing areas	Access road	Construction, Closure	Adverse	Negligible	None	No	Guide outfitters do not currently use the road for access to the area.								Not Significant		
	Prohibited access to Tukii Hunting Camp and tenured outfitting area overlapping with the mine site	Mine site	All phases	Adverse	Moderate	Reach mutually agreeable terms of accommodation	Yes	Guide outfitter currently uses the area in and around the mine site to hunt moose and black bear.	Medium	Landscape	Long-term	Continuous	Reversible	Low	Moderate	Not Significant	High	High
	Increased road hazards when using access road	Access road	All phases	Adverse	Negligible	None.	No	Guide outfitters do not currently use the road for area access										
	Ookpik Lodge																	
	Improved access to lodge (including consistent year-round accessibility)	Access road	Operations, Post-closure	Beneficial	Minor	None.	Yes	Improved road conditions and consistent year-round access to lodge.	Low	Local	Long-term	Continuous	Irreversible	High	Minor	Not Significant	High	High
	Limitations to accessing the lodge	Access road	Construction, Closure	Adverse	Negligible	None.	No	Owners do not currently use the road for access to their lodge										
	Increased road hazards when using access road	Access road	All phases	Adverse	Negligible	None.	No	Owners do not currently use the road for access to their lodge										
	Mineral Developers																	
	Improved access to mineral development sites/activities (including consistent year-round accessibility)	Access road	Operations, Post-closure	Beneficial	Minor	None.	Yes	Improved road conditions when accessing claims during operations and post closure.	Low	Local	Longterm	Continuous	Irreversible	High	Minor	Not Significant	High	High
	Limitations to access to mineral development sites/activities	Access road	Construction, Closure	Adverse	Minor	None.	Yes	Use of the access road may be delayed or temporarily closed during road upgrading, and construction/closure at the mine site.	Low	Local	Short-term	Sporadic	Reversible short-term	High	Minor	Not Significant	High	High
	Prohibited access to mineral claim overlapping with the waste management facility	Mine site	All phases	Adverse	Major	In cooperation with BC MEMPR's claim resolution process, PBM to obtain rights tone mineral claim tenure area currently held by Mr. Keith Morris.	No	Ownership of mineral claim directly overlapping with the waste management facilitywill be transferred to PBM.										
	Increased road hazards when using access road	Access road	Construction, Operation, Closure	Adverse	Minor	None.	Yes	Road upgrading and mine site construction/closure may increase road hazards for other mineral developers.	Low	Landscape	Short-term	Sporadic	Reversible short-term	Medium	Minor	Not Significant	High	High
	Increased road hazards when using access road closure	Access road	Construction, Operation, Closure	Adverse	Minor	None	Yes	Road upgrading and mine site construction/closure may increase road hazards for other mineral developers	Low	Landscape	Short-term	Sporadic	Reversible	Medium	Minor	Not Significant	High	High
			Post-closure		Negligible	None	No	Project-related traffic and road hazards will be minimal during post-closure										
	Trapline Tenure Holders																	
	Improved access to trapline (Including consistent year-round accessibility)	Access road	Operations, Post-closure	Beneficial	Negligible	None	No	Trappers do not currently use the mine site area, which has been in use for decades										
	Limitations to access to trapline	Access road	Construction, Closure	Adverse	Negligible	None	No	Trappers do not currently use the mine site area, not in use for decades										
	Prohibited access to the area of the trapline tenure that overlaps with the mine site	Mine site	All phases	Adverse	Negligible	None	No	Trappers do not currently use the mine site area, which has been in use for decades										
	Increased road hazards when using access road	Access road	All phases	Adverse	Negligible	None	No	Trappers do not currently use the mine site area, not in use for decades										

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	Resident Hunters																	
	Improved access to hunting areas, especially mouth of Morrison Creek (including consistent year-round accessibility)	Access road, transmission line	Operations, Post-closure	Beneficial	Minor	None	Yes	Improved road conditions when accessing hunting areas	Low	Landscape	Long-term	Continuous	Irreversible	High	Minor	Not Significant	Medium	High
	Limitations to access hunting areas, especially the mouth of Morrison Creek	Access road, transmission line	Construction, Closure	Adverse	Minor	None.	Yes	Use of the access road may be delayed or temporarily closed during road upgrading, and construction/closure at the mine site.	Low	Landscape	Short-term	Sporadic	Reversible short-term	High	Minor	Not Significant	High	High
	Limitations to access hunting areas, especially the mouth of Morrison Creek	Access road, transmission line	Construction, Closure	Adverse	Minor	None	Yes	Use of the access road may be delayed or temporarily closed during road upgrading, and construction/closure at the mine site.	Low	Landscape	Short-term	Sporadic	Reversible short-term	High	Minor	Not Significant	High	High
	Increased road hazards when using access mad	Access road	Construction, Operations, Closure	Adverse	Minor	None.	Yes	Road upgrading and mine site construction/closure may increase road hazards for resident hunters.	Low	Landscape	Short-term	Sporadic	Reversible short-term	Medium	Minor	Not Significant	High	High
			Post-closure		Negligible	None.	No	Project-related traffic and road hazards will be minimal during monitoring.										
	Ministry of Environment - Conservation Office (re: regulating poachers)																	
	Improved access for poachers to wildlife-abundant areas (including consistent year-round accessibility)	Access road, transmission line	Operations, Post-closure	Adverse	Minor	None	Yes	Improved road conditions and year-round accessibility may increase the number of poaching incidents in the primary study area	Low	Landscape	Long-term	Continuous	Reversible short-term	Medium	Moderate	Not Significant	Medium	Intermediate
	Limitations to access for poachers to wildlife-abundant areas	Access road, transmission line	Construction, Closure	Beneficial	Minor	None	No											
Quality of Experience Effects Assessment	**Lake Babine Nation**																	
	Increased noise levels from mine-related activities and haul truck traffic affect quality of experience	Mine site, Access road (within 1.5 km)	Construction, Operations, Closure	Adverse	Minor	None	Yes	The aesthetic quality of land long-term use activities may be diminished by noise associated with the mine during construction and operations	Medium	Landscape	Long-term	Sporadic	Reversible	Neutral	Moderate	Not Significant	High	Intermediate
	Increased presence of dust and other air pollutants diminishes aesthetic quality of experience	All components	Construction, Operations, Closure	Adverse	Minor	None	Yes	The aesthetic quality of land use activities may be diminished by the resulting dust associated with the access road during construction and operations	Low	Landscape	Long-term	Continuous	Reversible Long-term	Neutral	Minor	Not Significant	High	Intermediate
	Diminished drinking water quality	Mine site	All phases	Adverse	Minor	None	Yes	Increased cosmetic and long-tens aesthetic effects of the drinking water	Low	Local	Long-term	Continuous	Reversible	High	Minor	Not Significant	Low	Low
	Diminished visual quality	Mine Site	Construction, Operations, Closure	Adverse	Minor	None	Yes	The quality of land use activities may be diminished by visual obstructions and disruptions from mine infrastructre and activities.	Medium	Local	Long-term	Continuous	Irreversible	Neutral	Moderate	Not Significant	Medium	High
	Diminished visual quality	Transmission line	Construction, Operations, Closure	Adverse	Negligible	None	No											
	Increased third-party presence	All components	All phases	Adverse	Minor	None	Yes	Increased interest in the long-term Project area due to increased accessibility by new land users	Low	Landscape	Long-term	Seasonal	Reversible	Low	Minor	Not Significant	Medium	Intermediate
	Decreased noise levels related to an absence of mine-related activities allows resumption of quality of land use experience	Mine site, Access road (within 1.5 km)	Post-closure	Beneficial	Negligible	None	No											
	Decreased presence of dust and other air pollutants enhance aesthetic quality of experience	All components	Post-closure	Beneficial	Negligible	None	No											
	Improved visual quality	Mine Site	Post-closure	Beneficial	Minor	None	Yes	The quality of land use activities may improve based on a cessation of industrial activities and decommissioning of infrastructure. However, tailings facility and the open pit will remain.	Medium	Local	Long-term	Continuous	Irreversible	Neutral	Minor	Not Significant	Medium	High
	Improved visual quality	Transmission Line	Post-closure	Beneficial	Negligible	None	No											
	Tukii Lodge Hunting Camp																	
	Increased noise levels from mine-related activities affects quality of experience	Mine site (within 15 km)	Construction, Operations, Closure	Adverse	Major	None	Yes	The aesthetic quality of land use activities may be diminished by noise associated with the mine during construction and operations	High	Local	Long-term	Continuous	Reversible long-term	Low	Moderate	Not Significant	High	High
	Increased noise levels from haul truck traffic affects quality of experience	Access road (within 15 km)	Construction, Operations, Closure	Adverse	Negligible	None	No											
	Increased presence of dust and other air pollutants diminishes aesthetic quality of experience	Mine Site	Construction, Operations	Adverse Minor		None	Yes	The aesthetic quality of land use activities may be diminished by the resulting dust associated with the access road during construction and operations	High	Local	Long-term	Continuous	Reversible long-term	Low	Major	Not Significant	High	High
	Increased presence of dust and other air pollutants diminishes aesthetic quality of experience	Access road, transmission line	Construction, Operations	Adverse	Negligible	None	No											
	Diminished drinking water quality	Mine Site	All phases	Adverse	Major	Reach mutually agreeable terms of accommodation	Yes	Increased cosmetic and aesthetic effects of the drinking water	High	Local	Long-term	Continuous	Irreversible	Low	Major	Not Significant	Medium	Intermediate
	Diminished visual quality	Mine Site	Construction, Operations	Adverse	Moderate	None	Yes	The quality of land use activities may be diminished by visual obstructions and disruptions from mine infrastructre and activities.	Low	Local	Long-term	Continuous	Reversible long-term	Low	Moderate	Not Significant	High	High
	Diminished visual quality	Transmission line	Construction, Operations	Adverse	Negligible	None	No											
	Increased third party presence (e.g., boaters and new land users)	All components	All phases	Adverse	Moderate	None	Yes	Increased interest in the project area due to increased accessibility by new land users	Low	Landscape	Long-term	Continuous	Reversible long-term	Low	Moderate	Not Significant	Medium	Intermediate
	Decreased noise levels related to an absence of mine-related activities allows resumption of quality of land use experience	Mine site, Access road (within 1.5 km)	Post-closure	Beneficial	Negligible	None	No											
	Decreased presence of dust and other air pollutants enhance aesthetic quality of experience	Mine Site	Post-closure	Beneficial	Negligible	None	No											
	Decreased presence of dust and other air pollutants enhance aesthetic quality of experience	Access road, transmission line	Post-closure	Beneficial	Negligible	None	No											
	Improved visual quality	Mine Site	Closure, Post-closure	Beneficial	Negligible	None	No											
	Improved visual quality	Transmission Line	Closure, Post-closure	Beneficial	Negligible	None	No											
	Ookpik Lodge																	
	Increased noise levels from mine-related activities affects quality of experience	Mine site (within 1.5 km)	Construction, Operations, Closure	Adverse	Negligible	None	No											
	Increased noise levels from haul truck traffic affects quality of experience	Access road (within 1.5 km)	Construction, Operations, Closure	Adverse	Minor	None	No											
	Decreased noise levels related to an absence of mine-related activities allows resumption of quality of land use experience	Access road (within 1.5 km)	Post-closure	Beneficial	Negligible		No											
	Increased presence of dust and other air pollutants diminishes aesthetic quality of experience	Access road	Construction, Operations	Adverse	Negligible	None	No											
	Decreased presence of dust and other air pollutants enhance aesthetic quality of experience	Access road	Post-closure	Beneficial	Negligible	None	No											
	Diminished drinking water quality	Mine site	All phases	Adverse	Negligible	None	No											
	Diminished visual quality	Access road, transmission line	Construction, Operations	Adverse	Negligible	None	No											
	Improved visual quality	Access road, transmission line	Closure, Post-closure	Beneficial	Negligible	None	No											
	Increased third party presence	All components	All phases	Adverse	Negligible	None	Yes	Increased interest in the Project area due to increased accessibility by new land users	Low	Landscape	Long-term	Continuous	Reversible long-term	Low	Minor	Not Significant	Medium	Intermediate
	Registered Hunters																	

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	Increased noise levels from mine-related activities and haul truck traffic affect quality of experience	Mine site, Access road (within 1.5 km)	Construction, Operations, Closure	Adverse	Minor	None	Yes	The aesthetic quality of land short-term use activities may be diminished by noise associated with the mine during construction and operations	Low	Landscape	Short-term	Sporadic	Reversible	Neutral	Minor	Not Significant	High	Intermediate
	Increased presence of dust and other air pollutants diminishes aesthetic quality of experience	All components	Construction, Operations, Closure	Adverse	Minor	None	Yes	The aesthetic quality of land use activities may be diminished by the resulting dust associated with the access road during construction and operations	Low	Landscape	Long-term	Continuous	Reversible Long-term	Neutral	Minor	Not Significant	High	Intermediate
	Diminished drinking water quality	Mine Site	All phases	Adverse	Minor	None	Yes	Increased cosmetic and aesthetic effects of the drinking water	Low	Local	Long-term	Continuous	Irreversible	High	Minor	Not Significant	Medium	Low
	Diminished visual quality	Mine Site	Construction, Operations, Closure	Adverse	Minor	None	Yes	The quality of land use activities may be diminished by visual obstructions and disruptions from mine infrastructre and activities.	Low	Local	Longterm	Continuous	Irreversible	Neutral	Moderate	Not Significant	Medium	High
	Diminished visual quality	Transmission Line	Construction, Operations, Closure	Adverse	Negligible	None	Yes	The quality of land use activities may be diminished by visual obstructions and disruptions from mine infrastructre and activities.	Low	Landscape	Long-term	Continuous	Reversible Long-term	Neutral	Minor	Not Significant	Medium	High
	Increased third party presence	All components	All phases	Adverse	Minor	None	Yes	Increased interest in the project area due to increased accessibility by new land users	Low	Landscape	Long-term	Seasonal	Reversible Long-term	Low	Minor	Not Significant	Medium	Intermediate
	Decreased noise levels related to an absence of mine-related activities allows resumption of quality of land use experience	Mine site (within 1.5 km)	Post-closure	Beneficial	Negligible	None	No											
	Decreased presence of dust and other air pollutants enhance aesthetic quality of experience	All components	Host closure	Beneficial	Negligible	None	No											
	Improved visual quality	Mine Site	Post-closure	Adverse	Minor	None	Yes	The quality of land use activities may improve based on a cessation of industrial activities and decommissioning of infrastructure. However, tailings facility and the open pit will remain.	Medium	Local	Long-term	Continuous	Irreversible	Neutral	Minor	Not Significant	Medium	High
	Improved visual quality	Transmission Line	Post-closure	Beneficial	Negligible	None	No											
Quantity of Resources Effects Assessment																		
	Lake Babine Nation																	
	Decreased presence of moose due to human and sensory avoidance	Mine Site, Access Road	Construction	Adverse	Moderate	None	Yes	Construction activity and industrial presence may temporarily decrease the number of moose available for harvest by Lake Babine Nation members during construction	Medium	Landscape	Short-term	Continuous	Reversible short-term	High	Moderate	Not Significant	Medium	Low
	Increased presence of moose due to shift in distribution	All components	Operations	Beneficial	Moderate	None	Yes	Moose may return to the long-term area in and around the mouth of Morrison Creek during operations, which will increase the moose available for Lake Babine Nation harvest	Medium	Landscape	Long-term	Continuous	Reversible Long-term	High	Moderate	Not Significant	Medium	Low
	Increased presence of moose due to shift in distribution	All components	Closure, Post-closure	Beneficial	Minor	None	Yes	Moose population may increase due to a decline in mine-related activity and industrial presence. This may increase the moose available for Lake Babine Nation harvest.	Medium	Landscape	Long-term	Continuous	Reversible Long-term	High	Minor	Not Significant	Medium	Low
	Permanent loss of vegetative country food harvest capability (810 ha)	Mine Site, Transmission Line	All phases	Adverse	Minor	None	Yes	Installation of mine infrastructure and construction of components will require permanent removal of vegetation, resulting in loss of Lake Babine Nation vegetative harvest in perpetuity.	Low	Local	Far Future	Continuous	Irreversible	Neutral	Minor	Not Significant	High	Intermediate
	Temporary loss of vegetative country food harvest capability (817 ha)	Mine Site, Transmission Line	Construction, Operations	Adverse	Negligible	None	No											
	Increase in the availability of vegetative country foods	Transmission Line	Operations	Beneficial	Minor	None	Yes	Typically, transmission line right of ways (once cleared) regrow with berry-bearing plants, which will increase Lake Babine Nation vegetative harvest capacity	Low	Local	Long-term	Continuous	Reversible long-term	High	Minor	Not Significant	High	High
	Degraded abundance and quality of vegetative country food	All components, esp Access Road	Construction, Operations	Adverse	Moderate	None	Yes	Presence of industrially-generated dust during construction and operations will negatively affect the quality and quantity of vegetation along the Access Road available for Lake Babine Nation harvest	Medium	Local	Long-term	Continuous	Reversible Long-term	Neutral	Moderate	Not Significant	High	High
	Maintenance of fish harvest levels due to negligible effects of the Project on fish habitat	All components	All phases	Beneficial	Negligible	None	No											
	Decreased presence of moose due to human and sensory avoidance	Mine Site, Access Road	Construction	Adverse	Moderate	None	Yes	Construction activity and industrial presence may temporarily decrease the number of moose available for harvest by Lake Babine Nation members during construction	High	Landscape	Short-term	Continuous	Reversible short-term	Low	Moderate	Not Significant	Medium	Low
	Tukii Lodge Hunting Canp																	
	Decreased presence of moose due to human and sensory avoidance	Mine Site, Access Road	Construction	Adverse	Moderate	None	Yes	Construction activity and industrial presence may temporarily decrease the number of moose available for harvest by Lake Babine Nation members during construction	High	Landscape	Short-term	Continuous	Reversible Short-term	Low	Moderate	Not Significant	Medium	Low
	Increased presence of moose due to shift in distribution, especially near mouth of Morrison Creek	All components	Operations	Beneficial	Minor	None	Yes	Moose may return to the long-term area in and around the mouth of Morrison Creek during operations, which will increase the moose available for harvest	Medium	Landscape	Longterm	Continuous	Reversible long-term	High	Minor	Not Significant	Medium	Low
	Increased presence of moose due to shift in distribution, especially near mouth of Morrison Creek	All components	Closure, Post-closure	Beneficial	Negligible	None	No											
	Maintenance of fish harvest levels due to negligible effects of the Project on fish habitat	All components	All phases	Beneficial	Negligible	None	No											
	Ookpik Lodge																	
	Decreased presence of moose due to human and sensory avoidance	Access road, transmission line	Construction	Adverse	Minor	None	Yes	Construction activity and industrial presence may temporarily decrease the number of moose available for wildlife viewing during construction	Low	Local	Short-term	Continuous	Reversible short-term	Low	Minor	Not Significant	Medium	Low
	Decreased presence of moose due to human and sensory avoidance	Access Road, Transmission Line	Construction	Adverse	Minor	None	Yes	Constructor activity and industrial presence may temporarily decrease the number of moose available for wildlife viewing during construction	Low	Local	Short-term	Continuous	Reversible short-term	Low	Minor	Not Significant	Medium	Low
	Increased presence of moose population for wildlife viewing due to attraction to mine components	Access Road, Transmission Line	Operations, Closure, Post-closure	Beneficial	Minor	None	Yes	Moose may return to the area in and around the mouth of Morrison Creek during operations, which will increase the moose available for wildlife viewing	Low	Local	Long-term	Continuous	Reversible Long-term	High	Minor	Not Significant	Medium	Low
	Trapline Holders																	
	Maintenance of marten population levels for harvesting	All components	All phases	Beneficial	Negligible	None	No											
	Registered Hunters																	
	Decreased presence of moose due to human and sensory avoidance	Mine Site, Access Road	Construction	Adverse	Minor	None	Yes	Construction activity and industrial prey may temporarily decrease the number of moose available for harvest during construction	Low	Landscape	Short-term	Continuous	Reversible short-term	High	Minor	Not Significant	Medium	Low
	Increased presence of moose due to shift in distribution	All components, esp Transmission Line	Operations, Closure, Post-closure	Beneficial	Minor	None	Yes	Moose may return to the area in and around the mouth of Morrison Creek during operations, which will increase the moose available for harvest	Low	Landscape	Long-term	Continuous	Reversible long-term	High	Minor	Not Significant	Medium	Low

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	Canfor																	
	Outstanding forestry tenure obligations for free growing impede Canfor's ability to harvest timber in the areas of overlap.	All components	Construction	Adverse	Moderate	Discussions with Ministry of Forestry and Range to discuss release of Canfor's forestry obligation.	No											
	Harvest of strategic blocks BEFORE or DURING Project construction	All components	Construction	Beneficial	Negligible	Coordinate with forest tenure holder as to the timing and locations of timber removal. Compensation if project proceeds before fall 2010.	No											
	Harvest of strategic blocks AFTER Project construction			Adverse	Major		Yes	Major loss to merchantable timber	High	Landscape	Short-term	One time	Irreversible	Neutral	Major	Not Significant	Unknown	Intermediate
	Inability to develop, and/or harvest timber stands due to continuous vegetation suppression and management.	Mine site	Operations	Adverse	Moderate	Compensation for loss of harvestable timber stands or transfer of forest tenure to PBM over the 21 years of operations.	Yes	The Project footprint will not be available for harvest of merchantable timber. There will be temporary and permanent loss of timber.	Medium	Local	Long-term	Continuous	Reversible long-term	Neutral	Moderate	Not Significant	Medium	Low
	Regrowth of timber stands within tenure area for future harvest.	All components	Closure, Post-closure	Beneficial	Negligible	Coordinate with forest tenure holder as to the timing and locations of revegetation efforts.	Yes	The area in and around the Project footprint will once again be viable for timber harvesting, although some areas will be permanently lost.	Low	Landscape	Long-term	Continuous	Reversible long-term	Neutral	Minor	Not Significant	Medium	Low
	Angling Guides and Registered Anglers																	
	Maintenance of fish harvest levels due to negligible effects of the Project on fish habitat (e.g., Lake Trout and Sockeye Salmon).	All components	All phases	Adverse	Negligible	Work with angling guides, resident and Aboriginal anglers to develop a Fisheries Management Plan.	No											
	Ministry of Environment - Conservation Office																	
	Decreased poaching interest in the area due to a decrease in presence of moose due to human and sensory avoidance	All components	Construction	Beneficial	Moderate	None	Yes	Availability of moose drives the level of poaching interest and the necessary Conservation Office enforcement levels. A decrease in moose during construction may result in lower levels of poaching, and, as such, fewer Conservation Office resources to enforce hunting regulations and licensing.	Medium	Landscape	Short-term	Continuous	Reversible short-term	High	Moderate	Not Significant	Medium	Low
	Increased poaching interest in the area due to increased presence of moose, especially at the mouth of Morrison Creek	All components, esp Transmission Line	Operations, Closure, Post-closure	Adverse	Moderate	None	Yes	An increase in moose during operations may create increased poaching interest, which will necessitate increased Conservation office resources to regulate.	Medium	Landscape	Long-term	Continuous	Reversible long-term	Low	Moderate	Not Significant	Medium	Low
	Lake Babine Nation																	
	Increased capability to practice traditional activities due to increase in financial resources.	Human Resources	Construction, operations	Beneficial	Minor	None	Yes	Increased incomes to enable purchasing of fuel and equipment for traditional land use activities.	Low	Individual	Long-term	Regular	Reversible Long-term	Neutral	Minor	Not Significant	High	High
Cultural Values Effects Assessment	**Lake Babine Nation**																	
	Increased capability to practice traditional activities due to increase in financial resources.	Human Resources	Construction, operations	Beneficial	Minor	None	Yes	Increased incomes to enable purchasing of fuel and equipment for traditional land use activities.	Low	Individual	Long-term	Regular	Reversible Long-term	Neutral	Minor	Not Significant	High	High
	Decreased opportunity to practice traditional activities due to employment scheduling conflicts.	Human Resources	Construction, operations	Adverse	Moderate	None	No	If employees' schedules are flexible in this sense, no residual effects are expected.										
	Decreased opportunity to practice traditional activities due to decline in financial resources	Human Resources	Closure, post-closure	Adverse	Minor	None	No											
	Decreased transfer of TEK about the Project area between generations of Lake Babine Nation members, including population trends, movement patterns, management strategies, and species-specific habitat suitability needs	All components	All phases	Adverse	Minor	None	Yes		Low	Community	Long-term	Regular	Irreversible	Low	Minor	Not Significant	Medium	Intermediate
	Loss of knowledge and expertise regarding specific traditional land uses, including trapping, hunting, and plant gathering.	All components	All phases	Adverse	Minor	None	Yes		Low	Community	Long-term	Regular	Irreversible	Low	Minor	Not Significant	Medium	Intermediate
	Loss or degradation of culturally-sensitive areas	All components	Al phases	Adverse	Moderate	None	Yes	The access road may overlap with extremely sensitive areas, but both the mine site and road are areas of existing/prior use.	Medium	Local	Longterm	Continuous	Irreversible	Low	Moderate	Not Significant	Medium	Low
	Increased intra-Lake Babine Nation disagreement regarding the clan ownership of the area in the vicinity of the Project	All components	All phases	Adverse	Minor	None.	Yes		Low	Community	Short-term	Regular	Reversible short-term	Low	Minor	Not Significant	High	Intermediate
	Decreased spiritual/cultural connection to the land	All components	All phases	Adverse	Minor	None.	Yes	Increased industrial development in the area may affect some First Nations residents' spiritual/cultural connection with the land.	Low	Community	Longterm	Regular	Reversible long-term	Low	Minor	Not Significant	Medium	Intermediate
Management Objectives Effects Assessment	**Morice LRMP**																	
	Project conflicts with cultural heritage resources objectives	All components	Construction, Operations, Closure	Adverse	Minor	TBC - arch	Yes	TU sites, no significant new impacts.	Low	Local	Longterm	Continuous	Reversible long-term	High	Minor	Not Significant	Low	Low
	Project conflicts with hunting and fishing objectives	All components	Construction, Operations, Closure	Adverse	Minor	TBC - wildlife, aquatics (fish, game and furbearer populations)	Yes		Low	Local	Long-term	Continuous	Reversible long-term	High	Minor	Not Significant	High	High
	Project conflicts with recreation objectives	All components	Construction, Operations, Closure	Adverse	Minor	TBC - reevaluate based on other final effects.	Yes		Low	Local	Longterm	Continuous	Reversible long-term	High	Minor	Not Significant	Medium	High
	Support for access objectives	All components	Construction, Operations, Closure	Beneficial	Minor	Work with ILMB (as well as Lake Babine Nation, guide outfitters and interest groups) to develop an access management plan for the road.	No	The area is already accessible via the existing road with an effective access management plan, these objectives should not be affected.										
	Project conflictswith botanical forest products objectives	All components	Construction, Operations, Closure	Adverse	Minor	TBC - veg	Yes		Low	Local	Long-term	Continuous	Reversible long-term	High	Minor	Not Significant	High	High
	Project conflicts with guide outfitting objectives	All components	Construction, Operations, Closure	Adverse	Minor	TBC - wildlife a quatics (fish, game and furbearer populations)	Yes		Medium	Local	Long-term	Continuous	Reversible long-term	Low	Moderate	Not Significant	High	High
	Support for mineral and energy resource objectives	All components	Construction, Operations, Closure	Beneficial	Major	None	Yes	The project will support the mineral resource objectives of the LRMP.	High	Regional	Long-term	Continuous	Reversible long-term	High	Moderate	Not Significant	High	High
	Project conflicts with timber objectives	All components	Construction, Operations, Closure	Adverse	Minor	Work with forestry tenure holders to develop a timber supply management plan.	Yes		Medium	Local	Longterm	Continuous	Reversible long-term	Neutral	Moderate	Not Significant	High	High
	Project is neutral towards trapping objectives	All components	Construction, Operations, Closure	Negligible	Neutral	Work with trapline tenure holders to develop a wildlife management plan.	No											
Employment and Income Effects Assessment	**Effect 1**																	
	Increase in employment	Human Resources																
	Directly hiring a workforce, indirect supplier hiring, and induced hiring in response to new consumption from direct and indirect employee wages.	Granisle, Topley Landing, Smithers Landing, Topley, Burns Lake, Houston, and Telkwa	Construction	Beneficial	Minor	Hire a Human Resources Manager; Local hiring policies (30% local minimum hiring target); Local job/business fairs; Apprenticeships, mentorships, and on-the-job-training programs	Yes	Increased local employment	High	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	High	Intermediate
			Operations	Beneficial	Minor		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	High	Intermediate
			Decommissioning, post-closure	Beneficial	Negligible		No											
		Human Resources	Construction	Beneficial	Moderate		Yes	Increased local employment	High	Community	Short-term	Continuous	Reversible Short-term	Neutral	Major	Not Significant	High	Intermediate
		Lake Babine Nation communities and Smithers	Operations	Beneficial	Moderate		Yes		High	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Major	Not Significant	High	Intermediate
			Decommissioning, post-closure	Beneficial	Negligible		No											
	Effect 2																	
	Decrease in employment	Human Resources					Yes											
	Loss of direct, indirect, and induced employment (lay offs).	Granisle, Topley Landing, Smithers Landing, Topley, Burns	Operations	Adverse	Negligible	Career counselling; Skills transfer and employment	No											

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		Lake, Houston, and Telkwa	Decommissioning/post-closure	Adverse	Minor	transition workshops; Retraining programs; Information kits preparing for mine closure; Documenting and tracking skills and certifications; Written and/or phone references	Yes	Mitigation prevents loss in employment from being as significant as initial post-enhancement increase	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	High	Low
		Human Resources																
		Lake Babine Nation communities and Smithers	Operations	Adverse	Negligible		No											
			Decommissioning/post-closure	Adverse	Moderate		Yes	Mitigation prevents loss in employment from being as significant as initial post-enhancement increase	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	High	Low
	Effect 3																	
	Increase in income	Human Resources																
	Paying wages and salaries to direct, indirect, and induced employees.	Granisle, Burns Lake, Houston, Smithers, and Telkwa	Construction	Beneficial	Minor	Hire a Human Resources Manager; Local hiring policies (30% local minimum hiring target); Local job/business fairs; Apprenticeships, mentorships, and on-the-job-training programs; Financial management training	Yes	Increased local employment	High	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
			Operations	Beneficial	Minor		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		No											
		Human Resources																
		Lake Babine Nation communities, Topley Landing, Smithers Landing, and Topley	Construction	Beneficial	Moderate		Yes	Increased local employment	High	Community	Short-term	Continuous	Reversible Short-term	Neutral	Major	Not Significant	Medium	Intermediate
			Operations	Beneficial	Moderate		Yes		High	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Major	Not Significant	Medium	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		No											
	Effect4																	
	Decrease in income	Human Resources																
	Ceasing paying wages and salaries to direct, indirect, and induced employees.	Granisle, Burns Lake, Houston, Smithers, and Telkwa	Operations	Adverse	Negligible	Career counselling; Skills transfer and employment transition workshops; Retraining programs; Information kits preparing for mine closure; Documenting and tracking skills and certifications; Written and/or phone references; Financial management training	No											
			Decommissioning/post-closure	Adverse	Minor		Yes	Mitigation prevents loss in employment from being as significant as initial post-enhancement increase	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
		Human Resources																
		Lake Babine Nation communities, Topley Landing, Smithers Landing, and Topley	Operations	Adverse	Negligible		No											
			Decommissioning/post-closure	Adverse	Moderate		Yes	Mitigation prevents loss in employment from being as significant as initial post-enhancement increase	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Low
	Effect 5																	
	Variable access to employment and income	Human Resources																
	Unequal opportunities across genders, ethnicities, cultures, ages, and abilities due to pre-existing socio-cultural issues.	Lake Babine Nation communities	Construction	Adverse	Moderate	Equal opportunity and anti-discrimination policy	Yes	Variable access to employment and income	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
			Operations	Adverse	Moderate		Yes		Negligible	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Low
		Human Resources																
		Burns Lake, Houston, Smithers, Topley Landing, Smithers Landing, Topley, and Telkwa	Construction	Adverse	Minor		Yes	Variable access to employment and income	Negligible	Community	Short-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Low
			Operations	Adverse	Minor		Yes		Negligible	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Low
Education, Skills, and Training Effects Assessment	**Effect 1**																	
	Increase in skills base	Human Resources																
	Incentive for unskilled locals to obtain job-specific skills; Project employees obtain on-the-job training and experience; individuals with skills and experience are attracted to the Project area by employment opportunities.	Lake Babine Nation communities	Construction	Beneficial	Minor	Skills development and training programs and partnerships; Scholarships and awards for local students; Apprenticeships, mentorships, and on-the-job-training programs; Skills inventory and needs assessment survey; Provision of professional support for mining-specific education programs	Yes	Increase in labour and skills base	High	Community	Short-term	Continuous	Reversible Short-term	Neutral	Major	Not Significant	High	Intermediate
			Operations	Beneficial	Minor		Yes		High	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Major	Not Significant	High	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		Yes		Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
		Human Resources																
		Granisle, Burns Lake, Houston, and Smithers	Construction	Beneficial	Minor		Yes	Increase in labour and skills base	High	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	High	Intermediate
			Operations	Beneficial	Minor		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	High	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		Yes		Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
		Human Resources																
		Topley Landing, Smithers Landing, Topley and Telkwa	Construction	Beneficial	Negligible		Yes	Increase in labour and skills base	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Operations	Beneficial	Negligible		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		Yes		Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
	Effect 2																	
	Decrease in skills base	Human Resources																
	Out-migrating skilled labour at closure; loss of incentive for education and training.	Lake Babine Nation communities, Granisle, Burns Lake, and Houston	Decommissioning/post-closure	Adverse	Negligible	Skills development, training programs and partnerships; Skills transfer and employment transition workshops; Retraining programs	Yes	Decrease in labour and skills base	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Intermediate
	Effect3																	
	Increased demand for training and skill development resources	Human Resources																
	Increased demand for locally available education and training programs and resources.	Granisle, Topley Landing, Smithers Landing, Topley and Telkwa	Construction	Beneficial	Minor	Skills development and training programs and partnerships; Scholarships and awards for local students; Apprenticeships, mentorships, and on-the-job-training programs; Skills inventory and needs assessment survey; Provision of professional support for mining-specific education programs	Yes	Increased demand for training and skill development	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Operations	Beneficial	Minor		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
		Human Resources																
		Lake Babine Nation communities, Topley Landing, Houston, and Smithers	Construction	Beneficial	Minor		Yes	Increased demand for training and skill development	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
			Operations	Beneficial	Minor		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
	Effect4																	
	Decreased demand for training and skill development resources	Human Resources																
	Decreased demand for locally available education and training programs and resources.	Lake Babine Nation communities, Granisle, Topley Landing, Burns Lake, Houston, Smithers Landing, Topley and Telkwa	Decommissioning/post-closure	Neutral	Negligible	Skills development and training programs and partnerships; Skills transfer and employment transition workshops; Retraining programs	Yes	Decreased demand for training and skill development	Negligible	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Intermediate
	Effect5																	
	Decreased incentive to continue/complete education	Human Resources																
	Decreased motivation to continue with education relative to the immediate gains from receiving a salary.	Lake Babine Nation communities, Burns Lake, Houston, and Smithers	Construction	Adverse	Minor	Scholarships and awards for local students; Minimum age and education level hiring policies	Yes	Decreased incentive to continue/complete education	Negligible	Community	Short-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Low
			Operations	Adverse	Minor		Yes		Negligible	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Low
			Decommissioning/post-closure	Adverse	Minor		Yes		Negligible	Community	Short-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Low	Low

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	Effect 6																	
	Improved essential work and life skills	Human Resources																
	Enhanced essential life skills and work skills through steady employment and income management.	Lake Babine Nation communities, Burns Lake, Houston, and Smithers	Construction	Beneficial	Minor	Apprentceships, mentorships, and on-the-job-training programs; Life and career skills training; Financial management training	Yes	Improved essential work and life skills	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
			Operations	Beneficial	Minor		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
		Human Resources					No											
		Topley Landing, Smithers Landing, Topley, and Telkwa	Construction	Beneficial	Negligible		No											
			Operations	Beneficial	Negligible													
Business Opportunities and Economic Development Effects Assessment	**Effect 1**																	
	Increased businessopportunities	Human Resources																
	Direct, indirect, and induced business opportunities created through demand from the Project and its employees.	Granisle, Burns Lake, Houston, and Smithers	Construction	Beneficial	Moderate	Hire a Human Resources Manager; Local job/business fairs; Support local economic development associatons	Yes	Increased local business opportunities	High	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
			Operations	Beneficial	Moderate		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		No											
		Human Resources																
		Lake Babine Nation communities, Topley Landing, Smithers Landing, Topley, and Telkwa	Construction	Beneficial	Minor		Yes	Increased local business opportunities	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Operations	Beneficial	Minor		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		No											
	Effect 2																	
	Decreased business opportunities	Human Resources																
	Decreased or ceased direct, indirect, and induced business opportunities created through demand from the Project and its employees.	Granisle, Burns Lake, Houston, and Smithers	Operations	Adverse	Negligible	Emphasize contract timelines; References and/or testimonials	No											
			Decommissioning/post-closure	Adverse	Moderate		Yes	Mitigation will help businesses prepare for a slowdown, yet will do little to reverse this effect	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Low
		Human Resources																
		Lake Babine Nation communities, Smithers Landing, Topley, and Telkwa	Operations	Adverse	Negligible		No											
			Decommissioning/post-closure	Adverse	Minor		Yes	Mitigation will help businesses prepare for a slowdown, yet will do little to reverse this effect	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
	Effect 3																	
	Increased economic development	Human Resources																
	Direct, indirect, and induced economic growth derived from new demand for goods and services from the Project and its employees	Northwestern BC	Construction	Beneficial	Moderate	Hire a Human Resources Manager; Local job/business fairs; Support local economic development associatons; Local hiring policies; Apprentceships, mentorships, and on-the-job-training programs	Yes	Increased economic growth	High	Regional/First Nations	Short-term	Continuous	Reversible Short-term	Neutral	Major	Not Significant	Medium	Intermediate
			Operations	Beneficial	Moderate		Yes		High	Regional/First	Medium-term	Continuous	Reversible Short-term	Neutral	Major	Not Significant	Medium	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		No											
		Human Resources																
		Province	Construction	Beneficial	Minor		Yes	Increased economic growth	Medium	Provincial Transboundary	Short-term	Continuous	Reversible long-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Operations	Beneficial	Minor		Yes		Low	Provincial Transboundary	Medium-term	Continuous	Reversible long-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		No											
	Effect 4	Human																
	Decreased economic development	Resources																
	Direct, indirect, and induced economic decline derived from the absence of demand for goods and services from the Project and its employees	Northwestern BC	Operations	Adverse	Negligible	Emphasize contract timelines; References and/or testimonials; Career counselling; Skills transfer and employment transition workshops; Retraining programs; Information kits on preparing for mine closure; Documenting and tracking skills and certifications	No											
			Decommissioning/post-closure	Adverse	Moderate		Yes	Mitigation prevents loss in economic growth from being as significant as the initial post-enhancement increase	Medium	Regional/First Nations	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
		Human Resources																
		Province	Operations	Adverse	Negligible		No											
			Decommissioning/post-closure	Adverse	Minor		No											
	Effect 5																	
	Increased economic dependency on mining sector	Human Resources																
	Increased reliance on mining sector as an employment source	All primary communities and Smithers	Construction	Adverse	Moderate	Community Sustainability Advisory Committee	Yes	Increased economic dependence on mining sector	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
			Operations	Adverse	Moderate		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
			Decommissioning/post-closure	Adverse	Negligible		No											
		Human Resources																
		Burns Lake, Houston, Telkwa, and Northwestern BC	Construction	Adverse	Minor		Yes	Increased economic dependence on mining sector	Low	Regional/First Nations	Short-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Low
			Operations	Adverse	Minor		Yes		Negligible	Regional/First Nations	Medium-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Medium	Low
			Decommissioning/post-closure	Adverse	Negligible		No											
	Effect 6																	
	Increasingly specialized mining industry																	
	Increased capacity for the region to become a mining hub, attracting other projects and technology advances.	Human Resources				Hire a Human Resources Manager; Local job/business fairs; Local hiring policies; Apprentceships, mentorships, and on-the-job-training programs	Yes	Increasingly specialized mining industry	Medium	Regional/First Nations	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
		Northwestern BC and Smithers	Construction	Beneficial	Minor		Yes		Low	Regional/First Nations	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
			Operations	Beneficial	Minor		No											
			Decommissioning/post-closure	Beneficial	Negligible													
Population and Demographics Effects Assessment	**Effect1**																	
	Increased population	Human Resources																
	Hiring a workforce may induce population growth.	Granisle	Construction	Beneficial	Major	Local hiring policies; Local job/business fairs; Apprenticeships, mentorships, and on-the-job-training programs	Yes	Increased population	High	Community	Short-term	Continuous	Reversible long-term	Neutral	Moderate	Not Significant	High	Intermediate
			Operations	Beneficial	Major		Yes		Medium	Community	Medium-term	Continuous	Reversible long-term	Neutral	Moderate	Significant	High	Intermediate
			Decommissioning/post-closure	Beneficial	Negligible		No											
		Human Resources																
		Lake Babine Nation communities, Topley Landing, Smithers Landing, and Topley	Construction	Mixed	Moderate		Yes	Increased population	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	High	Intermediate
			Operations	Mixed	Moderate		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	High	Intermediate
			Decommissioning/post-closure	Mixed	Negligible		No											
		Human Resources																
		Burns Lake, Houston, Telkwa, and Smithers	Construction	Beneficial	Moderate		Yes	Increased population	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	High	Intermediate
			Operations	Beneficial	Moderate		Yes		Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	High	Intermediate

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
			Decommissioning/post-closure	Beneficial	Negligible		No											
	Effect 2																	
	Decreased population	Human Resources																
	The decline in job opportunities may result in population falls.	Granisle	Operations	Adverse	Negligible	Local hiring policies; Local job/business fairs; Apprenticeships, mentorships, and on-the-job-training programs	No											
			Decommissioning/post-closure	Adverse	Moderate		Yes	Decreased population	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Low
		Human Resources																
		Lake Babine Nation communities, Topley Landing, Smithers Landing, and Topley	Operations	Mixed	Negligible		No											
			Decommissioning/post-closure	Mixed	Minor		Yes	Decreased population	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
		Human Resources																
		Burns Lake, Houston, Telkwa, and Smithers	Operations	Adverse	Negligible		No											
			Decommissioning/post-closure	Adverse	Minor		Yes	Decreased population	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
	Effect 3																	
	Change in community demographics	Human Resources																
	Project-related immigration may alter the gentler balance, skills levels, and culture of the community.	Granisle	Construction	Mixed	Moderate	Inter-cultural training; Equal opportunity and anti-discrimination policy; Communication with community planning authorities and service providers	Yes	Change in community demographics	High	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Low
			Operations	Mixed	Moderate		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Low
			Decommissioning/post-closure	Mixed	Negligible		No											
		Human Resources																
		Lake Babine Nation communities, Topley Landing, Smithers Landing, Topley, Burns Lake, Houston, Smithers, and Telkwa	Construction	Mixed	Minor		Yes	Change in community demographics	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
			Operations	Mixed	Minor		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Low
			Decommissioning/post-closure	Mixed	Negligible		No											
Services and Infrastructure Effects Assessment	**Effect 1**																	
	Increased demand on community infrastructure, programs, and services	Human Resources																
	Project-related immigration may increase usage and competition for goods, services, and community amenities and resources	Granisle, Burns Lake, and Houston	Construction	Mixed	Moderate	Communicate with community planning authorities and service providers; Hire a Community Liaison and establish a Community Sustainability Advisory Committee; Local hiring policies; Local job/business fairs; Apprentceships, mentorships, and on-the-job-training programs	Yes	Increased demand on community infrastructure, programs, and services	Low	Community	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Intermediate
			Operations	Mixed	Moderate		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Intermediate
		Human Resources																
		Lake Babine Nation communities and Smithers	Construction	Adverse	Minor		Yes	Increased demand on community infrastructure, programs, and services	Low	Community	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Intermediate
			Operations	Adverse	Minor		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Intermediate
	Effect 2																	
	Decreased demand on community infrastructure, programs, and services	Human Resources																
	As workers' jobs are terminated upon mine closure, mine job-related emigration may reduce usage and competition for goods, services, and community amenities and resources.	Lake Babine Nation communities, Granisle, Burns Lake, Houston, and Smithers	Decommissioning/post-closure	Mixed	Negligible	Communicate with community planning authorities and service providers; Hire a Community Liaison and establish a Community Sustainability Advisory Committee; Local hiring policies; Local job/business fairs; Apprentceships, mentorships, and on-the-job-training programs	Yes	Decreased demand on community infrastructure, programs, and services	Negligible	Community	Medium-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
	Effect 3																	
	Increased tax base and provision of community infrastructure and services	Human Resources																
	Project and employee income tax and other tax payments will contribute to government revenues.	Granisle	Construction		Moderate	Communicate with community planning authorities and service providers; Hire a Community Liaison and establish a Community Sustainability Advisory Committee; Local hiring policies; Local job/business fairs; Apprentceships, mentorships, and on-the-job-training programs	Yes	Increased tax base and provision of community infrastructure and services	Low	Community	Medium-term	Continuous	Reversible Short-term	High	Moderate	Not Significant	Medium	Intermediate
			Operations	Beneficial	Moderate		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	High	Moderate	Not Significant	Medium	Intermediate
		Human Resources																
		All communities except for Granisle and Lake Babine Nation communities	Construction	Beneficial	Minor		Yes	Increased tax base and provision of community infrastructure and services	Negligible	Community	Medium-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Intermediate
			Operations	Beneficial	Minor		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Intermediate
		Human Resources																
		Lake Babine Nation communities	Construction	Beneficial	Negligible		Yes	Increased tax base and provision of community infrastructure and services	Negligible	Community	Medium-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
			Operations	Beneficial	Negligible		Yes		Negligible	Community	Medium-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
	Effect 4																	
	Decreased tax base and provision of community infrastructure and services	Human Resources																
	Reduced Project and employee income tax and other tax payments will decrease government revenues	Granisle	Operations	Adverse	Negligible	Communicate with community planning authorities and service providers; Hire a Community Liaison and establish a Community Sustainability Advisory Committee; Local hiring policies; Local job/business fairs; Apprentceships, mentorships, and on-the-job-training programs	No											
			Decommissioning/post-closure	Adverse	Moderate		Yes	Decreased tax base and provision of community infrastructure and services	Low	Community	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Intermediate
		Human Resources																
		All communities except for Granisle and Lake Babine Nation communities	Operations	Adverse	Negligible		No											
			Decommissioning/post-closure	Adverse	Negligible		Yes	Decreased tax base and provision of community infrastructure and services	Negligible	Community	Short-tens	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
		Human Resources																
		Lake Babine Nation communities	Operations	Adverse	Negligible		No											
			Decommissioning/post-closure	Adverse	Negligible		Yes	Decreased tax base and provision of community infrastructure and services	Negligible	Community	Short-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Intermediate
	Effect 5																	
	Increased property value and housing demand:	Human Resources				Communicate with community planning authorities and service providers; Hire a Community Liaison and establish a Community Sustainability Advisory Committee; Local hiring policies; Local job/business fairs; Apprentceships, mentorships, and on-the-job-training programs	Yes	Increased property value and housing demand	Low	Community	Short-tens	Continuous	Reversible Short-term	High	Moderate	Not Significant	Medium	Intermediate
	The mine's development and operations will trigger an upward surge in the market value of residential and commercial properties and need for housing in the surrounding area.	Granisle, Topley Landing, Smithers Landing, and Topley	Construction	Mixed	Major		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	High	Major	Not Significant	Medium	Intermediate
			Operations	Mixed	Major													
		Human Resources																
		Burns Lake, Houston, and Smithers	Construction	Mixed	Moderate		Yes		Low	Community	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Intermediate
			Operations	Mixed	Moderate		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Intermediate
	Effect6																	
	Decreased property value:	Human Resources																

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	The mine's closure will result in a lower market value of residential and commercial properties and need for housing in the surrounding area.	Granisle, Tapley Landing, Topley, Burns Lake, Houston, and Smithers	Decommissioning/post-closure	Mixed	Minor	Communicate with community planning authorities and service providers; Hire a Community Liaison and establish a Community Sustainability Advisory Committee; Local hiring policies; Local job/business fairs; Apprentceships, mentorships, and on-the-job training programs	Yes	Decreased property value and housing demand	Negligible	Community	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Low
Cultural Identity and Sustainability Effects Assessment	**Effect1**																	
	Decreased knowledge/participation in Carrier/Lake Babine cultural and/or traditional land use activities and customs:	Human Resources																
	Lake Babine Nation members employed with the Project may have reduced opportunities to speak in their native language and/or partake in cultural activities with family and fellow Lake Babine Nation members.	Lake Babine Nation communities	Construction	Adverse	Moderate	Sponsoring non-work related safety training	Yes	Decreased knowledge/participation in Carrier/Lake Babine language and/or cultural and/or traditional land use activities and customs.	Medium	First Nations	Short-term	Continuous	Reversible Short-term	High	Moderate	Not Significant	Medium	Low
			Operations	Adverse	Moderate		Yes		Medium	First Nations	Medium-term	Continuous	Reversible Short-term	High	Moderate	Not Significant	Medium	Low
	Effect2																	
	Increased knowledge/participation in Carrier/Lake Babine cultural and/or traditional land use activities and customs:	Human Resources																
	Increased income and time available between shifts during operations may increase available time to speak in native language and/or partake in cultural activities with family and fellow Lake Babine Nation members.	Lake Babine Nation communities	Construction	Beneficial	Minor	Sponsoring non-work related safety training	Yes	Increased knowledge/participation in Carrier/Lake Babine language and/or cultural and/or traditional land use activities and customs	Medium	First Nations	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Low
			Operations	Beneficial	Minor		Yes		Medium	First Nations	Medium-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Low
			Decommissioning/post-closure	Beneficial	Moderate		Yes		Medium	First Nations	Short-term	Continuous	Reversible Short-term	High	Minor	Not Significant	Medium	Low
	Effect3																	
	Increased intercultural exchange:	Human Resources																
	Interacting mixed outsider/western and Lake Babine Nation workforce will increase awareness of western techno-rational worldviews and values as well as Aboriginal, traditional, and specifically, Lake Babine Nation worldviews and values.	Lake Babine Nation communities	Construction	Mixed	Moderate	Intercultural training	Yes	Increased- intercultural exchange through exposure to different cultures	Low	First Nations	Short-tens	Continuous	Reversible long-term	High	Minor	Not Significant	Medium	Low
			Operations	Mixed	Moderate		Yes		Low	First Nations	Medium-term	Continuous	Reversible long-term	High	Moderate	Not Significant	Medium	Low
	Effect4																	
	Decreased intercultural exchange:																	
	Reduced interaction of mixed outsider/western co-workers because of job terminations will reduce opportunity for exposure to, and awareness of, western techno-rational worldviews and values as well as Aboriginal, traditional, and specifically, Lake Babine Nation worldviews and values.	Lake Babine Nation Communities	Decommissioning/post-closure	Mixed	Minor	Intercultural training	Yes	Decreased intercultural exchange through lack of exposure to different cultures in the workplace	Low	First Nations	Medium-term	Continuous	Reversible Short-term	High	Negligible	Not Significant	Medium	Low
Community Well-being Effects Assessment	**Effect 1:**																	
	Increased individual self-esteem/community pride and engagement:	Human Resources																
	Increase in an overall sense of self-worth and capacity through employment, skills development, salaries, and benefits.	Lake Babine Nation communities, Granisle, Burns Lake, and Houston	Construction	Beneficial	Minor	Hire a Community Liaison; Establish a Community Sustainability Advisory Committee	Yes	Increased individual self-esteem/community pride and engagement	Medium	Community	Short-term	Continuous	Reversible Medium-term	Neutral	Major	Not Significant	Medium	Intermediate
			Operations	Beneficial	Minor		Yes		Medium	Community	Medium-term	Continuous	Reversible Medium-term	Neutral	Major	Significant	Medium	Intermediate
		Human Resources																
		Topley Landing, Smithers Landing, Topley, Telkwa, and Smithers	Construction	Beneficial	Negligible		Yes	Increased individual self-esteem/community pride and engagement	Low	Community	Short-term	Continuous	Reversible Medium-term	Neutral	Moderate	Not Significant	Medium	Intermediate
			Operations	Beneficial	Negligible		Yes		Low	Community	Medium-term	Continuous	Reversible Medium-term	Neutral	Moderate	Not Significant	Medium	Intermediate
	Effect 2:																	
	Decreased individual self-esteem/community pride and engagement:	Human Resources																
	Decrease in an overall sense of self-worth and capacity, development, salaries, and benefits because of job and contract termination upon the mine's closure	Lake Babine Nation communities and Granisle	Decommissioning/post-closure	Adverse	Moderate	Hire a Community Liaison; Establish a Community Sustainability Advisory Committee	Yes	Decreased individual self-esteem/community pride and engagement	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
		Human Resources																
		Burns Lake, Houston, Smithers, Topley Landing, Smithers Landing, Topley, and Telkwa	Decommissioning/post-closure	Adverse	Moderate		Yes	Decreased individual self-esteem/community pride and engagement	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
	Effect 3:																	
	Increased financial independence and access to goods and services:	Human Resources																
	Improved access to goods and services through increased income, economic development, etc.	Lake Babine Nation communities, Granisle, Topley Landing, Burns Lake, Houston, Smithers Landing, and Topley	Construction	Beneficial	Moderate	Financial management and general life skill development training programs	Yes	Increased financial independence and access to goods and services	Medium	Community	Short-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
			Operations	Beneficial	Moderate		Yes		Medium	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Moderate	Not Significant	Medium	Intermediate
		Human Resources																
		Burns Lake, Houston, Telkwa, and Smithers	Construction	Beneficial	Minor		Yes	Increased financial independence and access to goods and services	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Operations	Beneficial	Minor		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
	Effect 4:																	
	Increased participation in socially/health-damaging activities:	Human Resources																
	Potential increase in drug and alcohol use and other societal challenges through disposable income generated from job salaries.	Lake Babine Nation communities, Granisle, Topley Landing, Smithers Landing, Burns Lake, and Houston	Construction	Adverse	Minor	Hire a Community Liaison; Establish a Community Sustainability Advisory Committee; Financial management and general life skill development training programs; Support for substance abuse treatment; Zero tolerance drug and alcohol policy	Yes	Increased participation in socially/health-damaging activities	Low	Community	Short-term	Continuous	Reversible Medium-term	Neutral	Minor	Not Significant	Medium	Intermediate
	Effect 5:																	
	Increased family stress and dysfunction:	Human Resources																
	Potential disruption to families resulting in increased stress, separation, and breakdowns in familial relationships.	Lake Babine Nation communities, Granisle, and Topley Landing	Construction	Adverse	Moderate	Hire a Community Liaison; Establish a Community Sustainability Advisory Committee; Financial management and general life skill development training programs; Support for substance abuse treatment	Yes	Increased family stress and dysfunction	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Operations	Adverse	Moderate		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
		Human Resources																
		Burns Lake and Houston	Construction	Adverse	Minor		Yes	Increased family stress and dysfunction	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate

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			Operations	Adverse	Minor		Yes		Negligible	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
	Effect 6																	
	Decrease in quality of natural environment, recreation, road traffic, and safety:	Human Resources																
	The construction and operation of the mine and concentrate hauling activities may cause deterioration to the environment, outdoor recreation, and road safety.	Granisle, Topley Landing, Tachet, and Topley	Construction	Adverse	Minor	Hire a Community Liaison; Establish a Community Sustainability Advisory Committee	Yes	Decrease in quality of natural environment, recreation, road traffic, and safety	Low	Community	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Operations	Adverse	Minor		Yes		Low	Community	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
	Effect 7																	
	Decreased purchasing power and increased cost of living:																	
	The Project may give rise to consumer price inflation that affects the cost of living for those whose wages do not keep pace with the local inflation rate.	Northwestern BC	Construction	Adverse	Minor	Financial management and general life skill development training programs	Yes	Decreased purchasing power and increased cost of living	Low	Regional/First Nation	Short-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Low	Intermediate
			Operations	Adverse	Minor		Yes		Low	Regional/First Nation	Medium-term	Continuous	Reversible Short-term	Neutral	Negligible	Not Significant	Low	Intermediate
			Decommissioning/post-closure	Adverse	Negligible		No											
Land-based Livelihoods Effects Assessment	**Effect 1**																	
	Decrease in business profits, personal incomes, and quality of life:																	
	Project disturbances to natural environment harm businesses offering wilderness and/or hunting experiences	Mine site and access road, Tukii Lodge Guide Outfitters	Construction	Adverse	Moderate	Relocation/Compensation Package; Community Sustainability Advisory Committee	Yes	Decrease in business profits, personal incomes, and quality of life	Medium	Individual/family	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Operations	Adverse	Moderate		Yes		Low	Individual/family	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
		Mine site and access road, Ookpik	Construction	Adverse	Minor		Yes	Decrease in business profits, personal incomes, and quality of life	Medium	Individual/family	Short-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
			Operations	Adverse	Minor		Yes		Low	Individual/family	Medium-term	Continuous	Reversible Short-term	Neutral	Minor	Not Significant	Medium	Intermediate
Visual Effects Assessment	The visual effect of Project-related activities on the surrounding landscape	Pit	Operation	Adverse	Moderate	N/A	Yes	Pit walls enlarged when pit becomes deeper	Medium	Landscape	Far future	Continuous	Irreversible	Neutral	Minor	Not Significant	High	High
			Closure	Adverse	Major	N/A	Yes	Slow fill up of the pit with water	High	Landscape	Far future	Continuous	Irreversible	Neutral	Major	Not Significant	High	High
			Post-closure	Adverse	Moderate	Slowly fill until just under lake surface water level	Yes	Less area of pit walls will be visible	Medium	Landscape	Far future	Continuous	Irreversible	Neutral	Minor	Not Significant	High	High
		Waste Rock Dump	Operation	Adverse	Major	~~N/A~~ Waste Rock Dump removed	Yes	~~WRD becoming larger over time~~ Waste Rock Dump placed back into open pit	Medium	Landscape	Far future	Continuous	Irreversible	Neutral	Moderate	Not Significant	High	High
			Closure	Adverse	Major	~~Dropping salvaged soil material over WRD and planting trees~~ Waste Rock Dump removed	Yes	~~Revegetation of the sides and the top~~ Waste Rock Dump placed back into open pit	~~High~~ Negligible	~~Regional~~ Local	Far future	Continuous	~~Irreversible~~ Reversible Short-term	Neutral	~~Moderate~~ Negligible	Not Significant	High	High
			Post-closure	Adverse	Minor	Green up with forests and grasses. Waste Rock Dump removed	Yes	~~Blending in with the surrounding landscape.~~ Waste Rock Dump placed back into open pit	Low	Regional	Far future	Continuous	Irreversible	Neutral	Minor	Not Significant	High	High
		Overburden stockpiles	Operation	Adverse	Major	N/A	Yes	Stockpiles becoming larger over time	High	Landscape	Medium-term	Continuous	Reversible	Neutral	Minor	Not Significant	High	High
			Closure	Adverse	Moderate	~~Material being used for draping over waste rock dump and~~ Tailings dam will completely remove the stockpile. Overburden stockpile changed location	Yes	Removal of material for revegetation use of other Project components. Overburden stockpile moved from Morrison Point to 700 m from Morrison Lake.	~~Medium~~ Negligible	Local	Medium-term	Continuous	Reversible Short-term	Neutral	~~Minor~~ Negligible	Not Significant	High	High
			Post-closure	Adverse	Negligible	Material being used for draping over waste rock dump and tailings dam will completely remove the stockpile	No											
		Low-grade ore stockpile	Operation	Adverse	Major	N/A	Yes	Stockpile becoming larger over time	High	Regional	Medium-term	Continuous	Reversible	Neutral	Minor	Not Significant	High	High
			Closure	Adverse	Minor	Complete removal of stockpile through processing ore	Yes	Underlying bare earth covered with salvaged soil material	Medium	Local	Short-term	Continuous	Reversible	Neutral	Negligible	Not Significant	High	High
			Post-closure	Adverse	Negligible	Green up with forests and grasses	No	Natural looking forest cover										
		Tailings storage facility	Operation	Adverse	Major	N/A	Yes	Build-up of dams and storage of tailings	High	Regional	Far future	Continuous	Irreversible	Neutral	Moderate	Not Significant	High	High
			Closure	Adverse	Major	~~Green up dams with grasses and fill with sediment.~~ Reclamation of TSF with terrestrial and ponded areas	Yes	~~Grass covered dam with lake behind it.~~ Smaller pond area, reclamation of terrestrial areas and wetlands	~~High~~ Medium	~~Regional~~ Local	Far future	Continuous	Irreversible	Neutral	~~Moderate~~ Minor	Not Significant	High	High
			Post-closure	Adverse	Moderate	Green up dams with grasses and fill with sediment	Yes	Grass covered dams with natural-looking wetland	Medium	Regional	Far future	Continuous	Irreversible	Neutral	Minor	Not Significant	High	High
		Plant site	Operation	Adverse	Major	N/A	Yes		High	Landscape	Far future	Continuous	Irreversible	Low	Negligible	Not Significant	Medium	High
			Closure	Adverse	Moderate	Demolishing buildings	Yes	Grass and shrub cover	Medium	Local	Far future	Continuous	Irreversible	Low	Negligible	Not Significant	Medium	High
			Post-closure	Adverse	Minor	Demolishing buildings	Yes	Natural-looking forest cover	Low	Local	Far future	Continuous	Irreversible	Low	Negligible	Not Significant	Medium	High
		Transmission line	Operation	Adverse	Minor	Green up right-of-way with grasses and low vegetation. Trees will be trimmed	Yes	Grasses and shrub under the transmission lines	Low	Landscape	Far future	Continuous	Irreversible	Neutral	Minor	Not Significant	Medium	High
			Closure	Adverse	Minor	Green up right-of-way with grasses and low vegetation. Trees will be trimmed	Yes	Grasses and shrub under the transmission lines	Low	Landscape	Far future	Continuous	Irreversible	Neutral	Minor	Not Significant	Medium	High
			Post-closure	Adverse	Minor	Green up right-of-way with grasses and low vegetation. Trees will be trimmed	Yes	Grasses and shrub under the transmission lines	Low	Landscape	Far future	Continuous	Irreversible	Neutral	Minor	Not Significant	Medium	High
		Access road to mine site (non-existing)	Operation	Adverse	Minor	N/A	Yes		Low	Local	Far future	Continuous	Irreversible	Neutral	Minor	Not Significant	Medium	High
			Closure	Adverse	Minor	N/A	Yes		Low	Local	Far future	Continuous	Irreversible	Low	Minor	Not Significant	Medium	High
			Post-closure	Adverse	Minor	N/A	Yes		Low	Local	Far future	Continuous	Irreversible	Low	Minor	Not Significant	Medium	High
Noise Effects on Human Health	Increase in average daytime and night time noise - People may be able to detect a change and not be able to cope	Access Road	Construction/Operations	Adverse	Negligible		No											
	Increase in pass-by daytime and night time noise - People may be able to detect a change and not be able to cope	Access Road	Construction/Operations	Adverse	Negligible		No											
	Increase in average daytime and night time noise - People may be able to detect a change and not be able to cope	Highway 118	Construction/Operations	Adverse	Negligible		No											
	Increase in pass-by daytime and night time noise - People may be able to detect a change and not be able to cope	Highway 118	Construction/Operations	Adverse	Negligible		No											
	Increase in average daytime noise from constant mine noise at Tukki Lodge Hunting Camp	Mine site	Construction/ Operations	Adverse	Minor	All site vehicles to comply with noise limits, all mining equipment to undergo regular maintenance minimize vegetation clearing surrounding Project footprint where possible to provide additional noise buffer.	Yes	People may be able to detect a change and not be able to cope	High	Individual / Household	Medium-term	Regular	Reversible Long-term (at closure)	Low	Major	Not Significant	Medium	Intermediate
	Increase in night time noise from constant mine noise at Tukii Lodge Hunting Camp -	Mine site	Construction/ Operations	Adverse	Minor	All site vehicles to comply with noise limits, all mining equipment to undergo regular maintenance minimize vegetation clearing surrounding Project footprint where possible to provide additional noise buffer.	Yes	People may be able to detect a change and not be able to cope	Medium	Individual / Household	Medium-term	Regular	Reversible Long-term (at closure)	Low	Major	Not Significant	Medium	Intermediate

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	Increase in peak noise from blasting at Tukii Lodge Hunting Camp	Mine site	Construction/ Operations	Adverse	Moderate	Limiting the blasts to once per day and the Tukii Hunting Camp will be provided with a blasting schedule that will include the days and times that the blasting will occur. To help them prepare for the blast noise, blasting times will be scheduled for the same time period each day.	Yes		Medium	Individual / Household	Medium-term	Regular	Reversible Long-term (at closure)	Low	Minor	Not Significant	Medium	Intermediate
	SO2, NO2, CO, O3, and PM2.5 concentrations may increase due to Project-related emissions that may result in adverse human health effects.	Mine Site and Access Road	Construction and Operation	Adverse											Negligible	Not Significant		
	Diesel Particulate Matter (PM2.5 and PM10) concentrations may increase due to Project-related emissions that may result in adverse non-carcinogenic human health effects at the fences line, Tukii Hunting Camp, Houston Forestry Camp, and Ookpik Wilderness Lodge.	Mine Site and Access Road	Construction and Operation	Adverse											Negligible	Not Significant		
	Diesel Particulate Matter (PM2.5 and PM10) concentrations may increase due to Project-related emissions that may result in adverse carcinogenic human health effects at the fence line, Houston Forestry Camp, and Ookpik Wilderness Lodge.	Mine Site and Access Road	Construction and Operation	Adverse											Negligible	Not Significant		
	Diesel Particulate Matter (PM2.5 and PM10) concentrations may increase due to Project-related emissions that may result in adverse human health effects at Tukii Hunting Camp.	Mine Site and Access Road	Construction and Operation	Adverse											Significant	Not Significant		
Drinking Water	Surface runoff and siltation and contaminant loading	Mine Site	Construction/ operations	Adverse	Minor	Silt fences; best management practices; environmental monitoring; erosion management plan	Yes	Increase in total suspended solids and potential contaminants resulting in degraded water quality which could be consumed by people and cause adverse health effects	Low	Individual / Household	Short-term	One Time			Negligible	Not Significant	Low	High
	Leaching of nitrogen residues from blasting	Mine Site	Construction, operations, closure and post-closure	Adverse	Minor	Proper storage and handling of blasting materials away from waterways, regular maintenance of facility, environmental monitoring	Yes	Increase in nitrogen residues resulting in degraded water quality which could be consumed by people and cause adverse health effects	Low	Individual / Household	Long-term	Sporadic			Negligible	Not Significant	Low	High
	Metal leaching and Acid Rock Generation (ML/ARD) from waste rock piles and temporary low grade ore pile	Mine Site	Construction, operations, closure and post-closure	Adverse	Minor	ML/ARD assessment of rock and substrates, appropriate use/storage of excavated materials, environmental monitoring, and groundwater pumping to TSF (operations) or pit (closure)	Yes	Degraded water quality could be consumed by people and cause adverse health effects	Low	Individual / Household	Long-term	Continuous			Negligible	Not Significant	Low	Medium
	Discharge of water from Ore Pond and Booker Lake into Morrison Lake.	Mine Site	Construction	Neutral	Negligible		No											
	Affected water in the Open Pit	Mine Site	Closure and post- closure	Adverse	Minor	Signs will be posted warning that public access is not permitted and that the water is not potable.	No											
	Discharge of Open Pit water to Morrison Lake	Mine Site	Closure	Adverse	Minor	Water will be treated to permitted discharge levels, water will be monitored to ensure that it meets the required permit levels.	Yes	Degraded water quality could be consumed by people and cause adverse health effects	Low	Individual / Household	Long-term	Sporadic/Continuous			Negligible	Not Significant	Low	Low
	Affected water in the TSF	Mine Site	Closure and post- closure	Adverse	Minor	Signs will be posted warning that public access is not permitted and that the water is not potable.	Yes	Degraded water quality could be consumed by people and cause adverse health effects	Low	Individual / Household	Long-term	Continuous			Negligible	Not Significant	Low	High
	Affected water in the TSF	Mine Site	Closure and post-closure	Adverse	Minor	Monitoring and Human Health Risk Assessment, if risk assessment finds unacceptable risks, signs may be posted warning that public access is not permitted and that the water is not potable and or additional mitigation which will be developed upon closure.	Yes	Degraded water quality could be consumed by people and cause adverse health effects	Low	Individual / Household	Long-term	Continuous			Negligible	Not Significant	Low	Intermediate
	Seepage of impacted water in the TSF into surface water bodies	Mine Site	Operations, closure and post-closure	Adverse	Minor	Ongoing monitoring, if monitoring during low flow events indicates exceedances of nitrate, signs will be posted indicating that the water is not potable.	Yes	Degraded water quality could be consumed by people and cause adverse health effects		Individual / Household	Short- term	Sporadic			Negligible	Not Significant	Low	High
Human Health Effects Associated with Country Foods	During operations, the water and soil quality are predicted to be affected in the TSF, which may reduce the quality of wildlife who incidentally ingest this environmental media. This could subsequently cause adverse health effects to people who consume the wildlife.	TSF	Operations	Adverse											Negligible	Not Significant		
	During closure, the water and sediment quality (in limited areas) are predicted to be affected in the TSF, which may reduce the quality of wildlife who incidentally ingest this environmental media. This could subsequently cause adverse health effects to people who consume the wildlife.	TSF	Closure	Adverse											Negligible	Not Significant		
Effects Assessment Tables from Review Response Report																		
Water Quantity and Quality	TSF seepage effects water quality effects on Streams 7, 8, 10	TSF	Operations and closure	Adverse	Moderate	Seepage mitigation in TSF. Seepage collection. Monitoring. Site specific water quality objectives.	Yes	Increased concentrations of metals and sulphate	Medium	Local	Long term	Continuous	Reversible (long-term)	Neutral	Moderate	Not Significant	Medium	Intermediate
	TSF water flow reduction in Stream 7	TSF	Operations	Adverse	Moderate	50% riparian baseflow maintained. Fish habitat compensation	Yes	Decrease flows by 50% loss of aquatic habitat (HADD)	Low	Local	Medium term	Continuous	Reversible (short-term)	High	Minor	Not Significant	High	High
	TSF water flow reduction in Stream 10	TSF	Operations	Adverse	Minor	Fish habitat compensation	Yes	Decrease flows by 17%. Loss of aquatic habitat (HADD)	Low	Local	Medium term	Continuous	Reversible (short-term)	High	Negligible	Not Significant	High	High
	TSF seepage effects on water quality Morrison Lake	TSF	Operations and closure	Adverse	Minor	Seepage mitigation in TSF.	Yes	Potential increase in cadmium concentration of 7 mg/L	Low	Watershed	Long term	Continuous	Reversible (long-term)	High	Negligible	Not Significant	Low	Intermediate
		TSF	Operations and closure	Adverse	Minor	Seepage mitigation in TSF	Yes	Potential increase in sulphate of 7 mg/L	Low	Watershed	Long term	Continuous	Reversible (long term)	High	Negligible	Not Significant	High	Intermediate
	Discharge of water from TSF after closure	TSF	Closure	Adverse	Negligible to Minor	Dewater closure pond and dilute with surface water	Yes	Potential exceedance of some water quality parameters	Low	Local	Short term	Sporadic	Reversible (short-term)	High	Negligible to Minor	Not Significant	Low	Intermediate
	Discharge of treated pit wall collection water to Morrison Lake	TSF	Operations	Adverse	Minor	Water management to reduce pond water accumulation. Land area discharge of groundwater from pit dewatering	Yes	Potential increase in cadmium and sulphate concentration in Morrison Lake 10% over baseline	Low	Watershed	Short term	Sporadic	Reversible (short-term)	High	Negligible	Not Significant	Low	Intermediate
	Water treatment plant discharge to Morrison Lake	Mine Area	Closure	Adverse	Minor	Placement of PAG rock back into the open pit and segregation of pit wall runoff water.	Yes	Increased cadmium concentrations in Morrison Lake: 2 mg/L steady state and 7 mg/L max.	Low	Watershed	Far Future	Continuous	Reversible (far future)	High	Minor	Not Significant	High	Intermediate
		Mine Area	Closure	Adverse	Minor	Placement of PAG rock back into the open pit and segregation of pit wall runoff water.	Yes	Increased sulphate concentrations in Morrison Lake: 10 mg/L steady state and 25 mg/L maximum	Low	Watershed	Far Future	Continuous	Reversible (far future)	High	Minor	Not Significant	High	Intermediate
	PAG porewater transport to Morrison Lake	Mine Area	Closure	Adverse	Minor	Lime PAG porewater to pH=8	Yes	Increase concentrations of cadmium by 2 mg/L and sulphate 2 mg/L in Morrison Lake	Low	Watershed	Long term	Continuous	Reversible (long-term)	High	Minor	Not Significant	Low to moderate	Intermediate
	Water flow reduction in Morrison Lake/Creek due to large pit water inflows	Mine Area	Operations	Adverse	Minor	Site investigations and potential grouting of major flow	Yes	Reduce annual flow through Morrison Lake/Creek by 1%.	Low	Watershed	Short to medium term	Sporadic to regular	Reversible (short term)	High	Negligible	Not Significant	Low	Intermediate
Terrestrial and Biological Environment	Direct GHG emissions from fossil fuel burning in internal combustion engines	Mine Area	Closure	Adverse	Negligible	Fuel and energy conservation	Yes	GHG will be released. Reclaiming larger area of TSF and areas of the open pit	Low	Local	Short to Medium Term	One Time	Reversible Short Term	Neutral	Negligible	Not Significant	High	Intermediate

Component	Project Description	Project Component(s)	Project Phase(s)	Nature	Extent	Mitigation and Management	Potential for Residual Effects	Description	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Resilience (Context)	Significance	Significance Rating	Probability of Occurrence	Confidence Level
	Ambient Air Quality	Mine Area	Operations & Closure	Negligible	Negligible	Control equipment (i.e., scrubber), regular maintenance, dust suppression (e.g., road watering, vehicle speed restrictions)	Yes	Fugitive emissions	Low	Local	Short to Medium Term	One Time	Reversible Short Term	Neutral	Negligible	Not Significant	High	Intermediate
	Surface runoff and siltation containment	Mine Area	Closure	Adverse	Negligible	Best management practices, environmental monitoring, erosion management plan	Yes	Submersion of waste rock in the open pit	Low	Local	Short Term	Sporadic	Reversible Short Term	High	Negligible	Not Significant	Low	High
	Metal Leaching and Acid Rock Drainage (Sediment Quality)	Mine Area	Closure	Adverse	Low	Excavated materials to be placed back into open pit	Yes	Waste rock dump eliminated, placed back into open pit	Negligible	Local	Short Term	Sporadic	Reversible Long Term	Neutral	Negligible	Not Significant	Low	High
	Surface Runoff and Siltation and Contaminant Loading (Aquatic Resources)	Mine Area	Closure	Adverse	Negligible	Silt fences, best management practices, environmental monitoring, erosion management plan	Yes	Waste rock dump eliminated, placed back into open pit.	Low	Local	Short Term	Sporadic	Reversible Short Term	High	Negligible	Not Significant	Low	High
	Metal Leaching and Acid Rock Drainage (Aquatic Resources)	Mine Area	Closure	Adverse	Major	Excavated materials to be placed back into open pit	Yes	ML/ARD resulting in mortality and sublethal effects to biota. Waste rock dump eliminated, placed back into open pit	Low	Local	Long Term	Sporadic	Reversible Long Term	Neutral	Negligible	Not Significant	Low	Low
	Habitat loss from draining or burial with tailings (Aquatic Resources)	TSF, Mine Area	Closure	Adverse	Major	Reclamation of TSF and areas of the open pit	Yes	Reclamation of 350 ha of habitat in the TSF, including approximately 1.7 km^2 of ponded area, with 67.5 ha of wetland; and, 68 ha of wetland in the open pit	Medium	Local	Medium Term	One Time	Reversible Long Term	Low	Moderate	Not Significant	Low	High
	Loss of fish bearing habitat	TSF, Mine Area	Closure	Adverse	Major	Reclaim TSF, implementation of FHCP	Yes	Rearing and spawning habitat created in off-lake channel habitat	Medium	Landscape / watershed	Long-term	One Time	Reversible Short Term	Neutral	Minor	Not Significant	Medium	High
	Loss of non-fish Bearing habitat	TSF, Mine Area	Closure	Adverse	Major	Reclaim TSF, implementation of FHCP	Yes	Non-fish bearing habitat reclaimed in TSF.	Medium	Local	Long-term	One Time	Reversible Short Term	High	Moderate	Not Significant	High	High
	Navigable Waters	Mine Area	Closure	Neutral	Negligible	Effluent pipe in deepest part of Morrison Lake. Loss of Booker Lake	Yes	N/A	Low	Landscape / watershed	Far Future	Continuous	Irreversible	High	Negligible	Not Significant	Medium	High
	Loss of Wetland Extent and Function	TSF	Closure	Adverse	Major	Construct littoral marsh wetland communities around perimeter of the TSF	Yes	Loss of 26.65 ha blue listed Wb01. Compensated with the creation of 50 ha submergent wetland and 17.5 ha emergent wetland.	High	Landscape / watershed	Far Future	One Time	Reversible Long Term	Low	Moderate	Not Significant	Medium	Intermediate
	Loss of Wetland Extent and Function	Waste Rock Dump	Closure	Adverse	Negligible	Placement of waste rock back into open pit, creation of additional wetland and open pond areas	No											
	Loss of Wetland Extent and Function	Mine Area	Closure	Adverse	Major	Areas lost included in non fish-bearing loss in Fish Habitat Compensation Plan	Yes	Loss of 0.4 ha Ws01 swamp in pit. Compensated with the creation of 68 ha of wetland habitat in open pit.	Medium	Local	Long-term	One Time	Reversible Short Term	Neutral	Minor	Not Significant	Medium	Intermediate
	Terrain, Surficial Materials, Overburden & Soils	Open Pit	Closure	Adverse	Minor	r Backfilling pit with waste rock	Yes	Pit backfilled with waste rock and reclaimed with vegetation around perimeter, and wetlands established within berm	Medium	Local	Medium Term	Continuous	Reversible Short Term	Low	Minor	Not Significant	High	High
	Terrain, Surficial Materials, Overburden & Soils	TSF	Closure	Adverse	Major	Flooding TSF	Yes	Smaller ponded area, reclaimed areas along exposed beaches and on dams	Medium	Local	Medium Term	Continuous	Reversible Short Term	Low	Minor	Not Significant	High	High
	Soil Slope Failure (Terrain Hazard)	TSF	Closure	Adverse	Moderate	Flooding TSF	Yes	Smaller water pond, removing water from dam face	Medium	Local	Long Term	Sporadic	Reversible Short Term	Neutral	Minor	Not Significant	Low	High
	Rock Slope Failure	Open pit	Closure	Neutral	Moderate	Pit backfilled with waste rock	Yes	Pit backfilled reduce height of exposed walls	Low	Local	Far Future	Sporadic	Irreversible	Low	Minor	Not Significant	High	Low
	Habitat Loss or Alteration (Ecosystems & Vegetation)	TSF, Mine Area, Waste Rock Dump	Closure	Adverse	Major	Soil salvage, reclamation of TSF, waste rock dump & perimeter of open pit	Yes	TSF reclaimed with terrestrial areas (65% of TSF area)	Medium	Local	Long Term	One Time	Reversible Long Term	Neutral	Minor	Not Significant	High	High
	Habitat Loss or Alteration of terrestrial ecosystems (for wildlife)	TSF, Mine Area, Waste Rock Dump	Closure	Adverse	Minor	Reclaim disturbed habitat to reflect pre-disturbance values after mine closure.	Yes	Habitat reclaimed in TSF, perimeter of open pit and waste rock dump.	Medium	Regional	Long-term	One Time	Reversible Long Term	Neutral	Minor/ Negligible	Not Significant	Medium	High
	Visual Effect	Waste Rock Dump	Closure	Adverse	Major	Overburden stockpile changed location; Waste Rock Dump removed	Yes	Overburden stockpile moved from Morrison Point to 700 m from Morrison Lake. Waste Rock Dump placed back into open pit	Negligible	Local	Far Future	Continuous	Reversible Short Term	Neutral	Negligible	Not Significant	High	High
	Visual Effect	TSF	Closure	Adverse	Major	Reclamation of TSF with terrestrial and ponded areas	Yes	Smaller pond area, reclamation of terrestrial areas and wetlands	Medium	Local	Far Future	Continuous	Irreversible	Neutral	Minor	Not Significant	High	High
	Noise	Mine Area	Closure	Adverse	Negligible	Site vehicles to comply with manufacturer noise limits; regular maintenance for all vehicles	Yes	Re-handling of waste rock and backfilling open pit	Medium	Landscape	Regular	Regular	Reversible Short Term	High	Minor	Not Significant	High	High
	Noise (Human Health)	Mine Area	Closure	Adverse	Moderate	Site vehicles to comply with manufacturer noise limits; regular maintenance for all vehicles	Yes	Re-handling of waste rock and backfilling open pit and effect to Tukii Hunting Camp	Major	Local	Medium Term	Regular	Reversible Short Term	Low	Moderate	Not Significant	High	High

Legend:
~~Strikethrough~~ - Revision to Effects Rating Based on Changes Documented in the Review Response Report

Air Quality Effects Assessment

Component	Description	Project Components	Project Phase	Nature and Extent	Mitigation and Management	Potential for Adverse Residual Effects	Magnitude	Spatial Extent	Duration of Effect	Frequency	Reversibility of Effects	Resilience (context)	Level of Significance Residual Effect	Probability of Occurrence	Confidence Level
Air Quality	Ambient air quality may be degraded outside the Project property boundary-gaseous and equipment PM emissions (SO2, NO2, CO, PM 2.5, PM 10)	Emissions sources include: Diesel fuel equipment Vehicle operation Open pit Tailings pond and waste rock dumps Access and haul roads	Construction, Operations	Negligible	n/a	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Ambient air quality may be degraded outside the Project property boundary-fugitive emissions (PM 2.5, PM 10)	Emissions sources include: Vehicle operation Open pit Tailings pond and waste rock dumps Access and haul roads	Construction	Negligible	n/a	No	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	Ambient air quality may be degraded outside the Project property boundary-fugitive emissions (PM 2.5, PM 10)	Emissions sources include: Vehicle operation Open pit Tailings pond and waste rock dumps Access and haul roads	Operations	Moderate	Use of: Control equipment (i.e., scrubber) Regular maintenance Dust suppression mechanisms (road watering, vehicle speed regulations)	Yes	High	Regional	Medium-term	Regular	Reversible Short-term	Neutral	Minor	High	Intermediate

Noise Effects Assessment

	Description	Project Components	Project Phase	Project Activity	Nature and Extent	Mitigation and Management	Potential for Adverse Residual Effects	Magnitude	Geographic extent	Duration	Frequency	Reversibility	Resilience (context)	Significance	Probability of Occurrence	Confidence Level
Noise Effects	Ambient noise may increase outside the Project property boundary	All noise-generating equipment. Significant sources include the open pit, mill site, tailings cyclones, pumps at the fresh water intake line, and traffic along the mine site access and haul roads.	Construction	General construction activities, site preparation, building infrastructure.	BN2: Major when there are occupants *BN1. Negligible	All site vehicles to comply with manufacturer noise limits, all mining equipment to undergo regular maintenance, minimize vegetation clearing surrounding Project footprint where possible to provide additional noise buffer.	Yes No	High	Landscape	Short-term	Regular	Reversible Short-term	Neutral	Major	High	High
	Ambient noise may increase outside the Project property boundary	All noise-generating equipment. Significant sources include the open pit, mill site, tailings cyclones, pumps at the fresh water intake line, and traffic along the mine site access and haul roads.	Operations	General site activities, operation of ventilation systems, ore and waste rock handling, ore crushing, haul truck traffic, general access road traffic, operation of tailings cyclones, fresh water intake pumps, etc	BN2. Major when there are occupants BN1: Moderate	All site vehicles to comply with manufacturer noise limits, all mining equipment to undergo regular maintenance, minimize vegetation clearing surrounding Project footprint where possible to provide additional noise buffer.	Yes' Yes'	High High	Landscape Landscape	Medium-term Medium-term	Regular Regular	Reversible Short-term Reversible Short-term	Neutral Neutral	Major' Moderate'	High High	High High
	Noise from the blast may cause nuisance	Construction and Operations blasting	Construction and Operations	Minor construction blasting for site preparation, blasting for development and operation of open pit mine	BN1: Negligible BN2: Moderate when there are occupants **Baseline Noise Monitoring Stations** BN1: Ookpik Lodge BN2: Tukii Hunting Camp BN3: Open area east of Morrison Lake 1: Also See Section 8.22 (Human Health) and 8.16 (Wildlife)	Blasting to occur only once per day to promote habituation, no night-time blasting	No Yes	High	Landscape	Medium-term	Regular	Reversible Short-term	Neutral	Moderate'	High	High