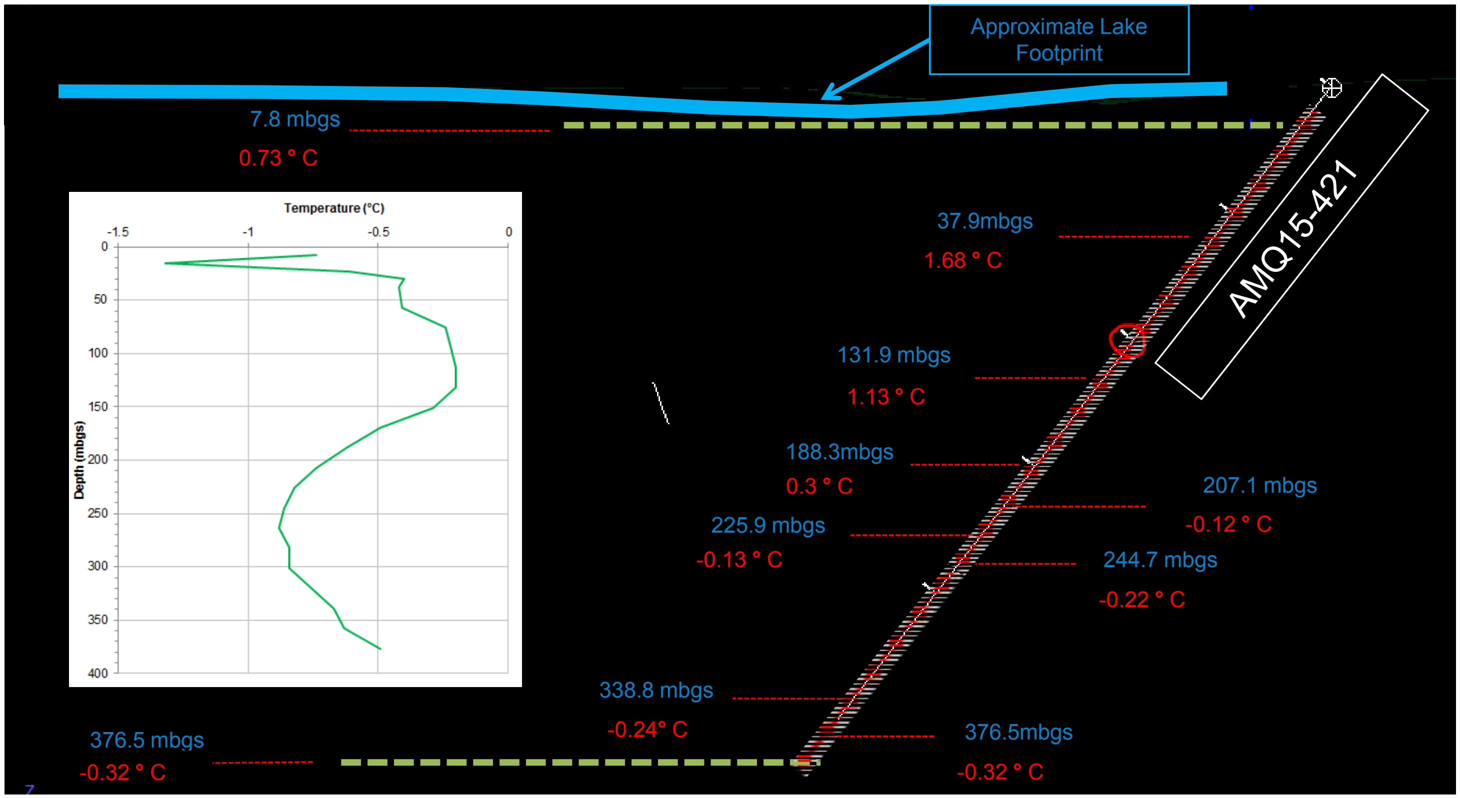
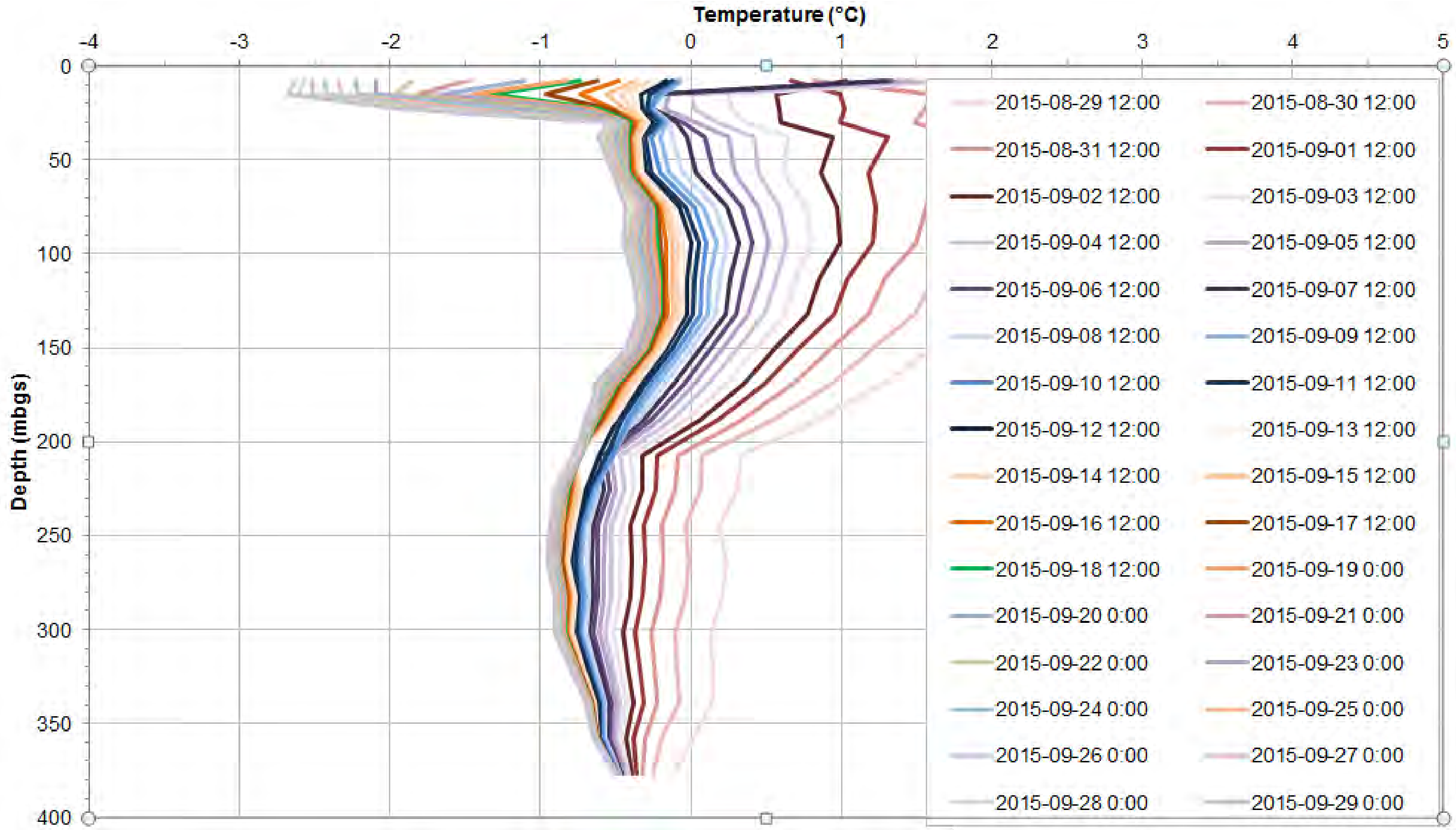
AMQ15-421 – Ground Temperature Profile



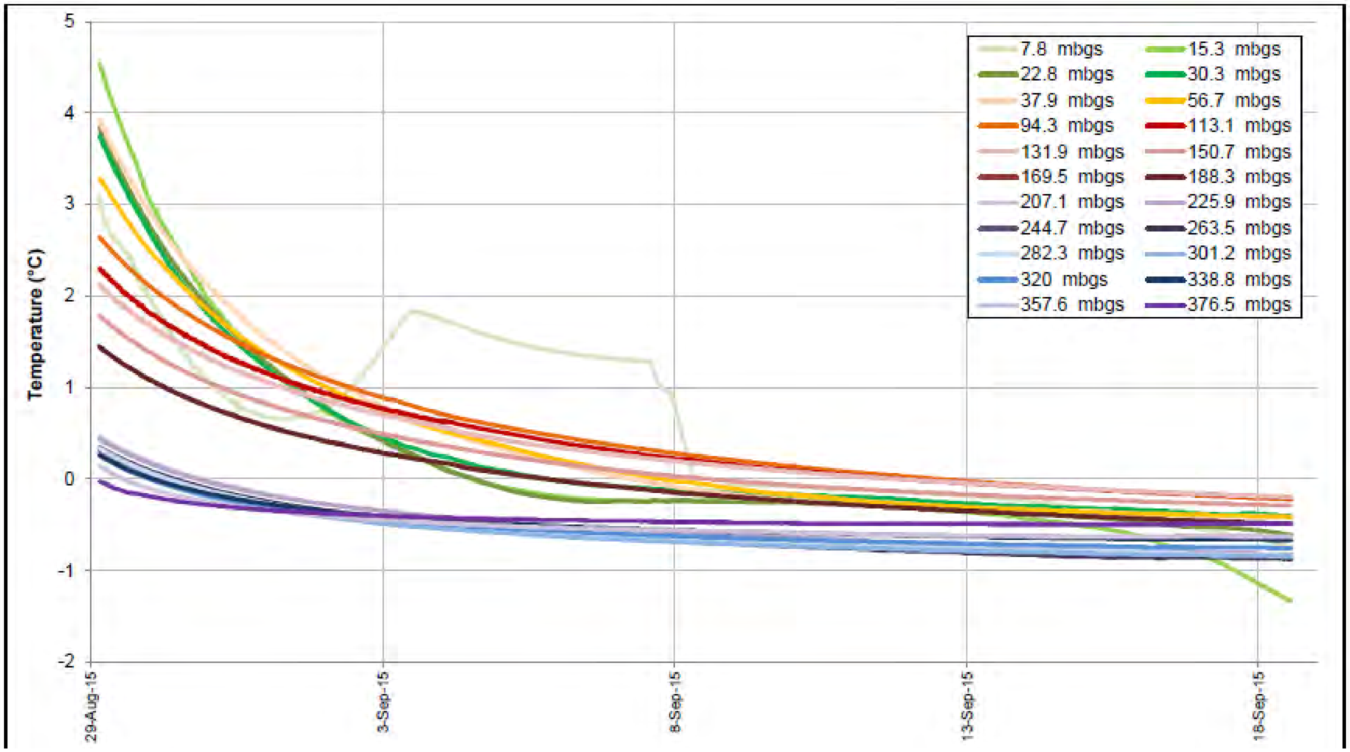
Knight Piésold

AMQ15-421 – Ground Temperature Profile

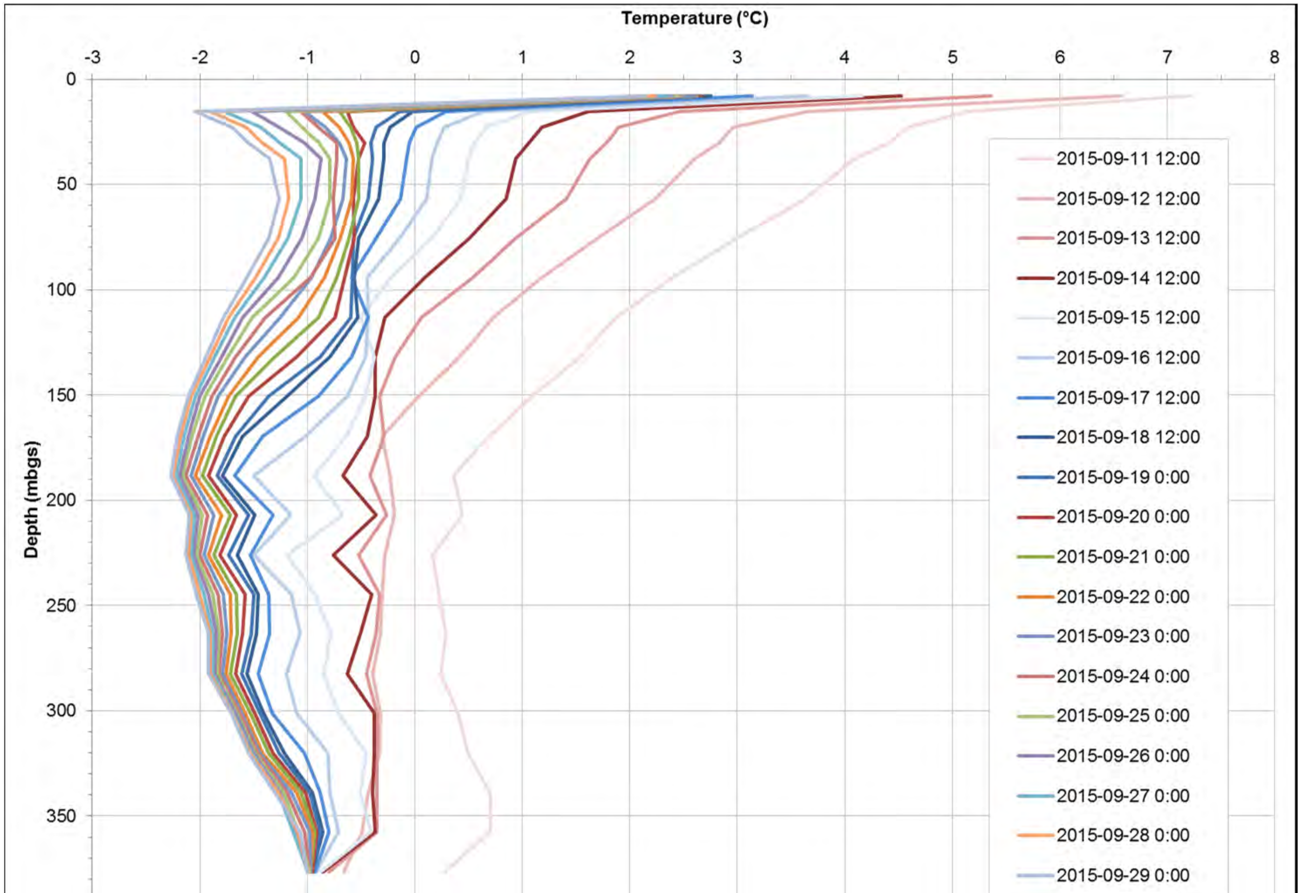


Knight Piésold

AMQ15-421 – Ground Temperature with Time



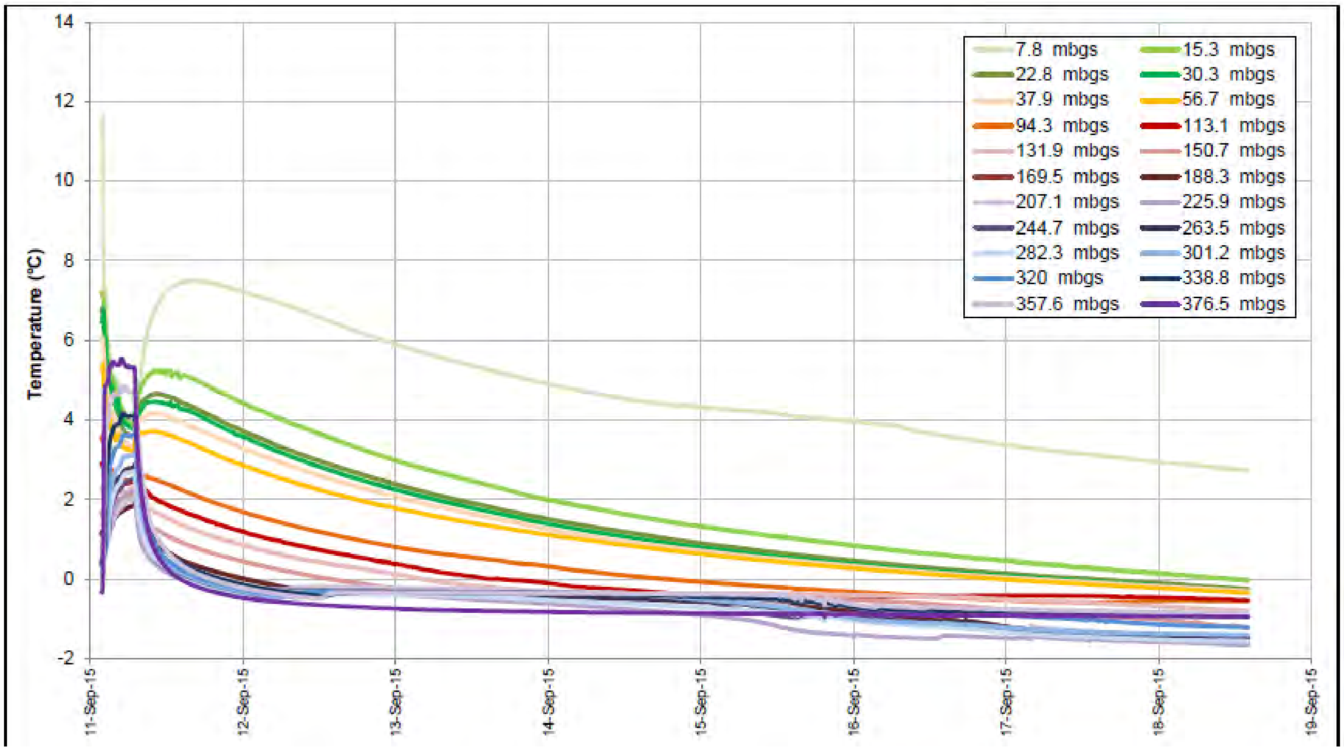
AMQ15-452 – Ground Temperature Profile



REV	DATE	DESCRIPTION	PREP'D	REV'D
A	02OCT'15	ISSUED FOR INFORMATION	REW	-

Knight Piésold

AMQ15-452 – Ground Temperature with Time



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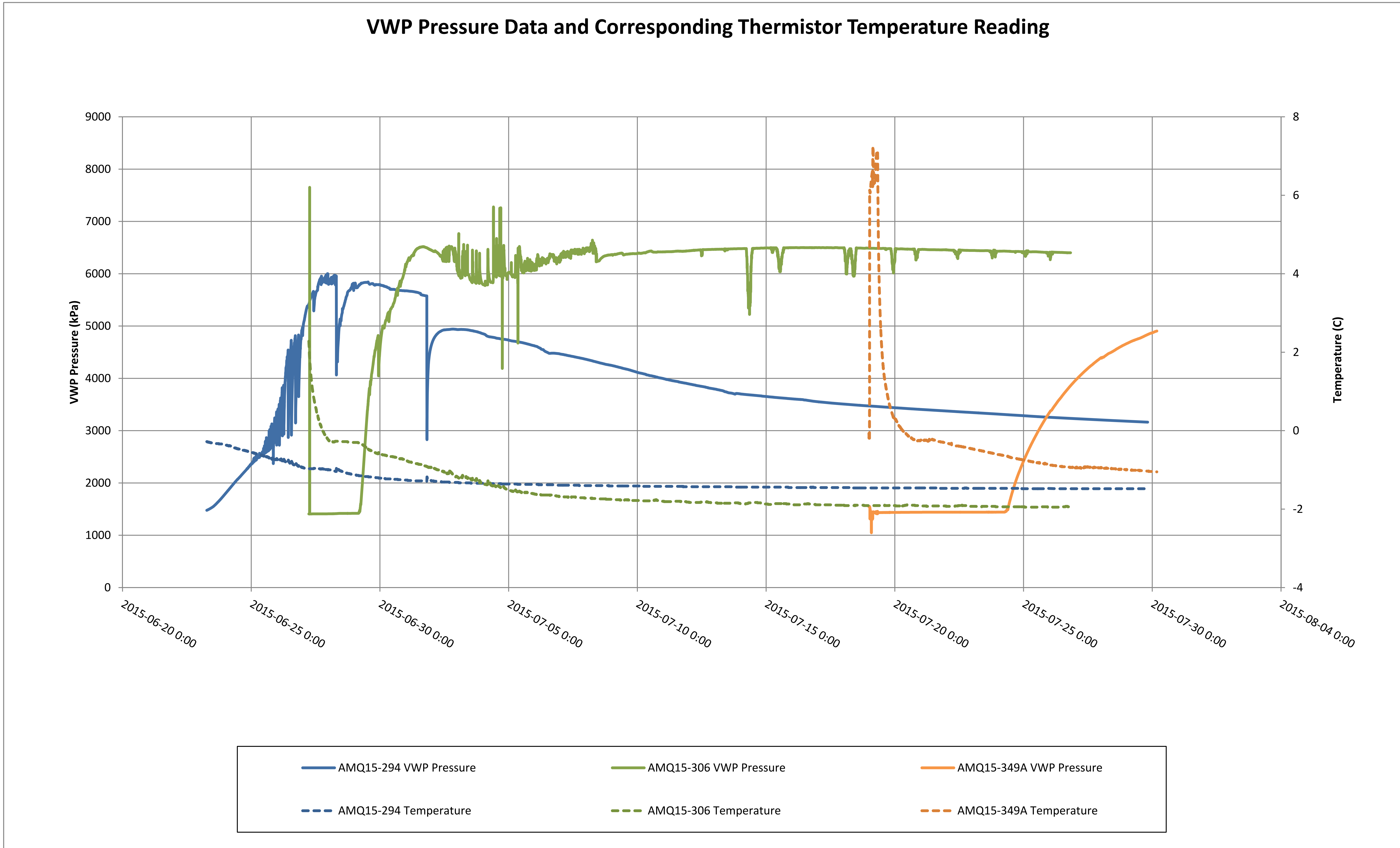
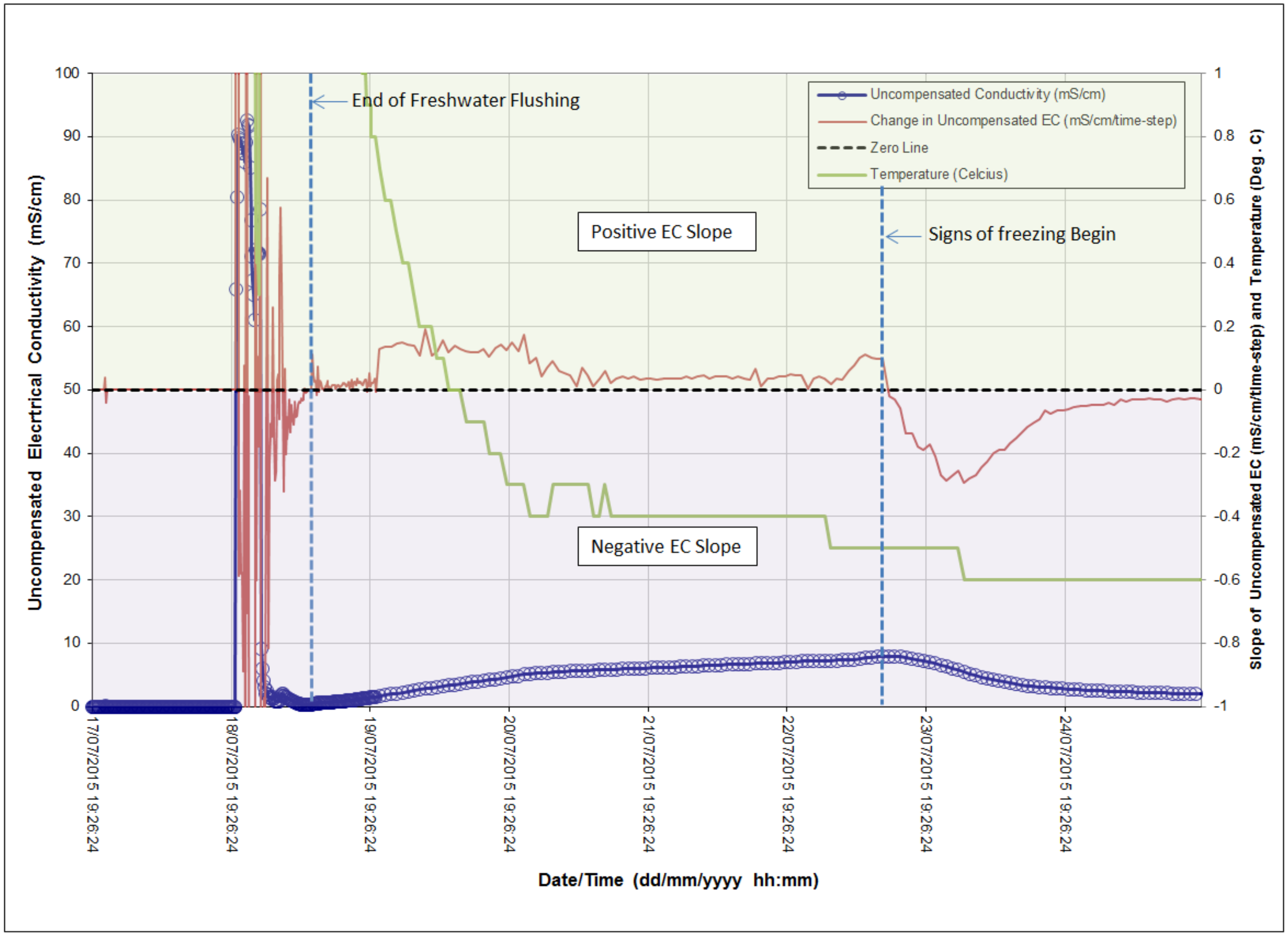

VWP Pressure Data and Corresponding Thermistor Temperature Reading
VWP Pressure (kPa)
Temperature (C)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
8
6
4
2
0
-2
-4
2015-06-20 0:00
2015-06-25 0:00
2015-06-30 0:00
2015-07-05 0:00
2015-07-10 0:00
2015-07-15 0:00
2015-07-20 0:00
2015-07-25 0:00
2015-07-30 0:00
2015-08-04 0:00
AMQ15-294 VWP Pressure
AMQ15-306 VWP Pressure
AMQ15-349A VWP Pressure
AMQ15-294 Temperature
AMQ15-306 Temperature
AMQ15-349A Temperature

AMQ15-349A – Electrical Conductivity with Time



Knight Piésold

Thermistor Strings

RST Instruments Ltd.
11545 Kingston St.,
Maple Ridge, BC
Canada V2X 0Z5

Telephone: 604 540 1100
Facsimile: 604 540 1005
Toll Free: 1 800 665 5599

info@rstinstruments.com

www.rstinstruments.com

RST Instruments manufactures thermistor string assemblies that are environmentally hardened to provide accurate and reliable long-term measurements under demanding geotechnical conditions. The strings incorporate interchangeable, curve tracking, negative temperature coefficient (NTC) thermistors. As the thermistors are curve matched to desired temperature tolerance over selected temperature ranges, this permits the use of multiple sensors with a single readout or data logger, eliminating costly calibration procedures.

RST thermistor strings are custom manufactured to user specifications: cable length, thermistor number, accuracy, and location on the string. Resistance to the ingress of water is insured by a triple encapsulation procedure. Standard cable employed is a heavy duty, direct burial rated 22 gauge water blocked instrumentation cable. Thermistor strings with piezometers are also available and custom made to order. Contact RST Sales for complete details.

Other cable types are available to suit site-specific requirements. Readout instruments are available, ranging from hand held devices to complete data logger systems.

A bussed digital version is also available, please see RST's Digital ThermArray brochure.

features

- High reliability, ensured by triple encapsulation.
- Precision matched, interchangeable thermistors.
- Pre-assembled to specific length and spacing.
- Heavy duty, direct burial cable standard.

ordering info

- Accuracy required.
- Cable length.
- Cable termination enclosures.
- Readout and datalogger.
- Quantities and required thermistor spacing per string.
- Method of cable termination.
- Special environmental conditions which may require non-standard cable, such as acidic mine tailings.

specifications

ITEM	DESCRIPTION
Interchangeability Tolerance	±0.1°C
Interchangeability Temp. Range	0°C to +75°C
Operating Temp. Range	-80°C to +75°C
Stability	0.01°C or better /100 months at 0°C
Resistance at 25º	2252, 3k, 5k, 10k ohms

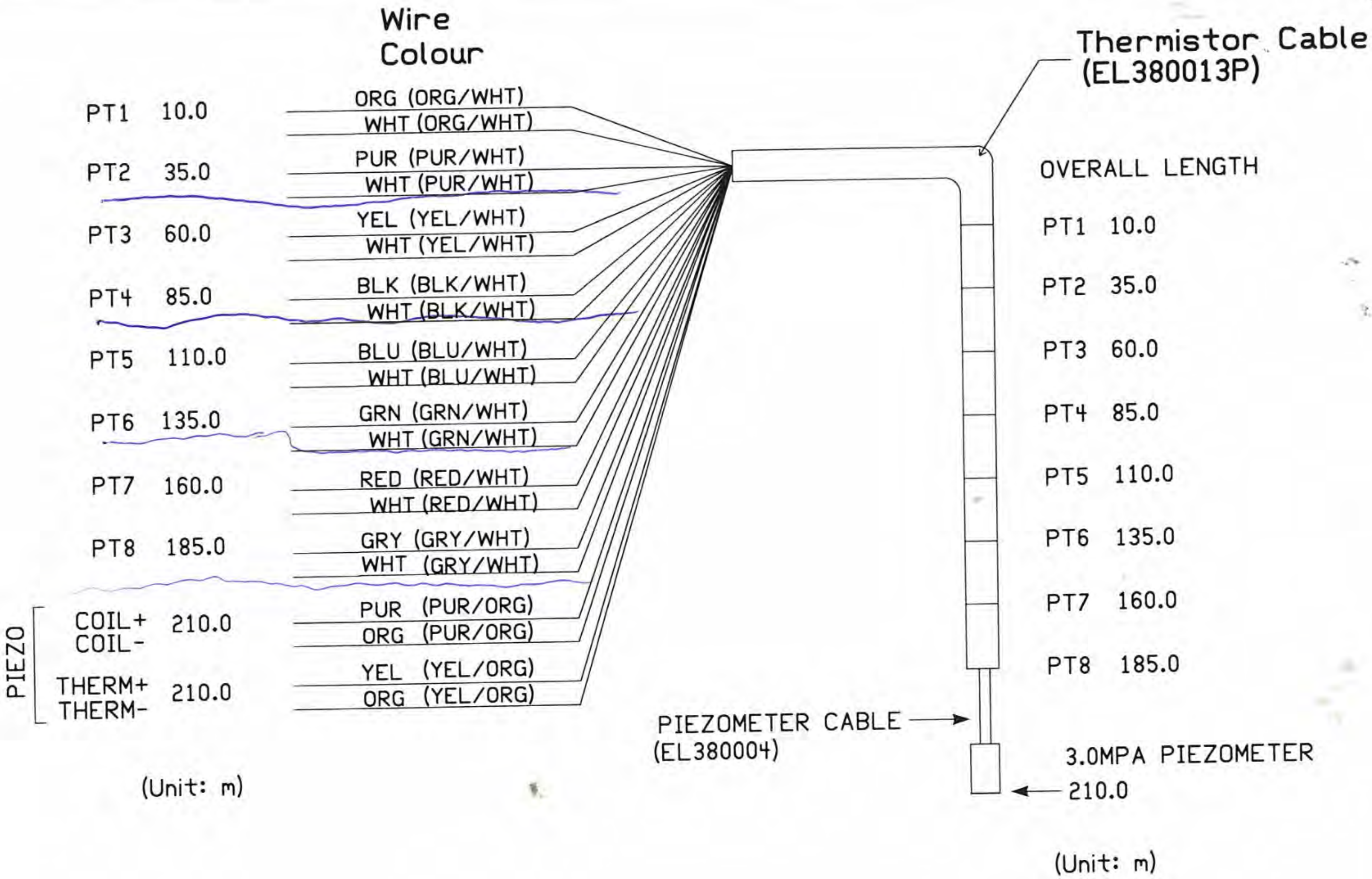
dimensions + ordering info

THERMISTOR POINTS		CABLE DIA.		BEAD* DIA.		CABLE
POINTS	PAIRS	MM.	IN.	MM.	IN.	PART #
1	1			13.97	0.55	EL380002S
2	2	6.35	0.25	13.97	0.55	EL380004
3-5	3	6.35	0.25	13.97	0.55	EL380006
4-7	4	8.128	0.32	13.97	0.55	EL380008
6-10	6	10.41	0.41	19.05	0.75	EL380012C
13-20	13	10.41	0.41	19.05	0.75	EL380013P
26-48	26	15.24	0.60	24.13	0.95	EL380026

* Please check with RST Sales for accurate dimensions of string assembly.

GEOTECHNICAL . MINING . ENVIRONMENTAL . STRUCTURAL

EPB0013G

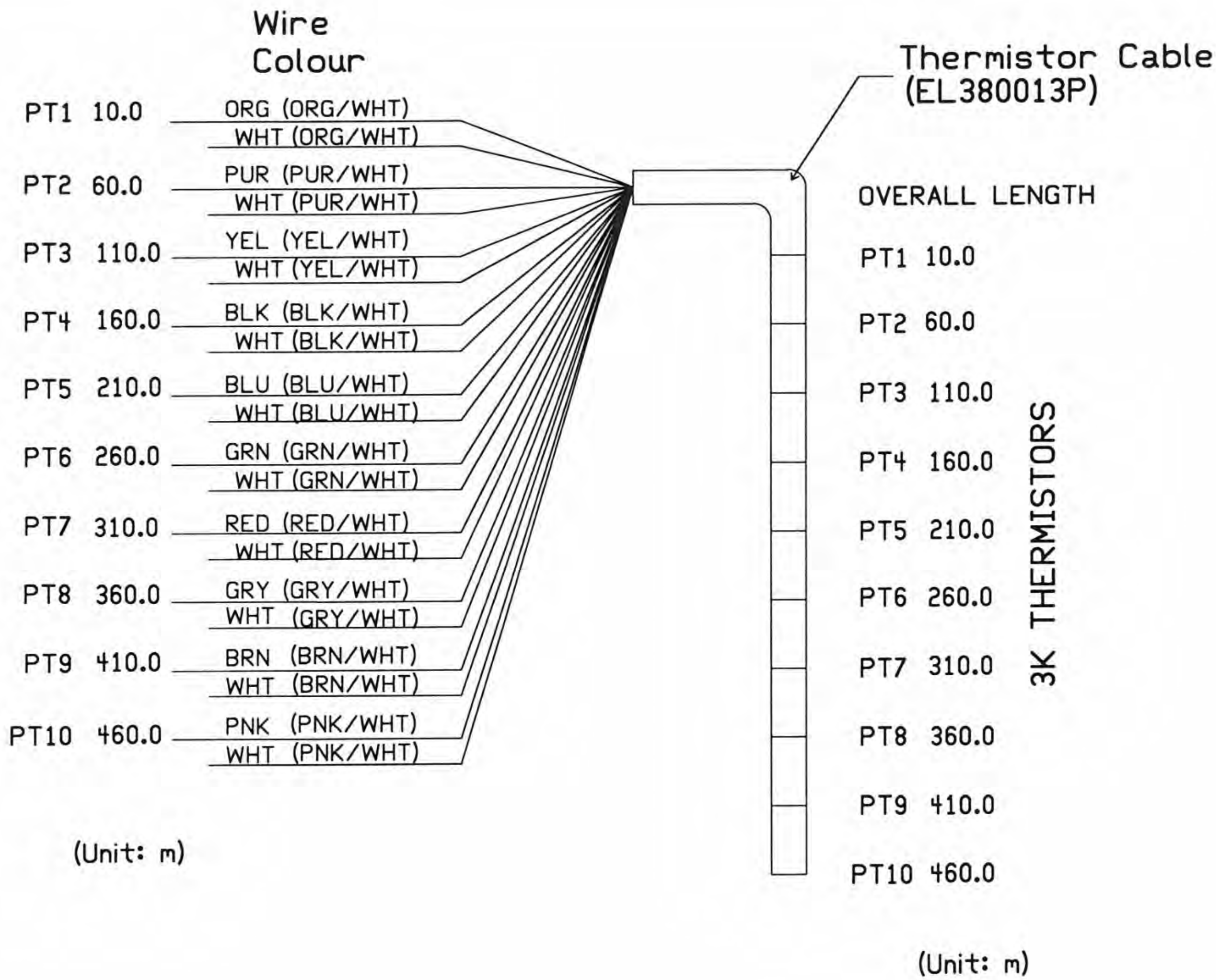


SPLICE COLOR EL380013P	EL380004
PUR (PUR/ORG)	RED
ORG (PUR/ORG)	BLK
YEL (YEL/ORG)	GRN
ORG (YEL/ORG)	WHT

S/N: TS3972-TS3974

PIEZOMETER S/N: VW32656-VW32658

Co:	RST INSTRUMENTS LTD
Title:	THERMISTOR CABLE
J/N:	THW0218_WO206818-1 — Revision: A
Author:	CB — Size: A
Date:	2015/04/27 — Sheet 1 of 2



S/N: TS3975

Co:	RST INSTRUMENTS LTD	
Title:	THERMISTOR CABLE	
J/N:	THW0218/WO206818-2	Revision: A
Author:	CB	Size: A
Date:	2015/04/27	Sheet 2 of 2

Resistance versus Temperature Relationship 3000 Ohm NTC Thermistors

Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp
201.1K	-50	16.60K	-10	2417	30	525.4	70	153.2	110
187.3K	-49	15.72K	-9	2317	31	507.8	71	149.0	111
174.5K	-48	14.90K	-8	2221	32	490.9	72	145.0	112
162.7K	-47	14.12K	-7	2130	33	474.7	73	141.1	113
151.7K	-46	13.39K	-6	2042	34	459.0	74	137.2	114
141.6K	-45	12.70K	-5	1959	35	444.0	75	133.6	115
132.2K	-44	12.05K	-4	1880	36	429.5	76	130.0	116
123.5K	-43	11.44K	-3	1805	37	415.6	77	126.5	117
115.4K	-42	10.86K	-2	1733	38	402.2	78	123.2	118
107.9K	-41	10.31K	-1	1664	39	389.3	79	119.9	119
101.0K	-40	9796	0	1598	40	376.9	80	116.8	120
94.48K	-39	9310	1	1535	41	364.9	81	113.8	121
88.46K	-38	8851	2	1475	42	353.4	82	110.8	122
82.87K	-37	8417	3	1418	43	342..2	83	107.9	123
77.99K	-36	8006	4	1363	44	331.5	84	105.2	124
72.81K	-35	7618	5	1310	45	321.2	85	102.5	125
68.30K	-35	7252	6	1260	46	311.3	86	99.9	126
64.09K	-33	6905	7	1212	47	301.7	87	97.3	127
60.17K	-32	6576	8	1167	48	282.4	88	94.9	128
56.51K	-31	6265	9	1123	49	283.5	89	92.5	129
53.10K	-30	5971	10	1081	50	274.9	90	90.2	130
49.91K	-29	56.92	11	1040	51	266.6	91	87.9	131
46.94K	-28	5427	12	1002	52	258.6	92	85.7	132
44.16K	-27	5177	13	965	53	250.9	93	83.6	134
39.13K	-25	4714	15	895.8	55	236.2	95	79.6	135
36.86K	-24	4500	16	863.3	56	229.3	96	77.6	136
34.73K	-23	4297	17	832.2	57	222.6	97	75.8	137
32.74K	-22	4105	18	802.3	58	216.1	98	73.9	138
30.87K	-21	3922	19	773.7	59	209.8	99	72.2	139
29.13K	-20	3748	20	746.3	60	203.8	100	70.4	140
27.49K	-19	3583	21	719.9	61	197.9	101	68.8	141
25.95K	-18	3426	22	694.7	62	192.2	102	67.1	142
24.51K	-17	3277	23	670.4	63	186.8	103	65.5	143
23.16K	-16	3135	24	647.1	64	181.5	104	64.0	144
21.89K	-15	3000	25	624.7	65	176.4	105	62.5	145
20.70K	-14	2872	26	603.3	66	171.4	106	61.1	146
19.58K	-13	2750	27	582.6	67	166.7	107	59.6	147
18.52K	-12	2633	28	562.8	68	162.0	108	58.3	148
17.53K	-11	2523	29	543.7	69	157.6	109	56.8	149
								55.6	150

Temperature calculated using:

Steinhart-Hart Linearization

$$T_C = \frac{1}{C_0 + C_1(\ln R) + C_3(\ln R)^3} - 273.15$$

3000 Ohm @ 25C NTC Thermistor

C_0= 0.0014051

C_1= 0.0002369

C_3= 0.0000001019

lnR= Natural Log of Resistance

T_c= Temperature in °C

Document THL0006A

Certificate of Compliance

innovation in geotechnical instrumentation

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Thermistor Strings

Customer: Hoskin Scientifique Ltee.
Work Order: 206818
Thermistor Type: 3 kΩ

Number of Points: 8
Length: 210 m

This is to certify that Thermistor Strings S/N: TS3972-TS3974 meet the RST Instruments specifications for the product.

Technician: I. Barua / J. Somphanthabansouk IB / JS As per JS Date: 7 May 2015

Applied Science Technologists and Technicians of British Columbia
26732
JAMES CHU
CTech

THM0008B

Certificate of Compliance

innovation in geotechnical instrumentation

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Thermistor Strings

Customer: Hoskin Scientifique Ltee.
Work Order: 206818
Thermistor Type: 3 kΩ

Number of Points: 10
Length: 460 m

This is to certify that Thermistor String S/N: TS3975 meets the RST Instruments specifications for the product.

Technician: I. Barua / I. Kurchavov IB / IK Date: 11 May 2015

Applied Science Technologists and Technicians of British Columbia
26732
JAMES CHU
CTech

THM0008B

innovation in geotechnical instrumentation

Calibration Record

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Piezometer

Customer: Hoskin Scientifique Ltee
Model: VW2100-3.0
Serial Number: **VW32656**
Mfg Number: 1506812
Range: 3.0 MPa
Temperature: 21.9 °C
Barometric Pressure: 1010.1 millibars
Work Order Number: 206818
Cable Length: 210 meters
Cable Markings: n/a
Cable Colour Code: Purple / Orange (Coil) Yellow / Orange (Thermistor)
Cable Type: EL380013P / EL380004
Thermistor Type: 3 kΩ

Applied Pressure (MPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (MPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8845	8846	8846	0.006	0.18	-0.01
0.6	8144	8145	8145	0.599	-0.02	0.02
1.2	7441	7441	7441	1.195	-0.15	0.00
1.8	6733	6734	6734	1.795	-0.17	-0.02
2.4	6020	6021	6021	2.399	-0.04	0.00
3.0	5304	5304	5304	3.006	0.20	0.00
				Max. Error (%):	0.20	0.02

Linear Calibration Factor: **C.F.= 0.00084720 MPa/B unit**
Regression Zero: **At Calibration = 8852.0 B unit**
Temperature Correction Factor: **Tk = 0.0007665 MPa/°C rise**

Polynomial Gage Factors (MPa) **A:** **-3.4838E-09** **B:** **-0.00079791** **C:** **7.3302**

Pressure is calculated with the following equations:
Linear: P(MPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.00010(Bi-Bc)]
Polynomial: P(MPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.00010(Bc-Bi)]

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	8-May-15	8853	22.4	1019.0

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: J. Chu Date: 8-May-15

Applied Science Technologists and Technicians of British Columbia 22724 AL CULLEY AScT

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Document Number: ELL0143H

innovation in geotechnical instrumentation

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Calibration Record

Vibrating Wire Piezometer

Customer:	Hoskin Scientifique Ltee
Model:	VW2100-3.0
Serial Number:	**VW32657**
Mfg Number:	1506386
Range:	3.0 MPa
Temperature:	22.7 °C
Barometric Pressure:	986.0 millibars
Work Order Number:	206818
Cable Length:	210 meters
Cable Markings:	n/a
Cable Colour Code:	Purple / Orange (Coil) Yellow / Orange (Thermistor)
Cable Type:	EL380013P / EL380004
Thermistor Type:	3 kΩ

Applied Pressure (MPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (MPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8956	8957	8957	0.006	0.20	-0.01
0.6	8255	8255	8255	0.599	-0.02	0.02
1.2	7551	7551	7551	1.195	-0.17	0.00
1.8	6842	6842	6842	1.794	-0.19	-0.01
2.4	6128	6128	6128	2.398	-0.06	-0.01
3.0	5409	5408	5409	3.007	0.23	0.01
				Max. Error (%):	0.23	0.02

Linear Calibration Factor: C.F.= **0.00084573 MPa/B unit**
Regression Zero: At Calibration = **8963.7 B unit**
Temperature Correction Factor: Tk = **0.0007243 MPa/°C rise**

Polynomial Gage Factors (MPa) A: **-3.9008E-09** B: **-0.00078970** C: **7.3854**

Pressure is calculated with the following equations:
Linear: P(MPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.00010(Bi-Bc)]
Polynomial: P(MPa) = $A(Lc)^2$ + BLc + C + Tk(Tc-Ti) - [0.00010(Bc-Bi)]

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	8-May-15	8959	22.5	1019.0

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: J. Chu Date: 8-May-15

Applied Science Technologists and Technicians of British Columbia 22724 AL CULLEY AScT

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Document Number: ELL0143H

innovation in geotechnical instrumentation

Calibration Record

RST Instruments Ltd., 11545 Kingston St., Maple Ridge, British Columbia, Canada V2X 0Z5
Tel: 604 540 1100 • Fax: 604 540 1005 • Toll Free: 1 800 665 5599 (North America only)
e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Piezometer

Customer:	Hoskin Scientifique Ltee	
Model:	VW2100-3.0	
Serial Number:	**VW32658**	
Mfg Number:	1506385	
Range:	3.0 MPa	
Temperature:	22.7 °C	
Barometric Pressure:	986.0 millibars	
Work Order Number:	206818	
Cable Length:	210 meters	
Cable Markings:	n/a	
Cable Colour Code:	Purple / Orange (Coil)	Yellow / Orange (Thermistor)
Cable Type:	EL380013P / EL380004	
Thermistor Type:	3 kΩ	

Applied Pressure (MPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (MPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8569	8569	8569	0.007	0.24	0.00
0.6	7861	7862	7862	0.599	-0.04	0.00
1.2	7149	7149	7149	1.194	-0.19	0.00
1.8	6432	6432	6432	1.794	-0.21	-0.01
2.4	5708	5708	5708	2.399	-0.04	0.01
3.0	4980	4980	4980	3.007	0.24	0.00
				Max. Error (%):	0.24	0.01

Linear Calibration Factor:	**C.F.=**	**0.00083588 MPa/B unit**
Regression Zero:	**At Calibration =**	**8577.7 B unit**
Temperature Correction Factor:	**Tk =**	**0.0008603 MPa/°C rise**

Polynomial Gage Factors (MPa) **A:** **-4.3022E-09** **B:** **-0.00077759** **C:** **6.9790**

Pressure is calculated with the following equations:

Linear: P(MPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.00010(Bi-Bc)]

Polynomial: P(MPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.00010(Bc-Bi)]

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	8-May-15	8569	22.4	1019.0

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

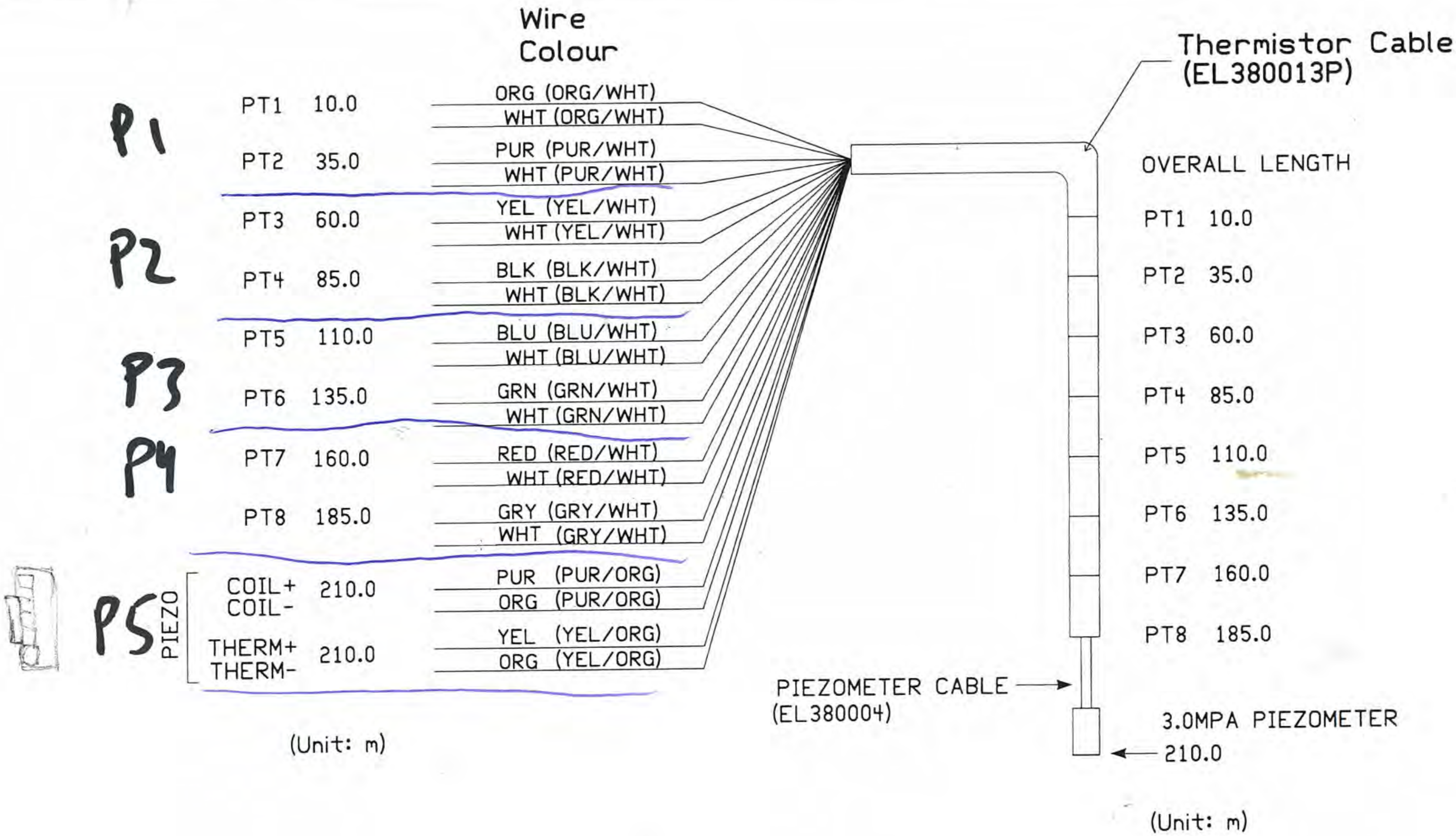
Technician: J. Chu Date: 8-May-15

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Applied Science Technologists and Technicians of British Columbia 22724 A.C AL CULLEY AScT

Document Number: ELL0143H

Recycled

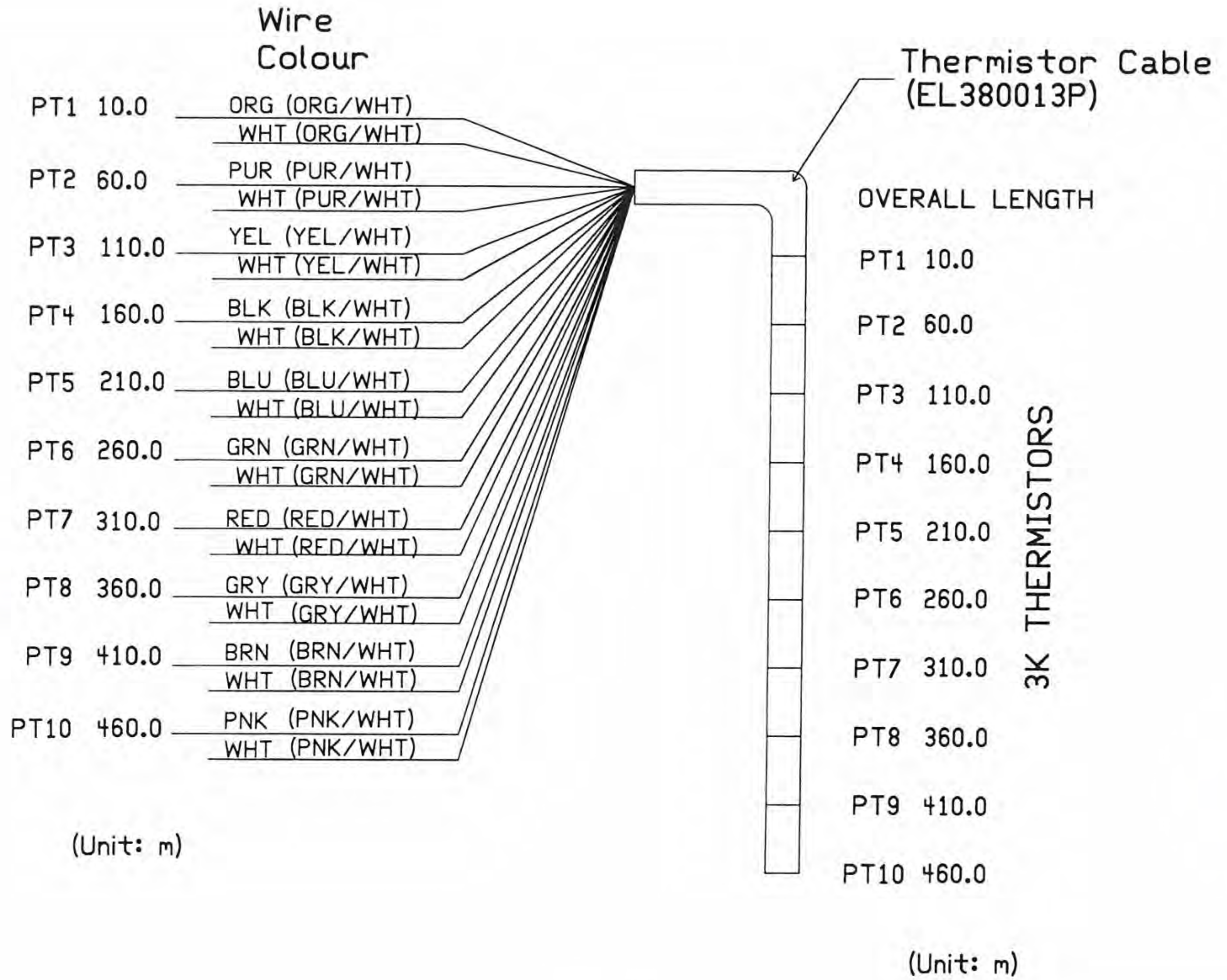


SPLICE COLOR EL380013P	EL380004
PUR (PUR/ORG)	RED
ORG (PUR/ORG)	BLK
YEL (YEL/ORG)	GRN
ORG (YEL/ORG)	WHT

S/N: TS3972-TS3974

PIEZOMETER S/N: VW32656-VW32658

Co:	RST INSTRUMENTS LTD		
Title:	THERMISTOR CABLE		
J/N:	THW0218_W0206818-1	Revision:	A
Author:	CB	Size:	A
Date:	2015/04/27	Sheet 1 of 2	



S/N: TS3975

Co:	RST INSTRUMENTS LTD
Title:	THERMISTOR CABLE
J/N:	THW0218/WO206818-2 — Revision: A
Author:	CB — Size: A
Date:	2015/04/27 — Sheet 2 of 2

Resistance versus Temperature Relationship 3000 Ohm NTC Thermistors

Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp
201.1K	-50	16.60K	-10	2417	30	525.4	70	153.2	110
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151.7K	-46	13.39K	-6	2042	34	459.0	74	137.2	114
141.6K	-45	12.70K	-5	1959	35	444.0	75	133.6	115
132.2K	-44	12.05K	-4	1880	36	429.5	76	130.0	116
123.5K	-43	11.44K	-3	1805	37	415.6	77	126.5	117
115.4K	-42	10.86K	-2	1733	38	402.2	78	123.2	118
107.9K	-41	10.31K	-1	1664	39	389.3	79	119.9	119
101.0K	-40	9796	0	1598	40	376.9	80	116.8	120
94.48K	-39	9310	1	1535	41	364.9	81	113.8	121
88.46K	-38	8851	2	1475	42	353.4	82	110.8	122
82.87K	-37	8417	3	1418	43	342..2	83	107.9	123
77.99K	-36	8006	4	1363	44	331.5	84	105.2	124
72.81K	-35	7618	5	1310	45	321.2	85	102.5	125
68.30K	-35	7252	6	1260	46	311.3	86	99.9	126
64.09K	-33	6905	7	1212	47	301.7	87	97.3	127
60.17K	-32	6576	8	1167	48	282.4	88	94.9	128
56.51K	-31	6265	9	1123	49	283.5	89	92.5	129
53.10K	-30	5971	10	1081	50	274.9	90	90.2	130
49.91K	-29	56.92	11	1040	51	266.6	91	87.9	131
46.94K	-28	5427	12	1002	52	258.6	92	85.7	132
44.16K	-27	5177	13	965	53	250.9	93	83.6	134
39.13K	-25	4714	15	895.8	55	236.2	95	79.6	135
36.86K	-24	4500	16	863.3	56	229.3	96	77.6	136
34.73K	-23	4297	17	832.2	57	222.6	97	75.8	137
32.74K	-22	4105	18	802.3	58	216.1	98	73.9	138
30.87K	-21	3922	19	773.7	59	209.8	99	72.2	139
29.13K	-20	3748	20	746.3	60	203.8	100	70.4	140
27.49K	-19	3583	21	719.9	61	197.9	101	68.8	141
25.95K	-18	3426	22	694.7	62	192.2	102	67.1	142
24.51K	-17	3277	23	670.4	63	186.8	103	65.5	143
23.16K	-16	3135	24	647.1	64	181.5	104	64.0	144
21.89K	-15	3000	25	624.7	65	176.4	105	62.5	145
20.70K	-14	2872	26	603.3	66	171.4	106	61.1	146
19.58K	-13	2750	27	582.6	67	166.7	107	59.6	147
18.52K	-12	2633	28	562.8	68	162.0	108	58.3	148
17.53K	-11	2523	29	543.7	69	157.6	109	56.8	149
								55.6	150

Temperature calculated using:

Steinhart-Hart Linearization

$$T_C = \frac{1}{C_0 + C_1(\ln R) + C_3(\ln R)^3} - 273.15$$

3000 Ohm @ 25C NTC Thermistor

C_0= 0.0014051

C_1= 0.0002369

C_3= 0.0000001019

lnR= Natural Log of Resistance

T_c= Temperature in °C

Document THL0006A

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Thermistor Strings

Customer: Hoskin Scientifique Ltee.
Work Order: 206818
Thermistor Type: 3 kΩ

Number of Points: 8
Length: 210 m

This is to certify that Thermistor Strings S/N: TS3972-TS3974 meet the RST Instruments specifications for the product.

Technician: I. Barua / J. Somphanthabansouk IB / JS As per JS Date: 7 May 2015

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JAMES CHU
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Thermistor Strings

Customer: Hoskin Scientifique Ltee.
Work Order: 206818
Thermistor Type: 3 kΩ

Number of Points: 10
Length: 460 m

This is to certify that Thermistor String S/N: TS3975 meets the RST Instruments specifications for the product.

Technician: I. Barua / I. Kurchavov IB / IK Date: 11 May 2015

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Calibration Record

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Piezometer

Customer: Hoskin Scientifique Ltee
Model: VW2100-3.0
Serial Number: **VW32656**
Mfg Number: 1506812
Range: 3.0 MPa
Temperature: 21.9 °C
Barometric Pressure: 1010.1 millibars
Work Order Number: 206818
Cable Length: 210 meters
Cable Markings: n/a
Cable Colour Code: Purple / Orange (Coil) Yellow / Orange (Thermistor)
Cable Type: EL380013P / EL380004
Thermistor Type: 3 kΩ

Applied Pressure (MPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (MPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8845	8846	8846	0.006	0.18	-0.01
0.6	8144	8145	8145	0.599	-0.02	0.02
1.2	7441	7441	7441	1.195	-0.15	0.00
1.8	6733	6734	6734	1.795	-0.17	-0.02
2.4	6020	6021	6021	2.399	-0.04	0.00
3.0	5304	5304	5304	3.006	0.20	0.00
				Max. Error (%):	0.20	0.02

Linear Calibration Factor: C.F.= **0.00084720 MPa/B unit**
Regression Zero: At Calibration = **8852.0 B unit**
Temperature Correction Factor: Tk = **0.0007665 MPa/°C rise**

Polynomial Gage Factors (MPa) A: -3.4838E-09 B: -0.00079791 C: 7.3302

Pressure is calculated with the following equations:
Linear: $P(MPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.00010(Bi-Bc)]$
Polynomial: $P(MPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.00010(Bc-Bi)]$

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	8-May-15	8853	22.4	1019.0

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: J. Chu Date: 8-May-15

Applied Science Technologists and Technicians of British Columbia 22724 AL CULLEY AScT

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Document Number: ELL0143H

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Vibrating Wire Piezometer

Customer:	Hoskin Scientifique Ltee
Model:	VW2100-3.0
Serial Number:	**VW32657**
Mfg Number:	1506386
Range:	3.0 MPa
Temperature:	22.7 °C
Barometric Pressure:	986.0 millibars
Work Order Number:	206818
Cable Length:	210 meters
Cable Markings:	n/a
Cable Colour Code:	Purple / Orange (Coil) Yellow / Orange (Thermistor)
Cable Type:	EL380013P / EL380004
Thermistor Type:	3 kΩ

Applied Pressure (MPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (MPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8956	8957	8957	0.006	0.20	-0.01
0.6	8255	8255	8255	0.599	-0.02	0.02
1.2	7551	7551	7551	1.195	-0.17	0.00
1.8	6842	6842	6842	1.794	-0.19	-0.01
2.4	6128	6128	6128	2.398	-0.06	-0.01
3.0	5409	5408	5409	3.007	0.23	0.01
				Max. Error (%):	0.23	0.02

Linear Calibration Factor:	**C.F.=**	**0.00084573 MPa/B unit**
Regression Zero:	**At Calibration =**	**8963.7 B unit**
Temperature Correction Factor:	**Tk =**	**0.0007243 MPa/°C rise**

Polynomial Gage Factors (MPa) **A:** **-3.9008E-09** **B:** **-0.00078970** **C:** **7.3854**

Pressure is calculated with the following equations:

Linear: $P(MPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.00010(Bi-Bc)]$

Polynomial: $P(MPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.00010(Bc-Bi)]$

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	8-May-15	8959	22.5	1019.0

Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: J. Chu Date: 8-May-15

Applied Science Technologists and Technicians of British Columbia 22724 AL CULLEY AScT

This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

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Calibration Record

Vibrating Wire Piezometer

Customer:	Hoskin Scientifique Ltee
Model:	VW2100-3.0
Serial Number:	**VW32658**
Mfg Number:	1506385
Range:	3.0 MPa
Temperature:	22.7 °C
Barometric Pressure:	986.0 millibars
Work Order Number:	206818
Cable Length:	210 meters
Cable Markings:	n/a
Cable Colour Code:	Purple / Orange (Coil) Yellow / Orange (Thermistor)
Cable Type:	EL380013P / EL380004
Thermistor Type:	3 kΩ

Applied Pressure (MPa)	First Reading (B units)	Second Reading (B units)	Average Reading (B units)	Calculated Linear (MPa)	Linearity Error (% FS)	Polynomial Error (% FS)
0.0	8569	8569	8569	0.007	0.24	0.00
0.6	7861	7862	7862	0.599	-0.04	0.00
1.2	7149	7149	7149	1.194	-0.19	0.00
1.8	6432	6432	6432	1.794	-0.21	-0.01
2.4	5708	5708	5708	2.399	-0.04	0.01
3.0	4980	4980	4980	3.007	0.24	0.00
				Max. Error (%):	0.24	0.01

Linear Calibration Factor:	**C.F.=**	**0.00083588 MPa/B unit**
Regression Zero:	**At Calibration =**	**8577.7 B unit**
Temperature Correction Factor:	**Tk =**	**0.0008603 MPa/°C rise**

Polynomial Gage Factors (MPa) **A:** **-4.3022E-09** **B:** **-0.00077759** **C:** **6.9790**

Pressure is calculated with the following equations:

Linear: $P(MPa) = C.F.(Li-Lc) - [Tk(Ti-Tc)] + [0.00010(Bi-Bc)]$

Polynomial: $P(MPa) = A(Lc)^2 + BLc + C + Tk(Tc-Ti) - [0.00010(Bc-Bi)]$

	Date (dd/mm/yy)	VW Readout Pos. B (Li)	Temp °C (Ti)	Baro (Bi)
Shipped Zero Readings:	8-May-15	8569	22.4	1019.0

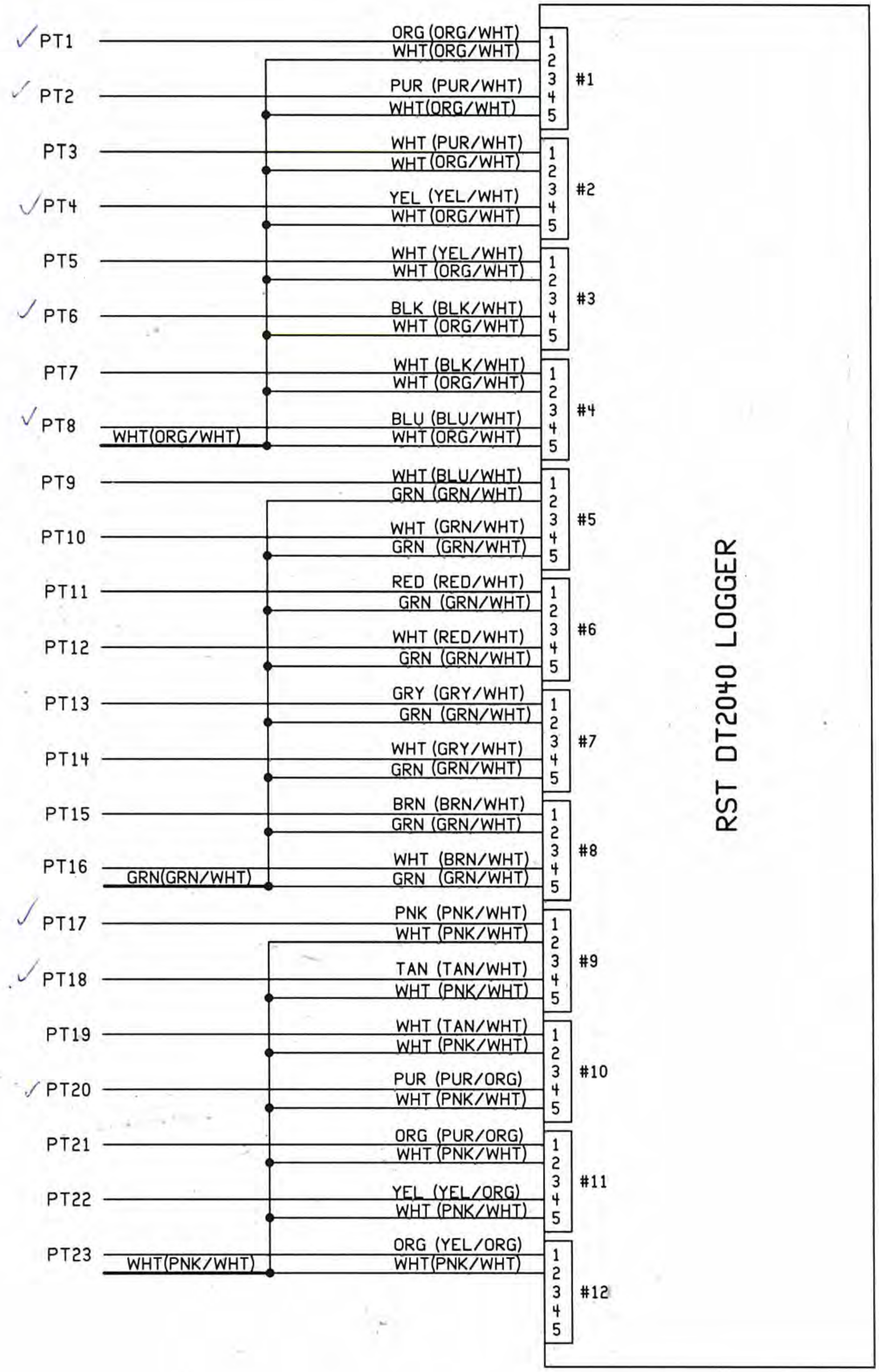
Li, Lc = initial (at installation) and current readings
Ti, Tc = initial (at installation) and current temperature, in °C
Bi, Bc = initial (at installation) and current barometric pressure readings, in millibars
B units = B scale output of VW 2102, VW 2104, VW 2106 and DT 2011 readouts
B units = Hz^2 / 1000 ie: 1700Hz = 2890 B units

Technician: J. Chu Date: 8-May-15

Applied Science Technologists and Technicians of British Columbia 22724 AL CULLEY AScT

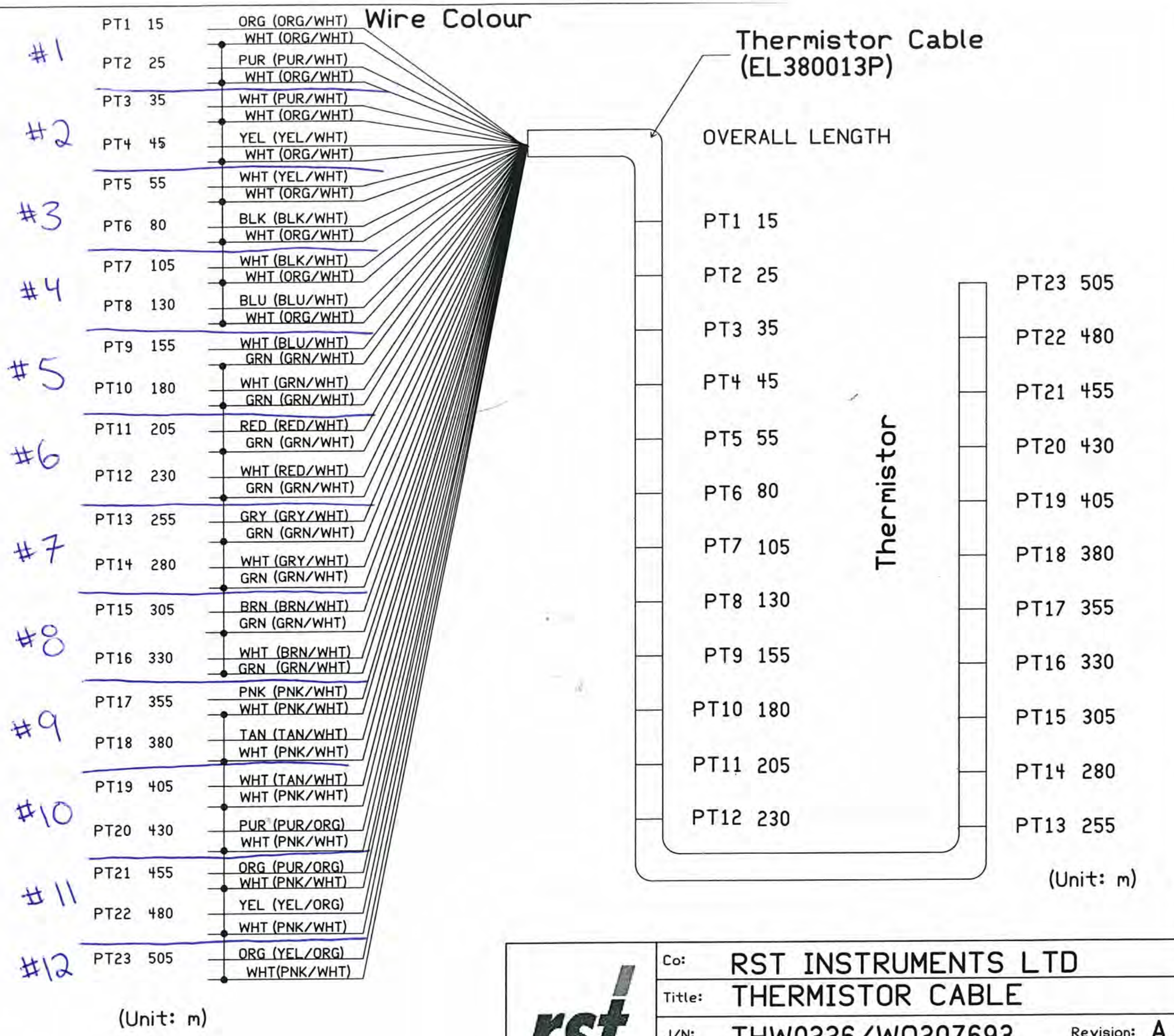
This instrument has been calibrated using standards traceable to the NIST in compliance with ANSI Z540-1

Document Number: ELL0143H



SN: TS4005-TS4006

Co:	RST INSTRUMENTS LTD
Title:	THERMISTOR CABLE
J/N:	THW0226/WO207693 — Revision: A
Author:	CB — Size: A
Date:	2015/07/27 — Sheet 2 of 2



Co:	RST INSTRUMENTS LTD
Title:	THERMISTOR CABLE
J/N:	THW0226/W0207693 — Revision: A
Author:	CB — Size: A
Date:	2015/07/27 — Sheet 1 of 1

SN: TS4005-TS4006

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Thermistor Strings

Customer:	Hoskin Scientifique LTEE.	Number of Points:	23
Work Order:	207693	Length:	505 m
Thermistor Type:	3 kΩ		

This is to certify that Thermistor Strings S/N: TS4005 and TS4006 meet the RST Instruments specifications for the product.

Technician: I. Kurchavov IK　　Date: 11 August 2015

THM0008B

Applied Science Technologists and Technicians of British Columbia
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Resistance versus Temperature Relationship 3000 Ohm NTC Thermistors

Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp	Ohms	Temp
201.1K	-50	16.60K	-10	2417	30	525.4	70	153.2	110
187.3K	-49	15.72K	-9	2317	31	507.8	71	149.0	111
174.5K	-48	14.90K	-8	2221	32	490.9	72	145.0	112
162.7K	-47	14.12K	-7	2130	33	474.7	73	141.1	113
151.7K	-46	13.39K	-6	2042	34	459.0	74	137.2	114
141.6K	-45	12.70K	-5	1959	35	444.0	75	133.6	115
132.2K	-44	12.05K	-4	1880	36	429.5	76	130.0	116
123.5K	-43	11.44K	-3	1805	37	415.6	77	126.5	117
115.4K	-42	10.86K	-2	1733	38	402.2	78	123.2	118
107.9K	-41	10.31K	-1	1664	39	389.3	79	119.9	119
101.0K	-40	9796	0	1598	40	376.9	80	116.8	120
94.48K	-39	9310	1	1535	41	364.9	81	113.8	121
88.46K	-38	8851	2	1475	42	353.4	82	110.8	122
82.87K	-37	8417	3	1418	43	342..2	83	107.9	123
77.99K	-36	8006	4	1363	44	331.5	84	105.2	124
72.81K	-35	7618	5	1310	45	321.2	85	102.5	125
68.30K	-35	7252	6	1260	46	311.3	86	99.9	126
64.09K	-33	6905	7	1212	47	301.7	87	97.3	127
60.17K	-32	6576	8	1167	48	282.4	88	94.9	128
56.51K	-31	6265	9	1123	49	283.5	89	92.5	129
53.10K	-30	5971	10	1081	50	274.9	90	90.2	130
49.91K	-29	56.92	11	1040	51	266.6	91	87.9	131
46.94K	-28	5427	12	1002	52	258.6	92	85.7	132
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36.86K	-24	4500	16	863.3	56	229.3	96	77.6	136
34.73K	-23	4297	17	832.2	57	222.6	97	75.8	137
32.74K	-22	4105	18	802.3	58	216.1	98	73.9	138
30.87K	-21	3922	19	773.7	59	209.8	99	72.2	139
29.13K	-20	3748	20	746.3	60	203.8	100	70.4	140
27.49K	-19	3583	21	719.9	61	197.9	101	68.8	141
25.95K	-18	3426	22	694.7	62	192.2	102	67.1	142
24.51K	-17	3277	23	670.4	63	186.8	103	65.5	143
23.16K	-16	3135	24	647.1	64	181.5	104	64.0	144
21.89K	-15	3000	25	624.7	65	176.4	105	62.5	145
20.70K	-14	2872	26	603.3	66	171.4	106	61.1	146
19.58K	-13	2750	27	582.6	67	166.7	107	59.6	147
18.52K	-12	2633	28	562.8	68	162.0	108	58.3	148
17.53K	-11	2523	29	543.7	69	157.6	109	56.8	149
								55.6	150

Temperature calculated using:

Steinhart-Hart Linearization

$$T_C = \frac{1}{C_0 + C_1(\ln R) + C_3(\ln R)^3} - 273.15$$

3000 Ohm @ 25C NTC Thermistor

C_0= 0.0014051
C_1= 0.0002369
C_3= 0.0000001019
lnR= Natural Log of Resistance
T_c= Temperature in °C

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Model DT2040 Vibrating Wire Data Logger **FW Ver: 3.09**

This is to certify that s/n 02065 meets RST Instruments specifications for this product.

Technician: S. Kim SK Date: July 27, 2015

ELL0229A

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Model DT2055B Vibrating Wire Data Logger FW Ver: 3.12

This is to certify that s/n 04511 meets RST Instruments specifications for this product.

Technician: S. Kim SK Date: July 6, 2015

ELL0220B

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e-mail: info@rstinstruments.com • Website: www.rstinstruments.com

Model DT2040 Vibrating Wire Data Logger **FW Ver: 3.09**

This is to certify that s/n 02064 meets RST Instruments specifications for this product.

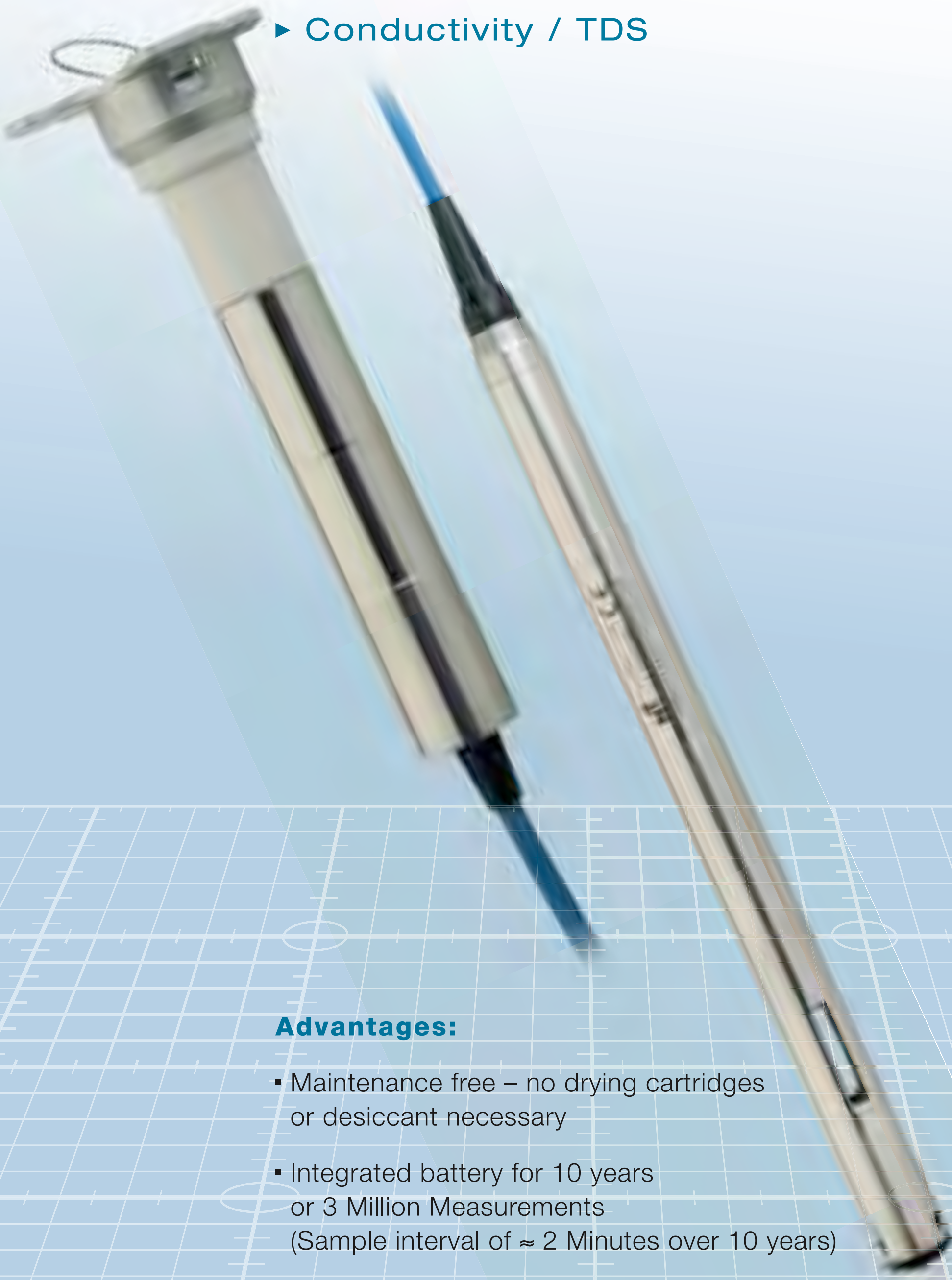
Technician: S. Kim SK Date: July 27, 2015

ELL0229A

Datalogger Type 575-LTC

Measuring and Recording of:

- Water Level
- Water Temperature
- Conductivity / TDS

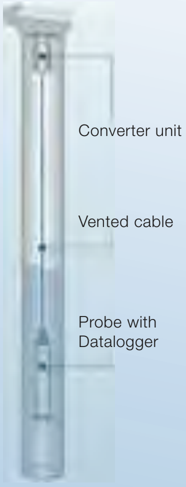


Datalogger

Advantages:

- Maintenance free – no drying cartridges or desiccant necessary
- Integrated battery for 10 years or 3 Million Measurements (Sample interval of ≈ 2 Minutes over 10 years)
- Ø 22 mm, for installations from 1 inch pipes
- Highest precision and long term stability by 4-pol conductivity sensor
- Particular, convenient operation by touch operation
- Flood protected – durable seal until 3 m water column
- Robust stainless steel design

Datalogger Type 575-LTC



Description

The Datalogger type 575- LTC is a compact analysing instrument for the documentation of water level, temperature and electrical conductivity. Additionally, from the conductivity values the TDS can be calculated if needed.

The built-in lithium battery powers the Datalogger over the guaranteed period of 10 years or 3 million measurements. A battery replacement is performed at HT, which always includes a general equipment check-up and a recalibration of the sensors.

Highest data security is achieved through the used non-volatile flash memory, which can record at least 253,000 data sets.

The Datalogger type 575- LTC is designed for the practical user, installation can be executed very quickly and without training, the menu is clearly structured. An exchange of the desiccant or other maintenance work is not necessary.

Highest quality standards for conductivity measurements will be fulfilled with this Datalogger, the complete design is based on over 20 years of experience in the field of water quality measurements.

Typical Applications

- Measuring and Recording of salt water intrusion in coastal areas
- Measurement of Water level, Temperature and Conductivity / TDS during Pumping Tests
- Monitoring of production and observation wells
- Tracer measurements
- Level- and quality monitoring of surface water
- Remediation of contaminated areas
- Monitoring of landfills

Optimized power consumption, 50% more measurements

This Datalogger Type 575-II was developed with new power-optimized components. For you as an user it means that we can dramatically extend the guaranteed battery-lifetime.

The new guarantee conditions are: 10 years or 3 million measurements! That is a lifetime over a period of 10 years at a recording interval of ≈ 2 Minutes without replacing the battery.

After that time the battery exchange will be done fast and uncomplicated in our factory service department inclusive recalibration and exchanging of seals.

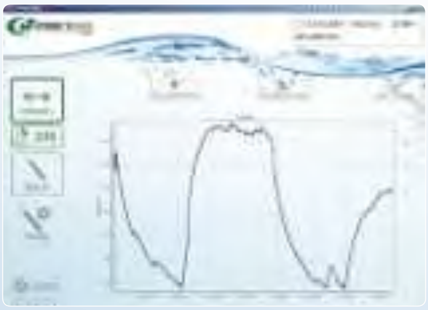
Highest precision and especially long-term-stable conductivity values

A highly accurate 4-electrode conductivity sensor with integrated temperature sensor is used. Over many years, stable and accurate conductivity values will be given without the need for a re-calibration. The Datalogger 575-LTC offers the possibility of an automatic temperature compensation to the reference temperature of 25°C.

The following settings are available:

- Sets an automatic temperature compensation based on 25°C according to DIN EN 27888
- Adjustment of an individual coefficient in % / °C for individual liquids
- Measurement without compensation, it will output the conductivity at the current temperature

Datalogger configuration and data transfer – modified operating software



So far, we hear from customers that the operation of HT Dataloggers is quite simple. It requires no training when you operate the first time or if you do not regularly work with the devices you can operate the systems very quickly again without mistakes.

Actually, exactly the words you want to hear as the manufacturer. Nevertheless, we put time and manpower into a new operating concept that aims not only to a more attractive design of the operating program. In particular, it was important for us to respond with a new operating concept on innovations in the PC market, means for the user a wider selection of PCs and control-devices.

Touch-enabled is not synonymous with touch-friendly! As currently the first manufacturer of groundwater Dataloggers we have adjusted the operating program also to touch PCs. This means on the one hand, that possibly cherished menu structures disappear. On the other hand, the Datalogger can now be easily operated without a touch pen and especially without a PC mouse which is during sunlight always a difficulty to move from one point to the next. The operating program is operated with a finger, which is known not to forget in the office, disappears in the tall grass or falling into the borehole. With this new operating concept, we are sure that we will make your job easier! Conventional devices, be it laptop or Pocket PC can of course still be used and are also supported by HT.

Datalogger installation – simple, conveniently and safely from 1 inch wells

Secure Installation

Supreme motto for the installation of HT Dataloggers, all possible precautions are taken so that the device can not fall into the borehole. By the standard fixing-ring of 2 inch (DN50) the Datalogger can be easily adapted to HT well caps. Check measurements with the Water Level Meter can be performed directly without removal of the Datalogger.

For smaller pipes HT can provide suitable fixing-rings, for check measurements, the converter unit of the Datalogger needs to be moved a few Centimetres.

For observation wells with a diameter of 2.5 inch or larger, intermediate rings are used to secure the fixing of the Datalogger. In cause of the design of the diameters it is not possible that the Datalogger can fall into the borehole.

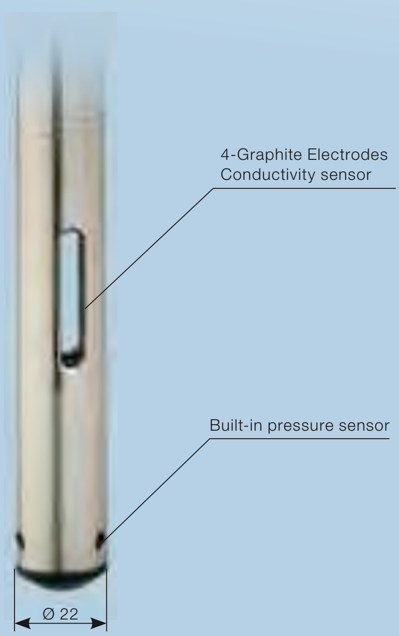
Please contact us if you have special sizes or special conditions of use. We can draw from an extensive archive of already implemented mounting options for Dataloggers.

Datalogger Type 575-LTC

Water Level	
Water Level	Relative pressure
Measuring range	selectable from 1 ... 300 m water column
Accuracy	< 0,05% of selected range
Long-term stability	< 0,05% of selected range / year
Resolution	Standard: 1 cm / Optional: 1 mm
Temperature correction	0 ... +50°C / Optional: 0 ... +70°C

Temperature	
Measuring range	-5 ... +50°C / Optional: -5 ... +70°C (Ice-free area)
Accuracy	< 0,1°C
Long-term stability	< 0,02°C / year
Resolution	0,1°C; Optional: 0,01°C

Conductivity	
Measuring range	0 ... 200.000 µS/cm
Accuracy	< 0,5% of current value, min. 2 µS/cm (0,002 mS/cm)
Resolution	0,001 mS/cm until value of 2 mS/cm 0,01 mS/cm until value of 20 mS/cm 0,1 mS/cm until value of 200 mS/cm



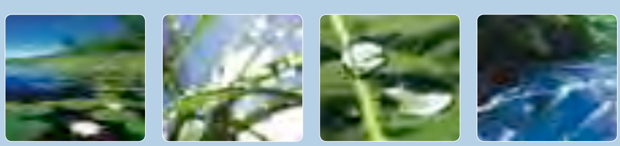
Device data	
Memory	Flash-memory 4MB for min. 253,000 recordings = 759,000 values
Power supply	Integrated Lithium-battery; guaranteed lifetime for 10 years or 3,000,000 measurements; Factory replaceable
Sample interval	Adjustable: 1 minute to 99 days Optional: from 1 second, 10 sample intervals pre-selectable
Interface	RS232, communication via serial and USB-interface
Accuracy clock	< 2 minutes / year

Mechanical Data	
Length of cable	Freely selectable until max. 500 m
Sensor immersion depth	max. 300 m water column
Vented cable	Ø 6 mm flexible, UV-resistant PUR coating; Kevlar strengthen to avoid cable-stretching; integrated tube for compensation of barometric fluctuation
Pressure transducer	Membrane made from Titan; Overload max. 4 fold FS, stability max. 2 fold FS
Conductivity sensor	4-Graphite electrodes; long-term stable and insensitive to contamination or dirt
Materials	Stainless steel 316Ti; POM fibreglass reinforced; Viton
Dimensions probe	Ø 22x315 mm
Dimensions conv. unit	Ø 24x140 mm
Protection class	IP 68, converter unit permanent seal until max. 3 m water column

Operating software	
Operating software Notebook / PC / Touch	Touch-friendly PC user interface; for XP, Vista, Win 7, Win 8 / 8.1
Operating software Pocket PC	Full functionality for operating program Win Mobile 5.0; 6.0; 6.1
Data file-format	Files are available as directly readable ASCII– files
Available formats	HT-Standard, Excel; *.zrxp; Labdüs; *.lgd; *.uvf; and many more Not the correct format there? Our software department can create the desired file-format

Manufacturer

HT Hydrotechnik GmbH
Im Wang 18 · Industriegebiet
87634 Obergünzburg / Germany
Tel.: +49(0)8372/9215-0
Fax: +49(0)8372/9215-16
eMail: service@ht-hydrotechnik.com
Internet: www.ht-hydrotechnik.com



Instruments and Monitoring for ground- and surface water

Knight Piésold CONSULTING

APPENDIX C

CALCULATION OF FREEZING POINT DEPRESSION POINT

(Pages C-1 to C-3)

APPENDIX C
DEVELOPMENT OF SITE-SPECIFIC FREEZING POINT DEPRESSION OF GROUNDWATER

A number of factors affect the freezing point depression of the groundwater, predominantly the salinity (or total dissolved solids, TDS) and hydraulic pressure. The freezing point depression used for the permafrost and talik characterization was based on the following site-specific data:

- The electrical conductivity (EC) logger installed in AMQ15-349A at a depth of approximately 150 m below ground surface (mbgs) froze at a temperature of approximately -0.4 to -0.6°C
- Vibrating wire piezometers installed in AMQ15-294, AMQ15-306 and AMQ15-349A at depths of approximately 150 mbgs froze at temperatures of approximately -0.3 to -0.5°C.
- The highest conductivity recorded by the EC logger prior to freezing was 7.96 mS/cm. Using a conversion factor of 0.67 gives a TDS of approximately 5300 ppm and a freezing point of approximately -0.35°C.

The TDS recorded by the EC logger was compared to values observed at other operating mines and mining projects in Nunavut and the Northwest Territories using data from Golder (2014) and Frape & Fritz (1987). The TDS value of 5300 ppm at a depth of 150 mbgs was extrapolated to depth using the Frape & Fritz relationship and a best-fit relationship developed for the Meadowbank Mine (Golder, 2014), as shown on Figure C.1.

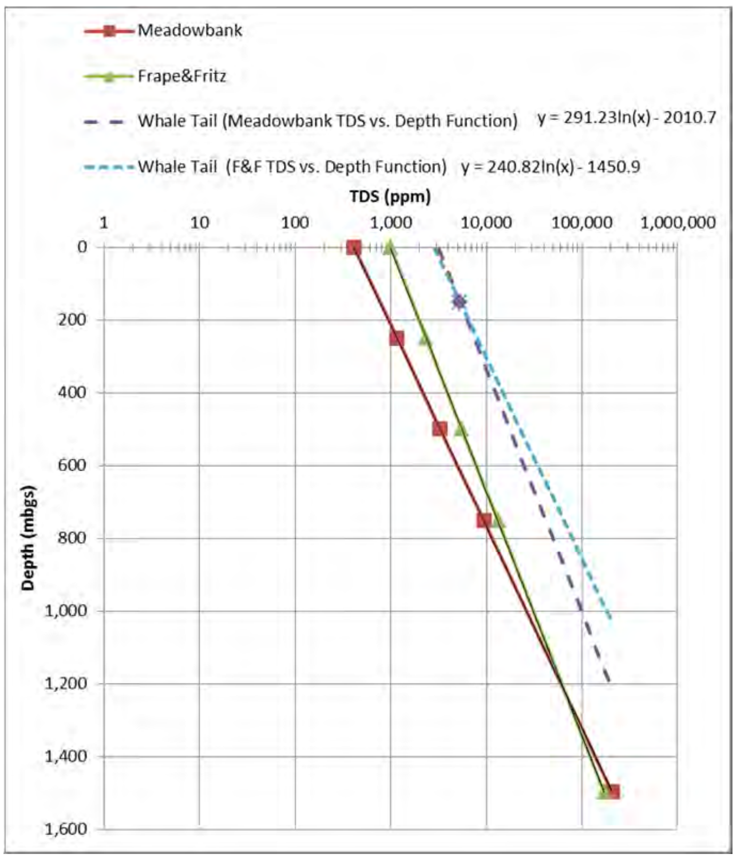


Figure C.1 Regional TDS Data vs Depth

The freezing point depressions associated with the TDS relationships presented in Figure C.1 were calculated using a relationship developed by Golder and AEM (Golder, 2014). Given the close proximity of the Meadowbank Mine to the Project, the Meadowbank TDS relationship was ultimately used. The relationship suggests a freezing point depression of approximately -1°C at a depth of 500 mbgs, as shown in Figure C.2.

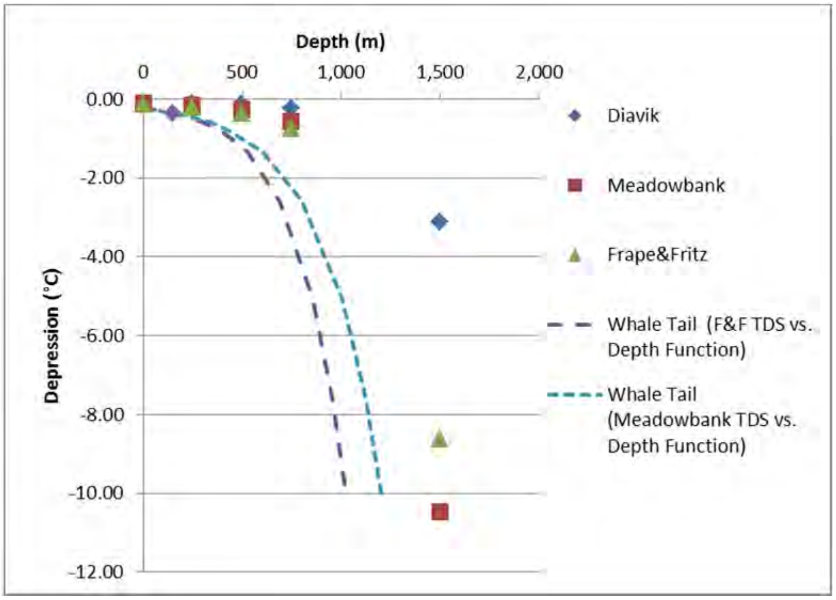


Figure C.2 Regional Freezing Point Depression vs Depth

The observed TDS and the calculated freezing point depression for the Project were compared to other operating mines and mining projects in Nunavut and the Northwest Territories:

- The TDS of 5300 ppm recorded by the EC logger is higher than TDS reported from similar depths at the Meadowbank Mine and the Diavik Mine but is less than the values seen at the Hope Bay Project and Lupin Mine.
- The calculated freezing point depression is lower than the data from the Meadowbank, Lupin and Diavik mines, but is higher than the data reported for numerous other mines and projects such as Meliadine, Back River and Hope Bay, as shown in Table C.1 below.

Table C.1 Summary of TDS and Freeze Point Depression data from cold climate mining studies

Site	Depth (mbgs)	TDS (mg/L)	Associated FP (deg C, [calculated])	Reference
Back River	515	47,000	-2.43	Sabina DEIS Vol 6, Sec 2.1.2.2
	620	76,000	-3.88	
Diavik	400	550	-0.11	Clayton et al 2013
Kiggavik	250	3500	-0.26	Kiggavik FEIS Vol 5-5B, 6.2 Results
Hope Bay	63 to 550	23,000 – 48,000	-1.2 to -2.5	Sabina DEIS Vol 6, Sec 2.1.1.3
	548	47,800	-2.47	Hope Bay Phase 2 Project Proposal
Lupin	250	39600	-2.06	Stotler, 2008
	570	4000	-0.28	
Meliadine	454	60,000 – 70,000	-3.1 to -3.6	Sabina DEIS Vol 6, Sec 2.1.1.3

The freezing point depression used in the permafrost and talik assessment was based on the data specific to the Project (-0.35°C at 150 mbgs) and the Meadowbank TDS vs depth relationship. The freezing point depression should be considered preliminary and will be re-evaluated as additional data is collected.

Note that the TDS of 5300 ppm recorded by the EC logger has been used solely for the purposes of estimating the freezing point depression. The recorded TDS should not be used for assessing groundwater quality until it can be confirmed through the collection of representative groundwater quality samples at the Project.

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APPENDIX D

ANALYTICAL AND NUMERICAL THERMAL MODELING

(Pages D-1 to D-8)

ANALYTICAL SOLUTION: FORMATION OF OPEN TALIKS UNDER ELONGATE LAKES

Burn (2002) developed a series of analytical solutions to describe talik development under surface water bodies. The solutions were developed to match the lake shape (circular or elongate), and to acknowledge the presence of a shallow terrace around the lake perimeter. In the case of the elongate nature of Whale Tail lake, the analytical equations of temperature profiles under lakes with terraces are presented by Burn (2002), can be estimated using the following equation:

Equation 1: Elongate Lake with Terrace

$$T_z = T_g + \frac{z}{l} + \frac{(T_t - T_g)}{\pi}\left(2tan^{-1}\frac{H_{p+t}}{z}\right) + \frac{(T_p - T_t)}{\pi}\left(2tan^{-1}\frac{H_p}{z}\right)$$

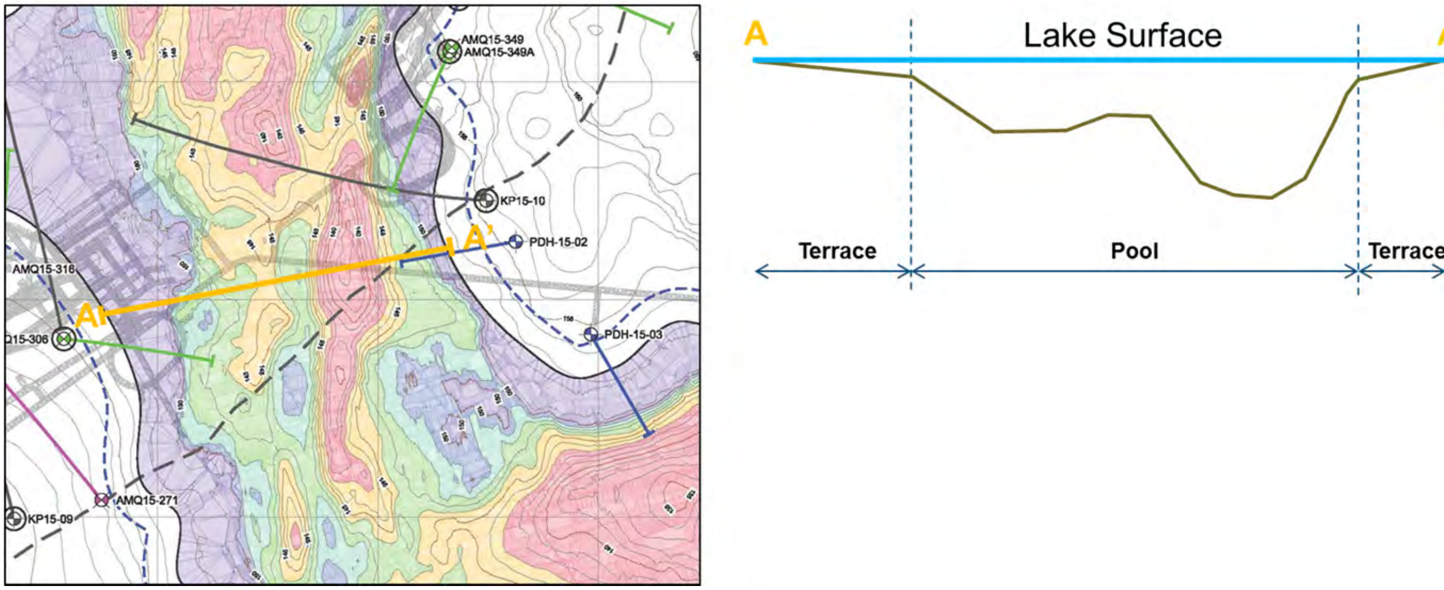
where:
z = depth (metres);
H_l = half-width of the lake (m);
T_z = temperature (°C) at depth z (m);
T_g = mean annual ground surface temperature (°C);
T_p = mean annual temperature at the bottom of the central pool (°C);
T_t = mean annual temperature of the terrace (°C);
H_p = half-width of the central pool (m);
H_{p+t} = half-width of the lake (pool and terrace) (m); and,
l = inverse of geothermal gradient (m/°C).

The input parameters for the equation are presented in the table below. Figure 1 presents one of the cross sections (CS1) showing the bathymetry of the lake and the interpretation of lake terraces (depth of <2 m).

Parameter	Value	Source
T_z =	Temperature at depth(z, °C);	Calculated
T_g =	Mean annual ground surface temperature (°C);	Extrapolated from AMQ15-324 geothermal gradient
z =	Depth (m);	From bottom of lake (1-10 m) to *below* base of permafrost (500 m)
l =	Inverse of geothermal gradient (m/°C);	Estimated From AMQ15-324
T_t =	Mean annual temperature of the terrace (°C);	Literature value used (-2°C, Burn 2002)
T_p =	Mean annual temperature at the bottom of the central pool (°C);	Literature value used (4°C, Burn 2002)
H_{p+t} =	Half-width of the lake (pool and terrace, m);	Measured off S.I. Plan
H_p =	Half-width of the central pool (m);	Measured off S.I. Plan

Table 1: Summary of input Parameters to Analytical and Numerical modeling

Figure 1: Cross section 1 (CS1) bathymetry



NUMERICAL SOLUTION: FORMATION OF OPEN TALIKS UNDER ELONGATE LAKES- TEMP - W

The finite element code Temp-W was used to simulate the ground temperature conditions through the cross sections of Whale Tail Lake. The model setup for each of the three sections can be viewed in the figures below. The input parameters can be summarized in **Error! Reference source not found.**.

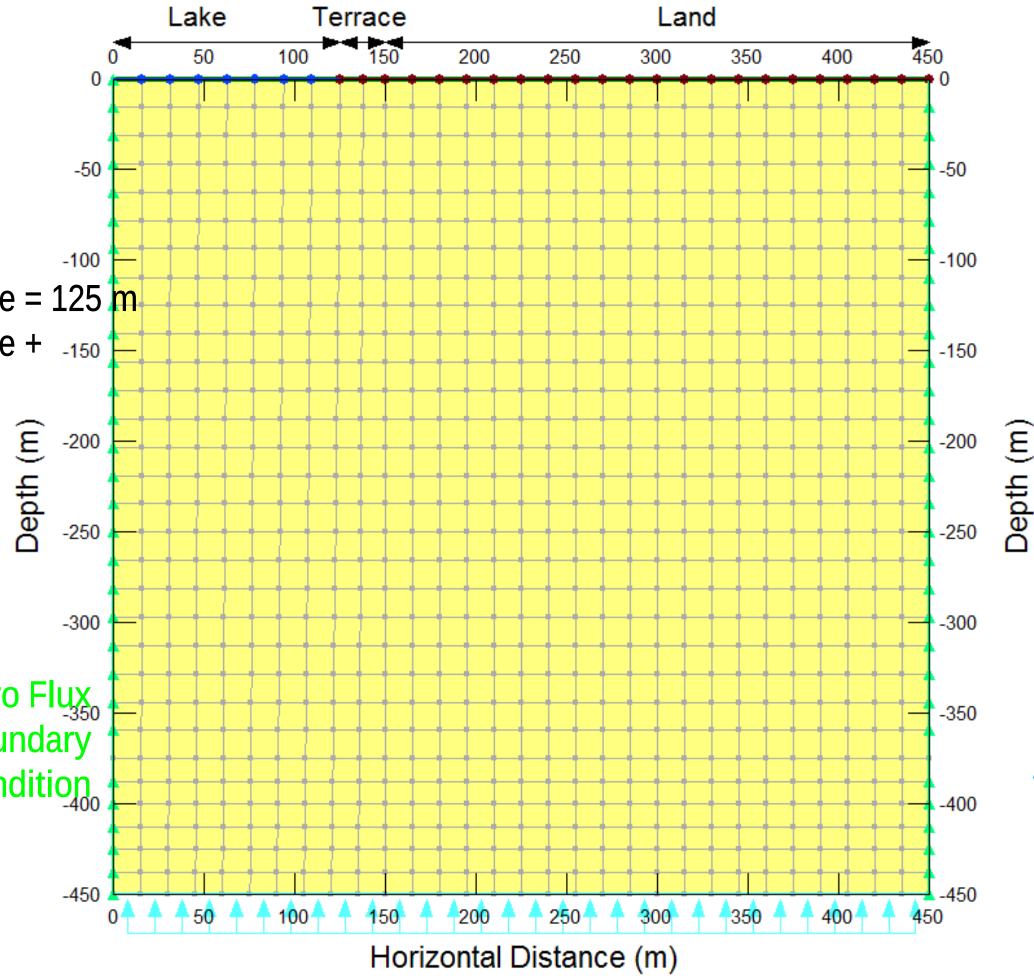
Parameter	Value	Source
MAST	Mean annual ground surface temperature (°C);	Meadowbank Weather Station
Depth	Depth (m);	From bottom of lake (1-10 m) to *below* base of permafrost (500 m)
Geothermal Heat Flux	Geothermal gradient (m/°C);	Estimated From AMQ15-324
T_t	Mean annual temperature of the terrace (°C);	Literature value used (-2°C, Burn 2002)
T_p	Mean annual temperature at the bottom of the central pool (°C);	Literature value used (4°C, Burn 2002)
H_{p+t}	Half-width of the lake (pool and terrace, m);	Measured off S.I. Plan
H_p	Half-width of the central pool (m);	Measured off S.I. Plan

Table 2: **Summary of input Parameters to Temp-W Numerical model**

CS1 – TEMP/W Model

Mean Annual Lake-Bottom Temperature = 4°C (Literature Study)

Mean Annual Ground Surface Temperature = -11.3° C (Meadowbank Weather Station)



Dimensions:
Half Width of Lake = 125 m
Half Width of Lake + Terrace = 140m
(From SI Plan)

Zero Flux Boundary Condition

Geothermal Heat Flux = 7.26 kJ/days/m² based on local geothermal gradient (0.021°C/m-AMQ15-324) and estimated thermal conductivity of the bedrock (Greywacke (USGS, 1988))

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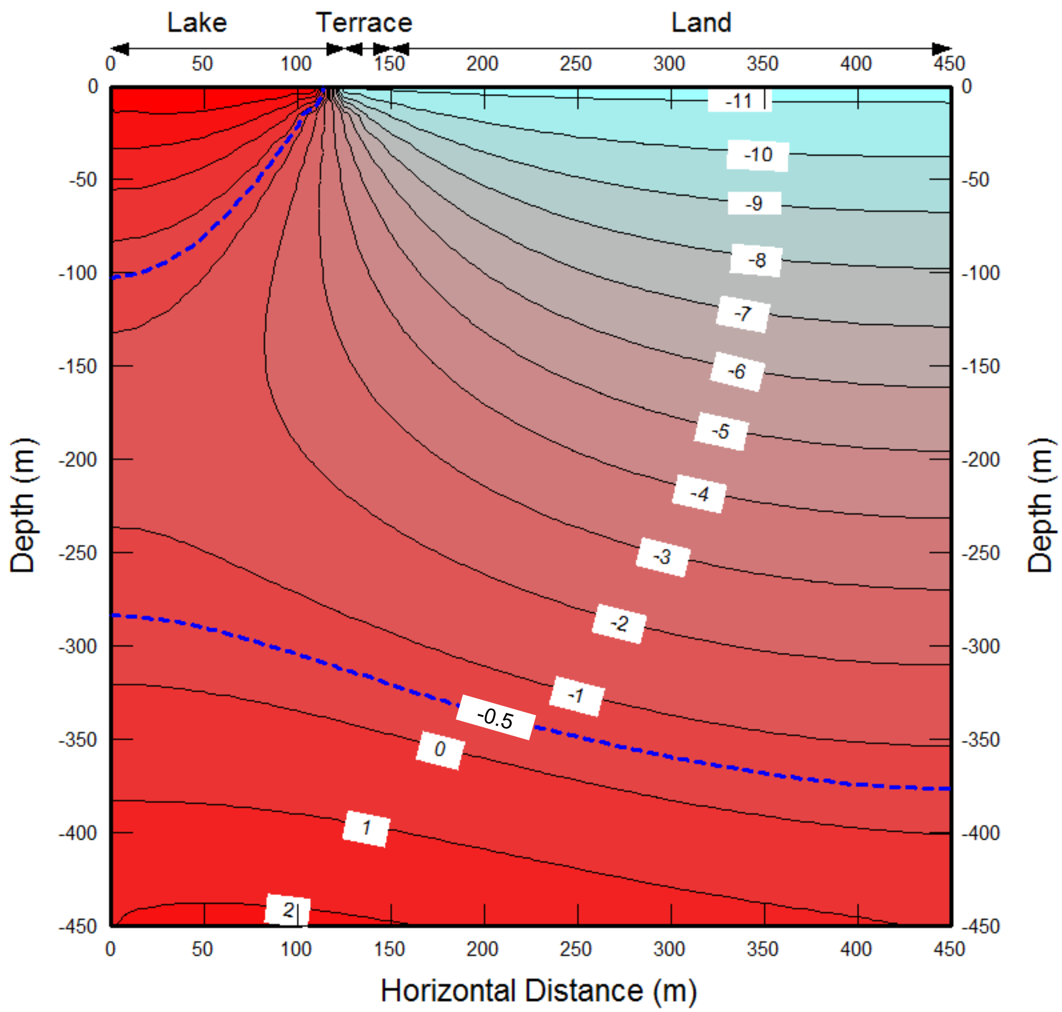
CS1 – TEMP/W Results



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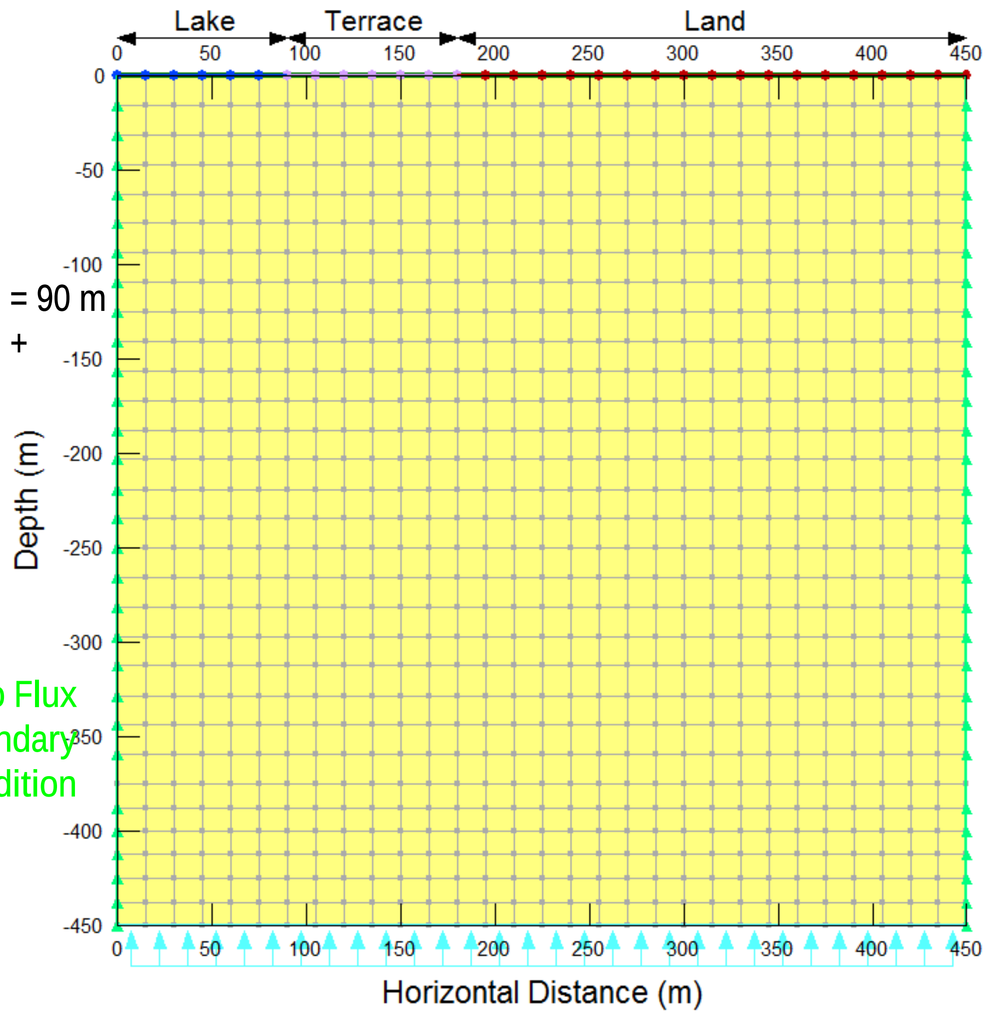
CS2 – TEMP/W Model

Mean Annual Lake-Bottom Temperature = 4°C (Literature Study)

Mean Annual Terrace Temperature = -2°C (Literature Study)

Mean Annual Ground Surface Temperature = -11.3° C (Meadowbank Weather Station)

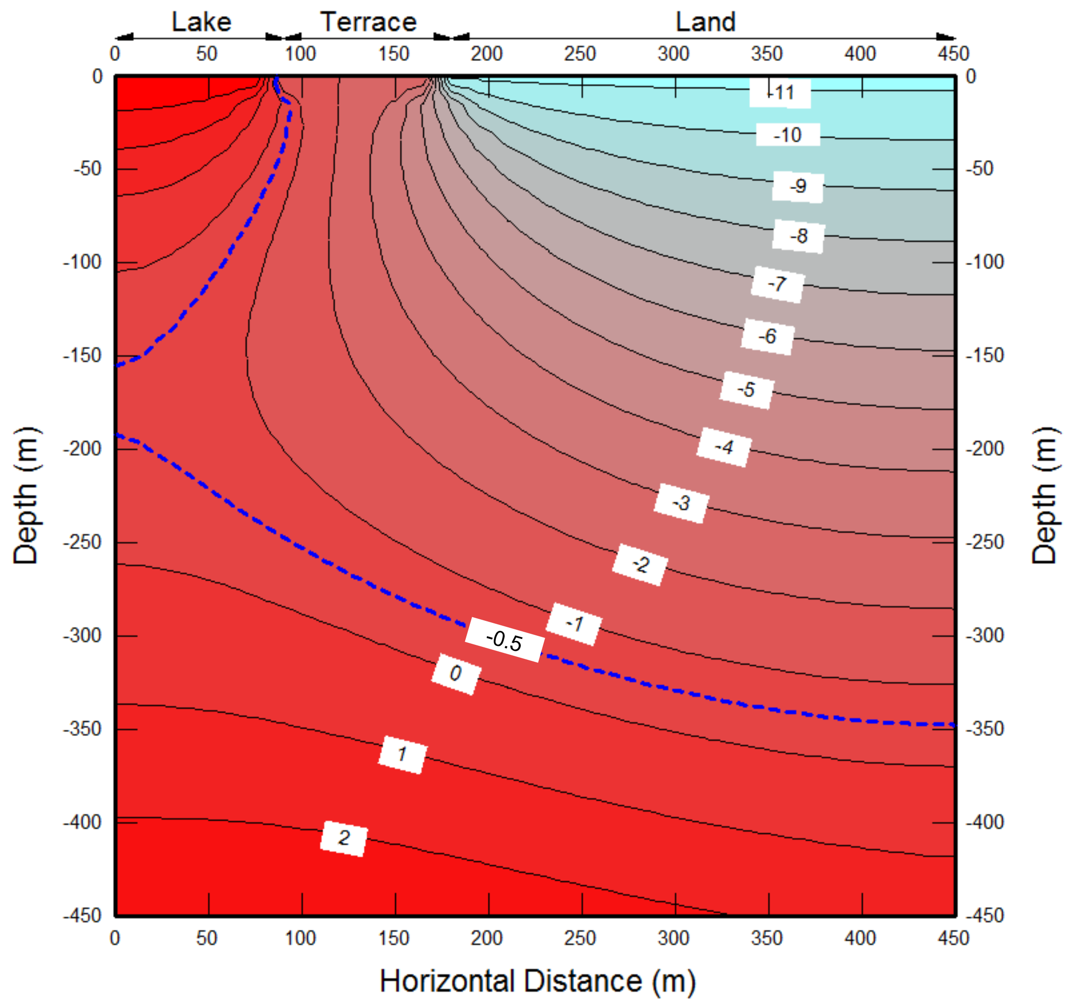
Dimensions:
Half Width of Lake = 90 m
Half Width of Lake + Terrace = 180m
(From SI Plan)



Zero Flux Boundary Condition

Geothermal Heat Flux = 7.26 kJ/days/m² based on local geothermal gradient (0.021°C/m-AMQ15-324) and estimated thermal conductivity of the bedrock (Greywacke (USGS, 1988))

CS2 – TEMP/W Results



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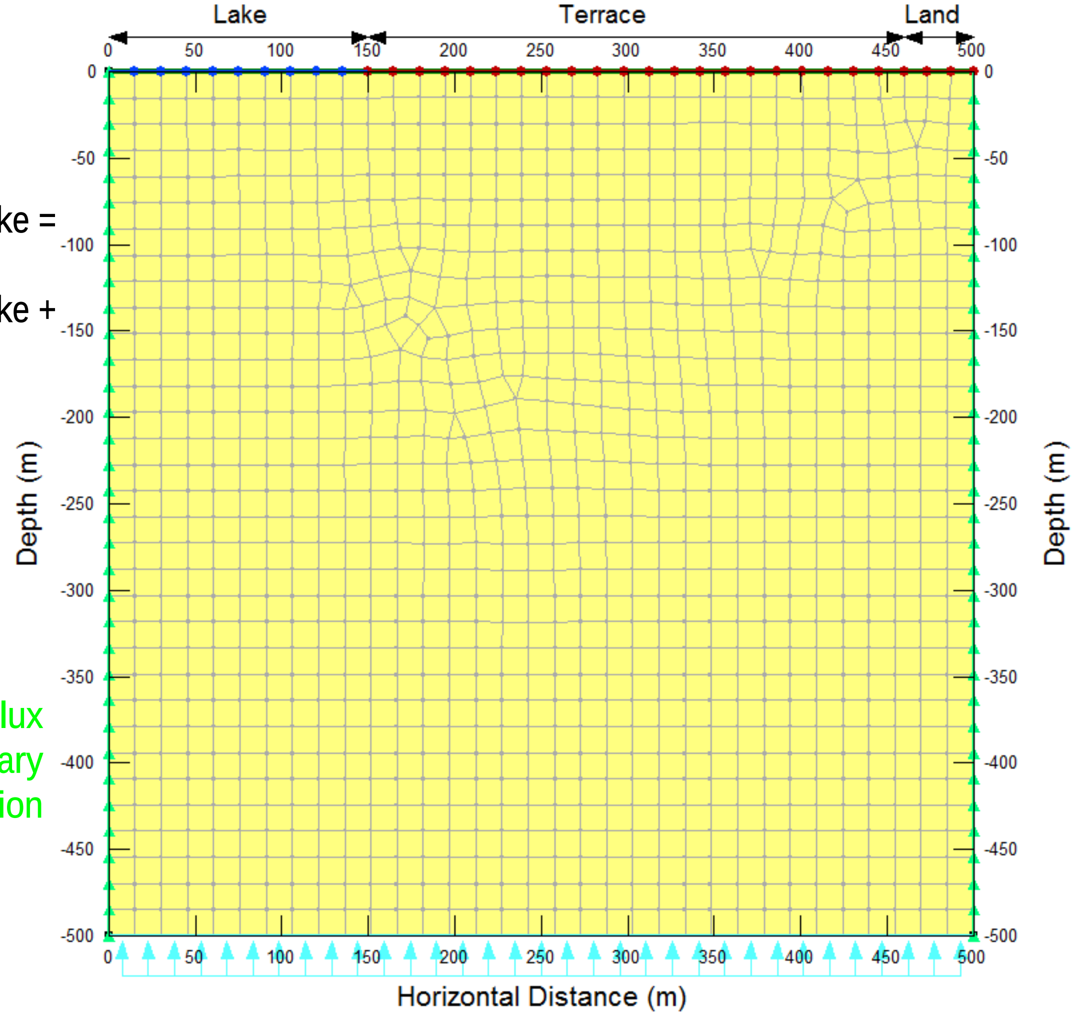
CS3 – TEMP/W Model

Mean Annual Lake-Bottom Temperature = +4ºC (Literature Study)

Mean Annual Ground Surface Temperature = -11.3ºC (Meadowbank Weather Station)

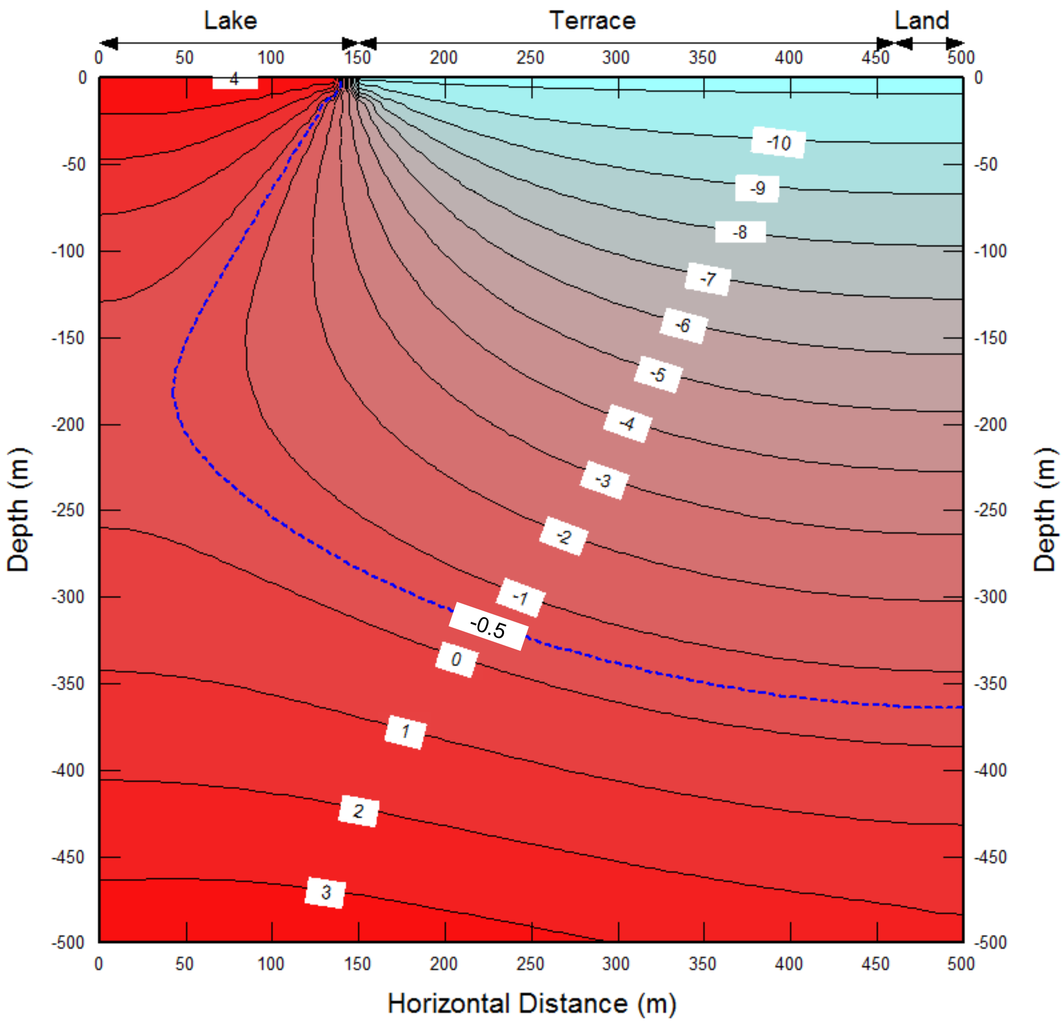
Dimensions:
Half Width of Lake = 150 m
Half Width of Lake + Terrace = 460m
(From SI Plan)



Zero Flux Boundary Condition

Geothermal Heat Flux = 7.26 kJ/days/m²
based on local geothermal gradient (0.021ºC/m-AMQ15-324) and estimated thermal conductivity of the bedrock (Greywacke (USGS, 1988))

CS3 – TEMP/W Results



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MEMORANDUM

To:	Mr. Serge Ouellet	Date:	November 20, 2015
Copy To:	Ben Peacock	File No.:	NB101-00622/04-A.01
From:	Ben Green	Cont. No.:	VA15-03382
Re:	Agnico Eagle Mines Ld.: Meadowbank Division – Whale Tail Pit - Groundwater Inflow Assessment		

1 – INTRODUCTION

Agnico Eagle Mines Ltd. (AEM) is developing the Whale Tail Pit in Nunavut, Canada. The Project is located 50 km northwest of AEM's Meadowbank Mine and 160 km northwest of Baker Lake. AEM is currently evaluating the potential for mining the satellite Whale Tail deposit using open pit mining methods.

Knight Piésold Ltd. (KP) was retained to provide geomechanical and hydrogeological services to support permitting and pre-feasibility level open pit mine design for the Project. One of the objectives of this scope of work is to characterize the quantity and quality of groundwater that could be expected to flow into the open pit. The groundwater quality is covered in (KP, 2015a).

The proposed open pit has a maximum depth of 120 m and is approximately 1,300 m long and 490 m wide. AEM plan to build a dam to the south and drain the northern portion of the lake. The current mine plan details the open pit extraction beginning in the last quarter of 2018 and continuing until the end of 2021.

This memorandum focuses on the quantity of groundwater inflows to the proposed open pit. A brief description of the deposit geology, as well as the permafrost and talik conditions expected in the vicinity of the deposit, is also provided. The permafrost and talik characterization is described in detail in (KP, 2015a).

2 – AVAILABLE RESOURCES

Information reviewed as part of the groundwater inflow assessment included:

- Staged open pit designs from 2018 Q4 until the end of 2021 (AEM, 2015b)
- Whale Tail Lake bathymetry (Groupe Conseil Nutshimit-Nippour, 2015)
- Lithology and structural, models (AEM, 2015a)
- Hydraulic conductivity data from eighteen packer tests conducted during the 2015 site investigation program completed by KP
- Ground temperature data from thermistors installed in six geotechnical boreholes during the 2015 site investigation program completed by KP
- Rock mass quality data collected during the 2015 site investigation program completed by KP, and
- The expected permafrost and talik conditions beneath Whale Tail Lake (KP, 2015a).

3 – GEOLOGY

The following summary of the deposit geology is summarised from AEM (2014) unless otherwise noted. The main lithologies encountered at the Project are summarized below:

- **Overburden:** The overburden layer in the vicinity of the pit is generally expected to be thin, with observed thicknesses of approximately 10 m.
- **Greywacke (S3):** The Greywacke is the most common lithology at the Project. This unit hosts the deposit and is also internal to it. The Greywacke is fine to medium grained and can be altered and/or deformed in the vicinity of the mineralized zones.

- **Mafic Volcanics (V3):** The Mafic Volcanics are present along the southern limit of the deposit and primarily consist of basalt. This package has been heavily folded and is characterized by a schistose or chaotic texture. Biotite and chlorite alteration are common within the Mafic Volcanics.
- **Ultramafics (Komatiite, V4):** The ultramafic volcanic unit, or Komatiite, bounds the northern and southern limits of the deposit. This unit is commonly altered to a chlorite-talc-carbonate schist (soapstone) with chaotic carbonate veining. The Komatiite is characterised by variable rock mass quality and can be faulted.
- **Altered Ultramafics (V3F):** The Komatiite can be locally altered and deformed, notably along the contact with the sedimentary units. The Altered Ultramafics are more competent and have more consistent rock mass quality than the Komatiite. The unit is often mineralized with disseminated sulphides and is one of the primary mineralized zones identified within the deposit.
- **Chert (S10):** A sedimentary unit consisting of interbedded bands of Chert, sediments and thin beds of iron formation. The Chert both hosts and forms many of the mineralized zones identified within the deposit. The Chert can be flooded with silica and has been locally heavily folded.
- **Graphitic Chert (S10E):** In some areas, the Chert has been interlayered with graphitic mudstone, resulting in a unit known as the Graphitic Chert. The Graphitic Chert has been intensely deformed causing it to appear chaotic and brecciated.
- **Mudstone (S6):** Well-banded fine grained sedimentary rock. This unit is often transitional with the Chert and Graphitic Chert.
- **Diorite (I2):** The Diorite is an intrusive unit located to the south of the Whale Tail deposit. The diorite is unmineralized.

A typical cross-section of the deposit is shown on Figure 1. Stratigraphy strikes towards the southwest and dips, at least initially, towards the south.

Structurally, the deposit lithologies trend ENE-WSW, which may represent the axis of an anticline or syncline. This is the dominant structural orientation. A series of diffuse ductile structures do exist that trend NE-SW, which offsets both the lithologies and the mineralization. A sub-horizontal set of structures has also been identified during the geomechanical site investigation program.

4 – PACKER TESTING

Eighteen (18) constant head hydraulic conductivity packer tests were completed in six geotechnical boreholes that were drilled during the geomechanical and hydrogeological site investigations undertaken between June 8 and October 4, 2015. Testing was completed using an HQ sized Standard Wireline Packer System (SWiPS) system manufactured by Inflatable Packers International (IPI). The results of the packer testing estimated relatively low hydraulic conductivities between less than 1 $x10^{-9}$ m/s (the achievable precision of the SWiPS) and 5 $x10^{-8}$ m/s. The results are summarized in Table 1.

Some uncertainty as to whether all of the tests were completed in talik exists due to the preliminary nature of the thermistor data used to define the extent of the talik (KP, 2015b). Two packer tests were completed in AMQ15-349A that were thought to be completely within the talik. These tests resulted in horizontal conductivity estimates of 1 $x10^{-8}$ m/s and 5 $x10^{-8}$ m/s.

5 – PERMAFROST AND TALIK CHARACTERIZATION

Groundwater regimes in permafrost regions are characterized as two systems separated by permafrost; the active layer and the deep regional groundwater system. A talik is a region of unfrozen ground that can form beneath large lakes. Fluids within a talik may remain in a liquid phase at temperatures below zero due to freezing point depression caused by high total dissolved solids (TDS) and hydrostatic pressure. An open talik is one which extends from the lakebed down through the surrounding permafrost to the regional groundwater table.

Open taliks form beneath large lakes and represent the primary connecting pathway for groundwater flow between the active layer and the regional groundwater system.

KP characterized the permafrost and potential for talik formation beneath Whale Tail Lake using the thermistor and hydraulic conductivity data from the geomechanical and hydrogeological site investigation program. The characterization is detailed in KP (2015a) and is summarised below:

- The depth to the base of continuous permafrost is expected to be approximately 420 metres below ground surface (mbgs).
- Freezing point depression beneath Whale Tail Lake ranges from -0.23°C beneath the lake to -0.75°C at 420 mbgs. These estimates are based upon an exponential freezing point depression vs. TDS function developed for the Meadowbank Mine (Golder, 2012) and on an exponentially increasing TDS relationship with depth (Golder, 2014) that has been calibrated to the Project TDS data.
- The western “fluke” of Whale Tail Lake is shallow and likely overlies permafrost. The eastern fluke is deeper and likely overlies a talik. Preliminary thermistor data and I-D analytical solutions from Burn (2002) indicate that the talik below the eastern fluke does not connect vertically through to the regional groundwater system (Figure 2).
- Whale Tail Lake is large and deep beneath the proposed attenuation pond and it overlies a talik that may connect through to the regional sub-permafrost groundwater system (Figure 2).

6 – CONCEPTUAL HYDROGEOLOGICAL MODEL

The hydrogeological conceptual model at the Project is largely a function of the permafrost and talik characterization described in KP (2015a). Other input data and assumptions used to develop the conceptual model include:

- For the purposes of the inflow assessment the vertical and horizontal hydraulic conductivities of permafrost are assumed to be zero.
- The horizontal hydraulic conductivity within the Whale Tail Lake talik zone is conservatively estimated to be $1x10^{-8}$ m/s based on the results of the packer testing summarized in Table 1.
- The vertical hydraulic conductivity is typically estimated to be considerably less than horizontal hydraulic conductivity (in lieu of sufficient data to indicate otherwise). This relationship may not be valid at the Project where both stratigraphy and structure are steeply dipping to sub-vertical, and where horizontal flow within talik zones is restricted by the areal extent of the talik. As a result, the vertical hydraulic conductivity was conservatively assumed to be equal to the horizontal hydraulic conductivity ($1 x10^{-8}$ m/s).
- The active layer is estimated to average 3 m thick, with a horizontal hydraulic conductivity of $1 x10^{-7}$ m/s while thawed based on the thickness of the active layer at other Projects in Northern Canada (Rescan, 2014).
- The available geomechanical data indicate that the bedrock close to surface is weathered and more fractured than the deeper bedrock. This is likely due to successive freeze/thaw cycles. The horizontal hydraulic conductivity of this weathered bedrock cap is estimated to be $1x10^{-7}$ m/s within the talik zone and zero within the surrounding permafrost. The thickness of this weathered bedrock cap is estimated to be 30 m.
- In-situ hydraulic head data is not currently available for the deposit. As a result, the direction and magnitude of the hydraulic gradients at the Project are unknown. Hydraulic gradients prior to the development of the open pit are expected to be small, since the lake elevations in the project area are all reasonably similar due to the flat topography.

Key aspects of the hydrogeological regime relevant to the groundwater inflow assessment are summarized below:

- The regional groundwater gradient is controlled by the elevations of large lakes in the area that are connected to the sub-permafrost groundwater system through a series of open taliks.
- Groundwater flow (through taliks from lakes to sub-permafrost groundwater and vice versa) will be along open fractures, faults, and joint systems conduits as defined by the regional structural orientations.

7 – GROUNDWATER INFLOW ESTIMATES

An estimate of groundwater inflows to Whale Tail Pit has been completed based on the available data and the conceptual hydrogeological model. Groundwater inflow estimates to the open pit were calculated every 3 months for the life of the open pit (years 2018 to 2021) based on the open pit designs provided by AEM. Proposed pit floor depths for the years where the pit will intersect the talik range from 15 to 137 meters below ground surface (mbgs).

KP expects there to be three main sources of inflows to the proposed open pit based on the hydrogeological conceptual model above:

- Seasonal inflows from the active layer.
- Perennial leakage inflows induced by the hydraulic gradient which will develop between the dammed portion of Whale Tail Lake and the floor of the open pit.
- Perennial inflows from the talik induced by the hydraulic gradient between nearby lakes connected to the regional groundwater system and the floor of the open pit, once the pit intersects the footprint of the talik in 2019 Q3.

A schematic diagram of expected inflows is provided in Figure 3.

Two analytical equations were selected to calculate an estimate of groundwater inflows as the open pit develops:

- The Dupuit (1863) equation for horizontal groundwater flow was used to simulate inflow to the open pit from the active layer and leakage from Whale Tail Lake, and
- The Hvorslev (1951) Type D equation was used to estimate inflows from the talik intersected by the open pit.

These analytical methods were used to estimate the inflows from three different sources. These methods are summarized below:

- **Dupuit Equation – Active Layer Inflows:** Development of Whale Tail Pit will result in a seepage face along the perimeter of the pit. Active layer inflows to the pit will cause a drawdown and a gradient for groundwater flow within the active layer. The rate of flow in the active layer is a function of the hydraulic conductivity of the active layer and of the gradient which develops. Recharge to the active layer will include thawed groundwater, snowmelt, precipitation, and leakage from nearby lakes and rivers. Inflows from the active layer will only occur during months with average air temperatures above 0°C. Inflows will occur along the entire perimeter of the open pit.
- **Dupuit Equation – Whale Tail Lake Dam Induced Inflows:** KP understands that the portion of Whale Tail Lake overlying the proposed open pit is to be drained and the southern extent of the lake retained behind a dam. This will create a hydraulic gradient between the surface of the lake behind the dam and the floor depth of the open pit. Inflows will occur through the weathered bedrock cap below the drained portion of the lake towards the pit, when the pit intersects the talik. This inflow is expected to be first encountered in Q3 of 2019 when the open pit will first intersect the lake and underlying talik. The inflow rate will depend on the hydraulic conductivity of the weathered bedrock zone (assumed 1×10^{-7} m/s), the hydraulic gradient which develops in the weathered bedrock unit, and the area through which flow occurs.
- **Hvorslev Type D Equation – Inflows through the Talik:** The hydraulic head of the regional sub-permafrost groundwater is controlled by the surface elevation of large lakes with open taliks. Once the open pit intersects the talik in Q3 of 2019, a hydraulic gradient between regional lakes (approximately ground surface) and the floor of the open pit will develop. Groundwater will begin to discharge from the talik beneath the open pit. This flow will utilize open fractures and joints as preferred conduits; however, inflows are expected to be limited by the vertical hydraulic conductivity (1×10^{-8} m/s, 0.32 m/yr). Therefore although the regional hydraulic gradient provides the driving force for groundwater inflows from the talik, the actual discharge over the life of the open pit is expected to be limited to groundwater immediately below the pit.

Calculated inflows do not account for the possibility of intersecting higher conductivity fault or fracture systems during pit development than has been encountered during drilling and packer testing thus-far.

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Inflows in the fourth quarter of 2021 from dam leakage and the underlying talik are expected to be 0.12 L/s and 0.29 L/s, respectively, for a total inflow rate of 0.41 L/s (35 m^3/day). The estimated groundwater inflows to the open pit from the active layer, Whale Tail Lake, and the regional groundwater system is summarised on a quarterly basis in Table 2.

Prepared: for: Eric Westberg, M.Sc., GIT
Staff Hydrogeologist

Reviewed: Ben Green, M.Sc., P.Geo.
Senior Hydrogeologist

PROFESSIONAL PROVINCE OF BRITISH COLUMBIA M.B. GREEN #48877 GEOSCIENTIST 20 Nov 2015

Approval that this document adheres to Knight Piésold Quality Systems:

Attachments:

Table 1 Rev 0	Drillhole Packer Testing Summary
Table 2 Rev 0	Estimated Groundwater Inflows
Figure 1 Rev 0	Typical Deposit Cross-Section
Figure 2 Rev 0	Assumed Talik Footprint beneath Whale Tail Lake
Figure 3 Rev 0	Conceptual Sources of Groundwater Inflow

References:

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TABLE 1

AGNICO EAGLE MINES LTD. MEADOWBANK DIVISION
WHALE TAIL PIT

GROUNDWATER INFLOW ASSESSMENT
DRILLHOLE PACKER TESTING SUMMMARY

Print Nov/20/15 12:31:13

Planning Drillhole Name	Actual Drillhole Name	Surveyed Drillhole Details[2]						Hydraulic Testing			
		Collar Coordinates[1]			Azimuth	Dip	Final Length	Along-Hole Packer Testing Interval		Constant Head Test Results[3]	Test Interval Lithology
		Easting	Northing	Elevation							
		(m)	(m)	(m)	(°)	(°)	(m)	From (m)	To (m)	(m/s)	
KP15-01A	AMQ15-326A	606,430.9	7,255,330.8	10,154.6	287	-58	180	160.3	180.0	No Take	ULTRAMAFIC
KP15-02	AMQ15-316	606,655.1	7,255,428.2	10,154.1	7	-54	189	181.3	189.0	$< 1 \times 10^{-9}$	GREYWACKE
KP15-04	AMQ15-349A	607,064.9	7,255,627.5	10,155.3	204	-45	203	97.3	141.0	5×10^{-8}	GREYWACKE, ALTERED ULTRAMAFICS
								136.3	180.0	1×10^{-8}	GREYWACKE, ALTERED ULTRAMAFICS
								178.3	202.5	$< 1 \times 10^{-9}$	GREYWACKE, ALTERED ULTRAMAFICS
KP15-05	AMQ15-306	606,714.8	7,255,363.8	10,154.9	96	-45	201	52.3	100.5	$< 1 \times 10^{-9}$	GREYWACKE
								103.3	162.0	$< 1 \times 10^{-9}$	GREYWACKE
								178.3	201.0	$< 1 \times 10^{-9}$	GREYWACKE
KP15-07	AMQ15-294	607,073.2	7,255,676.1	10,155.9	323	-45	221	100.3	150.0	1×10^{-9}	ULTRAMAFICS, ALTERED ULTRAMAFICS, QUARTZ VEINS
								201.8	220.5	9×10^{-9}	GREYWACKE
KP15-09	AM15-452	606,627	7,255,688	10,156	160	-50	501	127.3	177.0	$< 1 \times 10^{-9}$	GREYWACKE
KP15-10	AMQ15-421	607,098	7,255,491	10,155	274	-51	501	94.3	150.0	1×10^{-9}	DIORITE, GREYWACKE, ALTERED ULTRAMAFICS
								148.3	201.0	$< 1 \times 10^{-9}$	ALTERED MAFICS
								199.3	225.0	$< 1 \times 10^{-9}$	ALTERED ULTRAMAFICS
								298.3	330.0	1×10^{-9}	ULTRAMAFICS
								328.3	455.6	$< 1 \times 10^{-9}$	ULTRAMAFICS
								469.3	501.0	$< 1 \times 10^{-9}$	GRAPHIC CHERT

I:\1\01\00622\04\A\Correspondence\VA15-03382 - Pit Inflows Rev. 3\Tables\Working\[Table 1.xlsx]Table 1 Packer Testing Summary

NOTES:

1. COLLAR COORDINATES SURVEYED AND PROVIDED BY AEM. COORDINATES ARE IN UTM ZONE 14W; ELEVATIONS ARE TRANSLATED FROM THE MINE GRID.
2. REPORTED AZIMUTH AND DIPS ARE THE DRILLHOLE AVERAGE.
3. 1E-09 m/s IS LOWER LIMIT OF SWiPS PACKER TESTING PRECISION.

0	20OCT'15	ISSUED WITH MEMO VA15-03382	REW	MBG
REV	DATE	DESCRIPTION	PREP'D	RVW'D

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TABLE 2

AGNICO EAGLE MINES LTD. MEADOWBANK DIVISION
WHALE TAIL PIT

GROUNDWATER INFLOW ASSESSMENT
ESTIMATED GROUNDWATER INFLOWS

Print Nov/20/15 12:26:21

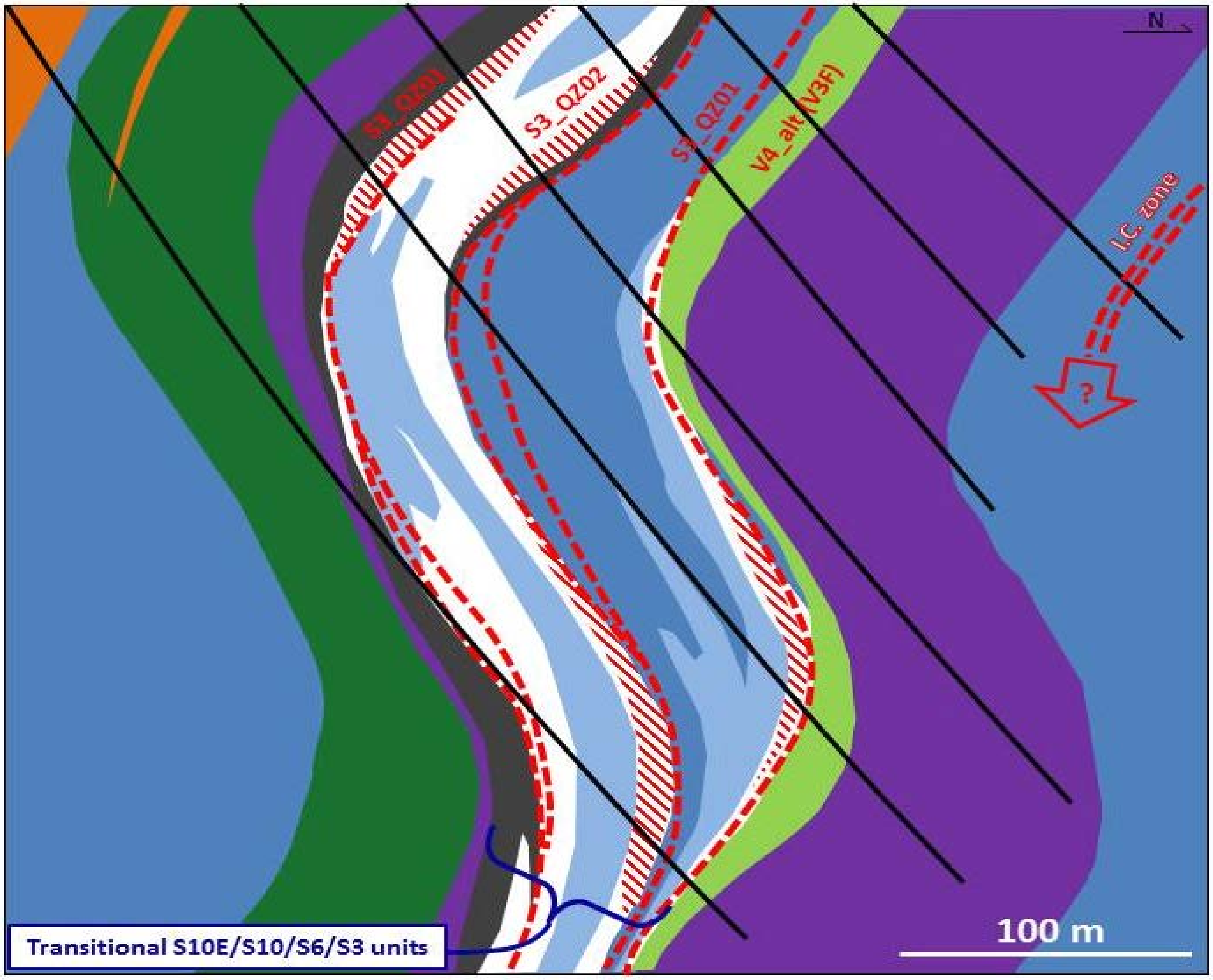
Pit Year	Cumulative Quarter	Talik Intersection	Active Layer Inflows	Dam Leakage	Talik Inflows	Total Inflows	Total Inflows
		(yes/no)	(L/s)	(L/s)	(L/s)	(L/s)	(m^3/day)
2018 Q4[1]	1	no	-	-	-	-	-
2019 Q1[1]	2	no	-	-	-	-	-
2019 Q2[1]	3	no	0.06	-	-	0.06	5
2019 Q3[1]	4	yes	0.11	0.12	0.06	0.30	26
2019 Q4[1]	5	yes	-	0.12	0.06	0.18	16
2020 Q1	6	yes	-	0.12	0.06	0.18	16
2020 Q2[1]	7	yes	0.11	0.12	0.11	0.34	29
2020 Q3[1]	8	yes	0.11	0.12	0.15	0.38	33
2020 Q4[1]	9	yes	-	0.12	0.17	0.29	25
2021 Q1[1]	10	yes	-	0.12	0.29	0.41	35
2021 Q2	11	yes	0.11	0.12	0.29	0.52	45
2021 Q3	12	yes	0.11	0.12	0.29	0.52	45
2021 Q4	13	yes	-	0.12	0.29	0.41	35

I:\1\01\00622\04\A\Correspondence\VA15-03382 - Pit Inflows Rev. 3\Tables\Working\[Table 2.xlsx]Table 2

NOTES:

1. OPEN PIT DIMENSIONS PROVIDED IN AEM DEVELOPMENT SCHEDULE (AEM 2015b). ADDITIONAL QUARTERS CONSIDERED TO ALLOW EXPRESSION OF ACTIVE LAYER INFLOWS. PIT DIMENSIONS OF ADDED QUARTERS ASSUMED THE SAME AS PREVIOUS QUARTER PIT DIMENSIONS PROVIDED BY AEM.
2. ACTIVE LAYER INFLOWS ONLY OCCUR DURING SUMMER (Q2 AND Q3).
3. BEDROCK INFLOWS DO NOT OCCUR UNTIL THE OPEN PIT INTERSECTS THE LAKE AND UNDERLYING TALIK IN Q3 2019.
4. (-) DENOTES NO INFLOW OCCURING.

0	12NOV'15	ISSUED WITH MEMO VA15-03382	REW	MBG
REV	DATE	DESCRIPTION	PREP'D	RVW'D



- Diorite (I2)
- Mafic volcanic/Intrusive (V3/I3)
- Graphitic Chert (S10E)
- Chert (S10)
- Mudstone (S6)
- Greywacke (S3)
- Ultramafic Volcanic (V4)
- Altered and mineralized ultramafic (V4_alt or V3F)
- Quartz Vein
- Chert silica flooded (S10 Si+)

NOTES:

1. CROSS-SECTION PROVIDED BY AEM (MARCH 5, 2015).

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	20OCT'15	ISSUED WITH MEMO	MJR	BDP

AGNICO EAGLE MINES LTD. MEADOWBANK DIVISION

WHALE TAIL PIT

TYPICAL DEPOSIT CROSS-SECTION

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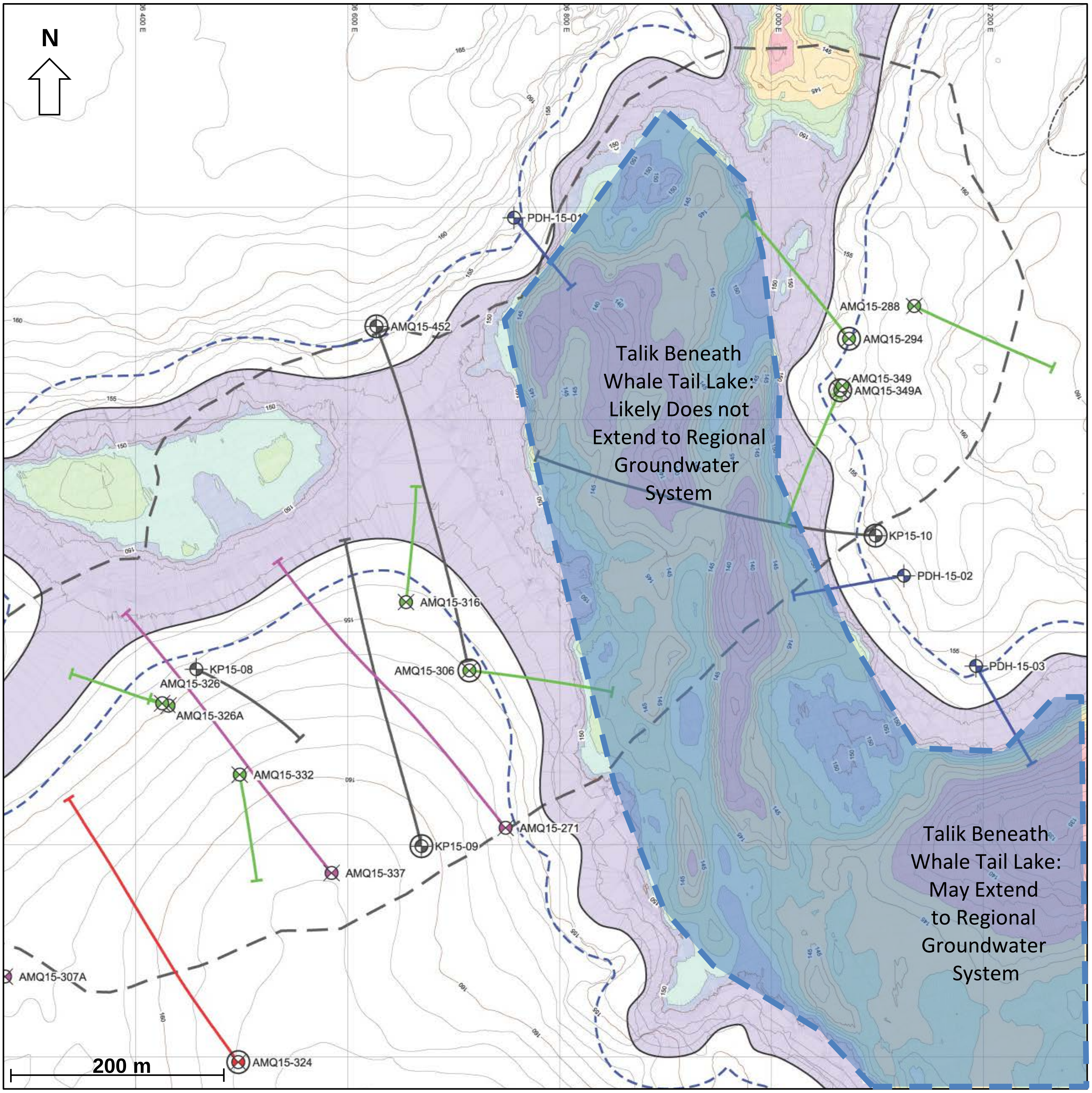
P/A NO. NB101-622/4

REF. NO. VA15-03382

FIGURE 1

REV 0



AGNICO EAGLE MINES LTD. MEADOWBANK DIVISION

WHALE TAIL PIT

ASSUMED TALIK FOOTPRINT BENEATH WHALE TAIL LAKE

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P/A NO.	REF. NO.
NB101-622/4	VA15-03382

FIGURE 2 REV 0

REV	DATE	DESCRIPTION	PREP'D	RVW'D
0	20OCT'15	ISSUED WITH MEMO	REW	MBG