ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 23-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323758

Sample Description	Method / Analyte / Units / LOD	OA-SFE01 Li mg/L 0.005	OA-SFE01 Mg mg/L 0.05	OA-SFE01 Mn mg/L 0.0005	OA-SFE01 Mo mg/L 0.0001	OA-SFE01 Moisture % 0.3	OA-SFE01 Na mg/L 0.05	OA-SFE01 Ni mg/L 0.0005	OA-SFE01 Pb mg/L 0.0001	OA-SFE01 P mg/L 0.3	OA-SFE01 Sb mg/L 0.0001	OA-SFE01 Se mg/L 0.0005	OA-SFE01 Si mg/L 0.05	OA-SFE01 Sn mg/L 0.0005	OA-SFE01 Sr mg/L 0.0005	OA-SFE01 Ti mg/L 0.01
B625265		0.013	4.87	0.2070	0.0366	<0.3	4.33	0.0044	0.0153	<0.6	0.0004	<0.001	17.20	<0.001	0.0028	0.49
B625266		0.005	8.87	0.0996	0.0185	<0.3	4.71	0.0016	0.0026	<0.3	0.0001	<0.0005	11.50	<0.0005	0.0015	0.21
B625267		0.013	8.35	0.0192	0.0182	<0.3	12.60	0.0020	0.0002	<0.3	0.0001	<0.0005	4.46	<0.0005	0.0139	0.02
B625268		0.009	7.52	0.0158	0.0058	<0.3	7.10	0.0012	0.0006	<0.3	<0.0001	<0.0005	6.03	<0.0005	0.0079	0.07
B625269		<0.005	8.74	0.0037	0.0037	<0.3	6.91	<0.0005	<0.0001	<0.3	<0.0001	<0.0005	2.87	<0.0005	0.0074	<0.01
B625270		0.006	6.48	0.0318	0.0038	<0.3	6.20	0.0020	0.0011	<0.3	<0.0001	<0.0005	6.92	<0.0005	0.0064	0.11
B625271		0.019	16.50	0.0059	0.0113	<0.3	16.60	0.0017	<0.0001	<0.3	0.0001	0.0005	5.37	<0.0005	0.0394	<0.01
B625272		0.016	104.00	0.0231	0.0134	<0.3	3.93	<0.0005	<0.0001	<0.3	<0.0001	0.0033	3.70	<0.0005	0.0201	<0.01
B625274		<0.005	16.00	0.0049	0.0030	<0.3	1.38	<0.0005	<0.0001	<0.3	<0.0001	<0.0005	1.96	<0.0005	0.0019	<0.01
B625275		0.022	4.46	0.0381	0.0144	<0.3	5.46	0.0023	0.0013	<0.3	<0.0001	0.0010	6.87	<0.0005	0.0061	0.07
B625276		0.008	6.28	0.0885	0.0303	<0.3	4.59	0.0093	0.0032	<0.3	<0.0001	<0.0005	30.30	0.0006	0.0044	0.44
B625277		0.027	9.22	0.1370	0.0076	<0.3	4.54	0.0030	0.0082	<2	<0.0005	<0.003	28.20	<0.003	0.0087	0.33
B625278		0.032	10.60	0.3810	0.0630	<0.3	14.80	0.0128	0.0067	<0.6	0.0002	<0.001	28.00	<0.001	0.0148	1.03
B625279		<0.03	9.91	0.1050	0.3460	<0.3	3.51	0.0051	0.0058	<2	<0.0005	<0.003	35.00	<0.003	0.0041	0.81
B625280		<0.005	17.60	0.0041	0.0053	<0.3	0.33	<0.0005	<0.0001	<0.3	<0.0001	0.0006	3.24	<0.0005	0.0017	<0.01
B625281		0.063	10.10	0.1650	0.0142	<0.3	4.55	0.0047	0.0021	<2	<0.0005	<0.003	33.30	<0.003	0.0176	1.06
B625282		0.012	6.94	0.1440	0.0072	<0.3	5.65	0.0044	0.0059	0.8	<0.0002	0.0013	21.70	<0.001	0.0055	0.57
B625283		<0.005	6.05	0.0193	0.0238	<0.3	5.64	0.0034	0.0002	<0.3	<0.0001	<0.0005	7.60	<0.0005	0.0026	0.12
B625284		<0.03	7.96	0.1030	0.0036	<0.3	6.09	0.0035	0.0022	<2	<0.0005	<0.003	23.40	<0.003	0.0049	0.15
B625285		0.039	9.48	0.0798	0.0042	<0.3	5.36	0.0031	0.0018	<2	<0.0005	<0.003	24.30	<0.003	0.0154	0.14
B625286		<0.01	7.61	0.0787	0.0020	<0.3	7.16	0.0017	0.0014	<0.6	<0.0002	<0.001	12.10	<0.001	0.0040	0.15
B625287		0.017	6.08	0.0837	0.0292	<0.3	6.93	0.0050	0.0091	0.6	<0.0002	<0.001	31.70	<0.001	0.0060	1.40
B625288		<0.005	4.52	0.0337	0.0015	<0.3	4.12	0.0134	0.0014	<0.3	0.0002	0.0008	6.98	<0.0005	0.0023	0.11
B625289		<0.005	34.90	0.0117	0.0002	<0.3	0.18	<0.0005	<0.0001	<0.3	<0.0001	0.0019	2.86	<0.0005	0.0056	<0.01
B625290		<0.03	7.15	0.2450	0.0041	<0.3	7.54	0.0059	0.0582	<2	<0.0005	<0.003	30.20	<0.003	0.0113	0.94
B625291		<0.03	7.20	0.2010	0.0059	<0.3	4.89	0.0049	0.0309	<2	<0.0005	<0.003	29.90	<0.003	0.0129	0.78
B625292		<0.03	13.80	0.1380	0.0130	<0.3	5.23	0.0049	0.0058	<2	<0.0005	<0.003	29.30	<0.003	0.0036	0.68
B625293		<0.03	8.04	0.0970	0.0057	<0.3	3.78	0.0033	0.0030	<2	<0.0005	<0.003	23.50	<0.003	0.0034	0.30

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 23-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323758

Sample Description	Method / Analyte / Units / LOD	OA-SFE01 Tl ppm 0.0001	OA-SFE01 U mg/L 0.00001	OA-SFE01 V mg/L 0.001	OA-SFE01 Zn mg/L 0.01	OA-SFE01 Hardness mg/L CaCO3e 0.6	OA-SFE01 Final pH Unity 0.1	MS14L-ANPH Br mg/L 0.05	MS14L-ANPH Cl mg/L 0.5	MS14L-ANPH F mg/L 0.02	MS14L-ANPH NO3 (as mg/L 0.005	MS14L-ANPH SO4 mg/L 0.5	MS14L-ANPH TDS mg/L 3	MS14L-ANPH Conducti uS/cm 2	MS14L-ANPH Alkalini mg/L CaCO3e 1
B625265		0.0002	0.00699	0.046	<0.02	20.8	9.4	<0.05	1.2	1.20	0.084	12.4	283	300	126
B625266		0.0001	0.00130	0.008	<0.01	37.0	8.3	<0.09	2.3	0.92	0.062	26.0	210	247	74
B625267		<0.0001	0.00214	0.002	<0.01	61.1	8.0	<0.2	18.7	0.61	0.053	3.9	142	243	77
B625268		<0.0001	0.00260	0.005	<0.01	46.1	8.0	<0.1	7.2	0.63	<0.03	2.9	116	180	63
B625269		<0.0001	0.00006	0.001	<0.01	46.6	7.9	<0.1	13.2	0.66	<0.04	1.2	99	180	53
B625270		<0.0001	0.00208	0.005	<0.01	39.0	8.0	<0.1	6.7	0.65	0.075	3.5	123	175	60
B625271		<0.0001	0.00548	0.004	<0.01	114.0	8.2	0.27	30.8	0.67	0.123	5.5	184	326	99
B625272		<0.0001	0.00002	<0.001	<0.01	440	7.1	<0.3	5.8	0.33	<0.05	454	617	865	14
B625274		<0.0001	<0.00001	<0.001	<0.01	66.7	7.7	<0.1	6.1	0.28	<0.04	4.4	59	133	39
B625275		<0.0001	0.00035	0.009	0.01	19.2	8.0	<0.1	3.2	0.84	0.087	6.7	114	149	44
B625276		0.0002	0.00147	0.029	0.02	26.5	8.1	<0.09	2.1	1.51	0.262	3.9	209	138	45
B625277		<0.0005	0.00122	0.017	<0.05	39.4	8.6	0.10	2.6	1.04	0.413	4.9	202	124	43
B625278		0.0008	0.00416	0.100	0.05	51.0	9.6	0.05	2.5	5.56	0.035	1.1	294	275	107
B625279		<0.0005	0.00458	0.028	<0.05	40.8	9.2	0.37	2.4	1.92	0.104	5.6	270	174	66
B625280		<0.0001	<0.00001	<0.001	<0.01	74.4	7.7	0.33	1.2	<0.5	0.033	1.3	58	129	45
B625281		<0.0005	0.00152	0.060	<0.05	43.7	9.6	0.07	0.8	1.50	0.050	1.2	257	154	70
B625282		0.0002	0.00190	0.047	0.02	30.0	9.3	0.07	0.7	1.34	0.204	2.1	192	143	56
B625283		<0.0001	0.00026	0.005	<0.01	25.4	8.4	0.17	5.1	1.14	0.051	2.5	127	167	52
B625284		<0.0005	0.00329	0.020	<0.05	32.8	8.6	0.12	3.3	1.16	0.036	0.7	169	109	44
B625285		<0.0005	0.00352	0.010	<0.05	41.6	8.3	0.16	2.1	0.82	0.115	2.0	174	115	42
B625286		<0.0002	0.00099	0.010	<0.02	32.3	8.7	0.14	4.2	1.00	0.101	0.9	142	144	51
B625287		0.0003	0.00463	0.045	<0.02	29.1	9.7	<0.05	2.3	1.49	0.060	1.4	314	282	105
B625288		<0.0001	0.00076	0.012	<0.01	19.4	8.4	<0.05	1.8	0.78	0.018	2.8	99	124	43
B625289		<0.0001	<0.00001	<0.001	<0.01	149.0	7.0	<0.05	3.4	0.20	0.225	134.0	192	316	11
B625290		<0.0005	0.00724	0.048	<0.05	36.3	9.3	<0.05	2.7	0.81	0.031	7.0	265	229	85
B625291		<0.0005	0.00241	0.061	<0.05	33.1	9.2	<0.05	1.5	0.82	0.034	8.1	238	184	65
B625292		<0.0005	0.00064	0.019	<0.05	56.8	8.3	<0.05	2.5	1.66	0.037	60.1	312	243	41
B625293		<0.0005	0.00131	0.010	<0.05	33.1	7.7	<0.05	2.4	1.28	0.066	43.2	220	174	26

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 23-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323758

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.
Applies to Method: FND-02 SND-01

Processed at ALSE Vancouver, Burnaby, BC, Canada.
Applies to Method: MS14L-ANPH OA-SFE01

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 15-DEC-2022
Account: BIMCIO

CERTIFICATE VA22323795

Project: Pulps for ABA & Shake Flask
P.O. No.: 4500111469
This report is for 50 samples of Crushed Rock submitted to our lab in Vancouver, BC, Canada on 26-OCT-2022.

The following have access to data associated with this certificate:

TREVOR BRISCO	PAUL BRYDEN	JASON DUFF
SIMON FLEURY	FRED LAWRENCE	SHAHE NACCASHIAN
HAYLEY POTHIER	JACOB PRINCE	ROBERT ROBERTSON
MELISSA ROSE	JHON SUAREZ	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
FND-02	Find Sample for Addn Analysis
SND-01	Send samples to external laboratory

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
OA-SFE01	Shake Flask Analysis at ALSE	
MS14L-ANPH	Anions by ion chromatography	ICP-MS

This is the Final Report and supersedes any preliminary report with this certificate number.Results apply to samples as submitted.All pages of this report have been checked and approved for release.
***** See Appendix Page for comments regarding this certificate *****

Signature:
Saa Traxler, Director, North Vancouver Operations

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 15-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323795

Sample Description	Method	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01
	Analyte	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Hg	K
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	LOD	0.00005	0.005	0.001	0.01	0.001	0.0005	0.0005	0.1	0.00005	0.0001	0.0005	0.001	0.03	0.00005	0.05
B625164		0.00216	23.500	0.012	0.31	0.018	0.0120	0.0017	1.2	0.00202	0.0023	0.0035	0.117	3.90	<0.00005	27.10
B625165		<0.0001	21.000	<0.002	0.16	0.068	0.0013	<0.001	4.2	0.00014	0.0094	0.0412	0.018	16.70	<0.00005	61.80
B625166		<0.00005	1.300	<0.001	0.14	0.015	<0.0005	<0.0005	1.9	<0.00005	0.0004	0.0067	<0.001	0.95	<0.00005	76.10
B625167		<0.00005	4.610	<0.001	0.09	0.035	<0.0005	<0.0005	0.7	<0.00005	0.0011	0.0326	0.001	2.60	<0.00005	39.60
B625168		<0.001	189.000	<0.02	0.79	0.550	0.0102	0.0120	2.3	<0.001	0.0147	0.0206	0.186	61.20	<0.00005	124.00
B625169		<0.00005	0.179	0.003	0.03	<0.001	<0.0005	<0.0005	0.2	<0.00005	0.0001	0.0024	<0.001	0.19	<0.00005	2.39
B625170		<0.00005	0.098	<0.001	0.13	0.008	<0.0005	<0.0005	8.3	<0.00005	<0.0001	<0.0005	<0.001	<0.03	<0.00005	54.60
B625171		<0.0001	16.600	<0.002	0.12	0.155	<0.001	<0.001	<0.2	<0.0001	0.0024	0.0039	0.003	9.12	<0.00005	53.60
B625172		<0.0003	37.400	<0.005	0.12	0.458	<0.003	<0.003	<0.5	<0.0003	0.0058	0.0080	<0.005	23.20	<0.00005	51.10
B625173		<0.00005	0.898	<0.001	0.06	0.008	<0.0005	<0.0005	0.9	<0.00005	0.0004	0.0083	<0.001	1.66	<0.00005	26.70
B625174		<0.00005	0.211	<0.001	0.02	0.002	<0.0005	<0.0005	0.6	<0.00005	<0.0001	0.0006	<0.001	0.17	<0.00005	10.60
B625175		<0.00005	0.790	<0.001	0.03	0.003	<0.0005	<0.0005	1.1	0.00011	0.0005	0.0056	0.002	2.35	<0.00005	12.80
B625176		<0.00005	0.523	<0.001	0.02	0.003	<0.0005	<0.0005	0.4	<0.00005	0.0006	0.0041	0.002	1.57	<0.00005	11.10
B625177		<0.00005	0.182	<0.001	0.02	<0.001	<0.0005	<0.0005	0.8	<0.00005	<0.0001	0.0043	<0.001	0.13	<0.00005	14.20
B625178		<0.0003	38.800	<0.005	0.63	0.287	<0.003	<0.003	1.0	<0.0003	0.0065	0.0189	0.018	22.80	<0.00005	36.40
B625179		0.00037	25.300	<0.001	0.17	0.147	0.0010	0.0056	5.1	<0.0006	0.0054	0.0093	0.052	18.60	<0.00005	52.70
B625180		<0.00005	0.203	<0.001	0.14	0.003	<0.0005	<0.0005	1.1	<0.00005	<0.0001	0.0006	<0.001	0.23	<0.00005	10.40
B625181		<0.00005	0.469	<0.001	0.10	<0.001	<0.0005	<0.0005	0.2	<0.00005	0.0002	0.0019	<0.001	0.14	<0.00005	12.00
B625182		<0.0003	40.600	<0.005	0.28	0.110	0.0030	<0.003	0.7	<0.0003	0.0049	<0.003	0.008	14.60	<0.00005	27.80
B625183		<0.00005	20.500	<0.001	0.10	0.138	<0.0005	<0.0005	0.3	<0.00005	0.0048	0.0040	0.004	21.10	<0.00005	50.00
B625184		<0.00005	0.192	<0.001	0.17	0.003	<0.0005	<0.0005	5.5	<0.0003	<0.0001	<0.0005	<0.001	<0.03	<0.00005	51.60
B625185		<0.0003	32.700	<0.005	0.16	0.286	<0.003	<0.003	0.7	<0.0003	0.0083	0.0046	<0.005	35.30	<0.00005	33.00
B625186		<0.00005	4.040	<0.001	0.14	0.044	<0.0005	<0.0005	2.6	<0.00005	0.0016	0.0461	0.002	3.16	<0.00005	52.40
B625187		0.00022	55.000	<0.002	0.05	0.536	0.0014	0.0032	1.2	0.00019	0.0162	0.0101	0.164	43.20	<0.00005	49.50
B625188		<0.00005	4.120	<0.001	0.06	<0.001	<0.0005	<0.0005	0.7	<0.00005	0.0031	0.0024	0.002	8.39	<0.00005	3.58
B625189		0.00007	7.640	<0.001	0.06	0.054	0.0007	0.0006	3.3	0.00021	0.0034	0.0066	0.038	7.58	<0.00005	45.30
B625190		0.00150	21.600	0.011	0.07	0.030	0.0078	0.0013	1.9	0.00277	0.0022	0.0029	0.067	6.56	<0.00005	33.90
B625191		<0.00005	5.900	<0.001	0.08	0.023	<0.0005	<0.0005	3.6	<0.0002	0.0023	0.0125	0.014	4.20	<0.00005	39.40
B625192		0.00260	25.300	0.011	0.04	0.032	0.0083	0.0024	1.7	<0.01	0.0022	0.0038	0.011	6.22	<0.00005	32.50
B625193		<0.00005	1.870	<0.001	0.22	0.006	<0.0005	<0.0005	4.3	<0.00005	0.0006	0.0105	0.002	1.03	<0.00005	44.60
B625194		<0.00005	0.120	<0.001	0.16	0.008	<0.0005	<0.0005	1.8	<0.00005	<0.0001	<0.0005	<0.001	0.13	<0.00005	25.50
B625195		<0.00005	0.042	<0.001	0.23	0.007	<0.0005	<0.0005	7.8	<0.00005	0.0004	<0.0005	<0.001	0.06	<0.00005	12.30
B625196		<0.00005	0.076	<0.001	0.20	0.001	<0.0005	<0.0005	1.1	<0.00005	0.0001	<0.0005	<0.001	0.06	<0.00005	7.81
B625197		<0.00005	0.443	<0.001	0.07	<0.001	<0.0005	<0.0005	2.2	<0.00005	0.0003	<0.0005	<0.001	0.86	<0.00005	2.39
B625199		<0.00005	5.760	<0.001	0.04	0.002	<0.0005	<0.0005	0.2	<0.00005	0.0061	0.0041	0.006	22.60	<0.00005	0.35
B625200		<0.00005	0.218	<0.001	0.02	<0.001	<0.0005	<0.0005	0.3	<0.00005	<0.0001	0.0016	<0.001	0.29	<0.00005	4.86
B625201		<0.00005	10.700	<0.001	0.20	0.055	0.0007	<0.0005	3.2	<0.0001	0.0024	0.0069	0.009	8.24	<0.00005	51.70
B625202		<0.00005	0.239	<0.001	0.08	0.004	<0.0005	<0.0005	6.3	<0.0001	<0.0001	0.0048	<0.001	0.06	<0.00005	43.00
B625203		0.00006	7.320	<0.001	0.16	0.033	<0.0005	0.0005	2.8	<0.0001	0.0033	0.0153	0.013	5.58	<0.00005	38.10
B625204		0.00041	29.100	<0.002	0.08	0.160	<0.001	0.0029	0.5	<0.002	0.0059	0.0023	0.058	21.60	<0.00005	51.80

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 15-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323795

Sample Description	Method / Analyte / Units / LOD	OA-SFE01 Li mg/L 0.005	OA-SFE01 Mg mg/L 0.05	OA-SFE01 Mn mg/L 0.0005	OA-SFE01 Mo mg/L 0.0001	OA-SFE01 Moisture % 0.3	OA-SFE01 Na mg/L 0.05	OA-SFE01 Ni mg/L 0.0005	OA-SFE01 Pb mg/L 0.0001	OA-SFE01 P mg/L 0.3	OA-SFE01 Sb mg/L 0.0001	OA-SFE01 Se mg/L 0.0005	OA-SFE01 Si mg/L 0.05	OA-SFE01 Sn mg/L 0.0005	OA-SFE01 Sr mg/L 0.0005	OA-SFE01 Ti mg/L 0.01
B625164		0.038	4.02	0.1250	0.8690	<0.3	18.20	0.0009	0.3780	<0.3	0.0007	<0.0005	76.40	0.0069	0.0071	0.10
B625165		0.044	19.20	0.2310	0.0459	<0.3	11.60	0.0184	0.0206	<0.6	0.0004	<0.001	45.60	<0.001	0.0184	0.73
B625166		0.012	2.12	0.0122	0.0303	<0.3	13.80	0.0008	0.0004	<0.3	0.0001	<0.0005	4.78	<0.0005	0.0051	0.06
B625167		<0.005	6.26	0.0350	0.0059	<0.3	3.10	0.0056	0.0003	<0.3	<0.0001	<0.0005	8.10	<0.0005	0.0060	0.05
B625168		<0.1	43.00	0.3920	0.0712	<0.3	3.10	0.0173	0.0185	<6	<0.002	<0.01	292.00	<0.01	0.0261	1.61
B625169		<0.005	15.80	0.0013	0.0210	<0.3	0.89	0.0014	<0.0001	<0.3	0.0002	0.0009	3.81	<0.0005	0.0016	<0.01
B625170		<0.005	48.20	0.0244	0.0307	<0.3	4.43	<0.0005	<0.0001	<0.3	<0.0001	0.0039	3.04	<0.0005	0.0170	<0.01
B625171		0.012	5.06	0.0512	0.0088	<0.3	3.12	0.0047	0.0006	<0.6	0.0002	<0.001	22.40	<0.001	0.0025	0.30
B625172		<0.03	11.60	0.1800	0.0033	<0.3	2.34	0.0111	0.0072	<2	<0.0005	<0.003	57.70	<0.003	0.0067	0.66
B625173		<0.005	10.70	0.0220	0.0138	<0.3	3.14	0.0052	0.0002	<0.3	0.0003	0.0023	4.65	<0.0005	0.0065	0.01
B625174		<0.005	12.50	0.0066	0.0166	<0.3	1.64	<0.0005	<0.0001	<0.3	<0.0001	0.0014	2.38	<0.0005	0.0059	<0.01
B625175		<0.005	12.20	0.0184	0.0150	<0.3	1.56	0.0050	0.0041	<0.3	0.0003	0.0016	5.03	<0.0005	0.0075	0.01
B625176		<0.005	11.90	0.0070	0.0326	<0.3	0.95	0.0042	0.0004	<0.3	0.0002	0.0017	5.08	<0.0005	0.0028	<0.01
B625177		<0.005	11.30	0.0047	0.0205	<0.3	2.28	<0.0005	<0.0001	<0.3	<0.0001	0.0012	2.66	<0.0005	0.0039	<0.01
B625178		<0.03	16.80	0.2580	0.0106	<0.3	9.33	0.0105	0.0029	<2	<0.0005	<0.003	77.70	<0.003	0.0125	0.81
B625179		0.037	18.80	0.4050	0.2220	<0.3	8.77	0.0087	0.0249	<0.3	0.0004	<0.0005	53.30	0.0019	0.0187	0.86
B625180		0.010	14.30	0.0040	0.0100	<0.3	1.26	0.0007	<0.0001	<0.3	0.0001	0.0016	3.51	<0.0005	0.0056	<0.01
B625181		<0.005	10.10	0.0008	0.0117	<0.3	0.70	0.0005	<0.0001	<0.3	<0.0001	0.0009	1.46	<0.0005	0.0020	<0.01
B625182		0.046	15.50	0.1110	0.0035	<0.3	4.98	0.0077	0.0036	<2	<0.0005	<0.003	57.30	<0.003	0.0103	0.24
B625183		0.012	13.00	0.0596	0.0804	<0.3	5.14	0.0114	0.0014	<0.3	<0.0001	0.0010	31.30	<0.0005	0.0047	0.64
B625184		0.012	3.32	0.0037	0.6290	<0.3	4.24	<0.0005	<0.0001	<0.3	0.0002	<0.0005	4.94	<0.0005	0.0143	<0.01
B625185		0.030	19.00	0.2060	0.0028	<0.3	5.02	0.0114	0.0097	<2	<0.0005	<0.003	52.40	<0.003	0.0083	0.62
B625186		0.007	6.24	0.0817	0.0087	<0.3	7.86	0.0075	0.0005	<0.3	<0.0001	<0.0005	13.60	<0.0005	0.0126	0.12
B625187		0.035	32.80	0.7020	0.0252	<0.3	4.32	0.0150	0.0075	<0.6	<0.0002	<0.001	85.30	0.0041	0.0116	1.73
B625188		0.006	11.30	0.0591	0.0208	<0.3	1.11	0.0103	0.0004	<0.3	<0.0001	0.0008	10.40	<0.0005	0.0033	0.03
B625189		0.017	6.81	0.1980	0.0478	<0.3	14.20	0.0058	0.0093	<0.3	0.0001	<0.0005	16.90	0.0010	0.0125	0.32
B625190		0.051	2.79	0.2740	0.1200	<0.3	28.20	0.0016	0.3880	<0.3	0.0016	0.0008	92.80	0.0015	0.0141	0.14
B625191		0.023	5.18	0.0792	0.2170	<0.3	12.40	0.0057	0.0107	<0.3	0.0005	0.0009	14.80	<0.0005	0.0101	0.22
B625192		0.060	2.25	0.1200	0.4720	<0.3	28.20	0.0035	0.3010	<0.3	0.0009	<0.0005	107.00	0.0156	0.0099	0.16
B625193		0.011	3.27	0.0155	0.0122	<0.3	11.70	0.0018	0.0010	<0.3	0.0005	0.0011	7.12	<0.0005	0.0130	0.04
B625194		0.011	30.50	0.0135	0.0200	<0.3	5.26	<0.0005	<0.0001	<0.3	<0.0001	0.0006	3.58	<0.0005	0.0124	<0.01
B625195		0.016	94.70	0.1210	0.0071	<0.3	1.33	0.0009	<0.0001	<0.3	<0.0001	0.0008	3.78	<0.0005	0.0054	<0.01
B625196		0.006	49.70	0.0043	0.0748	<0.3	1.66	<0.0005	<0.0001	<0.3	<0.0001	0.0010	3.14	<0.0005	0.0040	<0.01
B625197		<0.005	10.60	0.0049	0.0064	<0.3	1.04	0.0014	<0.0001	<0.3	<0.0001	0.0007	3.99	<0.0005	0.0056	<0.01
B625199		0.008	16.80	0.1360	0.0070	<0.3	0.14	0.0179	0.0001	<0.3	<0.0001	0.0007	18.30	<0.0005	0.0009	<0.01
B625200		<0.005	10.10	0.0053	0.0054	<0.3	0.78	0.0007	<0.0001	<0.3	<0.0001	<0.0005	2.04	<0.0005	0.0018	<0.01
B625201		0.022	8.33	0.0982	0.1380	<0.3	11.00	0.0025	0.0018	<0.3	0.0002	<0.0005	20.70	0.0010	0.0103	0.30
B625202		<0.005	5.37	0.0029	0.1490	<0.3	4.30	<0.0005	<0.0001	<0.3	<0.0001	<0.0005	3.10	<0.0005	0.0140	<0.01
B625203		0.029	8.30	0.0793	0.0758	<0.3	5.29	0.0073	0.0031	<0.3	0.0002	<0.0005	16.40	0.0005	0.0091	0.14
B625204		0.027	17.50	0.2920	0.3270	<0.3	3.34	0.0079	0.0031	<0.6	<0.0002	<0.001	47.00	0.0020	0.0049	0.58

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 15-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323795

Sample Description	Method	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH
	Analyte	Tl	U	V	Zn	Hardness	Final pH	Br	Cl	F	NO3 (as	SO4	TDS	Conducti	Alkalini
	Units	ppm	mg/L	mg/L	mg/L	mg/L CaCO3e	Unity	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	mg/L CaCO3e
	LOD	0.0001	0.00001	0.001	0.01	0.6	0.1	0.05	0.5	0.02	0.005	0.5	3	2	1
B625164		0.0005	0.08570	0.023	0.59	19.5	8.7	<0.05	8.9	3.46	0.121	1.9	328	122	46
B625165		0.0003	0.00555	0.099	0.05	89.6	8.7	<0.05	6.0	1.67	0.113	7.6	327	230	88
B625166		<0.0001	0.00014	0.031	<0.01	13.4	9.0	<0.05	5.9	3.64	0.317	4.8	188	309	104
B625167		<0.0001	0.00017	0.008	<0.01	27.6	8.1	<0.05	4.9	0.72	0.043	<0.5	117	153	54
B625168		<0.002	0.00421	0.085	<0.2	183.0	8.5	<0.05	3.3	1.22	0.061	1.1	1260	130	73
B625169		<0.0001	<0.00001	0.002	<0.01	65.5	7.4	<0.05	2.0	0.74	0.065	19.6	73	134	34
B625170		<0.0001	0.00003	<0.001	<0.01	219	6.9	<0.05	4.4	0.36	0.206	244	382	601	14
B625171		<0.0002	0.00068	0.022	<0.02	20.8	9.0	<0.05	2.1	1.18	0.223	1.8	199	148	74
B625172		<0.0005	0.00141	0.031	<0.05	47.8	8.2	<0.05	2.6	0.87	0.609	6.3	320	126	42
B625173		<0.0001	0.00004	0.002	<0.01	46.2	7.3	<0.05	3.7	0.39	0.086	19.3	101	169	34
B625174		<0.0001	<0.00001	<0.001	<0.01	53.0	7.2	<0.05	2.4	0.29	0.134	10.3	64	128	29
B625175		<0.0001	0.00007	0.002	0.01	52.9	7.1	<0.05	1.7	0.44	0.043	29.4	86	146	16
B625176		<0.0001	0.00004	0.002	<0.01	50.1	7.1	<0.05	1.4	0.56	0.113	18.1	75	127	23
B625177		<0.0001	<0.00001	<0.001	<0.01	48.5	7.6	<0.05	2.9	0.51	0.159	12.1	77	141	41
B625178		<0.0005	0.00282	0.029	<0.05	71.7	8.0	<0.05	4.0	0.85	0.162	1.6	365	93	37
B625179		0.0003	0.00291	0.028	0.07	90.2	8.4	<0.05	4.3	1.04	0.115	1.8	331	200	82
B625180		<0.0001	0.00004	<0.001	<0.01	61.6	7.0	<0.05	2.6	0.34	0.074	36.6	88	160	18
B625181		<0.0001	0.00001	<0.001	<0.01	42.1	7.5	<0.05	2.0	0.41	2.07	4.7	62	118	30
B625182		<0.0005	0.00536	0.016	<0.05	65.6	7.9	<0.05	2.8	0.61	0.072	0.6	287	74	38
B625183		0.0002	0.00232	0.020	<0.01	54.4	8.9	<0.05	4.0	1.32	0.065	1.6	233	145	51
B625184		<0.0001	0.00059	0.003	<0.01	27.3	8.8	<0.07	6.9	0.78	0.044	1.4	134	218	77
B625185		<0.0005	0.00200	0.028	<0.05	79.9	8.3	<0.05	2.8	0.73	0.038	1.0	294	92	36
B625186		<0.0001	0.00037	0.026	<0.01	32.1	9.0	<0.05	4.0	0.83	0.074	2.7	170	220	81
B625187		0.0005	0.00550	0.062	0.10	138.0	8.4	<0.05	2.4	1.16	0.515	0.7	452	110	45
B625188		<0.0001	0.00017	0.004	<0.01	48.3	7.5	<0.05	3.2	0.71	0.036	4.9	78	69	18
B625189		0.0001	0.00202	0.030	0.05	36.2	8.8	<0.06	4.0	2.05	0.074	1.4	192	213	88
B625190		0.0012	0.12900	0.009	0.52	16.3	9.3	<0.06	10.8	4.06	0.130	3.3	408	181	70
B625191		0.0001	0.01030	0.054	0.02	30.2	8.8	<0.05	6.1	0.76	0.097	5.4	164	189	67
B625192		0.0018	0.13100	0.009	0.21	13.5	9.1	<0.05	6.5	5.78	0.092	1.3	439	155	64
B625193		<0.0001	0.00013	0.040	<0.01	24.3	8.9	<0.07	6.2	0.49	0.078	8.3	145	221	72
B625194		<0.0001	0.00001	<0.001	<0.01	130.0	7.2	<0.1	5.3	0.37	0.085	148.0	237	396	16
B625195		<0.0001	<0.00001	<0.001	<0.01	410	6.7	<0.05	2.9	0.36	0.062	421	555	804	7
B625196		<0.0001	0.00003	<0.001	<0.01	207	7.3	<0.05	4.0	0.39	0.126	174.0	258	409	16
B625197		<0.0001	0.00001	<0.001	<0.01	49.1	7.5	<0.05	3.1	0.53	0.063	<0.5	50	99	30
B625199		<0.0001	0.00008	0.001	<0.01	69.6	7.5	<0.05	3.2	0.35	0.071	4.7	119	74	25
B625200		<0.0001	<0.00001	<0.001	<0.01	42.2	7.4	<0.05	2.9	0.27	0.116	1.1	43	86	26
B625201		0.0002	0.00113	0.027	0.02	42.3	8.4	<0.05	6.0	1.51	0.072	2.9	203	201	71
B625202		<0.0001	0.00004	0.008	<0.01	37.8	8.4	<0.05	6.4	1.46	0.046	1.1	125	228	79
B625203		0.0001	0.00062	0.023	<0.01	41.1	8.2	<0.05	3.8	1.08	0.037	0.9	154	152	60
B625204		0.0005	0.00435	0.032	0.04	73.3	8.7	<0.05	2.2	1.62	0.037	1.2	291	131	57

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 15-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323795

Sample Description	Method / Analyte / Units / LOD	OA-SFE01 Ag mg/L 0.00005	OA-SFE01 Al mg/L 0.005	OA-SFE01 As mg/L 0.001	OA-SFE01 B mg/L 0.01	OA-SFE01 Ba mg/L 0.001	OA-SFE01 Be mg/L 0.0005	OA-SFE01 Bi mg/L 0.0005	OA-SFE01 Ca mg/L 0.1	OA-SFE01 Cd mg/L 0.00005	OA-SFE01 Co mg/L 0.0001	OA-SFE01 Cr mg/L 0.0005	OA-SFE01 Cu mg/L 0.001	OA-SFE01 Fe mg/L 0.03	OA-SFE01 Hg mg/L 0.00005	OA-SFE01 K mg/L 0.05
B625205		0.00072	14.600	0.011	0.07	0.029	0.0027	<0.001	0.8	<0.001	0.0015	0.0017	0.012	3.11	<0.00005	31.90
B625210		<0.00005	0.033	<0.001	0.12	<0.001	<0.0005	<0.0005	8.3	<0.00005	<0.0001	<0.0005	<0.001	<0.03	<0.00005	2.63
B625211		<0.00005	3.420	0.001	0.05	<0.001	<0.0005	<0.0005	1.0	<0.00005	0.0028	0.0214	0.002	9.63	<0.00005	0.72
B625212																
B625213		<0.00005	1.190	<0.001	0.02	0.001	<0.0005	<0.0005	1.4	<0.00005	0.0007	0.0100	<0.001	2.94	<0.00005	4.34
B625214		<0.00005	0.278	<0.001	0.01	<0.001	<0.0005	<0.0005	0.3	<0.00005	<0.0001	0.0025	<0.001	0.16	<0.00005	1.21
B625215		<0.00005	0.210	<0.001	0.02	<0.001	<0.0005	<0.0005	0.9	<0.00005	<0.0001	0.0006	<0.001	0.43	<0.00005	3.46
B625216		<0.00005	0.607	<0.001	0.04	<0.001	<0.0005	<0.0005	<0.1	<0.00005	0.0004	0.0100	<0.001	2.07	<0.00005	2.18
B625217		<0.00005	0.131	<0.001	0.04	<0.001	<0.0005	<0.0005	0.7	<0.00005	<0.0001	0.0027	<0.001	0.16	<0.00005	3.14
B625218		<0.00005	1.220	<0.001	0.01	<0.001	<0.0005	<0.0005	0.5	<0.00005	0.0010	0.0091	0.005	3.26	<0.00005	0.64

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 15-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323795

Sample Description	Method / Analyte / Units / LOD	OA-SFE01 Li mg/L 0.005	OA-SFE01 Mg mg/L 0.05	OA-SFE01 Mn mg/L 0.0005	OA-SFE01 Mo mg/L 0.0001	OA-SFE01 Moisture % 0.3	OA-SFE01 Na mg/L 0.05	OA-SFE01 Ni mg/L 0.0005	OA-SFE01 Pb mg/L 0.0001	OA-SFE01 P mg/L 0.3	OA-SFE01 Sb mg/L 0.0001	OA-SFE01 Se mg/L 0.0005	OA-SFE01 Si mg/L 0.05	OA-SFE01 Sn mg/L 0.0005	OA-SFE01 Sr mg/L 0.0005	OA-SFE01 Ti mg/L 0.01
B625205		0.035	1.76	0.0717	1.1800	<0.3	19.30	<0.001	0.2020	<0.6	0.0006	<0.001	42.00	0.0086	0.0071	0.10
B625210		0.078	59.10	0.0165	0.0061	<0.3	0.18	<0.0005	<0.0001	<0.3	<0.0001	0.0035	4.66	<0.0005	0.0025	<0.01
B625211		0.006	13.70	0.0279	0.0150	<0.3	1.02	0.0179	0.0001	<0.3	<0.0001	0.0005	11.60	<0.0005	0.0010	<0.01
B625212																
B625213		<0.005	10.50	0.0201	0.0046	<0.3	0.98	0.0073	0.0001	<0.3	<0.0001	0.0010	7.04	<0.0005	0.0048	<0.01
B625214		<0.005	8.95	0.0039	0.0366	<0.3	0.52	<0.0005	<0.0001	<0.3	<0.0001	0.0039	1.51	<0.0005	0.0010	<0.01
B625215		<0.005	9.38	0.0096	0.0067	<0.3	0.95	<0.0005	<0.0001	<0.3	<0.0001	0.0012	2.99	<0.0005	0.0034	<0.01
B625216		<0.005	11.90	0.0112	0.0072	<0.3	0.66	0.0107	<0.0001	<0.3	0.0002	<0.0005	4.13	<0.0005	0.0010	<0.01
B625217		<0.005	14.60	0.0023	0.0219	<0.3	2.72	0.0006	<0.0001	<0.3	0.0001	0.0007	2.82	<0.0005	0.0028	<0.01
B625218		<0.005	8.28	0.0286	0.0085	<0.3	0.25	0.0063	0.0001	<0.3	<0.0001	0.0019	4.70	<0.0005	0.0031	<0.01

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 15-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323795

Sample Description	Method	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH
	Analyte	Tl	U	V	Zn	Hardness	Final pH	Br	Cl	F	NO3 (as	SO4	TDS	Conducti	Alkalini
	Units	ppm	mg/L	mg/L	mg/L	mg/L CaCO3e	Unity	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	mg/L CaCO3e
	LOD	0.0001	0.00001	0.001	0.01	0.6	0.1	0.05	0.5	0.02	0.005	0.5	3	2	1
B625205		0.0006	0.06590	0.007	0.41	9.3	9.1	0.07	11.2	3.34	0.423	3.3	234	160	48
B625210		<0.0001	<0.00001	<0.001	<0.01	264	6.9	<0.05	5.9	0.70	0.026	268	362	543	7
B625211		<0.0001	0.00015	0.005	<0.01	58.8	7.5	<0.05	4.0	0.58	0.044	4.3	85	74	24
B625212															
B625213		<0.0001	0.00003	0.002	<0.01	46.7	7.7	<0.05	3.2	0.46	0.042	1.6	67	96	34
B625214		<0.0001	<0.00001	<0.001	<0.01	37.5	7.6	<0.05	3.0	0.27	0.026	4.7	40	84	27
B625215		<0.0001	<0.00001	<0.001	<0.01	40.8	7.5	<0.05	4.1	0.33	0.043	11.2	54	97	23
B625216		<0.0001	0.00004	0.002	<0.01	49.0	7.4	<0.05	5.2	0.32	0.023	16.7	62	108	18
B625217		<0.0001	<0.00001	<0.001	<0.01	61.9	7.5	<0.05	6.9	0.39	0.052	6.5	63	134	33
B625218		<0.0001	0.00004	0.002	<0.01	35.4	7.4	<0.05	1.8	0.29	0.103	4.2	44	63	17

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 15-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22323795

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

	Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.	
Applies to Method:	FND-02	SND-01
	Processed at ALSE Vancouver, Burnaby, BC, Canada.	
Applies to Method:	MS14L-ANPH	OA-SFE01

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: **BAFFINLAND IRON MINES CORPORATION**
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 20-DEC-2022
Account: BIMCIO

CERTIFICATE VA22324725

Project: Pulps for ABA & Shake Flask

P.O. No.: 4500111469

This report is for 52 samples of Crushed Rock submitted to our lab in Vancouver, BC, Canada on 26-OCT-2022.

The following have access to data associated with this certificate:

TREVOR BRISCO	PAUL BRYDEN	JASON DUFF
SIMON FLEURY	FRED LAWRENCE	SHAHE NACCASHIAN
HAYLEY POTHIER	JACOB PRINCE	ROBERT ROBERTSON
MELISSA ROSE	JHON SUAREZ	

SAMPLE PREPARATION

ALS CODE	DESCRIPTION
FND-02	Find Sample for Addn Analysis
SND-01	Send samples to external laboratory

ANALYTICAL PROCEDURES

ALS CODE	DESCRIPTION	INSTRUMENT
OA-SFE01	Shake Flask Analysis at ALSE	
MS14L-ANPH	Anions by ion chromatography	ICP-MS

This is the Final Report and supersedes any preliminary report with this certificate number.Results apply to samples as submitted.All pages of this report have been checked and approved for release.

***** See Appendix Page for comments regarding this certificate *****

Signature:
Saa Traxler, Director, North Vancouver Operations

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 20-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22324725

Sample Description	Method	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01
	Analyte	Ag	Al	As	B	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	Hg	K
	Units	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	LOD	0.00005	0.005	0.001	0.01	0.001	0.0005	0.0005	0.1	0.00005	0.0001	0.0005	0.001	0.03	0.00005	0.05
B625206		0.00027	16.400	0.004	0.08	0.064	0.0028	0.0010	1.5	<0.001	0.0037	0.0164	0.027	8.95	<0.00005	48.20
B625207		<0.0003	38.300	<0.005	0.33	0.161	<0.003	0.0067	<0.5	<0.0003	0.0101	0.0735	0.160	18.80	<0.00005	57.30
B625208		<0.00005	0.931	<0.001	0.11	0.021	<0.0005	<0.0005	10.6	<0.00005	0.0002	0.0007	0.003	0.52	<0.00005	27.70
B625209		<0.0003	28.200	<0.005	0.33	0.351	<0.003	<0.003	0.6	0.00190	0.0048	0.0051	0.019	15.10	<0.00005	68.40
B625219		<0.00005	11.500	<0.001	0.22	0.053	<0.0005	0.0008	0.4	<0.00005	0.0029	0.0069	0.021	9.39	<0.00005	47.60
B625220		<0.0003	34.300	<0.005	0.08	0.366	<0.003	<0.003	<0.5	<0.0003	0.0061	0.0065	0.016	20.00	<0.00005	47.10
B625221		<0.00005	3.190	<0.001	0.11	0.012	<0.0005	<0.0005	0.3	<0.00005	0.0006	0.0006	0.001	3.58	<0.00005	29.10
B625222		<0.00005	0.738	<0.001	0.06	<0.001	<0.0005	<0.0005	0.4	<0.00005	0.0002	0.0043	<0.001	0.71	<0.00005	8.80
B625223		<0.00005	0.209	<0.001	0.02	<0.001	<0.0005	<0.0005	1.2	<0.00005	<0.0001	0.0008	<0.001	0.36	<0.00005	3.15
B625224		<0.0003	27.600	<0.005	<0.05	0.671	<0.003	<0.003	<0.5	<0.0003	0.0055	0.0033	0.012	40.20	<0.00005	59.20
B625225		<0.0003	30.500	<0.005	0.14	0.411	<0.003	<0.003	0.5	<0.0003	0.0052	0.0061	0.014	34.00	<0.00005	64.20
B625226		<0.0003	29.400	<0.005	<0.05	0.633	<0.003	<0.003	0.8	<0.0003	0.0053	0.0050	0.009	28.60	<0.00005	66.70
B625227		<0.0003	40.000	<0.005	0.12	0.561	<0.003	<0.003	0.7	<0.0003	0.0072	0.0112	0.027	22.30	<0.00005	61.50
B625228		<0.00005	4.330	<0.001	0.15	0.003	<0.0005	<0.0005	0.8	<0.00005	0.0006	0.0011	<0.001	3.36	<0.00005	20.00
B625229		<0.00005	0.342	<0.001	0.11	<0.001	<0.0005	<0.0005	0.5	<0.00005	<0.0001	<0.0005	<0.001	0.11	<0.00005	18.20
B625230		<0.00005	0.260	0.002	0.02	<0.001	<0.0005	<0.0005	0.2	<0.00005	<0.0001	0.0019	<0.001	<0.03	<0.00005	1.81
B625231		<0.0001	14.400	<0.002	0.09	0.059	<0.001	<0.001	0.3	<0.0001	0.0030	0.0011	0.004	9.29	<0.00005	26.20
B625232		<0.0001	14.500	<0.002	0.08	0.122	<0.001	<0.001	0.4	0.00026	0.0033	0.0060	0.016	10.00	<0.00005	24.50
B625233		<0.00005	0.798	<0.001	0.07	0.026	<0.0005	<0.0005	6.3	0.00009	0.0001	0.0014	0.001	0.26	<0.00005	32.40
B625234		0.00014	16.100	<0.002	0.08	0.170	<0.001	<0.001	2.6	0.00010	0.0075	0.0630	0.057	15.20	<0.00005	37.00
B625235		<0.0003	42.000	<0.005	0.26	0.138	<0.003	<0.003	0.6	<0.0003	0.0050	0.0038	0.015	18.80	<0.00005	35.00
B625236		<0.00005	0.524	<0.001	0.19	0.005	<0.0005	<0.0005	5.8	<0.0001	0.0002	0.0039	<0.001	0.40	<0.00005	28.70
B625237		0.00023	17.700	<0.002	0.06	0.145	<0.001	0.0048	0.6	<0.0002	0.0036	0.0017	0.027	13.00	<0.00005	39.70
B625238		<0.00005	8.580	<0.001	0.18	0.037	<0.0005	<0.0005	4.6	<0.0001	0.0039	0.0135	0.019	6.62	<0.00005	53.10
B625239		<0.00005	8.590	<0.001	0.27	0.072	<0.0005	<0.0005	0.4	<0.00005	0.0020	0.0009	0.005	7.48	<0.00005	48.00
B625240		<0.00005	1.120	<0.001	0.16	0.007	<0.0005	<0.0005	4.3	<0.00005	0.0003	0.0039	0.001	0.61	<0.00005	55.80
B625241		0.00007	18.200	<0.001	0.09	0.153	0.0019	0.0009	2.4	<0.0002	0.0037	0.0049	0.019	9.85	<0.00005	61.20
B625242		<0.00005	0.224	<0.001	0.06	<0.001	<0.0005	<0.0005	0.3	<0.00005	<0.0001	0.0015	<0.001	0.17	<0.00005	1.77
B625243		<0.00005	0.053	<0.001	0.05	<0.001	<0.0005	<0.0005	0.5	<0.00005	0.0002	<0.0005	<0.001	0.15	<0.00005	2.12
B625244		<0.00005	0.208	<0.001	0.01	<0.001	<0.0005	<0.0005	0.8	<0.00005	<0.0001	0.0008	<0.001	0.33	<0.00005	3.23
B625245		<0.00005	0.218	<0.001	0.03	<0.001	<0.0005	<0.0005	0.5	<0.00005	0.0002	0.0052	<0.001	0.47	<0.00005	0.40
B625246		<0.00005	0.105	<0.001	0.02	<0.001	<0.0005	<0.0005	3.8	<0.00005	<0.0001	0.0010	<0.001	0.13	<0.00005	0.20
B625247		<0.00005	0.237	<0.001	0.05	0.001	<0.0005	<0.0005	0.3	<0.00005	0.0001	0.0010	<0.001	0.25	<0.00005	12.00
B625248		<0.00005	2.890	<0.001	0.17	0.003	<0.0005	<0.0005	0.7	<0.00005	0.0009	0.0049	0.001	4.18	<0.00005	13.90
B625249		<0.00005	0.414	<0.001	0.02	0.002	<0.0005	<0.0005	0.3	<0.00005	<0.0001	0.0022	<0.001	0.11	<0.00005	12.60
B625250		<0.00005	0.318	<0.001	0.03	0.003	<0.0005	<0.0005	0.7	<0.00005	<0.0001	0.0017	<0.001	0.16	<0.00005	14.00
B625251		<0.00005	0.192	<0.001	0.03	0.001	<0.0005	<0.0005	1.3	<0.00005	<0.0001	0.0010	<0.001	0.21	<0.00005	3.45
B625252		<0.00005	0.140	<0.001	0.02	0.018	<0.0005	<0.0005	5.7	<0.00005	<0.0001	0.0140	<0.001	<0.03	<0.00005	30.80
B625253		<0.00005	0.156	<0.001	<0.01	0.008	<0.0005	<0.0005	7.8	<0.00005	<0.0001	0.0026	<0.001	<0.03	<0.00005	22.80
B625254		<0.00005	15.100	<0.001	0.02	0.120	<0.0005	<0.0005	0.3	<0.00005	0.0030	0.0057	0.006	9.16	<0.00005	71.90

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 20-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22324725

Sample Description / Method / Analyte / Units / LOD	OA-SFE01 Li mg/L 0.005	OA-SFE01 Mg mg/L 0.05	OA-SFE01 Mn mg/L 0.0005	OA-SFE01 Mo mg/L 0.0001	OA-SFE01 Moisture % 0.3	OA-SFE01 Na mg/L 0.05	OA-SFE01 Ni mg/L 0.0005	OA-SFE01 Pb mg/L 0.0001	OA-SFE01 P mg/L 0.3	OA-SFE01 Sb mg/L 0.0001	OA-SFE01 Se mg/L 0.0005	OA-SFE01 Si mg/L 0.05	OA-SFE01 Sn mg/L 0.0005	OA-SFE01 Sr mg/L 0.0005	OA-SFE01 Ti mg/L 0.01
B625206	0.039	7.03	0.1450	1.3400	<0.3	30.60	0.0077	0.1030	<0.6	0.0008	<0.001	36.30	0.0061	0.0064	0.28
B625207	0.045	11.90	0.1510	0.0175	<0.3	3.52	0.0195	0.0043	<2	<0.0005	<0.003	51.20	<0.003	0.0069	0.83
B625208	0.015	8.55	0.0167	0.0167	<0.3	12.60	0.0019	0.0002	<0.3	<0.0001	<0.0005	4.56	<0.0005	0.0144	0.02
B625209	0.062	12.80	0.1930	0.0115	<0.3	5.46	0.0072	0.0092	<2	<0.0005	<0.003	40.20	<0.003	0.0133	0.67
B625219	0.028	8.55	0.0710	0.0286	<0.3	4.48	0.0045	0.0022	<0.3	0.0001	0.0014	15.80	0.0011	0.0071	0.24
B625220	<0.03	12.70	0.1730	0.0286	<0.3	7.09	0.0075	0.0081	<2	<0.0005	<0.003	49.60	<0.003	0.0060	0.95
B625221	0.006	3.98	0.0094	0.0084	<0.3	6.16	0.0025	0.0002	<0.3	<0.0001	<0.0005	6.23	<0.0005	0.0038	0.05
B625222	<0.005	7.46	0.0080	0.0101	<0.3	1.28	0.0009	<0.0001	<0.3	<0.0001	<0.0005	2.37	<0.0005	0.0024	0.01
B625223	<0.005	11.70	0.0086	0.0087	<0.3	0.89	<0.0005	<0.0001	<0.3	<0.0001	0.0015	3.00	<0.0005	0.0037	<0.01
B625224	<0.03	9.52	0.0484	0.0189	<0.3	3.26	0.0133	0.0100	<2	<0.0005	<0.003	43.00	<0.003	0.0232	1.08
B625225	<0.03	10.10	0.0842	0.0461	<0.3	3.77	0.0071	0.0038	<2	<0.0005	<0.003	39.90	<0.003	0.0108	0.93
B625226	<0.03	8.40	0.1120	0.0072	<0.3	3.88	0.0063	0.0041	<2	<0.0005	<0.003	38.30	<0.003	0.0117	1.36
B625227	0.042	12.70	0.2390	0.0097	<0.3	3.93	0.0093	0.0043	<2	<0.0005	<0.003	53.60	<0.003	0.0120	1.20
B625228	<0.005	8.83	0.0485	0.0044	<0.3	3.55	0.0017	<0.0001	<0.3	<0.0001	<0.0005	8.48	<0.0005	0.0022	0.01
B625229	<0.005	14.60	0.0082	0.0175	<0.3	2.82	<0.0005	<0.0001	<0.3	<0.0001	0.0024	3.48	<0.0005	0.0028	<0.01
B625230	<0.005	13.00	<0.0005	0.0182	<0.3	0.43	<0.0005	<0.0001	<0.3	0.0002	0.0009	1.77	<0.0005	0.0026	<0.01
B625231	0.010	8.64	0.1070	0.0040	<0.3	3.83	0.0048	0.0027	<0.6	<0.0002	<0.001	24.10	<0.001	0.0032	0.11
B625232	0.011	8.73	0.1060	0.0165	<0.3	5.20	0.0047	0.0041	<0.6	<0.0002	<0.001	22.70	<0.001	0.0047	0.40
B625233	0.012	5.04	0.0085	0.0259	<0.3	28.10	<0.0005	0.0006	<0.3	0.0004	<0.0005	5.62	<0.0005	0.0276	0.02
B625234	0.022	11.30	0.2940	0.0110	<0.3	13.50	0.0201	0.0061	<0.6	<0.0002	<0.001	31.40	0.0018	0.0154	0.97
B625235	0.043	14.70	0.2100	0.0567	<0.3	3.82	0.0076	0.0021	<2	<0.0005	<0.003	62.90	<0.003	0.0121	0.21
B625236	0.021	6.95	0.0060	0.0894	<0.3	6.78	0.0006	0.0007	<0.3	0.0002	<0.0005	4.70	<0.0005	0.0134	<0.01
B625237	0.013	11.30	0.2200	0.1020	<0.3	2.48	0.0040	0.0054	<0.6	<0.0002	<0.001	28.60	0.0013	0.0042	0.26
B625238	0.034	9.00	0.0764	0.0748	<0.3	9.80	0.0041	0.0007	<0.3	0.0003	0.0007	20.60	<0.0005	0.0130	0.29
B625239	0.018	3.99	0.0250	0.0130	<0.3	3.41	0.0032	0.0015	<0.3	0.0002	0.0011	16.60	<0.0005	0.0067	0.24
B625240	0.016	4.65	0.0081	0.0287	<0.3	8.57	0.0008	0.0003	<0.3	0.0003	0.0006	4.79	<0.0005	0.0127	0.02
B625241	0.040	7.44	0.2150	0.0990	<0.3	27.50	0.0053	0.0081	<0.3	0.0007	0.0009	37.50	0.0027	0.0114	0.72
B625242	<0.005	14.20	0.0024	0.0041	<0.3	2.69	<0.0005	<0.0001	<0.3	0.0001	0.0008	2.06	<0.0005	0.0016	<0.01
B625243	0.022	28.20	0.0099	0.0049	<0.3	0.75	0.0015	<0.0001	<0.3	0.0004	0.0021	7.06	<0.0005	0.0046	<0.01
B625244	<0.005	11.60	0.0084	0.0070	<0.3	0.71	<0.0005	<0.0001	<0.3	<0.0001	0.0012	2.68	<0.0005	0.0045	<0.01
B625245	<0.005	21.10	0.0036	0.0075	<0.3	0.33	0.0021	<0.0001	<0.3	<0.0001	0.0035	4.92	<0.0005	0.0024	<0.01
B625246	<0.005	14.20	0.0027	0.0063	<0.3	0.15	<0.0005	<0.0001	<0.3	<0.0001	0.0009	3.94	<0.0005	0.0022	<0.01
B625247	<0.005	11.70	0.0120	0.0320	<0.3	2.45	<0.0005	<0.0001	<0.3	<0.0001	0.0018	3.66	<0.0005	0.0021	<0.01
B625248	0.007	8.13	0.0537	0.0146	<0.3	2.25	0.0033	0.0001	<0.3	<0.0001	0.0007	6.87	<0.0005	0.0021	0.02
B625249	<0.005	10.00	0.0012	0.0118	<0.3	1.05	<0.0005	<0.0001	<0.3	0.0005	0.0007	1.65	<0.0005	0.0027	<0.01
B625250	<0.005	11.50	0.0037	0.0120	<0.3	1.88	<0.0005	<0.0001	<0.3	0.0001	0.0011	2.07	<0.0005	0.0041	<0.01
B625251	<0.005	14.80	0.0027	0.0071	<0.3	1.25	<0.0005	<0.0001	<0.3	0.0002	0.0006	3.04	<0.0005	0.0062	<0.01
B625252	<0.005	23.50	0.0029	0.0230	<0.3	2.90	<0.0005	<0.0001	<0.3	0.0004	<0.0005	2.92	<0.0005	0.0065	<0.01
B625253	<0.005	22.10	0.0014	0.0327	<0.3	2.02	<0.0005	<0.0001	<0.3	0.0001	<0.0005	2.46	<0.0005	0.0077	<0.01
B625254	0.008	4.85	0.1050	0.0135	<0.3	9.88	0.0075	0.0106	0.3	0.0010	0.0010	21.00	<0.0005	0.0037	0.43

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 20-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22324725

Sample Description	Method Analyte Units LOD	OA-SFE01 Tl ppm 0.0001	OA-SFE01 U mg/L 0.00001	OA-SFE01 V mg/L 0.001	OA-SFE01 Zn mg/L 0.01	OA-SFE01 Hardness mg/L CaCO3e 0.6	OA-SFE01 Final pH Unity 0.1	MS14L-ANPH Br mg/L 0.05	MS14L-ANPH Cl mg/L 0.5	MS14L-ANPH F mg/L 0.02	MS14L-ANPH NO3 (as mg/L 0.005	MS14L-ANPH SO4 mg/L 0.5	MS14L-ANPH TDS mg/L 3	MS14L-ANPH Conducti uS/cm 2	MS14L-ANPH Alkalini mg/L CaCO3e 1
B625206		0.0005	0.02970	0.051	0.09	32.7	9.0	<0.05	7.8	5.38	0.334	2.5	295	270	111
B625207		<0.0005	0.00187	0.086	<0.05	49.0	8.5	<0.05	1.9	1.52	0.040	2.0	310	139	58
B625208		<0.0001	0.00269	0.003	<0.01	61.7	8.1	0.10	18.4	0.65	0.060	3.9	146	260	83
B625209		<0.0005	0.00088	0.029	0.13	54.3	9.1	0.06	1.7	0.84	0.116	16.7	298	191	63
B625219		<0.0001	0.00077	0.014	0.02	36.2	8.7	<0.05	4.1	0.95	<0.03	5.3	174	183	65
B625220		<0.0005	0.00417	0.034	<0.05	52.3	9.1	<0.05	4.5	1.12	<0.06	3.9	294	136	48
B625221		<0.0001	0.00026	0.002	<0.01	17.0	8.4	0.10	9.6	0.89	<0.02	1.4	102	136	45
B625222		<0.0001	<0.00001	0.002	<0.01	31.8	7.9	<0.05	3.2	0.29	<0.03	0.6	50	83	33
B625223		<0.0001	<0.00001	<0.001	<0.01	51.2	7.9	<0.05	3.2	0.38	0.068	2.9	60	117	46
B625224		<0.0005	0.00492	0.034	<0.05	39.2	9.5	<0.05	1.0	0.65	<0.04	11.1	304	164	57
B625225		<0.0005	0.00610	0.038	<0.05	42.9	9.3	<0.05	1.7	0.95	0.063	2.5	293	150	61
B625226		<0.0005	0.00110	0.072	<0.05	36.6	9.6	<0.05	0.6	1.05	0.100	0.9	287	164	70
B625227		<0.0005	0.00166	0.059	<0.05	54.0	9.4	<0.05	0.8	1.10	<0.06	1.0	328	145	64
B625228		<0.0001	0.00006	<0.001	<0.01	38.2	7.6	0.05	5.5	0.45	<0.05	8.5	97	123	31
B625229		<0.0001	0.00005	<0.001	<0.01	61.4	7.2	0.13	2.2	0.42	0.075	53.7	112	196	15
B625230		<0.0001	<0.00001	<0.001	<0.01	54.1	7.7	0.07	1.9	0.33	<0.05	13.4	54	110	30
B625231		<0.0002	0.00354	0.009	0.02	36.4	8.2	0.08	3.4	0.49	<0.05	<0.5	151	85	32
B625232		<0.0002	0.00156	0.016	0.03	37.0	8.1	0.06	2.4	0.60	<0.04	1.3	149	82	33
B625233		<0.0001	0.00098	0.010	<0.01	36.6	8.1	0.09	5.8	0.45	<0.06	72.2	194	292	45
B625234		0.0003	0.00158	0.063	0.04	53.0	8.8	<0.05	2.6	0.86	0.064	3.4	226	148	62
B625235		<0.0005	0.00328	0.017	<0.05	61.9	8.3	<0.05	2.6	0.75	0.090	0.6	316	85	42
B625236		<0.0001	0.00001	0.007	<0.01	43.1	8.3	0.07	7.1	0.99	0.100	0.6	114	184	71
B625237		<0.0002	0.00878	0.014	0.03	48.1	8.2	0.09	3.1	0.88	<0.05	2.5	196	119	45
B625238		0.0001	0.00032	0.041	0.01	48.6	8.9	0.11	4.7	1.24	<0.06	4.3	210	220	86
B625239		<0.0001	0.00053	0.007	<0.01	17.4	7.6	<0.2	1.9	0.98	0.120	36.2	172	175	25
B625240		<0.0001	0.00006	0.017	<0.01	29.8	8.7	0.10	7.8	1.48	<0.04	3.7	157	255	93
B625241		0.0003	0.00600	0.058	0.05	36.5	9.4	0.06	4.8	5.02	<0.05	2.0	312	273	119
B625242		<0.0001	<0.00001	<0.001	<0.01	59.3	7.9	0.06	6.6	0.40	<0.04	6.0	64	127	42
B625243		<0.0001	0.00005	<0.001	<0.01	117.0	7.2	<0.2	1.3	0.33	<0.07	70.2	131	230	14
B625244		<0.0001	<0.00001	<0.001	<0.01	49.8	7.6	<0.2	3.0	0.31	0.082	11.1	56	109	28
B625245		<0.0001	<0.00001	<0.001	<0.01	88.0	7.8	<0.05	2.8	0.41	<0.08	15.0	83	161	47
B625246		<0.0001	<0.00001	<0.001	<0.01	68.0	8.0	<0.05	2.2	0.53	<0.04	3.2	69	128	56
B625247		<0.0001	<0.00001	<0.001	<0.01	48.8	7.6	<0.1	4.3	0.45	<0.03	22.4	81	134	28
B625248		<0.0001	0.00006	0.001	<0.01	35.3	7.8	<0.05	4.2	0.46	0.087	3.3	79	96	33
B625249		<0.0001	<0.00001	<0.001	<0.01	42.0	7.9	0.07	2.1	0.43	0.215	8.0	63	118	37
B625250		<0.0001	<0.00001	<0.001	<0.01	49.1	7.9	0.10	3.5	0.47	<0.07	6.5	70	131	43
B625251		<0.0001	0.00002	<0.001	<0.01	64.2	7.9	0.08	3.9	0.65	<0.05	<0.5	63	132	49
B625252		<0.0001	0.00004	0.002	<0.01	111.0	8.4	0.17	2.8	0.89	0.091	71.5	190	327	73
B625253		<0.0001	0.00003	0.002	<0.01	110.0	8.0	0.11	5.1	0.89	0.108	82.7	178	303	46
B625254		0.0001	0.00172	0.019	0.02	20.8	8.5	<0.1	1.4	1.33	<0.08	62.5	265	272	52

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: **BAFFINLAND IRON MINES CORPORATION**
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 20-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22324725

Sample Description	Method Analyte Units LOD	OA-SFE01 Ag mg/L 0.00005	OA-SFE01 Al mg/L 0.005	OA-SFE01 As mg/L 0.001	OA-SFE01 B mg/L 0.01	OA-SFE01 Ba mg/L 0.001	OA-SFE01 Be mg/L 0.0005	OA-SFE01 Bi mg/L 0.0005	OA-SFE01 Ca mg/L 0.1	OA-SFE01 Cd mg/L 0.00005	OA-SFE01 Co mg/L 0.0001	OA-SFE01 Cr mg/L 0.0005	OA-SFE01 Cu mg/L 0.001	OA-SFE01 Fe mg/L 0.03	OA-SFE01 Hg mg/L 0.00005	OA-SFE01 K mg/L 0.05
B625255		<0.00005	10.000	<0.001	0.18	0.051	0.0012	<0.0005	0.6	<0.00005	0.0030	0.0340	0.003	5.87	<0.00005	48.80
B625256		0.00027	46.900	<0.005	0.06	0.841	<0.003	<0.003	0.8	<0.0003	0.0135	0.0146	0.053	38.00	<0.00005	70.00
B625257		<0.00005	0.895	<0.001	0.41	0.017	<0.0005	<0.0005	2.0	<0.00005	0.0001	0.0028	<0.001	0.33	<0.00005	89.50
B625258		<0.0003	34.000	<0.005	0.54	0.345	0.0059	<0.003	1.3	<0.0003	0.0121	0.0032	0.062	30.10	<0.00005	45.00
B625259		<0.0003	46.500	<0.005	0.51	0.298	0.0052	<0.003	0.9	<0.0003	0.0138	0.0080	0.051	39.70	<0.00005	57.20
B625260		<0.00005	5.450	<0.001	0.09	0.015	<0.0005	<0.0005	<0.1	<0.00005	0.0004	0.0010	<0.001	1.14	<0.00005	72.90
B625261		<0.00005	0.306	<0.001	0.28	0.015	<0.0005	<0.0005	1.6	<0.00005	<0.0001	<0.0005	<0.001	0.05	<0.00005	81.60
B625262		<0.00005	0.679	<0.001	0.15	0.021	<0.0005	<0.0005	3.1	<0.00005	<0.0001	<0.0005	<0.001	0.15	<0.00005	153.00
B625263		<0.0001	26.200	<0.002	0.13	0.278	0.0015	<0.001	0.4	<0.0001	0.0058	0.0029	0.005	23.50	<0.00005	64.60
B625264		<0.00005	0.216	<0.001	0.17	0.014	<0.0005	<0.0005	12.0	<0.00005	<0.0001	<0.0005	0.001	0.05	<0.00005	32.80
S664546		0.00012	20.400	0.003	0.04	0.288	0.0007	<0.0005	3.0	<0.00005	0.0007	0.0026	<0.001	5.00	<0.00005	41.20
S664547		0.00015	19.900	0.003	0.05	0.271	0.0007	<0.0005	3.1	<0.00005	0.0008	0.0014	0.001	5.52	<0.00005	36.10

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: **BAFFINLAND IRON MINES CORPORATION**
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 20-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22324725

Sample Description	Method	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01
	Analyte	Li	Mg	Mn	Mo	Moisture	Na	Ni	Pb	P	Sb	Se	Si	Sn	Sr	Ti
	Units	mg/L	mg/L	mg/L	mg/L	%	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
	LOD	0.005	0.05	0.0005	0.0001	0.3	0.05	0.0005	0.0001	0.3	0.0001	0.0005	0.05	0.0005	0.0005	0.01
B625255		0.024	7.85	0.0828	0.0051	<0.3	5.59	0.0186	0.0007	<0.3	<0.0001	<0.0005	15.00	<0.0005	0.0086	0.20
B625256		<0.03	15.50	0.5860	0.0932	<0.3	4.12	0.0245	0.0094	<2	<0.0005	<0.003	72.30	<0.003	0.0121	1.97
B625257		0.028	6.26	0.0036	0.0097	<0.3	5.59	<0.0005	<0.0001	<0.3	<0.0001	0.0018	3.25	<0.0005	0.0076	0.02
B625258		0.074	17.10	0.2300	0.0077	<0.3	4.01	0.0088	0.0085	<2	<0.0005	<0.003	40.00	<0.003	0.0202	0.71
B625259		0.071	24.20	0.3410	0.0155	<0.3	4.21	0.0187	0.0064	<2	<0.0005	<0.003	52.30	<0.003	0.0196	1.24
B625260		<0.005	1.08	0.0117	0.0397	<0.3	4.99	0.0006	0.0026	<0.3	0.0002	<0.0005	5.11	<0.0005	0.0010	0.06
B625261		0.016	12.50	0.0034	0.0787	<0.3	3.17	<0.0005	<0.0001	<0.3	<0.0001	<0.0005	2.43	<0.0005	0.0027	<0.01
B625262		0.066	9.53	0.0045	0.0586	<0.3	9.07	<0.0005	<0.0001	<0.3	<0.0001	<0.0005	2.40	<0.0005	0.0252	<0.01
B625263		0.018	9.73	0.1350	0.0020	<0.3	4.82	0.0051	0.0071	<0.6	<0.0002	<0.001	29.80	<0.001	0.0035	0.88
B625264		0.021	13.00	0.0063	0.0149	<0.3	7.72	<0.0005	<0.0001	<0.3	<0.0001	0.0007	3.82	<0.0005	0.0186	<0.01
S664546		0.060	1.59	0.1070	0.0017	<0.3	36.70	0.0011	0.0240	<0.3	0.0001	<0.0005	70.30	0.0008	0.0560	0.31
S664547		0.057	1.74	0.1200	0.0018	<0.3	34.60	0.0006	0.0240	<0.3	0.0001	<0.0005	68.80	0.0009	0.0530	0.33

***** See Appendix Page for comments regarding this certificate *****

ALS Canada Ltd.
2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 20-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22324725

Sample Description	Method	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	OA-SFE01	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH	MS14L-ANPH
	Analyte	Tl	U	V	Zn	Hardness	Final pH	Br	Cl	F	NO3 (as	SO4	TDS	Conducti	Alkalini
	Units	ppm	mg/L	mg/L	mg/L	mg/L CaCO3e	Unity	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	uS/cm	mg/L CaCO3e
	LOD	0.0001	0.00001	0.001	0.01	0.6	0.1	0.05	0.5	0.02	0.005	0.5	3	2	1
B625255		0.0001	0.00057	0.014	<0.01	33.8	8.5	0.12	3.1	0.71	0.191	1.0	168	175	71
B625256		0.0007	0.00852	0.078	0.05	65.9	9.1	0.07	2.0	0.92	<0.02	4.6	419	148	66
B625257		<0.0001	0.00013	0.007	<0.01	30.7	7.7	0.22	5.5	0.59	<0.08	96.8	239	370	38
B625258		<0.0005	0.00686	0.046	<0.05	73.7	8.3	<0.08	4.9	0.90	0.247	3.6	282	113	52
B625259		<0.0005	0.00420	0.096	<0.05	102.0	8.7	<0.06	3.8	1.15	0.068	1.2	364	130	71
B625260		<0.0001	0.00020	0.032	<0.01	4.5	9.3	<0.07	1.4	0.83	0.198	2.4	164	211	98
B625261		<0.0001	0.00007	<0.001	<0.01	55.4	7.2	<0.05	3.3	0.89	0.055	121.0	242	373	18
B625262		<0.0001	0.00016	0.001	<0.01	47.0	7.6	<0.08	2.6	0.81	0.061	180.0	384	557	30
B625263		0.0003	0.00195	0.031	0.02	41.1	8.6	<0.05	2.4	0.99	0.053	27.7	274	193	53
B625264		<0.0001	0.00098	0.002	<0.01	83.5	7.9	<0.2	15.3	0.53	0.229	36.3	172	293	70
S664546		0.0004	0.05570	0.016	0.02	14.1	9.5	0.09	13.6	1.42	0.576	1.1	372	239	91
S664547		0.0004	0.05050	0.016	0.02	15.0	9.4	0.09	14.0	1.31	0.396	0.9	358	233	87

ALS Canada Ltd.

2103 Dollarton Hwy
North Vancouver BC V7H 0A7
Phone: +1 604 984 0221 Fax: +1 604 984 0218
www.alsglobal.com/geochemistry

To: BAFFINLAND IRON MINES CORPORATION
2275 UPPER MIDDLE ROAD EAST
SUITE 300
OAKVILLE ON L6H 0C3

Finalized Date: 20-DEC-2022
Account: BIMCIO

Project: Pulps for ABA & Shake Flask

CERTIFICATE OF ANALYSIS VA22324725

CERTIFICATE COMMENTS

LABORATORY ADDRESSES

Processed at ALS Vancouver located at 2103 Dollarton Hwy, North Vancouver, BC, Canada.
Applies to Method: FND-02 SND-01

Processed at ALSE Vancouver, Burnaby, BC, Canada.
Applies to Method: MS14L-ANPH OA-SFE01

wsp.com

APPENDIX A2

Thermal Model and Assessment of Conceptual Summer Deposition Strategies for the Waste Rock Storage Facility at Mary River Mine Technical Memorandum

TECHNICAL MEMORANDUM

DATE August 29, 2023 **Reference No.** 22572750-004-2000-Rev0

TO Trevor Brisco
Baffinland Iron Mine Corporation

CC

FROM Fernando Junqueira and Gabriella Wahl **EMAIL fernando.junqueira@wsp.com, gabriella.wahl@wsp.com**

THERMAL MODEL AND ASSESSMENT OF CONCEPTUAL SUMMER DEPOSITION STRATEGIES FOR THE WASTE ROCK STORAGE FACILITY AT MARY RIVER MINE

1.0 INTRODUCTION

Potential acid generating (PAG) and non-acid generating (Non-AG) waste rock are currently being deposited in the waste rock facility (WRF) at the Mary River Project, operated by Baffinland Iron Mine Corporation (Baffinland) and located on Baffin Island in Nunavut. The mitigation strategy defined for prevention of acid generation and metal leaching from the pile centers on placement of PAG rock away from the edges of the pile and progressive freezing of the pile during winter that always maintains the PAG rock in frozen conditions after it is frozen.

In 2019, Golder conducted a thermal assessment (Golder 2019) to evaluate the thermal regime in the pile and support the design of a waste rock deposition plan to promote freezing of the pile. The 2019 study included a review of initial instrumentation data (i.e., thermistors and oxygen probes) and the preparation of thermal models for the period between March and September 2019.

In 2021, WSP Golder conducted an update to the thermal assessment (Golder 2021), with supplemental instrumentation data up to November 2020. The main goal was to re-evaluate the potential influence of internal heat sources on the thermal regime of the pile. It was confirmed that the pile remained mostly frozen at all times as per the design intent. Based on the instrumentation data and results of thermal models, it was concluded that temporary and localized increases in the waste rock temperature were not affecting the overall thermal regime of the pile.

In 2023, WSP completed a review and interpretation of on-site active instrumentation (WSP 2023). Results of this study were used to update thermal models with incorporation of supplemental instrumentation and waste rock deposition data available up to March 2023. The main goal of this assessment is to confirm the waste rock pile continues to freeze progressively, and to assist in developing an updated waste rock management plan (WRMP) for the deposition of PAG materials at the existing waste rock storage facility (WRSF).

This document presents a summary of the latest instrumentation data available, the results of updated thermal models, and provides discussion and recommendations for future deposition of waste rock in the pile.

2.0 WASTE ROCK FACILITY

2.1 Instrumentation

Between December 2018 and March 2019, instrumentation was installed within the waste rock pile that consisted of thermistors strings, oxygen probes, vibrating-wire piezometers, and a barometer. Vertical strings were installed along boreholes BH1, BH2 and BH3 up to 23 m in depth, while three 40 m long horizontal strings were installed along trenches T3, T4 and T5 at an initial depth of about 1.5 m (additional waste rock has been placed on top of some areas since installation).

In addition, two 5 m deep vertical thermistors were installed to monitor the thermal performance of the future WRF pond berm expansion foundation (T1) and the WRF north toe berm (T2).

Figure 1 shows the locations of all horizontal and vertical thermistor strings relative to the cross-section used in previous thermal modeling studies.

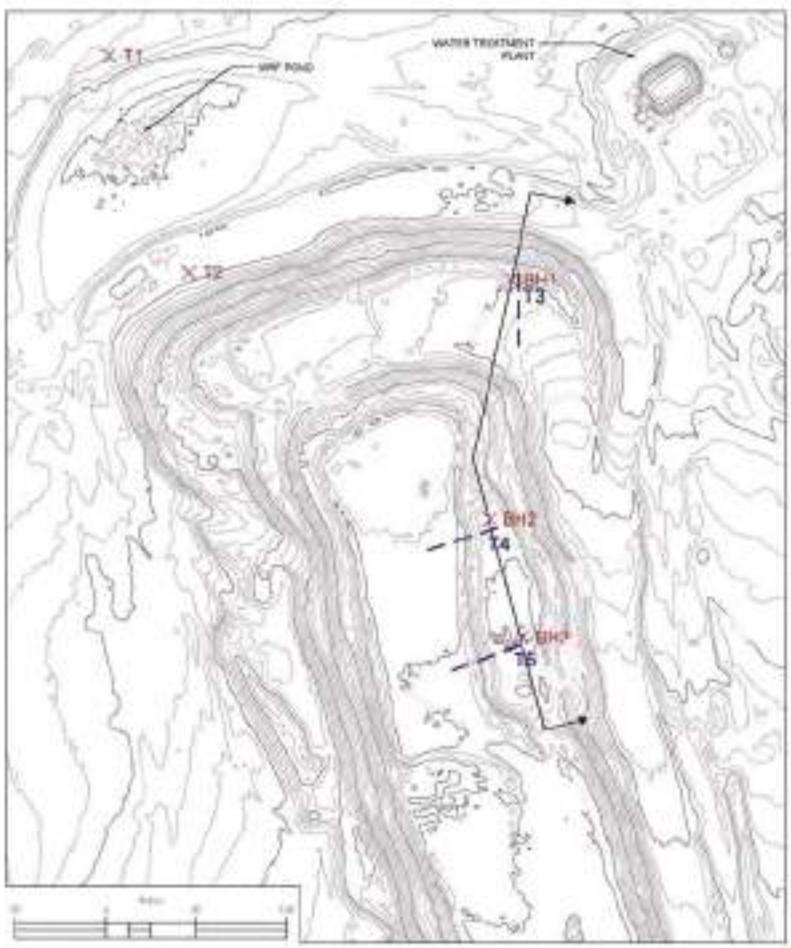


Figure 1: Locations of vertical and horizontal thermistor strings and alignment of cross section defined for the thermal modelling.

2.2 Waste Rock Deposition

Since the installation of the monitoring stations in February 2019, the pile has been progressively constructed with placement of Non-AG and PAG rock at different locations. New survey data and aerial photos were provided by Baffinland for the WRF between November 2020 and March 2023.

It is important to note that aerial photos show seasonal snow cover between October and May, which obscures the actual amount of waste deposited. This is notable particularly at BH2 and BH3 which are in depressions and can accumulate significant amounts of snow. It is WSP’s understanding that ground surveys in winter have likely captured both winter material deposition and snow cover. It is known that no waste rock has been removed from the surface of the waste pile. Negative changes in ground elevation are likely due to changes in snowfall depth with seasonal freeze and melt patterns, slight consolidation of the pile over time, an error associated with ground surveys, or temporary excavation for instrumentation repair.

Table 1 provides a summary of ground surface elevation over time based on ground survey data and has been reviewed to comply with known placement data from site. Data is provided for vertical thermistors BH1, BH2, BH3, T1, and T2. Data is also provided at the end of each horizontal thermistor string T3, T4, and T5.

Table 1: Summary of Changes in Waste Rock Ground Surface Elevation with Time

Approximate Date of Deposition	Approximate Depth of Rockfill (m)							
	BH1	BH2	BH3	T1	T2	T3[(a)]	T4[(a)]	T5[(a)]
December 10, 2018								
December 15, 2018				-	-		1.0	
December 19, 2018				-	-	0.6	No data	0.5
March 3, 2019			-	-	-	-	No data	No data
March 4, 2019	-		-	-	-	-	No data	No data
April 30, 2019	-	-	-	-	-	-	4.0	5.4
July 5, 2019	-	-	-	-	-	No data	No data	No data
September 13, 2019	-	-	-	5.2	-	0.1	4.5	3.7
February 29, 2020	-	-	-	No data	No data	No data	-	-
March 31, 2020	-	-	No data	No data	No data	No data	No data	No data
April 18, 2020	-	5.8	0.6	0.9	0.8	0.3	No data	3.6
May 16, 2020	-	-	-	-	-	-	6.1	1.9
October 30, 2020	-	-	No data	-	-	-	-	-
February 27, 2021	-	-	No data	-	-	-	4.4	3.8
March 31, 2021	-	-	0.6	-	-	-	-	-
July 7, 2021	-	-	-	-	-	-	-	-
September 30, 2021	-	-	-	-	-	4.1	-	-
December 31, 2021	-	-	-	-	-	11.0	-	-
June 1, 2022	-	-	-	-	-	1.6	-	-

Note: Boxes highlighted in green indicate the date of installation for each station.

a) Various thicknesses of material are placed along the length of T3, T4, and T5. The numbers provided summarize rockfill placed at a bead installed at 40 m along the string (i.e., at the end of each thermistor string).

2.2.1 Stations BH1 and T3

BH1 and T3 are installed at close proximity to one another, where T3 is installed about parallel to the cross section between BH1 and BH2 shown in Figure 1 . Based on both ground survey and site data, it is known that no material was placed or removed on BH1 between September 2020 and March 2023.

About 40 m from BH1 along the cross section shown in Figure 1, about 0.4 m was placed between September 13, 2019, and July 5, 2020. About 16 m of waste rock was placed between July 7, 2021, and June 29, 2022. It is known from site data and additional survey data that most of the 16 m was placed between September 30 and December 31, 2021. Figure 2 provides a profile of the ground surface along T3 between September 2020 to March 2023.

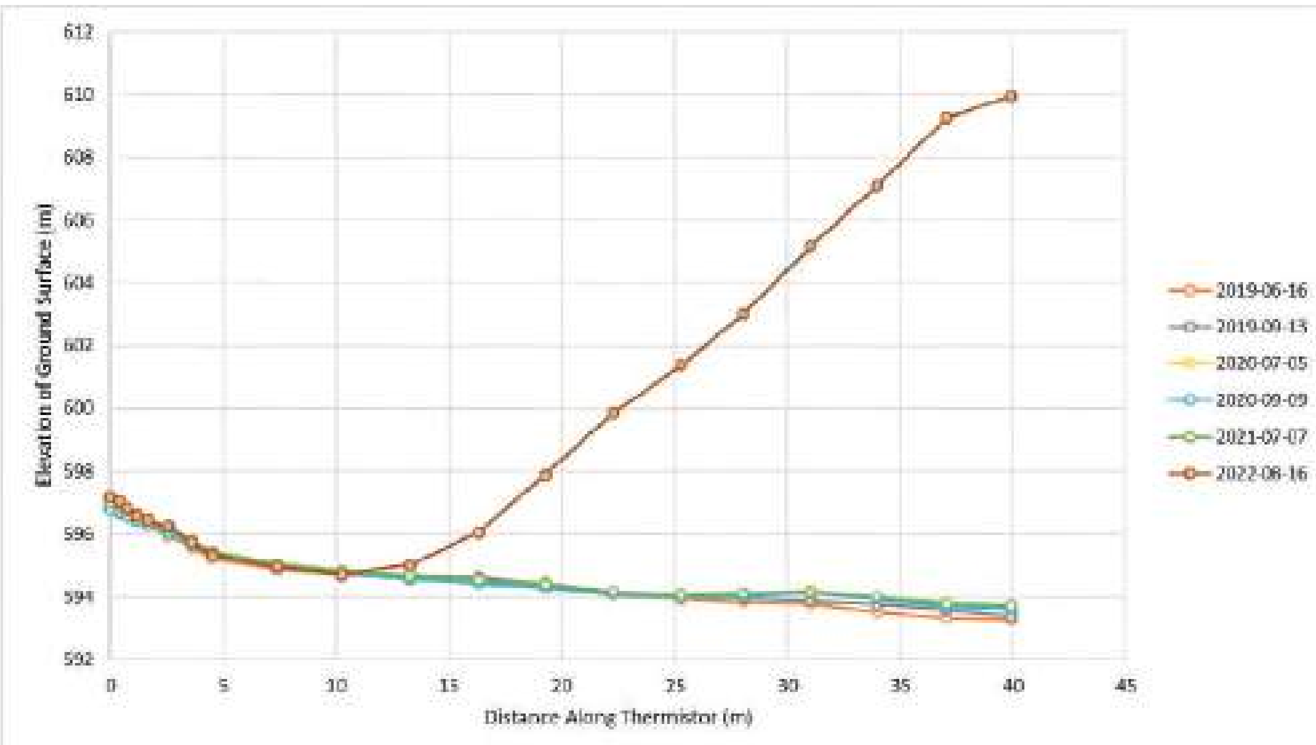


Figure 2: Evolution of ground surface elevation along T3 with time.

2.2.2 Stations BH2 and T4

The horizontal thermistor T4 is located close to BH2, at 0 m distance along the thermistor string. At BH2, the most notable addition of rockfill was noted between September 2019 and July 2020, where about 5.6 m was placed.

Along T4, several significant increments of waste rock were placed, the first of which was placed between March 4 and June 16, 2019, and was found to be 2.9 m thick. Subsequent lifts of 4.5 m, 6.1 m, 4.7 m, and 1.2 m were placed at the end of the thermistor string by September 13, 2019, July 5, 2020, July 7, 2021, and June 29, 2022, respectively. Figure 3 contains the material deposition measured along the length of T4 over time between September 2020 and March 2023.

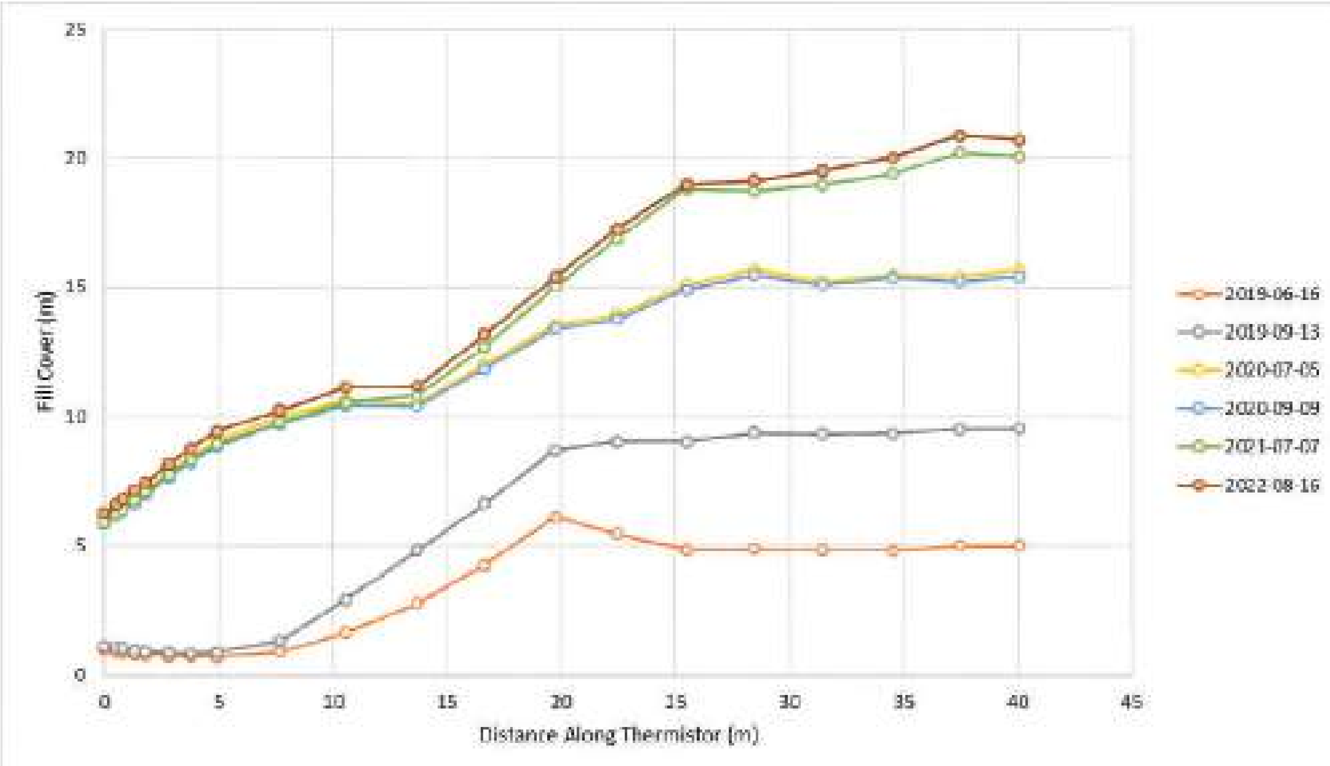


Figure 3: Evolution of ground surface elevation along T4 with time.

2.2.3 Stations BH3 and T5

Material deposition on top of BH3 occurred as described in Table 1 which saw relatively consistent material deposition between September 2019 and June 2022. The most significant material placement occurred between September 2019 and July 2020 of 1.3 m.

After September 2019, the majority of the rockfill placed along T5 occurred between about 14 m and 40 m along the thermistor string. At the end of the string, a lift of 4.0 m was placed by June 2019, and was followed by two lifts of about 3.7 m in September 2019 and 5.5 m in July 2020. Two remaining lifts were placed in July 2021 and June 2022 of 3.9 m and 0.9 m lift thickness respectively. Figure 4 presents the deposition of rockfill along T5 between September 2020 and March 2023.

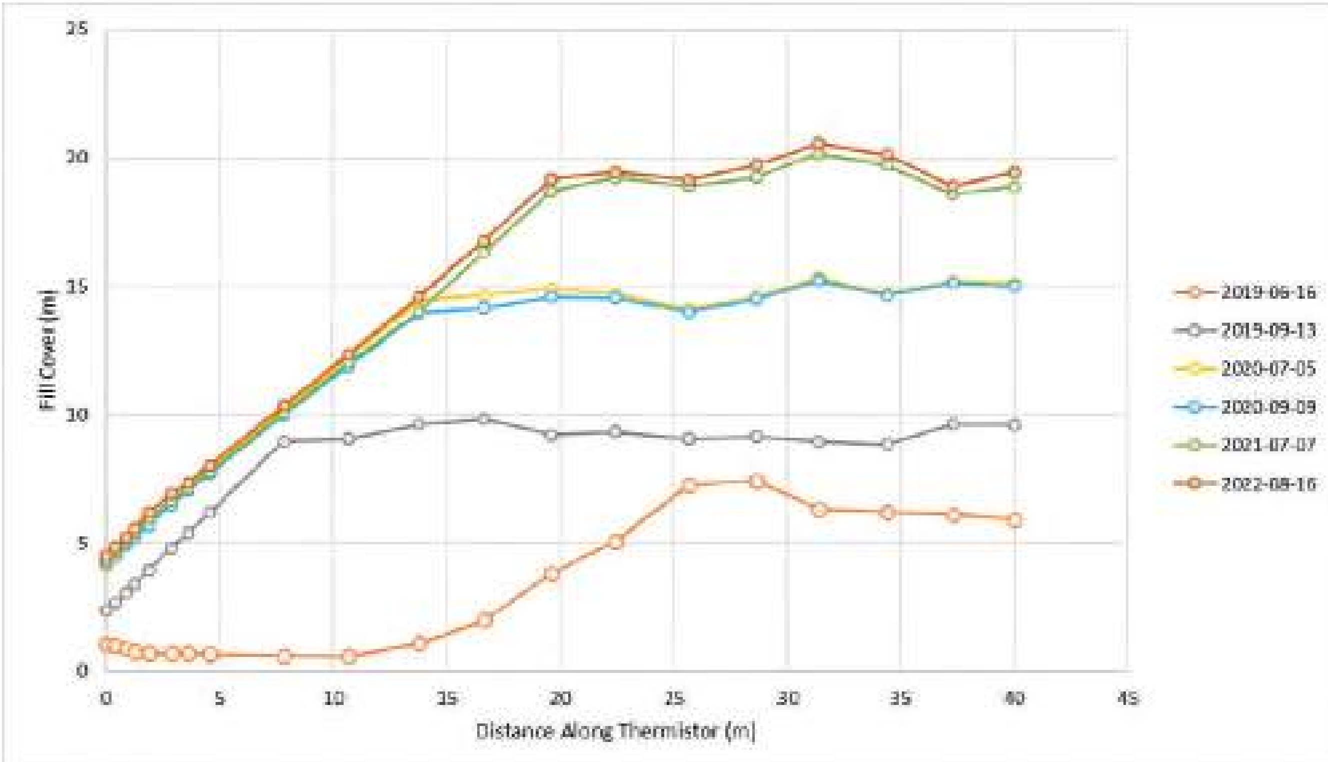


Figure 4: Evolution of ground surface elevation along T5 with time.

2.2.4 Stations T1 and T2

Figure 5 shows the change in ground surface elevation on top of stations T1 and T2. It is shown that the majority of waste rock placed at T1 (about 5.7 m) was deposited between June 16, 2019, and September 13, 2019. After this period, minimal variations in material deposition were measured, where it is noted data between June 29 and August 16, 2022, is missing.

At T2, compared with T1, little waste rock was placed, the maximum amount of waste rock placed was measured to be about 1.3 m between June 16, 2019, and July 7, 2021.

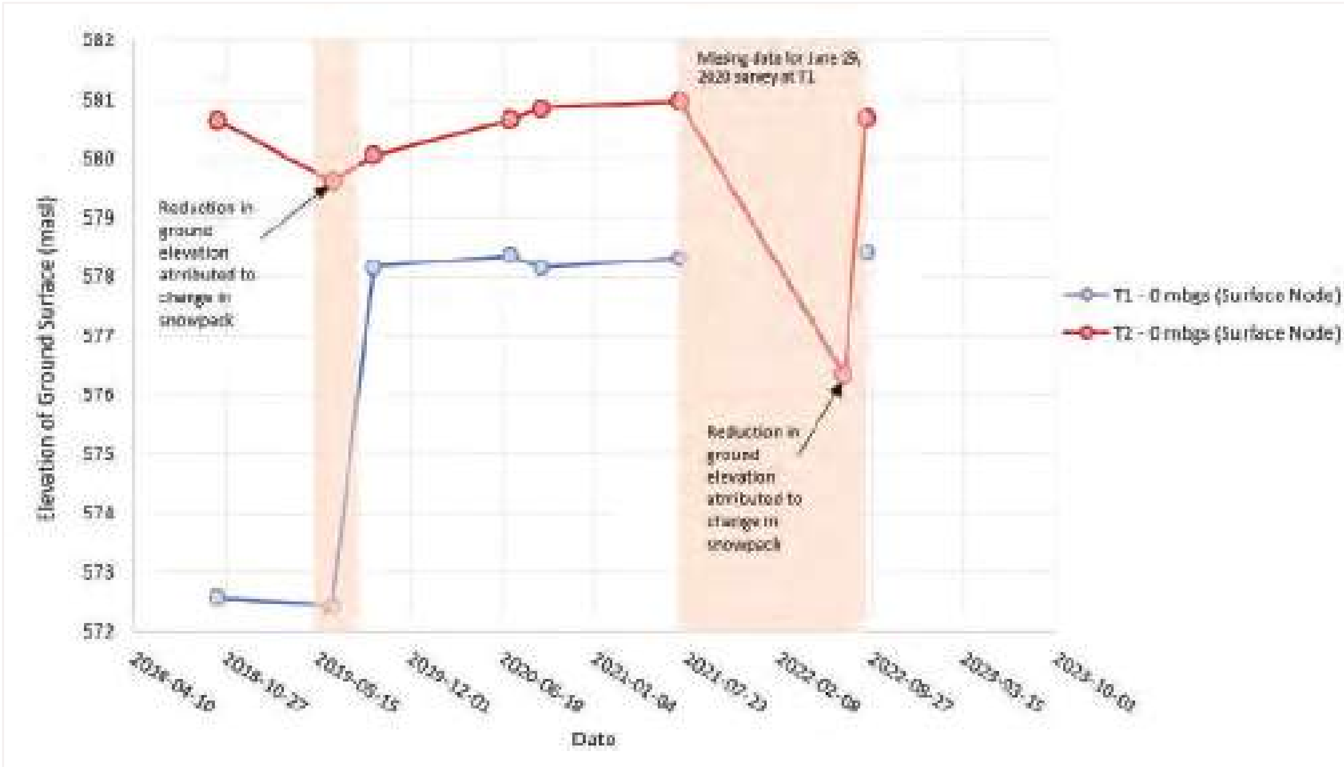


Figure 5: Elevation of ground surface at T1 and T2 over time.

2.3 Instrumentation Status

Thermistor data for BH1 was available through August 2022, with a period of no data between November 2021 and April 2022. BH2 had temperature data available through March 2022, and data for BH3 was available through February 2022. Temperature data for horizontal thermistors T4 and T5 were available through April 2022, and T3 had data available through August 2022.

No new data from the oxygen probes installed in BH1 and BH2 has been available since the 2021 assessment, and the status of these sensors is uncertain. The installation and maintenance of oxygen probes have been challenging, and the use of this type of sensor will no longer be considered in the future. Vertical and horizontal thermistor strings installed at strategic locations within the pile will continue to constitute the primary means to monitor the thermal regime of the pile and compare its performance against the design intent.

A summary of instrumentation status through August 2022 is presented in Table 2.

Table 2: Summary of Instrumentation Status Through 2022

Station	Sensor	Date Available Through	Damaged Sensor
BH1	Temperature	March 2019 – August 2022	No damaged beads Bead 19.95 m data missing after September 2019 Data missing between November 2021 and April 2022
	Vibrating-Wire Piezometer	March 2019 - August 2022	No known damage
	Oxygen	Not operational since May 2020	Uncertain after May 2020
BH2	Temperature	March 2019 – March 2022	Beads from 0.2 to 3.8 m (except for 1.3 m), and 17.2 m damaged after October 2019
	Vibrating-Wire Piezometer	February 2019 – November 2021	Uncertain after November 2021
	Oxygen	February 2019 – August 2019	Uncertain after August 2019
BH3	Temperature	December 2018 – February 2022	No damaged beads
T1	Temperature	February 2021 - August 2022	No damaged beads Data missing from all beads between April 2022 and July 2022
T2	Temperature	February 2021 – August 2022	Bead at 0.1 m, and between 2.0 and 4.0 functioning inconsistently between January 2021 and November 2021 Bead at 1.0 m after September 2020 Bead at 3.0 m after March 2022
T3	Temperature	March 2019 – August 2022	No damaged beads
T4	Temperature	March 2019 – April 2022	No damaged beads
T5	Temperature	February 2019 – April 2022	Bead at 22.4 m damaged since January 2022 Beads at 19.6, 25.6, 28.6 damaged since January 2022 Bead at 31.4 after March 2022 Beads at 34.4 - 40.0 after April 2022

3.0 INSTRUMENTATION TRENDS

No data has been available for the oxygen probes since the 2021 assessment, and therefore there is no update in trends from those sensors.

Data available for the vibrating-wire piezometers installed in BH1 (through August 2022) and BH2 (through November 2021) show the piezometers are dry and in frozen ground.

The trends observed from the horizontal and vertical thermistors are discussed below.

3.1 Vertical Thermistor BH1

A variation in waste rock elevation was noted at BH1, as summarized in Table 1. However, it is known that in general little to no material has been placed or removed on top of BH1. The following trends and patterns have been observed from this monitoring station between November 2020 and March 2023:

- Based on available data, the active zone subject to freezing and thawing cycles is less than 1 m deep, with the pile beneath the active zone remaining frozen year-round.
- Measured waste rock temperatures have been between -0.1°C and -12.2°C, with seasonal variations mostly measured by thermistor beads near the surface.
- In general, all temperatures between 2 m and 7 m showed a decreasing trend in 2021 and 2022, possibly due to a colder summer in 2021.
- Waste rock temperatures below a depth of 10 m are showing a trend of a slight increase but have remained between -7.7°C and -5.5°C since early 2019. For instance, the temperature at a depth of 19 m has increased progressively from -7.7°C in March 2019 to -6.5°C in August 2022.
- Extended thermistor data beyond August 2020 show the lasting effects of an event of increasing waste rock temperature measured in July 2020 between 4.8 mbgs and 9.8 mbgs, with temperatures remaining at higher levels within that zone until about April 2021. Heat from that zone propagated downwards and probably contributed to the trend of increasing temperature observed below a depth of 10 m.
- After the July 2020 warming event, no other period of sudden increases in the waste rock temperature has been observed in BH1.

Figure 6 shows temperature profiles along BH1 between July 2020 and September 2021 and illustrates the progression of increased rockfill temperatures in that period. Figure 7 shows the variation of waste rock temperature with time at different depths along BH1 during the entire monitoring period, demonstrating that the pile has remained mostly frozen at the location of BH1.

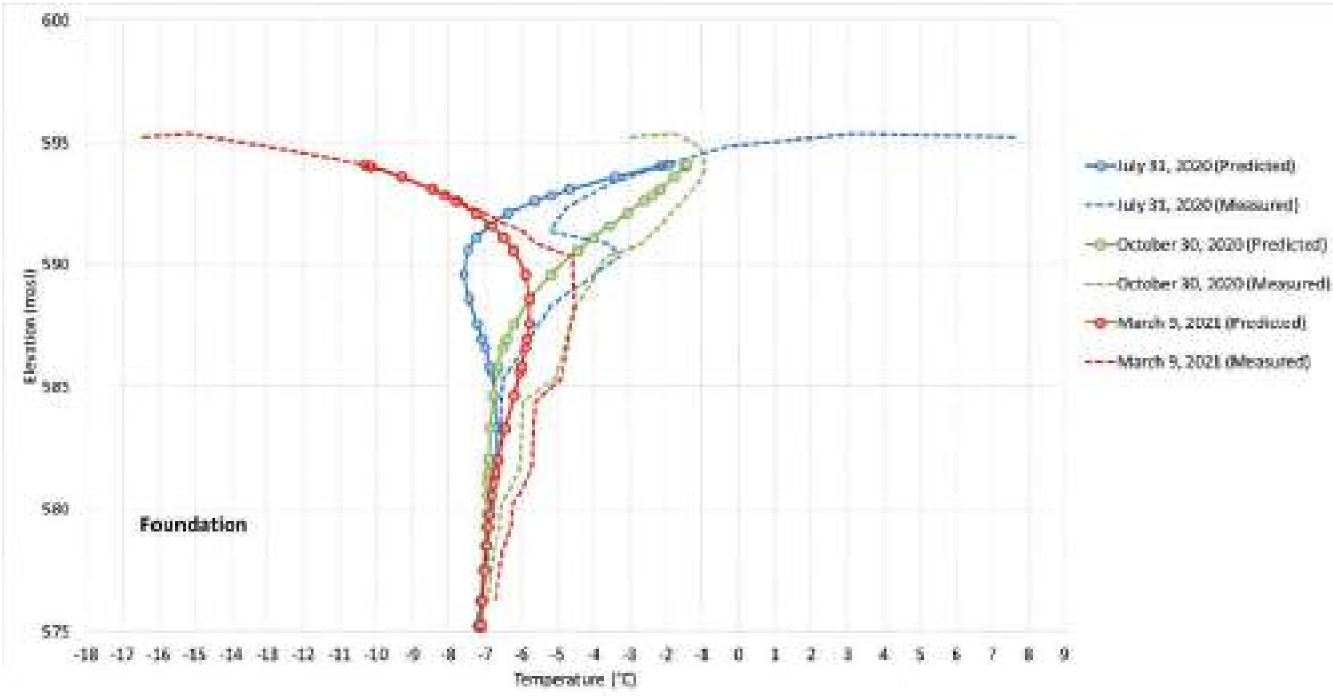


Figure 6: Localized increase in temperatures along BH1 between July 2020 and September 2021

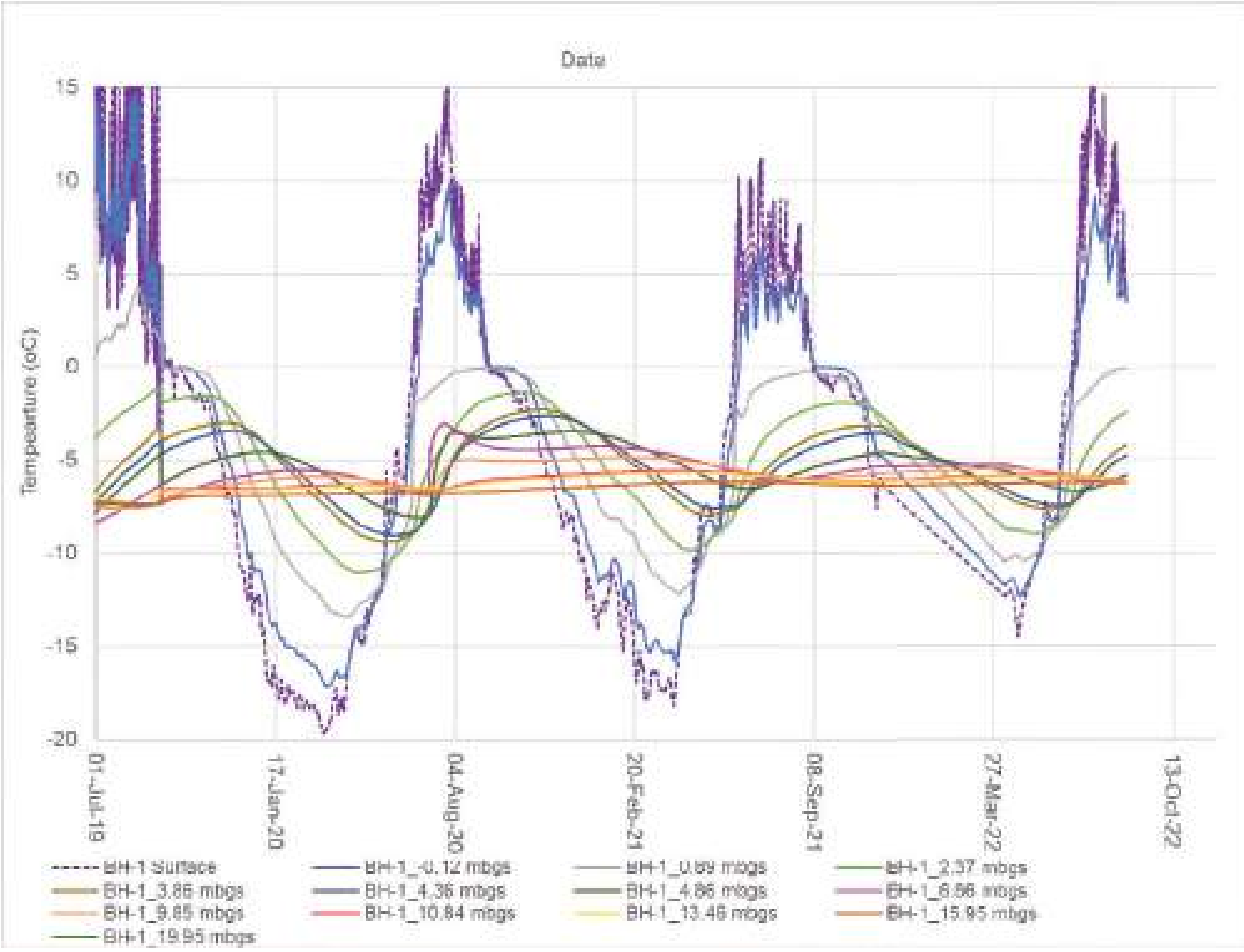


Figure 7: Variation in temperature with time along BH1.

3.2 Vertical Thermistor BH2

Approximately 5.6 m of rockfill was placed on BH2 between September 2019 and July 2020 (See Table 1). The following trends and patterns have been observed:

- Temperatures measured within the waste rock pile have been negative since December 2019 with some seasonal fluctuation.
- A cooling trend has been observed at beads originally installed at depths of 4.8 to 27 m since March 2019, clearly associated with the placement of additional rock on top of BH2 between March and August 2020. For example, temperatures at the original depth of 27 m decreased from -4.3°C to -5°C, and at the original depth of 10 m, waste rock temperature decreased from about -3°C to -4.7°C between December 2019 and March 2022.

- Temperatures measured between the original installation depths of 15 m and 25 m in BH2 are approximately 2°C warmer than those measured at similar depths in BH1. This emphasizes the existence of spatial variations in waste rock temperatures within the pile.
- Overall, additional material placed after September 2020 is contributing to maintain previously deposited waste rock frozen during all times and with a trend of decreasing temperatures, which supports the primary objective of the waste rock management plan.

Figure 8 shows variation in temperatures with time at selected thermistor nodes, which are labelled according to their original installation depths.

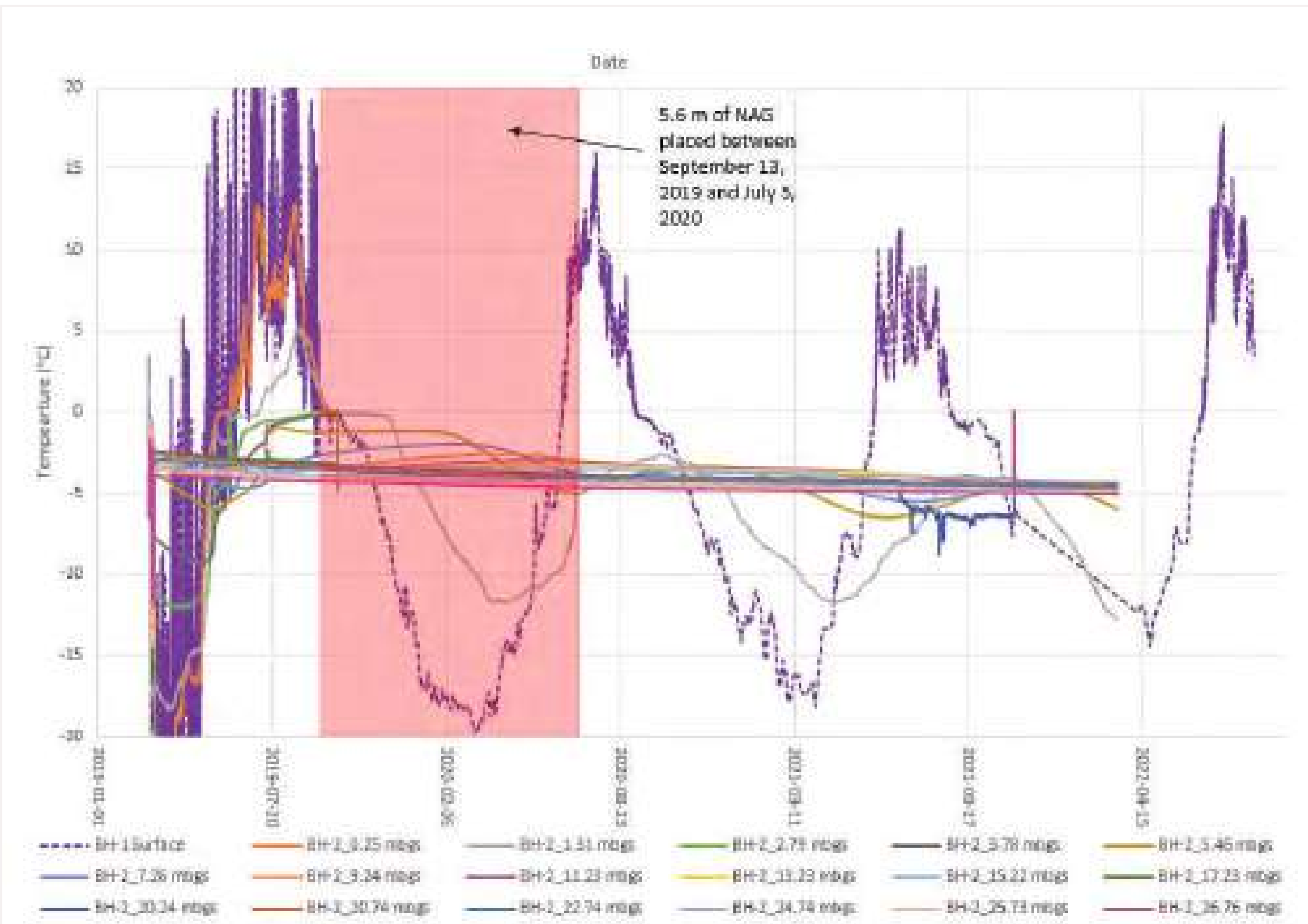


Figure 8: Variation in temperatures at selected thermistor installation depths along BH2 with time.

3.3 Vertical Thermistor BH3

Variations in ground surface elevation were noted, as shown in Table 1, where it is known that 1.3 m was deposited between September 2019 and July 2020, and subsequent placement of waste rock occurred between July 2020 and June 2022. The following trends and patterns have been observed:

- Temperature measured by all thermistor beads have been negative since October 2020, clearly associated with placement of additional rock on top of BH3.

- No sharp localized temperature increases were visible.
- Temperatures between 13 m and 23 m (original installation depths) are between about -4.3°C and -5.4°C, which is comparable to those measured in BH2 at similar depths.
- Ground temperatures at depth of 23.3 mbgs (original installation depth) has progressively decreased over time.
- Overall, material placed after September 2020 continues to allow the pile to remain frozen and continues to cool, which supports the primary objective of the waste rock management plan.

Figure 9 shows variation in temperatures with time at selected depths (i.e., original beads installation depths before placement of additional rock in March 2020).

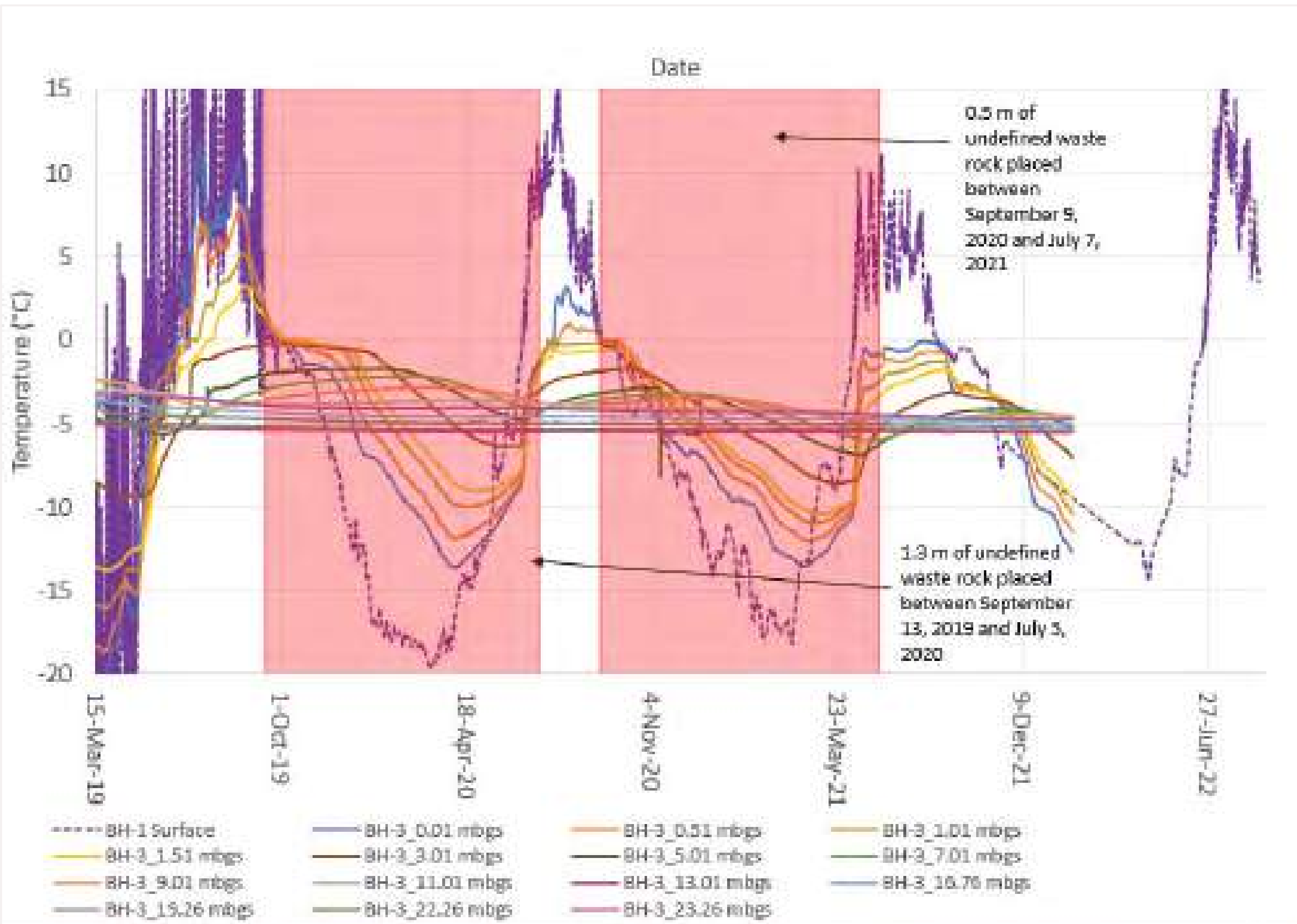


Figure 9: Variation in temperatures at selected thermistor installation depths along BH3 with time.

3.4 Horizontal Thermistor T3

Between July 2021 and June 2022, varying amounts of rockfill were placed between 10 m and 40 m from the edge of the pile along the thermistor string, with about 16 m of waste rock placed at the end of the thermistor string (inwards towards the centre of the pile). The following trends and patterns were observed:

- The first 3.6 m remain frozen all year from November 2020 to 2022.
- Thermistors beads between 3.6 and 40 m were subject to freezing and thawing cycles until about September 2021, when additional rockfill placement began on top of the string.
- After September 2021, waste rock temperatures between 16.3 m and 40 m along the length of the thermistor string remained below 0°C and exhibited much smaller seasonal variations. This correlates with the beginning of progressive placement of waste rock in that area between September 2021 and June 2022 as indicated by survey and deposition data (See Figure 2).
- Overall, material placed after September 2021 continues to allow the pile to remain frozen and continues to cool, which supports the overall objective of the waste rock management plan.

Figure 10 provides the temporal variation in rockfill temperature for selected distances over the length of thermistor string T3. Figure 10 also contains benchmarks of waste rock deposition that occurred at the end of the thermistor string (40 m inwards towards the centre of the pile). Figure 11 shows temperatures along the entire length of T3 for selected dates.

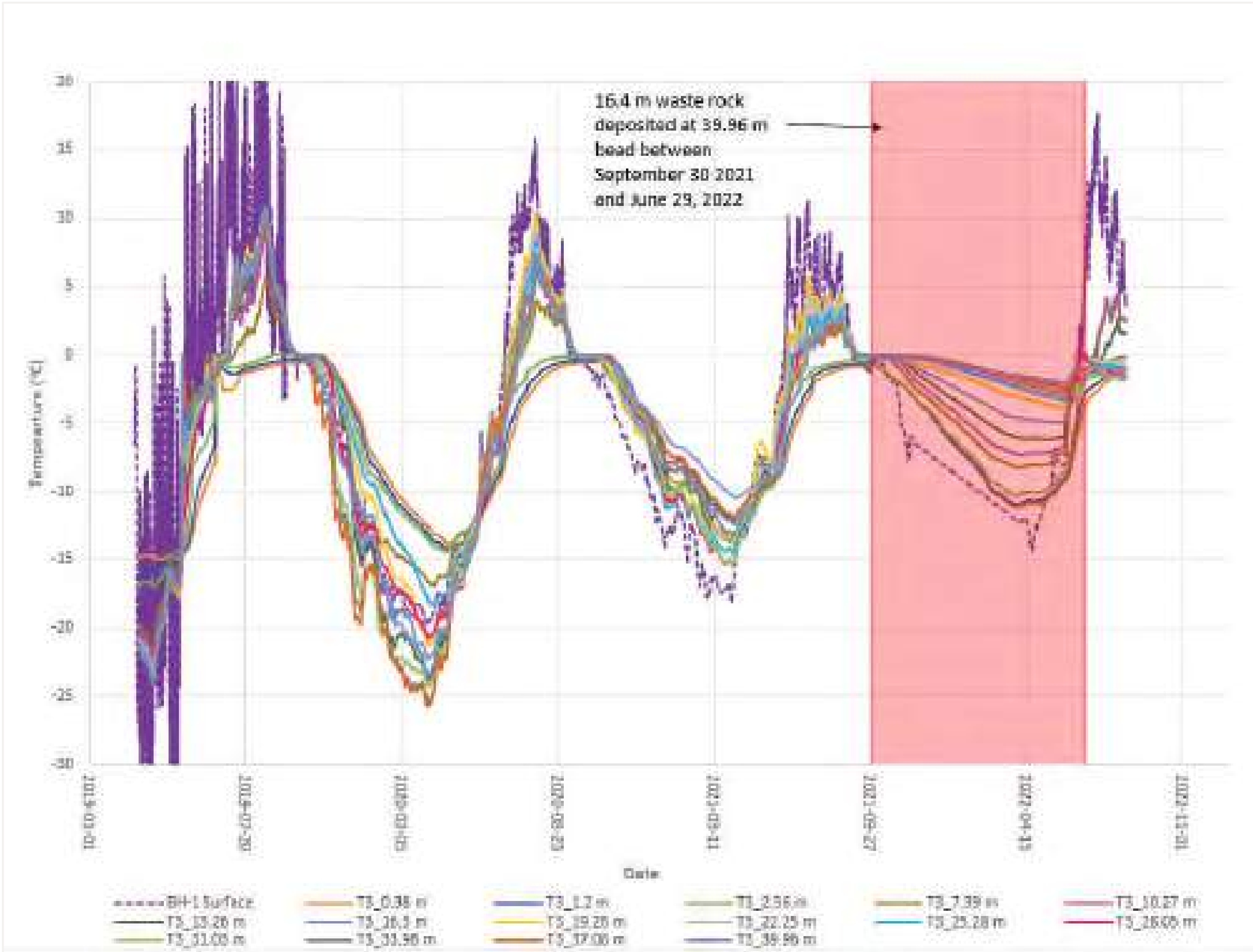


Figure 10: Variation in temperature along T3 from the edge of the pile (0 m) to the end of the string (40 m).

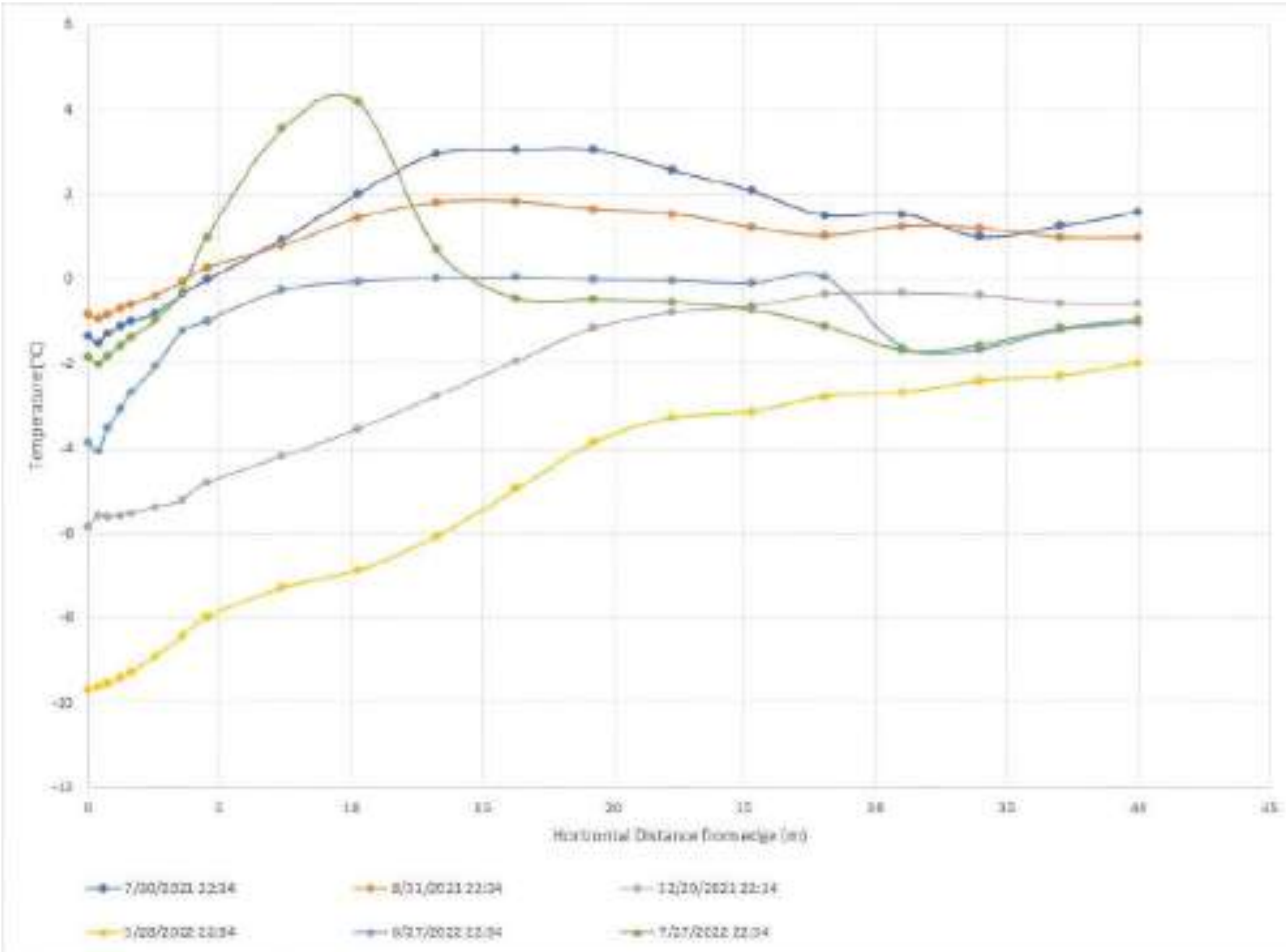


Figure 11: Variation in temperature along T3 for selected dates.

3.5 Horizontal Thermistor T4

The majority of rockfill was placed along the thermistor string began at about 10.6 m and continued between September 2020 and June 2022. The following trends and patterns were observed:

- Temperatures along the entire length of the thermistor (0 to 40 m) have remained below 0°C since August 2019.
- Seasonal variations in ground temperature reduces starting at about 20 m from the edge of the pile, where the temperature ranges between -1.7°C to -5.5°C.
- Along the entire length of the thermistor string, progressive cooling over time continues.
- Overall, material placed after September 2020 continues to allow the pile to remain frozen and continues to cool, which supports the main objective of the waste rock management plan.

Figure 12 presents recorded temperatures at specific distances along the thermistor string with time. Figure 12 also contains benchmarks of waste rock deposition that occurred at the end of the thermistor string (40 m inwards towards the centre of the pile).

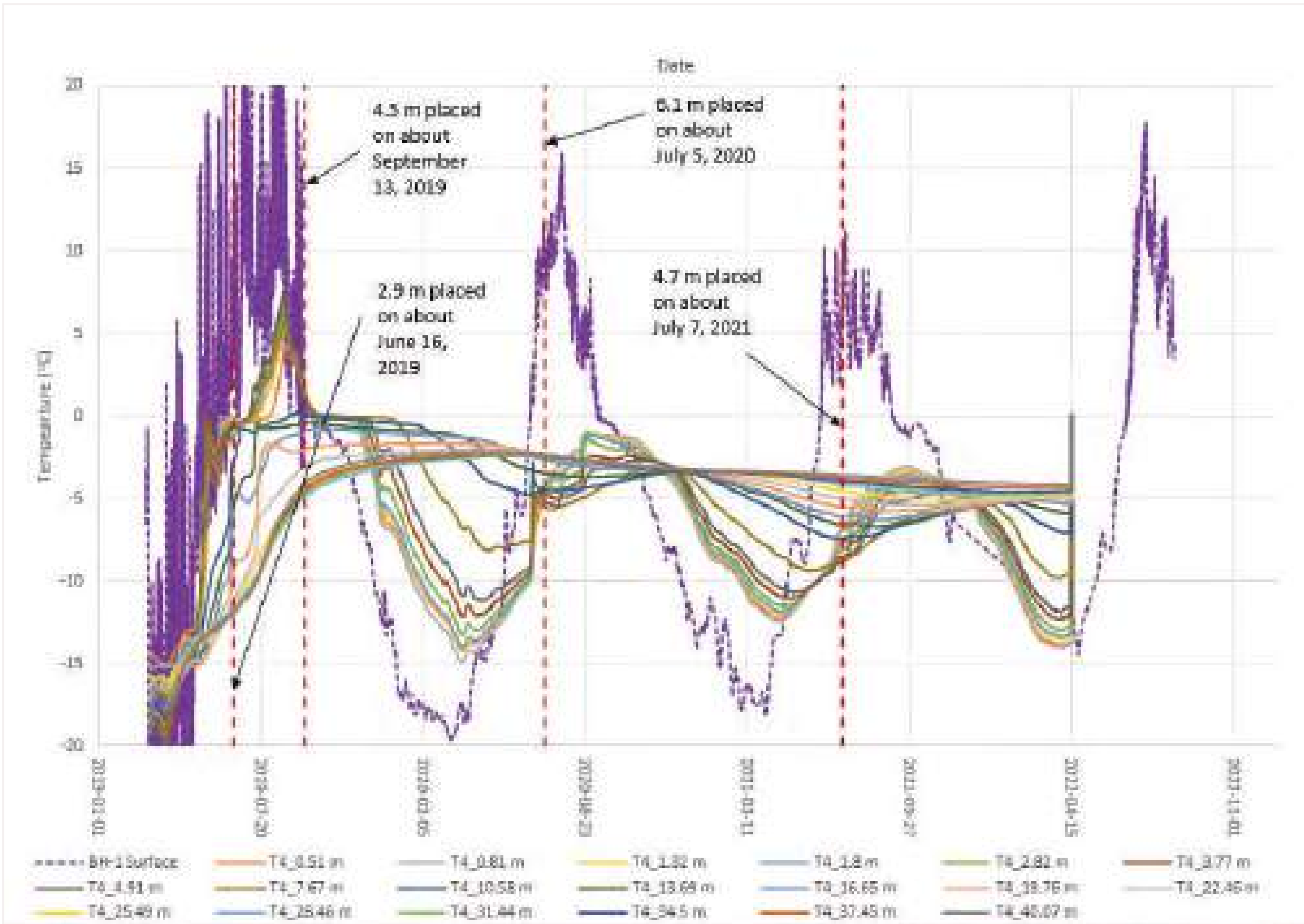


Figure 12: Variation in temperature along T4 from edge of the pile (0 m) to the end of the string (40 m).

3.6 Horizontal String T5

A total of about 17 m of rockfill was placed at the end of the thermistor string (See Figure 4). The following trends and patterns were observed:

- After August 2019, all thermistor beads have remained frozen along the length of the thermistor.
- Waste rock temperatures continue to cool over time at all lengths along the thermistor string.
- Overall, material placed after September 2019 continues to allow the pile to remain frozen and continue to cool, which supports the main objective of the waste rock management plan.

Figure 13 shows variations in temperature in T5. Figure 13 also contains benchmarks of waste rock deposition that occurred at the end of the thermistor string (40 m inwards towards the centre of the pile).

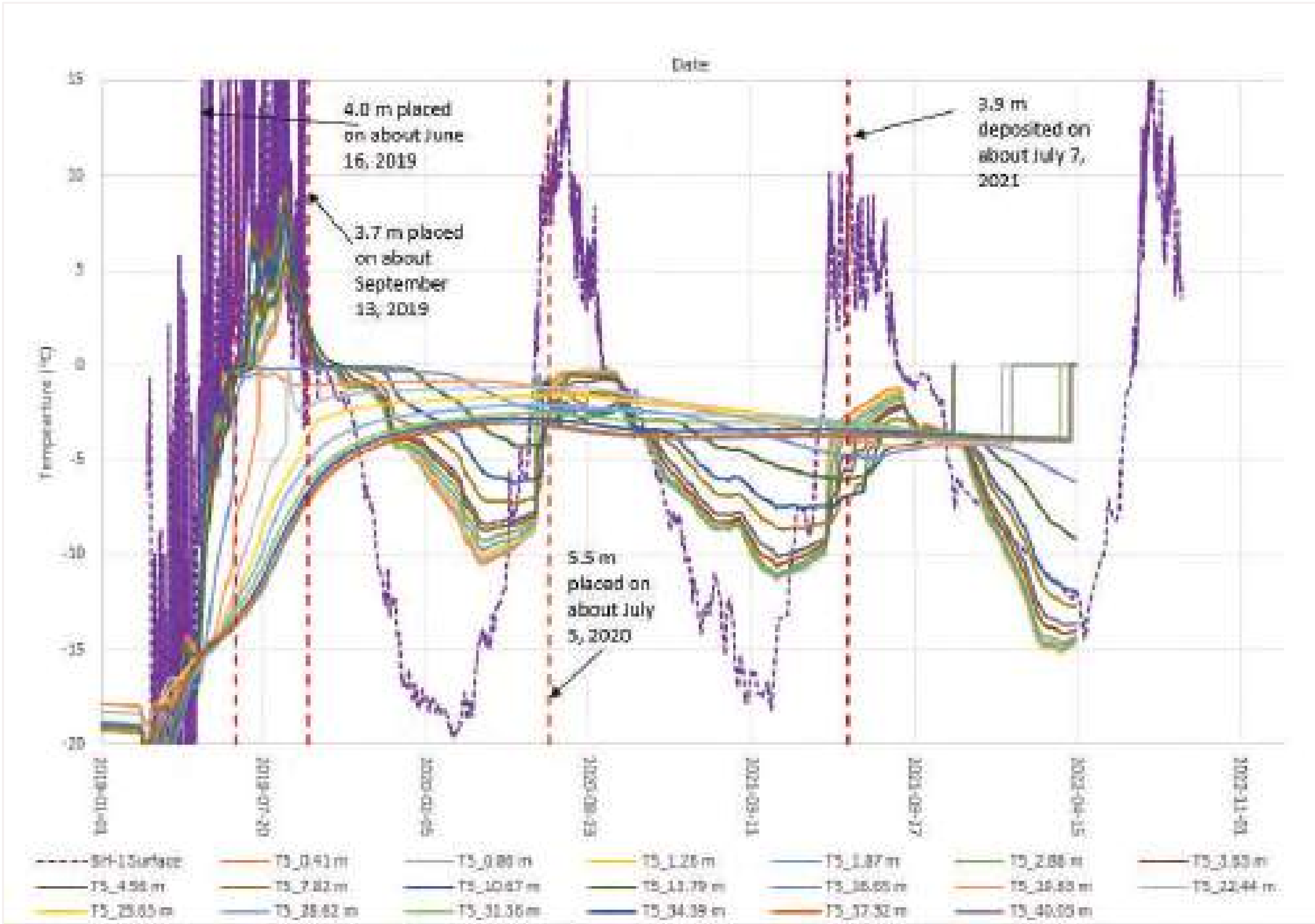


Figure 13: Variation in temperature along T5 from the edge of the pile (0 m) to the end of the string (40 m).

3.7 Vertical Thermistors T1 and T2

Two vertical thermistor strings were installed northwest of the waste rock pile near the contact water collection pond. Temperatures are monitored between 0 m and 5 m depth. The following sections summarize the temporal variation in ground temperatures between February 2019 and August 2022.

3.7.1 Station T1

Between June and September 2019, 5.8 m of waste rock was placed on top of T1. The following summarizes observations within T1:

- After December 2019, the ground remains frozen at all depths, where seasonal fluctuations in temperatures remain below 0°C.
- A sharp increase in rockfill temperature was observed between 0 m and 2 m depth (original installation depths) in June 2020. The increase likely corresponded to increased air temperatures and was not observed to sustain localized temperature increases after the event.
- Waste rock temperatures have continued to cool over time along the thermistor string since additional rock was placed in the area in September 2019.

Figure 14 contains a time series of thermistor beads within T1 between 0.1 and 5.0 m depth.

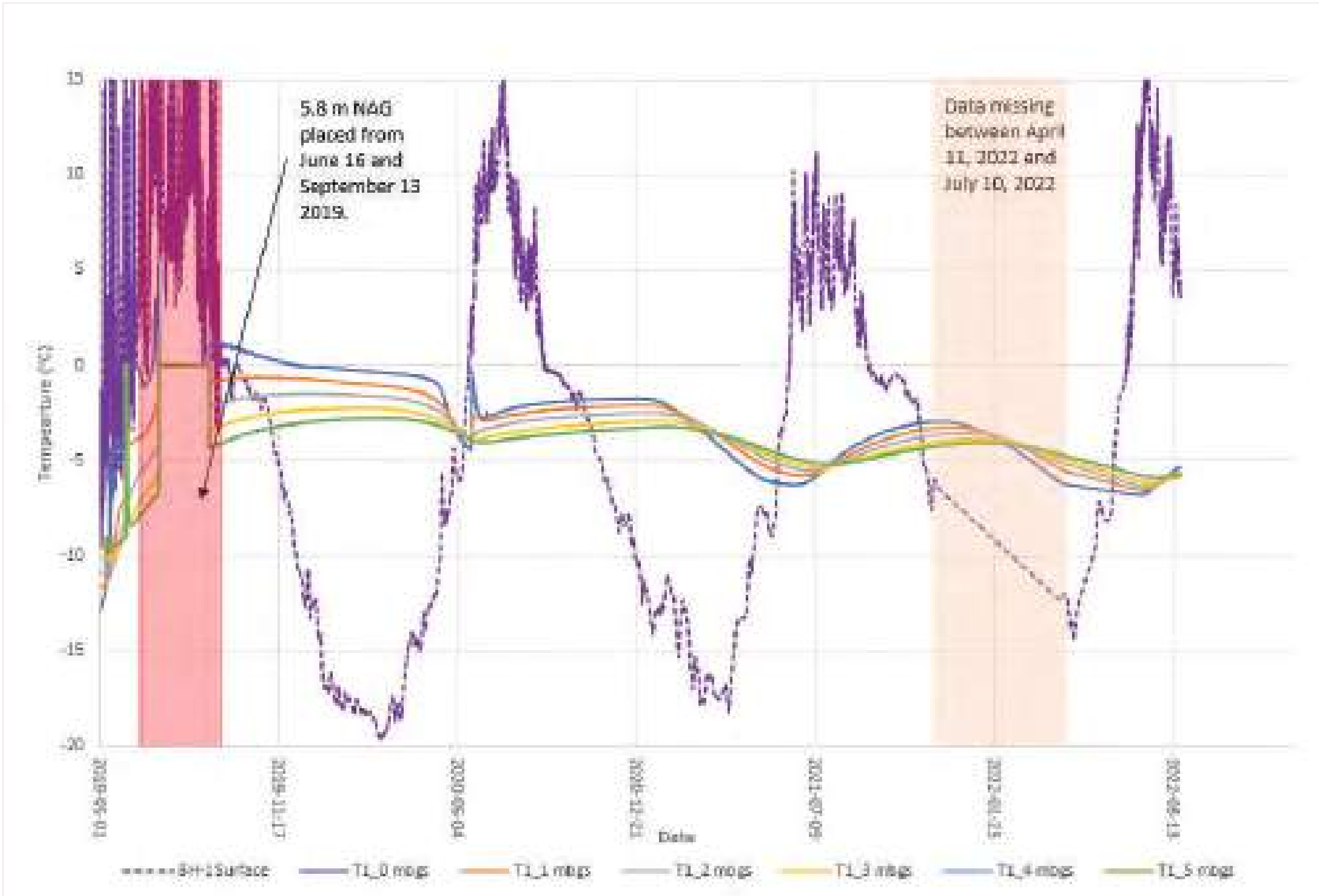


Figure 14: Variations in temperature along T1 with time.

3.7.2 Station T2

About 1.3 m of waste rock was deposited between September 2019 and July 2021. The following summarize trends and observations:

- Large gaps exist along T2, where data is either missing or read in error (See Figure 15).
- Data provided at intervals without errors indicate that rockfill greater than 2.0 mbgs has remained frozen year-round.

Figure 15 presents a time series of temperature measurements along T2 at depths between 0.1 m and 5.0 m.

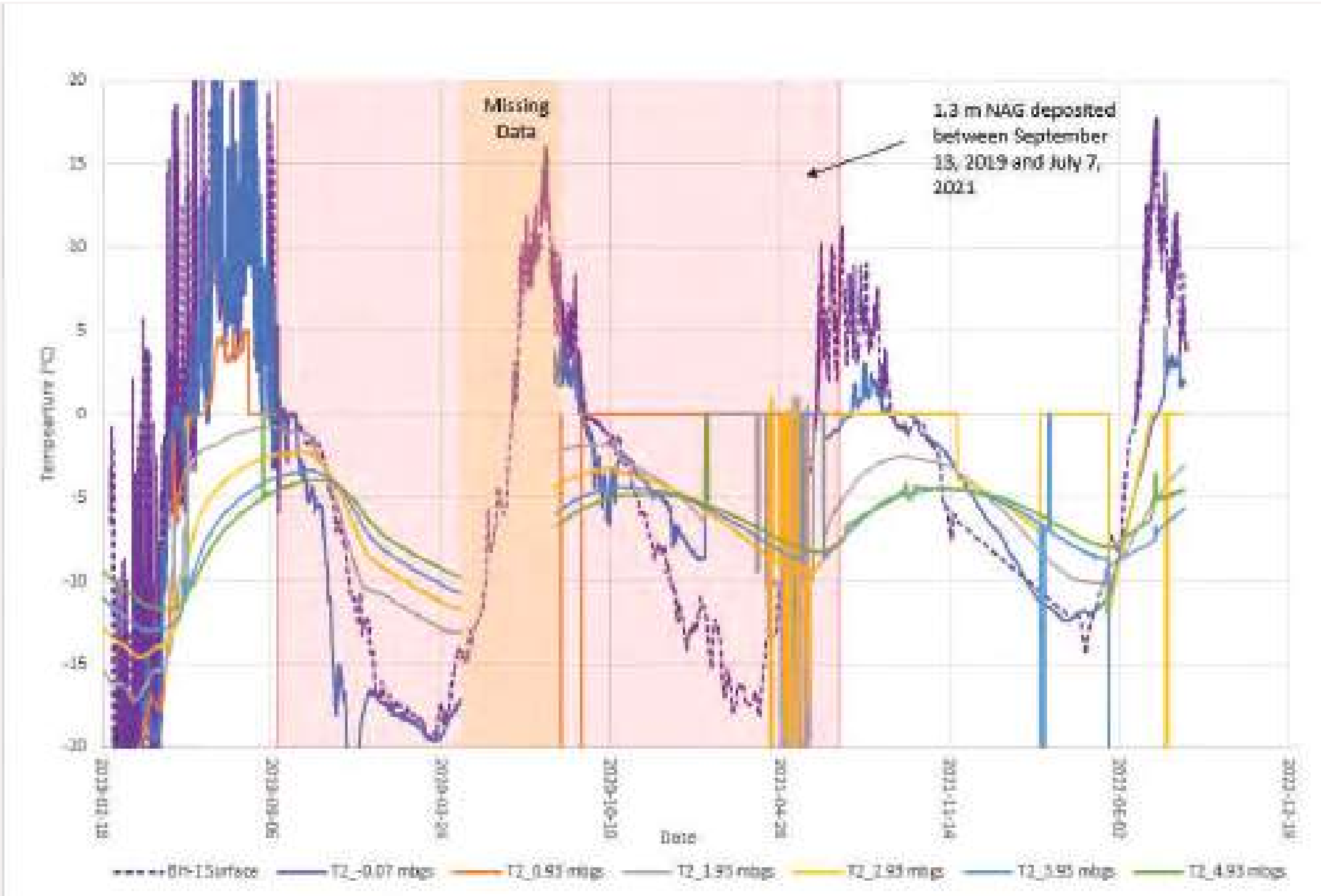


Figure 15: Variation in temperature along T2 with time.

3.8 Summary of Instrumentation Trends

An update of the thermal assessment conducted in 2021 was carried out based on supplemental thermistor data available for the period between November 2020 and August 2022.

Thermistors deployed along the six monitoring locations indicates the following patters and trends:

- Overall, the pile continues to present a freezing trend and remains frozen throughout the year as per the design intent. Placement of additional rockfill in the pile prevents previously deposited rock from thawing and allows for progressive cooling over time.
- The portions of the pile monitored by the temperature probes in BH1, BH2, and BH3 remained entirely frozen throughout the monitoring period, except for the active zone within 2 to 3 m in depth, which is subject to seasonal freeze and thaw cycles.
- Rockfill located along the horizontal thermistor strings T4 and T5 has remained frozen along the length of the string since September 2020. Along the horizontal string T3, waste rock located between approximately 13 to 40 m from the beginning of the string (located close to the edge of the waste pile) remained frozen after September 2021, when additional waste rock started being deposited in that area.

- At depths below about 11 m in BH1, temperatures are observed to be increasing slightly over time, whereas in BH2 and BH3, progressive cooling at depth is observed. Additional waste rock placed on T3, BH2, and BH3 have facilitated the progressive cooling at the base of BH2 and BH3, while the lack of material placement at BH1 has allowed for the slight warming trend at depth. Furthermore, heat propagating from a temporary and localized warming zone that developed between 4.8 m and 9.8 m in depth at BH1 from July 2020 to April 2022 further contributed to the warming trend observed at BH1 below 10 m in depth.
- The 2021 assessment based on a shorter temperature dataset suggested that local sudden increases in waste rock temperature, like the event observed at BH1 in July 2020, were possibly related to localized warmer airflow with increases in air temperature at the same period. However, extended thermistor data in BH1 beyond August 2020 showed that the affected zone remained at higher temperatures for some nine months until about April 2021 before the profile started to cool down once again. It is unlikely that migration of warmer air alone would be sufficient to sustain higher temperatures in that zone for several months and other factors, like a localized internal heat generation, were likely in play.
- The thermal regime of the pile is probably affected by a combination of seasonal variations in air temperature, preferential air flow through the pile, and temporary localized heat generation associated with sulphide oxidation and/or mineral dissolution, but the fact that the pile remained mostly frozen during all times with a progressive colling trend continues to indicate that the site cold climatic condition is the prevailing mechanism governing the thermal regime in the pile, as intended in the design.

4.0 NUMERICAL MODELLING

4.1 Thermal Model Update History

The first thermal modeling exercise was prepared in 2019 (Golder 2019) based on limited instrumentation data available for the period between March and September 2019. Calibration of the 2019 model in portions of the waste rock pile adjacent to BH2 and BH3 using this limited data set was only attained with the inclusion of continuous and widespread assumption of internal heat generation that was further assumed to correlate with sulphide oxidation.

A review of the thermal model was completed in 2021, where temperature and waste deposition data through November 2020 was utilized. The main purpose of that model update was to assess whether heat generation within the pile was contributing to the overall thermal regime of the pile. The updated model with an expanded instrumentation dataset showed that internal heat generation was probably not having a significant impact on the overall thermal regime of the pile, although the existence of possible localized internal heat could generate temporary changes in the waste rock temperature patterns.

The present model update described in this report was prepared to confirm/validate the conclusions from the 2021 update based on the latest instrumentation and waste rock deposition data, and to assess the effect of conceptual rockfill deposition schedules on the overall thermal performance of the pile.

4.2 Methodology

4.2.1 Model Calibration

The first stage was completed using a transient 2D thermal model using the finite element software TEMP/W of GeoStudio 2021, developed by GEO-SLOPE international Ltd. Update of the thermal model was conducted for the same waste rock pile cross section defined in 2019 along the alignment of boreholes BH1, BH2 and BH3 as shown in Figure 1. Data from thermistors installed along these boreholes for the period between November 2020 and November 2021 was used for model calibration purpose. There was a period of no data for BH1 between December 2021 and April 2022.

The model calibration process consisted of adjusting model boundary conditions and timing of additional rock deposition on the pile until the predicted patterns of temperature variations were in general agreement with trends observed from measured values.

The model geometry was adjusted to incorporate rockfill placed on the pile after June 2020, based on ground survey data provided by Baffinland for different dates in 2020 through 2022. Using sensitivity trials, the calibrated model scenario included instant progressive placement of rockfill on top of each borehole from June 2020 to August 2022. Rockfill placed between BH1 and BH2 was defined based on thermistor data measured at T3, which was installed approximately parallel to the chosen cross section. Table 3 contains a summary of the final deposition schedule used after calibration was completed.

It should be noted that the ultimate depths of rockfill placed on top of BH2 and BH3 presented in Table 3 differ slightly from those in Table 1. The first 0.6 m of rockfill placed on BH3 around July 2020 had already been applied in the previous thermal model and was carried over to this stage of calibration. The 0.3 m difference between rockfill values for BH2 between March and April 2020 is attributed to the survey data. It is not expected that this small difference will affect the model calibration.

Table 3: Final Model Calibration Rockfill Deposition Schedule

Date of Deposition	Depth of Rockfill (m)			
	BH1	BH2	BH3	Between BH1 and BH2[(a)]
July 31, 2020	-	5.5	-	-
March 31, 2021	-	-	0.6	-
September 30, 2021	-	-	-	5.3
October 31, 2021[(b)]	-	-	-	3.3
November 30, 2021[(b)]	-	-	-	3.3
December 31, 2021	-	-	-	3.3

a) Lifts of varying thickness were deposited along the cross section between BH1 and BH2. Depth of rockfill reported is measured at a point about 98 m along the cross section and at an elevation of 595.9 masl, which is at the interface between lifts placed on July 7, 2021, and September 30, 2021.

b) A ground survey was not directly provided for this date. These dates were inferred from survey data available along the horizontal thermistor T3, which lies approximately parallel to the cross section between BH1 and BH2.

4.2.2 Conceptual Waste Rock Deposition Models

Ten deposition scenarios were simulated to understand the thermal response of the waste rock pile to conceptual deposition sequencing. Varying thicknesses and timing of waste rock deposition were modelled along the selected cross section within the summer and winter seasons to assess the optimum operational timeline for waste rock placement. It is understood that not all the deposition schedules tested are practically achievable due to operational constraints and waste rock production schedules; however, the scenarios were modeled to assess the general response of the pile to a variety of waste rock deposition time and thickness. Table 4 presents a summary of each deposition schedule modelled.

Table 4: Conceptual Waste Rock Deposition Model Scenarios

Date of Deposition	Depth of Rockfill Placed (m)									
	Scenario A	Scenario B	Scenario C	Scenario D	Scenario E	Scenario F	Scenario G	Scenario H	Scenario I	Scenario J
June 1, 2022	7	3	-	-	-	-	-	-	-	-
July 1, 2022	-	2	3	5	5	5	5	5	-	-
August 1, 2022	-	2	2	-	2	2	2	2	-	5
September 1, 2022	-	-	2	-	-	-	-	-	5	-
December 1, 2022	-	-	-	-	-	3	3	-	-	-
February 1, 2023	-	-	-	-	-	-	-	3	-	-
July 1, 2023	-	-	-	-	-	-	5	-	-	-

Initial conditions at the start of the conceptual assessment were taken from the calibrated 2D model on June 1, 2022. Each material deposition schedule was followed from this point forward. Temperatures used to characterise each conceptual lift at the date of deposition are detailed in Section 4.4.2.

4.3 Material Properties

The thermal properties of waste rock used in both stages of numerical modelling remained the same as defined in the 2019 study and those used within the 2022 study, which are based primarily on the results of laboratory testing conducted as part of the 2019 thermal assessment (Golder 2019b). Table 5 summarizes the material thermal properties used in the models.

Table 5: Thermal properties of materials included in the thermal models.

Material	Volumetric Water Content	Thermal Conductivity (W/m-°C)		Volumetric Heat Capacity (MJ/m³-°C)	
		Frozen	Unfrozen	Frozen	Unfrozen
Waste Rock	8%	1.95	1.8	1.7	2.0
Overburden	35%	2.1	1.5	2.2	2.8
Bedrock	1%	2.9	2.9	2.4	2.4

4.4 Boundary Conditions and Initial Conditions

4.4.1 Model Calibration

Temperatures obtained between November 2020 and August 2022 from the thermistor bead in BH1 installed at a depth of 0.1 m were used as the ground temperature function applied to the top of the model geometry.

Data from the thermistor bead at 0.1 mbgs within BH1 was found to be missing between November 22, 2021, and April 7, 2022. Data for this period was gap filled using ground temperatures from the previous winter period. Figure 16 shows the measured data and the temperature function used in the models.

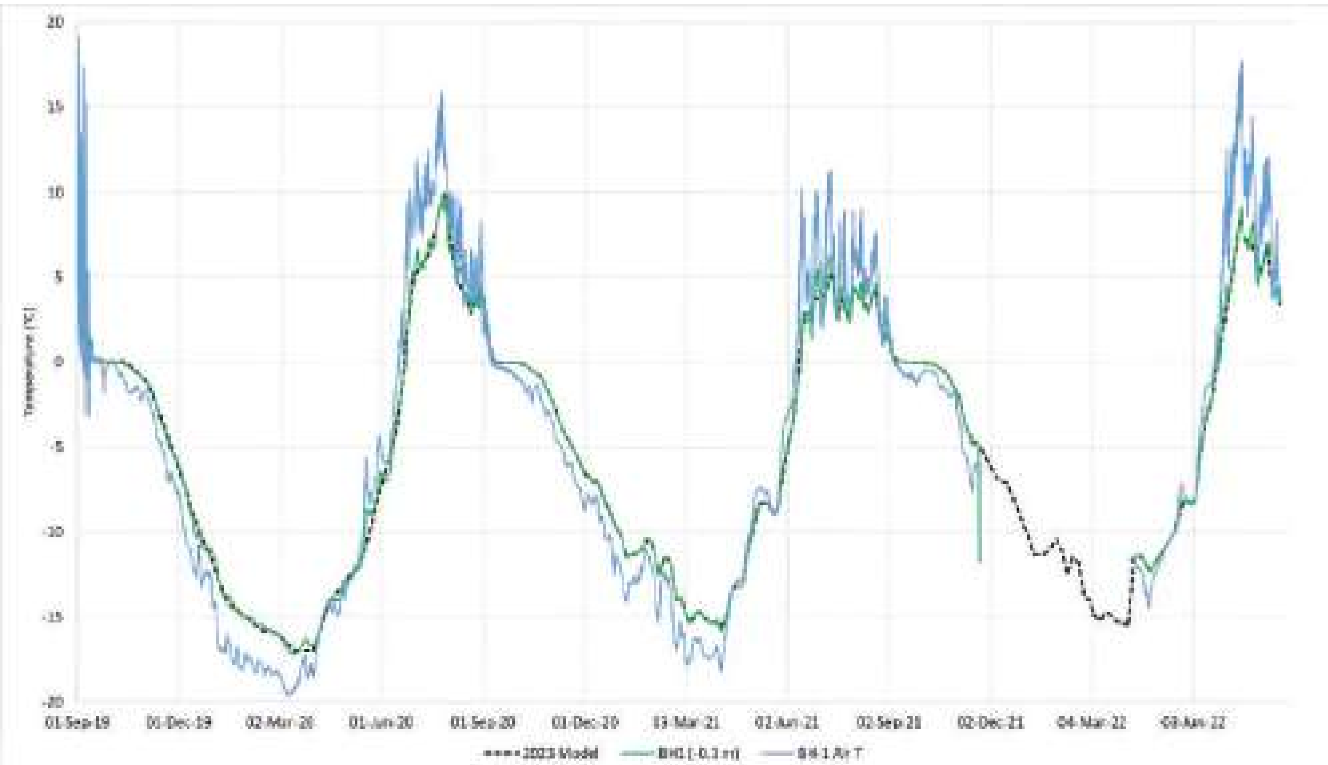


Figure 16: Comparison of measured ground surface temperatures in BH1, and temperature boundary function used in the 2023 modelling exercise.

In the 2021 study, a constant ground temperature of -8°C was defined as the bottom boundary condition. This value was defined based on thermal gradients estimated from the deepest beads of thermistors installed along boreholes BH-1, BH-2, and BH-3. Sensitivity analyses during the calibration period showed that a constant ground temperature of -7.5°C resulted in a more balanced agreement between measured data in BH-1, BH-2, and BH-3.

4.4.2 Conceptual Rockfill Deposition

A ground surface temperature function was created to represent future conditions. To be conservative, the warmest year recorded by thermistors (2020) was applied as the ground temperature function (See Figure 16).

As the models incorporated progressive and instantaneous placement of rockfill at selected months, the initial as-deposited waste rock temperature was also required to be defined. Similar to the ground temperature function, the warmest temperature recorded in each month of deposition was used to define the initial temperature of the conceptual waste rock lift. Sensitivity analyses were also conducted assuming the rockfill is deposited at the average recorded monthly temperatures. Table 6 contains the baseline and sensitivity waste rock activation temperatures used in the models.

Table 6: Summary of Baseline and Sensitivity Case Activation Temperatures of Conceptual Waste Rock Lifts

Month of Deposition	Maximum Monthly Rockfill Temperature (°C)	Average Monthly Rockfill Temperature (°C)
June 2022	5.3	-2.5
July 2022 and July 2023	9.8	7.2
August 2022	6.9	4.5
September 2022	2.7	0.4
December 2022	-6.5	-7.8
February 2023	-11	-15

The boundary condition applied to the bottom of the model geometry remained at –7.5 degrees, equal to that applied during the calibration stage.

4.5 Model Limitations

The models prepared for this study constitute a simplification of the field reality and carry assumptions and limitations that shall be taken into consideration during interpretation of model results. The most important model limitations as follows:

- The models consider a homogeneous waste rock mass with no spatial variation in waste rock properties. Waste rock piles typically present zones of segregated materials, densification, and layering that affect the thermal and hydraulic characteristics of the pile. These zones can work as preferential flow paths for air flow that can impact internal temperatures.
- The updated model geometry considered instantaneous placement of additional rock in the pile for each assessment period, based on survey data. Waste rock is placed progressively throughout the year and the timing and sequence of waste rock deposition affects the thermal regime.
- The thermal models compute variation in temperature associated only with conduction and is not set to incorporate the impact of heat transfer associated with air and water flow through the pile. Instrumentation data suggest air flow is an important component affecting the thermal regime of the pile, and snowmelt during the freshet season can also have an effect.
- The 2D nature of the thermal models can only capture heat transfer along the cross section and does not incorporate three-dimensional heat transfer coming from adjacent areas perpendicular to the model geometry.
- Historical deposition of materials between survey dates with large gaps in time is assumed to have a linear deposition over time. It is acknowledged that this is an approximation of the actual deposition schedule and contributed to differences during the calibration stage.

5.0 MODEL CALIBRATION RESULTS

Model calibration focused on thermistor data from June 2020 to November 2021, due to the lack of reference measured ground temperatures for BH 1 between November 2021 to April 2022. The following sections summarize the results of calibration at each borehole.

5.1 BH1

Figure 17 and Figure 18 provide measured and predicted rockfill temperature profiles between July 2020 and September 2021.

In general, the predicted temperature profiles correlated well the measured profiles along the thermistor string down to about 5 m below surface. The thermal model was not able to capture the effects of the localized internal heat identified at about 590 masl (5.0 to 7.0 m original installation depth along thermistor string) that started in July 2020. Subsequent measured profiles after July 2020 show the migration of heat downwards through March 2021. After March 2021, the measured thermal profile continues to move back towards the predicted profile, showing that the heat eventually dissipated slowly over a period of approximately nine months.

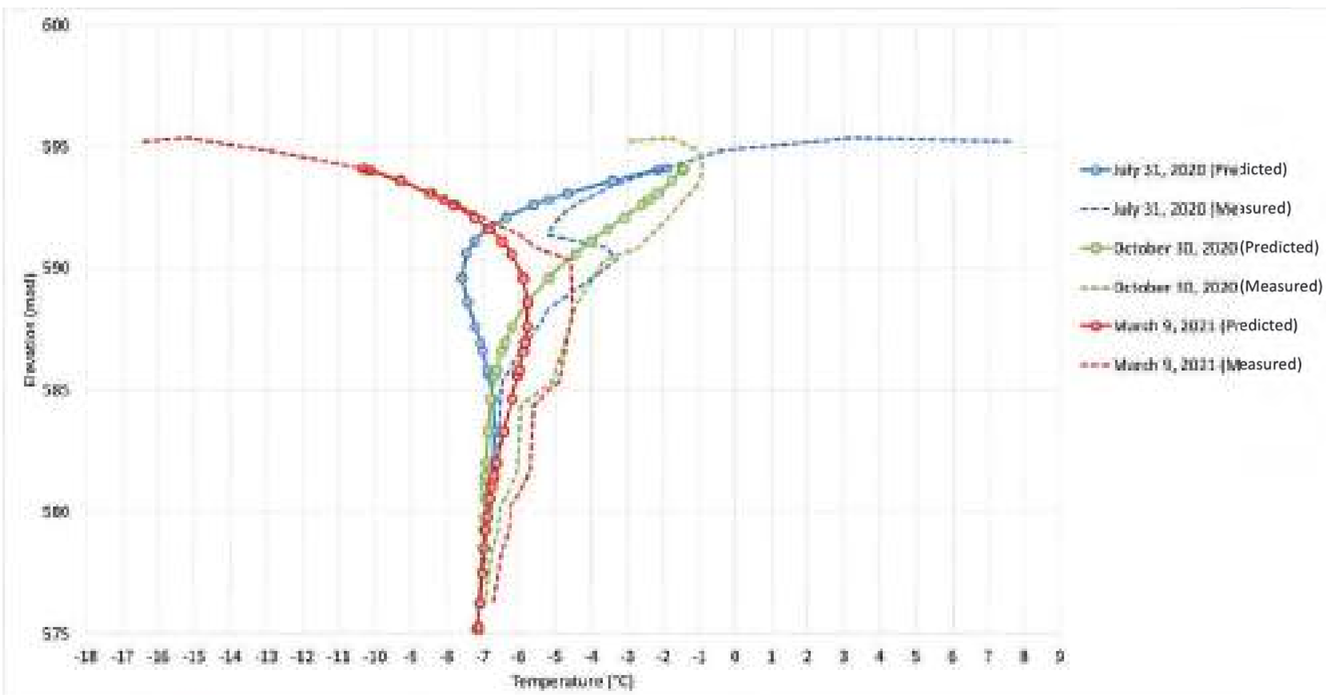


Figure 17: Measured and Predicted Temperature Profiles at BH1 between July 2020 and March 2021.

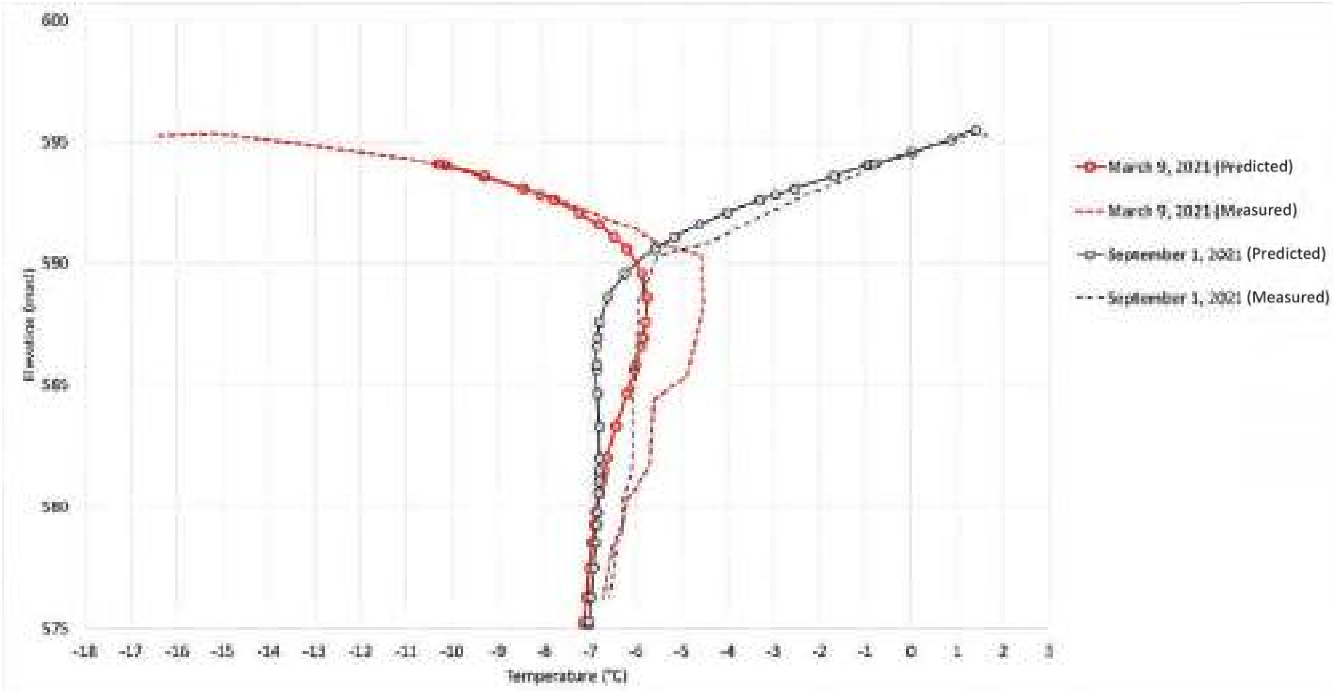


Figure 18: Measured and Predicted Temperature Profiles at BH1 between March 2021 and September 2021.

At depth, measured data show that the ground temperature slightly increases over time from about –7.3°C to -6.5°C degrees (March 2019 to August 2022). Results of the model calibration show a similar trend as expected due to the lack of waste rock placed on top of BH1 over time.

The calibrated model was in good agreement with the warming trend observed at depth; however, it was not able to replicate the magnitude of increase after July 2020, which is shown in Figure 19. In general, predicted values are slightly cooler than measured, where measured values show an accelerated warming between July 2020 and November 2020 that was not captured within the model. The timing of the deviance coincides with the localized heat measured in-situ in July 2020, and is thought to be a result of heat propagating downwards through the borehole. After November 2021, the rate of measured ground temperature does not accelerate further and agrees well with the rate predicted by the thermal model. Figure 19 provides the temporal variation in ground temperature at depth within BH1 for both measured and predicted values.

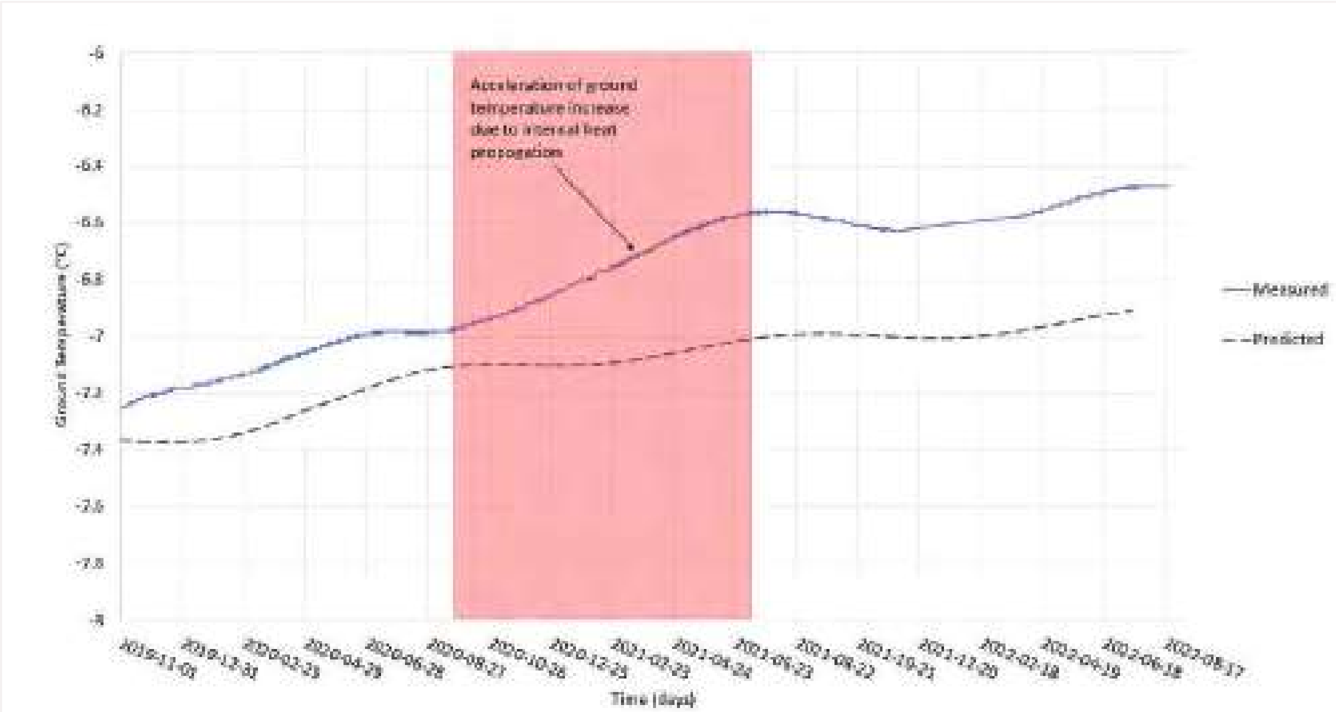


Figure 19: Measured and Predicted Temporal Variations in Rockfill Temperature at Bottom Node within BH1 (18.95 mbgs).

5.2 BH2

As shown in Figure 20, In general, the model predicted warmer temperatures at near-surface nodes than measured in-situ and agreed well with measured temperature profiles below an elevation of about 590 masl.

Calibration of temperatures along BH2 was difficult because about 6 m of rock was placed on top between March and August 2020. The model assumed instantaneous placement of 6 m of rock at the end of July, but progressive deposition or deposition of rock earlier in spring would have affected the pattern of temperature change at the top of the thermistor string.

At depth, temperatures were measured to be slightly cooling over time, which is likely a result of the progressive placement of waste rock on top of BH2. The calibrated model agrees well with in-situ measurements, where little difference between the two trends is observed. Figure 21 shows both measured and calculated temperatures at depth over time.

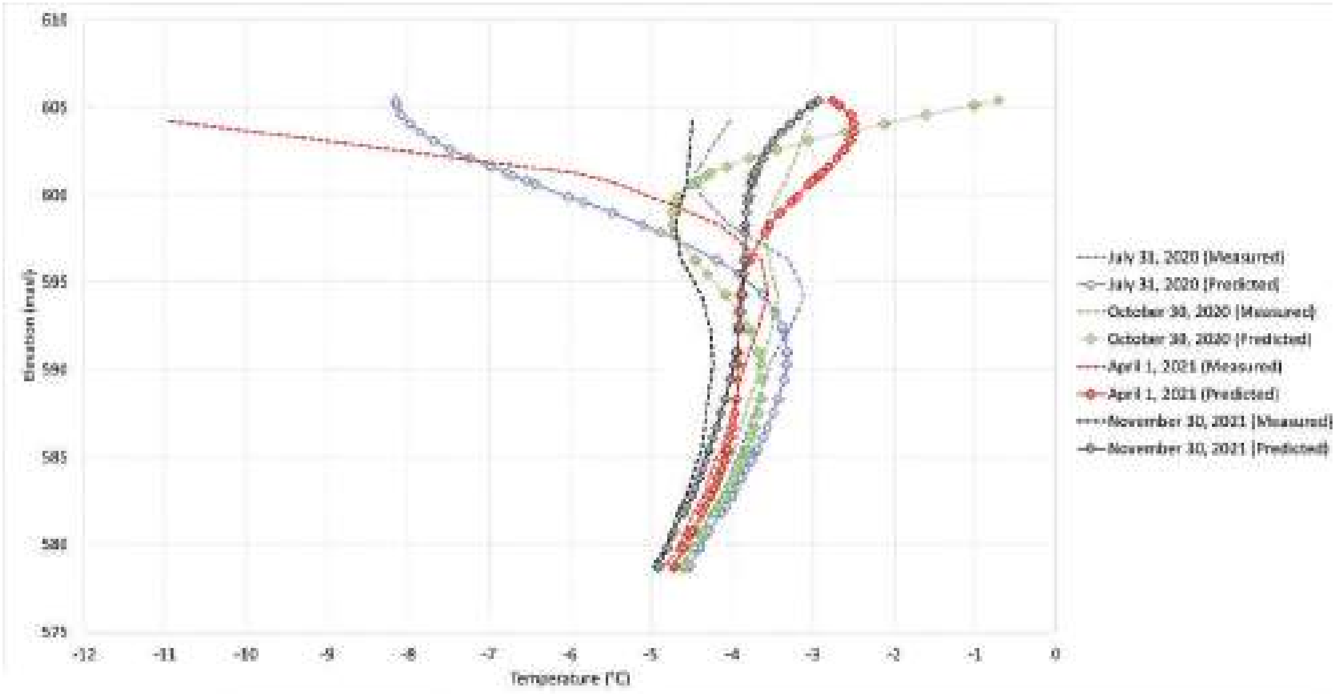


Figure 20: Measured and Predicted Temperature Profiles at BH2 between July 2020 and September 2021

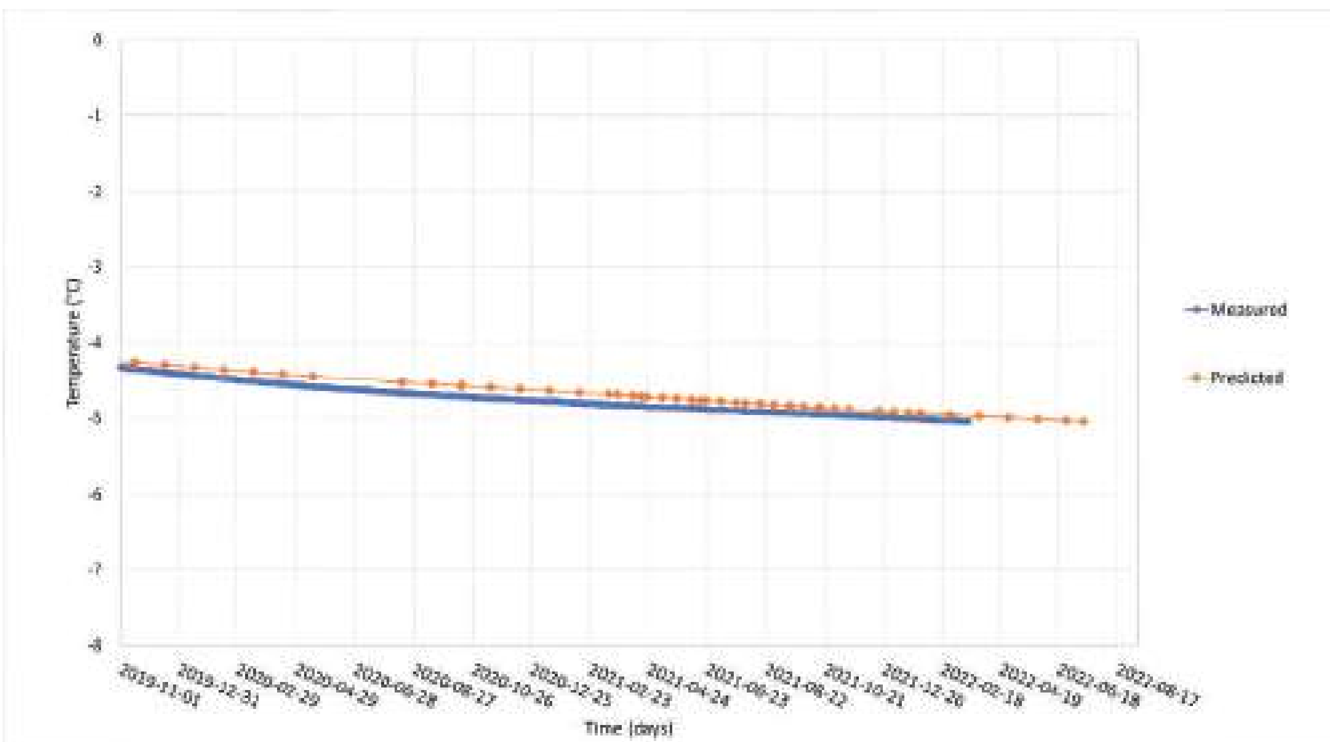


Figure 21: Measured and Predicted Temporal Variations in Rockfill Temperature at Bottom Node within BH2 (26.76 mbgs).

5.3 BH3

As with BH2, calibration of the top thermistor nodes within BH3 was difficult. Waste rock was noted to be placed over a period between April 2020 and March 2021, while the model geometry incorporates instantaneous placement of waste rock at selected dates. Although the predicted temperatures at the top nodes were much warmer than measured values, at about 600 masl, measured and predicted temperature profiles begin to agree better with one another, despite predicted values being about 0.75 degrees warmer than measured values at the base of the profiles.

At depth, BH3 shows a slightly cooling trend over time, reducing about 0.25°C between November 2019 and August 2022. Calibration results had a similar trend with time, where ground temperatures cooled slightly faster over time (See Figure 23).

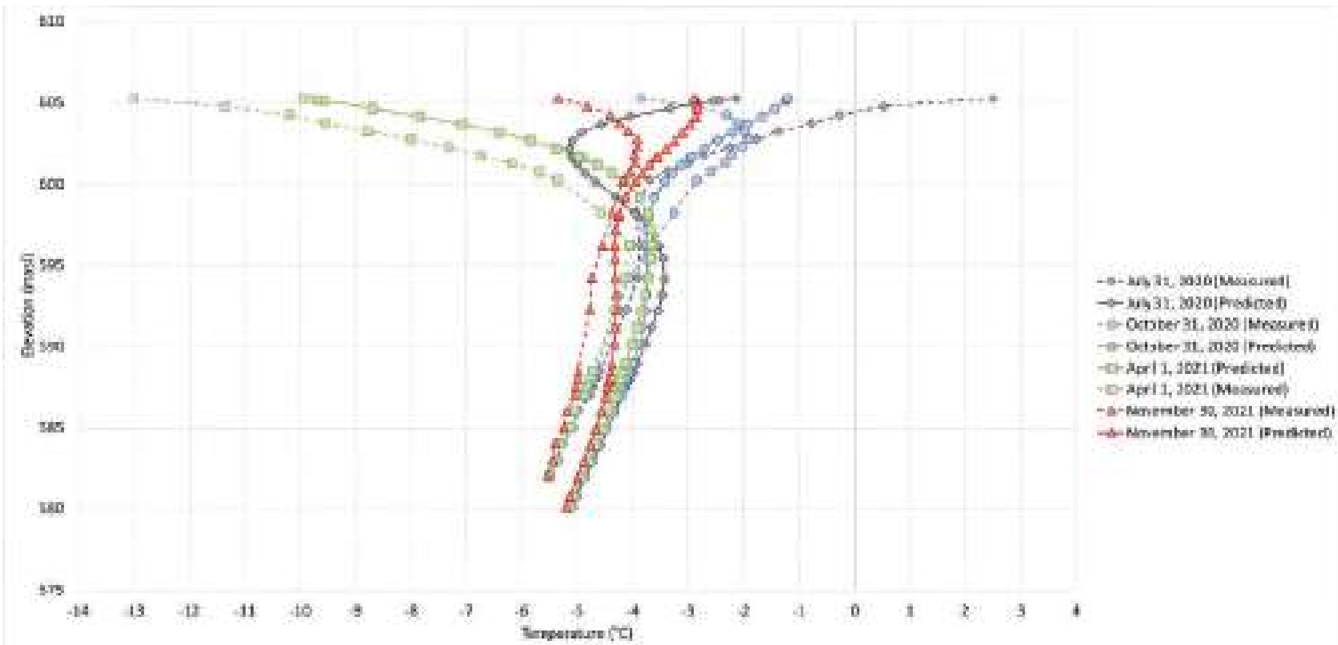


Figure 22: Measured and Predicted Temperature Profiles at BH3 between July 2020 and November 2021

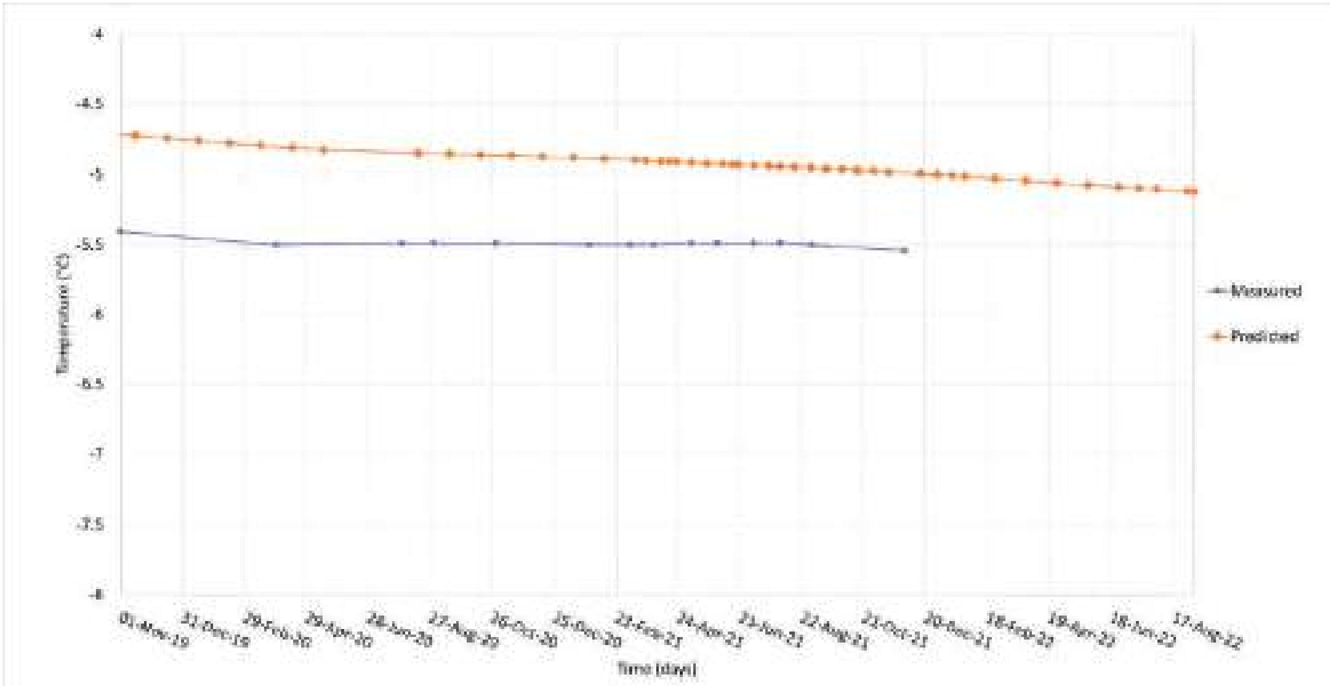


Figure 23: Measured and Predicted Temporal Variations in Rockfill Temperature at Bottom Node within BH3 (23.26 mbgs).

5.4 Summary of Model Calibration

Calibration of a thermal model for the waste rock pile was completed based on supplemental thermistor and waste rock deposition data. The calibration process at the location of BH1 was affected by a prolonged period of localized internal heat that could not be captured in the model. At the locations of BH2 and BH3, the calibration process was very difficult due to waste rock been progressively deposited on those locations over time while the model incorporates subsequent waste rock lifts as instantaneous deposition at selected dates. General comments on the calibration process are provided below:

- BH1 had little change in waste rock elevation over time and was used as a reference in calibrating the thermal model. Overall, the temperatures at surface and depth within BH1 were calibrated well:
  - Deviation of measured results from predicted values at certain depths along BH1 is due to the propagation of heat from a localized event observed in July 2020 that could not be captured in the model. The migration of measured temperature profiles back towards the predicted values indicate that internal heat eventually dissipates.
- Difficulty calibrating surface nodes at BH2 and BH3 was due to the sensitivity of the thermal models to the exact date of material placement (i.e., progressive placement in the field vs. instantaneous placement in the models). In general, the models predicted warmer ground temperature compared to measured values along BH2 and BH3.
- The model was able to replicate the cooling trends measured by the deepest nodes of thermistors installed along BH2 and BH3, as well as a slightly warming trend measured by the deepest node at the base of BH1.

Overall, the model was able to capture the general trends and patterns measured in-situ, where the thermal regime and response of the pile to previous waste rock depositions is captured at depth within each borehole.

6.0 CONCEPTUAL WASTE ROCK DEPOSITION MODEL RESULTS

Ten base case and four sensitivity deposition scenarios were assessed to evaluate the effect of lift thickness and timing of deposition on the time required for a lift to freeze before a subsequent lift can be placed on top. The model scenarios tested are described in Section 4.2.2.

A location along the model geometry was chosen, identified as Profile A, for tracking freezing times as it was found to take the longest to achieve sub-zero temperatures over time. To be considered frozen, the waste rock placed in each scenario was to achieve and maintain a sub-zero temperature at the interface between existing waste rock, and the conceptual lift of waste rock. A visual representation of the reference points within the conceptual lift is provided in Figure 24. Figure 25 and Figure 26 show examples of unfrozen, and frozen states respectively, as well as the location of Profile A along the model geometry.

The following sections summarize the results of the conceptual deposition scenarios. A comparison of depositions scenarios in both summer and winter seasons is discussed to inform general recommendations for waste rock placement.

Figure 24: Visual reference of defined assessment points within the conceptual waste rock lifts.

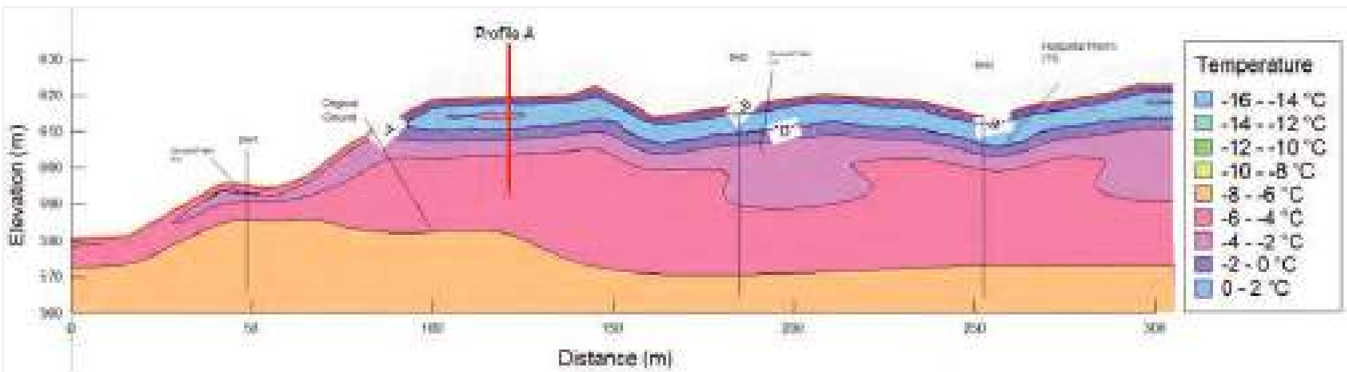


Figure 25: Scenario C (December 2022): Base of Conceptual Lift Still Unfrozen

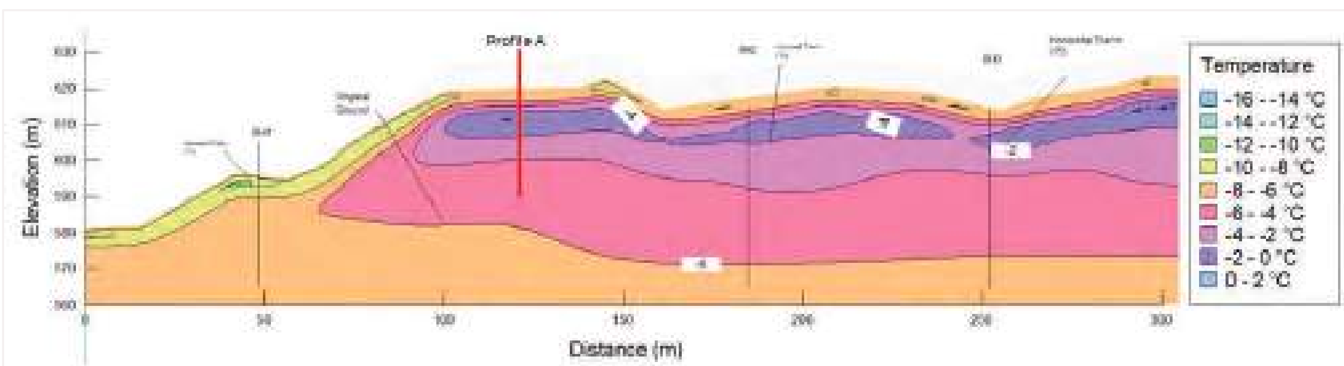


Figure 26: Scenario C (June 2023): Base of Conceptual Lift is Frozen

6.1 Results Summary

Table 7 summarises the time required for waste rock to achieve sub-zero temperatures for each of the conceptual deposition schedule modeled. Table 7 summarize results for base case models (waste rock deposition temperature defined as the highest ground temperature in the deposition month), and for selected sensitivity cases (waste rock deposition temperature defined as the average ground temperature in the deposition month).

Table 7: Summary of freezing Times required for Conceptual Waste Rock Deposition Schedules

Scenario	Description of Deposition Sequence	Computed Days to Sub-Zero Condition[a]		Date of Achieving Sub-Zero Condition	
		Base Case	Sensitivity Case	Base Case	Sensitivity Case
A	7 m in June	225	N/A	January 12, 2023	N/A
B	3 m in June 2 m in July 2 m in August	235	N/A	January 22, 2023	N/A
C	3 m in July 2 m in August 2 m in September	315	305	May 12, 2023	May 2, 2023
D	5 m in July	235	N/A	February 21, 2023	N/A
E	5 m in July 2 m in August	325	315	May 22, 2023	May 12, 2023
F	5 m in July 2 m in August 3 m in December	417	377	August 22, 2023	July 13, 2023
G	5 m in July 2 m in August 3 m in December 5 m in July	426	N/A	August 31, 2023	N/A
H	5 m in July 2 m in August 3 m in February	347	337	June 13, 2023	June 3, 2023
I	5 m in September	185	N/A	March 5, 2023	N/A
J	5 m in August	216	N/A	March 5, 2023	N/A

a) Days to frozen state is calculated using the first day of deposition for each scenario.

In general, the model results showed that all deposition scenarios tested ultimately resulted in sub-zero temperatures at the base of the conceptual waste rock lift, where the activation temperatures, lift thickness, and deposition time affect the relative duration of time to freezing at the base. Figure 27 shows the computed evolution of waste rock temperatures at specific elevations within each conceptual lift over time.

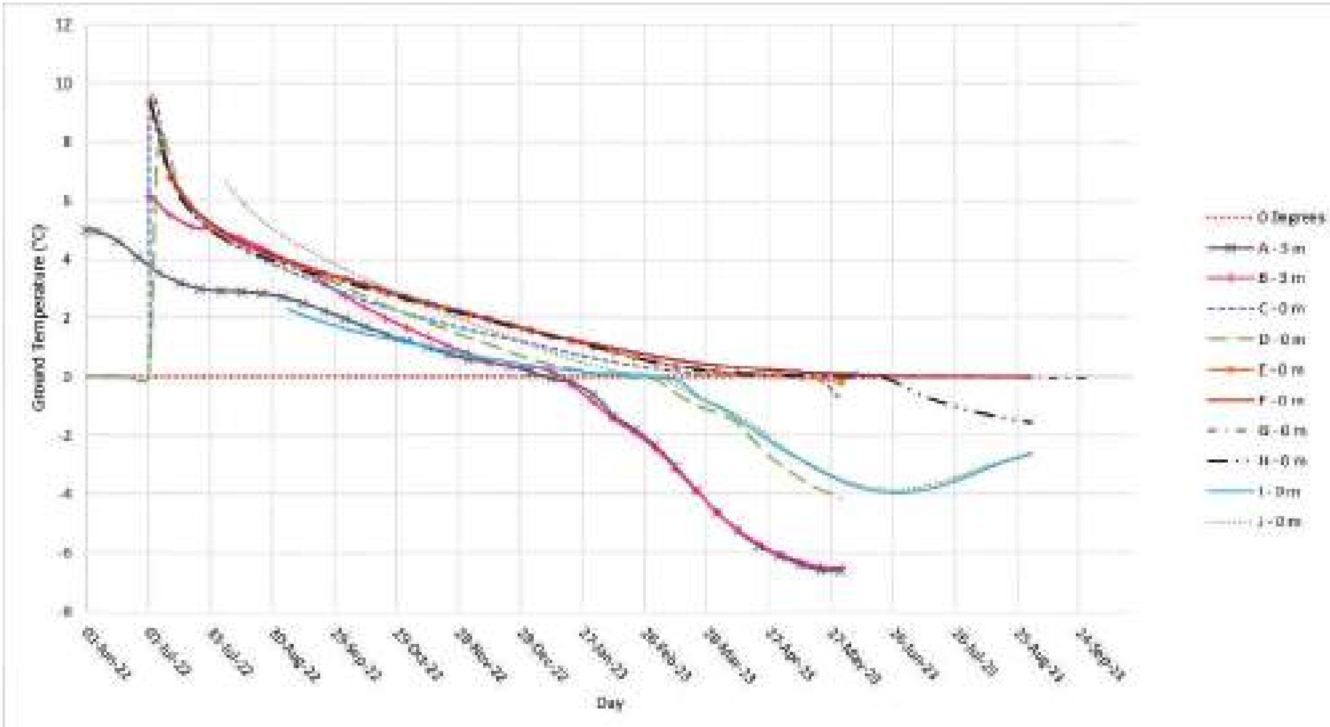


Figure 27: Temperatures of each conceptual deposition scenario with time.

It is noted for Scenarios A and B, temperatures are provided at an elevation of 3 m within the conceptual waste rock lift, where the remaining scenarios are provided at a depth of 0 m. This is done as waste rock temperatures remain above zero longest at the elevation of 3 m within the conceptual layer for Scenario A and B, whereas this occurs at a depth of 0 m for the remaining Scenarios.

The following observations summarize the overall results:

- In general, it is expected that the waste rock deposition temperature will not be the main contributing factor in the overall performance of the rockfill pile. The sensitivity cases using waste rock deposition at the average monthly temperatures froze in about two to four weeks faster than the base cases with waste rock deposition at the highest monthly temperatures. A larger gap between baseline and sensitivity cases was observed in Scenario F, where a total of 7 m of rock was placed in July and August, followed by 3 m of waste rock deposition in December.
- Depositing a 7 m thick lift at the beginning of summer (June) results in faster cooling than thinner lifts placed progressively in late summer (Scenario A and C).
- Placing a 5 m thick lift of waste rock in early summer promoted faster cooling than 7 m of rock placed over a period of two months in later summer.
  - If thicker lifts are to be used, placing them in earlier summer will allow for faster cooling than in late summer.
- 5 m lifts of material placed in late summer (August and September) will eventually freeze faster than 7 m of rock placed in mid to late summer.

- Deposition of waste rock in early winter on top of unfrozen layers can delay freezing.
- The models showed that cooling of basal ground temperatures at the locations of BH2 and BH3 is independent of the conceptual deposition tested. This suggests that the pile will tend to freeze back as per the design intent during operation of the pile with continuous waste rock deposition.

Overall, waste placement in late summer and mid winter seasons will result in freezing at the base of the previous waste rock lift, where 5 m and 7 m lifts both resulted in freezing over time.

6.2 Trends for Summer and Winter Waste Rock Deposition

Operational constraints regarding waste rock placement may occur during the operational life of the waste rock pile, where lifts of waste rock may have to be placed in late summer followed by depositions in subsequent winter months. The following section details the trends observed in both summer and winter months to provide recommendations for seasonal waste rock deposition.

6.2.1 Summer Deposition

Figure 28 shows the calculated temperature with time for Scenarios D, E, I, and J to compare the effects of varying summer deposition schedules on the thermal regime of the waste rock pile. Scenarios D, I, and J consider the instantaneous placement of a 5 m thick lift in July, September, and August, respectively, whereas Scenario E considers 7 m of waste rock placed over a two-month period in July and August.

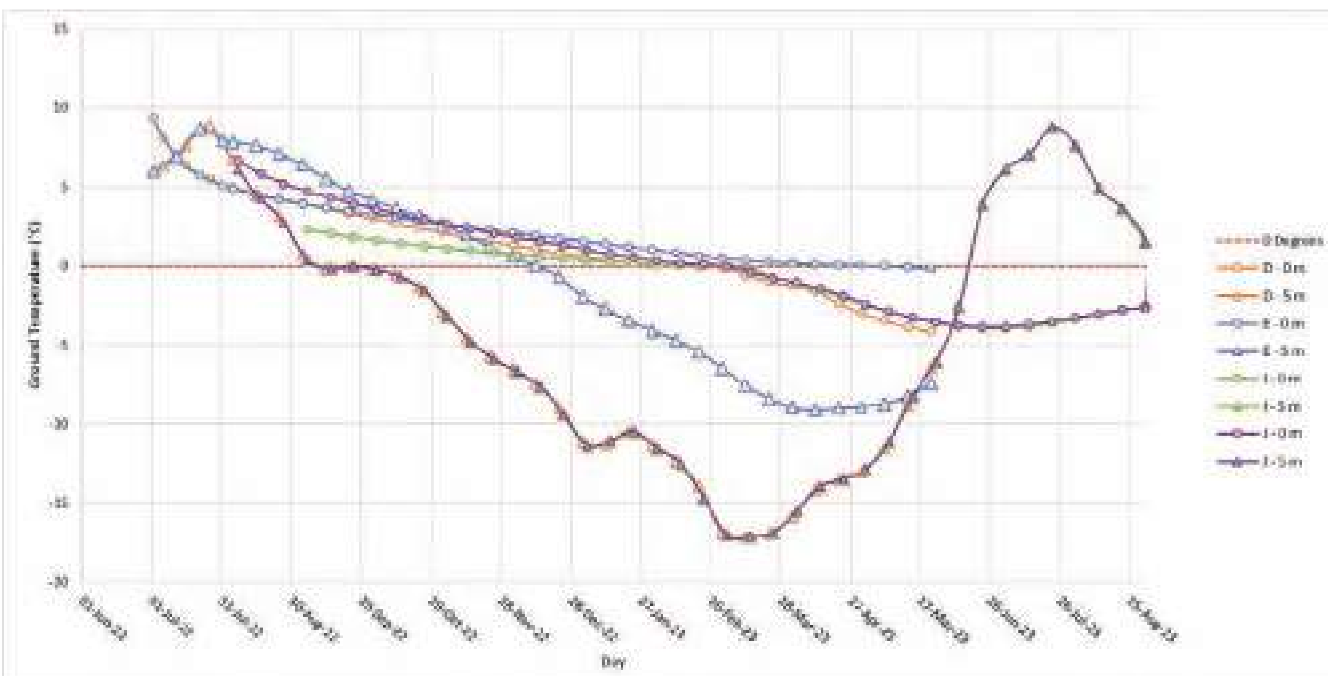


Figure 28: Summary of conceptual waste rock temperature at varying depths for summer depositions in Scenario D, E, I, and J.

Results show that sub-zero temperatures are achieved and maintained at the base of each conceptual lift, however the time to achieve a frozen state varies between each scenario. Placing a 5 m lift in mid-summer (July) resulted in a longer duration of time for cooling than placing the same lift in late summer (September), however, material placed in July freezes at an earlier date than material placed in September. The difference in total days to cooling between the two scenarios is likely due to warmer existing ground and conceptual rockfill temperatures in July when compared with September.

Progressively placing 7 m of material over two months in mid to late summer (July and August) resulted in the longer cooling time. Scenario E represents the worst-case scenario for material placement, where a thick lift is placed over the warmest months. Although this lift eventually freezes, it took about 90 days longer when compared with a 5 m lift placed in July.

Comparing Scenario, I and J (waste rock placed in September and August, respectively), it is shown that basal freezing is achieved around the same time, due to an initial colder waste rock temperature in September. From an operational perspective, the models showed it took 31 days less to cool the September lift than the August lift, which reduces the required time between lift placements.

It is important to note that regardless of the surface material deposition schedules tested in summer months, basal ground temperatures in BH2 and BH3 are predicted to continue cooling over time.

6.2.2 Winter Deposition

The model results indicate that the timing of material deposition in winter months affects the duration of time to achieving sub-zero temperatures. Figure 29 compares temperatures at 0 m and 5 m heights within the lift for Scenarios F and H, where 3 m of waste rock is placed on top of a 7 m summer deposition in December and February respectively.

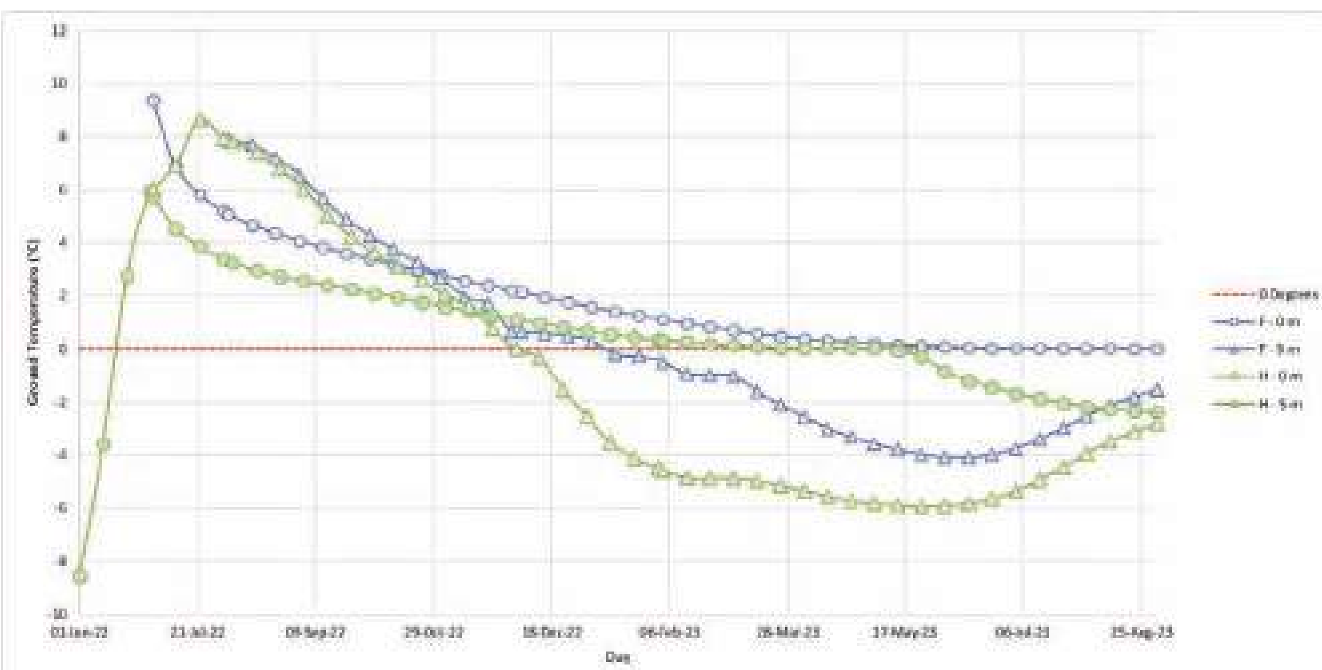


Figure 29: Summary of conceptual waste rock temperature at varying depths for Scenario F and H.

As seen in Figure 29, comparing both scenario results at 5 m within the conceptual lift, placement of waste rock in December slows the cooling significantly compared with the same lift being placed in February. where the December and February lifts are predicted to freeze by September 1 (i.e., layer would still be unfrozen by the following summer) and May 22, respectively.

In the scenarios modelled, placement of waste rock in December insulates the previous summer deposition from the cooler winter temperatures. When placed in February, the previous lift remains exposed to colder temperatures for a longer period of time, promoting faster cooling before it is covered by the subsequent winter deposition.

The models also showed that, irrespective of the winter deposition timing, a cooling trend is still predicted to prevail at depths over time, taking the base of BH2 and BH3 as reference points.

6.3 Summary of Conceptual Deposition Results

Numerous model scenarios were tested to understand the impacts on the thermal regime when lift thicknesses and deposition timing were varied. The following are general results from the conceptual waste rock placement schedules:

- All conceptual deposition schedules modelled eventually achieved and sustained sub-zero temperatures at the base of the initial waste rock lift.
- Ground temperatures at depth within both BH2 and BH3 continued to cool over time irrespective of the deposition schedule.
- Placing thicker lifts in early summer, and thinner lifts in late summer promotes faster cooling and allows for material deposited in late summer to freeze in the subsequent winter.
- Placing waste rock in early winter (December) would delay freezing of summer deposition compared to placement of rock in mid-winter (February).
- Waste rock placed in 5 m lifts during late summer (August and September), would still freeze in winter and allow for the deposition of more waste rock to the pile during winter of the following year (January to March).

7.0 CONCLUSIONS AND RECOMMENDATIONS

An update of the thermal assessment conducted in 2021 was carried out based on supplemental thermistor and waste rock deposition data available for the period between November 2020 and August 2022. Following calibration of the thermal model, 10 base case conceptual deposition sequences were modelled to understand the response of the waste rock pile to future depositions at varying thicknesses and at different times in summer and winter.

It was found that in general, all deposition sequences modelled resulted in sub-zero temperatures at the base of each conceptual lift. The time required for achieving frozen conditions is dependant on when the lift is placed as well as the thickness of material placed. Based on the results of all deposition schedules tested, general material placement guidelines are provided as follows:

- In general, summer deposition of thicker lifts should occur in early summer (June and July), while thinner lifts (i.e., deposition of waste rock over a larger surface area), should be deposited in late summer and early fall.
- When deposition happens in mid to late summer, 5 m or less of waste rock should be placed. A maximum of 7 m of waste rock can be placed with the understanding that more time will be required before subsequent lifts can be placed on top.
- Winter placement of waste rock in areas that received waste rock in late summer should occur preferably in mid to late winter (February to April) to allow summer deposited layers to freeze before being covered by additional waste rock.

Additional recommendations are made below for general operation and maintenance of the pile during deposition:

- Deposition should be planned to reduce material segregation and the development of preferential water/air flow paths during the deposition process.
- Conduct regular maintenance to extend the lifespan of the existing instrumentation installed in 2019.
- Continue to track where PAG rock has been deposited to allow for the proper interpretation of instrumentation data.
- Install supplemental monitoring stations at different areas periodically within the waste rock storage facility, including areas where deposition of PAG rock is known to have occurred.
- As the pile continues to grow, it should be continually monitored at higher elevations within the pile to confirm that future depositions achieve sub-zero temperatures. Monitoring thermistors installed in target locations is the only way to confirm the deposition strategy is promoting freezing as per the design intent.
- It is recommended that additional vertical and horizontal thermistor strings be installed at strategic locations within the existing footprint of the pile (e.g., locations where thicker lifts of waste rock were deposited in summer) to provide supplemental data for continuous monitoring of the pile’s thermal regime.
- The need for the installation of additional instrumentation should be evaluated periodically, based on the results of the existing instrumentation.
- Continue to conduct regular surveillance to track changes in the waste rock elevation within the pile.

8.0 CLOSURE

We trust the information provided in this document meets your expectations and needs. Should you have any questions or requests, please do not hesitate to contact WSP.

WSP Canada Inc.

ORIGINAL SIGNED

Gabriella Wahl, M.Sc., E.I.T. (AB)
Junior Geoenvironmental Engineer

ORIGINAL SIGNED

Fernando Junqueira, D.Sc., M.Sc., P.Eng.
Senior Principle Geotechnical Engineer

GW/FJ/jr

9.0 REFERENCES

Golder (Golder Associates Ltd.) .2019. WRF Instrumentation Installation Summary Report. Technical Memorandum. July 25, 2019.

Golder. 2021. Update of Thermal Assessment for the Waste Rock Storage Facility at Mary River Mine. Prepared for Baffinland Iron Mines Corporation. Golder Project. No. 20446413. 22 February 2021.

WSP (WSP Canada Inc.). 2023. Assessment of Instrumentation Data and the Thermal Regime of the Waste Rock Storage Facility at Mary River Mine. Prepared for Baffinland Iron Mines Corporation. Reference No. 22572750_002-Rev0-TM. 27 June 2023.

APPENDIX A3

2023 Water Balance Update Report

REPORT

2023 Water Balance Update

Baffinland Iron Mines Mary River Project

Submitted to:

Baffinland Iron Mines

2275 Upper Middle Road East, Suite 300
Oakville, ON, Canada
L6H 0C3

Submitted by:

WSP Canada Inc.

6925 Century Avenue, Suite 100, Mississauga, ON, L5N 7K2, Canada

+1 905 567 4444

22572750-005-R-3000-rev1

15 December 2023

Distribution List

One copy – WSP Canada Inc.

One copy – Baffinland Iron Mines

Table of Contents

TABLES

FIGURES

1.0 INTRODUCTION

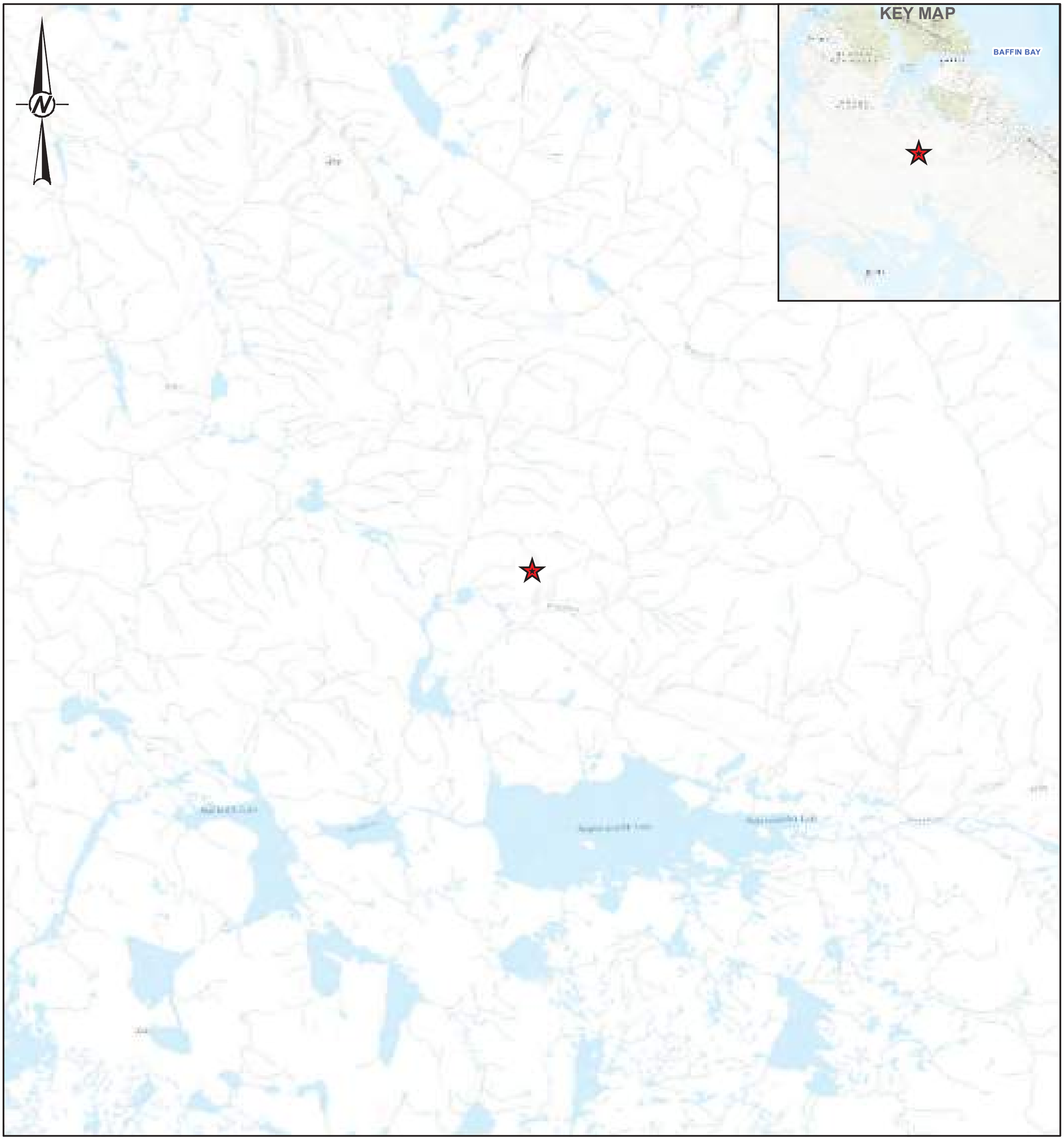
Baffinland Iron Mines Corporation's (Baffinland) Mary River Project (the Project) is an operational iron mine on Baffin Island in Nunavut, Canada (Figure 1). Baffinland has retained WSP Canada Inc. (WSP) to assist with developing an updated waste rock management plan (WRMP) for deposition of Potential Acid Generating (PAG) and Non-AG waste rock at their Waste Rock Facility (WRF). An updated WRMP is required to manage Acid Rock Drainage (ARD) from the WRF and improve the chemical stability of future PAG waste rock deposition.

A water balance was originally prepared in 2019 (Golder 2019a) to estimate the surface water flows generated over the WRF footprint for the period of January 2020 – September 2021 and provided inputs to the WRF water quality model (Golder 2019b). This report summarizes an update to the water balance including discussion on the assumptions, inputs, calibration, and water balance results.

The 2023 water balance includes the following updates:

- new runoff modules to simulate peak flows from various land types
- use of Hargreaves equation to estimate lake evaporation
- as-built WRF pond storage configuration
- inflo from deposit 1 sump to the WRF Pond
- updated catchment areas and land type proportions as provided by Baffinland and estimated from survey and
- updated calibration using monitoring data between January 2020 to the end of 2022

The water balance projections from the planned deposition plan under various climate scenarios are presented in this report.



LEGEND

SITE LOCATION

0 4,625 9,250 18,500
1:200000 METRES

NOTE(S)

REFERENCE(S)
1. BASEMAP: SOURCES: ESRI, HERE, GARMIN, INTERMAP, INCREMENT P CORP., GEBCO, USGS, FAO, NPS, NRCAN, GEOBASE, IGN, KADASTER NL, ORDNANCE SURVEY, ESRI JAPAN, METI, ESRI CHINA (HONG KONG), (C) OPENSTREETMAP CONTRIBUTORS, AND THE GIS USER COMMUNITY
2. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM: UTM ZONE 17N

CLIENT
BAFFINLAND IRON MINES CORPORATION

PROJECT
2023 WASTE ROCK MANAGEMENT PLAN

TITLE
SITE LOCATION

CONSULTANT

wsp

YYYY-MM-DD	2023-07-11
DESIGNED	AL
PREPARED	JJ
REVIEWED	AP
APPROVED	KDV

PROJECT NO.	CONTROL	REV.	FIGURE
22572750	0001	0	1

Path: S:\Clients\Baffinland_Iron_Mines_Corp\Baffin_Island\99_PROJ\22572750\40_PROD\0001_WasteRock_MP\22572750-0001-HS-0001.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

2.0 BACKGROUND

The WRF area consists of the following components (Figure 2):

- Waste rock stockpile (referred to as the WRF)
- Perimeter ditch system around the WRF
- WRF Pond and
- Water Treatment Plant (WTP)

Runoff from the WRF is collected by the perimeter ditches and directed towards the WRF Pond for management. An additional inflow from the Deposit 1 sump is pumped to the WRF Pond.

The existing WRF Pond was constructed from September 2015 to May 2016 with the geomembrane installed to elevation 575.8 metres above sea level (masl) and a storage capacity of 9,000 m^3 (Hatch 2017).

In 2019 the WRF Pond was designed to include a geomembrane raise from elevation 575.8 masl to elevation 579.3 masl and the WRF Pond design capacity was increased to 65,000 m^3 (Golder 2018a). The WRF perimeter ditch system was also expanded in 2019 to capture an anticipated increased runoff as accommodated by the increased WRF Pond capacity (Golder 2019a). A raise of the WRF Pond was completed in 2020.

3.0 WATER BALANCE OBJECTIVES

The general objectives of the Baffinland Water Balance model are to simulate:

- the current and future water accumulation in the WRF Pond and water transfers
- climate/hydrologic variability to understand the risks to current and planned water management strategies at the WRF Pond
- potential site water quantity overflow to the receiving environment (if applicable)
- input to the WRF water quality model

LEGEND

- WRF CATCHMENT (green)
- WRF POND CATCHMENT (blue)
- ADDITIONAL CATCHMENT (yellow)

NOTES

1. 1 m CONTOURS DISPLAYED ARE FROM SURVEY DATA DATED 20220816
2. CATCHMENTS SHOWN WERE DELINEATED USING DISPLAYED SURVEY DATA, AND DATA DATED 20220629 AND 20230325
3. EXISTING DITCH ALIGNMENTS SHOWN WERE DELINEATED FROM DISPLAYED SURVEY DATA AND AIR IMAGE
4. SURVEY DATA INDICATES ADDITIONAL CATCHMENT AREA SHOWN IN YELLOW REPORTS TO THE WRF POND
5. ALL SURVEY DATA PROVIDED BY BAFFINLAND
6. AIR IMAGE PROVIDED BY BAFFINLAND DATED 20220804

FILE No.	WRMP UPDATE 2023.dwg	SCALE	AS SHOWN
PROJECT No.	22572750 VER. 1	DATE	JULY 11 2023
		DESIGN	SL
		DRAWN	SL
		CHECK	AL
		REVIEW	AP

TITLE

WASTE ROCK FACILITY OVERVIEW

BAFFINLAND WRMP

FIGURE 2

4.0 MODELLING APPROACH

The water balance was developed with a daily timestep using the computer software package GoldSim (version 14.0). GoldSim is a graphical, object-oriented mathematical code where all input components and functions are defined by the user and are built as individual objects or elements linked together by mathematical expressions.

The water balance has been set to run various climatic conditions and considers WRF catchment areas changes over time to estimate the flows reporting to the WRF Pond on a daily basis. Runoff was estimated for the following surfaces:

- Unclassified waste rock (existing placed waste rock where survey is not available to differentiate PAG and Non-AG materials)
- Non-AG waste rock
- PAG waste rock
- Direct precipitation to the WRF Pond
- Runoff generated by precipitation on the WRF Pond walls and
- Prepared ground from the WTP pad

Inflow from the Deposit 1 sump was included in the water balance based on monitoring data collected and provided by Baffinland. The surface water flows reporting to the WRF Pond are the primary output from the water balance and provide input into the WRF water quality model.

The water balance has been set up to allow the selection between 12 different climate scenarios, as follows:

- Historical climate conditions (including a shifting option to run the model with historical data into the future)
- Average year conditions
- Extreme conditions - wet year with a return period of 100 years
- Extreme conditions - wet year with a return period of 50 years
- Extreme conditions - wet year with a return period of 25 years
- Extreme conditions - wet year with a return period of 10 years
- Extreme conditions - wet year with a return period of 5 years
- Extreme conditions - dry year with a return period of 5 years
- Extreme conditions – dry year with a return period of 10 years
- Extreme conditions – dry year with a return period of 25 years
- Extreme conditions – dry year with a return period of 50 years
- Extreme conditions - dry year with a return period of 100 years

4.1 Flow Diagram

The WRF flow diagram is presented on Figure 3 and defined in Table 1. The list of flows from the flow diagram is presented in Table 2.

Table 1: Flow IDs in the Water Balance Model

Flow Type	Flow ID	Description
Runoff	R	Runoff from a catchment area and/or direct precipitation reporting to a storage element
Evaporation	E	Evaporation losses from open water surfaces
Transfer Flow	T	Pumped or gravity flows transfers between elements
Seepage Losses	S	Seepage from a storage element
Discharge	D	Overflow to the Environment

Flows can be classified under three broad categories:

- **Additions** to the mine water management system (runoff [R])
- **Losses** from the system (evaporation [E] and seepage [S])
- **Internal flows** between elements (pumped flows and gravity transfers [T] and discharge to the environment via overflow [D])

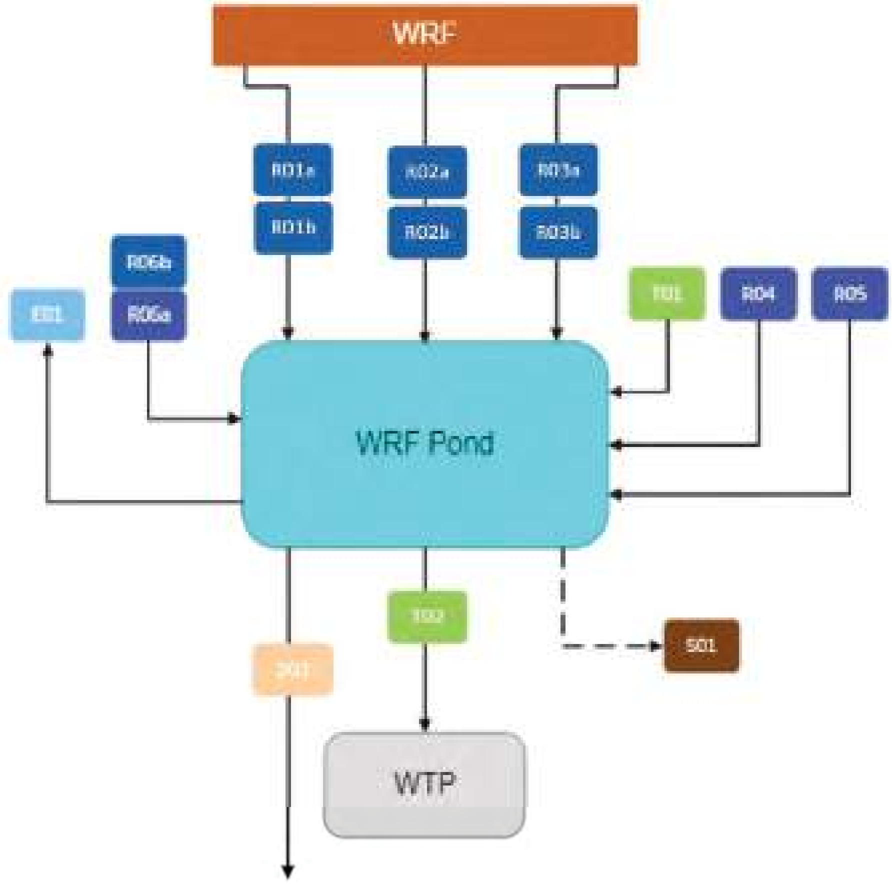


Figure 3: WRF Flow Diagram

Table 2: Water balance flows

Flow ID	Description
R01a	Runoff from Non-AG waste rock
R01b	Toe seepage from Non-AG waste rock
R02a	Runoff from PAG waste rock
R02b	Toe seepage from PAG waste rock
R03a	Runoff from unclassified waste rock
R03b	Toe seepage from unclassified waste rock
R04	Runoff from natural ground
R05	Runoff from prepared ground
R06a	Direct precipitation on WRF Pond
R06b	Runoff from WRF Pond wall
T01	Deposit 1 Sump inflow
T02	Total outflow from the WRF Pond to the WTP
E01	Evaporation from the WRF Pond surface
S01	Seepage losses from the WRF Pond
D01	Overflow from the WRF Pond via Emergency Spillway

5.0 WATER BALANCE INPUTS AND PARAMETERS

The water balance input parameters are discussed in the following sections.

5.1 Climate

The Project is located in the northern region of Baffin Island. The baseline dataset developed for the site was based on a combination of on-site monitoring data, Environment Canada and Climate Change (ECCC) meteorological stations and reanalysis data from the European Centre for Medium Range Weather Forecasts (ECMWF) Re Analysis (ERA5) dataset. ERA5 provides hourly estimates of atmospheric, land and oceanic climate variables by combining observations and atmospheric modelling to represent the current climate on a gridded basis.

These data sources were assessed based on data availability and geographical siting (i.e., elevation, distance from site, proximity to water bodies and land features) and compared to each other to develop the long-term dataset. Regional climate stations used to develop the long-term dataset are presented in Figure 4 and Table 3 below.