

CLIENT: EOC HOLDINGS LTD.	DRILLING CO: Uniwide Drilling Ltd.	BOREHOLE NO: EOC.SRKR44
PROJECT: Environmental Investigation	DRILLING DATE: September 12, 1997	PROJECT NO: 8CE001.01
LOCATION: 15100 River Road, Richmond, BC	METHOD: SOLID STEM	ELEVATION:
SAMPLE TYPE <input checked="" type="checkbox"/> DISTURBED <input checked="" type="checkbox"/> NO RECOVERY <input checked="" type="checkbox"/> GRAB SAMPLE <input type="checkbox"/> SPT <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> PISTON TUBE		
BACKFILL TYPE <input checked="" type="checkbox"/> BENTONITE <input type="checkbox"/> PEA GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> DRILL CUTTINGS <input type="checkbox"/> SAND		

DEPTH(m)	SOIL SYMBOL	Soil Description	SAMPLE TYPE	SAMPLE NO	VAPOR CONC (ppmv)	RETAINED	ANALYSED	SLOTTED PIEZOMETER	WELL COMMENTS	DEPTH(ft)
0.0		Surface conditions: Asphalt								0.0
0.0 - 1.0		Light brown, fine/medium SAND, damp, loose								1.0
1.0		Grey, clayey SILT, damp, stiff	<input checked="" type="checkbox"/>	44-1	N/A	YES	NO			2.0
1.0 - 1.22		- wet and soft below 1.22m								3.0
1.22 - 1.52		- some sand below 1.52m								4.0
1.52 - 2.0			<input checked="" type="checkbox"/>	44-2	N/A	YES	NO			5.0
2.0 - 3.0			<input checked="" type="checkbox"/>	44-3	N/A	YES	NO			7.0
3.0		Grey, silty medium SAND, wet, loose	<input checked="" type="checkbox"/>	44-4	N/A	YES	NO			10.0
3.0 - 3.35		- grades to fine below 3.35m								11.0
3.35 - 4.0			<input checked="" type="checkbox"/>	44-5	N/A	YES	NO			12.0
4.0 - 4.57		END OF HOLE AT 4.57m								15.0

SRK ROBINSON Burnaby, British Columbia	LOGGED BY: EC	COMPLETION DEPTH: 4.6 m
	REVIEWED BY: MM	COMPLETE: 09/12/97
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2.0 Permeability Estimates

A total of eight piezometer bail tests were performed on selected monitoring wells to estimate the permeability of the aquifer (and the aquitard). The water level in a given monitoring well was bailed down using the Waterra system and the recovery of the water level in the well recorded manually (rising head test). The data were analyzed using the Hvorslev method (Freeze and Cherry, 1979).

The raw data of the bail tests and the graphical analysis of the recovery data are shown in Appendix 1. The results are summarized in Table 1.

Table 1. Summary of Hvorslev Piezometer Test Results.

Monitoring Well ID	Soil Type Screened	Permeability Estimate (in cm/s)
SRKR-4	SILT w/ organics (aquitard)	1.90E-06
SRKR-11	fine to medium SAND (aquifer)	2.60E-03
SRKR-30	fine to medium SAND (aquifer)	8.10E-04
SRKR-44	silty medium SAND (aquifer)	8.10E-04
MW-7	silty fine SAND (aquifer)	3.80E-04
MW-9	silty fine SAND (aquifer)	1.10E-03
MP-9	not known	6.80E-05
MP-10	not known (SAND aquifer ?)	1.50E-04
Geometric mean (all values)		2.47E-04
Geometric mean (aquifer values only)		6.89E-04

Note: K value obtained in MW-7 using the Hvorslev bail test agrees very well with K estimate (2.8E-4 cm/s) obtained by Piteau & Ass. using the Cooper piezometer test method.

As is typical for fluvial deposits the sand unit shows some local variation in permeability. K values range from $\sim 3 \times 10^{-3}$ cm/s to as low as $\sim 1.5 \times 10^{-4}$ cm/s (possibly even lower). The average permeability of the sand aquifer is estimated to be $K_{\text{sand}} \sim 7 \times 10^{-4}$ cm/s, i.e. the geometric mean of all K values for the aquifer unit (see Table 1). This average K value is considered accurate to within +/- half an order of magnitude.

As expected from the grain size analysis, the silt unit has a significantly lower permeability ($K_{\text{silt}} \sim 2 \times 10^{-6}$ cm/s) than the sand unit, hence the confined conditions in the sand aquifer. Similarly low K values were reported for other boreholes on site (e.g. MP-3, MP-4 and MW-1, see summary table in Piteau Ass.).

Based on the soil stratigraphy and K estimates, the transport of contaminants to any downgradient receiving water (e.g. Fraser River) would occur most rapidly in the sand aquifer, once the contaminants have penetrated the silty aquitard (see section 4 below).