Appendix Q

NRCAN 07 Response and Supporting Documents

Information Request No. NRCan 07 (Labrador)

a) A careful numerical or analytic estimation of the drawdown cone should be carried out because this drawdown estimate is of major importance. NRCan recommends that a long-term pumping test be performed at least in one of the two wells drilled down to 300 m, using many of the boreholes/wells as observation wells. These observation wells should be selected so as to obtain a good spatial coverage 1) in all directions and 2) at a large distance (2 km) to properly estimate the drawdown cone. Measurements of the water level of Lakes Gleeson and Daviault should also be carried out during pumping tests. The flow rate should be chosen so as to cause a large drawdown at the well, keeping in mind that the objective is to predict the dewatering effect of the 400 m-deep open pit.

b) NRCan recommends that accurate estimates of hydraulic conductivity (K) in the vicinity of Rose Pit be calculated.

c) It is recommended that the cross-section of Appendix A (of Appendix G) be improved so as to integrate geological formations, as well as existing wells and boreholes. Its location should be shown on one of the maps.

d) Slug tests performed need to be re-analysed,because only straight lines, not curves, can be analyzed with the Bouwer and Rice (1976) method. Butler (1998) suggests a way for analysing these data: first normalize observed data, and then use data around a certain value. This method is summarized on the AqteSolv website: http://www.agtesolv.com/slug-tests/recommended-normalized-head-ranges.htm. The K values might decrease slightly. The slug test in borehole BH-GE-06 should not be interpreted, as there is not enough data.

As mentioned earlier, the two lakes that are to the north and south of Rose pit (hydraulically connected to the one in the center) might be affected or dry up if they are not dammed.

Reference:

Butler,J.J.,Jr.,1998. *The Design, Performance, and Analysis of Slug Tests,* Lewis Publishers, New York, 252p

Alderon Response to IR No. NRCan 07 (Labrador)

General Response

Since submission of the EIS, additional geological assessment, map creation, and geotechnical work has been completed which has advanced the understanding of the hydrogeological environment, as represented in this response. The current understanding of the existing and future hydrogeological environment is based on exploration geological data, geotechnical investigations, and hydrogeological testing and monitoring that have been completed to date and this has served to confirm and further support the hydrogeological model presented in the EIS.

The hydrologic and hydrogeological assessments completed to date indicate that the groundwater drawdown around the open pit development will not impact water levels in adjacent lakes. As part of the ongoing Project design process, Alderon will continue the field work and analyses necessary to update and refine the current model of the existing hydrogeological environment around the proposed open pit, and the potential impacts of the open pit development. The results will serve as key input planning, design, and operation of the open pit.

Response to IR No. NRCan 07 "a"

Part 1: Drawdown Cone Prediction

The conceptual cross section provided in the EIS showing the predicted drawdown from the open pit (now updated to show geology and attached as Drawing No. 121614000-306-GE-06; REV. 1) was developed on the basis of the limited hydrogeological information that was available at the time. It was assumed that the hydraulic conductivities from the packer testing were an indication of the bulk hydraulic conductivity of the bedrock. Since submission of the EIS, additional hydrogeological information has been obtained in the open pit area. This data supports the previous work and findings and includes:

- 11 additional rising head response tests performed on overburden or the till-overburden interface zone in the vicinity of open pit;
- Block geological model showing inferred orientation of faults based on core logs and core recovery;
- Falling head permeameter analysis of selected overburden materials; and
- Additional estimates of overburden hydraulic conductivity based on grain size distribution from sieve/hydrometer analysis.

The assessment of the existing and future hydrogeological environment presented in the EIS remains unchanged based on the review and incorporation of this additional data. The additional work outlined in Part 3, below, will update and refine the current model as part of the Project detailed engineering and design process.

Part 2: Long-term Pumping Test

To date, Alderon's field work and subsequent analyses have been constrained by requirements imposed on the project by the Newfoundland and Labrador Department of Environment and Conservation in relation to the activities in the Pike Lake South Habitat Management Unit. Alderon has been informed that no further permits will be provided for work required in the Management Unit, where the open pit will be located, until the project is released from the Environmental Assessment process.

The two geotechnical / exploration bedrock boreholes (RBR-12-01 and RBR-12-02) referenced, shown on Drawing A2-1 (attached), were drilled as follows:

- 208 m and 300 m deep, respectively;

- inclined at 60°; and
- at 96 mm in diameter (HQ drill core).

These boreholes were drilled to investigate structural features such as fault systems and weathering zones that were identified from exploration borehole logging which are discussed in the structural geology response to NRCan 06. The diameter of the boreholes (RBR-12-01 and RBR-12-02) are not large enough to accommodate a pump that could produce the flow rates that would be required to induce a substantial hydraulic response in nearby observation wells (typically more than 100 m apart). Therefore, pumping of these holes would generate a limited area of drawdown influence which would not provide the information needed to predict the dewatering effect of the proposed pit. Alderon is planning to carry out further assessment and field work as outlined in Part 3, below, and part of this work will be to refine the modelling and measurement of the pit draw-down cone

Part 3: Detailed Design Phase

As part of the normal progression of the Kami Project through the detailed design and engineering phase of the Project, further hydrogeological assessment will be conducted including:

- Compilation and input of the data collected to date to create a preliminary numerical groundwater flow model (using MODFLOW or FEFLOW) that would generate a number of possible scenarios regarding the effects of the proposed open pit mine on the regional groundwater flow system.

- Comparison of the flow model scenarios with the structural geology data available from the exploration program to determine: 1) what additional data is required to advance/confirm the model; 2) what field work is required to obtain that data; and 3) what field work location(s) are strategic with respect to potential environmental and operational impacts.

- Carry out the necessary field and assessment work determined in the previous stage, once permission is granted to re-enter the Pike Lake South Habitat Management Unit. This work is expected to include additional boreholes, packer tests, large-scale pump tests, and possibly other work including geophysics, and other test work as determined to be required.

- Finalization of the hydrogeological model and design and development of detailed management plan with respect to environmental or operational impacts.

The results of the advanced hydrogeological work will be presented in support of Alderon's development and operation permit documentation for review by regulators.

Response to IR No. NRCan 07 “b”

Hydraulic conductivity test data on the overburden soils collected from boreholes completed in the area surrounding the Rose Pit and throughout the site have been modified since the submission of the EIS and these updated results, as well as the results of further testing completed in existing boreholes in the Rose Pit area in August 2012, are presented in Table 1. Estimates of hydraulic conductivity were also derived from grain size distribution curves of soil samples collected from the overburden material in the pit area as presented in Table 2. These grain size based estimates agree quite closely with the test results shown in Table 1. For reference, Drawing A1-2 (attached) presents the overburden thickness across the open pit area.

Estimates of hydraulic conductivity of the bedrock units are based on packer injection tests completed in two geotechnical / exploration bedrock boreholes (RBR-12-01 and RBR-12-02). Packer Test Reports for these boreholes are attached to this response and the results are presented in Table 1.

As shown in Table 1, below, the re-evaluated data, and additional data collected since the EIS was issued are generally consistent with that presented in the EIS. As a result, the conclusions presented in the EIS are maintained. These hydraulic conductivity estimates will be further refined/updated as additional investigation of soil and bedrock hydraulic properties is carried out during the detailed engineering and design phase of the Project.

Table 1 Summary of Hydraulic Conductivity Testing

Well ID	Test Date	MW Location	Screened In	% of sand pack in Till	MW Depth (mbg)	WL (mbg)	Sand pack		Corrected K (m/s)	Previously Reported K (m/s)
							Depth (mbg)	Length (m)		
BH-GE-03	31-Jan-12	Main Plant East	Silty Sandy Till	100.0%	15.47	1.34	6.4-15.5	9.1	1.1E-06	6.78E-07
BH-GE-06	25-Mar-12	Access Road - Waldorf R.	Sandy Till	100.0%	15.25	3.14	3.1-15.8	12.7	2.6E-05	2.60E-05
BH-GE-09	25-Mar-12	Process Plant Area	Silty Sandy Till	100.0%	9.25	1.71	3.4-9.4	6	1.3E-04	7.26E-07
BH-GE-10	26-Mar-12	Process Plant Area	Silty Sandy Till	100.0%	9.15	0.20	2.4-9.2	6.8	5.2E-07	2.55E-07
BH-GE-15	12-Aug-12	Tailings Area	Silty Sandy Till	100.0%	8.95	-0.07	2.95-8.75	6.8	7.0E-07	
BH-GE-18	29-Mar-12	Kami Rail Spur	Silty Sandy Till	100.0%	12.2	3.21	2.4-12.2	9.8	2.3E-07	2.41E-07
ROB-11-01B	7-Aug-12	Rose Pit Perimeter	Silty Sandy Till	100.0%	47.56	-0.60	3.05-46.53	43.48	8.7E-08	
ROB-11-13B	26-Mar-12	Rose Pit Perimeter	Silty Sandy Till	100.0%	10.67	4.78	1.4-10.7	9.3	1.7E-06	1.92E-06
ROB-11-05B (run1)	23-Mar-12	Rose Pit Perimeter	Silty Sandy Till	100.0%	13.72	1.54	3.1-13.7	10.6	3.2E-06	1.81E-06
ROB-11-05B (run2)	23-Mar-12	Rose Pit Perimeter	Silty Sandy Till	100.0%	13.72	1.54	3.1-13.7	10.6	1.0E-06	5.06E-07
ROB-11-02	22-Mar-12	Rose Pit Perimeter	till/rock	71.0%	25.90	-0.33	3.1-25.9	22.8	1.9E-07	9.48E-08
ROB-11-03	8-Aug-12	Rose Pit Perimeter	till/rock	73.6%	23.60	-0.95	2.74-23.6	20.86	1.8E-06	
ROB-11-04	8-Aug-12	Rose Pit Perimeter	till/rock	84.7%	21.30	0.20	2.45-21.3	18.85	2.2E-07	
ROB-11-06	9-Aug-12	Rose Pit Perimeter	till/rock	54.8%	13.72	5.05	2.44-13.72	7.53	1.0E-07	

Well ID	Test Date	MW Location	Screened In	% of sand pack in Till	MW Depth (mbg)	WL (mbg)	Sand pack		Corrected K (m/s)	Previously Reported K (m/s)
							Depth (mbg)	Length (m)		
ROB-11-07	9-Aug-12	Rose Pit Perimeter	till/rock	82.2%	60.05	5.62	3.05-60.05	57	9.7E-08	
ROB-11-14	10-Aug-12	Rose Pit perimeter	till/rock	26.5%	9.15	-0.01	2.4-9.15	6.75	1.7E-06	
ROB-11-15	9-Aug-12	Rose Pit perimeter	till/rock	16.5%	8.98	0.94	2.82-8.98	6.16	1.3E-06	
ROB011-16	10-Aug-12	Rose Pit perimeter	till/rock	55.8%	16.41	-0.67	3.05-16.41	13.36	1.8E-07	
ROB-11-17	23-Jan-12	Rose Pit Interior	till/rock	81.1%	47.9	1.91	4.6-47.8	43.2	5.8E-08	
ROB-11-18	11-Aug-12	Rose Pit interior	till/rock	79.2%	30.50	0.11	2.44-30.38	27.94	7.9E-07	3.17E-08
ROB-11-19	11-Aug-12	Rose Pit interior	till/rock	48.2%	14.95	0.14	2.1-14.95	12.85	5.5E-07	
ROB-11-20	31-Jan-12	Rose Pit Interior	till/rock	57.9%	15.1	4.44	1.5-15.0	13.5	3.8E-07	1.16E-06
ROB-11-11	12-Aug-12	Rose Pit Perimeter	bedrock	0.0%	5.8	0.85	2.2-5.8	3.6	1.1E-07	
RBR-12-02	27-Mar-12	Rose Pit Interior	bedrock	0.0%	245.2 (Vert)	4.87	33.1-290.0	256.9	1.2E-06	
RBR-12-01	13-Mar-12	Rose Pit Interior	bedrock	0.0%	185.8 (Vert)	-0.90	16.4-300.0	283.6	2.6E-06	
Geomean Silty Sandy Till (m/sec)									**1.6E-06**	**8.80E-07**
Geomean till/rock (m/sec)									**3.5E-07**	**4.29E-07**
Geomean Bedrock (m/sec)									**6.9E-07**	**1.88E-06**

New K value added since EA was issued

Note: all MW with rrising head within the sand pack were corrected for 25% porosity (clean silica sand).

Method: Bouwer & Rice, 1976 (ATESOLV).

Table 2 – Hydraulic Conductivity Estimates from Grain Size Distribution

Area	Well	Sample	Depth (m)	d_{10} (mm)	K (cm/s)	K (m/s)
Eastern	ROB -11-11	SS2	0.6-1.0	0.01	1.0E-04	1.0E-06
	ROB -11-12	SS4	3.0-3.6	0.04	1.6E-03	1.6E-05
	ROB -11-12	SS3	1.4-2.0	0.06	3.6E-03	3.6E-05
	ROB -11-16	SS16	11.1-11.7	0.009	8.1E-05	8.1E-07
	ROB -11-16	SS2	0.6-1.0	0.017	2.9E-04	2.9E-06
Southern	ROB -11-07	SS2	1.2-1.6	0.0066	4.4E-05	4.4E-07
	ROB -11-08	SS9	7.6-8.0	0.0085	7.2E-05	7.2E-07
	ROB -11-08	SS21	17.4-17.8	0.059	3.5E-03	3.5E-05
	ROB -11-08	BS26	22.0	0.0098	9.6E-05	9.6E-07
	ROB -11-09	SS7	4.5-5.1	0.002	4.0E-06	4.0E-08
	ROB -11-09	SS11	7.6-8.2	0.17	2.9E-02	2.9E-04
	ROB -11-09	SS16	12.1-12.7	0.25	6.3E-02	6.3E-04
	ROB -11-09	SS17	12.7-13.3	0.0072	5.2E-05	5.2E-07
	ROB -11-09	SS18	16.8-17.4	0.04	1.6E-03	1.6E-05
	ROB -11-20	SS11		0.025	6.3E-04	6.3E-06
Western	ROB -11-03	SS9	9.5-10.1	0.0068	4.6E-05	4.6E-07
	ROB -11-05	SS2	1.8-2.4	0.018	3.2E-04	3.2E-06
	ROB -11-17	SS40	31.0-31.6	0.0032	1.0E-05	1.0E-07
	ROB -11-18	SS4	2.1-2.7	0.04	1.6E-03	1.6E-05
	ROB -11-18	SS6	3.6-4.2	0.016	2.6E-04	2.6E-06
	ROB -11-18	SS10	6.7-7.3	0.005	2.5E-05	2.5E-07
	ROB -11-18	SS12	8.2-8.8	0.038	1.4E-03	1.4E-05
	ROB -11-18	SS18	13.7-13.9	0.07	4.9E-03	4.9E-05
	ROB -11-19	SS9	7.6-8.2	0.0075	5.6E-05	5.6E-07
Northern	ROB -11-01	SS34	26.0-26.4	0.0045	2.0E-05	2.0E-07
	ROB -11-01	SS29	21.8-22.4	0.017	2.9E-04	2.9E-06

Area	Well	Sample	Depth (m)	d_{10} (mm)	K (cm/s)	K (m/s)
	ROB -11-01	SS51	44.7-44.8	0.0025	6.3E-06	6.3E-08
	ROB -11-17	SS11	8.2-8.6	0.0098	9.6E-05	9.6E-07
	ROB -11-17	SS25	18.1-19.5	0.0098	9.6E-05	9.6E-07
	ROB -11-17	BS46	39.5-39.6	0.0005	2.5E-07	2.5E-09
				Minimum	**2.5E-07**	**2.5E-09**
				Maximum	**6.3E-02**	**6.3E-04**
				Geometric Mean	**1.9E-04**	**1.9E-06**

Method: Hazan, A (1893). $K = A[d_{10}]^2$; where A = 1.0 for K in cm/sec; and d_{10} in mm (Freeze & Cherry, 1979).
Used only curves with hydrometer data reaching 90% retained (10% passing or effective grain size).

Source: Appendix A: Geotechnical Investigations; Figures A1-5 to A1-8.

Response to IR No. NRCan 07 “c”

The cross section presented in Drawing No. 121614000-306-GE-06; REV. 1, has been revised and updated as requested with information on bedrock geology and the location of the cross section through the pit is depicted in the inserted plan view. Drawings showing the geological data and locations of the existing wells and boreholes that were used to generate this cross section are attached to this response (Drawing Nos. A1-1, A1-2, A2-1, and A3-1).

Response to IR No. NRCan 07 “d”

Hydraulic test data collected from boreholes completed in the area surrounding the Rose Pit and throughout the site was re-evaluated as recommended by NRCan and the revised results are presented in Table 1, above. As shown in the table by direct comparison with the data reported in the EIS provided in the last column, the revised data did not vary significantly from the estimates presented in the EIS.

BH-GE-06 was included as it is the only well screened in apparent permeable sand (e.g., response almost too fast to measure; 90 percent in 15 sec); and is intended to show that such strata are locally present.

Additional Comment by NRCan

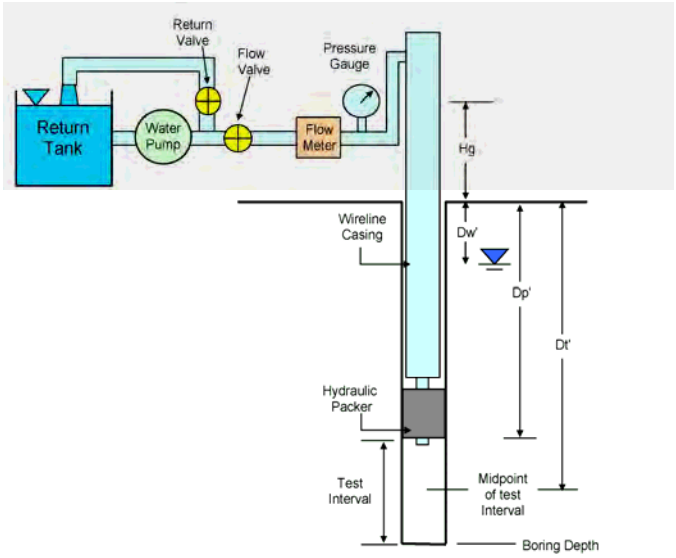
The two lakes located to the north (Pike Lake) and south (Mid Lake) of Rose Pit have been, and will continue to be considered in the hydrological and hydrogeological assessment of the open pit area. Currently, the design for control of surface water includes a small diversion dam at the downstream end of Mid Lake to allow surface water flow to be captured and piped around the pit and then discharged to the upstream end of Pike Lake. There is no "dam" currently designed for the upstream end of Pike Lake adjacent to the open pit as the assessment of topography, pit slope design, and water levels within Pike Lake shows that a dam is not required to control surface water. The current design for the crest of the proposed open pit adjacent to Pike Lake will incorporate a small diversion berm to address any surface water that might flow towards the open pit, and the design of the pit slope in overburden (greater than 30 m in thickness at this location) will incorporate slope protection to address precipitation and seepage, water conveyance and collection to ensure slope stability and to minimize sedimentation. All collected water from precipitation and groundwater seepage will be pumped to a sedimentation pond and released back to Pike Lake to ensure the natural lake water levels are maintained.

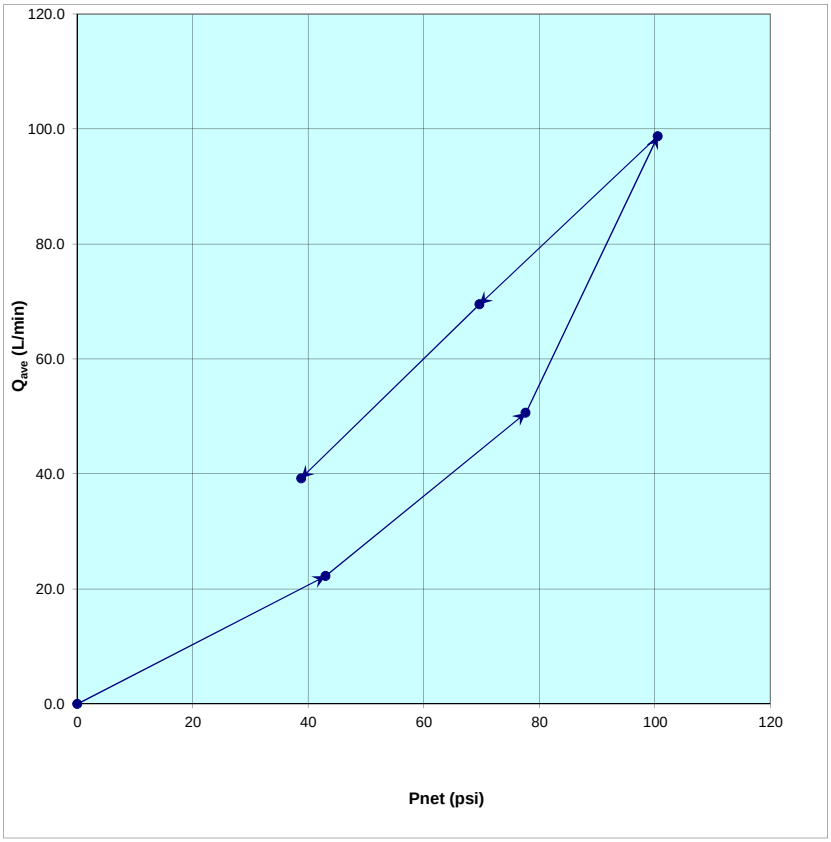
SINGLE IPI PACKER INJECTION TEST

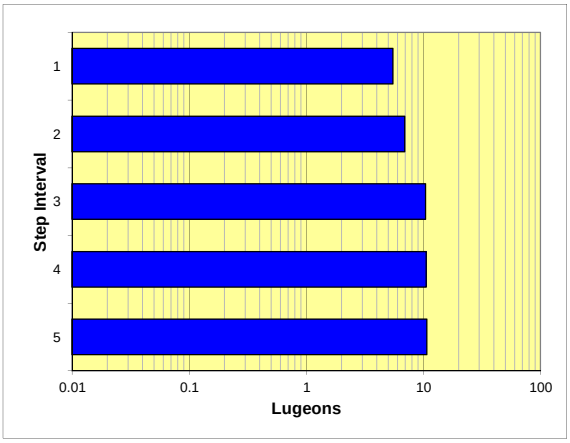
Project Name:	Kami Iron Ore Project, Pit Slope Design	BH Nº:	RBR-12-01
Project Nº:	121614000	Test Nº:	1
Test Interval (m):	48.3 to 62.0	GS Elev. (m):	573.2
		Supervisor:	JG/CM

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**48.3** m	L	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**55.2** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**41.8** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**47.8** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	44	85	130	84	43
1	22.00	50.50	98.00	70.00	39.00
2	22.00	50.50	99.00	70.00	39.00
3	22.00	51.00	99.00	69.00	40.00
4	23.00	50.50	99.00	69.00	39.00
5					
6					
Q_{avg} (L/min)	22.25	50.62	98.75	69.50	39.25
Pf (psi)	1.5	7.9	30.0	14.9	4.7
Pnet (psi)	43.0	77.6	100.5	69.6	38.8
K (m/min)	4.8E-05	6.1E-05	9.2E-05	9.3E-05	9.5E-05
K (m/sec)	8.1E-07	1.0E-06	1.5E-06	1.6E-06	1.6E-06
Lugeons	5.5	6.9	10.4	10.6	10.7







Comments

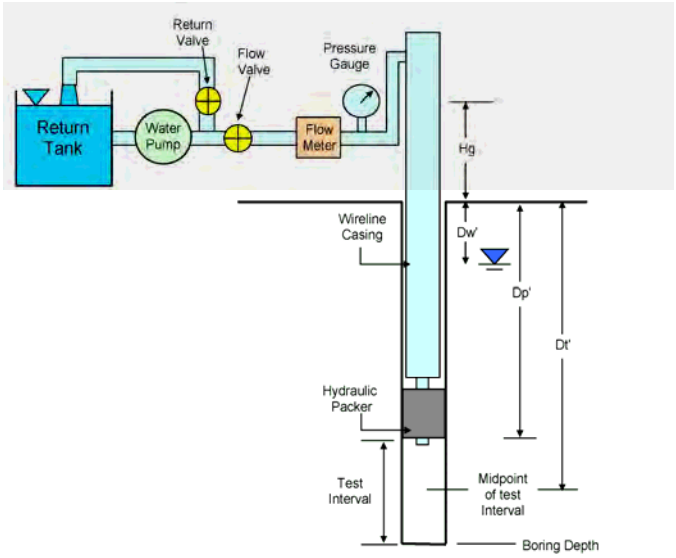
- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.
- Slight Artesian conditions noted.
- Steps 1 to 3 used for K_{avg} calculation.
- **K_{avg} = 1.1x10^{-6} m/sec**

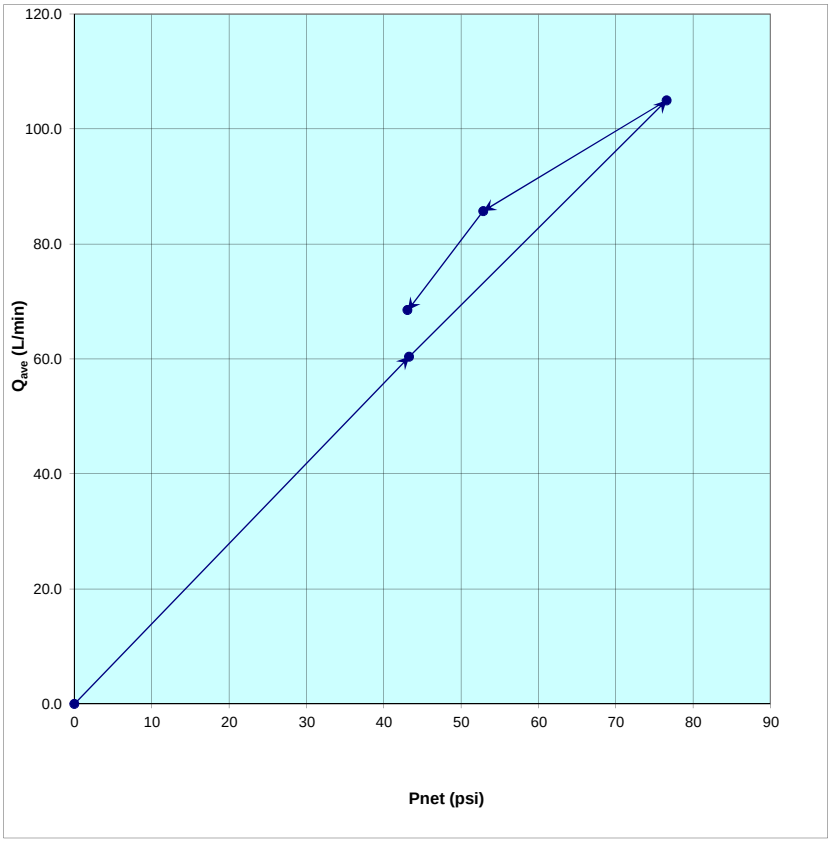
SINGLE IPI PACKER INJECTION TEST

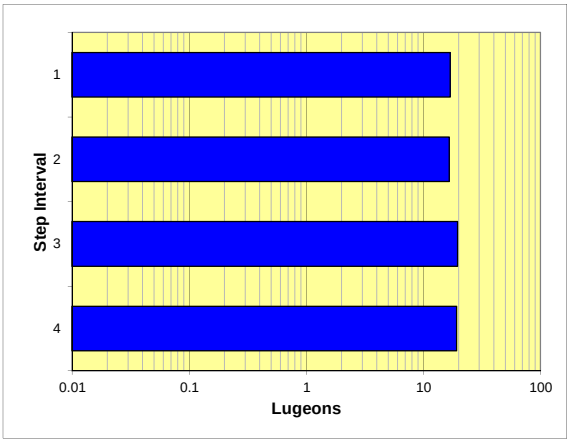
Project Name:	Kami Iron Ore Project, Pit Slope Design	**BH Nº:**	RBR-12-01
Project Nº:	121614000	**Test Nº:**	2
Test Interval (m):	62.0 to 74.0	**GS Elev. (m):**	573.2
		Supervisor:	JG

Dw	Measured depth of static water level (1)	-0.9 m	**Hg**	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2 m	**rb**	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**62.0** m	**L**	Length of test section	**12.0** m
Dt	Measured depth to midpoint of test	**68.0** m	**f**	Friction factor	**0.055** √psi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	**Pf**	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8** m	**Pg**	Gauge pressure	
Dp'	Vertical depth to packer	**53.7** m	**Pnet**	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**58.9** m	**K**	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	54	110	75	57	
1	60.00	106.00	86.00	70.00	
2	60.00	103.00	85.00	69.00	
3	60.00	105.00	85.00	67.00	
4	60.00	106.00	87.00	68.00	
5	62.00				
6					
Q_{avg} (L/min)	60.39	104.99	85.75	68.49	
Pf (psi)	11.2	34.0	22.6	14.4	
Pnet (psi)	43.3	76.6	52.9	43.1	
K (m/min)	1.5E-04	1.4E-04	1.7E-04	1.7E-04	
K (m/sec)	2.4E-06	2.4E-06	2.8E-06	2.8E-06	
Lugeons	16.9	16.6	19.6	19.2	







Comments

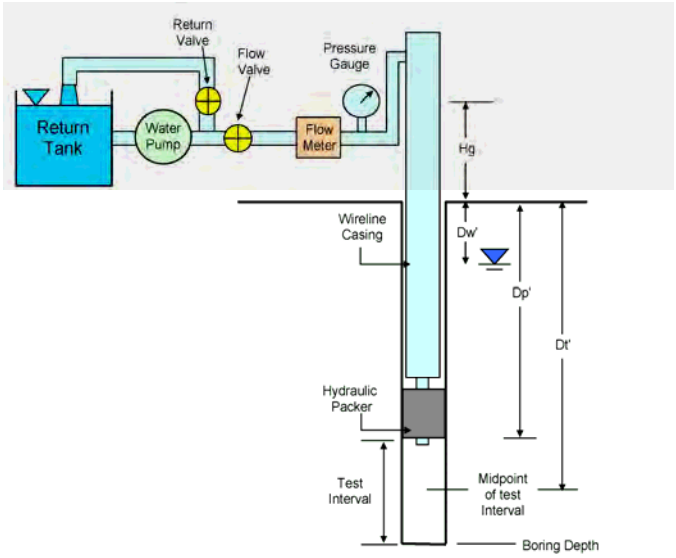
- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.
- Slight Artesian conditions noted.
- Steps 1 to 2 used for K_{avg} calculation.
- **K_{avg} = 2.4x10^{-6} m/sec**

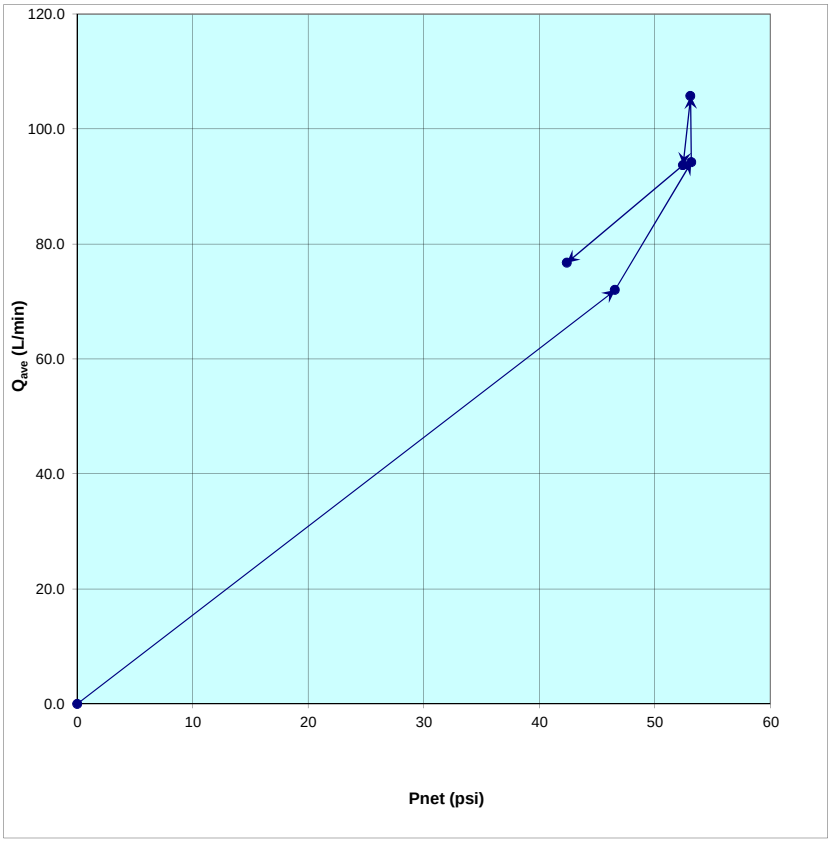
SINGLE IPI PACKER INJECTION TEST

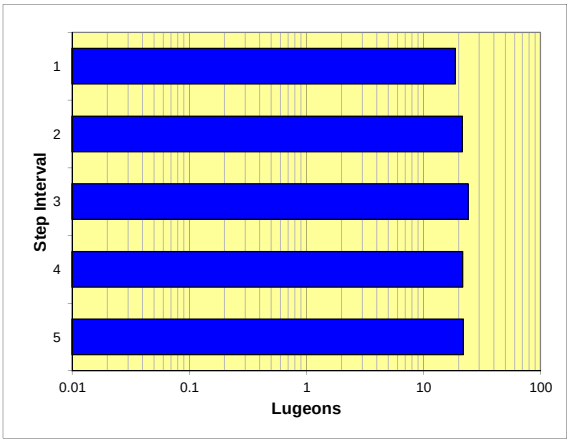
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-01
Project Nº: 121614000	Test Interval (m): 74.0 to 86.0	Test Nº:	3
		GS Elev. (m):	573.2
		Supervisor:	JG

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**74.0** m	L	Length of test section	**12.0** m
Dt	Measured depth to midpoint of test	**80.0** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**64.1** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**69.3** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	62	80	87	79	60
1	72.00	95.00	107.00	94.00	76.00
2	72.00	93.00	105.00	94.00	77.00
3	72.00	95.00	105.00	93.00	77.00
4	72.00	94.00	106.00	94.00	77.00
5					
6					
Q_{avg} (L/min)	72.00	94.25	105.75	93.75	76.75
Pf (psi)	16.0	27.4	34.4	27.1	18.1
Pnet (psi)	46.5	53.2	53.1	52.4	42.4
K (m/min)	1.6E-04	1.8E-04	2.1E-04	1.9E-04	1.9E-04
K (m/sec)	2.7E-06	3.1E-06	3.5E-06	3.1E-06	3.1E-06
Lugeons	18.7	21.4	24.1	21.6	21.9







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Slight Artesian conditions noted.

- Steps 1 to 3 used for K_{avg} calculation.

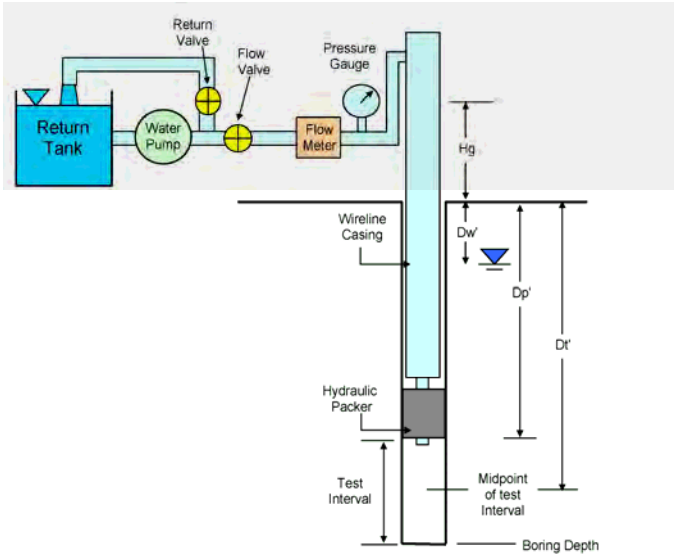
- **K_{avg} = 3.1x10^{-6} m/sec**

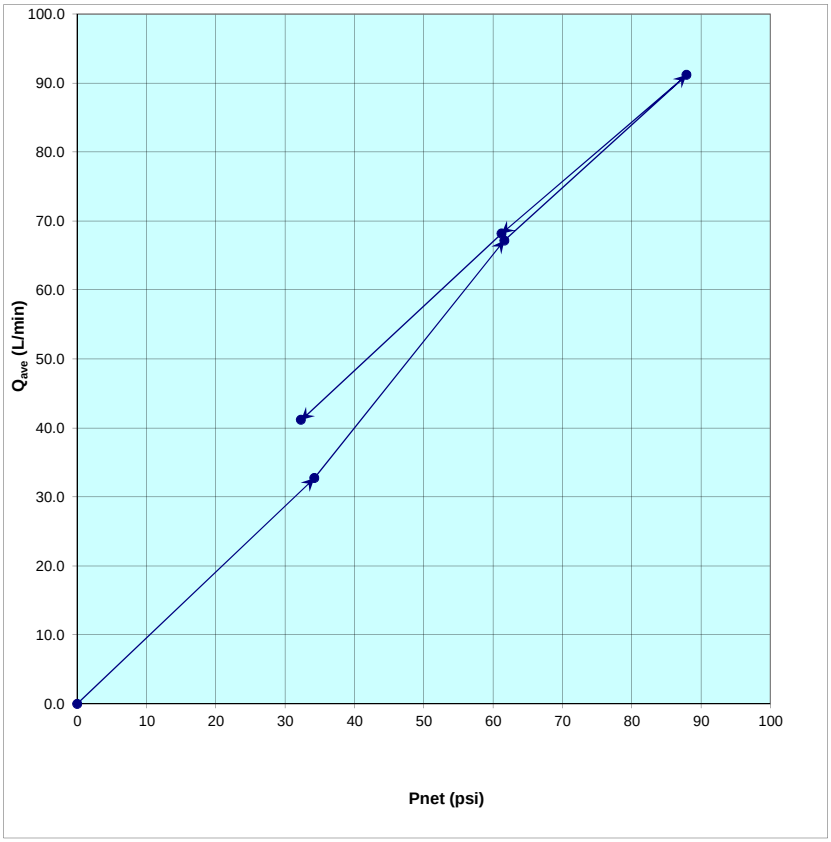
SINGLE IPI PACKER INJECTION TEST

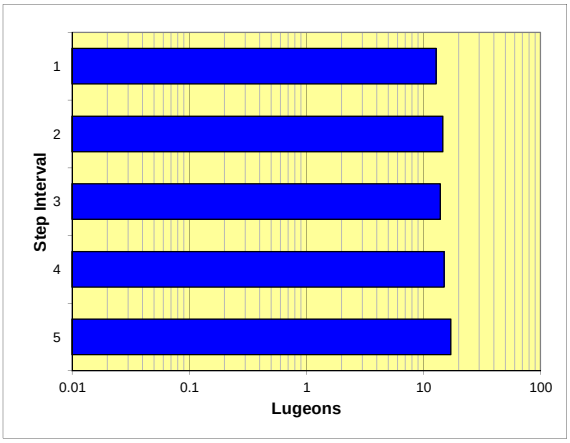
Project Name:	Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-01
Project Nº:	121614000	Test Interval (m):	87.2 to 98.0	Test Nº:	4
				GS Elev. (m):	573.2
				Supervisor:	JM

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**87.2** m	L	Length of test section	**10.8** m
Dt	Measured depth to midpoint of test	**92.6** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**75.5** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**80.2** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	37	75	113	75	37
1	36.00	69.00	91.00	69.00	42.00
2	33.00	65.00	93.00	70.00	42.00
3	34.00	68.00	89.00	66.00	42.00
4	31.00	67.00	91.00	67.00	39.00
5	30.00	67.00	92.00	69.00	41.00
6					
Q_{avg} (L/min)	32.73	67.19	91.19	68.18	41.18
Pf (psi)	3.3	13.9	25.6	14.3	5.2
Pnet (psi)	34.2	61.6	87.9	61.2	32.3
K (m/min)	1.1E-04	1.2E-04	1.2E-04	1.3E-04	1.4E-04
K (m/sec)	1.8E-06	2.1E-06	2.0E-06	2.1E-06	2.4E-06
Lugeons	12.9	14.7	13.9	15.0	17.1







Comments

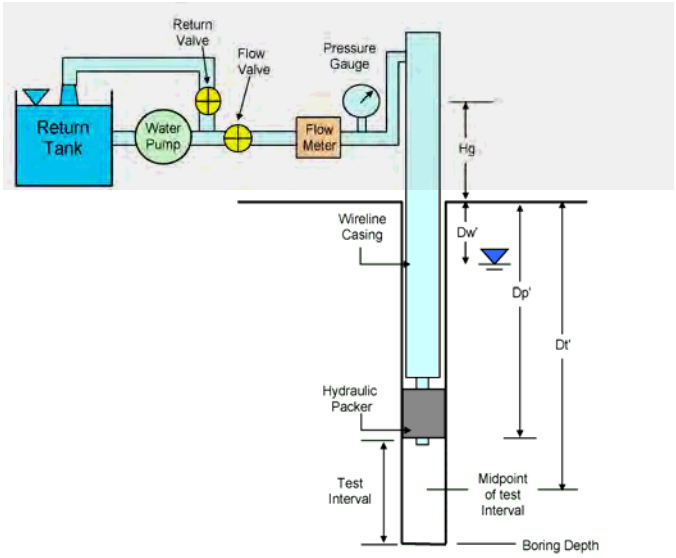
- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.
- Slight Artesian conditions noted.
- Steps 1 to 3 used for K_{avg} calculation.
- **K_{avg} = 1.9x10^{-6} m/sec**

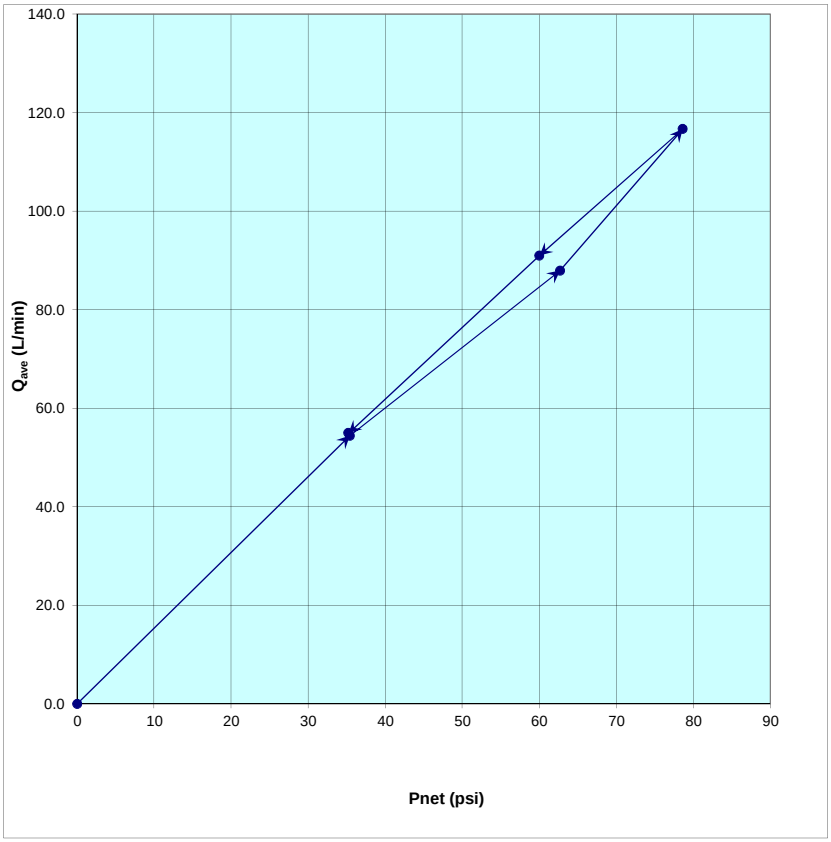
SINGLE IPI PACKER INJECTION TEST

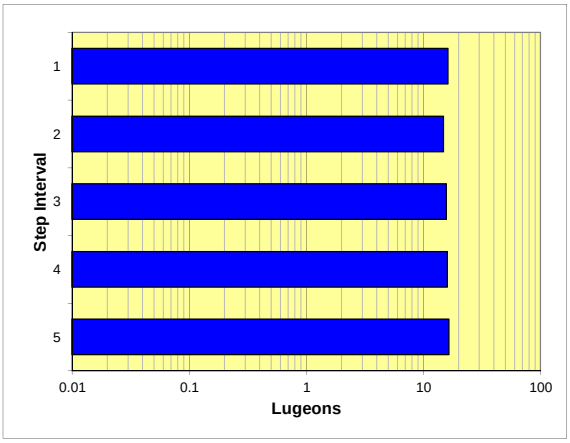
BH Nº:	**RBR-12-01**		
Project Name:	**Kami Iron Ore Project, Pit Slope Design**	**Test Nº:**	**5**
Project Nº:	**121614000**	**GS Elev. (m):**	**573.2**
Test Interval (m):	**96.3** to **110.0**	**Supervisor:**	**JM**

Dw	Measured depth of static water level (1)	-0.9 m	**Hg**	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2 m	**rb**	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**96.3** m	**L**	Length of test section	**13.8** m
Dt	Measured depth to midpoint of test	**103.1** m	**f**	Friction factor	**0.055** √psi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	**Pf**	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8** m	**Pg**	Gauge pressure	
Dp'	Vertical depth to packer	**83.4** m	**Pnet**	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**89.3** m	**K**	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	44	86	120	85	44
1	61.00	101.00	116.00	90.00	56.00
2	59.00	82.00	117.00	91.00	55.00
3	57.00	85.00	117.00	92.00	54.00
4	54.00	85.00			
5	47.00				
6	50.00				
Q_{avg} (L/min)	54.44	87.95	116.67	91.00	54.99
Pf (psi)	9.1	23.8	41.9	25.5	9.3
Pnet (psi)	35.4	62.7	78.6	60.0	35.2
K (m/min)	1.4E-04	1.3E-04	1.4E-04	1.4E-04	1.5E-04
K (m/sec)	2.4E-06	2.2E-06	2.3E-06	2.4E-06	2.4E-06
Lugeons	16.2	14.8	15.7	16.0	16.5







Comments

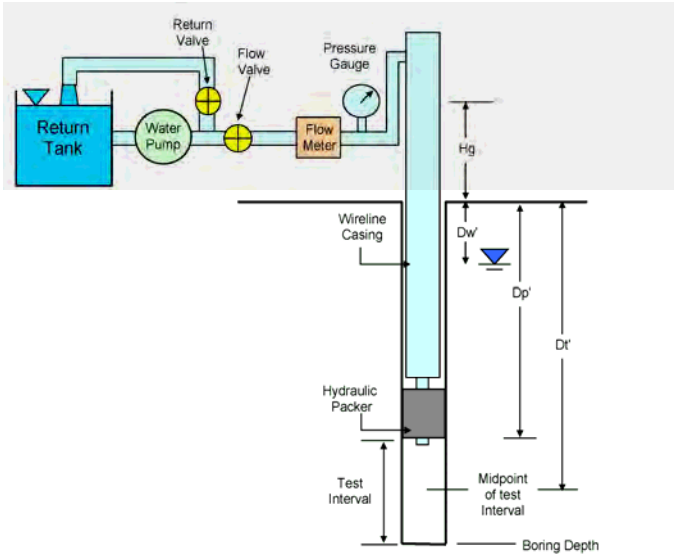
- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.
- Slight Artesian conditions noted.
- Steps 1 to 3 used for K_{avg} calculation.
- **K_{avg} = 2.3x10^{-6} m/sec**

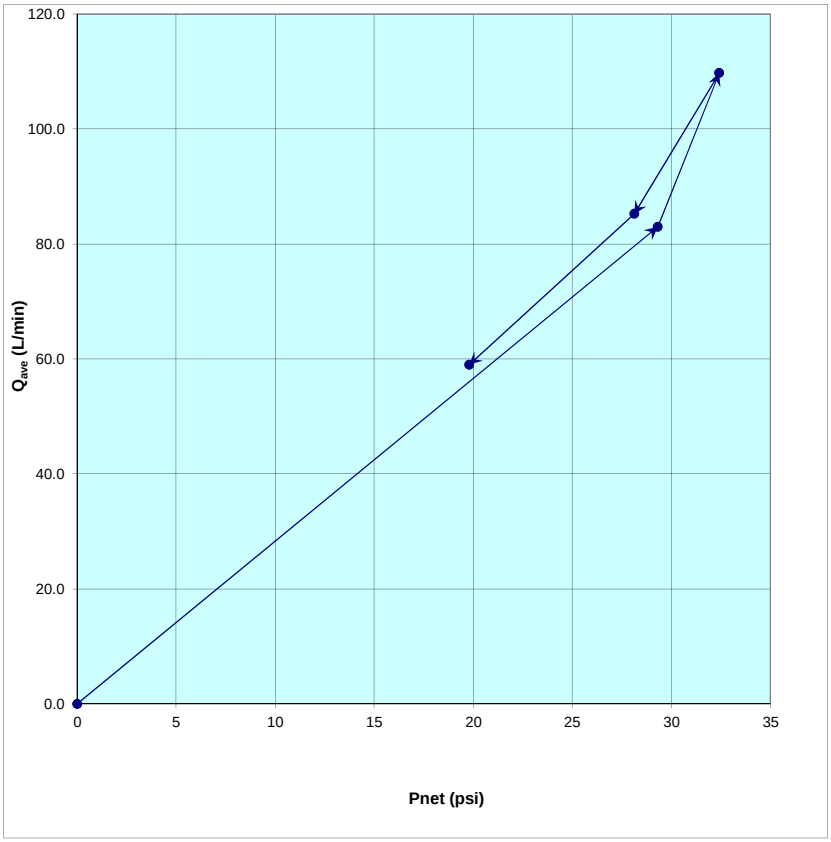
SINGLE IPI PACKER INJECTION TEST

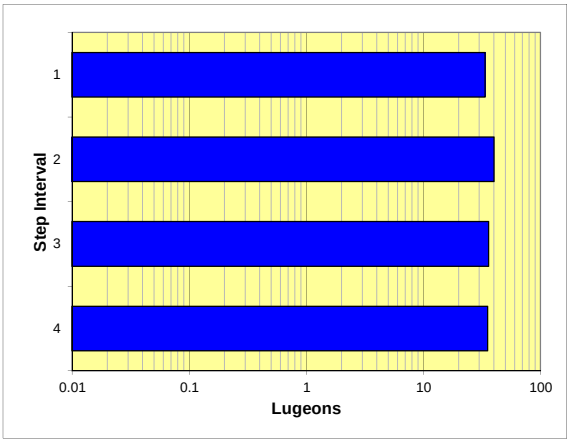
Stantec	Project Name: Kami Iron Ore Project, Pit Slope Design					BH Nº:	RBR-12-01
	Project Nº: 121614000	Test Interval (m):	109.8	to	122.0	Test Nº:	6
						GS Elev. (m):	573.2
						Supervisor:	JG

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m	
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m	
Dp	Measured depth to packer	**109.8** m	L	Length of test section	**12.3** m	
Dt	Measured depth to midpoint of test	**115.9** m	f	Friction factor	**0.055** Vpsi/L/min	
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss		
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure		
Dp'	Vertical depth to packer	**95.0** m	Pnet	Net injection pressure at midpoint of test		
Dt'	Vertical depth to midpoint of test	**100.4** m	K	Hydraulic conductivity		

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	50	69	50	30	
1	86.00	110.00	85.00	59.00	
2	85.00	109.00	86.00	59.00	
3	83.00	110.00	85.00	59.00	
4	81.00	110.00	85.00	59.00	
5	81.00				
6	82.00				
Q_{avg} (L/min)	82.98	109.75	85.25	59.00	
Pf (psi)	21.2	37.1	22.4	10.7	
Pnet (psi)	29.3	32.4	28.1	19.8	
K (m/min)	2.9E-04	3.5E-04	3.1E-04	3.1E-04	
K (m/sec)	4.8E-06	5.8E-06	5.2E-06	5.1E-06	
Lugeons	33.5	40.1	35.9	35.3	







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Slight Artesian conditions noted.

- Steps 1 to 2 used for K_{avg} calculation.

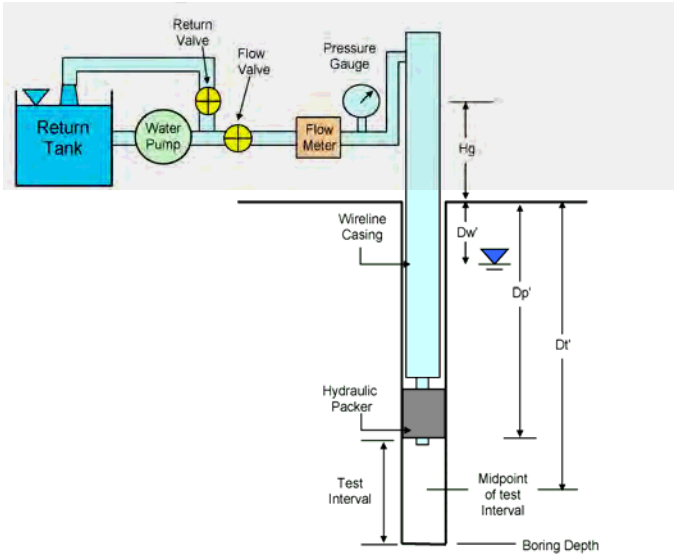
- **K_{avg} = 5.3x10^{-6} m/sec**

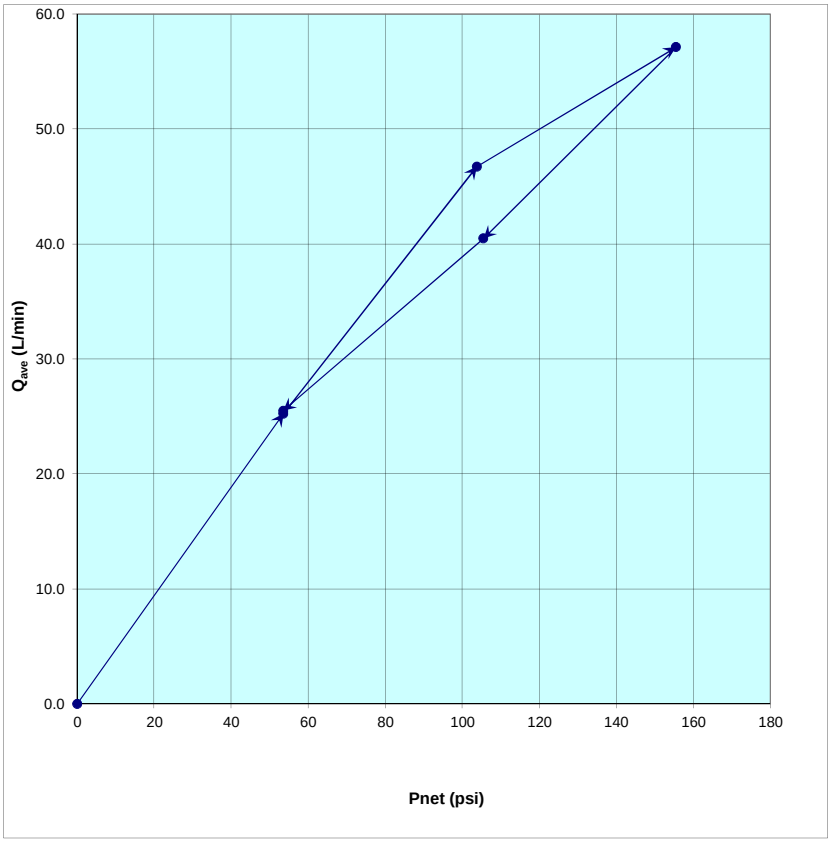
SINGLE IPI PACKER INJECTION TEST

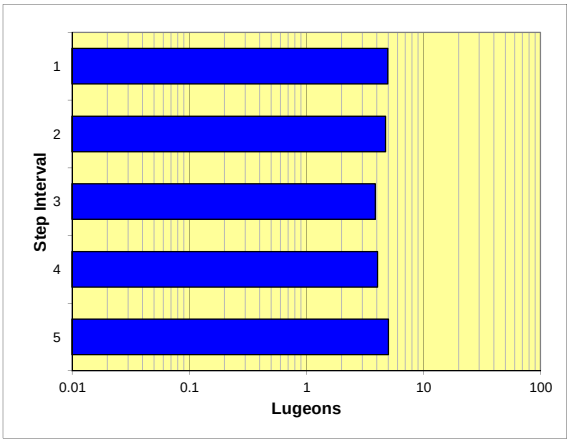
Stantec	Project Name: Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-01
				Test Nº:	7
	Project Nº: 121614000	Test Interval (m):	120.3 to 134.0	GS Elev. (m):	573.2
				Supervisor:	JM/JG

Dw	Measured depth of static water level (1)	-0.9	m	Hg	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2	m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**120.3**	m	L	Length of test section	**13.8** m
Dt	Measured depth to midpoint of test	**127.1**	m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0	º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8**	m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**104.1**	m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**110.1**	m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	55	110	165	110	55
1	25.00	48.00	68.00	41.00	25.00
2	26.00	45.00	58.00	39.00	26.00
3	25.00	47.00	56.00	40.00	26.00
4	25.00	47.00	53.00	42.00	25.00
5			52.00		
6					
Q_{avg} (L/min)	25.25	46.74	57.13	40.48	25.50
Pf (psi)	2.0	6.7	10.1	5.0	2.0
Pnet (psi)	53.6	103.8	155.5	105.5	53.5
K (m/min)	4.4E-05	4.2E-05	3.4E-05	3.6E-05	4.4E-05
K (m/sec)	7.3E-07	7.0E-07	5.7E-07	6.0E-07	7.4E-07
Lugeons	5.0	4.8	3.9	4.1	5.0







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Slight Artesian conditions noted.

- Issues with pressure gauge freezing during testing.

- Minor leakage out of casing noted during step #4. Deemed negligible (< 2 L/min)

- Steps 1 to 3 used for K_{avg} calculation.

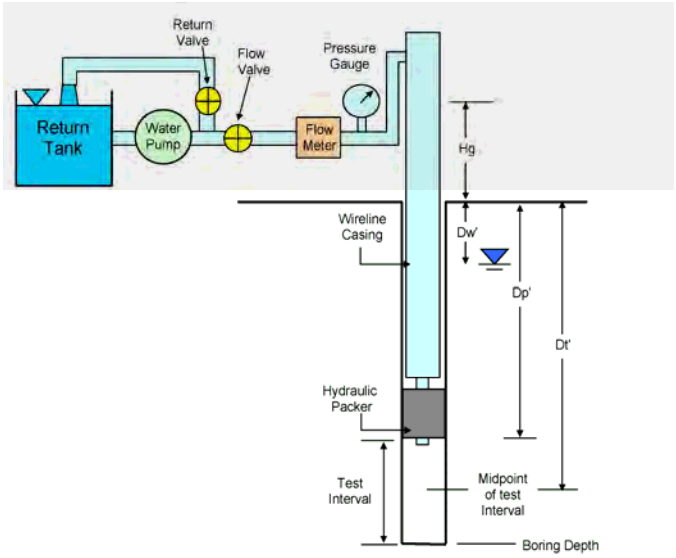
- **K_{avg} = 6.6x10^{-7} m/sec**

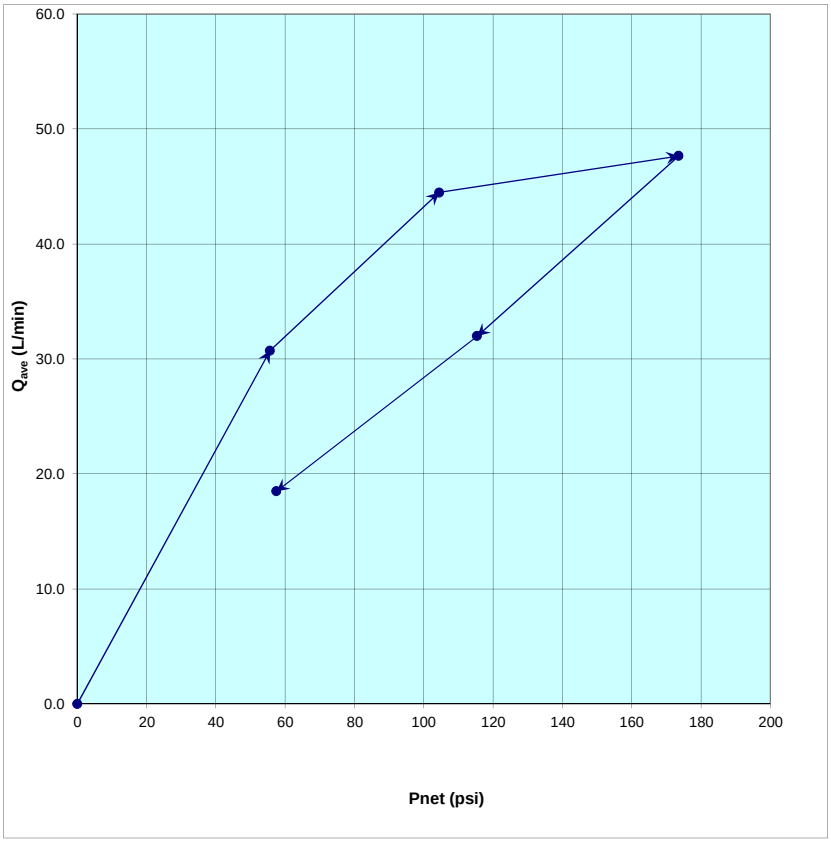
SINGLE IPI PACKER INJECTION TEST

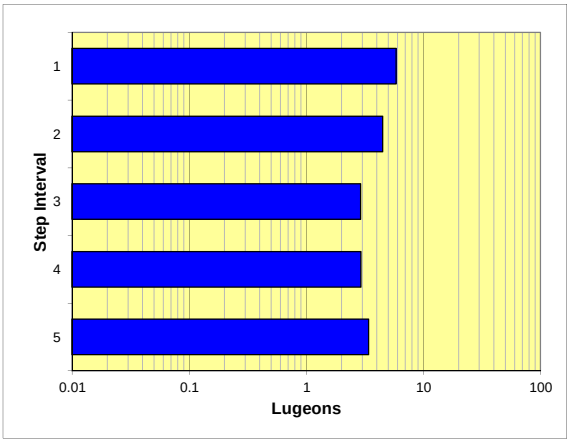
Stantec	Project Name: Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-01
				Test Nº:	8
	Project Nº: 121614000	Test Interval (m):	132.3 to 146.0	GS Elev. (m):	573.2
				Supervisor:	JM

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**132.3** m	L	Length of test section	**13.8** m
Dt	Measured depth to midpoint of test	**139.1** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**114.5** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**120.5** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	58	110	180	118	58
1	32.00	46.00	48.00	32.00	18.00
2	31.00	45.00	47.00	32.00	19.00
3	29.00	44.00	48.00	32.00	19.00
4	31.00	43.00			18.00
5					
6					
Q_{avg} (L/min)	30.73	44.49	47.66	32.00	18.49
Pf (psi)	2.9	6.1	7.0	3.2	1.1
Pnet (psi)	55.6	104.4	173.5	115.4	57.5
K (m/min)	5.2E-05	4.0E-05	2.6E-05	2.6E-05	3.0E-05
K (m/sec)	8.6E-07	6.6E-07	4.3E-07	4.3E-07	5.0E-07
Lugeons	5.8	4.5	2.9	2.9	3.4







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Slight Artesian conditions noted.

- Steps 1 to 3 used for K_{avg} calculation.

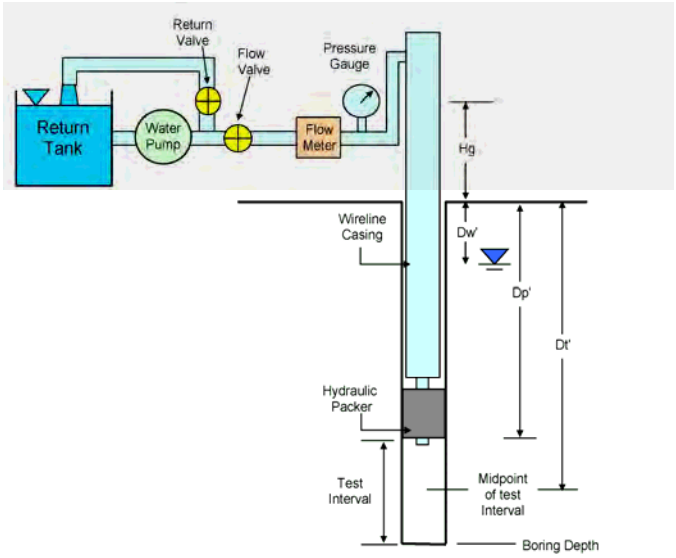
- **K_{avg} = 6.2x10^{-7} m/sec**

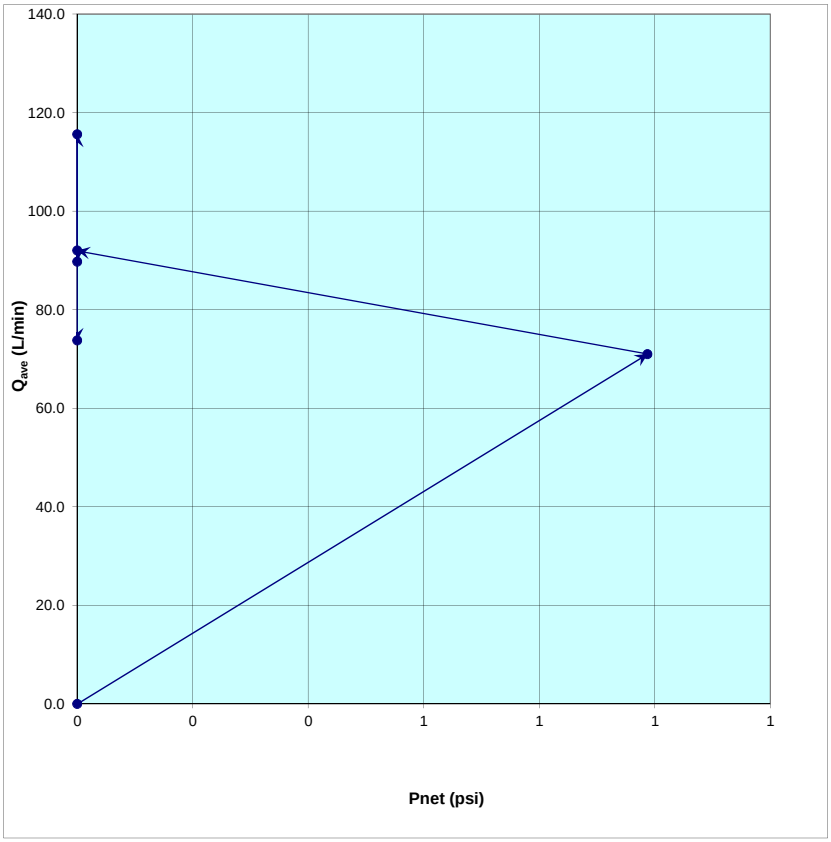
SINGLE IPI PACKER INJECTION TEST

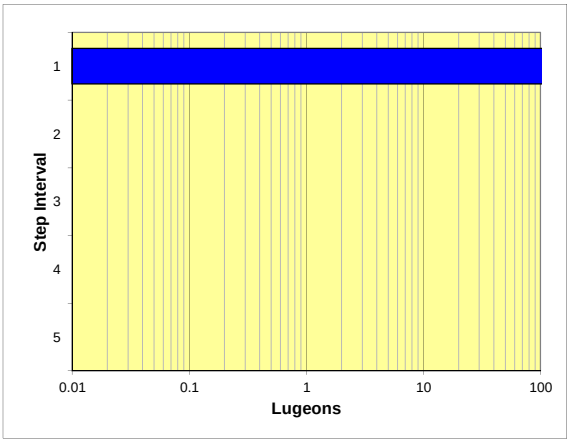
Stantec	Project Name: Kami Iron Ore Project, Pit Slope Design					BH Nº:	RBR-12-01
	Project Nº: 121614000	Test Interval (m):	145.8	to	158.0	Test Nº:	9
						GS Elev. (m):	573.2
						Supervisor:	JG

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m	
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m	
Dp	Measured depth to packer	**145.8** m	L	Length of test section	**12.3** m	
Dt	Measured depth to midpoint of test	**151.9** m	f	Friction factor	**0.055** Vpsi/L/min	
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss		
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure		
Dp'	Vertical depth to packer	**126.2** m	Pnet	Net injection pressure at midpoint of test		
Dt'	Vertical depth to midpoint of test	**131.5** m	K	Hydraulic conductivity		

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	16	23	35	24	17
1	70.00	92.00	117.00	90.00	70.00
2	71.00	92.00	117.00	90.00	73.00
3	72.00	92.00	115.00	90.00	77.00
4	71.00	92.00	115.00	89.00	74.00
5			114.00		75.00
6					
Q_{avg} (L/min)	71.00	92.00	115.59	89.75	73.76
Pf (psi)	15.5	26.1	41.2	24.8	16.8
Pnet (psi)	1.0	0.0	0.0	0.0	0.0
K (m/min)	7.4E-03	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
K (m/sec)	1.2E-04	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
Lugeons	851.9	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Slight Artesian conditions noted.

- Test water injection flows exceeded the capabilities of packer. All pressure likely developed in packer system and no net pressure introduced to the formation.

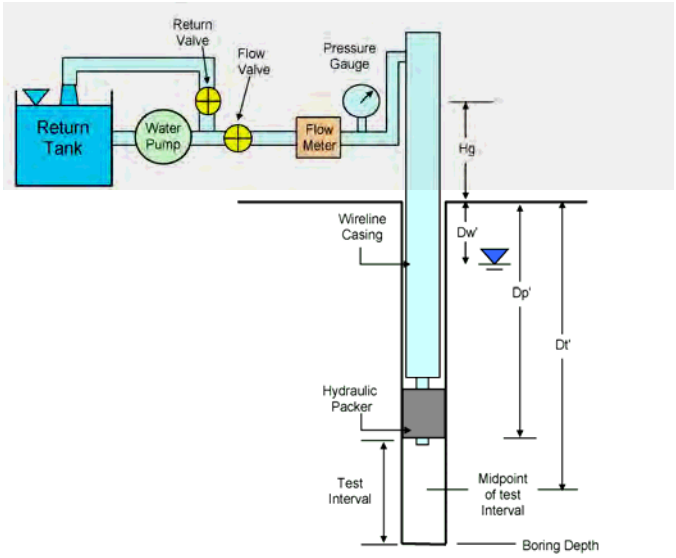
- Permeability results inconclusive.

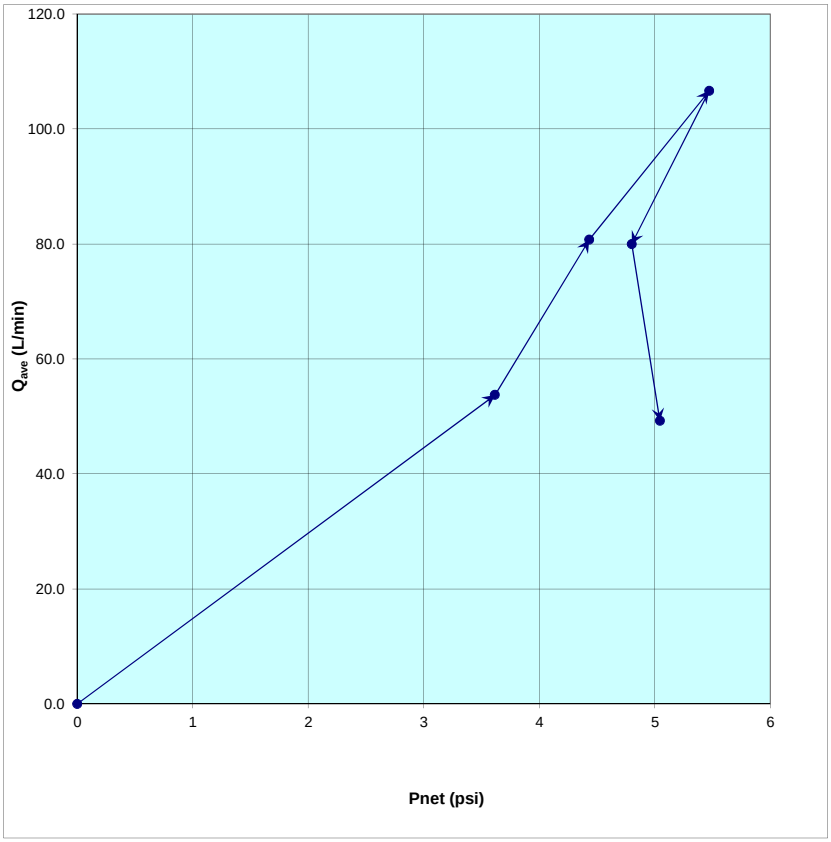
SINGLE IPI PACKER INJECTION TEST

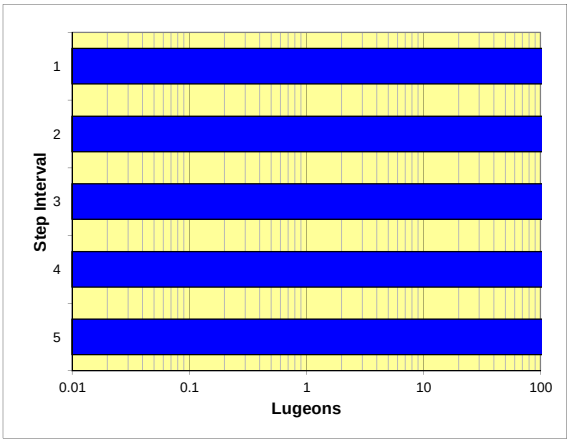
Project Name:	Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-01
Project Nº:	121614000	Test Interval (m):	157.8 to 170.0	Test Nº:	10
				GS Elev. (m):	573.2
				Supervisor:	JG

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**157.8** m	L	Length of test section	**12.3** m
Dt	Measured depth to midpoint of test	**163.9** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**136.6** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**141.9** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	12	24	40	24	12
1	54.00	82.00	106.00	80.00	50.00
2	53.00	81.00	108.00	80.00	49.00
3	54.00	80.00	106.00	80.00	49.00
4	54.00	80.00		80.00	49.00
5					
6					
Q_{avg} (L/min)	53.75	80.75	106.66	80.00	49.25
Pf (psi)	8.9	20.1	35.0	19.7	7.5
Pnet (psi)	3.6	4.4	5.5	4.8	5.0
K (m/min)	1.5E-03	1.9E-03	2.0E-03	1.7E-03	1.0E-03
K (m/sec)	2.5E-05	3.1E-05	3.3E-05	2.8E-05	1.7E-05
Lugeons	176.2	215.9	231.0	197.5	115.7







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Slight Artesian conditions noted.

- Test water injection flows approached the capabilities of packer. Minimal net pressure introduced to the formation.

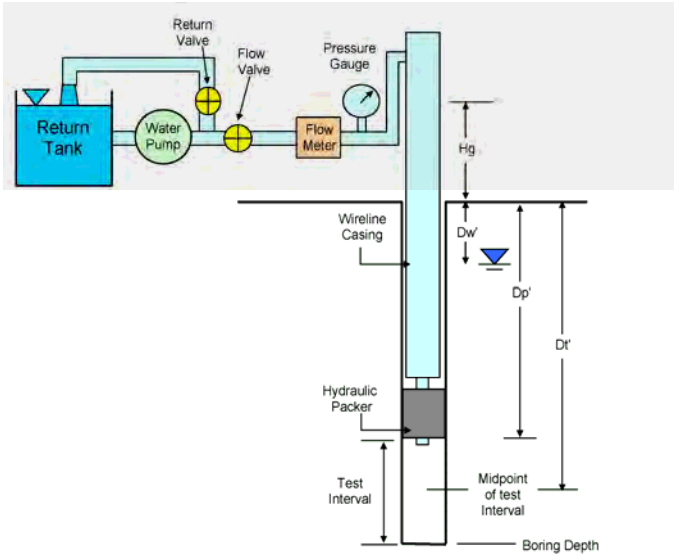
- Permeability results inconclusive.

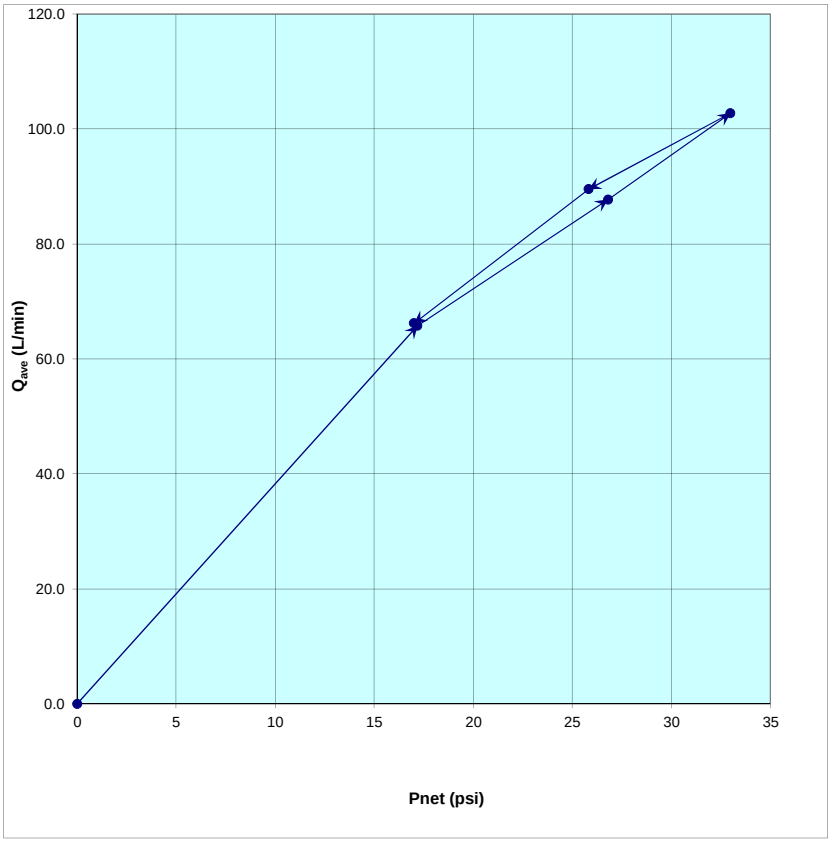
SINGLE IPI PACKER INJECTION TEST

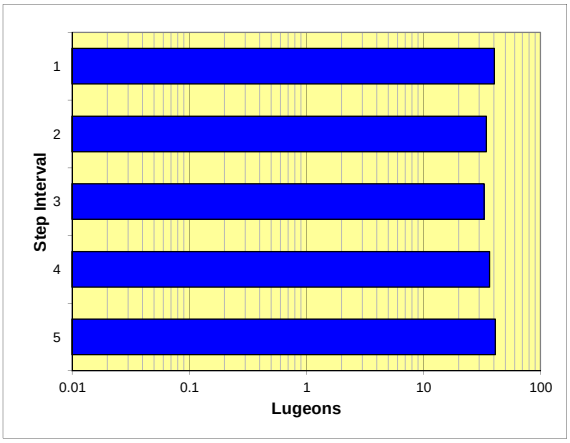
Project Name: Kami Iron Ore Project, Pit Slope Design				BH Nº:	RBR-12-01
Project Nº: 121614000	Test Interval (m):	168.3	to	182.0	Test Nº: 11
				GS Elev. (m):	573.2
				Supervisor:	JM

Dw	Measured depth of static water level (1)	-0.9	m	Hg	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2	m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**168.3**	m	L	Length of test section	**13.8** m
Dt	Measured depth to midpoint of test	**175.1**	m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0	º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8**	m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**145.7**	m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**151.7**	m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	30	50	65	50	30
1	67.00	88.00	104.00	92.00	68.00
2	66.00	87.00	106.00	88.00	68.00
3	65.00	87.00	100.00	84.00	63.00
4	65.00	89.00	104.00	84.00	66.00
5	66.00		100.00	96.00	
6				94.00	
Q_{avg} (L/min)	65.80	87.75	102.77	89.54	66.22
Pf (psi)	13.3	23.7	32.5	24.7	13.5
Pnet (psi)	17.2	26.8	33.0	25.8	17.0
K (m/min)	3.6E-04	3.1E-04	2.9E-04	3.2E-04	3.6E-04
K (m/sec)	6.0E-06	5.1E-06	4.8E-06	5.4E-06	6.1E-06
Lugeons	40.4	34.6	32.9	36.6	41.1







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Slight Artesian conditions noted. Constant (~10 L/min) leakage out of casing before, during and after test.

- Steps 1 to 3 used for K_{avg} calculation.

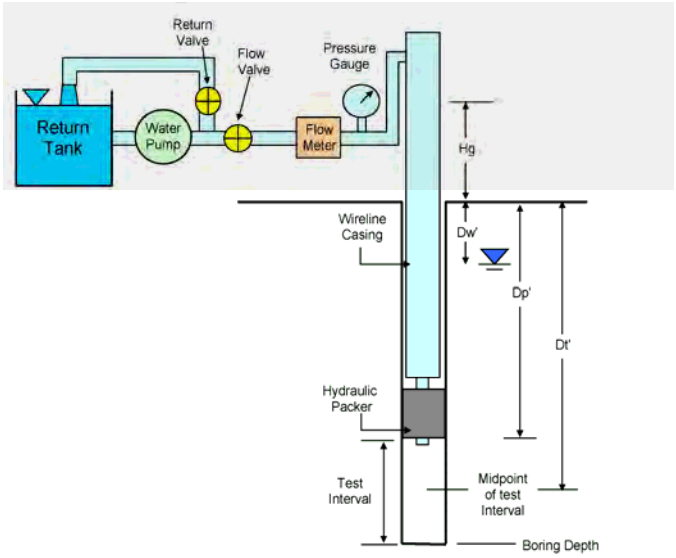
- **$K_{avg} = 5.3 \times 10^{-6}$ m/sec**

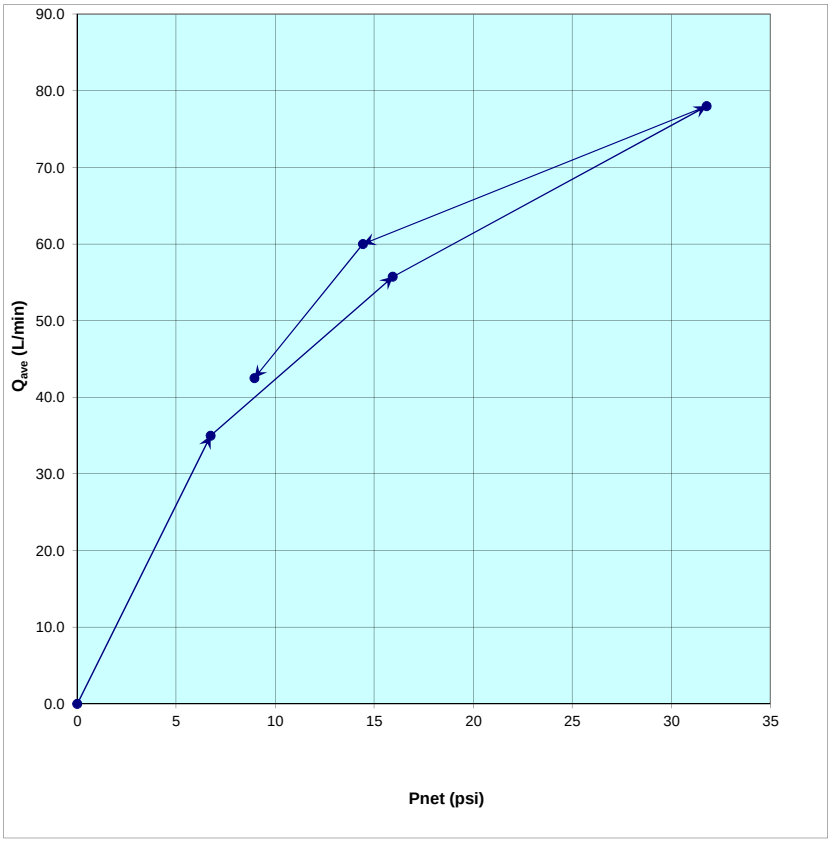
SINGLE IPI PACKER INJECTION TEST

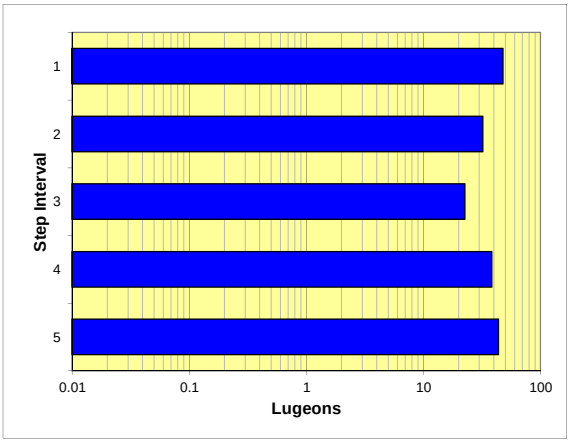
Stantec	Project Name: Kami Iron Ore Project, Pit Slope Design					BH Nº:	RBR-12-01
	Project Nº: 121614000	Test Interval (m):	181.3	to	197.0	Test Nº:	12
						GS Elev. (m):	573.2
						Supervisor:	JG

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m	
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m	
Dp	Measured depth to packer	**181.3** m	L	Length of test section	**15.8** m	
Dt	Measured depth to midpoint of test	**189.1** m	f	Friction factor	**0.055** Vpsi/L/min	
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss		
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure		
Dp'	Vertical depth to packer	**157.0** m	Pnet	Net injection pressure at midpoint of test		
Dt'	Vertical depth to midpoint of test	**163.8** m	K	Hydraulic conductivity		

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	10	25	50	25	14
1	35.00	56.00	78.00	60.00	42.00
2	35.00	55.00	78.00	60.00	43.00
3	35.00	56.00	78.00	60.00	42.00
4	35.00	56.00	78.00	60.00	43.00
5					
6					
Q_{avg} (L/min)	35.00	55.75	78.00	60.00	42.50
Pf (psi)	3.8	9.6	18.7	11.1	5.6
Pnet (psi)	6.7	15.9	31.8	14.4	9.0
K (m/min)	4.3E-04	2.9E-04	2.0E-04	3.5E-04	4.0E-04
K (m/sec)	7.2E-06	4.9E-06	3.4E-06	5.8E-06	6.6E-06
Lugeons	47.9	32.2	22.6	38.3	43.8







Comments

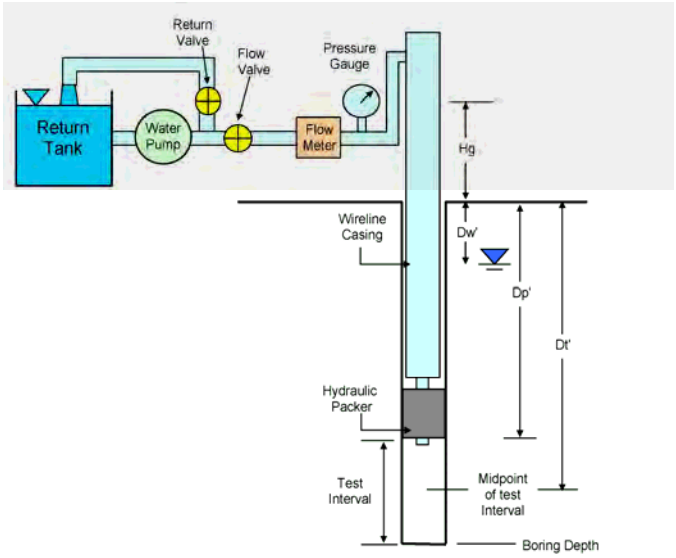
- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.
- Slight Artesian conditions noted.
- Steps 1 to 3 used for K_{avg} calculation.
- **K_{avg} = 4.9x10^{-6} m/sec**

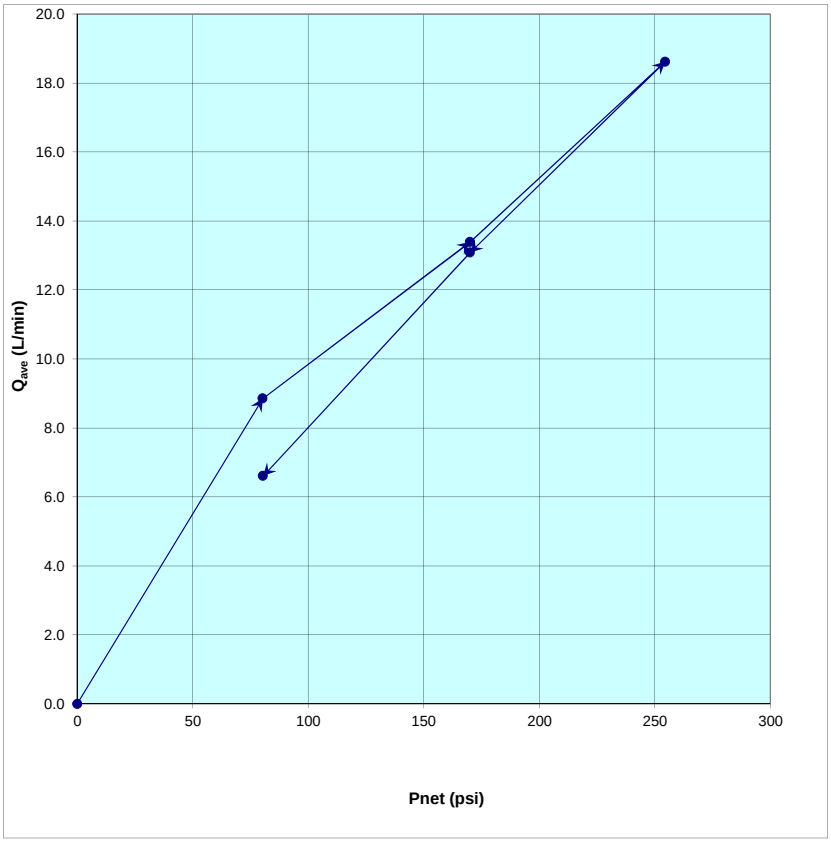
SINGLE IPI PACKER INJECTION TEST

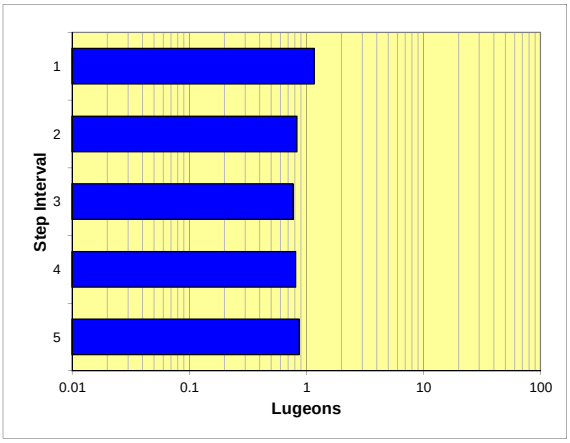
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-01
Project Nº: 121614000	Test Interval (m): 192.3 to 206.0	Test Nº:	13
		GS Elev. (m):	573.2
		Supervisor:	JM

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**192.3** m	L	Length of test section	**13.8** m
Dt	Measured depth to midpoint of test	**199.1** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**166.5** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**172.4** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	80	170	255	170	80
1	9.40	13.00	18.00	14.20	4.00
2	8.90	14.00	19.00	11.50	7.70
3	8.60	13.00	18.50	14.00	7.60
4	8.90	13.70	19.00	12.00	7.60
5	8.50	13.30		14.00	7.10
6					
Q_{avg} (L/min)	8.85	13.39	18.62	13.09	6.61
Pf (psi)	0.2	0.6	1.1	0.5	0.1
Pnet (psi)	80.3	170.0	254.4	170.0	80.4
K (m/min)	1.0E-05	7.3E-06	6.8E-06	7.2E-06	7.7E-06
K (m/sec)	1.7E-07	1.2E-07	1.1E-07	1.2E-07	1.3E-07
Lugeons	1.2	0.8	0.8	0.8	0.9







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Slight Artesian conditions noted.

- Steps 1 to 3 used for K_{avg} calculation.

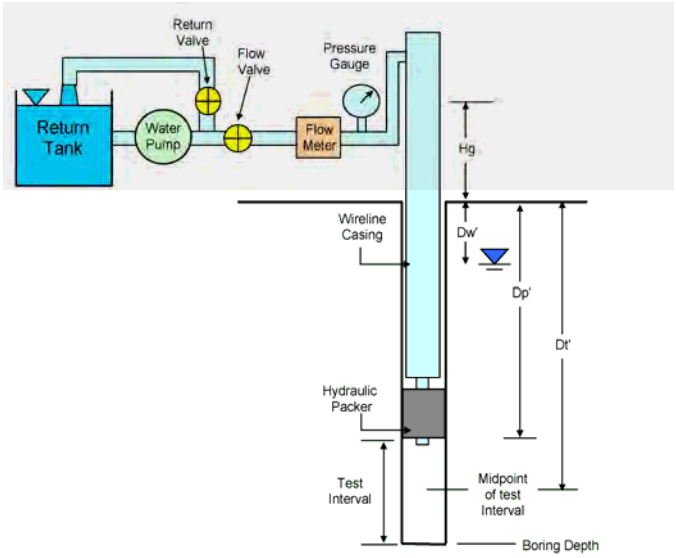
- **K_{avg} = 1.3x10^{-7} m/sec**

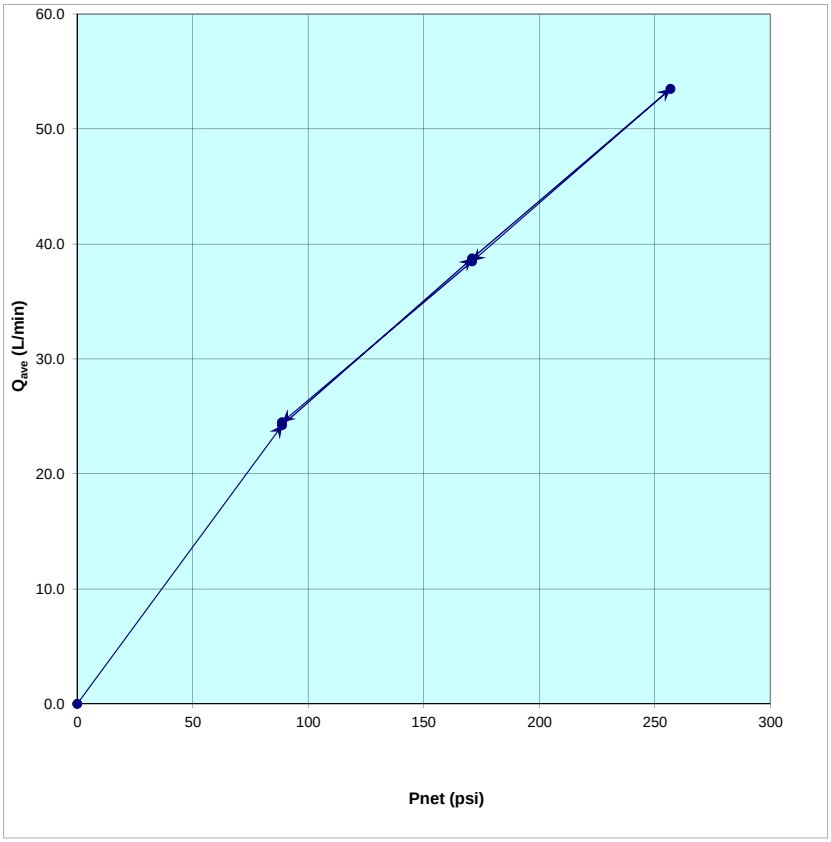
SINGLE IPI PACKER INJECTION TEST

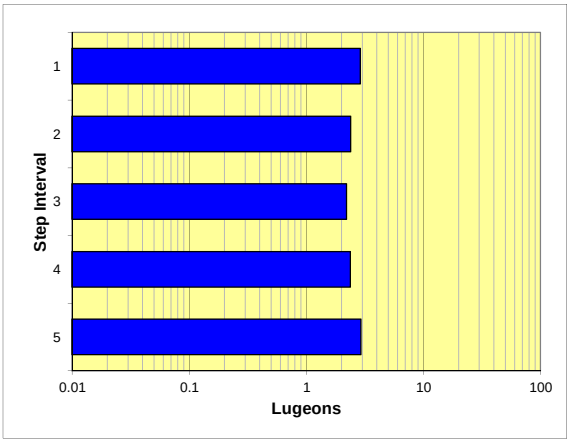
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-01
Project Nº: 121614000	Test Interval (m): 204.3 to 218.0	Test Nº:	14
		GS Elev. (m):	573.2
		Supervisor:	JM

Dw	Measured depth of static water level (1)	-0.9 m	Hg	Gauge height	1.1 m
Dbr	Measured depth to bedrock	38.2 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**204.3** m	L	Length of test section	**13.8** m
Dt	Measured depth to midpoint of test	**211.1** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**-0.8** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**176.9** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**182.8** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	90	175	265	175	90
1	25.00	40.00	53.00	39.00	25.00
2	24.00	39.00	55.00	39.00	24.00
3	24.00	38.00	53.00	38.00	24.00
4	24.00	38.00	53.00	38.00	25.00
5					
6					
Q_{avg} (L/min)	24.25	38.74	53.49	38.50	24.49
Pf (psi)	1.8	4.6	8.8	4.6	1.8
Pnet (psi)	88.7	170.9	256.7	170.9	88.7
K (m/min)	2.5E-05	2.1E-05	1.9E-05	2.1E-05	2.6E-05
K (m/sec)	4.2E-07	3.5E-07	3.2E-07	3.5E-07	4.3E-07
Lugeons	2.9	2.4	2.2	2.4	2.9







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Slight Artesian conditions noted.

- Steps 1 to 3 used for K_{avg} calculation.

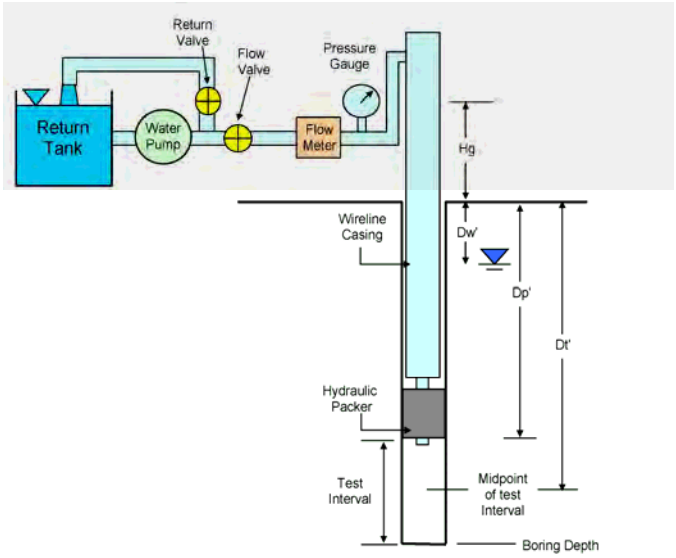
- **K_{avg} = 3.6x10^{-7} m/sec**

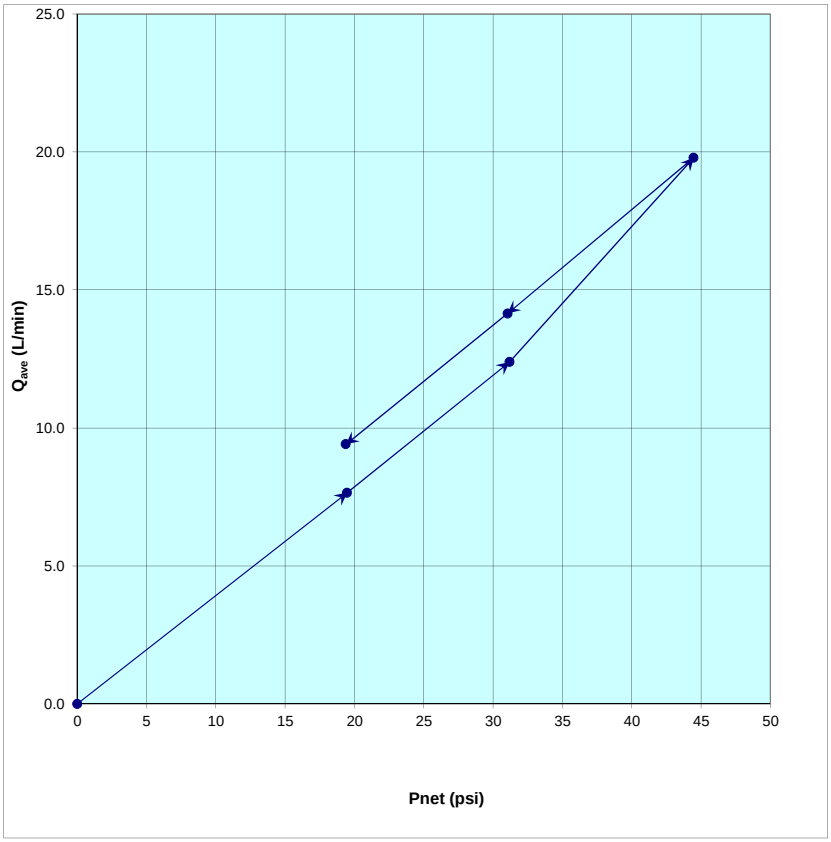
SINGLE IPI PACKER INJECTION TEST

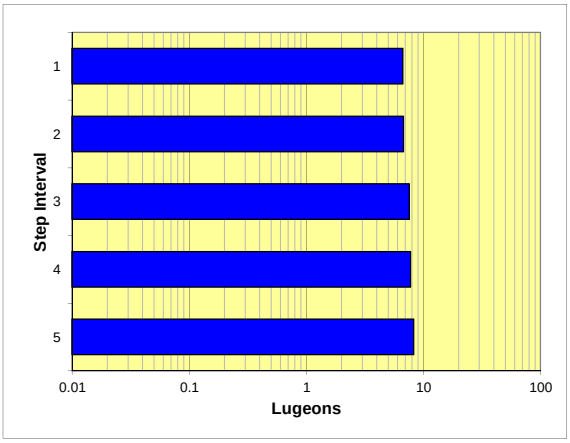
Project Name:	Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-02
Project Nº:	121614000	Test Interval (m):	23.3 to 31.8	Test Nº:	1
				GS Elev. (m):	581.3
				Supervisor:	JM

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	23.3 m	L	Length of test section	8.6 m
Dt	Measured depth to midpoint of test	27.5 m	f	Friction factor	0.055 Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	2.4 m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	20.1 m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	23.8 m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	14	26	40	26	14
1	8.70	12.00	20.00	14.80	9.50
2	8.00	13.00	19.00	14.50	9.50
3	7.30	12.00	20.00	13.50	8.40
4	7.30	13.00	20.00	14.10	10.60
5	7.10	12.00	20.00	13.90	9.20
6					
Q_{avg} (L/min)	7.66	12.39	19.80	14.15	9.41
Pf (psi)	0.2	0.5	1.2	0.6	0.3
Pnet (psi)	19.5	31.2	44.5	31.0	19.4
K (m/min)	5.4E-05	5.5E-05	6.1E-05	6.3E-05	6.7E-05
K (m/sec)	9.0E-07	9.1E-07	1.0E-06	1.0E-06	1.1E-06
Lugeons	6.7	6.7	7.6	7.7	8.2







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

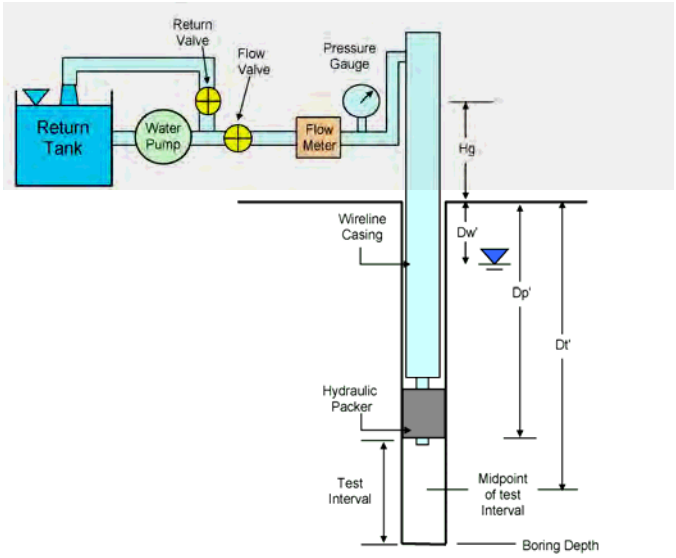
- **K_{avg} = 9.4x10^{-7} m/sec**

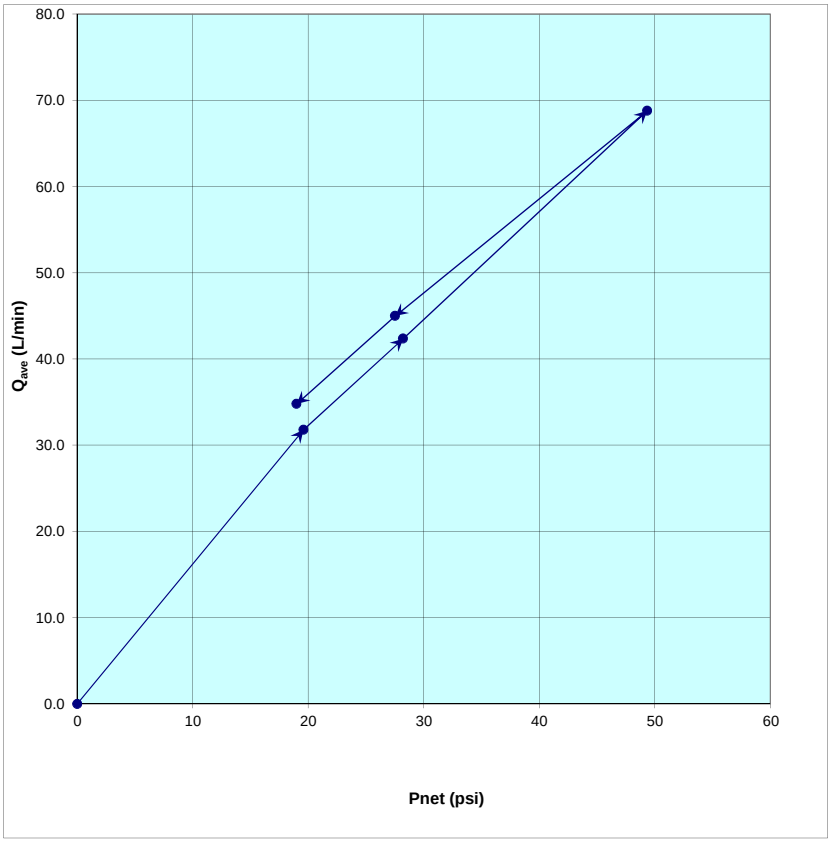
SINGLE IPI PACKER INJECTION TEST

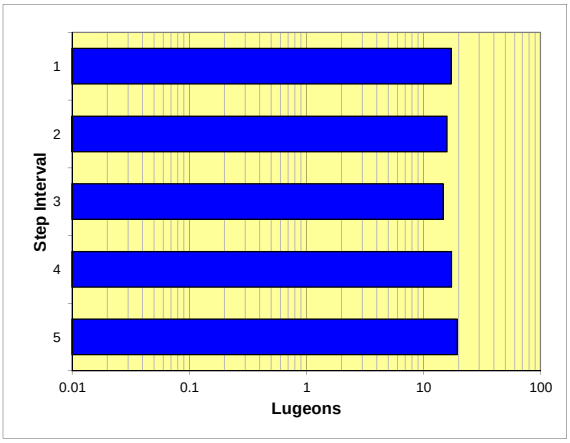
Project Name: Kami Iron Ore Project, Pit Slope Design				BH Nº:	RBR-12-02
Project Nº: 121614000	Test Interval (m):	29.3	to	43.0	Test Nº: 2
					GS Elev. (m): 581.3
					Supervisor: TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**29.3** m	L	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**36.2** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**25.4** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**31.3** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	17	28	58	28	17
1	32.00	45.00	70.00	45.00	34.00
2	31.00	43.00	67.00	45.00	34.00
3	32.00	42.00	68.00	45.00	35.00
4	32.00	41.00	70.00	45.00	35.00
5	32.00	41.00	69.00	45.00	36.00
6					
Q_{avg} (L/min)	31.80	42.37	68.79	45.00	34.79
Pf (psi)	3.1	5.4	14.3	6.1	3.7
Pnet (psi)	19.6	28.2	49.3	27.5	19.0
K (m/min)	1.5E-04	1.4E-04	1.3E-04	1.5E-04	1.7E-04
K (m/sec)	2.5E-06	2.3E-06	2.2E-06	2.5E-06	2.9E-06
Lugeons	17.2	15.9	14.8	17.3	19.4







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

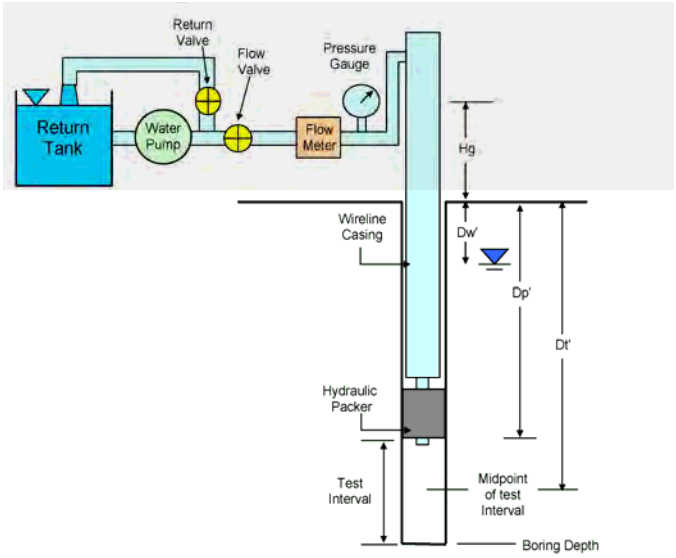
- **K_{avg} = 2.3x10^{-6} m/sec**

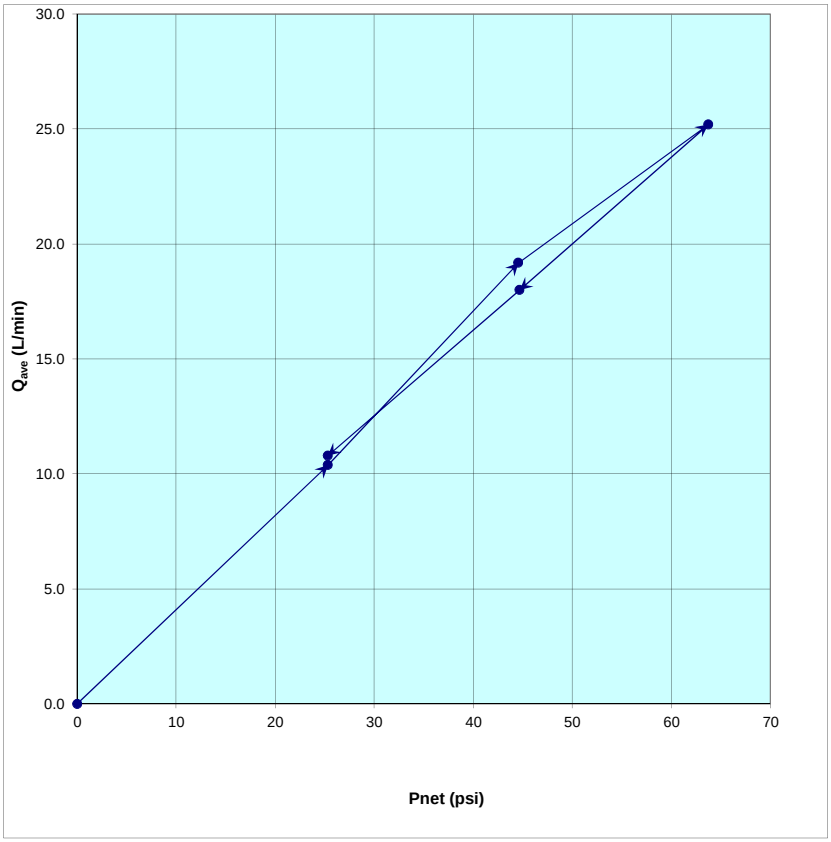
SINGLE IPI PACKER INJECTION TEST

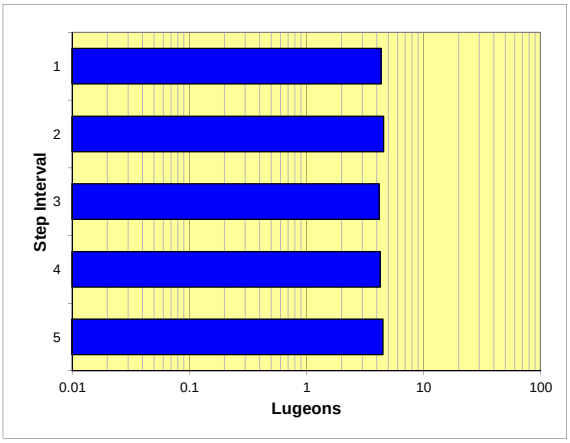
BH Nº:	**RBR-12-02**		
Project Name:	**Kami Iron Ore Project, Pit Slope Design**	**Test Nº:**	**3**
Project Nº:	**121614000**	**GS Elev. (m):**	**581.3**
Test Interval (m):	**41.3** to **55.0**	**Supervisor:**	**TS/DG**

Dw	Measured depth of static water level (1)	2.7 m	**Hg**	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	**rb**	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**41.3** m	**L**	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**48.2** m	**f**	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	**Pf**	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	**Pg**	Gauge pressure	
Dp'	Vertical depth to packer	**35.8** m	**Pnet**	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**41.7** m	**K**	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	20	40	60	40	20
1	10.00	20.00	25.00	18.00	11.00
2	11.00	20.00	26.00	18.00	11.00
3	10.00	19.00	25.00	18.00	11.00
4	11.00	19.00	25.00	18.00	11.00
5	10.00	18.00	25.00	18.00	10.00
6					
Q_{avg} (L/min)	10.39	19.19	25.20	18.00	10.79
Pf (psi)	0.3	1.1	1.9	1.0	0.4
Pnet (psi)	25.3	44.5	63.7	44.7	25.3
K (m/min)	3.8E-05	4.0E-05	3.7E-05	3.8E-05	4.0E-05
K (m/sec)	6.4E-07	6.7E-07	6.2E-07	6.3E-07	6.7E-07
Lugeons	4.3	4.6	4.2	4.3	4.5







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

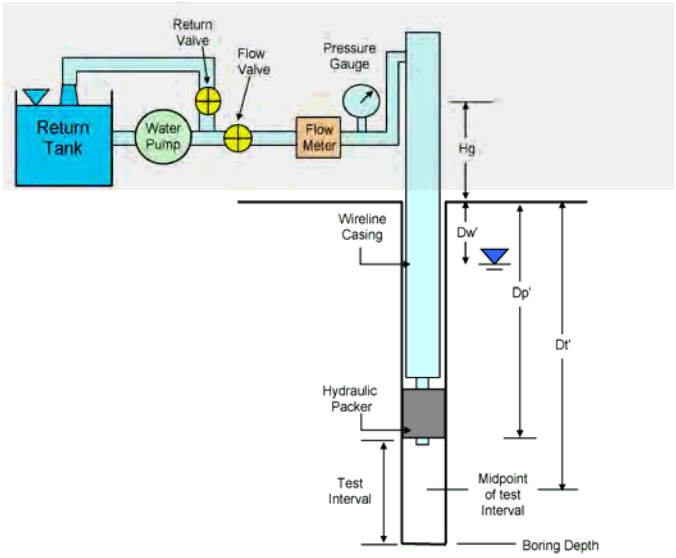
- **K_{avg} = 6.4x10^{-7} m/sec**

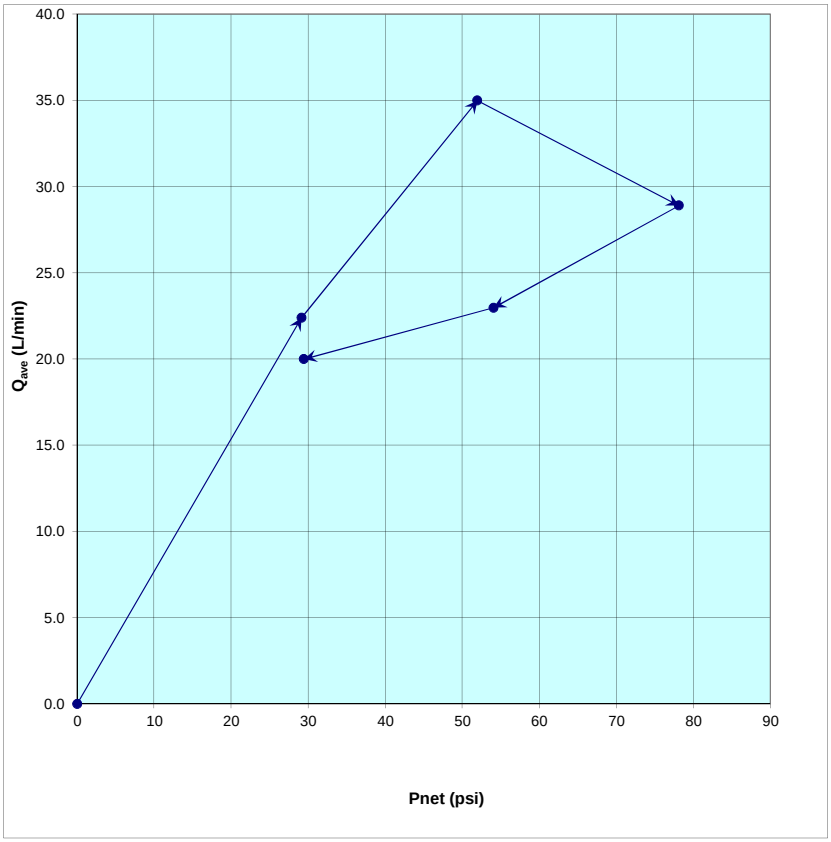
SINGLE IPI PACKER INJECTION TEST

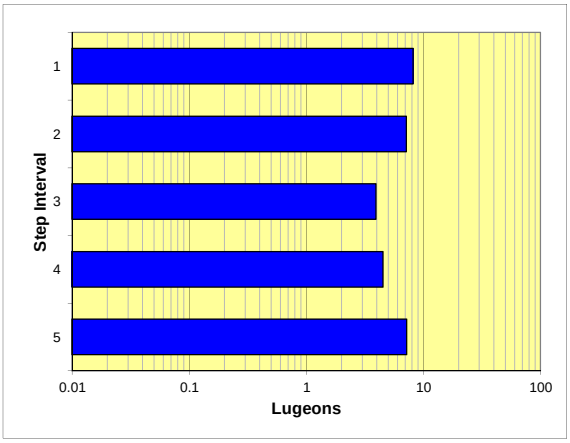
Project Name:	Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-02
Project Nº:	121614000	Test Interval (m):	53.3 to 67.0	Test Nº:	4
				GS Elev. (m):	581.3
				Supervisor:	DG

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	53.3 m	L	Length of test section	13.7 m
Dt	Measured depth to midpoint of test	60.2 m	f	Friction factor	0.055 Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	2.4 m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	46.2 m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	52.1 m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	25	50	75	50	25
1	24.00	36.00	25.00	23.00	20.00
2	22.00	36.00	32.00	23.00	20.00
3	22.00	34.00	30.00	25.00	20.00
4	22.00	34.00	29.00	22.00	20.00
5	22.00	35.00	29.00	22.00	20.00
6					
Q_{avg} (L/min)	22.39	34.99	28.91	22.97	20.00
Pf (psi)	1.5	3.7	2.5	1.6	1.2
Pnet (psi)	29.1	51.9	78.1	54.0	29.4
K (m/min)	7.2E-05	6.3E-05	3.5E-05	4.0E-05	6.4E-05
K (m/sec)	1.2E-06	1.0E-06	5.8E-07	6.6E-07	1.1E-06
Lugeons	8.1	7.1	3.9	4.5	7.2







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

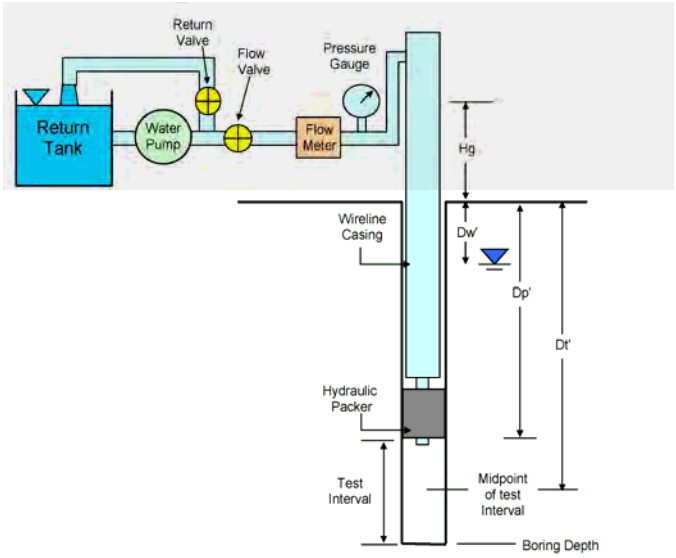
- **K_{avg} = 9.0x10^{-7} m/sec**

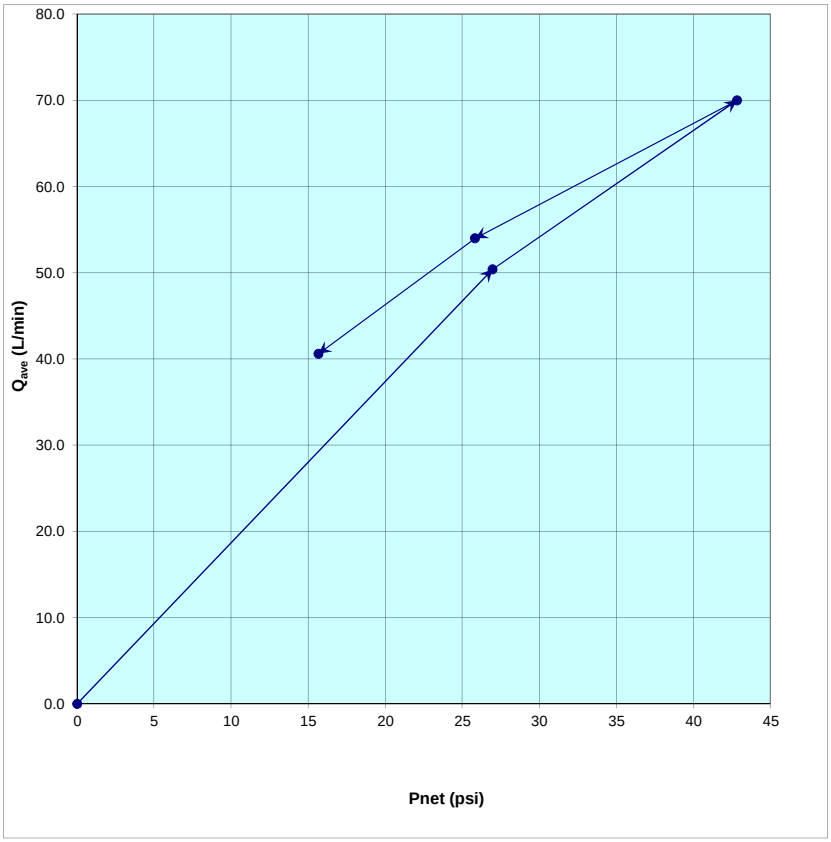
SINGLE IPI PACKER INJECTION TEST

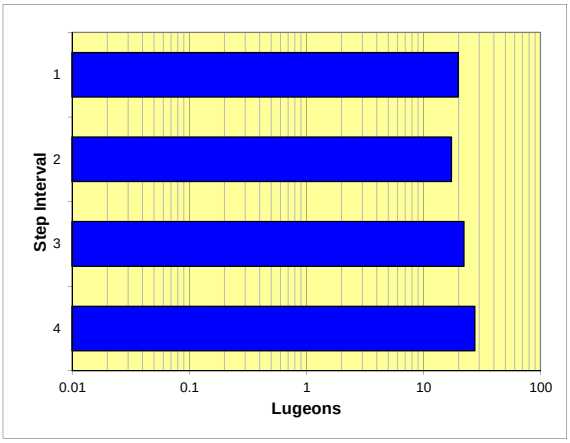
Stantec	Project Name: Kami Iron Ore Project, Pit Slope Design					BH Nº:	RBR-12-02
	Project Nº: 121614000	Test Interval (m):	65.3	to	79.0	Test Nº:	5
						GS Elev. (m):	581.3
						Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m	
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m	
Dp	Measured depth to packer	**65.3** m	L	Length of test section	**13.7** m	
Dt	Measured depth to midpoint of test	**72.2** m	f	Friction factor	**0.055** Vpsi/L/min	
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss		
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure		
Dp'	Vertical depth to packer	**56.6** m	Pnet	Net injection pressure at midpoint of test		
Dt'	Vertical depth to midpoint of test	**62.5** m	K	Hydraulic conductivity		

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	29	52	29	15	
1	51.00	71.00	54.00	41.00	
2	50.00	70.00	54.00	40.00	
3	50.00	69.00	54.00	41.00	
4	50.00	70.00	54.00	41.00	
5	51.00	70.00	54.00	40.00	
6					
Q_{avg} (L/min)	50.40	70.00	54.00	40.60	
Pf (psi)	7.7	14.8	8.8	5.0	
Pnet (psi)	27.0	42.8	25.8	15.7	
K (m/min)	1.7E-04	1.5E-04	2.0E-04	2.4E-04	
K (m/sec)	2.9E-06	2.5E-06	3.3E-06	4.0E-06	
Lugeons	19.8	17.3	22.2	27.5	







Comments

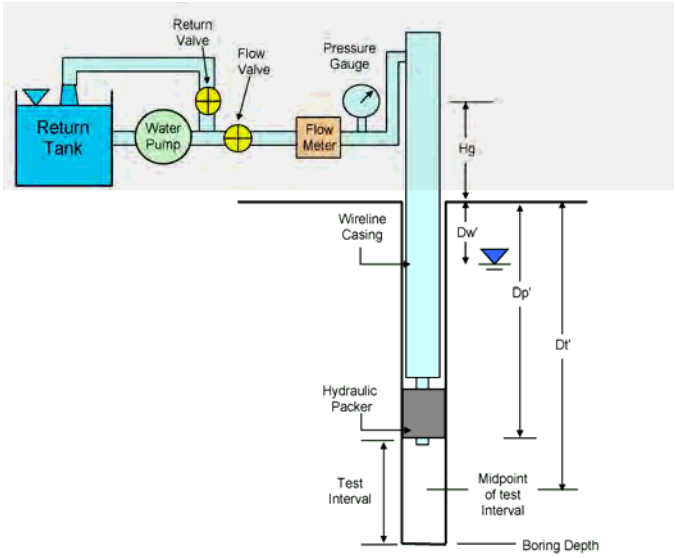
- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.
- Drill pump at maximum output at Step 2.
- Steps 1 to 2 used for K_{avg} calculation.
- **K_{avg} = 2.7x10^{-6} m/sec**

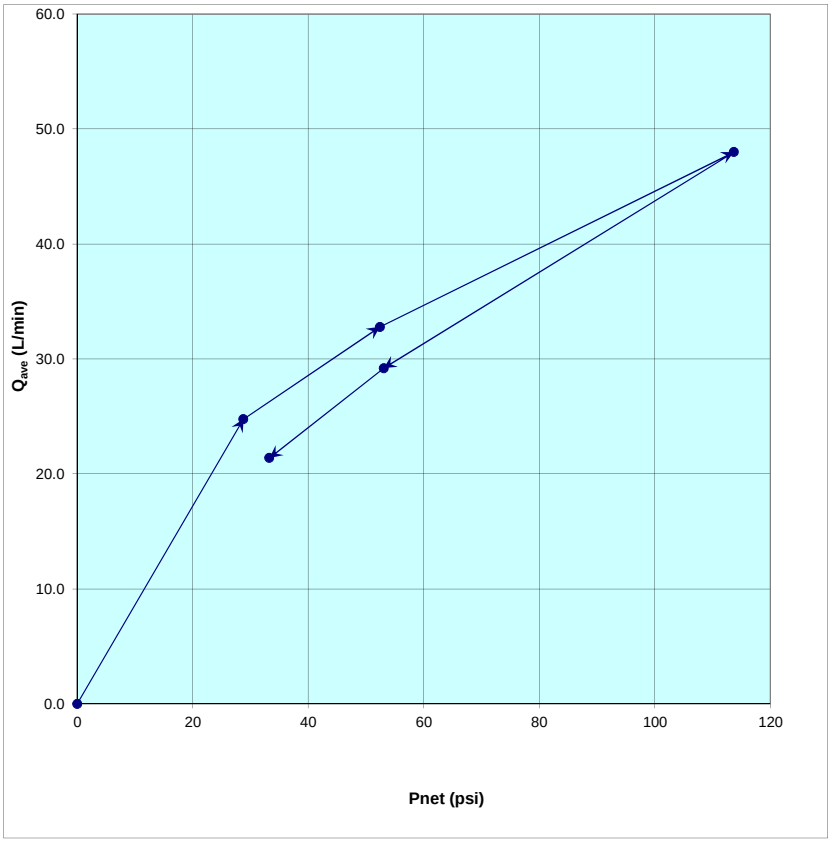
SINGLE IPI PACKER INJECTION TEST

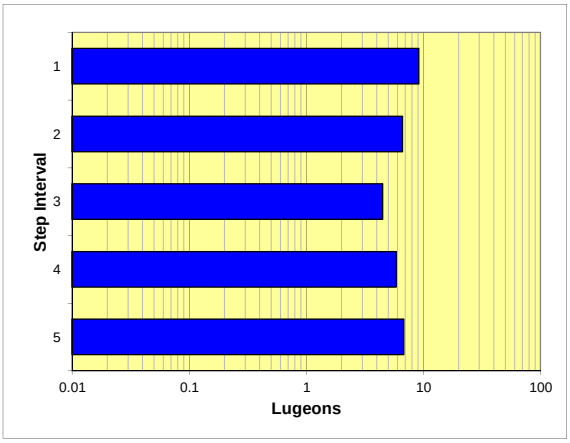
Project Name:	Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-02
Project Nº:	121614000	Test Interval (m):	77.3 to 91.0	Test Nº:	6
				GS Elev. (m):	581.3
				Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	77.3 m	L	Length of test section	13.7 m
Dt	Measured depth to midpoint of test	84.2 m	f	Friction factor	0.055 Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	2.4 m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	66.9 m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	72.9 m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	25	50	115	50	29
1	26.00	32.00	49.00	29.00	22.00
2	26.00	33.00	48.00	30.00	21.00
3	25.00	33.00	47.00	29.00	21.00
4	24.00	33.00	48.00	29.00	22.00
5	23.00	33.00	48.00	29.00	21.00
6					
Q_{avg} (L/min)	24.77	32.80	48.00	29.20	21.39
Pf (psi)	1.9	3.3	7.0	2.6	1.4
Pnet (psi)	28.8	52.4	113.7	53.1	33.3
K (m/min)	8.0E-05	5.9E-05	3.9E-05	5.1E-05	6.0E-05
K (m/sec)	1.3E-06	9.8E-07	6.6E-07	8.6E-07	1.0E-06
Lugeons	9.1	6.6	4.5	5.8	6.8







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

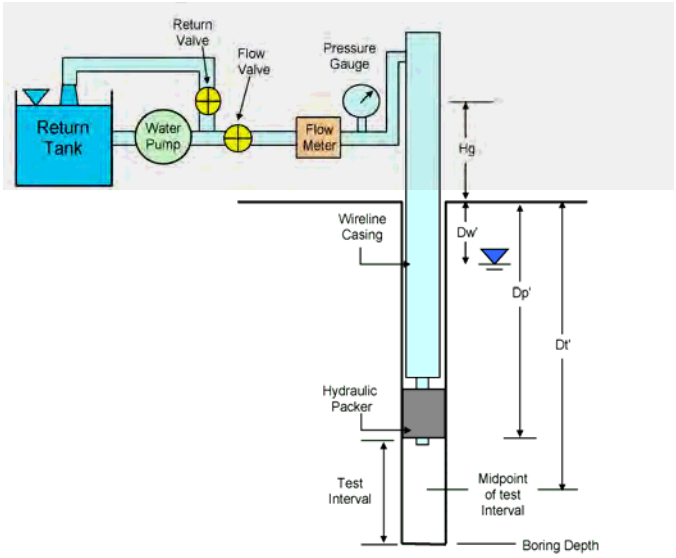
- **$K_{avg} = 9.5 \times 10^{-7}$ m/sec**

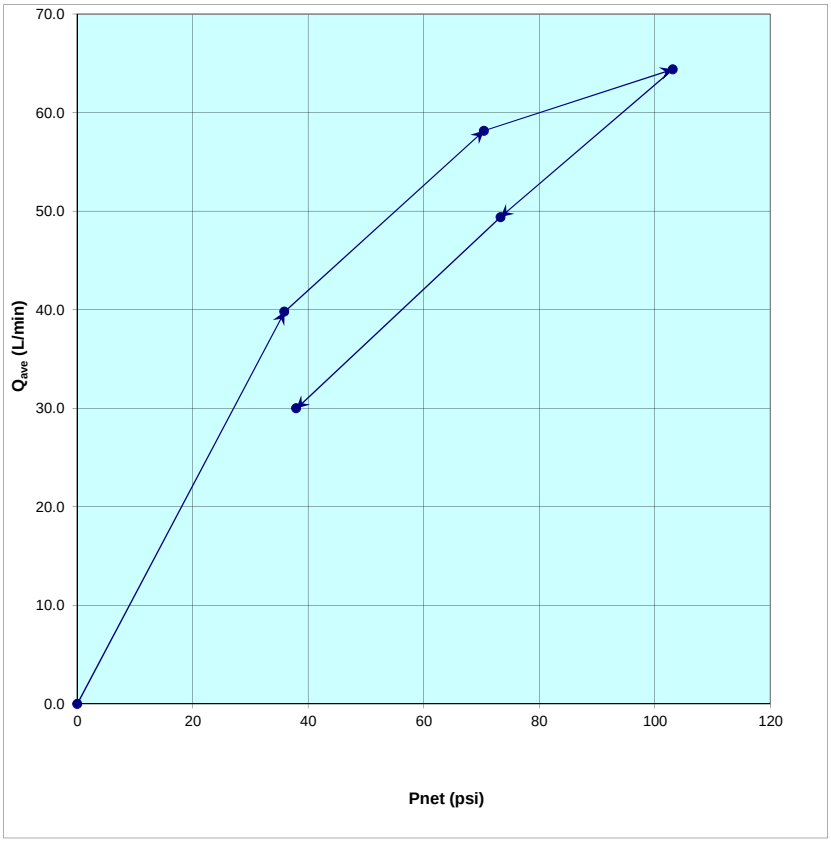
SINGLE IPI PACKER INJECTION TEST

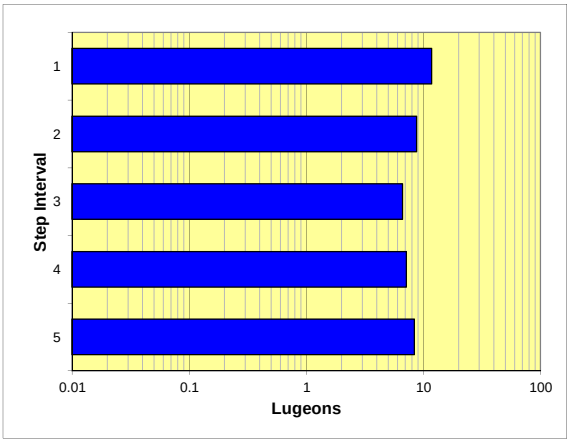
Stantec	Project Name: Kami Iron Ore Project, Pit Slope Design					BH Nº:	RBR-12-02
	Project Nº: 121614000	Test Interval (m):	89.3	to	103.0	Test Nº:	7
						GS Elev. (m):	581.3
						Supervisor:	DG

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m	
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m	
Dp	Measured depth to packer	**89.3** m	L	Length of test section	**13.7** m	
Dt	Measured depth to midpoint of test	**96.2** m	f	Friction factor	**0.055** Vpsi/L/min	
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss		
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure		
Dp'	Vertical depth to packer	**77.3** m	Pnet	Net injection pressure at midpoint of test		
Dt'	Vertical depth to midpoint of test	**83.3** m	K	Hydraulic conductivity		

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	35	75	110	75	35
1	40.00	62.00	65.00	50.00	30.00
2	40.00	58.00	64.00	49.00	30.00
3	40.00	56.00	63.00	50.00	30.00
4	40.00	57.00	65.00	48.00	30.00
5	39.00	58.00	65.00	50.00	30.00
6					
Q_{avg} (L/min)	39.80	58.17	64.39	49.39	30.00
Pf (psi)	4.8	10.2	12.5	7.4	2.7
Pnet (psi)	35.9	70.4	103.1	73.3	37.9
K (m/min)	1.0E-04	7.7E-05	5.8E-05	6.3E-05	7.4E-05
K (m/sec)	1.7E-06	1.3E-06	9.7E-07	1.1E-06	1.2E-06
Lugeons	11.8	8.8	6.6	7.1	8.4







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

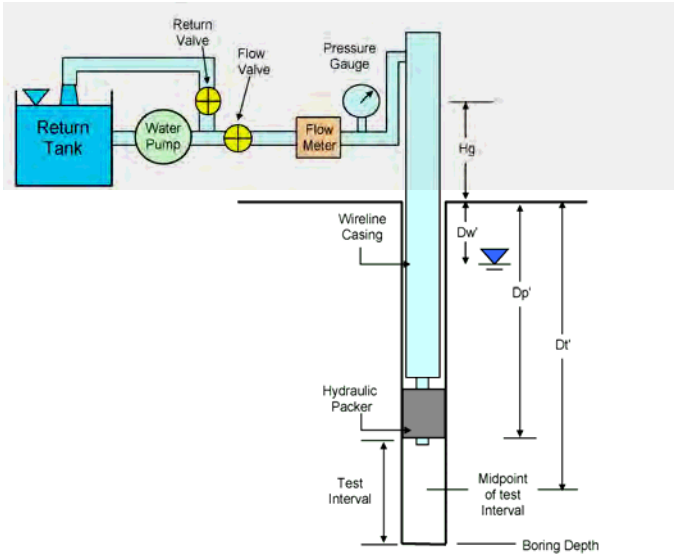
- **K_{avg} = 1.3x10^{-6} m/sec**

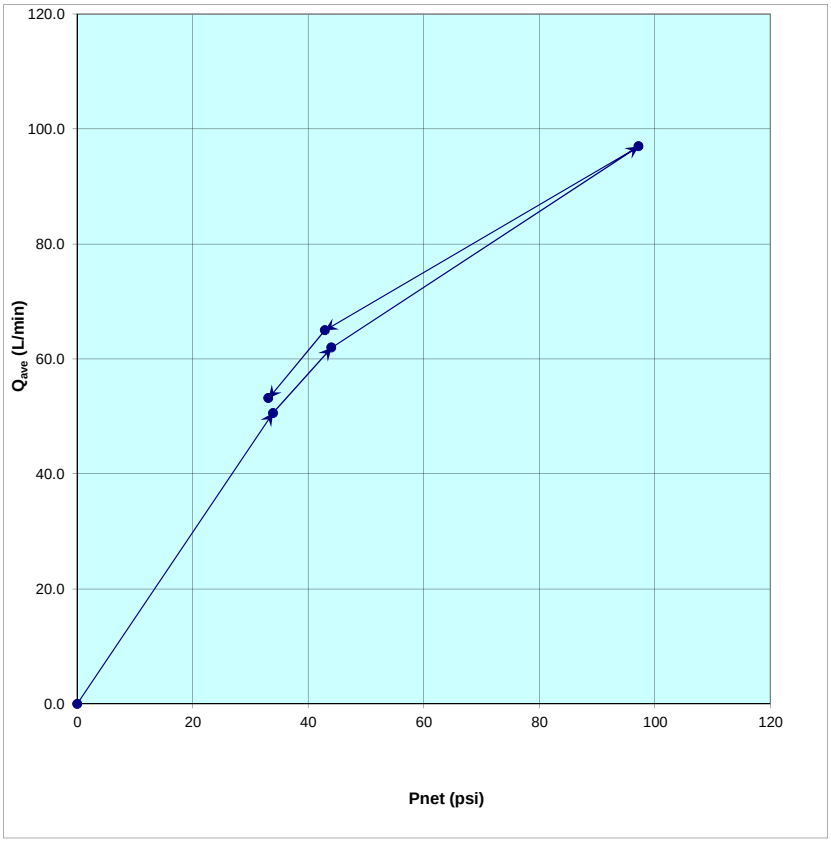
SINGLE IPI PACKER INJECTION TEST

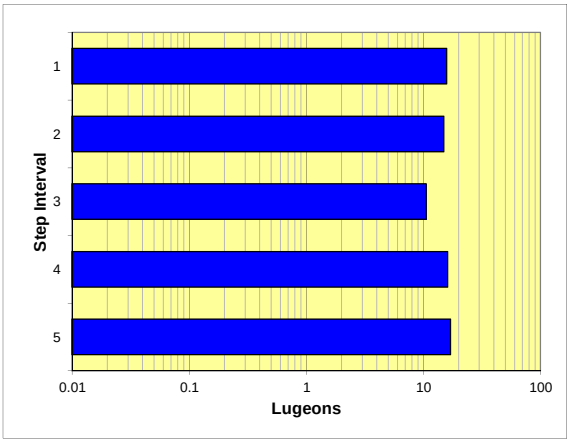
						BH Nº:	RBR-12-02
	Project Name: Kami Iron Ore Project, Pit Slope Design					Test Nº:	8
Stantec	Project Nº: 121614000	Test Interval (m):	101.3	to	115.0	GS Elev. (m):	581.3
						Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m	
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m	
Dp	Measured depth to packer	**101.3** m	L	Length of test section	**13.7** m	
Dt	Measured depth to midpoint of test	**108.2** m	f	Friction factor	**0.055** Vpsi/L/min	
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss		
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure		
Dp'	Vertical depth to packer	**87.7** m	Pnet	Net injection pressure at midpoint of test		
Dt'	Vertical depth to midpoint of test	**93.7** m	K	Hydraulic conductivity		

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	36	50	120	50	36
1	51.00	62.00	97.00	65.00	54.00
2	50.00	62.00	97.00	63.00	53.00
3	51.00	62.00	97.00	65.00	53.00
4	51.00	62.00	97.00	66.00	53.00
5	50.00	62.00	97.00	66.00	53.00
6					
Q_{avg} (L/min)	50.60	62.00	97.00	64.99	53.20
Pf (psi)	7.7	11.6	28.5	12.8	8.6
Pnet (psi)	33.9	44.0	97.2	42.9	33.1
K (m/min)	1.4E-04	1.3E-04	9.3E-05	1.4E-04	1.5E-04
K (m/sec)	2.3E-06	2.2E-06	1.6E-06	2.4E-06	2.5E-06
Lugeons	15.8	14.9	10.6	16.1	17.0







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

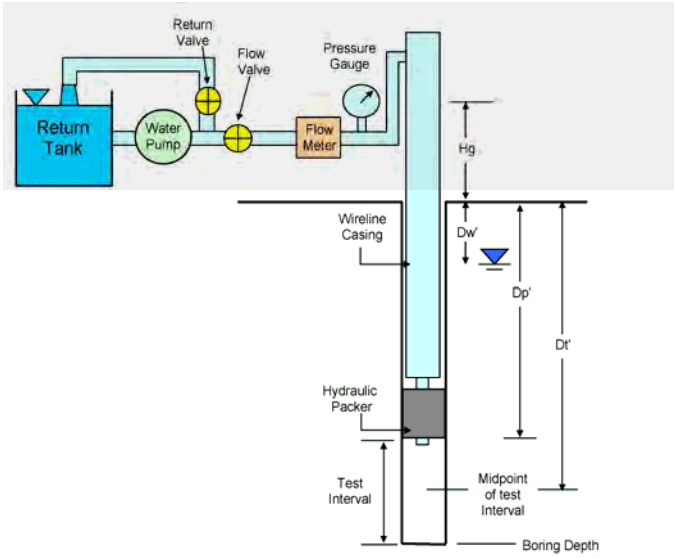
- **K_{avg} = 2.0x10^{-6} m/sec**

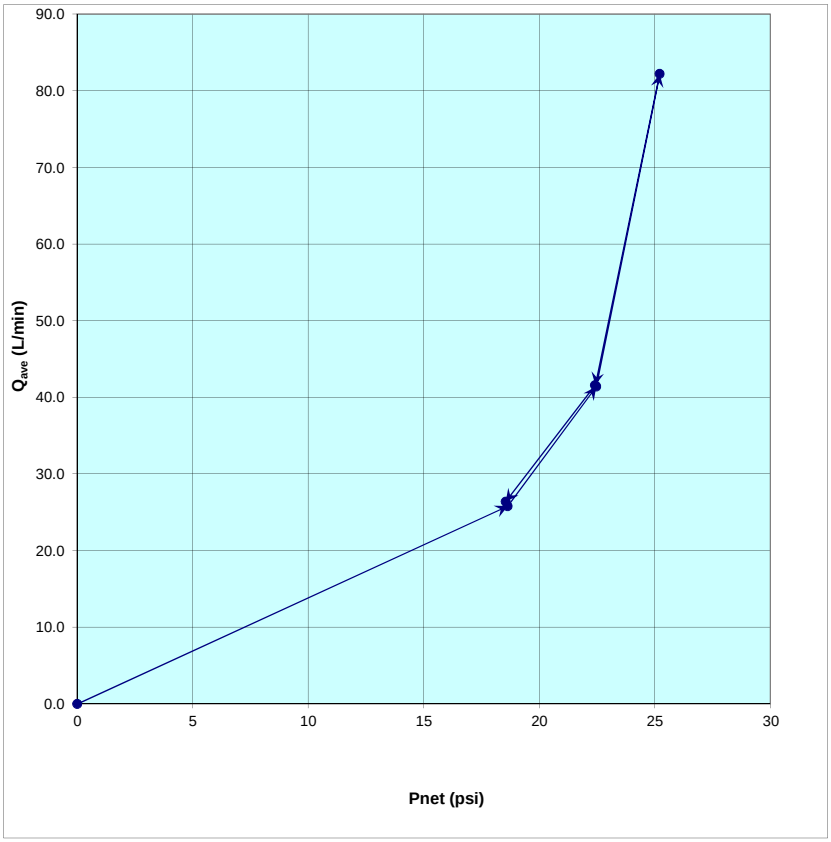
SINGLE IPI PACKER INJECTION TEST

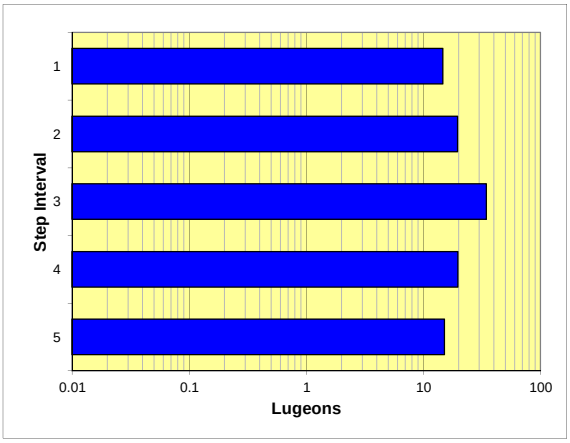
Project Name:	Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-02
Project Nº:	121614000	Test Interval (m):	113.3 to 127.0	Test Nº:	9
				GS Elev. (m):	581.3
				Supervisor:	DG

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**113.3** m	L	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**120.2** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**98.1** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**104.1** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	15	22	40	22	15
1	26.00	41.00	83.00	42.00	27.00
2	25.00	42.00	82.00	41.00	27.00
3	26.00	41.00	82.00	42.00	27.00
4	26.00	42.00	82.00	42.00	26.00
5	26.00	41.00	82.00	41.00	25.00
6					
Q_{avg} (L/min)	25.80	41.40	82.20	41.60	26.39
Pf (psi)	2.0	5.2	20.4	5.2	2.1
Pnet (psi)	18.6	22.5	25.2	22.4	18.5
K (m/min)	1.3E-04	1.7E-04	3.0E-04	1.7E-04	1.3E-04
K (m/sec)	2.2E-06	2.9E-06	5.1E-06	2.9E-06	2.2E-06
Lugeons	14.7	19.5	34.5	19.7	15.1







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

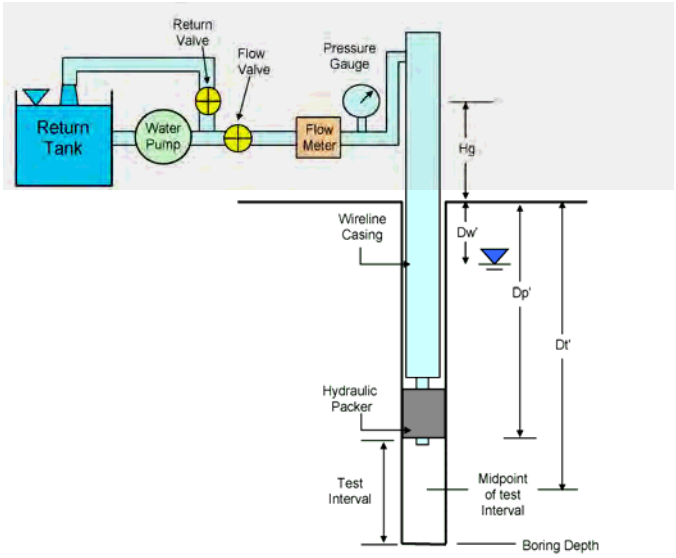
- **K_{avg} = 3.2x10^{-6} m/sec**

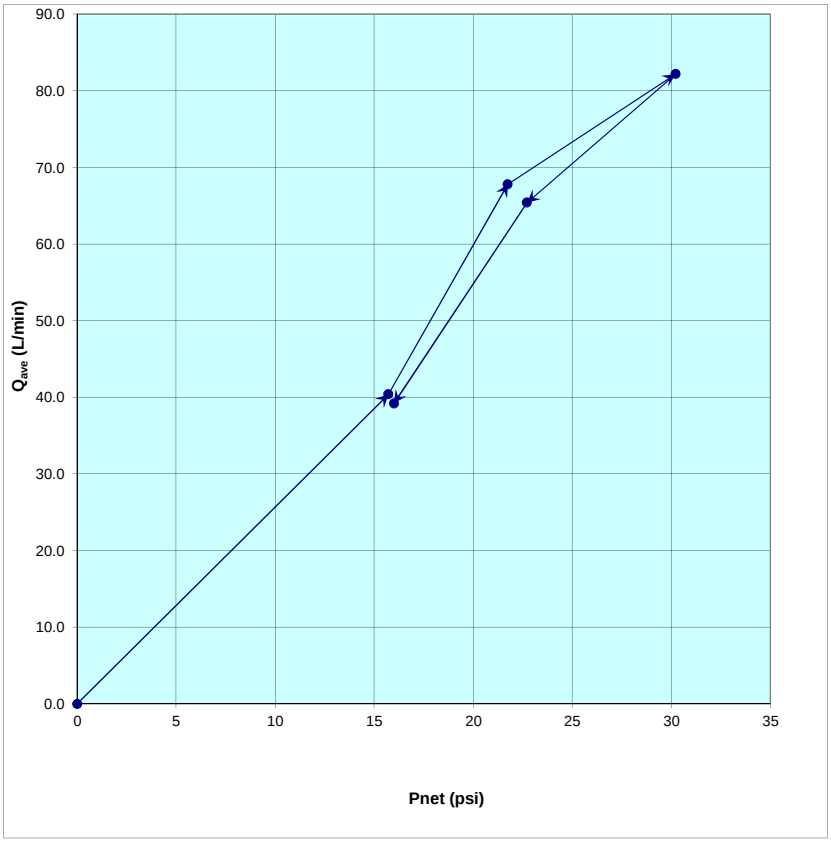
SINGLE IPI PACKER INJECTION TEST

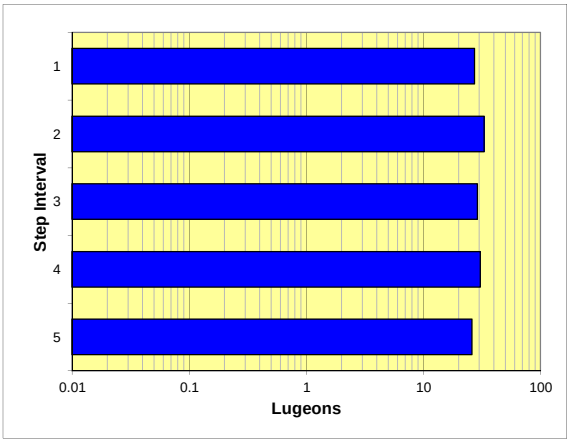
Stantec	Project Name: Kami Iron Ore Project, Pit Slope Design					BH Nº:	RBR-12-02
	Project Nº: 121614000	Test Interval (m):	125.3	to	139.0	Test Nº:	10
						GS Elev. (m):	581.3
						Supervisor:	DG

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m	
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m	
Dp	Measured depth to packer	**125.3** m	L	Length of test section	**13.7** m	
Dt	Measured depth to midpoint of test	**132.2** m	f	Friction factor	**0.055** Vpsi/L/min	
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss		
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure		
Dp'	Vertical depth to packer	**108.5** m	Pnet	Net injection pressure at midpoint of test		
Dt'	Vertical depth to midpoint of test	**114.4** m	K	Hydraulic conductivity		

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	15	30	45	30	15
1	40.00	68.00	83.00	66.00	39.00
2	41.00	68.00	81.00	66.00	39.00
3	40.00	67.00	83.00	65.00	40.00
4	40.00	68.00	82.00	65.00	39.00
5	41.00	68.00	82.00	65.00	39.00
6					
Q_{avg} (L/min)	40.40	67.80	82.20	65.40	39.20
Pf (psi)	4.9	13.9	20.4	12.9	4.6
Pnet (psi)	15.7	21.7	30.2	22.7	16.0
K (m/min)	2.4E-04	2.9E-04	2.5E-04	2.7E-04	2.3E-04
K (m/sec)	4.0E-06	4.9E-06	4.2E-06	4.5E-06	3.8E-06
Lugeons	27.2	33.0	28.8	30.5	26.0







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

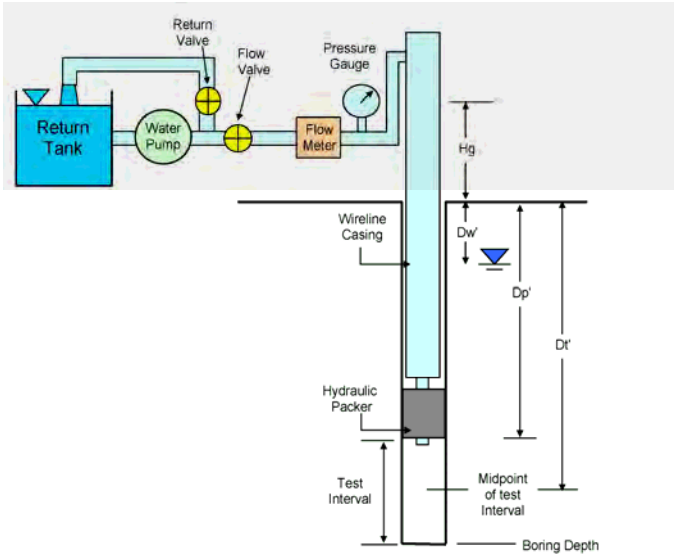
- **K_{avg} = 4.4x10^{-6} m/sec**

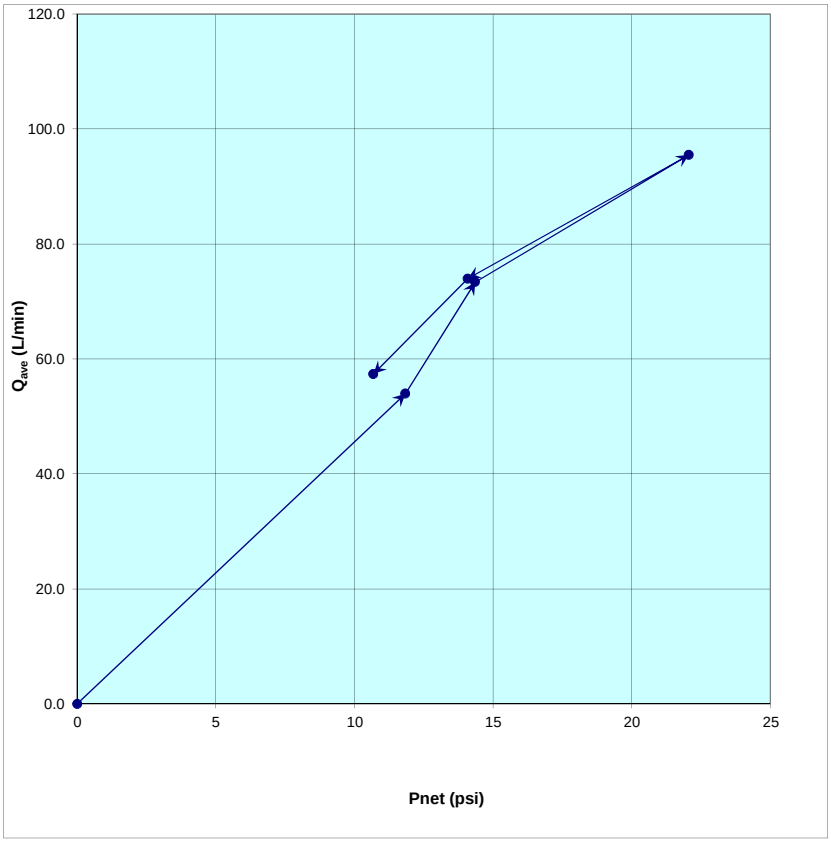
SINGLE IPI PACKER INJECTION TEST

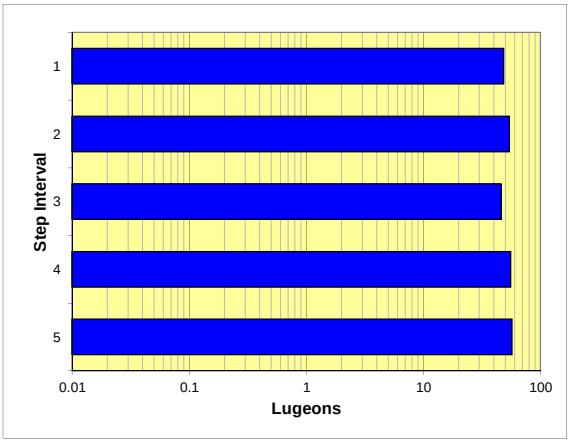
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-02
Project Nº: 121614000	Test Interval (m): 137.3 to 151.0	Test Nº:	11
		GS Elev. (m):	581.3
		Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	137.3 m	L	Length of test section	13.7 m
Dt	Measured depth to midpoint of test	144.2 m	f	Friction factor	0.055 Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	2.4 m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	118.9 m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	124.8 m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	15	25	44	25	15
1	51.00	73.00	105.00	72.00	57.00
2	56.00	72.00	86.00	74.00	57.00
3	54.00	74.00	95.00	74.00	57.00
4	54.00	74.00	95.00	75.00	58.00
5	55.00	74.00	96.00	75.00	58.00
6			97.00		
Q_{avg} (L/min)	53.97	73.40	95.51	73.99	57.40
Pf (psi)	8.8	16.3	27.6	16.6	10.0
Pnet (psi)	11.8	14.3	22.1	14.1	10.7
K (m/min)	4.3E-04	4.8E-04	4.1E-04	4.9E-04	5.0E-04
K (m/sec)	7.1E-06	8.0E-06	6.8E-06	8.2E-06	8.4E-06
Lugeons	48.3	54.2	45.9	55.7	56.9







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Drill pump at maximum output at Step 3.

- Steps 1 to 3 used for K_{avg} calculation.

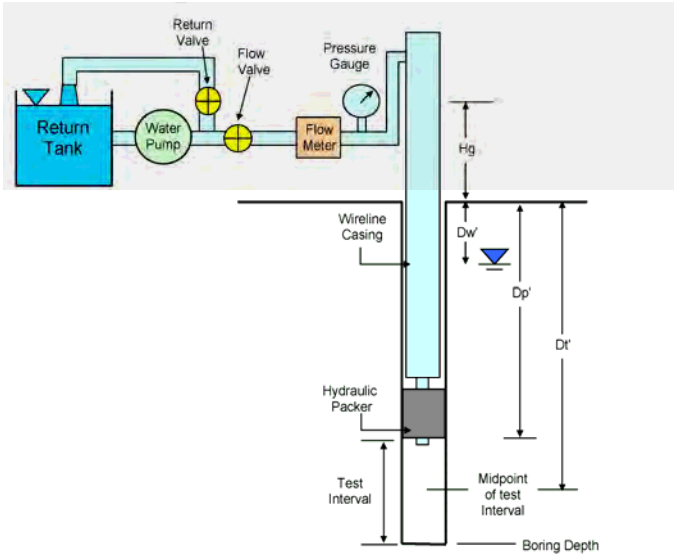
- **K_{avg} = 7.3x10^{-6} m/sec**

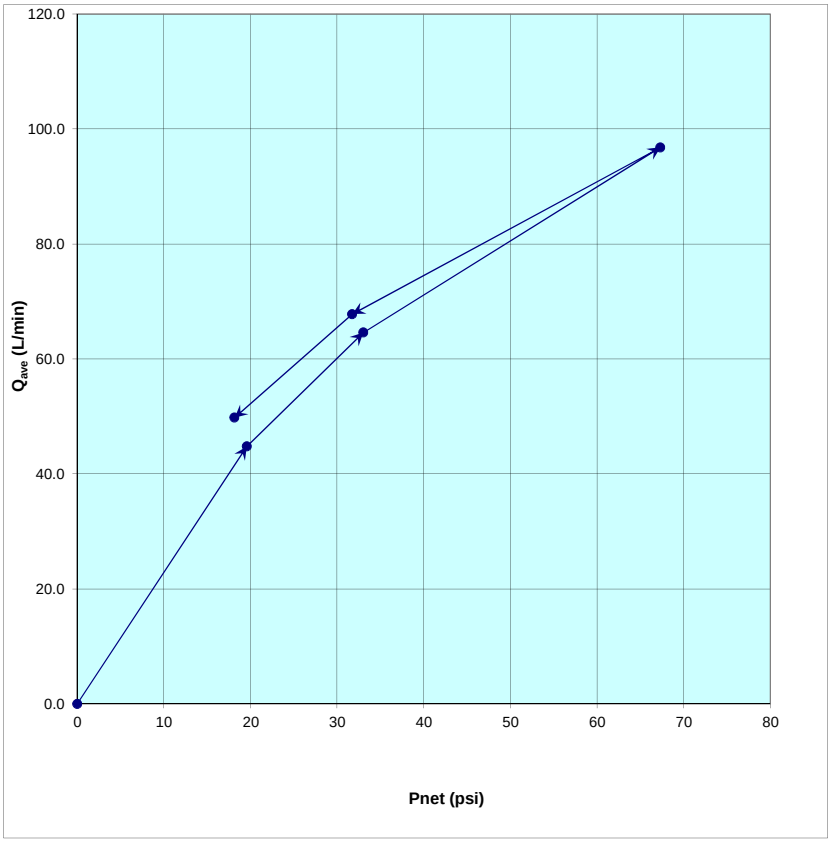
SINGLE IPI PACKER INJECTION TEST

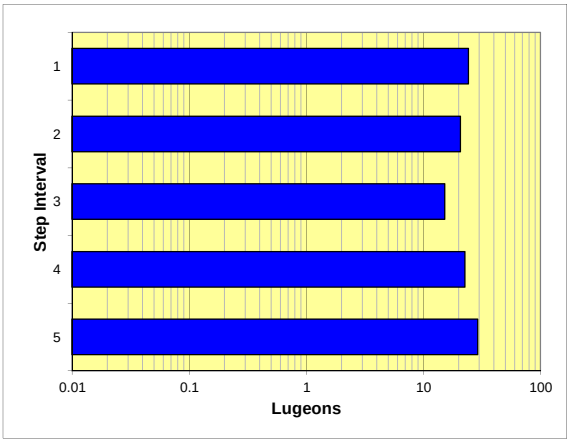
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-02
Project Nº: 121614000	Test Interval (m): 149.3 to 163.0	Test Nº:	12
		GS Elev. (m):	581.3
		Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**149.3** m	L	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**156.2** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**129.3** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**135.2** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	20	40	90	40	20
1	44.00	65.00	97.00	69.00	50.00
2	45.00	65.00	96.00	68.00	49.00
3	45.00	64.00	97.00	67.00	50.00
4	45.00	64.00	97.00	68.00	50.00
5	45.00	65.00	97.00	67.00	50.00
6					
Q_{avg} (L/min)	44.80	64.60	96.80	67.80	49.80
Pf (psi)	6.1	12.6	28.3	13.9	7.5
Pnet (psi)	19.6	33.0	67.3	31.7	18.1
K (m/min)	2.1E-04	1.8E-04	1.3E-04	2.0E-04	2.6E-04
K (m/sec)	3.6E-06	3.0E-06	2.2E-06	3.3E-06	4.3E-06
Lugeons	24.2	20.7	15.2	22.6	29.1







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Drill pump at maximum output at Step 3.

- Steps 1 to 3 used for K_{avg} calculation.

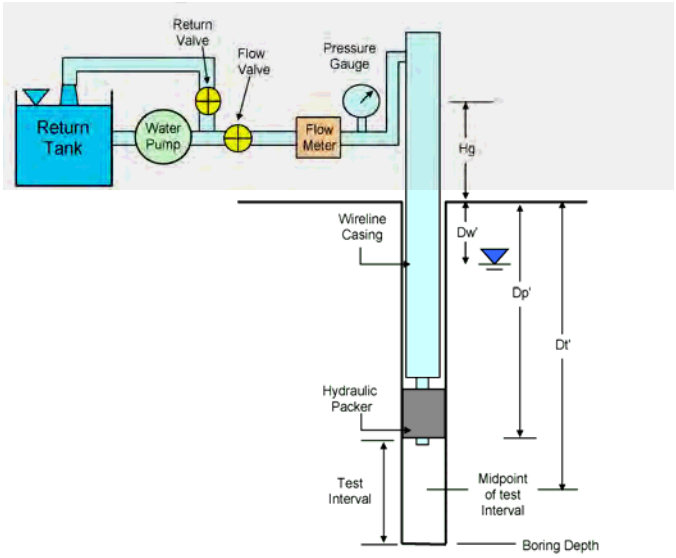
- **K_{avg} = 2.9x10^{-6} m/sec**

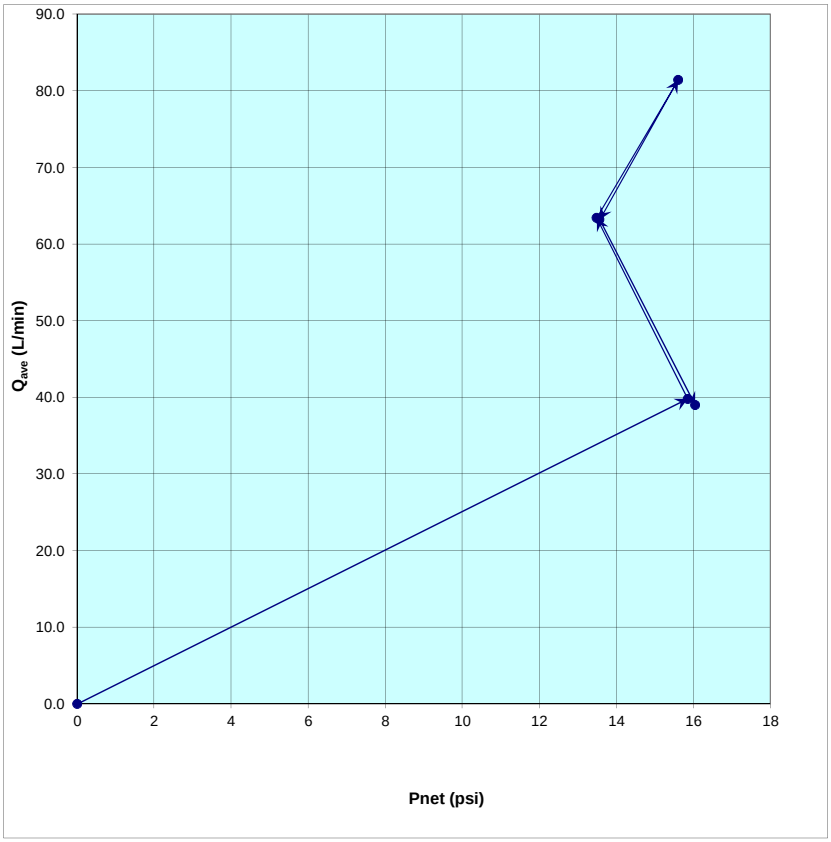
SINGLE IPI PACKER INJECTION TEST

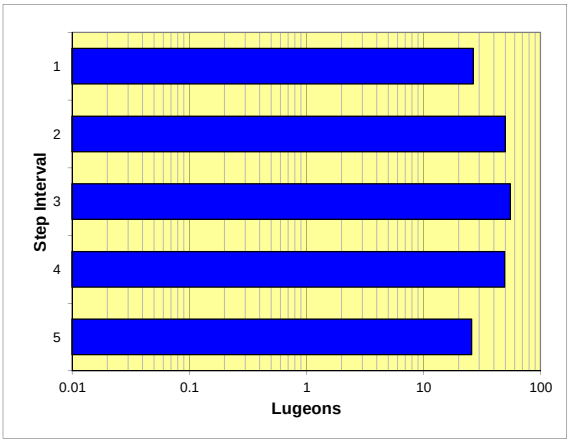
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-02
Project Nº: 121614000	Test Interval (m): 161.3 to 175.0	Test Nº:	13
		GS Elev. (m):	581.3
		Supervisor:	DG

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**161.3** m	L	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**168.2** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**139.7** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**145.6** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	15	20	30	20	15
1	39.00	62.00	81.00	63.00	39.00
2	40.00	64.00	81.00	63.00	39.00
3	40.00	64.00	82.00	63.00	39.00
4	40.00	64.00	81.00	64.00	39.00
5	40.00	63.00	82.00	63.00	39.00
6					
Q_{avg} (L/min)	39.80	63.39	81.40	63.20	39.00
Pf (psi)	4.8	12.2	20.0	12.1	4.6
Pnet (psi)	15.9	13.5	15.6	13.6	16.0
K (m/min)	2.3E-04	4.4E-04	4.9E-04	4.4E-04	2.3E-04
K (m/sec)	3.9E-06	7.3E-06	8.1E-06	7.3E-06	3.8E-06
Lugeons	26.6	49.8	55.3	49.4	25.8







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Drill pump at maximum output at Step 3.

- Test water injection flows approached the capabilities of packer. Minimal net pressure introduced to the formation.

- Steps 1 to 3 used for K_{avg} calculation.

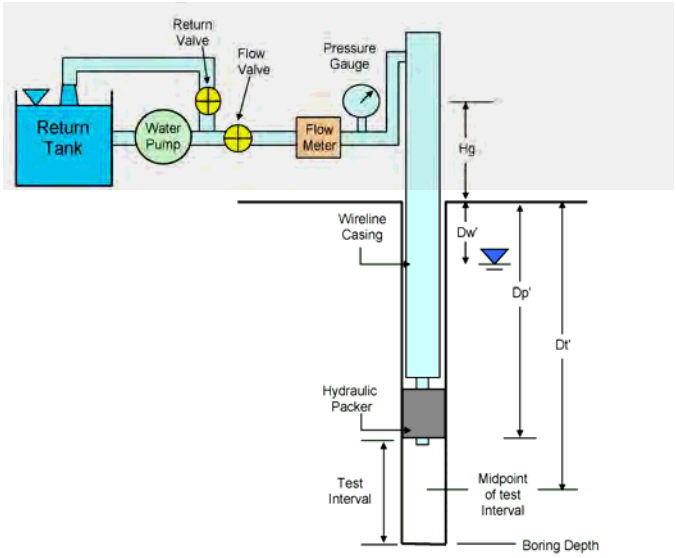
- **K_{avg} = 6x10^{-6} m/sec (estimated)**

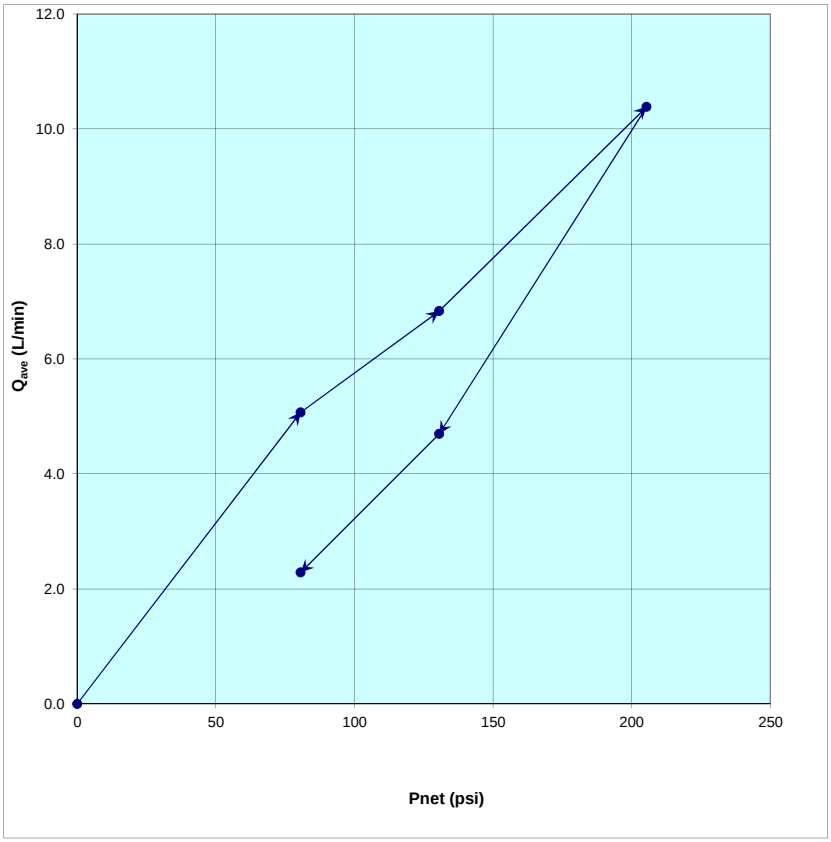
SINGLE IPI PACKER INJECTION TEST

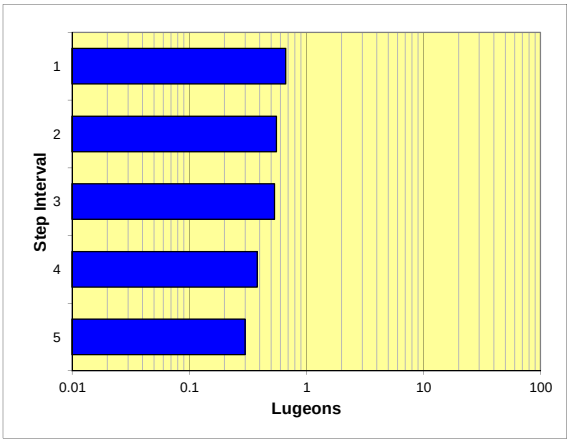
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-02
Project Nº: 121614000	Test Interval (m): 173.3 to 187.0	Test Nº:	14
		GS Elev. (m):	581.3
		Supervisor:	DG

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	173.3 m	L	Length of test section	13.7 m
Dt	Measured depth to midpoint of test	180.2 m	f	Friction factor	0.055 Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	2.4 m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	150.1 m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	156.0 m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	75	125	200	125	75
1	5.50	7.30	10.00	4.60	1.50
2	5.30	7.00	10.00	4.70	2.90
3	5.00	6.80	11.00	4.70	2.40
4	4.90	6.60	10.00	4.80	2.50
5	4.70	6.50	11.00	4.70	2.40
6					
Q_{avg} (L/min)	5.07	6.83	10.39	4.70	2.29
Pf (psi)	0.1	0.1	0.3	0.1	0.0
Pnet (psi)	80.6	130.5	205.3	130.6	80.6
K (m/min)	5.9E-06	4.9E-06	4.7E-06	3.4E-06	2.7E-06
K (m/sec)	9.8E-08	8.2E-08	7.9E-08	5.6E-08	4.4E-08
Lugeons	0.7	0.6	0.5	0.4	0.3







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

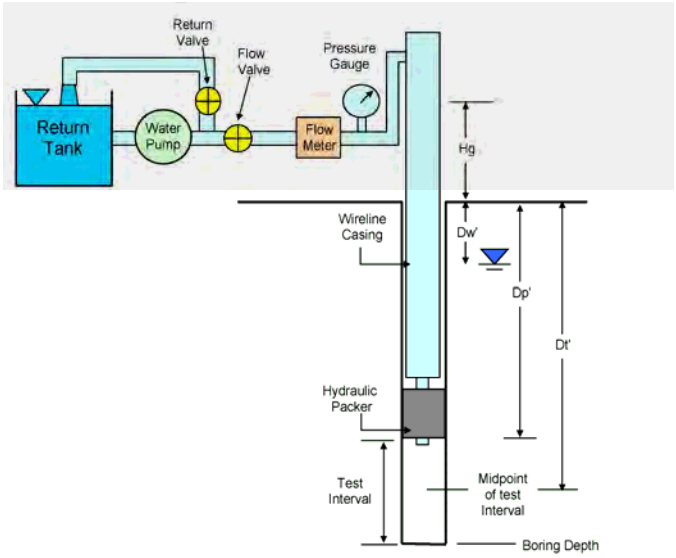
- **K_{avg} = 8.6x10^{-8} m/sec**

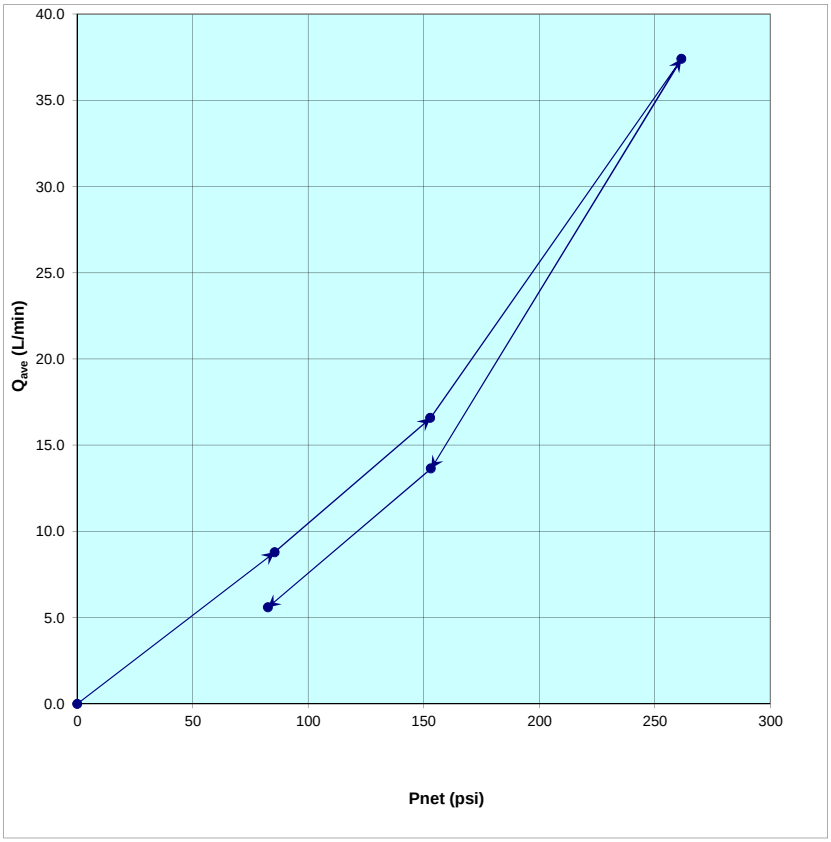
SINGLE IPI PACKER INJECTION TEST

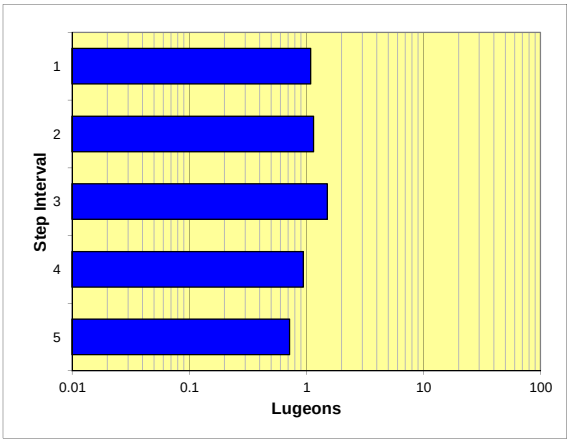
Project Name:	Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-02
Project Nº:	121614000	Test Interval (m):	185.3 to 199.0	Test Nº:	15
				GS Elev. (m):	581.3
				Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**185.3** m	L	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**192.2** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**160.5** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**166.4** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	80	148	260	148	77
1	9.00	17.20	38.00	14.60	6.00
2	8.70	17.80	37.00	13.90	5.60
3	8.70	16.50	37.00	13.50	5.50
4	8.60	15.80	37.00	13.40	5.50
5	9.00	15.70	38.00	12.90	5.40
6					
Q_{avg} (L/min)	8.80	16.58	37.40	13.65	5.60
Pf (psi)	0.2	0.8	4.2	0.6	0.1
Pnet (psi)	85.4	152.8	261.4	153.1	82.5
K (m/min)	9.6E-06	1.0E-05	1.3E-05	8.3E-06	6.3E-06
K (m/sec)	1.6E-07	1.7E-07	2.2E-07	1.4E-07	1.1E-07
Lugeons	1.1	1.1	1.5	0.9	0.7







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

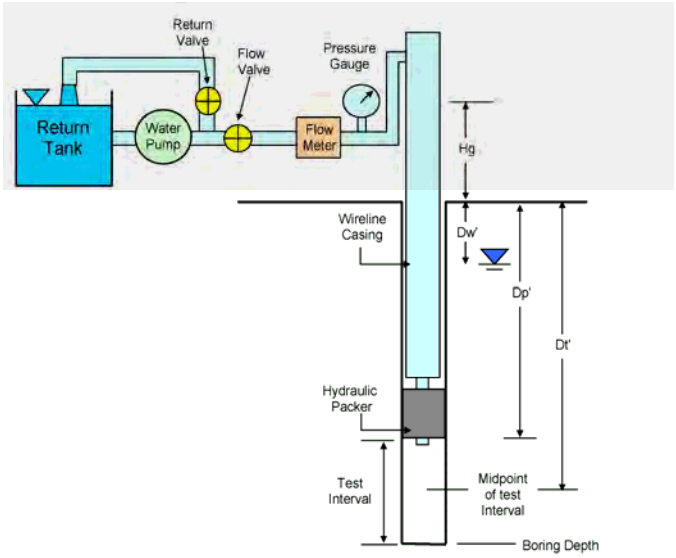
- **K_{avg} = 1.8x10^{-7} m/sec**

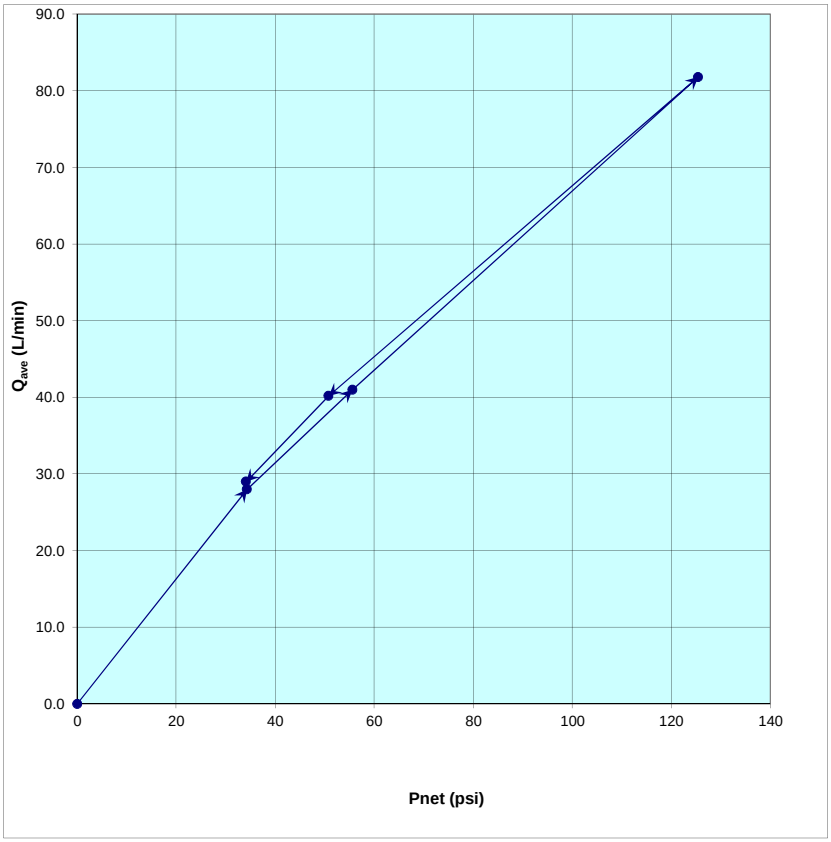
SINGLE IPI PACKER INJECTION TEST

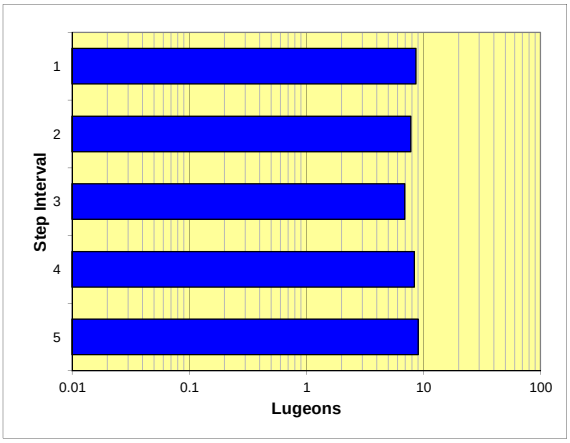
BH Nº:	**RBR-12-02**		
Project Name:	**Kami Iron Ore Project, Pit Slope Design**	**Test Nº:**	**16**
Project Nº:	**121614000**	**GS Elev. (m):**	**581.3**
Test Interval (m):	**197.3** to **211.0**	**Supervisor:**	**TS**

Dw	Measured depth of static water level (1)	2.7 m	**Hg**	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	**rb**	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**197.3** m	**L**	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**204.2** m	**f**	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	**Pf**	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	**Pg**	Gauge pressure	
Dp'	Vertical depth to packer	**170.9** m	**Pnet**	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**176.8** m	**K**	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	31	55	140	50	31
1	28.00	40.00	83.00	41.00	29.00
2	28.00	40.00	81.00	40.00	29.00
3	28.00	41.00	82.00	40.00	29.00
4	28.00	42.00	82.00	40.00	29.00
5	28.00	42.00	81.00	40.00	29.00
6					
Q_{avg} (L/min)	28.00	40.99	81.80	40.20	29.00
Pf (psi)	2.4	5.1	20.2	4.9	2.5
Pnet (psi)	34.3	55.6	125.4	50.8	34.1
K (m/min)	7.6E-05	6.9E-05	6.1E-05	7.4E-05	8.0E-05
K (m/sec)	1.3E-06	1.1E-06	1.0E-06	1.2E-06	1.3E-06
Lugeons	8.7	7.8	6.9	8.4	9.0







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Drill pump at maximum output at Step 3.

- Steps 1 to 3 used for K_{avg} calculation.

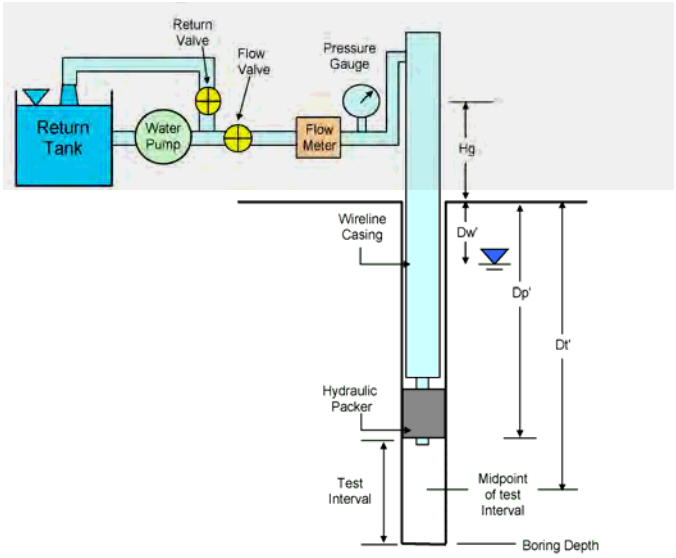
- **K_{avg} = 1.1x10^{-6} m/sec**

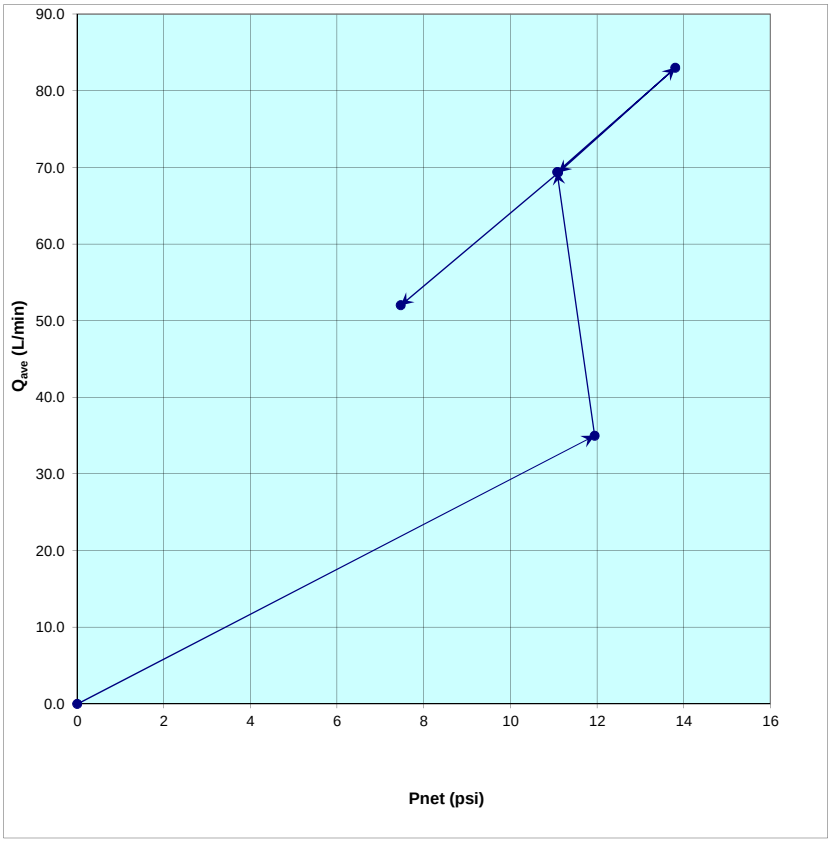
SINGLE IPI PACKER INJECTION TEST

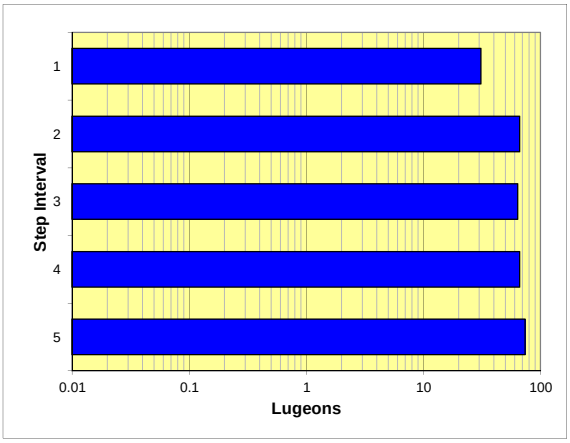
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-02
Project Nº: 121614000	Test Interval (m): 209.3 to 223.0	Test Nº:	17
		GS Elev. (m):	581.3
		Supervisor:	DG

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**209.3** m	L	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**216.2** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**181.3** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**187.2** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	10	20	29	20	10
1	34.00	69.00	83.00	69.00	52.00
2	35.00	70.00	83.00	69.00	52.00
3	35.00	69.00	83.00	70.00	52.00
4	36.00	69.00	83.00		52.00
5	35.00	70.00	83.00		52.00
6					
Q_{avg} (L/min)	34.99	69.40	83.00	69.33	52.00
Pf (psi)	3.7	14.6	20.8	14.5	8.2
Pnet (psi)	11.9	11.1	13.8	11.1	7.5
K (m/min)	2.7E-04	5.9E-04	5.6E-04	5.8E-04	6.5E-04
K (m/sec)	4.6E-06	9.8E-06	9.4E-06	9.7E-06	1.1E-05
Lugeons	31.0	66.4	63.7	66.2	73.8







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Drill pump at maximum output at Step 3.

- Test water injection flows approached the capabilities of packer. Minimal net pressure introduced to the formation.

- Steps 1 to 3 used for K_{avg} calculation.

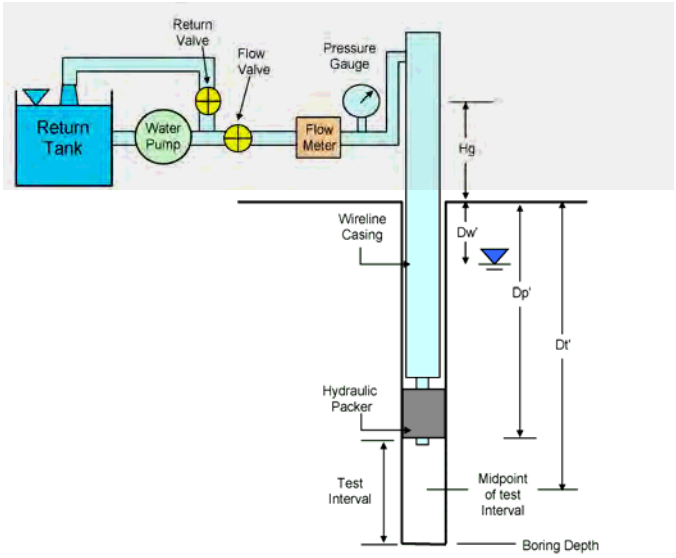
- **K_{avg} = 8x10^{-6} m/sec (estimated)**

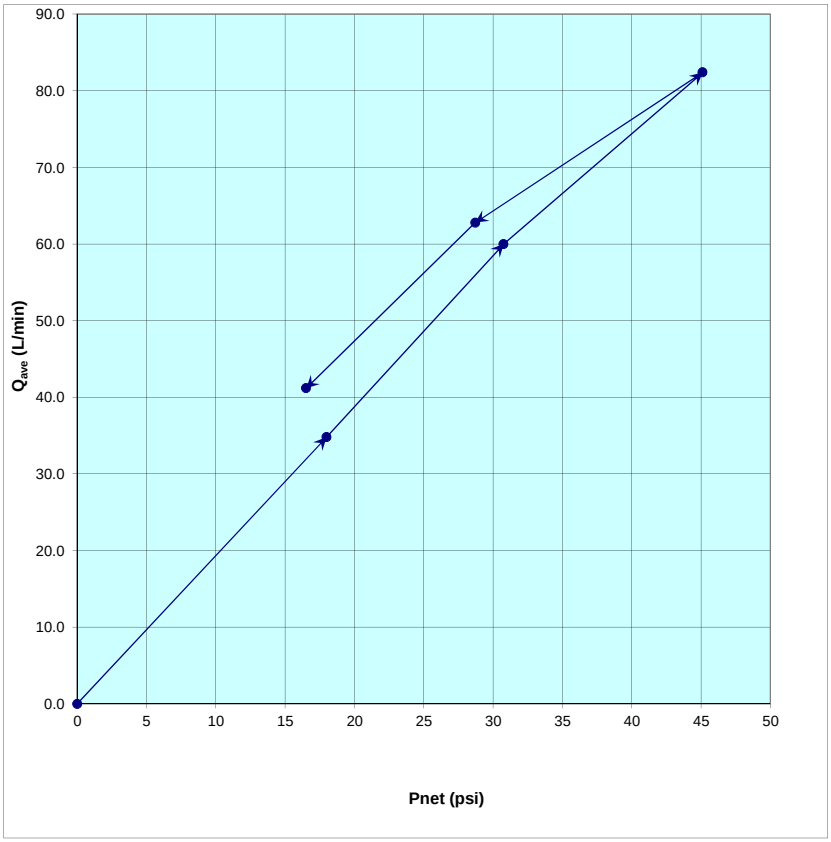
SINGLE IPI PACKER INJECTION TEST

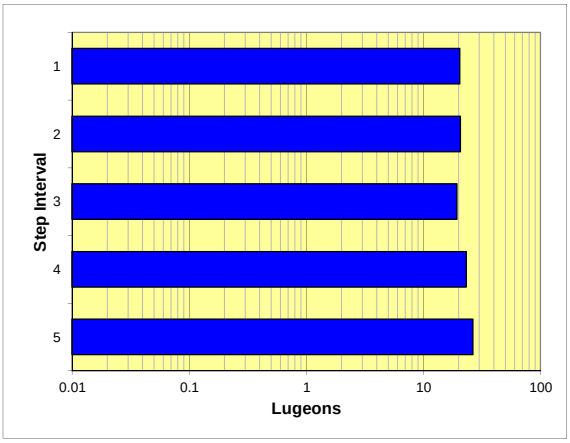
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-02
Project Nº: 121614000	Test Interval (m): 221.3 to 235.0	Test Nº:	18
		GS Elev. (m):	581.3
		Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	221.3 m	L	Length of test section	13.7 m
Dt	Measured depth to midpoint of test	228.2 m	f	Friction factor	0.055 Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	2.4 m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	191.7 m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	197.6 m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	16	36	60	35	16
1	34.00	59.00	83.00	63.00	42.00
2	35.00	60.00	83.00	63.00	41.00
3	35.00	60.00	81.00	62.00	41.00
4	35.00	61.00	83.00	63.00	41.00
5	35.00	60.00	82.00	63.00	41.00
6					
Q_{avg} (L/min)	34.80	60.00	82.40	62.80	41.20
Pf (psi)	3.7	10.9	20.5	11.9	5.1
Pnet (psi)	18.0	30.8	45.1	28.7	16.5
K (m/min)	1.8E-04	1.8E-04	1.7E-04	2.0E-04	2.3E-04
K (m/sec)	3.0E-06	3.0E-06	2.8E-06	3.4E-06	3.9E-06
Lugeons	20.5	20.7	19.4	23.2	26.4







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Drill pump at maximum output at Step 3.

- Steps 1 to 3 used for K_{avg} calculation.

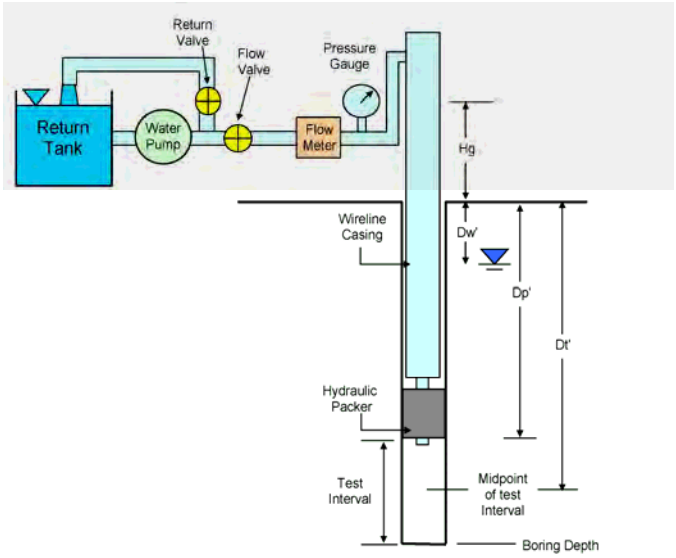
- **K_{avg} = 3.0x10^{-6} m/sec**

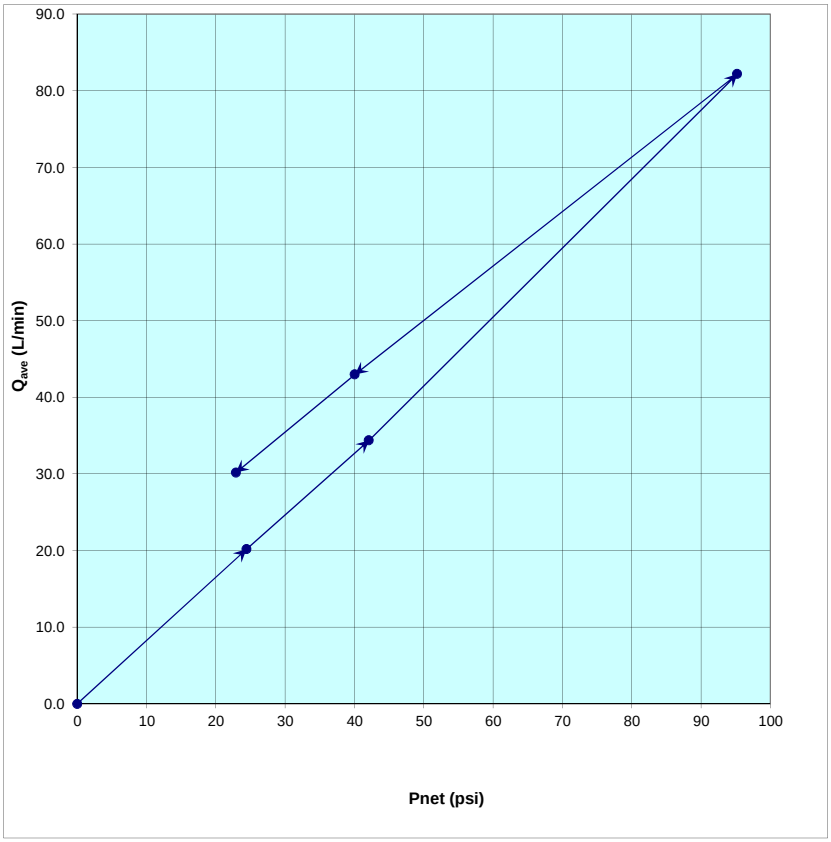
SINGLE IPI PACKER INJECTION TEST

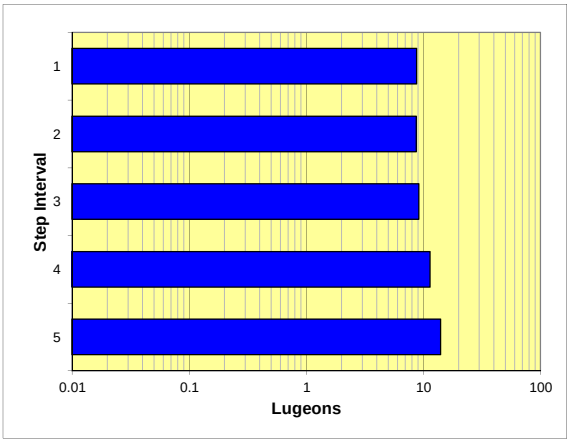
Project Name: Kami Iron Ore Project, Pit Slope Design		BH Nº:	RBR-12-02
Project Nº: 121614000	Test Interval (m): 233.3 to 247.0	Test Nº:	19
		GS Elev. (m):	581.3
		Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	233.3 m	L	Length of test section	13.7 m
Dt	Measured depth to midpoint of test	240.2 m	f	Friction factor	0.055 Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	2.4 m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	202.0 m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	208.0 m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	20	40	110	40	20
1	20.50	35.00	82.00	44.00	31.00
2	20.00	35.00	83.00	42.00	30.00
3	20.50	35.00	82.00	44.00	30.00
4	20.00	33.00	82.00	42.00	30.00
5	20.00	34.00	82.00	43.00	30.00
6					
Q_{avg} (L/min)	20.20	34.39	82.20	42.99	30.20
Pf (psi)	1.2	3.6	20.4	5.6	2.8
Pnet (psi)	24.4	42.1	95.2	40.1	22.9
K (m/min)	7.7E-05	7.6E-05	8.1E-05	1.0E-04	1.2E-04
K (m/sec)	1.3E-06	1.3E-06	1.3E-06	1.7E-06	2.1E-06
Lugeons	8.8	8.7	9.1	11.4	14.0







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Drill pump at maximum output at Step 3.

- Steps 1 to 3 used for K_{avg} calculation.

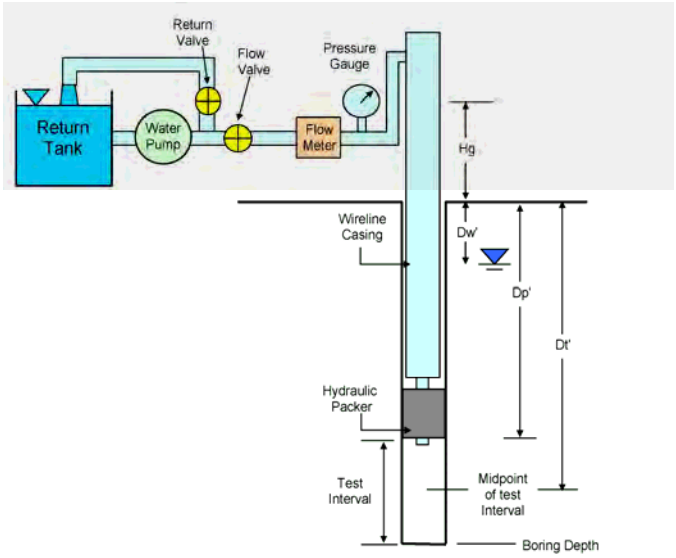
- **K_{avg} = 1.3x10^{-6} m/sec**

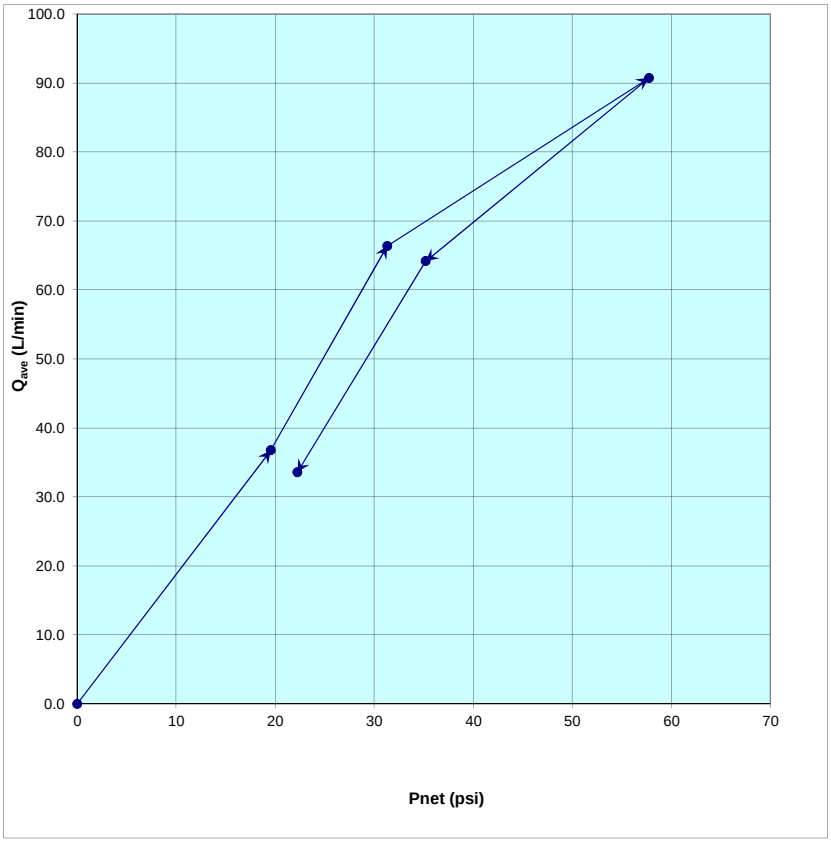
SINGLE IPI PACKER INJECTION TEST

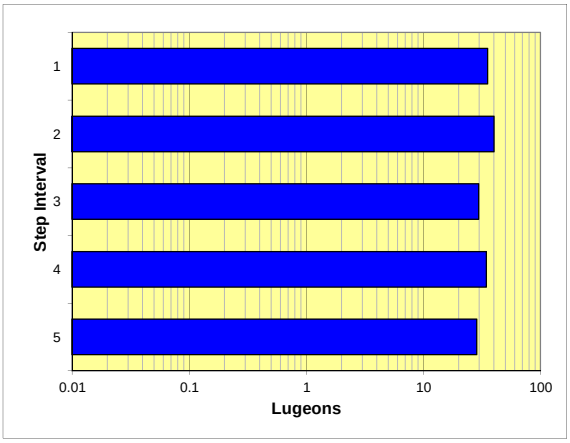
Project Name: Kami Iron Ore Project, Pit Slope Design				BH Nº:	RBR-12-02
Project Nº: 121614000	Test Interval (m):	254.3	to	262.0	Test Nº: 20
				GS Elev. (m):	581.3
				Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**254.3** m	L	Length of test section	**7.7** m
Dt	Measured depth to midpoint of test	**258.2** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**220.2** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**223.6** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	18	39	77	42	20
1	35.00	67.00	86.00	65.00	33.00
2	35.00	65.00	92.00	67.00	34.00
3	37.00	67.00	95.00	63.00	33.00
4	38.00	67.00	90.00	64.00	34.00
5	39.00	66.00	91.00	62.00	34.00
6					
Q_{avg} (L/min)	36.77	66.40	90.75	64.18	33.60
Pf (psi)	4.1	13.3	24.9	12.5	3.4
Pnet (psi)	19.6	31.3	57.7	35.2	22.2
K (m/min)	2.8E-04	3.2E-04	2.3E-04	2.7E-04	2.3E-04
K (m/sec)	4.7E-06	5.3E-06	3.9E-06	4.5E-06	3.8E-06
Lugeons	35.4	40.0	29.6	34.4	28.5







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Test initially attempted at 245.3 to 259.0 m interval. Due highly fractured rock, packer would not inflate. Test completed at 254.3 to 262 m interval. Section from 247.0 to 254.3 m not tested.

- Drill pump at maximum output at Step 3.

- Steps 1 to 3 used for K_{avg} calculation.

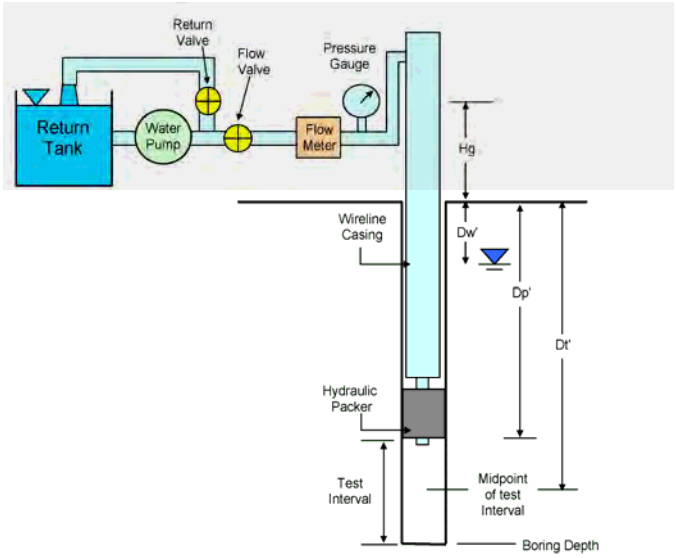
- **K_{avg} = 4.6x10^{-6} m/sec**

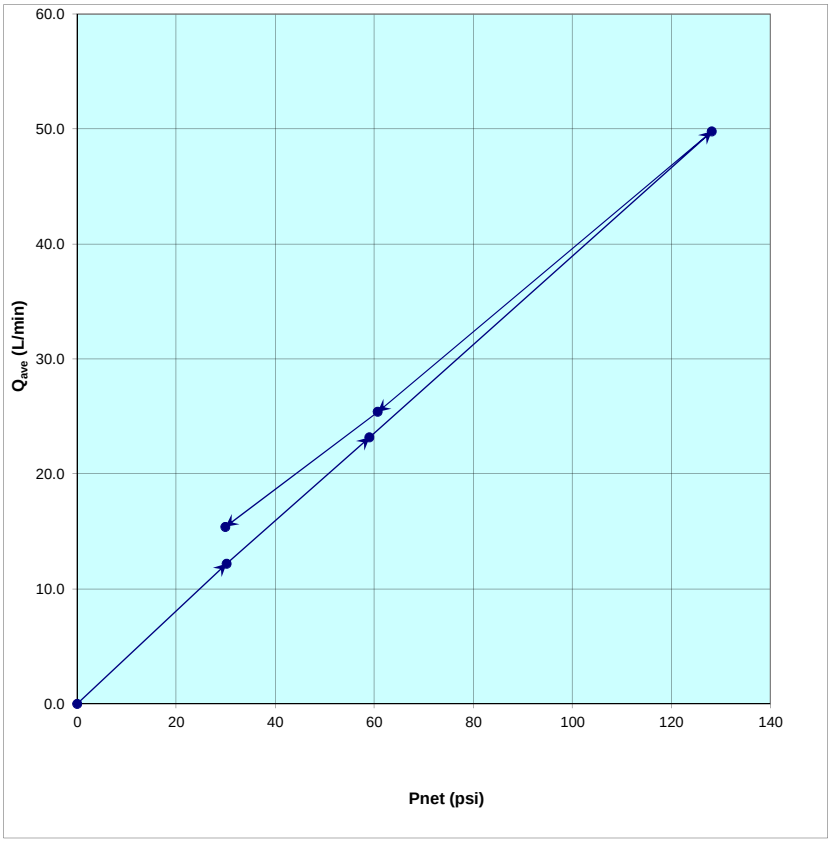
SINGLE IPI PACKER INJECTION TEST

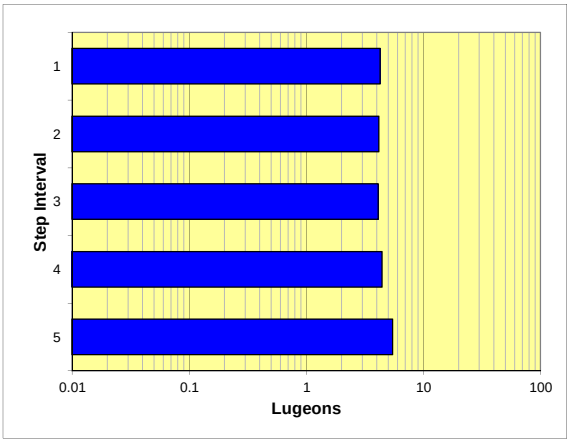
Stantec	Project Name: Kami Iron Ore Project, Pit Slope Design					BH Nº:	RBR-12-02
	Project Nº: 121614000	Test Interval (m):	260.3	to	274.0	Test Nº:	21
						GS Elev. (m):	581.3
						Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m	
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m	
Dp	Measured depth to packer	260.3 m	L	Length of test section	13.7 m	
Dt	Measured depth to midpoint of test	267.2 m	f	Friction factor	0.055 Vpsi/L/min	
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss		
Dw'	Vertical depth to static water level	2.4 m	Pg	Gauge pressure		
Dp'	Vertical depth to packer	225.4 m	Pnet	Net injection pressure at midpoint of test		
Dt'	Vertical depth to midpoint of test	231.4 m	K	Hydraulic conductivity		

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	25	55	130	57	25
1	12.50	24.00	49.00	26.00	15.50
2	12.50	24.00	49.00	26.00	15.50
3	12.00	23.00	51.00	25.00	16.00
4	12.00	22.00	50.00	25.00	15.00
5	12.00	23.00	50.00	25.00	15.00
6					
Q_{avg} (L/min)	12.20	23.19	49.79	25.40	15.40
Pf (psi)	0.5	1.6	7.5	2.0	0.7
Pnet (psi)	30.2	59.0	128.1	60.7	29.9
K (m/min)	3.8E-05	3.7E-05	3.6E-05	3.9E-05	4.8E-05
K (m/sec)	6.3E-07	6.1E-07	6.1E-07	6.5E-07	8.0E-07
Lugeons	4.3	4.2	4.1	4.4	5.4







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Drill pump at maximum output at Step 3.

- Steps 1 to 3 used for K_{avg} calculation.

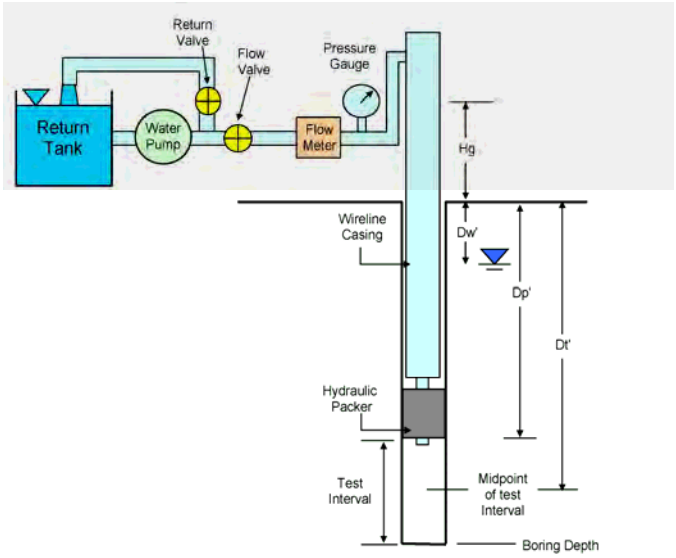
- **K_{avg} = 6.2x10^{-7} m/sec**

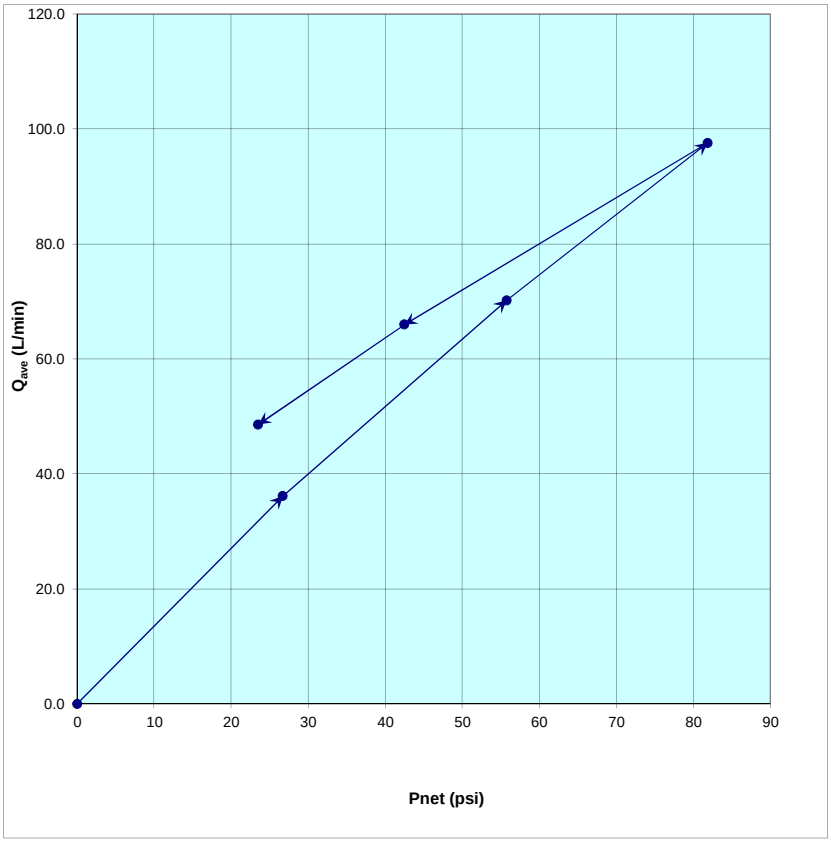
SINGLE IPI PACKER INJECTION TEST

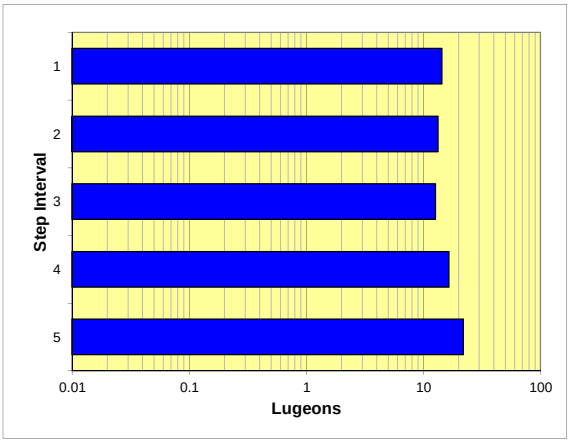
BH Nº:	**RBR-12-02**		
Project Name:	**Kami Iron Ore Project, Pit Slope Design**	**Test Nº:**	**22**
Project Nº:	**121614000**	**GS Elev. (m):**	**581.3**
Test Interval (m):	**272.3** to **286.0**	**Supervisor:**	**TS**

Dw	Measured depth of static water level (1)	2.7 m	**Hg**	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	**rb**	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**272.3** m	**L**	Length of test section	**13.7** m
Dt	Measured depth to midpoint of test	**279.2** m	**f**	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	**Pf**	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	**Pg**	Gauge pressure	
Dp'	Vertical depth to packer	**235.8** m	**Pnet**	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**241.8** m	**K**	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	25	65	105	50	25
1	34.00	71.00	97.00	67.00	49.00
2	35.00	70.00	100.00	66.00	48.00
3	36.00	70.00	97.00	64.00	49.00
4	38.00	71.00	95.00	66.00	48.00
5	38.00	69.00	99.00	67.00	49.00
6					
Q_{avg} (L/min)	36.16	70.20	97.58	65.99	48.60
Pf (psi)	4.0	14.9	28.8	13.2	7.1
Pnet (psi)	26.7	55.7	81.8	42.5	23.5
K (m/min)	1.3E-04	1.2E-04	1.1E-04	1.5E-04	1.9E-04
K (m/sec)	2.1E-06	2.0E-06	1.9E-06	2.4E-06	3.2E-06
Lugeons	14.4	13.3	12.6	16.5	21.9







Comments

- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Drill pump at maximum output at Step 3.

- Steps 1 to 3 used for K_{avg} calculation.

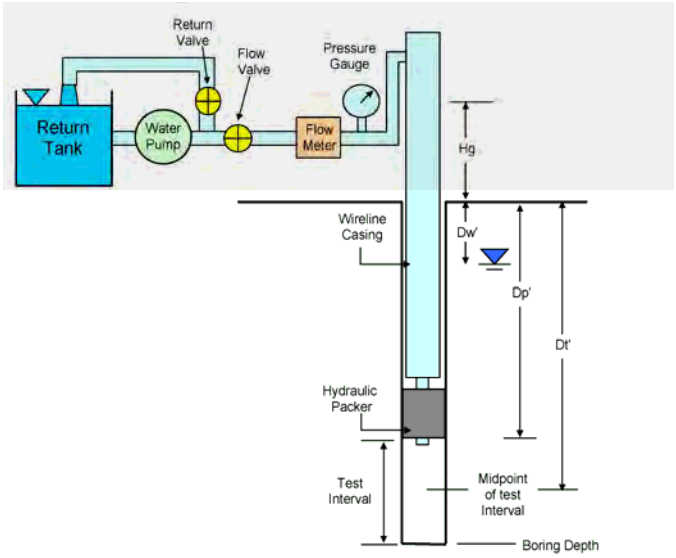
- **K_{avg} = 2.2x10^{-6} m/sec**

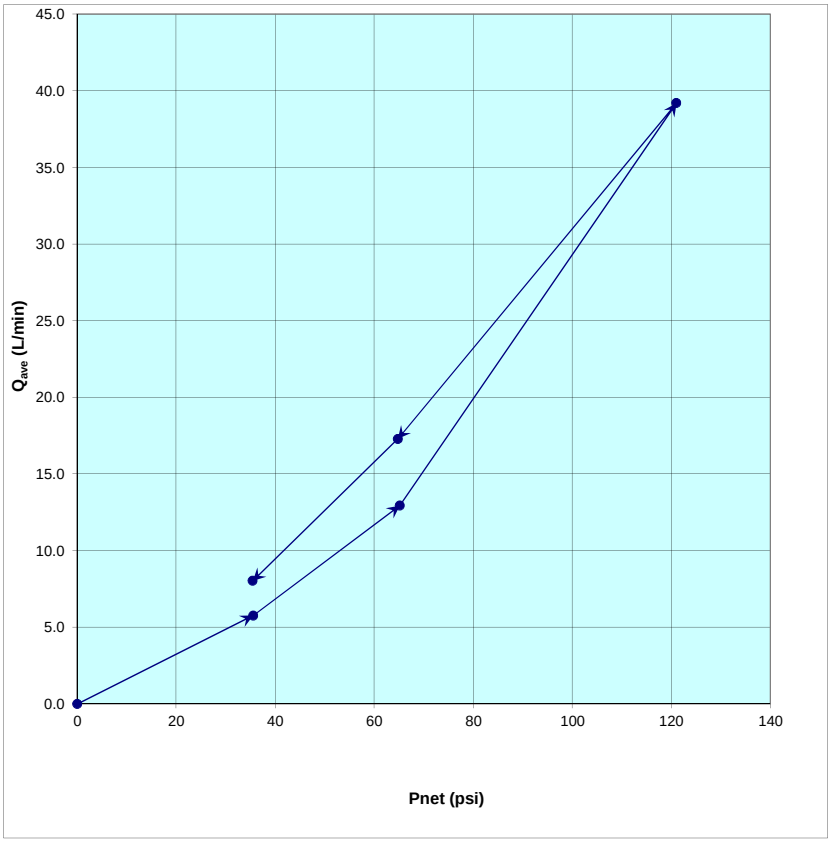
SINGLE IPI PACKER INJECTION TEST

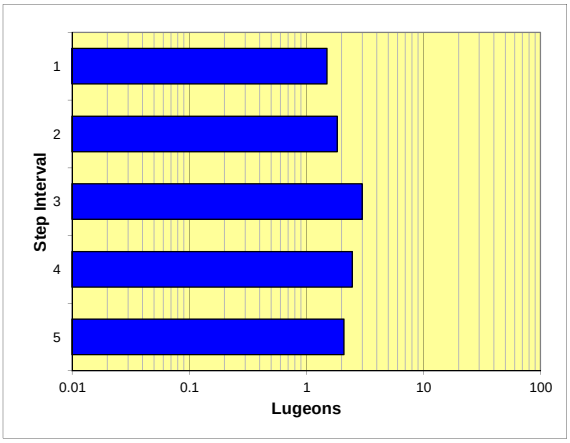
Project Name:	Kami Iron Ore Project, Pit Slope Design			BH Nº:	RBR-12-02
Project Nº:	121614000	Test Interval (m):	284.3 to 300.0	Test Nº:	23
				GS Elev. (m):	581.3
				Supervisor:	TS

Dw	Measured depth of static water level (1)	2.7 m	Hg	Gauge height	1.6 m
Dbr	Measured depth to bedrock	16.0 m	rb	Borehole radius (HQ=0.048m, NQ=0.038m)	0.048 m
Dp	Measured depth to packer	**284.3** m	L	Length of test section	**15.7** m
Dt	Measured depth to midpoint of test	**292.2** m	f	Friction factor	**0.055** Vpsi/L/min
ß	Average inclination from horiz. (degrees)	60.0 º	Pf	Friction pressure loss	
Dw'	Vertical depth to static water level	**2.4** m	Pg	Gauge pressure	
Dp'	Vertical depth to packer	**246.2** m	Pnet	Net injection pressure at midpoint of test	
Dt'	Vertical depth to midpoint of test	**253.0** m	K	Hydraulic conductivity	

Measurement (minutes)	Q (Litres/minute)				
	Pg (psi) Step 1	Pg (psi) Step 2	Pg (psi) Step 3	Pg (psi) Step 4	Pg (psi) Step 5
	30	60	120	60	30
1	6.50	13.00	38.00	18.50	8.60
2	5.70	12.50	39.00	17.50	8.20
3	5.70	12.50	40.00	17.00	8.00
4	5.50	13.00	39.00	16.50	7.80
5	5.50	13.70	40.00	17.00	7.60
6					
Q_{avg} (L/min)	5.77	12.93	39.19	17.29	8.03
Pf (psi)	0.1	0.5	4.6	0.9	0.2
Pnet (psi)	35.5	65.1	121.0	64.7	35.4
K (m/min)	1.4E-05	1.7E-05	2.7E-05	2.2E-05	1.9E-05
K (m/sec)	2.3E-07	2.8E-07	4.5E-07	3.7E-07	3.2E-07
Lugeons	1.5	1.8	3.0	2.5	2.1





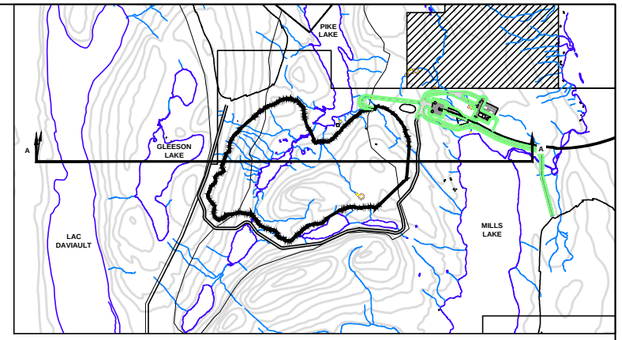


Comments

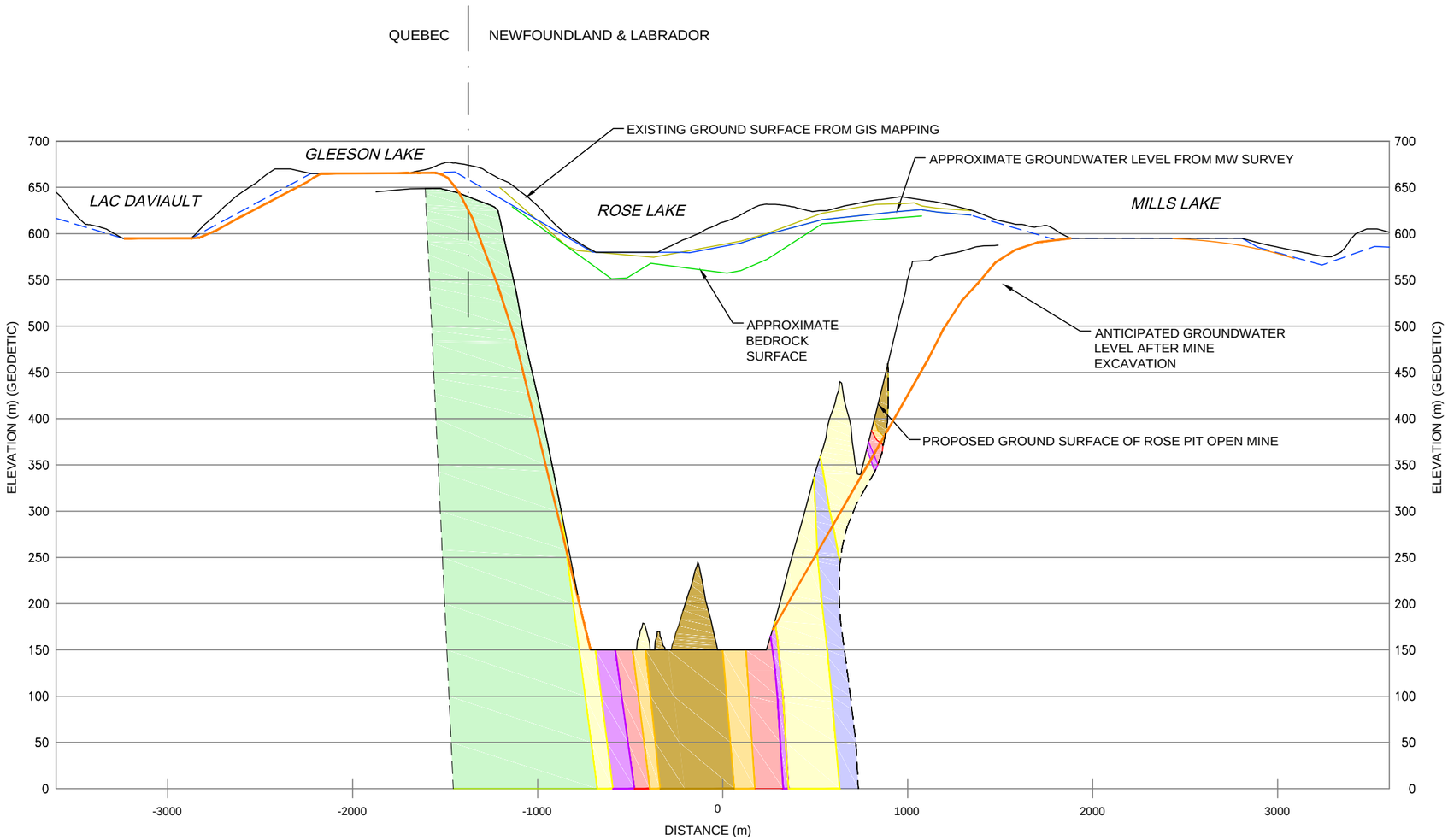
- Test completed using Hydraulic Single IPI Packer with IPI flowmeter.

- Steps 1 to 3 used for K_{avg} calculation.

- **K_{avg} = 3.0x10^{-7} m/sec**



CROSS SECTION A'-A'



LEGEND

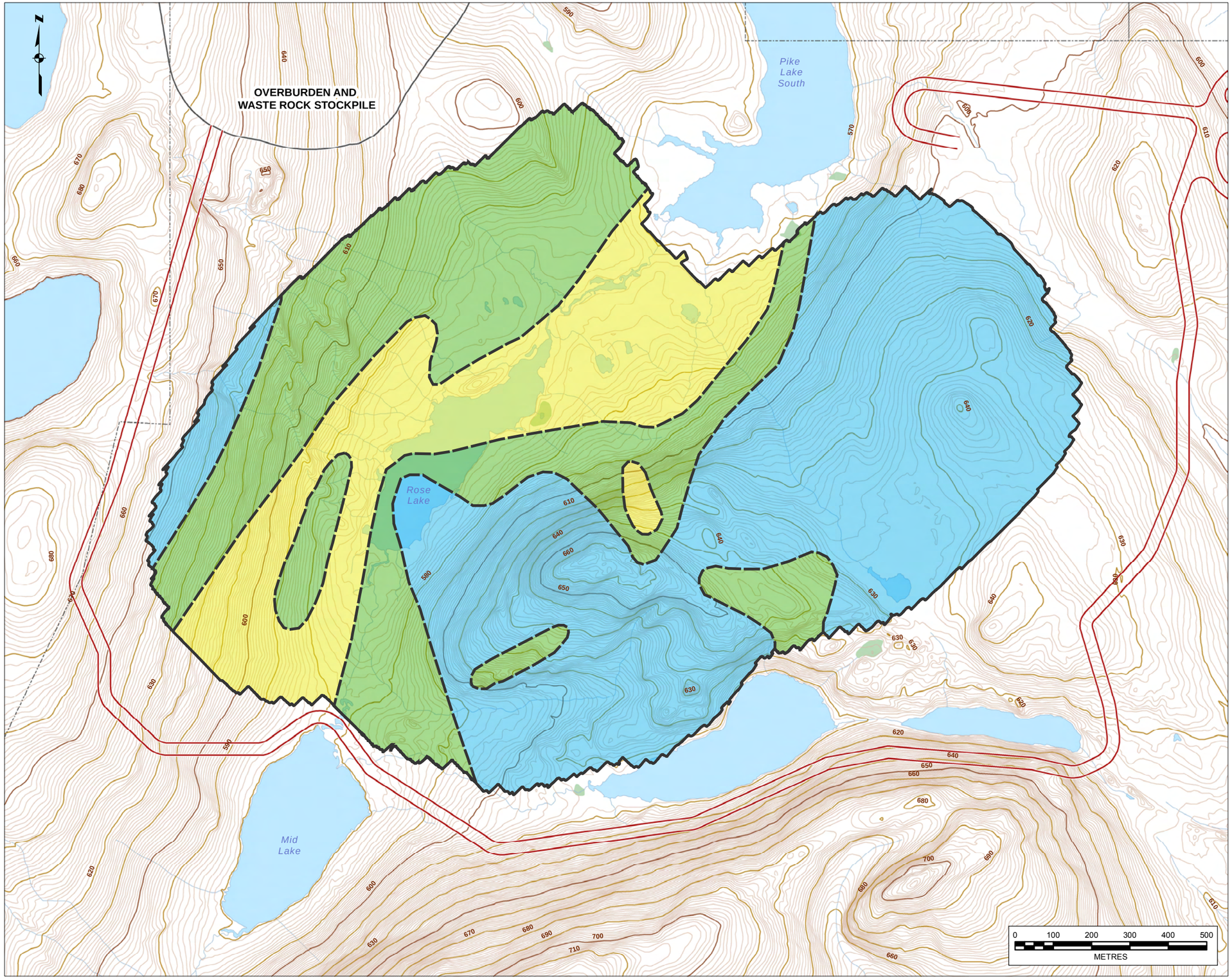
- MENIHEK FM (SCHIST)
- SOKOMAN FM (IRON FORMATION)
  - RC3/NR3
  - RC2/NR2
  - RC1/NR1
- WISHART FM (QUARTZITE)
- DENAULT FM (MARBLE)
- KATSAO FM (GRANITE GNEISS)

NOTE: THIS DRAWING ILLUSTRATES SUPPORTING INFORMATION SPECIFIC TO A STANTEC CONSULTING LTD. REPORT AND MUST NOT BE USED FOR OTHER PURPOSES.

CLIENT:	ALDERON IRON ORE
PROJECT TITLE:	PROJECT DEVELOPMENT DESIGN KAMI MINE SITE
DRAWING TITLE:	CROSS-SECTION SHOWING APPROXIMATE REGIONAL GROUNDWATER LEVEL

SCALE: AS SHOWN	DATE: JAN. 7, 2013
DRAWN BY: R.L.	CHECKED BY: R.M.
EDITED BY: -	REV. No. 1
DRAWING No: 121614000-306-GE-06	
CAD FILE: 121614000-306-GE-06.dwg	

Stantec



LEGEND

Inferred Overburden Thickness

- 0 to 15 metres
- 15 to 30 metres
- > 30 metres

Contours

- 10m Interval
- 50m Interval
- Wetland
- Waterbody

Proposed Kami Project Features

- Proposed Project Features
- Proposed Access Road
- Alderon Licenses
- Rose Pit Boundary

NOTE

1. **This drawing illustrates supporting information specific to a Stantec Consulting Ltd. report and must not be used for other purposes.**
2. Information presented for illustrative purposes only. Not for engineering and/or design takes offs, or quantity estimates.
3. Compiled from Alderon Exploration Group's database dated June 10/2012 (K- series holes) and Stantec's drill logs (RBR- and ROB- series holes).
4. Final borehole locations, elevations, collar azimuths, and collar inclinations were collected by the client's surveyor(s) and were provided to Stantec. It is understood that horizontal survey control was referenced to NAD 27 Zone 19U and vertical control to geodetic datum.
5. Interpretation of overburden units for RBR- and ROB- series holes was completed by Stantec, while interpretation of exploration holes (K- series) was completed by Alderon.
6. Overburden thicknesses were estimated using the recorded drilled overburden lengths assuming simplified straight trajectories orientated at the provided collar azimuths and inclinations. Values are shown plotted at the provided collar locations. Depending on the borehole orientation, variations in topography may result in estimation errors on inclined boreholes.
7. Estimates of overburden thickness are based on subsurface conditions encountered at the specific borehole locations, and can only be extrapolated to a limited extent around these locations depending on the variability of soil conditions.

REFERENCE

1. Base Data provided by Forbes West: Kami LiDAR (06/01/2012)
2. Site plan and infrastructure (except Rose Pit footprint): ACAD-3054001-000000-41-D20.0001-RAF.dwg, provided by BBA (8/15/2012)
Rose Pit footprint: ACAD-3054001-000000-41-D20.0001.dwg, provided by BBA (5/07/2012)
* Scoping level Rose Pit footprint was the focus of this assessment, therefore the original pit outline, provided in May 2012, is shown herein.
3. Projection: Transverse Mercator
Datum: NAD 83
Coordinate System: UTM Zone 19N

DATE	DESCRIPTION	REVISION
Sept. 2012	Final Report	0

CLIENT: ALDERON IRON ORE CORP

PROJECT TITLE

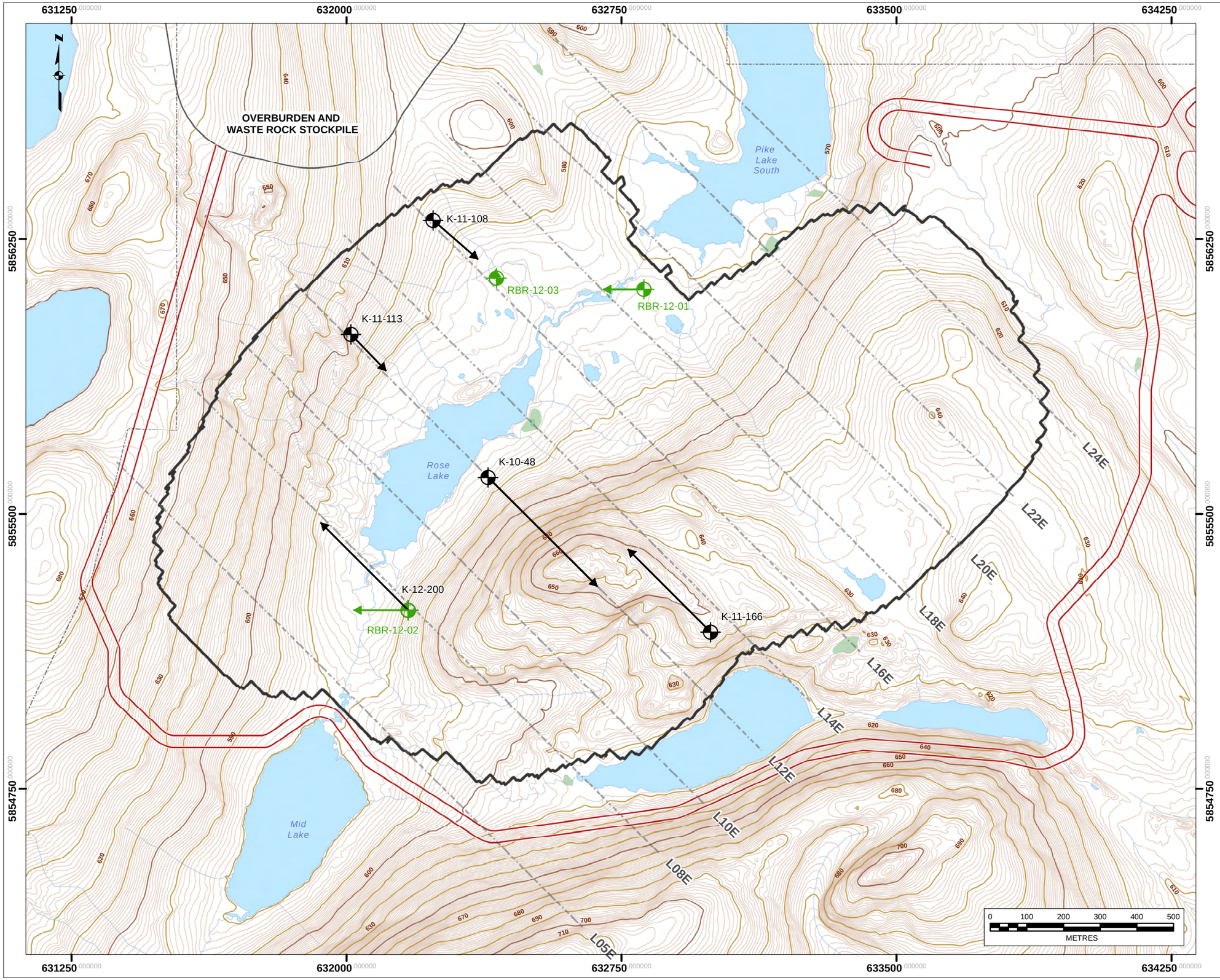
KAMI IRON ORE PROJECT
PIT SLOPE DESIGN

DRAWING TITLE

ESTIMATED OVERBURDEN THICKNESS MAP

Stantec Consulting Ltd.

SCALE: 1:10,000	DATE: September 14, 2012
DRAWN BY: AB	CHECKED BY: MM
EDITED BY: MM	REV. NO.: 0
DRAWING No: A1-2	
DWG FILE: ALD_ST_723.MXD	



LEGEND

- Bedrock Geotechnical Targeted Borehole
- Supplementary Geotechnically Logged Exploration Borehole
- Bedrock Geotechnical Targeted Borehole Trace
- Supplementary Geotechnically Logged Exploration Borehole Trace
- Section Line

Proposed Kami Project Features

- Proposed Project Features
- Proposed Access Road
- Rose Pit Boundary
- Alderon Licenses

Contours

- 10m Interval
- 50m Interval
- Wetland
- Waterbody

NOTE

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   * Scoping level Rose Pit footprint was the focus of this assessment, therefore the original pit outline, provided in May 2012, is shown herein.
3. Borehole collars surveyed by the client's surveyors
4. Borehole traces estimated from collar and EOH
5. Projection: Transverse Mercator
   Datum: NAD 83
   Coordinate System: UTM Zone 19N

DATE	DESCRIPTION	REVISION
Sept. 2012	Final Report	0

CLIENT: ALDERON IRON ORE CORP

PROJECT TITLE

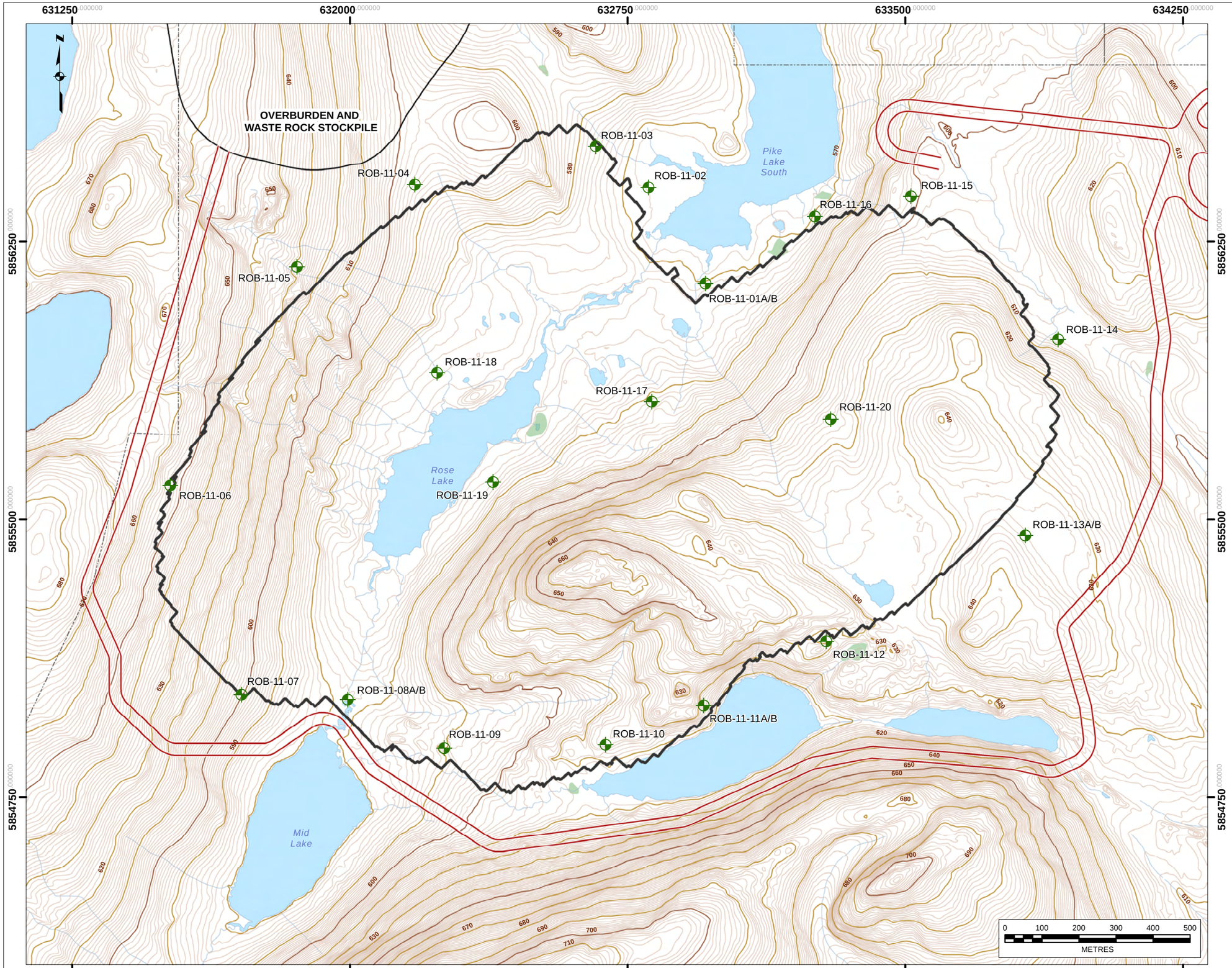
KAMI IRON ORE PROJECT
PIT SLOPE DESIGN

DRAWING TITLE

BEDROCK GEOTECHNICAL INVESTIGATION
BOREHOLE LOCATION PLAN

Stantec Consulting Ltd.

SCALE: 1:10,000	DATE: September 13, 2012
DRAWN BY: AB	CHECKED BY: MM
EDITED BY: MM	REV. NO.: 0
DRAWING No: A2-1	
CAD FILE: ALD_ST_638.MXD	



LEGEND

- OVB Borehole

Proposed Kami Project Features

- Proposed Project Features
- Proposed Access Road
- Rose Pit Boundary
- Alderon Licenses

Contours

- 10m Interval
- 50m Interval
- Wetland
- Waterbody

NOTE

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5. Projection: Transverse Mercator
   Datum: NAD 83
   Coordinate System: UTM Zone 19N

DATE	DESCRIPTION	REVISION
Sept. 2012	Final Report	0

CLIENT:

ALDERON IRON ORE CORP

PROJECT TITLE

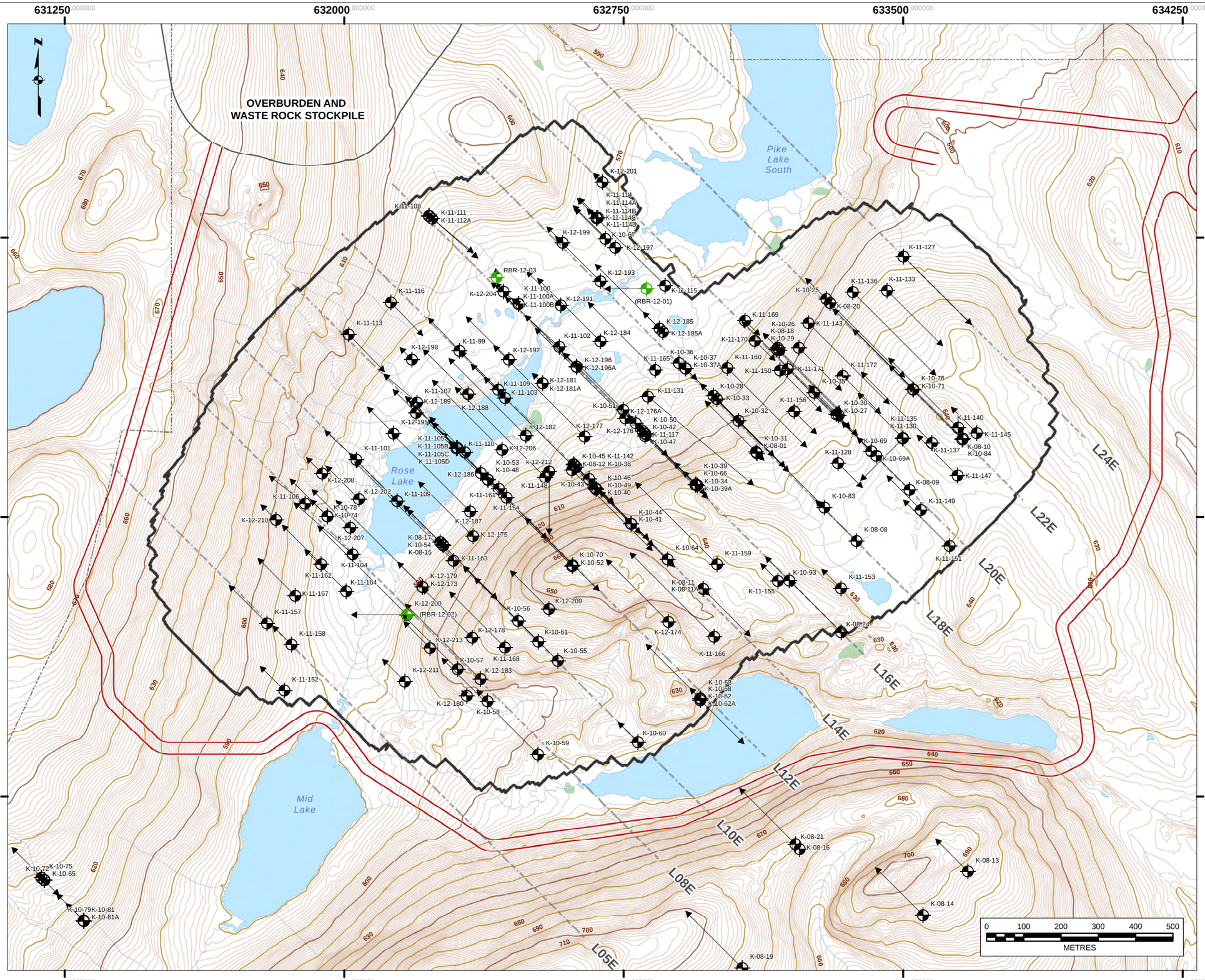
KAMI IRON ORE PROJECT
PIT SLOPE DESIGN

DRAWING TITLE

OVERBURDEN BOREHOLE LOCATION PLAN

Stantec Consulting Ltd.

SCALE: 1:10,000	DATE: September 13, 2012
DRAWN BY: AB	CHECKED BY: MM
EDITED BY: MM	REV. NO.: 0
DRAWING No: A1-1	
DWG FILE: ALD_ST_651.MXD	



LEGEND

Borehole

- Exploration
- Bedrock Pit Slope Design - Feasibility Level
- Borehole Trace
- Section Line

Contours

- 10m Interval
- 50m Interval
- Wetland
- Waterbody

Proposed Kami Project Features

- Proposed Project Features
- Proposed Access Road
- Rose Pit Boundary
- Alderon Licenses

NOTE

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4. Borehole traces estimated from collar and EOH
5. Projection: Transverse Mercator
   Datum: NAD 83
   Coordinate System: UTM Zone 19N

DATE	DESCRIPTION	REVISION
Sept. 2012	Final Report	0

CLIENT: ALDERON IRON ORE CORP

PROJECT TITLE

KAMI IRON ORE PROJECT
PIT SLOPE DESIGN

DRAWING TITLE

EXPLORATION BOREHOLE LOCATION PLAN

Stantec Consulting Ltd.

SCALE: 1:10,000	DATE: September 13, 2012
DRAWN BY: AB	CHECKED BY: MM
EDITED BY: MM	REV. NO.: 0
DRAWING No: A3-1	
DWG FILE: ALD_ST_643.MXD	