Photograph H11-5 Saline Ditch

Date: July 26, 2022 **Photo Number**: 51

Description: From approx. Sta. 0+140, looking southeast. Presence of gravel in the ditch.

Photograph H11-6 Saline Ditch

Date: July 26, 2022 **Photo Number**: 46

Description: From approx. Sta. 0+410, looking north.

Photograph H11-7 Saline Ditch

Date: July 26, 2022 **Photo Number**: 39

Description: From approx. Sta. 0+440, looking west.

Photograph H11-8 Saline Ditch

Date: July 26, 2022 **Photo Number**: 40

Description: From approx. Sta. 0+530, looking east.

Photograph H11-9 Saline Ditch

Date: July 26, 2022 **Photo Number**: 41

Description: From approx. Sta. 0+530, looking north.

Photograph H11-10 Saline Ditch

Date: July 26, 2022 **Photo Number**: 42

Description: From approx. Sta. 0+560. Culvert obstructed by blocks and debris.

Photograph H11-11 Saline Ditch

Date: July 26, 2022 **Photo Number**: 43

Description: From approx. Sta. 0+560, looking west.

Photograph H11-12 Saline Ditch

Date: July 26, 2022 **Photo Number**: 44

Description: From the southwestern extremity of the Saline Ditch, looking east.

Photograph H11-13 Saline Ditch

Date: July 26, 2022 **Photo Number**: 45

Description: From the southwestern extremity of the Saline Ditch, looking northwest. Presence of boulders and debris in the ditch.

Appendix H-12

Underground Ore Stockpile Saline Ditch Photographic Log

Photograph H12-1 UG Ore Stockpile Saline Ditch

Date: July 26, 2022 **Photo Number**: 30

Description: From the southeastern extremity of the UG Ore Stockpile Saline Ditch, looking northeast.

Photograph H12-2 UG Ore Stockpile Saline Ditch

Date: July 26, 2022 **Photo Number**: 31

Description: From the southeastern extremity of the UG Ore Stockpile Saline Ditch, looking southwest.

Photograph H12-3 UG Ore Stockpile Saline Ditch

Date: July 26, 2022 **Photo Number**: 32

Description: From approx. Sta. 0+050, looking southwest. Presence of debris in the ditch.

Photograph H12-4 UG Ore Stockpile Saline Ditch

Date: July 26, 2022 **Photo Number**: 33

Description: From approx. Sta. 0+150, looking southeast. Presence of debris in the ditch

Photograph H12-5 UG Ore Stockpile Saline Ditch

Date: July 26, 2022 **Photo Number**: 34

Description: From approx. Sta. 0+150, looking northwest.

Photograph H12-6 UG Ore Stockpile Saline Ditch

Date: July 26, 2022 **Photo Number**: 35

Description: From approx. Sta. 0+200, looking northeast.

Photograph H12-7 UG Ore Stockpile Saline Ditch

Date: July 26, 2022 **Photo Number**: 37

Description: From approx. Sta. 0+300, looking east.

Photograph H12-8 UG Ore Stockpile Saline Ditch

Date: July 26, 2022 **Photo Number**: 38

Description: From approx. Sta. 0+300, looking west.

Appendix H-13

IVR Diversion Channel Photographic Log

Photograph H13-1 IVR Diversion Channel

Date: July 26, 2022 **Photo Number**: 55

Description: From the south extremity of the IVR Diversion Channel, looking northwest.

Photograph H13-2 IVR Diversion Channel

Date: July 26, 2022 **Photo Number**: 56

Description: From around Sta. 0+020, looking northeast. Water is entering the channel from the natural topography.

Photograph H13-3 IVR Diversion Channel

Date: July 26, 2022 **Photo Number**: 57

Description: From around Sta. 0+130, looking southeast.

Photograph H13-4 IVR Diversion Channel

Date: July 26, 2022 **Photo Number**: 58

Description: From around Sta. 0+130, looking northwest.

Photograph H13-5 IVR Diversion Channel

Date: July 26, 2022 **Photo Number**: 60

Description: From around Sta. 0+270, looking north at the outlet. Water is flowing well towards the lake.

Photograph H13-6 IVR Diversion Channel

Date: July 26, 2022 **Photo Number**: 59

Description: From around Sta. 0+270, looking southeast.

Photograph H13-7 IVR Diversion Channel

Date: July 26, 2022 **Photo Number**: 61

Description: From around the access road Sta. 0+270, looking southeast. Tension cracks in the side slope of the road.

Photograph H13-8 IVR Diversion Channel

Date: July 26, 2022 **Photo Number**: 62

Description: From around the access road Sta. 0+110, looking northwest. Tension cracks in the side slope of the road.

APPENDIX I

DIKES DETAILS AND INSTRUMENTATION

1.0 MEADOWBANK DEWATERING DIKES

1.1 East Dike

East Dike was constructed in the summer of 2008; grouting of the foundation and bedrock occurred in 2008 and during the first quarter of 2009.

Instrumentation has been installed within East Dike and includes piezometers, thermistors, inclinometers, and flow meters. Survey monuments were removed from East Dike in the past as they have never been used. The inclinometer at Sta. 60+195 was destroyed in the past and has not been replaced. Replacement of this instrument is not considered necessary; however, monitoring of East Dike should continue and, if anomalous conditions are observed, then replacing this inclinometer should be re-evaluated.

Instrumentation within East Dike was installed in the spring of 2009 to monitor the dike's performance following construction and during dewatering, operation, and into closure. Additional instrumentation was added in 2009 and 2010 to increase coverage across the dike. Since June 2012, all piezometers and thermistors on East Dike have been connected to an automatic data collection and transmission system (VDV database). The following subsections present a summary of the data collected between September 2017 and August 2018.

Instrumentation within East Dike was installed in the spring of 2009 to monitor the dike's performance following construction and during dewatering, operation, and into closure. Additional instrumentation was added in 2009 and 2010 to increase coverage across the dike. Since June 2012, all piezometers and thermistors on East Dike have been connected to an automatic data collection and transmission system (VDV database). Two inclinometers are installed on East Dike at Sta. 60+495 and 60+705. An inclinometer was installed at Sta. 60+195, but was destroyed in July 2010 and has not been replaced.

In 2022, three new thermistors have been installed downstream of the dike in the South Channel area to cover the inferred seepage pathway area.

Table 1 and Table 2 below detail instrumentation on East Dike.

Table 1: List of Piezometers and Thermistors on East Dike (source: AEM)

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
150C	60+150	Pz150C	Interface	× broken		127.35
190P1A	60+190	Pz190P1A	Bedrock	✓		116.7
190P1B		Pz190P1B	Bedrock	✓		121.7
190P1C		Pz190P1C	Interface	✓		126.7
190P2A		Pz190P2A	Bedrock	✓		116.34
190P2B		Pz190P2B	Bedrock	✓		121.34
190P2C		Pz190P2C	Bedrock	× broken		129.34
190P3A		Pz190P3A	Bedrock	✓		116.63
190P3B		Pz190P3B	Bedrock	✓		121.63
200C	60+200	Pz200C	Interface	✓		127.71
240C	60+240	Pz240C	Interface	✓		128.71
400C	60+400	Pz400C	Interface	✓		126.76
420C	60+420	Pz400C	Interface	✓		125.32
440C	60+400	Pz440C	Interface	✓		124.66
450C	60+450	Pz450C	Interface	✓		127

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
460C	60+460	Pz460C	Interface	✓		125.15
470C	60+470	Pz470C	Interface	✓		127.76
472C	60+472	Pz472C	Interface	✓		126.87
480C	60+480	Pz480C	Interface	✓		125.44
490P1A	60+490	Pz490P1A	Bedrock	✓		114.12
490P1B		Pz490P1B	Bedrock	✓		119.12
490P1C		Pz490P1C	Interface	✓		125.81
490P2A		Pz490P2A	Bedrock	✓		115.07
490P2B		Pz490P2B	Bedrock	✓		120.07
490P2C		Pz490P2C	Interface	✓		126.76
490P3A		Pz490P3A	Bedrock	✓		114.62
490P3B		Pz490P3B	Bedrock	✓		119.62
500C	60+500	Pz500C	Interface	✓		125.78
510C	60+510	Pz510C	Interface	✓		126.06
550C	60+550	Pz550C	Interface	× temp only	Frozen	129.85
600C	60+600	Pz600C	Interface	× temp only	Frozen	128.6
650C	60+650	Pz650C	Interface	× temp only	Frozen	125.48
700P1A	60+700	Pz700P1A	Bedrock	× temp only	Frozen	118.81
700P1B		Pz700P1B	Bedrock	× temp only	Frozen	122.92
700P1C		Pz700P1C	Interface	✓	Frozen	130.5
700P2A		Pz700P2A	Bedrock	✓	Frozen	118.08
700P2B		Pz700P2B	Bedrock	× temp only	Frozen	123.08
700P2C		Pz700P2C	Interface	× temp only	Frozen	129.77
700P3A		Pz700P3A	Bedrock	✓		117.93
700P3B		Pz700P3B	Bedrock	✓		122.93
750C	60+750	Pz750C	Interface	× broken	Frozen	128.16

STA	DH-ID	Working Beads	Reliable Beads	Total Beads	Top Bead Elevation	Bottom Bead Elevation
60+092	TH092	0	0	16	136	119
60+185	TH185	16	16	16	136	119
60+485	TH485	16	16	16	136	119
60+695	TH695	16	16	16	136	119
60+842	TH842	3	3	16	136	119
60+232 D/S	TH ED-232	13	13	13	134.5	122.5
60+233 D/S	TH ED-233	13	13	13	129.7	117.7
60+267 D/S	TH ED-267	16	16	16	128.3	113.3

Table 2: Inclinometers on East Dike (source: AEM)

Location	Instrument ID	Operational (✓)/Not operational (×)	Manual/Automatic	Elevation interval in meters (top/bottom)
60+195	ED-IN-195	×(Damaged)	-	-
60+495	ED-IN-495	✓	Manual	136.6/124.1
60+705	ED-IN-705	✓	Manual	137.1/126.1

1.2 South Camp Dike

South Camp Dike was constructed between April and June of 2009. Additional thermal capping material and rockfill for the haul road was added to the dike in the winter of 2009-2010.

Table 3 below details instrumentation on South Camp Dike.

Table 3: List of Thermistors on South Camp Dike (source: AEM)

Hole	ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
38-3	SC-09-A	TH	✓	Manual	-	-	16	133.03/110.03
38-5	SC-10	TH	✓	Manual	-	-	16	132.40/109.40

1.3 Bay-Goose Dike

Construction of Bay-Goose Dike started in the summer of 2009. The earthworks component for the northern portion of the dike was mostly completed by early October 2009 and by October 2010 for the southern portion. Grouting of the foundation and bedrock occurred between March 2010 and July 2011. Jet grouting occurred in selected portions of the dike between October 2010 and May 2011. The first phase of dewatering Bay-Goose Basin was completed by mid-November 2011 and the second phase was completed in August 2012.

Instruments were installed on Bay-Goose Dike in the summer of 2011 to monitor the dike's performance following construction, during dewatering and operation, and into closure. Survey monuments were removed from Bay-Goose Dike as they have never been used. Additional boreholes have been drilled in the North Channel sector in 2017 to install TDR reflectometers and inclinometers in order to monitor the dike's reaction to nearby blasting in Pit E5.

Table 4, Table 5 and Table 6 below detail instrumentation on Bay-Goose Dike.

Table 4: List of Piezometers and Thermistors on Bay-Goose Dike (source: AEM)

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
1P1A	30+158	Pz01P1A	Bedrock	× temp only	Frozen	117.15
1P1B		PZ01P1B	Bedrock	× temp only	Frozen	120.89
1P1C		Pz01P1C	Bedrock	× temp only	Frozen	127.69
1P2A		Pz01P2A	Bedrock	✓	Frozen	117.92
1P2B		Pz01P2B	Bedrock	✓	Frozen	121.38

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
1P2C		Pz01P2C	Bedrock	✓	Frozen	127.36
1P3A		Pz01P3A	Bedrock	× temp only	Frozen	116.43
1P3B		Pz01P3B	Bedrock	× temp only	Frozen	121.61
6P2	30+167	Pz06P2	SB	✓	Frozen	128.67
7P2	30+249.5	Pz07P2	SB	× temp only	Frozen	129.97
2P1A	30+276.5	Pz02P1A	Bedrock	× temp only	Frozen	119.64
2P1B		PZ02P1B	Bedrock	× temp only	Frozen	123.94
2P1C		Pz02P1C	SB	✓	Frozen	130.53
2P2A		Pz02P2A	Bedrock	✓	Frozen	119.68
2P2B		Pz02P2B	Bedrock	× temp only	Frozen	124.36
2P2C		Pz02P2C	SB	✓	Frozen	130.43
2P3A		Pz02P3A	Bedrock	✓		119.97
2P3B		Pz02P3B	Grouting	✓		125.09
8P2	30+306.5	Pz08P2	SB	✓	Frozen	129.77
3P1A	30+378.5	Pz03P1A	Bedrock	✓		112.68
3P1B		PZ03P1B	Bedrock	✓		118.9
3P1C		Pz03P1C	Jet Grouting	✓	Frozen	124.83
3P2A		Pz03P2A	Bedrock	✓		114.63
3P2B		Pz03P2B	Bedrock	✓		119.47
3P2C		Pz03P2C	Jet Grouting	✓		125.31
3P3A		Pz03P3A	Bedrock	✓		114.37
3P3B		Pz03P3B	Bedrock	✓		119.26
9P2	30+440	Pz09P2	CSB	✓	Frozen	127.53
4P1A	30+453.5	Pz04P1A	Bedrock	× temp only	Frozen	117.04
4P1B		PZ04P1B	Bedrock	× temp only	Frozen	119.21
4P1C		Pz04P1C		× temp only	Frozen	125.12
4P2A		Pz04P2A	Bedrock	✓		115.28
4P2B		Pz04P2B	Bedrock	✓		120.24
4P2C		Pz04P2C	Interface	✓	Frozen	126.25
4P3A		Pz04P3A	Bedrock	✓		115.46
4P3B		Pz04P3B	Bedrock	✓		120.59
10P2	30+516.5	Pz10P2	CSB	× temp only	Frozen	130.56
5P1A	30+645.5	Pz05P1A	Bedrock	× temp only	Frozen	112.68
5P1B		PZ05P1B	Bedrock	× temp only	Frozen	118.9
5P1C		Pz05P1C	Interface	× temp only	Frozen	124.83
5P2A		Pz05P2A	Bedrock	✓	Frozen	114.63
5P2B		Pz05P2B	Bedrock	× temp only	Frozen	119.47
5P2C		Pz05P2C	Interface	× temp only	Frozen	125.31
5P3A		Pz05P3A	Bedrock	✓		114.37

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
5P3B		Pz05P3B	Bedrock	✓		119.26
11P2	30+684.5	Pz11P2	SB	× temp only	Frozen	130.87
12P2	30+770	Pz12P2	SB	✓	Frozen	132.16
13P2	30+804.5	Pz13P2	SB	✓	Frozen	130.05
14P2	31+052	Pz14P2	SB	× temp only	Frozen	131.47
23P1A	31+165	Pz23P1A	Bedrock	× temp only	Frozen	118.8
23P1B		PZ23P1B	Bedrock	× temp only	Frozen	123.51
23P1C		Pz23P1C	Bedrock	× temp only	Frozen	127.454
23P2A		Pz23P2A	Bedrock	✓		117.07
23P2B		Pz23P2B	Bedrock	✓	Frozen	122.15
23P2C		Pz23P2C	Bedrock	✓		128.018
23P3A		Pz23P3A	Interface	✓		115.46
23P3B		Pz23P3B	Grouting	✓		126.75
15P2	31+220	Pz15P2	SB	× temp only	Frozen	130.73
16P2	31+565	Pz16P2	Bedrock	× temp only	Frozen	131.048
24P1A1	31+600	Pz24P1A1	Bedrock	× temp only	Frozen	111.3
24P1A2		PZ24P1A2	Bedrock	× temp only	Frozen	116.3
24P1B1		Pz24P1B1	Bedrock	× temp only	Frozen	121.8
24P1B2		Pz24P1B2	Interface	✓		124.3
24P2A1		Pz24P2A1	Bedrock	✓	Frozen	110.15
24P2A2		Pz24P2A2	Bedrock	✓		116.15
24P2B1		Pz24P3B1	Interface	✓		120.65
24P2B2		Pz24P2B2	Jet Grouting	✓		123.15
24P2C		Pz24P2C	Jet Grouting	✓		124.64
24P3A1		Pz24P3A1	Bedrock	✓	Frozen	110.64
24P3A2		Pz24P3A1	Bedrock	✓		115.64
24P3B1		Pz24P3B1	Grouting	✓		121.16
17P2	31+615	Pz17P2	CSB	× temp only	Frozen	129.398
18P2	31+700	Pz18P2	CSB	× temp only	Frozen	130.387
25P1A1	31+815	Pz25P1A1	Bedrock	✓		117.02
25P1A2		PZ25P1A2	Bedrock	✓	Frozen	122.02
25P1B1		Pz25P1B1	Bedrock	✓	Frozen	127.52
25P1B2		Pz25P1B2	Interface	✓	Frozen	129.52
25P2A1		Pz25P2A1	Bedrock	✓		113.82
25P2A2		Pz25P2A2	Bedrock	✓		118.82
25P2B1		Pz25P3B1	Bedrock	✓		124.32
25P2B2		Pz25P2B2	SB	✓		126.32
25P2C		Pz25P2C	SB	✓		127.32
25P3A1		Pz25P3A1	Bedrock	✓		115.1
25P3A2		Pz25P3A2	Bedrock	✓		120.1

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
25P3B1		Pz25P3B1	Bedrock	✓		123.1
25P3B2		Pz25P3B2	Bedrock	✓		125.1
22P2	31+842	Pz22P2	Grouting	✓		116.8
26P1A1	31+885	Pz26P1A1	Bedrock	✓		104.44
26P1A2		PZ26P1A2	Bedrock	✓		109.44
26P1B1		Pz26P1B1	Grouting	✓		114.94
26P1B2		Pz26P1B2	Jet Grouting	✓		117.94
26P2A1		Pz26P2A1	Bedrock	✓		106.77
26P2A2		Pz26P2A2	Bedrock	✓		111.77
26P2B1		Pz26P3B1	Jet Grouting	✓		117.27
26P2B2		Pz26P2B2	Jet Grouting	✓		120.27
26P2C		Pz26P2C	CSB	✓		123.27
26P3A1		Pz26P3A1	Bedrock	✓		104.743
26P3A2		Pz26P3A2	Bedrock	✓		111.36
26P3B1		Pz26P3B1	Bedrock	✓		117.46
26P3B2		Pz26P3B2	Bedrock	✓		120.27
19P2	31+928	Pz19P2	CSB	✓		127.873
20P2	31+990	Pz20P2	CSB	✓		125.09
27P1A1	32+000	Pz27P1A1	Bedrock	✓		113.25
27P1A2		PZ27P1A2	Bedrock	✓		118.25
27P1B1		Pz27P1B1	Jet Grouting	✓	Frozen	123.75
27P1B2		Pz27P1B2	CSB	✓	Frozen	125.75
27P2A1		Pz27P2A1	Bedrock	✓		112.61
27P2A2		Pz27P2A2	Bedrock	✓		117.61
27P2B1		Pz27P2B1	Interface	✓		123.61
27P2B2		Pz27P2B2	Jet Grouting	✓		123.11
27P2C		Pz27P2C	CSB	✓	Frozen	125.11
27P3A1		Pz27P3A1	Bedrock	✓		126.61
27P3A2		Pz27P3A2	Bedrock	✓		111.72
27P3B1		Pz27P3B1	Bedrock	✓		116.72
27P3B2		Pz27P3B2	Grouting	×		122.22
21P2	32+020	Pz21P2	Jet Grouting	✓		124.24
28P1A1	32+065	Pz28P1A1	Bedrock	✓		102.99
28P1A2		PZ28P1A2	Bedrock	✓		107.99
28P1B1		Pz28P1B1	Interface	✓		112.99
28P1B2		Pz28P1B2	Jet Grouting	✓		115.99
28P2A1		Pz28P2A1	Bedrock	✓		105.02
28P2A2		Pz28P2A2	Bedrock	✓		110.02
28P2B1		Pz28P3B1	Jet Grouting	✓		115.02
28P2B2		Pz28P2B2	Jet Grouting	✓		118.02
28P2C		Pz28P2C	CSB	✓	Frozen	124.02
28P3A1		Pz28P3A1	Bedrock	✓		105.91

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
28P3A2		Pz28P3A2	Bedrock	✓		110.91
28P3B1		Pz28P3B1	Interface	✓		115.91
28P3B2		Pz28P3B2	Jet Grouting	✓		122.22
28P3B3		Pz28P3B3	Jet Grouting	✓		118.63
29P1A1	32+105	Pz29P1A1	Bedrock	✓	Frozen	115.32
29P1B1		PZ29P1B1	Bedrock	✓	Frozen	120.32
29P1B2		Pz29P1B2	Jet Grouting	✓	Frozen	125.32
29P1B3		Pz29P1B3	Jet Grouting	✓	Frozen	127.32
29P2A1		Pz29P2A1	Bedrock	✓		114.99
29P2B1		Pz29P3B1	Bedrock	✓		119.99
29P2B2		Pz29P2B2	Jet Grouting	✓	Frozen	124.99
29P2B3		Pz29P2B3	Jet Grouting	×		126.99
29P2C		Pz29P2C	Jet Grouting	✓	Frozen	129.99
29P3A1		Pz29P3A1	Bedrock	✓		115.91
29P3B1		Pz29P3B1	Bedrock	✓		120.91
29P3B2		Pz29P3B2	Jet Grouting	✓	Frozen	125.74
29P3B3		Pz29P3B3	Jet Grouting	×		127.89

STA	DH-ID	Working Beads	Reliable Beads	Total Beads	Top Bead Elevation	Bottom Bead Elevation
30+134	T01	16	16	16	135	115
30+185	T02	16	15	16	135	115
30+260	T03	16	16	16	130	125.5
30+260	T03-1	16	16	16	139.97	116.97
30+272	T04	16	16	16	13	125.5
30+272	T04-1	16	16	16	139.97	116.97
30+388.5	T05	16	16	16	130	125.5
30+388.5	T05-1	16	16	16	139.97	116.97
30+330.5	T06	16	16	16	135	115
30+386	T07	16	16	16	135	115
30+417.5	T08	16	16	16	135	115
30+489.5	T09	16	16	16	135	115
30+553.25	T10	16	16	16	135	115
30+621.5	T11	16	16	16	135	115
30+650	T12	16	16	16	135	115
30+713	T13	16	16	16	135	115
30+827	T14	16	16	16	135	115
31+080	T15	16	16	16	135	115
31+134.5	T16	16	16	16	135	115
31+170	T17	16	16	16	135	115
31+352	T18	16	16	16	135	115
31+595	T19	16	16	16	135	108

STA	DH-ID	Working Beads	Reliable Beads	Total Beads	Top Bead Elevation	Bottom Bead Elevation
31+605	T20	16	16	16	135	115
31+752.5	T21	16	16	16	135	115
31+820	T22	16	16	16	134	115
31+850	T23	16	16	16	133.5	108
31+880	T24	16	16	16	135	108
31+960	T25	16	16	16	135	115
31+995	T26	16	16	16	135	115
32+030	T27	16	16	16	133.5	108
32+060	T28	16	16	16	135	108
32+100	T29	16	16	16	134	115
32+140	T30	16	16	16	134	115

Table 5: List of Inclinometers on Bay-Goose Dike (source: AEM)

Location	Instrument ID	Operational (✓)/Not operational (×)	Manual/Automatic	Elevation interval in meters (top/bottom)
30+282	BG-IN-30+282	✓	Manual	139.3/124.8
30+390	BG-IN-30+390	✓	Manual	140.0/119.0
30+640	BG-IN-30+640	✓	Manual	138.8/124.3
31+180	BG-IN-31+180	✓	Manual	139.0/124.5
31+590	BG-IN-31+590	✓	Manual	139.5/115.0
31+815	BG-IN-31+815	✓	Manual	139.2/119.7
31+885	BG-IN-31+885	✓	Manual	138.8/113.3
32+065	BG-IN-32+065	✓	Manual	139.1/116.6

Table 6: List of TDR Reflectometers on Goose Pit wall (source: AEM)

Location of hole	DL #	Instrument ID	Inclination (°)	Length (m)	Casing elevation (m)	Crimps
31+255	9	TDR-11	60	70	134.4	Every 25 m
31+153	9	TDR-12	60	180	133.5	Every 25 m
31+058	9	TDR-15	60	180	134.3	Every 25 m
31+035	9	TDR-17	60	206.35	134.9	Every 25 m
30+937	9	TDR-18	60	180	135.6	Every 25 m
30+960	9	TDR-20	60	200	136.5	Every 25 m

1.4 Vault Dike

The construction of Vault Dike was done in the winter of 2013 to keep its foundation frozen.

Five thermistor strings were originally installed on Vault Dike following its construction in the winter of 2013 and four are still operational. TH3 is installed in the deepest channel downstream, TH5 is installed under the liner, TH6 is installed upstream of the liner, TH7 is installed east of the deepest channel, and TH8 is installed upstream in the deepest channel outside of the key trench. One thermistor (TH-3, on the side of Vault Lake) had been damaged by sloughing in previous year and stopped working in October 2015.

Table 7 below details instrumentation on Vault Dike.

Table 7: List of Thermistors on Vault Dike (source: AEM)

Hole	ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
71-2	VD-TH5	TH	✓	Manual	-	-	16	142.50/136.10
94-2	VD-TH6	TH	✓	Manual	-	-	16	140.50/121.50
96-1	VD-TH8	TH	✓	Manual	-	-	16	140.50/119.50
96-2	VD-TH7	TH	✓	Manual	-	-	16	140.50/119.50

2.0 TAILINGS STORAGE FACILITY

The TSF was commissioned in conjunction with the mill start-up in February 2010, with tailings being deposited within the North Cell of the facility. The North Cell and structures Saddle Dam 1, Saddle Dam 2 and Stormwater Dike were constructed to El. 150 m in two stages from 2009 to 2011.

The construction of the South Cell started in 2012 with Central Dike, thereby closing the eastern portion of the South Cell. The beginning of the tailings deposition in the South Cell started at the end of 2014. From 2012 to 2018, Central Dike was raised to El. 145 m in six stages. To increase the capacity of the South Cell, additional peripheral structures (Saddle Dam 3, Saddle Dam 4 and Saddle Dam 5) were constructed to El. 145 m in three stages from 2015 to 2018. The South Cell is designed to be able to be raised to El. 150 m. The construction of subsequent portions of the South Cell could occur in the future in the unlikely case of additional capacity being required.

2.1 North Cell Internal Structure – North Cell

The North Cell Internal Structure was built in 2018 to El. 152 m from Sta. 1+100 m to 1+660 m and from 2+750 m to 3+200 m, and to El. 154 m from Sta. 1+660 m to 2+750. This stage is an intermediate phase and the structure could be raised and lengthened to provide additional capacity if required. The tailings deposition from the North Cell Internal Structure started in August 2018.

Tailings deposition was transferred from the North Cell to the South Cell at the end of 2014. Tailings deposition occurred during the summer of 2015 within the North Cell and resumed in the South Cell in October 2015. Progressive closure of the North Cell started in the winter of 2015 with the construction of a non-acid generating rockfill capping over the tailings and continued in the winter of 2016.

A rockfill berm was constructed in 2016 at the toe of Stormwater Dike in the South Cell (from Sta. 10+300 to Sta. 10+750) to mitigate the crest and downstream slope movement observed in this sector at the end of August 2016. Following an investigation and instrumentation program, the movements observed are inferred to be caused by the soft sediment foundation thawing and settling due to the South Cell water pond reaching the dike foundation during the summer. Water ponding against Stormwater Dike is part of the tailings deposition plan and is acceptable, as Stormwater Dike is not a peripheral structure. Having direct ponding water within Stormwater Dike foundation is geotechnically acceptable. For South Cell closure and environmental aspects, given that it is inferred that the Stormwater Dike foundation presents some open windows of exposed fractured bedrock that may contribute to feeding the seepage at Central Dike, it is recommended that a beach be put in place along Stormwater Dike downstream slope to seal the foundation before the end of the deposition activities.

Four vertical thermistor strings were installed on the crest of the North Cell Internal Structure in August 2018 (NCIS-01, NCIS-02, NCIS-03 and NCIS-04). NCIS-01, NCIS-02 and NCIS-04 are installed on the upstream side of the dike whereas NCIS-02 is installed on the downstream side.

Table 8 below details instrumentation on the North Cell Internal Structure.

Table 8: List of Instruments on the North Cell Internal Structure (source: AEM)

Hole	Instrument ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
NCIS-T1	NCIS-18-01	Thermistor	✓	Automatic (DL55)	-	-	16	140/110
NCIS-T2	NCIS-18-02	Thermistor	No data X	Automatic (DL55)	-	-	16	134/119
NCIS-T3	NCIS-18-03	Thermistor	✓	Automatic (DL56)	-	-	16	149/132.84
NCIS-T4	NCIS-18-04	Thermistor	✓	Automatic (DL57)	-	-	16	148/118
PSM	NCIS1 TO NCIS16	Prism	✓	Manual	-	-	-	-

2.2 Saddle Dam 1 – North Cell

Stage 1 of Saddle Dam 1 was constructed in the fall of 2009 to a height of 10 m (crest elevation of 141 m) and a length of 250 m. Stage 2 was constructed in 2010 to an overall height of 20 m (final crest elevation of 150 m) and length of about 400 m.

Three thermistors (T1, T2, T3) are installed to monitor the thermal condition within the structure and its foundation; they were installed in 2009 and early 2010 as part of Stage 1. The fourth thermistor string (T4) was installed in 2009 and extended in 2010 along the upstream face of the dam to monitor the thermal condition of the tailings. The SD1-T1 thermistor string is installed in the centre of the upstream face of the dike immediately beneath the geomembrane liner to monitor temperatures within the deposited tailings. A thin layer of protective granular material exists above the geomembrane liner at this location. The SD1-T2 thermistor string is installed vertically through the upstream Stage 1 crest in the centre of the dike at El. 140 m. The SD1-T3 thermistor string is installed vertically through the upstream Stage 2 crest in the centre of the dike at El. 150 m. The SD1-T4 thermistor string is installed vertically through the upstream toe of the dike near the centre of the dike.

TH-T3 stopped working on November 2020, will be repaired in 2022

Table 9 below details instrumentation on Saddle Dam 1.

Table 9: List of Thermistors on Saddle Dam 1 (source: AEM)

Hole	Instrument ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
SD1-T2	SD1-02	Thermistor	✓	Automatic (DL14)	-	-	16	140/110
SD1-T4	SD1-04	Thermistor	✓	Automatic (DL14)	-	-	16	134/119
SD1-T1	SD1-01	Thermistor	✓	Automatic (DL14)	-	-	16	149/132.84

2.3 Saddle Dam 2 – North Cell

Saddle Dam 2 was constructed in one stage in 2011 to a crest elevation of 150 m. Saddle Dam 2 has a maximum height of about 10 m and a crest length of 460 m.

TH-T4 stopped working on July 2021.

Table 10 below details instrumentation on Saddle Dam 2.

Table 10: List of Thermistors on Saddle Dam 2 (source: AEM)

Hole	Instrument ID	Type	Status	Readings	For PZ		For TH	
SD2-T3	SD2-03	Thermistor	✓	Automatic (DL15)	-	-	16	144/129
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
SD2-T1	SD2-01	Thermistor	✓	Automatic (DL15)	-	-	16	148.05/145.31
SD2-T2	SD2-02	Thermistor	✓	Automatic (DL15)	-	-	16	148/118

2.4 RF1/RF2 – North Cell

Four thermistors were installed in 2012 to monitor the temperature of RF1 and RF2 (which delineates the northeastern side of the TSF North Cell).

Table 11 below details instrumentation on RF1 and RF2.

Table 11: List of Thermistors on RF1 and RF2 (source: AEM)

Hole	Instrument ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
121-1	121-RF1-1	Thermistor	✓	Manual	-	-	16/16	136/90
73-6	73-6-RF1-2	Thermistor	✓	Manual	-	-	14/16	149.5/133
RF1-3	RF1-3	Thermistor	✓	Manual	-	-	11/11	148/144
122-1	122-1RF2	Thermistor	✓	Manual	-	-	14/16	137/90

2.5 North Cell Tailings

Five thermistors are installed in the tailings of the North Cell of the TSF (SWD-1, SD2-1, 90-1, NC-TH-1 and NC-TH-2). These thermistors were installed from 2012 to 2016. Thermistor 90-1 was installed in 2012 in the tailings of the North Cell near Saddle Dam 1. Thermistor NC-T1 and NC-T2 were installed in April 2016 in the tailings of the North Cell in the location of the former reclaim pond. Nine additional thermistors were installed in February 2017 in the tailings of the North Cell (SWD-01, NC17-01, NC-17-02, NC-17-03, NC-17-04, NC-17-05, NC-17-06, NC-17-07, NC-17-08).

Table 12 below details instrumentation in the North Cell tailings.

Table 12: List of Thermistors in the North Cell tailings (source: AEM)

Hole	Instrument ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
NC-T1	NC-T1	Thermistor	✓	Manual	-	-	16	146.6/86.6
NC-17-01	NC-17-01	Thermistor	✓	Automatic (DL20)	-	-	16	148/112
NC-17-02	NC-17-02	Thermistor	✓	Automatic (DL21)	-	-	16	147.6/102
NC-17-03	NC-17-03	Thermistor	✓	Automatic (DL22)	-	-	13/16	147.6/102.6
NC-17-04	NC-17-04	Thermistor	✓	Automatic (DL23)	-	-	16	148.5/122
NC-17-05	NC-17-05	Thermistor	✓	Automatic (DL24)	-	-	16	146.6/112.6
NC-17-06	NC-17-06	Thermistor	✓	Automatic (DL25)	-	-	16	148/112
NC-17-07	NC-17-07	Thermistor	✓	Automatic (DL26)	-	-	16	148/112
NC-17-08	NC-17-08	Thermistor	✓	Automatic (DL27)	-	-	15/16	146/99

2.6 Stormwater Dike – Divider Dike

Stormwater Dike was progressively constructed. Stage 1 was constructed in 2009 to a height of 10 m (crest elevation of 140 m) and a length of 860 m. Stage 2 was primarily constructed in 2010 to an overall height of 18 m (crest elevation of 148 m) and length of about 1,060 m. A horizontal bench is present along the upstream face of the structure due to the connection of the 2009 and 2010 portions of the structure. The junction between the bituminous liner of Stormwater Dike and the LLDPE liner of Saddle Dam 2 was completed in 2011. The crest of Stormwater Dike was raised to 150 m in 2013.

The majority of the dike is seated on dense till from the former lakebed within the talik while the abutments are generally founded on bedrock. The foundation preparation of Stage 2 was completed in winter conditions. It was generally done above water except in an area where water ponding was present (between Sta.10+500 and 10+750 approximately). This pond was located where the topography suggests that the soft lakebed sediment thickness may be greater than at other locations along the dike. Due to the presence of water, the ice crust was cracked with the excavator and only minimal foundation preparation was possible. As a result, most of the lakebed sediment probably remained in place in this area.

A single deep thermistor (T147-1) and a piezometer string (VWP 13265) were installed at the downstream toe of Stormwater Dike (within the South Cell). These instruments were broken in September 2016 during the construction of the buttress at the toe of Stormwater Dike within the South Cell. Three new thermistors (TH-SWD-01, TH-SWD-02, TH-SWD-03) and piezometers (PZ-SWD-02-A, PZ-SWD-03-A, PZ-SWD-03-B) were installed since then. SWD-01 is installed on the upstream side of Stormwater Dike within the North Cell tailings. SWD-02 is installed on the downstream side of Stormwater Dike (approx. Sta. 10+650 m) within the stabilization buttress. SWD-03 is installed on the downstream side of Stormwater Dike (approx. Sta. 10+690 m) within the stabilization buttress.

PZ-SWD-02-A and TH-SWD-02 are now broken, while the other piezometers are frozen but still transmit data.

In 25 August 2016 two wireline extensometers, four crack monitoring stations and three prisms were installed on the crest of Stormwater Dike in the area showing movements (between Sta. 10+500 and 10+750 approximately). Following the MDRB recommendations, AEM installed additional instruments in 2017 to monitor the response of Stormwater Dike during tailings deposition in the South Cell. In 2018, an additional prism and 3 crackmeters were added, leading to a total of 3 piezometers, 3 thermistors, 4 extensometers, 3 crackmeters and 20 prisms installed on Stormwater Dike.

Table 13 below details instrumentation on Stormwater Dike.

Table 13: List of Instruments on Stormwater Dike (source: AEM)

Hole	Instrument ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
SWD-01	SWD-01	Thermistor	✓	Automatic (DL19)			16	148/118
SWD-02	PZ-SWD-02-A	Piezo	×	Automatic (DL19)	62	Bedrock		
	TH-SWD-02	Thermistor	✓	Automatic (DL19)			6	127/117
SWD-03	PZ-SWD-03A	Piezo	Frozen	Automatic (DL19)	110	Bedrock		
	PZ-SWD-03B	Piezo	Frozen	Automatic (DL19)	122			
	TH-SWD-03	Thermistor	✓	Automatic (DL19)			14	125/111

2.7 Saddle Dam 3, Saddle Dam 4 and Saddle Dam 5 – South Cell

Stage 1 of Saddle Dam 3 and 4 was constructed in 2015. Stage 1 of Saddle Dam 5 was constructed in 2016. During Stage 1, Saddle Dam 3 and 4 were constructed to El. 140 m and Saddle Dam 5 to El. 137 m. Stage 2 of Saddle Dam 3, 4 and 5 was constructed to El. 143 m in 2016. Stage 3 of Saddle Dam 4 and 5 was constructed to El. 145 m in 2017. Stage 3 of Saddle Dam 3 was constructed partially to El. 145 m in 2017, with the installation the geomembrane and the construction of the liner erosion protection cover completed in 2018. These structures are designed to be able to be raised to El. 150 m and the final crest elevation of these structures is subject to review by AEM. At the end of Stage 3, the decision was made by AEM to close the abutments of these structures, as no further raise was planned at the moment. If these structures are to be raised higher, it will be necessary to re-open the abutments. The completed crest length is approximately 245 m for Saddle Dam 3, 365 m for Saddle Dam 4, and 255 m for Saddle Dam 5.

Five thermistors are installed at Saddle Dam 3. Three of these thermistors are located along the axis of the faulted zone that was encountered during the construction of Saddle Dam 3 (around Sta. 20+650). Along this axis, two thermistors are installed on the crest (SD3-T3 around the centerline and SD3-T2 on the upstream edge), and the other (SD3-T4) is installed on the upstream toe liner tie-in. Another thermistor is installed at Sta. 20+720 within the upstream toe liner tie-in (SD3-T5). One thermistor (SD3-T6) was installed in 2018 on the crest towards the junction with Saddle Dam 2.

Table 14 below details instrumentation on Saddle Dam 3.

Table 14: List of Thermistors on Saddle Dam 3 (source: AEM)

Hole	Instrument ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
SD3-T2	SD3-02	Thermistor	✓	Automatic (DL16)	-	-	16	139.1/123.1
SD3-T3	SD3-03	Thermistor	✓	Automatic (DL16)	-	-	15	138.6/121.6
SD3-T4	SD3-04	Thermistor	× (since June 2019)	Automatic (DL16)	-	-	0/15	137.3/122.3
SD3-T5	SD3-05	Thermistor	× (since Dec 2019)	Automatic (DL16)	-	-	16	138.4/122.4
SD3-T6	SD3-06	Thermistor	✓	Automatic (DL16)	-	-	16	143.9/113.9

Four thermistors are installed at Saddle Dam 4 near Sta. 40+300. One thermistor (SD4-T2) is installed on the upstream edge crest while another (SD4-T4) is installed in the upstream toe line tie-in, and another one (SD4-T1) is in the centre of the upstream face of the dike immediately on top of the geomembrane liner to monitor the thermal regime of the tailings in contact with the structure. One thermistor (SD4-T3) was installed on the middle of the crest in January 2018.

Table 15 below details instrumentation on Saddle Dam 4.

Table 15: List of Thermistors on Saddle Dam 4 (source: AEM)

Hole	Instrument ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
SD4-T2	SD4-02	Thermistor	✓	Automatic (DL17)	-	-	16	139/129
SD3-T3	SD3-03	Thermistor	✓	Automatic (DL17)	-	-	16	144/129
SD4-T4	SD4-04	Thermistor	✓	Automatic (DL17)	-	-	5/14	137.3/127.8
SD4-T1	SD4-01	Thermistor	× (since August 2018)	Automatic (DL17)	-	-	16	143.4/139.6

Three thermistors were installed at Saddle Dam 5 in 2018 near Sta. 40+680. One thermistor (SD5-T2) is installed on the downstream edge crest, one (SD5-T4) around the middle of the crest, and another (SD5-T3) is installed in the toe liner tie-in.

Table 16 below details instrumentation on Saddle Dam 5.

Table 16: List of Thermistors on Saddle Dam 5 (source: AEM)

Hole	Instrument ID	Type	Status	Readings	For PZ		For TH	
#	ID	PZ/TH	Operational (✓)/Not operational (×)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in meters (top/bottom)
SD5-02	SD4-02	Thermistor	✓	Automatic (DL58)	-	-	16(cap)	144/129
SD5-03	SD3-03	Thermistor	✓	Automatic (DL58)	-	-	16	141/126
SD5-04	SD4-04	Thermistor	✓	Automatic (DL58)	-	-	16(cap)	144/129

2.8 Central Dike – South Cell

Construction of Central Dike started in 2012 (stage 1) at the El. 110 m with a key trench located underneath the centreline. In 2013 (Stage 2), the footprint of Central Dike was widened for a crest elevation of 150 m, the structure was raised to El. 115 m and the key trench was relocated at the upstream toe. In 2014 (Stage 3), the key trench was relocated at the upstream toe and constructed to El. 132 m. Central Dike was raised to El. 137 in

2015 (Stage 4), to El. 143 m in 2016 (Stage 5), and to El. 145 m in two steps in 2017 and 2018 (Stage 6). Central Dike is designed to be able to be raised to El. 150 m and the final crest elevation is subject to review by AEM. The completed crest length is approximately 900 m at El. 145 m.

Desktop studies were undertaken by Golder in 2015 to estimate the seepage flows and pore water pressures, verify the dike stability, and attempt to predict the eventual flow volume that would report to the downstream toe for higher pond elevation. The seepage pathway used in the Golder 2015 model was through a layer of fine material in the till layer of the foundation as it was deemed the most critical scenario for the structure stability. The main recommendation from this desktop study was to maintain beaches adjacent to Central Dike and to maintain a 'back pressure' on the downstream side of Central Dike in order to reduce the hydraulic gradient by holding the downstream pond at El. 115 m. Willowstick was also hired to carry out electromagnetic surveys to detect seepage paths. The geophysical campaign led to additional recommendations and identified possible seepage path locations. Following the geophysical campaign, an investigation was conducted by SNC-Lavalin (SNC) and AEM in December 2015 at station CD-595, and between CD-810 and CD-850. Highly altered and fractured bedrock was encountered, and high hydraulic conductivity was measured from Packer testing. Instrumentation of the four boreholes with piezometers and thermistors was done at the same time. A study has been completed in 2017 by Golder to update the seepage modelling with a seepage flow through the bedrock, and allowed for updating of the Emergency Preparedness Plan as well as the Operation, Maintenance, and Surveillance Manual. The summer 2017 investigation and instrumentation campaign shows that the seepage pathway was most probably mainly controlled by the bedrock.

Instruments were installed on Central Dike to monitor the dike's performance during its construction, operation, and closure. Nine boreholes were drilled on three rows corresponding to the central key trench (545-P1, 580-P1, 650-P1 and 750-P1), the final downstream toe (545-P2 and 650-P2) and the Portage Pit limit (465-P3, 650-P3, 875-P3 and WR-P3). Four additional boreholes were drilled and instrumented in 2016 during the seepage field investigation in the key trench alignment (595-P1, 810-P1, 825-P1 and 850-P1). Two thermistor strings were also installed on the upstream face to monitor the temperature within the tailings of the South Cell.

Seven additional boreholes were drilled and instrumented in 2017 (700-P1, 745-P3, 800-P2, 800-P3, 875-P2, 975-P3 and 1050-P3).

In October 2020, four additional boreholes were drilled and instrumented to replace broken instruments (545-P1R, 595-P1R, 650-P1R, 815-P1R).

Table 17: List of Piezometers and Thermistors on Central Dike (source: AEM)

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
465-P3	0+465	465-P3-A	Bedrock	✓	Frozen	65
465-P3	0+465	465-P3-B	Bedrock	✓	Frozen	85
545-P1R	0+545	545-P1R-A		✓		
545-P1R	0+545	545-P1R-B		✓		
545-P1R	0+545	545-P1R-C		✓		
545-P1R	0+545	545-P1R-D		✓		
545-P2	0+545	545-P2-A	Bedrock	×	Frozen	65
545-P2	0+545	545-P2-B	Bedrock	×	Frozen	85
545-P2	0+545	545-P2-C	Bedrock	×	Frozen	11
545-P2	0+545	545-P2-D	Rockfill/till	×	Frozen	104

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
580-P1R	0+580	580-P1R-A	Sand	✓		69.5
580-P1R	0+580	580-P1R-B	Bedrock	✓		75.5
580-P1R	0+580	580-P1R-C	Bedrock	✓		79
595-P1R	0+595	595-P1R-A		✓		
595-P1R	0+595	595-P1R-B		✓		
595-P1R	0+595	595-P1R-C		✓		
650-P1R	0+650	650-P1R-A		✓		
650-P1R	0+650	650-P1R-B		✓		
650-P1R	0+650	650-P1R-C		✓		
650-P2	0+650	650-P2-A	Bedrock	✓		65
650-P2	0+650	650-P2-B	Bedrock	✓		85
650-P2	0+650	650-P2-C	Bedrock	✓		99.5
650-P2	0+650	650-P2-D	Rockfill/till	✓		103.5
650-P3	0+650	650-P3-A	Bedrock	✓	Frozen	65
650-P3	0+650	650-P3-B	Bedrock	✓	Frozen	85
700-P1	0+700	700-P1-A		✓		
700-P1	0+700	700-P1-B		✓		
700-P1	0+700	700-P1-C		✓		
700-P1	0+700	700-P1-D		✓		
700-P1	0+700	700-P1-E		×		
750-P1	0+750	750-P1-A	Bedrock	✓		65
750-P1	0+750	750-P1-B	Bedrock	✓		76
750-P1	0+750	750-P1-C	Dense till	✓		80
750-P1	0+750	750-P1-D	Dense till	✓		88
750-P1	0+750	750-P1-E	Rockfill	✓		100
800-P2	0+800	800-P2-A	Bedrock	✓		70.07
800-P2	0+800	800-P2-B	Bedrock	✓		85.7
800-P2	0+800	800-P2-C	Bedrock	✓		95.07
800-P2	0+800	800-P2-D	Rockfill/till	✓		105.07
800-P3	0+800	800-P3-A	Bedrock	✓		62.95
800-P3	0+800	800-P3-B	Bedrock	✓		82.95
800-P3	0+800	800-P3-C	Till	✓		96.45
810-P1	0+810	810-P1-A	Bedrock	×		67.7
810-P1	0+810	810-P1-B	Bedrock	×		79.9
810-P1	0+810	810-P1-C	Dense till	×		86.9
810-P1	0+810	810-P1-D	Dense till	×		93.9
815-P1R	0+815	815-P1R-A		✓		
815-P1R	0+815	815-P1R-B		✓		
815-P1R	0+815	815-P1R-C		✓		
825-P1	0+825	825-P1-A	Bedrock	✓		74.15
825-P1	0+825	825-P1-B	Bedrock	✓		93.5

DH-ID	STA	Instrument_ID	Stratigraphic_Unit	OP Status	Frozen Status	Elevation
825-P1	0+825	825-P1-E	Till (casing)	✓		101
850-P1	0+850	850-P1-A	Bedrock	✓		72
850-P1	0+850	850-P1-B	Bedrock	✓		93.7
850-P1	0+850	850-P1-E	Rockfill	✓		106
875-P2	0+875	875-P2-A	Bedrock	✓		65.08
875-P2	0+875	875-P2-B	Bedrock	✓		85.08
875-P2	0+875	875-P2-C	Bedrock	× temp only	Frozen	105.38
875-P2	0+875	875-P2-D	Till	× temp only	Frozen	107.58
875-P3	0+875	875-P3-A	Bedrock	✓		65
875-P3	0+875	875-P3-B	Bedrock	✓		85
975-P3	0+975	975-P3-A	Bedrock	✓		64.53
975-P3	0+975	975-P3-B	Bedrock	✓		84.53
1050-P3	0+1050	1050-P3-A	Bedrock	✓	Frozen	66.37
1050-P3	0+1050	1050-P3-B	Bedrock	✓	Frozen	86.37

DH-ID	STA	Instrument ID	Working Beads	Reliable Beads	Total Beads	Top Bead Elevation	Bottom Bead Elevation
465-P3	0+465	465-TH-P3	10	10	13	105	69
545-P1	0+545	545-TH-P1	0	0	13	111	63
545-P2	0+545	545-TH-P2	13	13	13	105	51
580-P1R	0+580	580-TH-P1R	16	16	16	120.5	65.5
595-P1	0+595	595-TH-P1	16	16	16	114.6	69.6
650-P1R	0+650	650-TH-P1R	13	13	13	107.2	95.2
650-P2	0+650	650-TH-P2	13	13	13	105	51
650-P3	0+650	650-TH-P3	13	12	13	105	51
700-P1	0+700	700-TH-P1	16	16	16	118.4	63.4
745-P3	0+745	745-TH-P3	8	8	16	125.08	102.08
750-P1	0+750	750-TH-P1	13	12	13	111	63
800-P2	0+800	800-TH-P2	16	16	16	120.07	70.07
800-P3	0+800	800-TH-P3	14	13	14	118.95	62.95
810-P1	0+810	810-TH-P1	0	0	16	134.84	114.84
815-P1R	0+815	815-TH-P1R	13	13	13	98.5	80.5
825-P1	0+825	825-TH-P1R	16	15	16	131.25	71.25
850-P1	0+850	850-TH-P1	16	15	16	133.02	73.02
875-P2	0+875	875-TH-P2	15	15	16	120.08	63.08
875-P3	0+875	875-TH-P3	13	13	13	105	51
975-P3	0+975	975-TH-P3	16	16	16	131.12	64.12
1050-P3	1+050	1050-TH-P3	16	15	16	134.77	65.77
650 US	0+650	CD-US-0+650	29	29	32	143	111.06

Table 18: List of Piezometers Recording Suction on Central Dike

Name of Piezometer	Installation Unit	Observation
545-P1-A	Bedrock	Suction.
545-P2 B	Bedrock	Suction. Broken.
545-P2-C	Bedrock	Suction. Broken.
545-P2-D	Till	Suction. Broken.
650-P2-D	Till	Suction. Frozen.
650-P3-B	Bedrock	Suction. Frozen.
750-P1-(B,C)	Bedrock, till	Suction.

3.0 WHALE TAIL PROJECT DEWATERING DIKES

3.0 Whale Tail Dike

The construction of Whale Tail Dike started on July 2018 and ended in February 2019.

The instruments installed on Whale Tail Dike are summarized in Tables 19 and 20 below and consist of:

- 4 inclinometers in the cut-off wall;
- 35 thermistors in the dike;
- 3 thermistors in the upstream lake;
- 2 thermistors in the downstream area;
- 15 piezometer holes having each 3 to 4 instruments (50 piezometers in total).

Thermistors are mostly located downstream of the cut-off wall with the temporary thermistors installed just downstream of the secant wall to gain more data on potential wall defects that would exhibit warm up in the cut off wall. The piezometers have 2 holes downstream (P1 & P2) of the wall and 1 upstream (P3) for a given section. All the instruments except for the temporary thermistors are connected to an automated data acquisition system that gathers data every 3 hours.

Table 19: List of Piezometers and Thermistors on Whale Tail Dike (source: AEM)

DH-ID	STA	INSTRUMENT_ID	Stratigraphic unit	OP Status	Frozen Status	Elevation
PZ-1	0+260	WTD_260_P1_A	Bedrock	✓		138.5
		WTD_260_P1_B	Bedrock	✓		145.5
		WTD_260_P1_C	Interface	✓	Frozen	151.5
PZ-2	0+260	WTD_260_P2_A	Bedrock	✓		138.5
		WTD_260_P2_B	Bedrock	✓		145.5
		WTD_260_P2_C	Interface	Broken		150.5
PZ-3	0+260	WTD_260_P3_A	Bedrock	✓		138.32
		WTD_260_P3_B	Bedrock	✓		145.32
		WTD_260_P3_C	Interface	✓		149.82
PZ-4	0+360	WTD_360_P1_A	Bedrock	✓		132
		WTD_360_P1_B	Bedrock	✓		139
		WTD_360_P1_C	Interface	✓		145.53
PZ-5	0+360	WTD_360_P2_A	Bedrock	✓		132
		WTD_360_P2_B	Bedrock	✓		137
		WTD_360_P2_C	Interface	✓		142
PZ-6	0+360	WTD_360_P3_A	Bedrock	✓		132
		WTD_360_P3_B	Bedrock	✓		139
		WTD_360_P3_C	Interface	✓		142.8
PZ-7	0+440	WTD_440_P1_A	Bedrock	✓		137
		WTD_440_P1_B	Bedrock	✓		144
		WTD_440_P1_C	Interface	✓		139
PZ-8	0+440	WTD_440_P2_A	Bedrock	✓		137.19
		WTD_440_P2_B	Bedrock	✓		144.19
		WTD_440_P2_C	Interface	✓	Freezing	149.19
PZ-9	0+440	WTD_440_P3_A	Bedrock	✓		136.35
		WTD_440_P3_B	Bedrock	✓		143.35
		WTD_440_P3_C	Interface	To investigate		148.35
PZ-10	0+550	WTD_550_P1_A	Bedrock	✓		141.15
		WTD_550_P1_B	Bedrock	✓		146.15
		WTD_550_P1_C	Interface	✓		149.85
PZ-11	0+550	WTD_550_P2_A	Bedrock	✓		141.30
		WTD_550_P2_B	Bedrock	✓		146.30
		WTD_550_P2_C	Interface	✓		149.80
PZ-12	0+550	WTD_550_P3_A	Bedrock	✓		141.32
		WTD_550_P3_B	Bedrock	Broken		146.32
		WTD_550_P3_C	Interface	✓	Near zero	149.82
PZ-13	0+710	WTD_701_P1_A	Bedrock	✓		139.95
		WTD_701_P1_B	Bedrock	✓		144.95
		WTD_701_P1_C	Interface	✓		147.95
PZ-14	0+710	WTD_701_P2_A	Bedrock	✓		140.03
		WTD_701_P2_B	Bedrock	✓		145.03
		WTD_701_P2_C	Interface	✓		148.03
		WTD_701_P2_D	Fine Filter	✓		151.03
PZ-15	0+710	WTD_701_P3_A	Bedrock	✓		140.10
		WTD_701_P3_B	Bedrock	✓		145.10
		WTD_701_P3_C	Interface	✓		148.10
		WTD_701_P3_D	Fine Filter	✓		151.10
Pz-DS	-	WTD_Pz_US	Water	✓		141.882
Pz-US	-	WTD_Pz_US	Water	✓		146.856

STA	DH-ID	New	Working beads	Reliable beads	Total beads	Top bead elevation	Bottom bead elevation
0+110	TH 0+110	x	14	14	16	156.4	141.4
0+142	TH-1		13	11	13	156.8	144.8
0+190	TH-12		12	10	13	157.4	140.4
0+210	TH-2		16	16	13	157.2	142.2
0+240	TH 0+240	x	13	13	13	158.1	128.1
0+260	TH-3		13	11	13	157.0	127.0
0+276	TH-LAKE		13	13	13	157.3	145.3
0+290	TH-LAKE-US-290		13	13	13	157.0	142.0
0+310	TH-4		13	13	13	157.0	127.0
0+336	TH-US-0+336	x	13	13	13	156.4	142.4
0+360	TH-5		13	11	13	157.0	127.0
0+380	TH 0+380	x	13	13	13	157.1	127.1
0+407	TH-6		13	9	13	157.0	127.0
0+425	TH 0+425	x	13	13	13	158.6	128.6
0+453	TH-7		13	13	13	156.9	126.9
0+475	TH 0+475_T	x	13	13	13	161.0	146.0
0+500	TH-500	x	16	15	16	157.1	142.1
0+520	TH-8		13	12	13	157.0	127.0
0+530	TH-530		13	13	13	159.0	147.0
0+550	TH 0+550	x	13	13	13	158.0	128.0
0+580	TH-580		13	13	13	158.0	143.0
0+596	TH 0+596	x	13	13	13	157.8	127.8
0+607	TH-9		13	10	13	157.0	127.0
0+635	TH-635		13	13	13	158.3	143.3
0+645	TH 0+645	x	13	13	13	158.6	128.6
0+665	TH-LAKE-US-665		13	13	13	157.0	142.0
0+665	TH-665		13	13	13	158.3	143.3
0+675	TH-10		13	13	13	157.0	142.0
0+685	TH-685		13	13	13	157.5	145.5
0+695	TH-695		13	13	13	158.0	146.0
0+707.5	TH-707.5		13	13	13	158.0	143.0
0+710	TH-13		16	15	16	157.1	142.1
0+720	TH-720		13	13	13	157.0	145.0
0+740	TH-740		13	13	13	161.0	146.0
0+475	TH-475		13	13	13	159.0	147.0
0+750	TH-14		16	15	16	157.0	142.0
0+772	TH-11		13	0	13	157.0	142.0
0+790	TH 0+790	x	16	16	16	157.2	142.2
0+618	D/S East		9	9	16	152.0	137.0
0+340	D/S West		16	16	16	148.6	134.6

Table 20: List of Inclinometers on Whale Tail Dike (source: AEM)

STA	DH-ID	Working beads	Reliable beads	Total beads	Top bead elevation	Bottom bead elevation
0+205	INC_1	29	29	29	158.1	144.1
0+366	INC_2	37	37	37	157.9	139.9
0+560	INC_3	33	33	33	157.7	141.7
0+726	INC_4	31	31	31	157.3	142.3

3.1 WRSF Dike

The construction of WRSF Dike occurred from January to February 2019 to maintain the frozen condition of the foundation. Thermistors TH-01 to 03 were installed in March 2019. Four additional thermistors were installed in early October 2019 to monitor more precisely the temperature trends in WRSF Dike in order to study the seepage mechanism after water had been seeping through the dike since August 2019. Two additional thermistors (Th-08 and TH-09) were installed in the constructed upstream thermal berm in 2020.

Table 21 below details instrumentation on WRSF Dike, with the exception of the newest instruments that were shortly installed at the time of the inspection (TH-08 and TH-09).

Table 21: List of Thermistors on WRSF Dike (source: AEM)

Station	Instrument ID	Drawing Name	Type	Status	Readings	For PZ		For TH	
#	ID		PZ/TH	Operational (✓) / Not operational (×)/Frozen (F)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in m (top/bottom)
0+120	WRSF-19-01	TH-01	TH	✓	Automatic (DL105)			13/13	139/123
0+120	WRSF-19-02	TH-02	TH	✓	Automatic (DL105)			13/13	159/147
0+120	WRSF-19-03	TH-03	TH	✓	Automatic (DL105)			13/13	155/143
0+093	WRSF-19-04	TH-04	TH	✓	Automatic (DL105)			13/13	158/142
0+135	WRSF-19-05	TH-05	TH	✓	Automatic (DL105)			13/13	154/142
0+135	WRSF-19-06	TH-06	TH	✓	Automatic (DL105)			13/13	156/143
0+172	WRSF-19-07	TH-07	TH	✓	Automatic (DL105)			13/13	155/142

3.2 Mammoth Dike

The construction of Mammoth Dike occurred from February 2019 to March 2019 to maintain the frozen condition of the foundation.

There are three thermistor strings installed within Mammoth Dike.

Table 22 below details instrumentation on Mammoth Dike.

Table 22: List of Thermistors on Mammoth Dike (source: AEM)

Station	Instrument ID	Drawing Name	Type	Status	Readings	For PZ		For TH	
#	ID		PZ/TH	Operational (✓) / Not operational (×)/Frozen (F)	Manual/ Automatic	Elevation (m)	Stratigraphic unit	Number of operational beads	Elevation interval in m (top/bottom)
0+143	MD-19-01	TH-01	TH	✓	Automatic (DL106)			13/13	139/123
0+143	MD-19-02	TH-02	TH	✓	Automatic (DL106)			13/13	155/143
0+143	MD-19-03	TH-03	TH	✓	Automatic (DL106)			13/13	154/142

3.3 IVR Dike

The construction of IVR Dike occurred from February 2021 to May 2021 to maintain the frozen condition of the foundation.

There are seven thermistor strings installed within IVR Dike.

Table 23 below details instrumentation on IVR Dike.

Table 23: List of Thermistors on IVR Dike (source: AEM)

DH-ID	STA	Instrument ID	Working Beads	Reliable Beads	Total Beads	Top Bead Elevation	Bottom Bead Elevation
liner	0+180	IVR-TH-01	16	16	16	164.5	159.5
	0+150	IVR-TH-02	16	16	16	165	150
	0+150	IVR-TH-03	16	16	16	165	150
	0+150	IVR-TH-04	16	16	16	165	150
horizontal in key trench	0+145 to 0+220	IVR-TH-05	13	13	13	159	159
	0+150	IVR-TH-06	13	13	13	162	150
	0+150	IVR-TH-07	13	13	13	162	150