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Title: Analysis of Escalante, Utah Permeability Data for High Velocity Flow Effects

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Task Objectives: Nearly 500 sets of permeability data will be analyzed for evidence of high velocity flow effects. Differential pressure squared vs. flow rate ($\Delta(P^2)$ vs. Q) will be plotted at each data location, as well as log-log plots of the same, & $\Delta(P^2)/Q$ vs. Q, following procedures outlined in LeCain (1997, 1998), and Rousseau et al. (1999). Information gathered through these methods of examining the data will ultimately be used to interpret any role that high velocity flow effects may be playing with respect to calculated permeability values. Appropriate actions will then be taken. Discussions of the Escalante, Utah data collection may be found in Dinwiddie (2001), and Current (2001), and general discussions of instrumentation employed are in CNWRA SN 526, as are discussions of methodology.

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References:

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LeCain, G.D. 1997. Air-injection testing in vertical boreholes in welded and non-welded tuff, Yucca Mountain, Nevada. US. Geological Survey Water-Resources Investigations Report 96-4262, Denver, CO.

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Rousseau, J.P., E.M. Kwicklis, and D.C. Gillies. 1999. Hydrogeology of the unsaturated zone, North Ramp Area of the Exploratory Studies Facility, Yucca Mountain, Nevada. US Geological Survey Water-Resources Investigations Report 98-4050, Denver, CO.

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The redacted material is from
Escalante, Utah Data
Dinwiddie, 2001

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M.S. Thesis by
Current, 2001

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The data presented in Appendix A of Dinwiddie, 2001 and in Chapter 1 of Current, 2001 were never evaluated for the presence of high velocity flow effects. It is the objective of the work contained in this SN to do just that.

Equation 1

If Darcy's Law holds, $\boxed{P_1^2 - P_0^2 = AQ}$, where P_1^2 = steady-state injection pressure squared, P_0^2 = atmospheric pressure squared, A = formation loss term, and Q = measured flowrate. Thus, plotting the air-injection pressure squared differences $(P_1^2 - P_0^2)$ on the y-axis and the flowrate on the x-axis will indicate whether or not Darcy's Law holds. Additionally, $\log(P_1^2 - P_0^2) = \log(AQ) = \cancel{\log(A)}^{A^*} + \log(Q)$ $= \log(Q) + A^*$. If Darcy's Law holds, plotting $\log(P_1^2 - P_0^2)$ versus $\log(Q)$ will yield a plot w/ the slope equal to unity, and a y-intercept $= \log(\text{formation loss}) = \log(A) = A^*$.

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Non-Darcian flow due to high velocity flow effects follows Forchheimer's Law as follows:

$$\boxed{(P_1^2 - P_0^2) = CQ^n + AQ} \qquad \text{Equation 2}$$

$$\begin{aligned}\log(P_1^2 - P_0^2) &= \log(CQ^n + AQ)\\ &= \log(C) + n\log(Q) + \log(A) + \log(Q)\\ &= \log(C) + \log(A) + (n+1)\log Q\\ &= (n+1)\log Q + C^*\end{aligned}$$

where $C^* = \log(C) + \log(A) = \log(CA)$

Thus, when plotting $\log(P_1^2 - P_0^2)$ versus $\log(Q)$, the slope is greater than unity, and the y-intercept is the logarithm of the product of the formation loss term (A), & the well-loss term (C)

Divide both sides of Equation 2 by Q:

$$\boxed{\frac{(P_1^2 - P_0^2)}{Q} = CQ^{n-1} + \cancel{B}\ A} \qquad \text{Equation 3}$$

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An arithmetic plot of $(P_1^2 - P_0^2)/Q$ versus Q yields a y-intercept equal to A — the formation loss term, because as $Q \to 0$, Darcy's Law is valid. Additionally, it yields a slope equal to C, the well-loss term. If the slope, C, is negligible, → no high velocity flow effect

The probe permeameter solution for permeability is:

$$\boxed{k = \frac{2\mu Q P_1}{BG_0(P_1^2 - P_0^2)}}, \qquad \text{Equation 4}$$

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where k ≡ permeability, μ ≡ gas viscosity, Q ≡ flowrate, P_1 & P_0 ≡ injection and atmospheric pressure, respectively, B ≡ seal length, G_0 ≡ geometrical factor ~~pertaining~~ (CLD, 08/15/02) pertaining specifically to the geometry of the probe/outcrop system.

Equations 3 & 4 may be combined, giving a corrected air-injection k-value based on the zero flow intercept, A (i.e. $\frac{P_1^2 - P_0^2}{Q} = A$)

$$\Rightarrow \boxed{k = \frac{2\mu P_1}{BG_0 A}} \qquad \text{Equation 5}$$

When temperature differences are accounted for, as was the case for the data considered herein, Equation 4 is slightly modified as;

$$\boxed{k = \frac{2\mu Q P_1\ T_{injection}}{BG_0(P_1^2 - P_0^2)T_{ambient}}}, \qquad \text{Equation 6}$$

such that Equation 5 becomes:

$$\boxed{k = \frac{2\mu P_1\ T_{injection}}{BG_0 A\ T_{ambient}}}. \qquad \text{Equation 7}$$

Thus, to correct the data for the presence of high-velocity flow effects, re-compute each k at each injection pressure by simply replacing the term $\left(\frac{Q}{P_1^2 - P_0^2}\right)$ with the term (1/A). This will have the effect of increasing

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the computed permeability value to that expected in the absence of high velocity flow effects.

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x -10 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	2:41:18 PM	11.751	11.431	1145.6	43.76	2907.6662	3093.5954	X-10	1
7/10/00	2:43:45 PM	11.841	11.431	1544.0	43.73	3046.7564	3264.2006	X-10	2
7/10/00	2:44:44 PM	11.911	11.431	1819.2	43.69	3056.9100	3291.6274	X-10	3
7/10/00	2:46:45 PM	11.951	11.431	1944.8	43.46	3009.3455	3236.4073	X-10	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x -9 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	25.5	0.01771					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	5:08:19 PM	11.761	11.431	872.0	33.28	2069.5452	1800.3314	X-9	1
7/9/00	5:09:25 PM	11.801	11.431	1174.4	33.22	2451.2444	2162.2540	X-9	2
7/9/00	5:10:36 PM	11.881	11.431	1614.4	33.14	2794.3446	2446.1616	X-9	3
7/9/00	5:11:32 PM	11.941	11.431	1943.2	33.08	2959.7254	2599.6698	X-9	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x -8 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	2:29:21 PM	11.771	11.431	1272.0	43.35	3032.0816	3205.2690	X-8	1
7/10/00	2:31:20 PM	11.821	11.431	1523.6	43.52	3161.2429	3367.1960	X-8	2
7/10/00	2:32:21 PM	11.891	11.431	1816.0	43.58	3185.7726	3417.2526	X-8	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x -7 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.0	0.01774					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	2:23:24 PM	11.741	11.431	1347.6	42.92	3528.7146	3749.4108	X-7	1
7/10/00	2:25:01 PM	11.791	11.431	1578.0	43.04	3551.9840	3799.1830	X-7	2
7/10/00	2:26:00 PM	11.861	11.431	1890.0	43.10	3551.9236	3826.0230	X-7	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x -6 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	11:58:07 AM	11.80	11.47	1112.4	32.62	2625.6090	2172.1803	X-6	1
7/11/00	11:59:54 AM	11.86	11.47	1463.6	32.77	2917.1333	2435.4737	X-6	2
7/11/00	12:01:22 PM	11.97	11.47	1970.4	32.88	3050.2396	2577.6978	X-6	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x -5 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	2:17:22 PM	11.761	11.431	1556.8	42.62	3816.2022	3972.0767	X-5	1
7/10/00	2:18:42 PM	11.791	11.431	1688.4	42.70	3790.0614	3961.2385	X-5	2
7/10/00	2:19:45 PM	11.831	11.431	1895.6	42.79	3824.3071	4017.7476	X-5	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	-4 hole	4"	5/8"	4"	silong lu			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	25.5	0.01771					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00		11.771	11.431	1540	41.9	3656.0000	3886.9084	X-4	1
7/10/00		11.801	11.431	1710	42.0	3725.0000	3980.4890	X-4	2
7/10/00		11.841	11.431	1896	42.3	3723.0000	4018.0012	X-4	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x -3 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.0	0.01774					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	2:01:29 PM	11.751	11.431	1288.8	40.43	3223.9344	3273.6003	X-3	1
7/10/00	2:04:37 PM	11.771	11.431	1546.4	41.13	3645.8273	3764.0207	X-3	2
7/10/00	2:06:14 PM	11.851	11.431	1874.4	41.48	3569.3365	3737.2218	X-3	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x -2 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.0	0.01774					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	1:43:58 PM	11.77	11.44	1593.2	39.68	3853.7483	3852.9358	X-2	1
7/10/00	1:45:19 PM	11.79	11.44	1730.4	39.60	3942.1045	3940.9477	X-2	2
7/10/00	1:46:26 PM	11.83	11.44	1900.0	39.57	3877.6226	3886.9221	X-2	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x -1 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	2:50:48 PM	11.771	11.431	1166.8	42.92	2777.5346	2911.0147	X-1	1
7/10/00	2:51:53 PM	11.851	11.431	1456.4	42.76	2795.7032	2940.2418	X-1	2
7/10/00	2:53:18 PM	11.921	11.431	1733.6	42.61	2842.6978	2998.0040	X-1	3
7/10/00	2:54:18 PM	11.981	11.431	1928.0	42.50	2808.5395	2970.0727	X-1	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 0 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.0	0.01774					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	2:56:34 PM	11.771	11.431	1701.2	42.36	4049.2403	4264.6439	X-0	1
7/10/00	2:57:34 PM	11.801	11.431	1811.2	42.33	3956.1389	4174.5301	X-0	2
7/10/00	2:58:18 PM	11.821	11.431	1926.8	42.33	3989.4526	4216.7382	X-0	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 1 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.0	0.01774					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	3:00:16 PM	11.736	11.426	1056.8	42.35	2762.2568	2901.2891	X1	1
7/10/00	3:02:34 PM	11.806	11.426	1395.6	42.44	2967.9246	3141.4587	X1	2
7/10/00	3:03:40 PM	11.866	11.426	1622.8	42.50	2973.5490	3167.0961	X1	3
7/10/00	3:04:39 PM	11.946	11.426	1907.6	42.56	2948.3103	3165.0068	X1	4

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 2 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	3:07:51 PM	11.756	11.426	1218.0	42.67	2986.1707	3111.3145	X2	1
7/10/00	3:08:40 PM	11.806	11.426	1432.8	42.68	3044.2628	3185.8243	X2	2
7/10/00	3:09:45 PM	11.906	11.426	1795.6	42.70	3007.8213	3175.3339	X2	3
7/10/00	3:10:49 PM	11.926	11.426	1891.6	42.70	3039.3386	3213.9355	X2	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 3 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	3:13:00 PM	11.816	11.426	566.4	42.59	1171.7426	1225.0181	X3	1
7/10/00	3:14:08 PM	12.076	11.426	1055.2	42.53	1295.3521	1382.0200	X3	2
7/10/00	3:15:23 PM	12.256	11.426	1480.0	42.50	1412.1074	1527.8551	X3	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 4 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	3:19:08 PM	11.906	11.426	561.6	42.45	939.9949	987.3172	X4	1
7/10/00	3:21:06 PM	12.166	11.426	928.8	42.47	997.5238	1070.8658	X4	2
7/10/00	3:22:40 PM	12.376	11.426	1365.6	42.47	1132.6491	1236.5972	X4	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 5 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	3:26:33 PM	12.376	11.426	1405.6	42.45	1165.7518	1272.2192	X5	1
7/10/00	3:28:06 PM	12.206	11.426	1062	42.41	1080.1597	1161.8507	X5	2
7/10/00	3:30:45 PM	11.826	11.426	517.2	42.38	1042.0783	1085.7161	X5	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 6 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	26.5	0.01776					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	3:31:00 PM	11.816	11.426	595	42.4	1229.0000	1281.1337	X6	1
7/10/00		12.056	11.426	1066	42.4	1350.0000	1434.9274	X6	2
7/10/00	3:40:00 PM	12.236	11.426	1524	42.4	1491.0000	1607.0636	X6	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
measurement (from top to	Escalante, UT	x 7 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	27.0	0.01778					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	3:40:01 PM	12.056	11.426	1556.4	42.41	1968.8792	2059.0517	X7	1
7/10/00	3:41:25 PM	11.876	11.426	988.8	42.42	1764.4779	1818.4181	X7	2
7/10/00	3:43:48 PM	11.776	11.426	673.6	42.47	1552.2064	1587.9573	X7	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 8 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	27.5	0.0178					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	3:46:28 PM	11.766	11.426	874.8	42.5	2072.7476	2087.2713	X8	1
7/10/00	3:48:00 PM	11.846	11.426	1192.4	42.5	2279.4337	2310.8359	X8	2
7/10/00	3:49:42 PM	11.946	11.426	1552.0	42.5	2386.2817	2439.3460	X8	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 9 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	28.0	0.01782					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	3:55:04 PM	11.806	11.426	918.8	42.47	1941.1490	1930.4905	X9	1
7/10/00	3:56:22 PM	11.906	11.426	1237.6	42.45	2061.1472	2066.1531	X9	2
7/10/00	3:57:41 PM	12.076	11.426	1765.2	42.42	2155.3901	2189.7843	X9	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 10 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	28.0	0.01782					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/10/00	4:04:56 PM	11.951	11.421	1868.4	42.22	2810.2052	2815.4798	X10	1
7/10/00	4:10:42 PM	11.861	11.421	1518.8	42.02	2760.2864	2733.6116	X10	2
7/10/00	4:13:22 PM	11.781	11.421	1198.0	41.84	2668.6226	2615.3786	X10	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 11 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	19.5	0.01746					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	9:42:31 AM	11.905	11.475	1444.4	22.11	2546.9011	1968.2690	X11	1
7/11/00	9:44:00 AM	11.945	11.475	1689.6	22.29	2722.7949	2127.0964	X11	2
7/11/00	9:46:29 AM	12.045	11.475	1920.8	22.55	2543.9072	2025.4201	X11	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 12 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	20.0	0.01749					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	9:50:20 AM	12.025	11.475	1084.4	22.92	1488.9675	1175.4405	X12	1
7/11/00	9:53:09 AM	12.095	11.475	1412.8	23.17	1717.3557	1377.2199	X12	2
7/11/00	9:54:33 AM	12.215	11.475	1890.8	23.31	1916.9450	1561.0849	X12	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 13 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	20.0	0.01749					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	9:58:12 AM	11.797	11.477	797.2	23.58	1903.8714	1513.5739	X13	1
7/11/00	9:59:37 AM	11.847	11.477	876.4	23.71	1807.1575	1450.0385	X13	2
7/11/00	10:02:26 AM	11.917	11.477	1192.4	23.89	2062.7656	1676.4472	X13	3
7/11/00	10:03:50 AM	11.997	11.477	1619.6	24.00	2363.6859	1941.9731	X13	4

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 14 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	23.0	0.01761					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	11:46:25 AM	11.80	11.47	650.4	31.86	1528.7760	1417.1365	X14	1
7/11/00	11:48:47 AM	11.93	11.47	940.0	32.00	1577.1463	1483.7416	X14	2
7/11/00	11:50:08 AM	12.04	11.47	1351.2	32.11	1821.8142	1734.8927	X14	3
7/11/00	11:51:53 AM	12.16	11.47	1807.2	32.20	2003.4289	1931.5081	X14	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	ole (redrilled a	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	21.0	0.01753					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	10:34:15 AM	11.86	11.48	841.2	25.55	1692.9081	1394.5535	X15	1
7/11/00	10:35:47 AM	11.96	11.48	1275.2	25.65	2023.8402	1687.1076	X15	2
7/11/00	10:37:37 AM	12.11	11.48	1938.0	25.72	2329.3376	1970.8119	X15	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	(redrilled above)	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	21.0	0.01753					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	10:41:18 AM	11.99	11.48	1972.4	25.97	2945.6650	2489.7036	X16	1
7/11/00	10:43:32 AM	11.92	11.48	1520.8	26.12	2641.6191	2231.5046	X16	2
7/11/00	10:45:16 AM	11.82	11.48	934.8	26.2	2110.7353	1773.1579	X16	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	(redrilled above)	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	10:50:08 AM	11.91	11.48	772.8	26.61	1379.5663	1130.3793	X17	1
7/11/00	10:55:02 AM	11.99	11.48	1011.2	27.04	1519.0163	1271.3900	X17	2
7/11/00	10:56:40 AM	12.13	11.48	1596.0	27.20	1871.2140	1592.7674	X17	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	(redrilled above)	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	23.0	0.01761					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	11:01:45 AM	11.88	11.47	1284.8	27.67	2407.8234	1963.4144	X18	1
7/11/00	11:03:41 AM	11.96	11.47	1663.2	27.84	2600.8115	2146.8322	X18	2
7/11/00	11:06:27 AM	12.01	11.47	1880.4	28.10	2716.3321	2227.5594	X18	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x19 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.5	0.01759					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	3:13:36 PM	11.986	11.426	570.8	32.18	791.2968	763.0820	X19	1
7/9/00	3:14:48 PM	12.226	11.426	734.4	32.26	705.7775	695.6279	X19	2
7/9/00	3:16:26 PM	12.416	11.426	1105.2	32.35	851.8431	854.6188	X19	3
7/9/00	3:18:36 PM	12.646	11.426	1576.8	32.49	977.4402	1002.4459	X19	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x20 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.5	0.01759					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	2:41:47 PM	12.631	11.431	677.2	30.96	424.9930	416.7697	X20	1
7/9/00	2:44:12 PM	11.961	11.431	441.9	30.93	645.4367	599.2136	X20	2
7/9/00	2:46:13 PM	11.781	11.431	250.5	30.91	558.2111	510.2250	X20	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x21 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.5	0.01759					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	3:04:47 PM	13.216	11.426	1556.8	31.52	640.8021	668.1032	X21	1
7/9/00	3:06:08 PM	12.916	11.426	1129.2	31.62	565.2997	577.7922	X21	2
7/9/00	3:07:53 PM	12.546	11.426	714.8	31.72	483.4070	481.4533	X21	3
7/9/00	3:10:02 PM	11.866	11.426	435.0	31.89	770.6364	729.8643	X21	4

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x22 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.5	0.01759					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	2:57:02 PM	12.281	11.431	714.0	31.20	642.2389	616.8121	X22	1
7/9/00	2:58:39 PM	12.551	11.431	1071.2	31.25	723.3169	710.8025	X22	2
7/9/00	2:59:54 PM	12.801	11.431	1543.2	31.29	843.3846	846.0875	X22	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
measurement (from top to	Escalante, UT	x23 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	24.0	0.01765					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	2:06:53 PM	11.921	11.431	485.4	33.25	774.4628	718.8641	X23	1
7/9/00	2:08:27 PM	12.511	11.431	694.0	33.15	490.1023	475.8978	X23	2
7/9/00	2:09:42 PM	12.831	11.431	1022.4	33.05	549.6131	545.7089	X23	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x24 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	24.5	0.01767					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	1:57:21 PM	12.823	11.433	1492.4	33.86	809.1469	805.8369	X24	1
7/9/00	1:59:32 PM	12.633	11.433	1181.2	33.69	747.1410	729.9029	X24	2
7/9/00	2:01:31 PM	12.273	11.433	681.6	33.55	624.7699	590.9552	X24	3
7/9/00	2:03:55 PM	11.813	11.433	472.7	33.42	975.9543	885.8082	X24	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x25 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	25.5	0.01771					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	1:50:43 PM	11.815	11.435	496.9	34.26	1025.2512	919.2827	X25	1
7/9/00	1:52:17 PM	12.245	11.435	681.2	34.18	647.4884	600.2115	X25	2
7/9/00	1:53:47 PM	12.545	11.435	1090.4	34.09	746.8356	707.4193	X25	3
7/9/00	1:55:11 PM	12.745	11.435	1465.6	34.00	843.4255	809.6031	X25	4

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x26 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	25.5	0.01771					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	1:39:44 PM	12.755	11.435	1538.4	34.65	880.1174	859.8223	X26	1
7/9/00	1:41:38 PM	12.495	11.435	1043.6	34.58	751.2256	717.8146	X26	2
7/9/00	1:43:49 PM	12.185	11.435	654.0	34.51	673.7576	626.8630	X26	3
7/9/00	1:47:22 PM	11.795	11.435	485.7	34.37	1059.0870	950.7349	X26	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x27 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	25.0	0.01769					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	1:31:15 PM	11.815	11.435	496.8	34.85	1028.7363	952.5054	X27	1
7/9/00	1:32:59 PM	12.235	11.435	681.6	34.85	658.7730	631.3992	X27	2
7/9/00	1:34:45 PM	12.515	11.435	1064.4	34.82	753.2426	737.7193	X27	3
7/9/00	1:36:32 PM	12.745	11.435	1516.8	34.77	876.5477	872.9737	X27	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x28 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	24.0	0.01765					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	1:19:32 PM	12.945	11.435	1536.0	34.29	763.1017	791.7954	X28	1
7/9/00	1:20:48 PM	12.695	11.435	1123.2	34.37	675.6969	689.1350	X28	2
7/9/00	1:22:34 PM	12.305	11.435	664.8	34.52	588.7947	584.5293	X28	3
7/9/00	1:26:00 PM	11.835	11.435	461.4	34.78	907.1743	872.3322	X28	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x29 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	24.0	0.01765					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	1:13:01 PM	12.015	11.435	729.2	34.28	979.7398	944.0680	X29	1
7/9/00	1:14:28 PM	12.185	11.435	1120.4	34.25	1155.8222	1128.4464	X29	2
7/9/00	1:16:04 PM	12.315	11.435	1504.0	34.22	1315.1293	1296.5189	X29	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x30 hole	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	24.0	0.01765					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/9/00	1:02:58 PM	12.755	11.435	1544.4	33.86	883.2300	893.0593	X30	1
7/9/00	1:05:14 PM	12.465	11.435	977.2	34.06	725.1808	720.5235	X30	2
7/9/00	1:06:49 PM	12.225	11.435	689.2	34.18	673.7194	658.6994	X30	3
7/9/00	1:09:49 PM	11.795	11.435	473.0	34.29	1033.4060	977.9975	X30	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-31	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	24.0	0.01765					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	2:01:43 PM	11.94	11.44	443.0	26.20	673.1897	506.8246	X31	1
7/8/00	2:03:32 PM	12.45	11.44	698.8	26.34	514.9361	406.0349	X31	2
7/8/00	2:05:44 PM	12.90	11.44	1001.2	26.54	501.4569	412.3832	X31	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 32	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	24.0	0.01765					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	9:56:00 AM	11.895	11.485	490.2	25.44	903.6287	661.5907	X32	1
7/12/00	9:58:37 AM	12.245	11.485	715.2	25.88	701.9585	537.2818	X32	2
7/12/00	10:00:26 AM	12.645	11.485	1062.0	26.27	672.6561	538.8290	X32	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-33	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	22.5	0.01759					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	2:12:44 PM	11.86	11.44	738.4	26.98	1342.8155	1097.1514	X33	1
7/8/00	2:16:41 PM	12.02	11.44	1164.4	27.18	1524.2940	1270.4383	X33	2
7/8/00	2:18:48 PM	12.11	11.44	1628.4	27.30	1839.1823	1550.4423	X33	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-34	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	22.5	0.01759					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	2:22:47 PM	12.83	11.44	1664.8	27.49	880.5196	790.9196	X34	1
7/8/00	2:25:41 PM	12.58	11.44	1129.2	27.61	735.9364	650.8689	X34	2
7/8/00	2:27:13 PM	12.19	11.44	670.4	27.67	674.9756	579.7962	X34	3
7/8/00	2:30:21 PM	11.82	11.44	450.8	27.77	910.1040	760.7420	X34	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-35	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	22.5	0.01759					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	2:33:40 PM	11.85	11.44	432.3	27.87	808.1426	679.4236	X35	1
7/8/00	2:34:58 PM	12.30	11.44	679.2	27.90	594.1732	518.7777	X35	2
7/8/00	2:36:59 PM	12.73	11.44	1118.4	27.95	640.9465	579.9552	X35	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-36	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	21.5	0.01755					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	2:40:52 PM	12.40	11.44	1135.6	28.04	889.6596	818.4950	X36	1
7/8/00	2:44:19 PM	12.06	11.44	662.4	28.12	815.1324	731.4621	X36	2
7/8/00	2:46:37 PM	11.78	11.44	493.5	28.16	1120.6404	983.7673	X36	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-37	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	21.5	0.01755					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	2:55:08 PM	11.85	11.44	482.8	28.44	907.3278	808.4074	X37	1
7/8/00	2:57:51 PM	12.22	11.44	658.8	28.47	640.8774	589.2117	X37	2
7/8/00	3:01:50 PM	12.61	11.44	1077.2	28.52	687.6036	653.1733	X37	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-38	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	21.5	0.01755					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	3:05:19 PM	12.875	11.445	1093.2	28.56	565.0279	548.3702	X38	1
7/8/00	3:08:26 PM	12.485	11.445	709.2	28.61	512.2047	482.9115	X38	2
7/8/00	3:13:06 PM	11.945	11.445	483.4	28.73	742.8375	672.9714	X38	3
7/8/00	3:15:06 PM	11.775	11.445	259.4	28.78	608.4019	544.2694	X38	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-39	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	21.5	0.01755					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	3:18:54 PM	11.875	11.445	495.9	28.84	889.0314	803.5158	X39	1
7/8/00	3:20:29 PM	12.335	11.445	733.2	28.84	608.8316	584.6870	X39	2
7/8/00	3:22:33 PM	12.615	11.445	1058	28.87	676.1317	649.3916	X39	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-40	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	21.5	0.01755					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	3:27:08 PM	12.675	11.445	1102.8	28.87	668.7475	645.3236	X40	1
7/8/00	3:31:36 PM	12.285	11.445	662	28.84	597.2405	558.2385	X40	2
7/8/00	3:33:50 PM	11.875	11.445	476.5	28.84	854.2518	772.0816	X40	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-41	4"	5/8"	4"	robert bridges			
Outside Diam. (in)	Inside Diam. (in)	Geom. Fact.	Ref. Temp. (C)	Viscosity (cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	3:36:33 PM	12.125	11.445	744.0	28.84	833.2013	804.7178	X41	1
7/8/00	3:38:30 PM	12.285	11.445	1051.2	28.79	946.6031	924.6712	X41	2
7/8/00	3:40:02 PM	12.515	11.445	1662.4	28.76	1164.0251	1157.0359	X41	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-42	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	3:43:28 PM	12.775	11.445	1680.8	28.69	936.6484	887.7299	X42	1
7/8/00	3:45:18 PM	12.485	11.445	1044.4	28.61	752.9425	695.8191	X42	2
7/8/00	3:47:29 PM	12.145	11.445	644.0	28.58	699.4668	628.3748	X42	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-43	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	3:50:42 PM	11.955	11.445	480.7	28.53	722.1949	637.7325	X43	1
7/8/00	3:54:35 PM	12.485	11.445	706.0	28.49	508.7763	468.3912	X43	2
7/8/00	3:56:13 PM	12.845	11.445	1056.8	28.44	557.4262	526.9872	X43	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-44	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	4:00:38 PM	12.78	11.45	1300.0	28.36	723.6501	678.6947	X44	1
7/8/00	4:02:38 PM	12.61	11.45	962.0	28.27	618.0518	570.3763	X44	2
7/8/00	4:04:30 PM	12.31	11.45	684.8	28.23	600.7057	540.6135	X44	3
7/8/00	4:06:57 PM	11.88	11.45	478.1	28.18	853.7965	740.6143	X44	4

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-45	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	4:10:44 PM	11.78	11.45	484.1	28.18	1131.2396	973.0997	X45	1
7/8/00	4:12:18 PM	12.20	11.45	754.8	28.15	762.4804	678.3859	X45	2
7/8/00	4:13:52 PM	12.42	11.45	1151.6	28.12	891.2505	806.3313	X45	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-46	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	4:17:04 PM	12.57	11.45	1164.4	28.1	775.6323	709.6625	X46	1
7/8/00	4:19:19 PM	12.24	11.45	703.6	28.1	673.5421	600.2339	X46	2
7/8/00	4:21:46 PM	11.83	11.45	482.9	28.13	977.7308	843.2264	X46	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-47	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	4:25:08 PM	11.81	11.45	467.9	28.18	1001.0007	863.2386	X47	1
7/8/00	4:26:21 PM	12.19	11.45	689.6	28.19	706.4175	628.8050	X47	2
7/8/00	4:27:36 PM	12.50	11.45	1080.4	28.19	770.0881	702.7388	X47	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-48	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	4:30:33 PM	12.49	11.45	1088.0	28.24	783.4130	715.4803	X48	1
7/8/00	4:32:22 PM	12.15	11.45	668.0	28.26	724.7641	644.4867	X48	2
7/8/00	4:35:24 PM	11.79	11.45	445.2	28.30	1009.7164	872.6487	X48	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-49	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	4:39:04 PM	11.79	11.45	483.6	28.33	1096.9171	948.9225	X49	1
7/8/00	4:40:31 PM	12.17	11.45	716.4	28.33	755.2337	674.1856	X49	2
7/8/00	4:42:03 PM	12.40	11.45	1047.2	28.30	828.6909	752.8785	X49	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-50	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	4:44:51 PM	12.51	11.45	1068.8	28.30	754.5994	691.5867	X50	1
7/8/00	4:46:20 PM	12.20	11.45	689.2	28.27	696.4903	622.0676	X50	2
7/8/00	4:48:48 PM	11.81	11.45	473.9	28.27	1014.1397	877.1004	X50	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-51	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	4:51:44 PM	11.80	11.45	495.3	28.27	1090.6791	942.5063	X51	1
7/8/00	4:53:43 PM	12.14	11.45	694.0	28.26	764.2037	679.0041	X51	2
7/8/00	4:56:36 PM	12.41	11.45	1059.6	28.23	829.2353	752.2844	X51	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-52	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	4:58:41 PM	12.42	11.45	1070.8	28.21	828.9652	752.1561	X52	1
7/8/00	5:00:06 PM	12.13	11.45	680.4	28.19	760.3856	673.5449	X52	2
7/8/00	5:02:00 PM	11.79	11.45	481.8	28.19	1092.3265	940.7186	X52	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
measurement (from top to	Escalante, UT	X-53	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	5:06:59 PM	11.84	11.45	467.4	28.18	921.8473	796.9781	X53	1
7/8/00	5:08:20 PM	12.34	11.45	714.8	28.16	604.9759	544.5616	X53	2
7/8/00	5:09:32 PM	12.69	11.45	1112.4	28.12	666.0643	615.5709	X53	3
7/8/00	5:13:17 PM	12.41	11.45	1153.2	28.04	901.9167	813.2271	X53	4
7/8/00	5:14:59 PM	12.11	11.45	697.6	28.01	803.4204	706.3885	X53	5
7/8/00	5:16:26 PM	11.77	11.45	475.1	28.00	1144.7395	978.1522	X53	6

This data is from drillhole X-54. A seperate e-file was not opened to collect this data. See manually recorded data in Dinwiddie's file cabinet. CLD, 05/19/03

RNM, 08/20/02

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	#54 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	5:17:00 PM	12.41	11.45	1152	28.00	902.0000	811.2220	X54	1
7/8/00		12.11	11.45	698	28.00	804.0000	706.5412	X54	2
7/8/00	5:19:00 PM	11.77	11.45	476	28.00	1145.0000	980.0052	X54	3

See previous page, Comments under X-53. CLD, 05/19/03.

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	X-55	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	22.0	0.01757					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/8/00	5:18:49 PM	11.90	11.45	534.8	28.00	911.2937	787.2200	X55	1
7/8/00	5:20:53 PM	12.31	11.45	1084.8	27.93	950.6375	847.2916	X55	2
7/8/00	5:21:53 PM	12.47	11.45	1523.6	27.90	1118.2314	1008.5081	X55	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 56 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	28.0	0.01782					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	1:49:52 PM	11.925	11.465	562.8	39.01	968.2074	900.0909	X56	1
7/11/00	1:52:22 PM	12.345	11.465	1249.2	39.02	1103.9536	1062.3174	X56	2
7/11/00	1:54:17 PM	12.675	11.465	1885.2	39.04	1195.4562	1181.3500	X56	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 57 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	28.0	0.01782					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	1:56:44 PM	11.845	11.465	507.2	39.05	1059.9448	979.7054	X57	1
7/11/00	1:58:32 PM	12.245	11.465	1127.2	39.05	1128.6090	1078.0544	X57	2
7/11/00	2:00:20 PM	12.515	11.465	1705.2	39.04	1254.2459	1223.9496	X57	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x58	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.5	0.01788					
Date	Time	Flow Press	Atm. Press	Flow Rate	Temp.	old Perm.	new Perm.	Sample	Reading
		(psia)	(psia)	(cc/min)	(C)	(md)	(md)		
7/13/00	11:41:31 AM	12.039	11.499	546.4	35.44	789.4242	646.2015	X58	1
7/13/00	11:45:25 AM	12.429	11.499	1016.4	35.76	839.8501	715.2296	X58	2
7/13/00	11:46:46 AM	12.749	11.499	1656.4	35.90	1005.5246	881.2240	X58	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	9 hole (also v2	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press	Atm. Press	Flow Rate	Temp.	old Perm.	new Perm.	Sample	Reading
		(psia)	(psia)	(cc/min)	(C)	(md)	(md)		
7/11/00	2:03:46 PM	11.89	11.46	522.0	39.05	963.6043	908.0780	X59	1
7/11/00	2:05:33 PM	12.27	11.46	1053.6	39.05	1016.2743	988.0154	X59	2
7/11/00	2:08:21 PM	12.59	11.46	1668.4	39.09	1138.6498	1136.5883	X59	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 60	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press	Atm. Press	Flow Rate	Temp.	old Perm.	new Perm.	Sample	Reading
		(psia)	(psia)	(cc/min)	(C)	(md)	(md)		
7/11/00	2:12:00 PM	12.87	11.46	1685.6	39.12	911.6169	930.6273	X60	1
7/11/00	2:14:59 PM	12.59	11.46	1235.6	39.09	843.2724	841.7457	X60	2
7/11/00	2:20:13 PM	12.08	11.46	572.4	39.04	727.0074	695.7983	X60	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 61	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press	Atm. Press	Flow Rate	Temp.	old Perm.	new Perm.	Sample	Reading
		(psia)	(psia)	(cc/min)	(C)	(md)	(md)		
7/11/00	2:22:25 PM	12.04	11.46	566.4	39.01	770.2094	734.2348	X61	1
7/11/00	2:23:51 PM	12.43	11.46	1083.2	38.96	866.5004	851.5614	X61	2
7/11/00	2:25:48 PM	12.74	11.46	1631.2	38.89	976.1971	981.5092	X61	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 62	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press	Atm. Press	Flow Rate	Temp.	old Perm.	new Perm.	Sample	Reading
		(psia)	(psia)	(cc/min)	(C)	(md)	(md)		
7/11/00	2:29:11 PM	12.78	11.46	1652.4	38.75	956.9355	962.0914	X62	1
7/11/00	2:30:36 PM	12.37	11.46	968.0	38.68	826.6987	803.4728	X62	2
7/11/00	2:32:26 PM	12.00	11.46	542.4	38.58	792.4397	745.6697	X62	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 63	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press	Atm. Press	Flow Rate	Temp.	old Perm.	new Perm.	Sample	Reading
		(psia)	(psia)	(cc/min)	(C)	(md)	(md)		
7/11/00	2:41:01 PM	11.87	11.46	542.0	38.36	1047.8900	970.5885	X63	1
7/11/00	2:43:07 PM	12.23	11.46	1116.4	38.27	1131.9389	1077.5913	X63	2
7/11/00	2:45:51 PM	12.52	11.46	1700.0	38.18	1236.6805	1202.6500	X63	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 64	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press	Atm. Press	Flow Rate	Temp.	old Perm.	new Perm.	Sample	Reading
		(psia)	(psia)	(cc/min)	(C)	(md)	(md)		
7/11/00	2:49:15 PM	12.53	11.46	1722.8	38.05	1240.6870	1203.7372	X64	1
7/11/00	2:51:23 PM	12.25	11.46	1136.8	37.99	1121.3950	1062.5171	X64	2
7/11/00	2:53:02 PM	11.87	11.46	536.4	37.96	1035.7308	950.5440	X64	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 65	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press	Atm. Press	Flow Rate	Temp.	old Perm.	new Perm.	Sample	Reading
		(psia)	(psia)	(cc/min)	(C)	(md)	(md)		
7/11/00	2:56:02 PM	11.94	11.46	463.4	37.99	762.1188	704.0081	X65	1
7/11/00	2:58:00 PM	12.77	11.46	784.4	37.96	456.7532	450.6456	X65	2
7/11/00	2:59:05 PM	13.01	11.46	1079.2	37.96	525.9983	528.6216	X65	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 66	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	3:03:29 PM	12.035	11.455	1151.6	37.99	1560.8643	1453.8217	X66	1
7/11/00	3:09:48 PM	11.865	11.455	686.8	37.99	1326.2650	1218.0358	X66	2
7/11/00	3:11:34 PM	12.225	11.455	1667.6	37.99	1689.1271	1597.8748	X66	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 67	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	3:16:17 PM	12.105	11.455	1692.0	38.07	2040.9071	1915.4221	X67	1
7/11/00	3:18:01 PM	11.905	11.455	1081.2	38.11	1899.8326	1755.4730	X67	2
7/11/00	3:19:11 PM	11.825	11.455	782.0	38.14	1676.9849	1540.3131	X67	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 68	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	27.5	0.01780					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	3:22:21 PM	11.785	11.455	963.2	38.22	2320.4401	2128.0988	X68	1
7/11/00	3:23:38 PM	11.895	11.455	1390.8	38.24	2501.4829	2316.3947	X68	2
7/11/00	3:25:13 PM	11.995	11.455	1736.8	38.27	2534.9186	2368.5199	X68	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 69	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	3:36:48 PM	11.755	11.455	1919.2	38.44	5099.1069	4458.4739	X69	1
7/11/00	3:38:21 PM	11.756	11.455	1941.6	38.45	4990.5875	4496.8843	X69	2

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 70	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	3:43:00 PM	11.765	11.455	1671.6	38.44	4296.1797	3759.5870	X70	1
7/11/00	3:45:05 PM	11.815	11.455	1846.8	38.39	4077.9675	3579.5563	X70	2
7/11/00	3:48:22 PM	11.835	11.455	1943.2	38.27	4060.0107	3559.9797	X70	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 71	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	3:54:07 PM	11.755	11.455	1955.6	38.08	5190.1455	4500.4878	X71	1

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 72 revisited	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:00:46 PM	11.755	11.445	1955.6	37.85	5016.5667	4330.8710	~~X~~ 72	1
7/11/00	4:01:34 PM	11.755	11.445	1963.2	37.82	5035.5764	4344.2560	~~X~~ 72	2

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 73 revisited	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:04:30 PM	11.755	11.445	1718.8	37.76	4407.8433	3797.4028	X73	1
7/11/00	4:05:27 PM	11.775	11.445	1810.4	37.74	4357.2721	3758.5262	X73	2
7/11/00	4:07:00 PM	11.795	11.445	1932.0	37.71	4380.2512	3781.9328	X73	3

For correction above refer to Atlantis D. Drive / Fractal - data / escalante - Data / horizontal / X transect / #72 hole. RNM, 08/22/02

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 74 revisited	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:09:49 PM	11.825	11.445	1202.0	37.71	2506.8717	2169.8942	X74	1
7/11/00	4:10:56 PM	11.935	11.445	1600.8	37.71	2577.1889	2251.2920	X74	2
7/11/00	4:12:08 PM	12.035	11.445	1944.0	37.71	2588.4149	2279.8442	X74	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 75 revisited	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:16:02 PM	11.745	11.445	1959.6	37.79	5195.5791	4475.3986	X75	1

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	#76 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:17:00 PM	11.685	11.445	1942	37.8	6225.0000	5531.4533	X76	1

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	#77 hole	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:18:00 PM	11.715	11.445	1949	37.8	5800.0000	4940.8309	X77	1

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 78	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:24:57 PM	11.765	11.445	1570.8	37.79	3901.1446	3366.0532	X78	1
7/11/00	4:25:57 PM	11.805	11.445	1754.0	37.79	3865.5906	3346.5968	X78	2
7/11/00	4:27:03 PM	11.845	11.445	1948.8	37.76	3858.5398	3349.3553	X78	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 79	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:30:43 PM	11.885	11.445	672.4	37.74	1208.1834	1051.7627	X79	1
7/11/00	4:31:58 PM	12.035	11.445	1042.8	37.70	1388.4322	1222.6291	X79	2
7/11/00	4:33:06 PM	12.235	11.445	1542.0	37.65	1520.4859	1359.2549	X79	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 80	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:35:41 PM	12.265	11.445	1590.8	37.57	1508.8578	1349.6940	X80	1
7/11/00	4:36:56 PM	12.015	11.445	994.4	37.51	1370.7517	1199.7354	X80	2
7/11/00	4:38:32 PM	11.825	11.445	615.2	37.43	1281.8536	1102.3353	X80	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 81	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:41:49 PM	11.915	11.445	577.6	37.31	969.0968	837.2057	X81	1
7/11/00	4:43:58 PM	12.265	11.445	1130.8	37.23	1071.3782	950.7304	X81	2
7/11/00	4:45:03 PM	12.505	11.445	1589.6	37.20	1153.5197	1042.7003	X81	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x82	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	33.5	0.01805					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/13/00	1:07:53 PM	11.844	11.494	433.2	37.81	973.4553	743.6749	X82	1
7/13/00	1:10:20 PM	12.584	11.494	1022.8	37.87	715.8260	581.5393	X82	2
7/13/00	1:12:14 PM	12.864	11.494	1513.6	37.93	833.4439	692.9933	X82	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 83	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:47:24 PM	12.655	11.445	1616.0	37.17	1020.9388	933.1469	X83	1
7/11/00	4:48:49 PM	12.305	11.445	989.2	37.13	891.8653	792.1091	X83	2
7/11/00	4:50:55 PM	11.975	11.445	569.2	37.13	844.2201	729.8926	X83	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 84	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	29.0	0.01786					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/11/00	4:53:40 PM	11.915	11.445	842.0	37.13	1411.7964	1214.5538	X84	1
7/11/00	4:54:26 PM	12.055	11.445	1243.2	37.10	1596.5596	1388.4838	X84	2
7/11/00	4:56:28 PM	12.255	11.445	1746.4	37.05	1674.7771	1478.6598	X84	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 85	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	33.0	0.01803					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	2:34:41 PM	12.015	11.475	572.4	38.19	829.4262	657.4306	X85	1
7/12/00	2:36:07 PM	12.465	11.475	1098.8	38.41	853.0371	704.7734	X85	2
7/12/00	2:37:47 PM	12.605	11.475	1434.8	38.69	971.1804	816.4914	X85	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 86	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	35.5	0.01813					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	2:41:37 PM	11.835	11.475	171.1	39.21	377.0268	280.8634	X86	1
7/12/00	2:43:07 PM	12.155	11.475	475.9	39.44	548.2143	421.4633	X86	2
7/12/00	2:44:26 PM	12.855	11.475	681.6	39.64	376.1984	307.0711	X86	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 87	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	36.5	0.01817					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	2:47:49 PM	12.295	11.475	675.6	40.20	641.1347	495.7366	X87	1
7/12/00	2:49:51 PM	12.575	11.475	1030.8	40.55	721.6792	574.9304	X87	2
7/12/00	2:51:16 PM	12.805	11.475	1464.8	40.77	840.8770	685.2485	X87	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 88	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	36.5	0.01817					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	2:53:35 PM	12.915	11.475	1501.6	41.00	793.2073	655.1006	X88	1
7/12/00	2:56:08 PM	12.415	11.475	710.4	41.12	586.9136	467.3138	X88	2
7/12/00	2:59:08 PM	11.875	11.475	465.8	41.19	925.0966	705.8750	X88	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 89	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	34.0	0.01807					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	3:01:45 PM	11.96	11.47	640.0	41.19	1030.6574	848.2415	X89	1
7/12/00	3:04:23 PM	12.17	11.47	1115.2	41.12	1245.9826	1041.6838	X89	2
7/12/00	3:05:47 PM	12.32	11.47	1521.6	41.11	1391.2347	1177.1459	X89	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 90	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	32.5	0.01800					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	3:08:39 PM	12.27	11.47	1549.2	41.03	1515.1303	1322.4153	X90	1
7/12/00	3:10:14 PM	12.09	11.47	1031.2	40.99	1310.8282	1126.5881	X90	2
7/12/00	3:12:16 PM	11.89	11.47	606.0	40.94	1146.5967	968.2002	X90	3

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Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 91	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	32.5	0.01800					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	3:16:46 PM	11.88	11.47	1126.0	41.22	2185.3025	1854.7145	X91	1
7/12/00	3:18:17 PM	11.95	11.47	1511.6	41.31	2499.2002	2137.5528	X91	2
7/12/00	3:21:04 PM	12.03	11.47	1826.8	41.53	2582.0138	2233.3031	X91	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 92	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	35.0	0.01811					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	3:26:23 PM	11.82	11.47	1466.0	42.00	3340.8960	2685.0514	X92	1
7/12/00	3:28:01 PM	11.88	11.47	1816.4	42.14	3526.3137	2856.5454	X92	2
7/12/00	3:31:26 PM	11.90	11.47	1926.4	42.25	3564.1660	2898.5606	X92	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x93	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	33.0	0.01803					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/13/00	1:18:41 PM	11.864	11.494	1520.8	38.14	3238.6950	2528.1345	X93	1
7/13/00	1:20:17 PM	11.914	11.494	1763.2	38.21	3301.6901	2592.2461	X93	2
7/13/00	1:22:04 PM	11.954	11.494	1919.6	38.29	3277.3231	2586.4217	X93	3

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	#94 hole	4"	5/8"	4"	silong lu			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	32.5	0.01800					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/13/00	1:23:00 PM	11.784	11.494	1988	38.4	5432.0000	4291.2288	X94	1

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	#95 hole	4"	5/8"	4"	silong lu			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	32.5	0.01800					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading

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7/13/00	1:25:00 PM	11.804	11.494	1967.0	38.7	5029.0000	4006.3527	X95	1
Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	#96	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	32.5	0.01800					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/13/00	1:27:00 PM	11.764	11.494	1986	39.00	6085.0000	4672.4830	X96	1

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 97	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	34.0	0.01807					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	3:34:52 PM	11.78	11.47	1933.2	42.2	5001.8746	4118.4599	X97	1

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 98	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	32.0	0.01798					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	3:38:10 PM	11.79	11.47	1881.2	42.11	4716.5870	4099.1405	X98	1
7/12/00	3:38:57 PM	11.80	11.47	1921.2	42.13	4669.2363	4063.0690	X98	2
7/12/00	3:40:19 PM	11.80	11.47	1928.8	42.17	4688.3022	4083.0149	X98	3

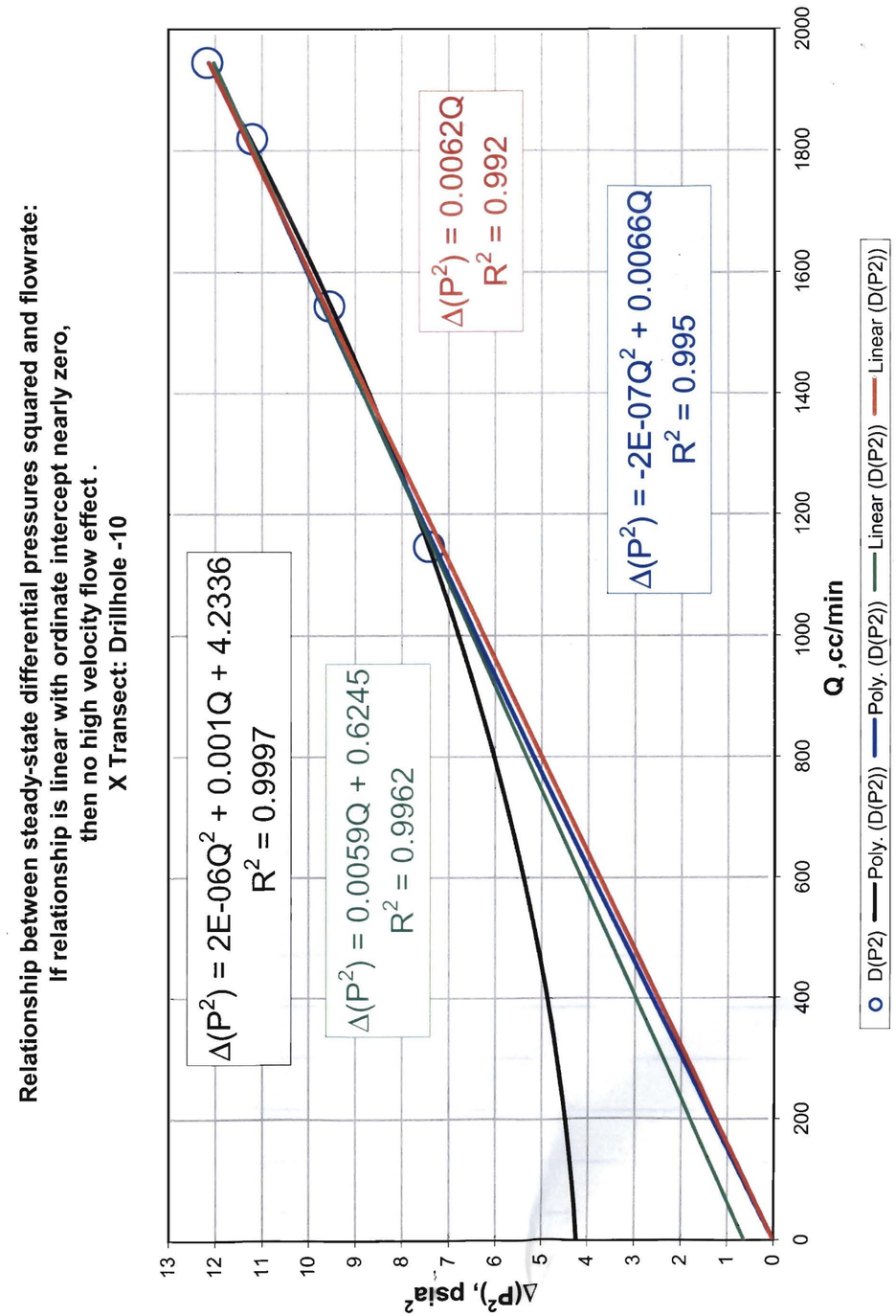
Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 99	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	32.0	0.01798					
Date	Time	Flow Press (psia)	Atm. Press (psia)	Flow Rate (cc/min)	Temp. (C)	old Perm. (md)	new Perm. (md)	Sample	Reading
7/12/00	3:44:08 PM	11.85	11.47	1582.4	42.40	3335.6229	2930.9393	X99	1
7/12/00	3:45:29 PM	11.90	11.47	1790.4	42.48	3329.0711	2942.2045	X99	2
7/12/00	3:46:24 PM	11.93	11.47	1929.6	42.54	3350.3228	2972.0082	X99	3

RNM, 08/20/02

Sample Name	Field	Well	Depth	Diameter	Length	Operator			
permeability measurement	Escalante, UT	x 100	4"	5/8"	4"	robert bridges			
Outside Diam.	Inside Diam.	Geom. Fact.	Ref. Temp.	Viscosity					
(in)	(in)		(C)	(cp)					
0.92	0.92	7.211	33.5	0.01805					
						old	new		
Date	Time	Flow Press	Atm. Press	Flow Rate	Temp.	Perm.	Perm.	Sample	Reading
		(psia)	(psia)	(cc/min)	(C)	(md)	(md)		
7/12/00	3:49:02 PM	11.78	11.47	1662.4	42.71	4315.2063	3633.6827	X100	1
7/12/00	3:51:42 PM	11.81	11.47	1852.8	42.91	4382.3067	3714.4654	X100	2
7/12/00	3:53:37 PM	11.81	11.47	1923.6	43.05	4551.7816	3868.9863	X100	3

The following graphical information was developed from the flow rate and steady-state pressure data. An explanation of this data can be found on pages 41 through 44 of this notebook

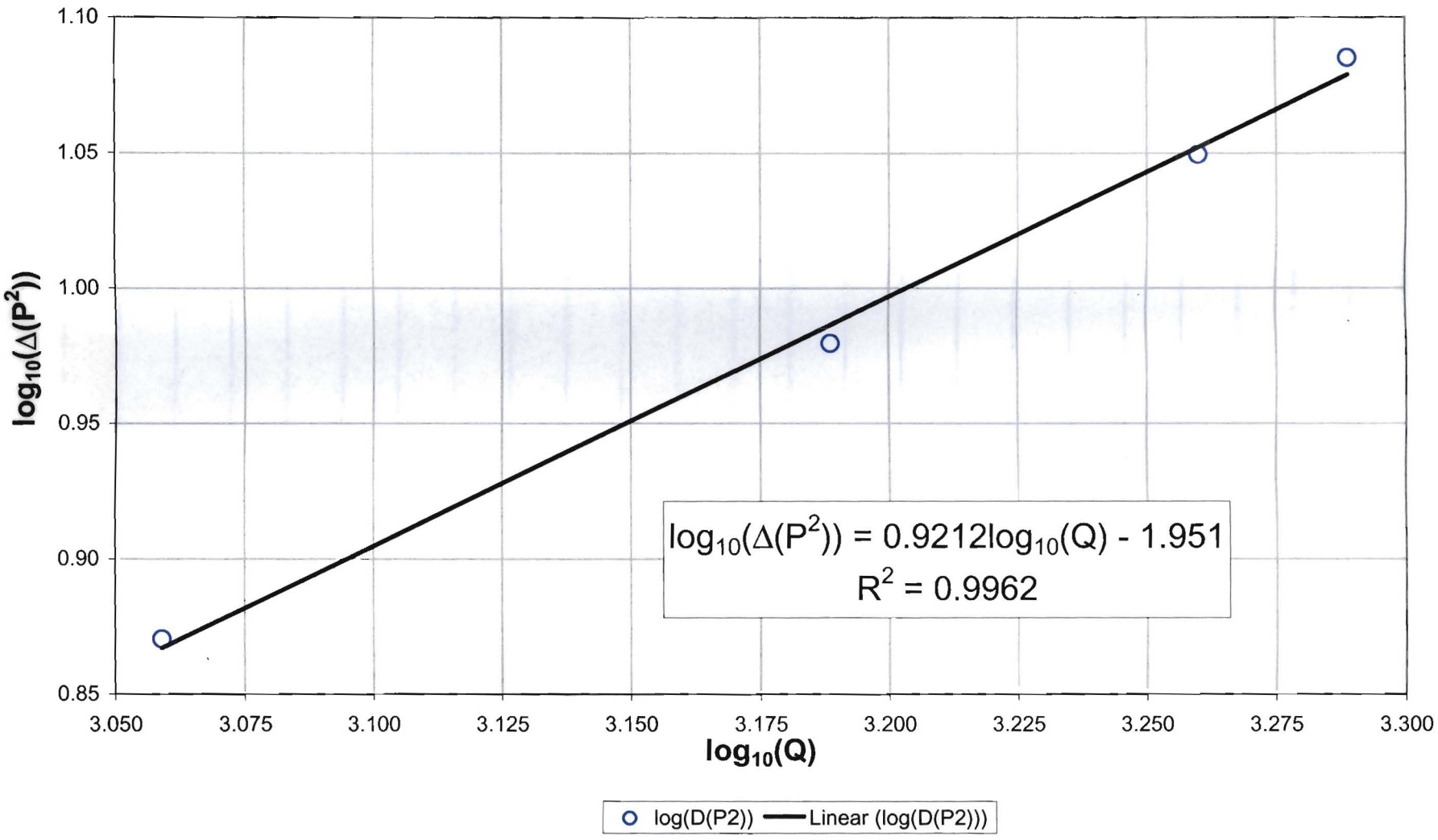
RNM, 08/20/02



RNM, 08/21/02

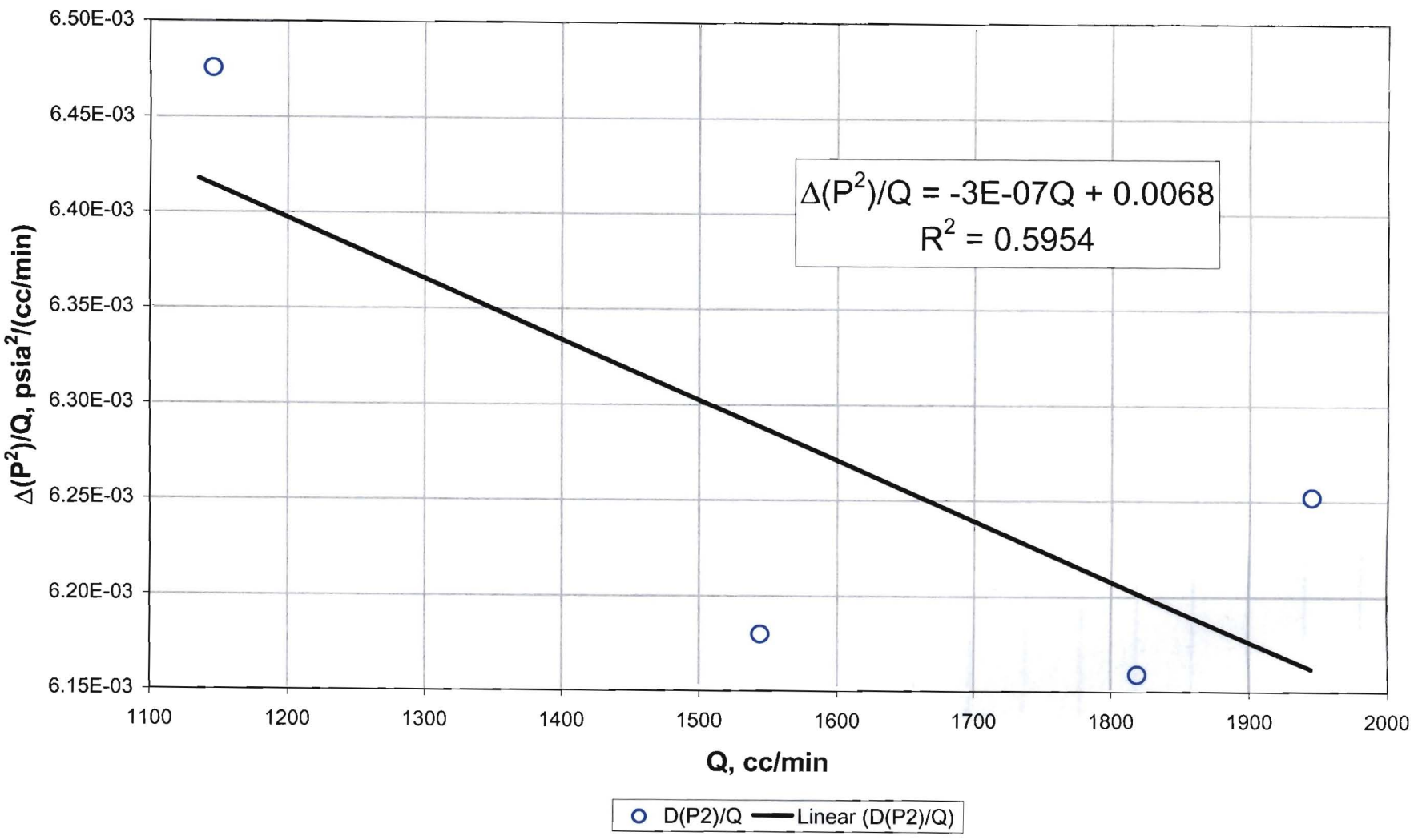
RWM, 08/21/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole -10

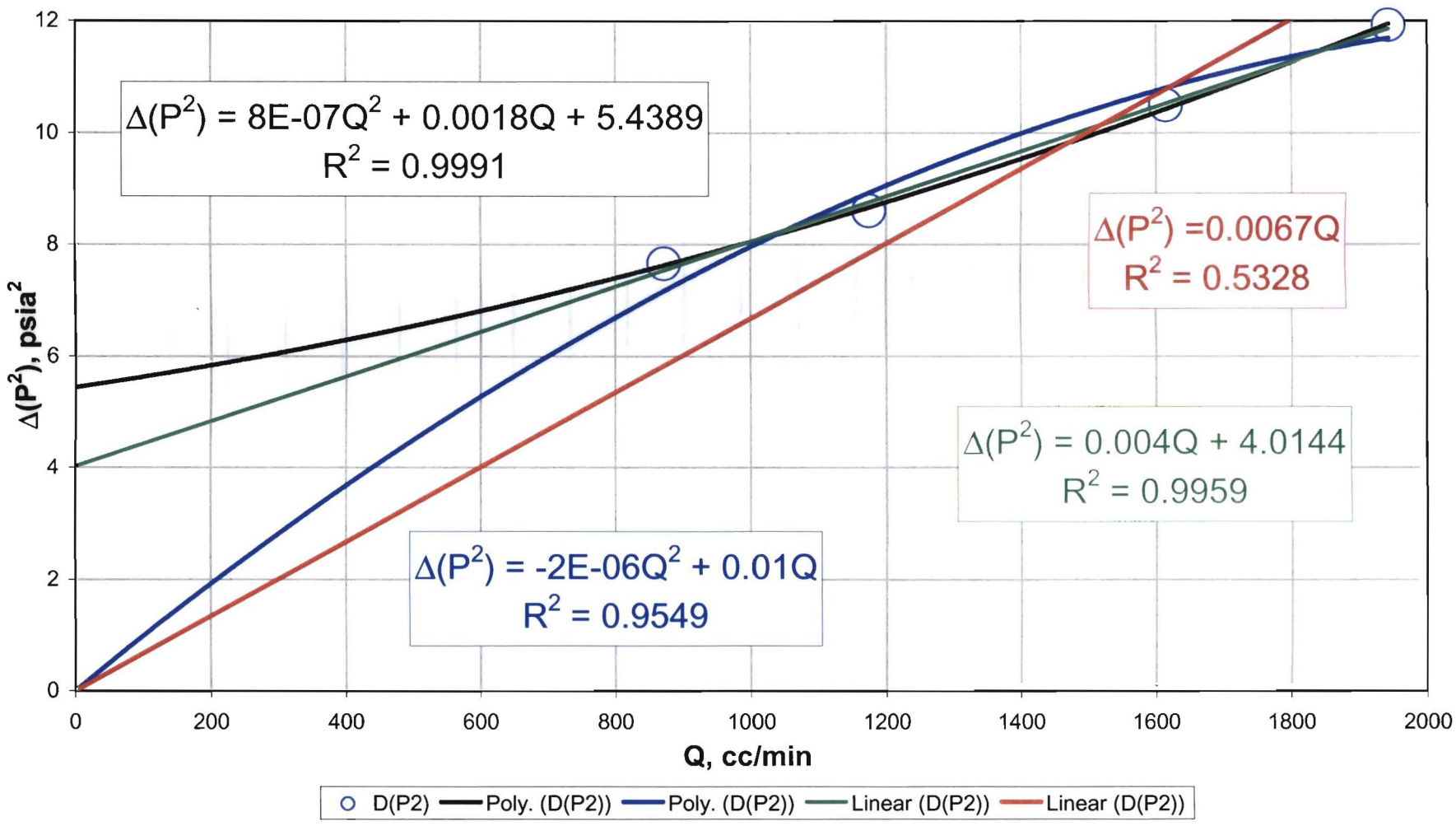


RWM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole -10

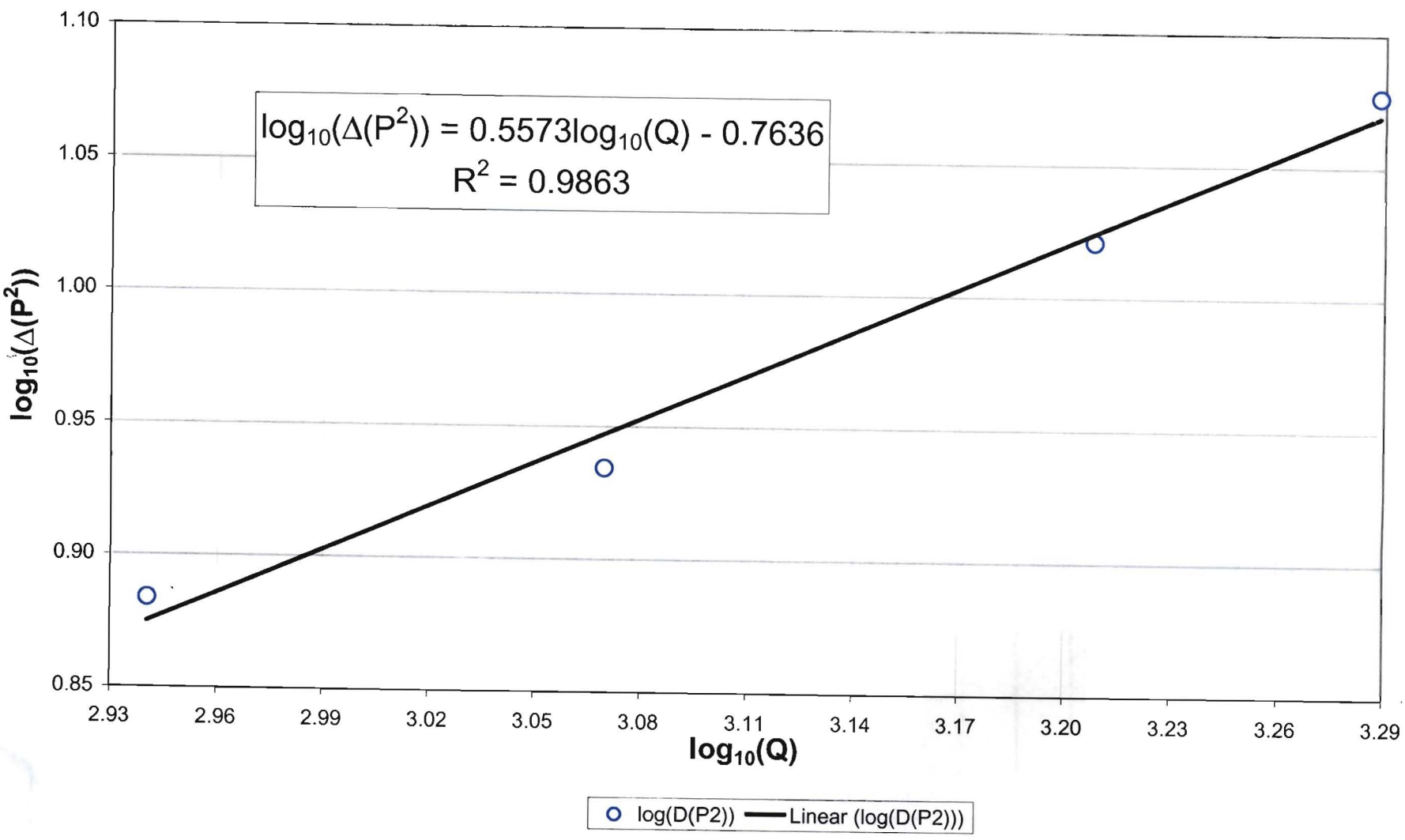


Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole - 9



RNM, 08/21/02

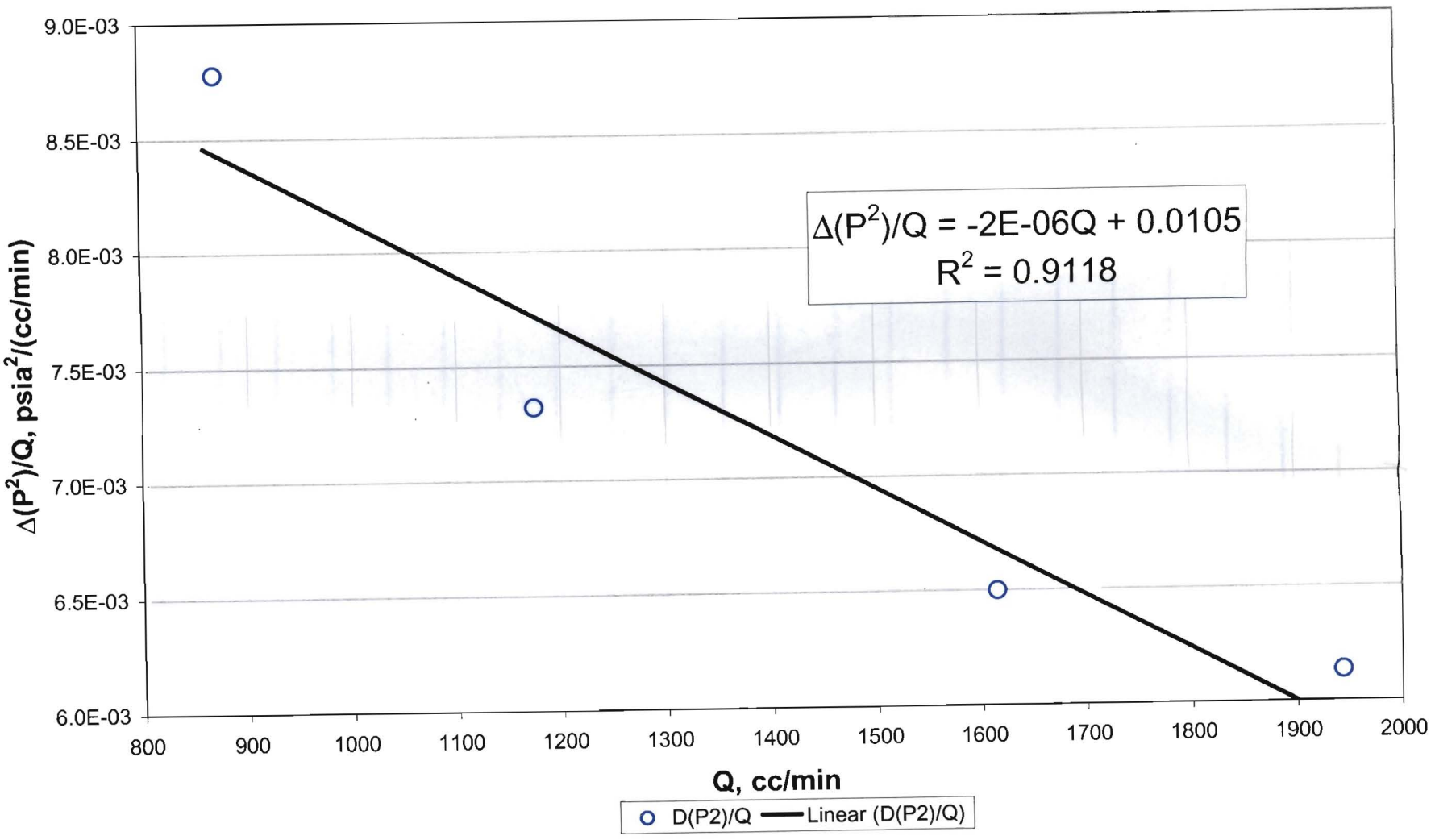
Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drilhole -9



RNM, 08/21/02

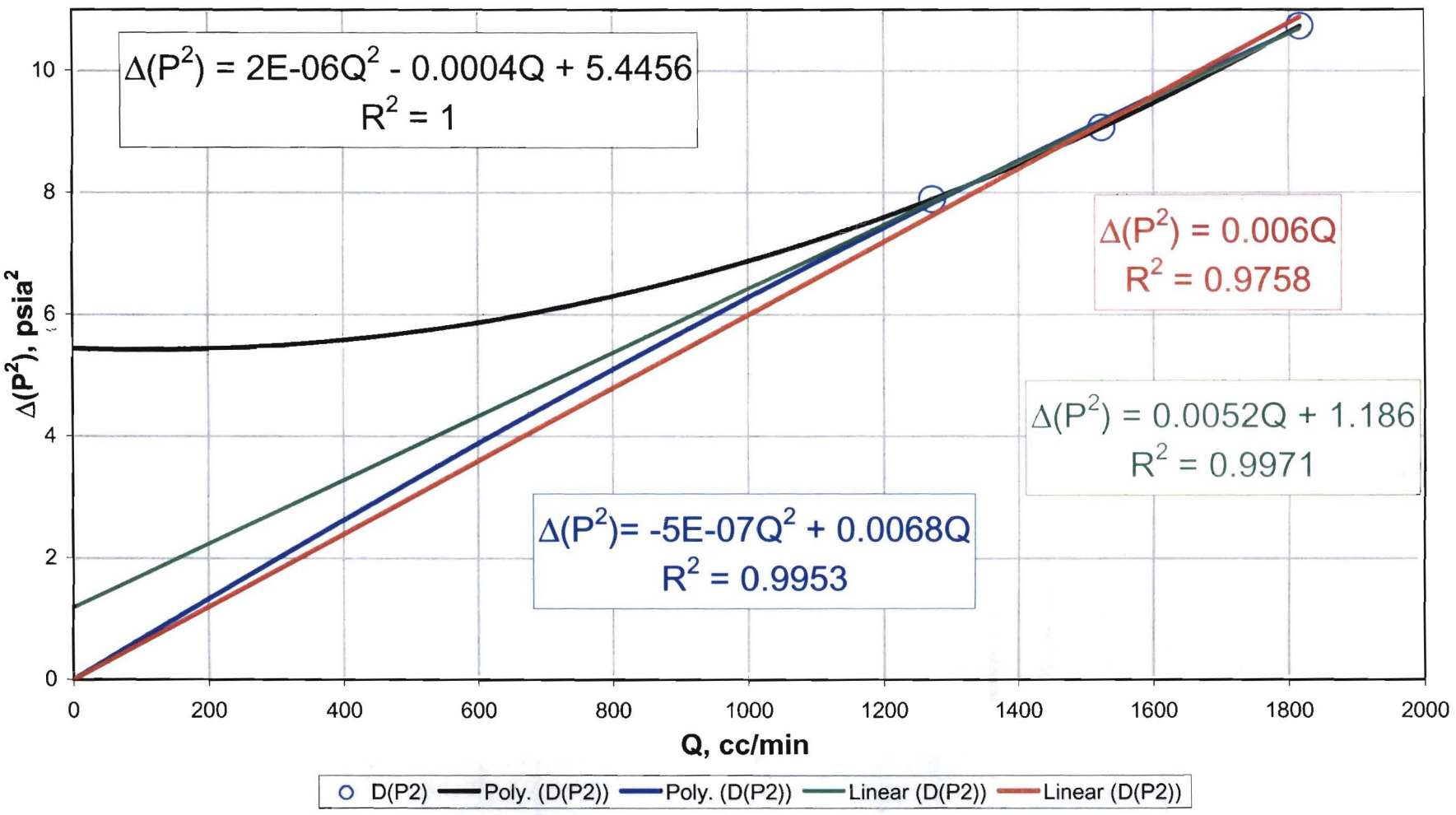
RNM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole -9



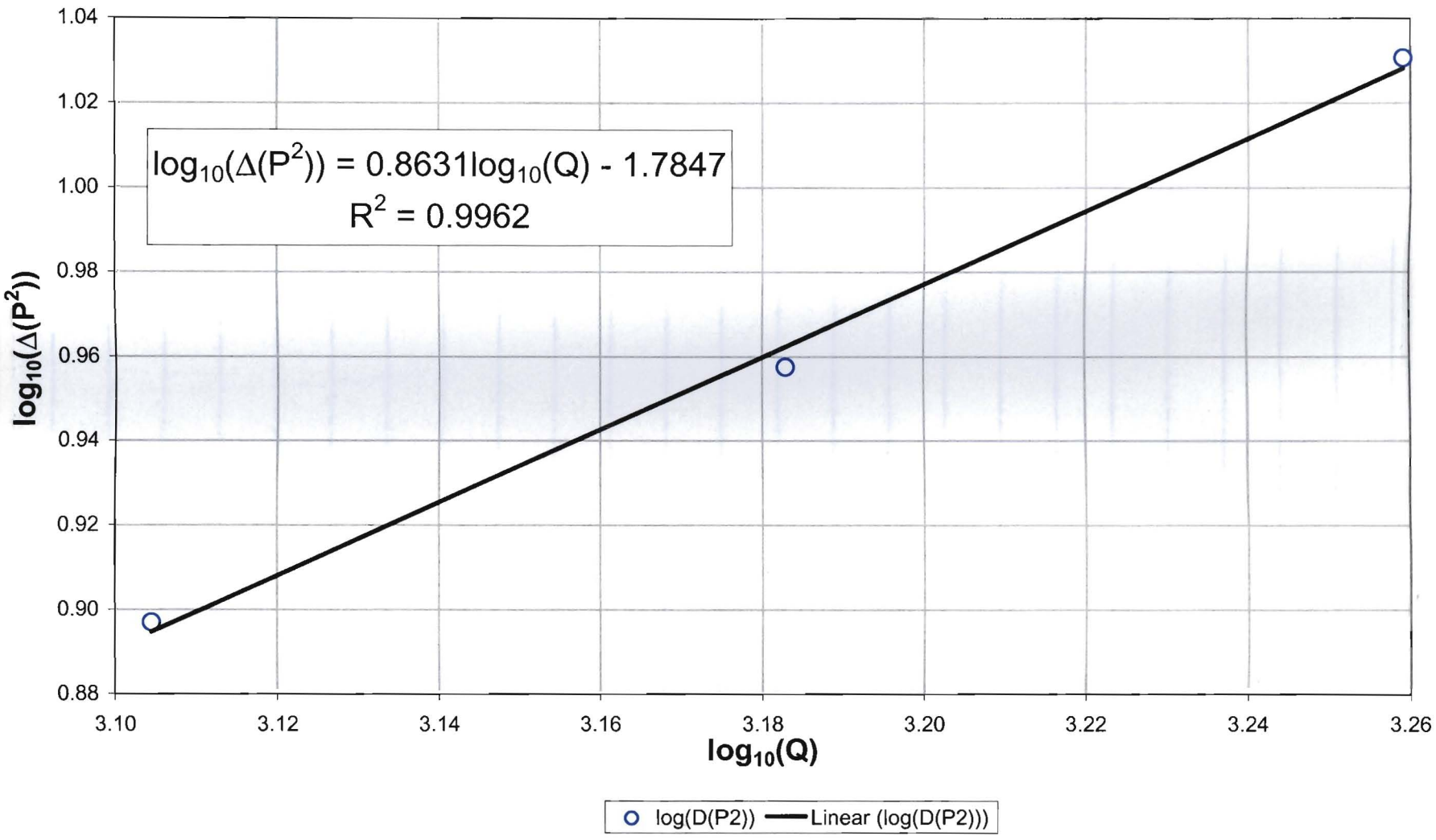
RNM, 08/21/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole -8



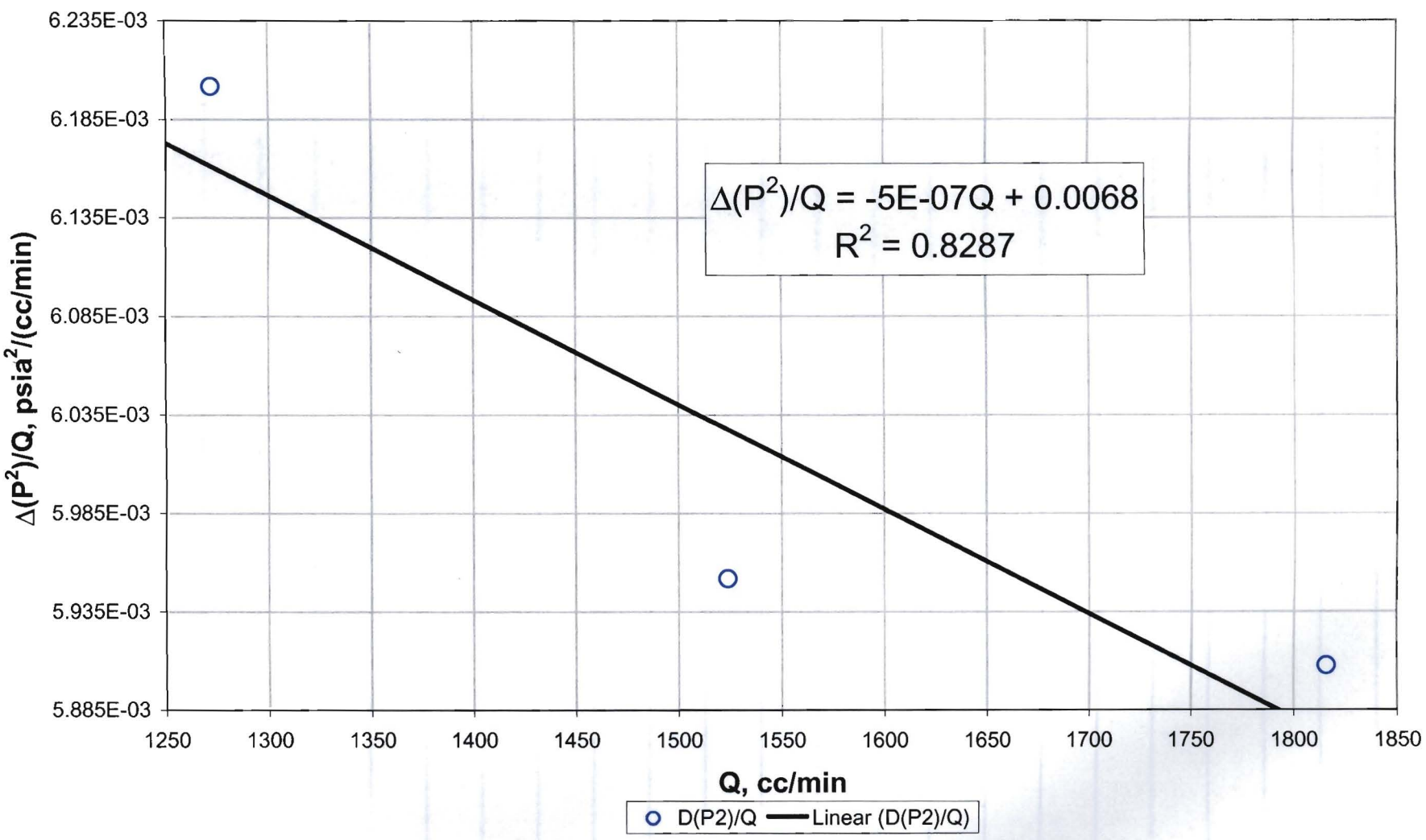
RWM, 08/21/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole -8

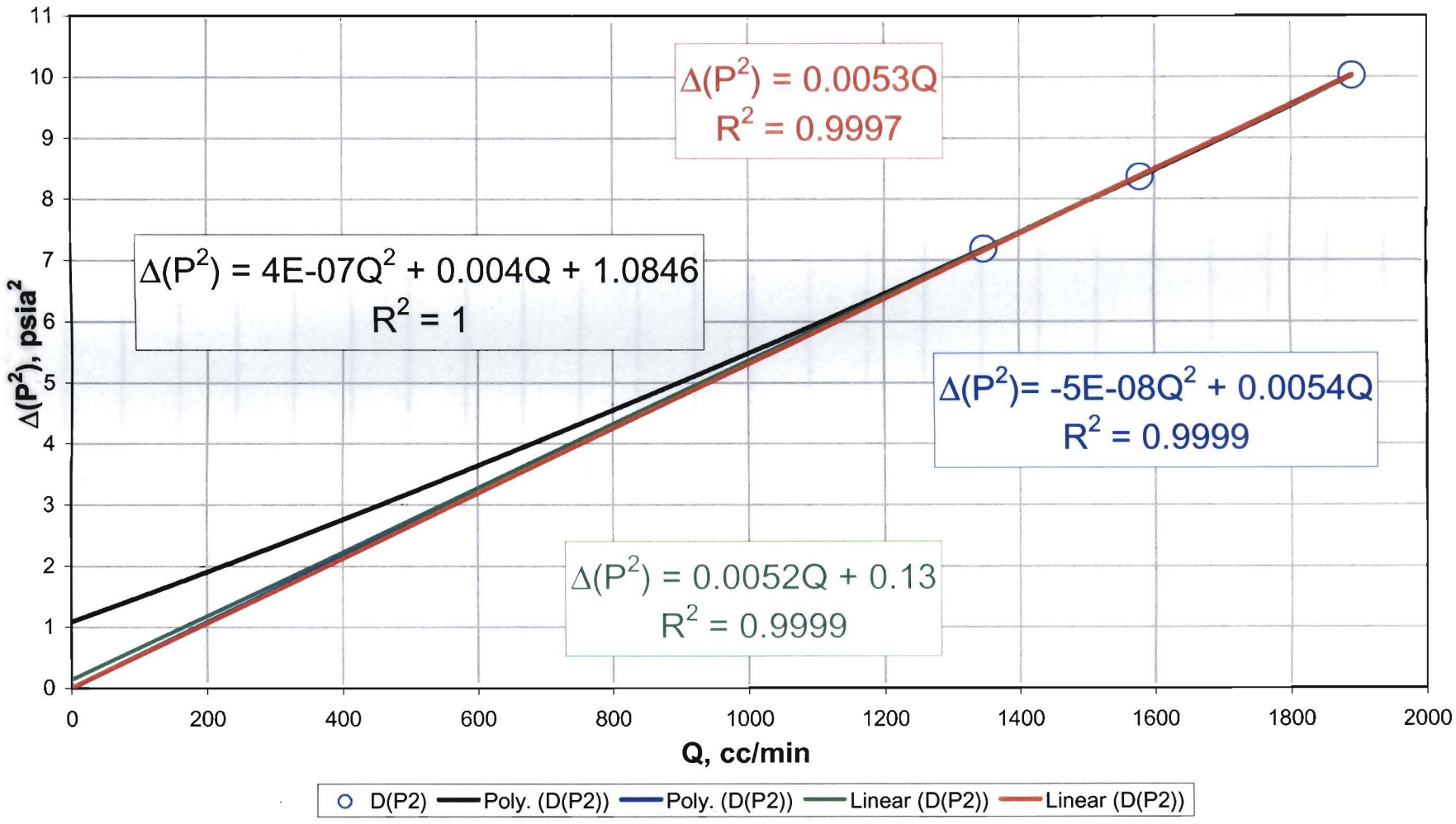


RWM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole -8

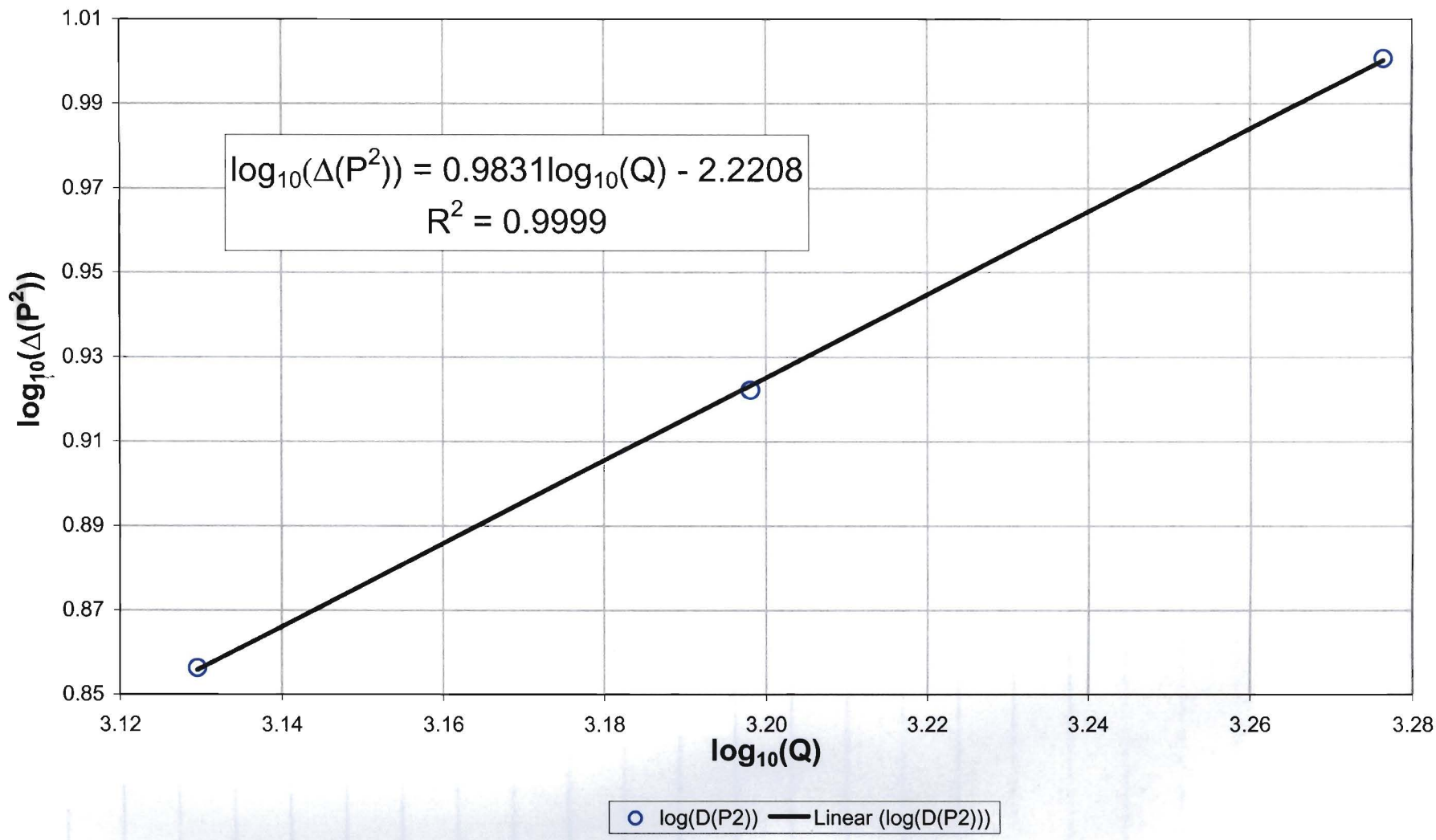


Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole - 7



RWM, 08/21/02

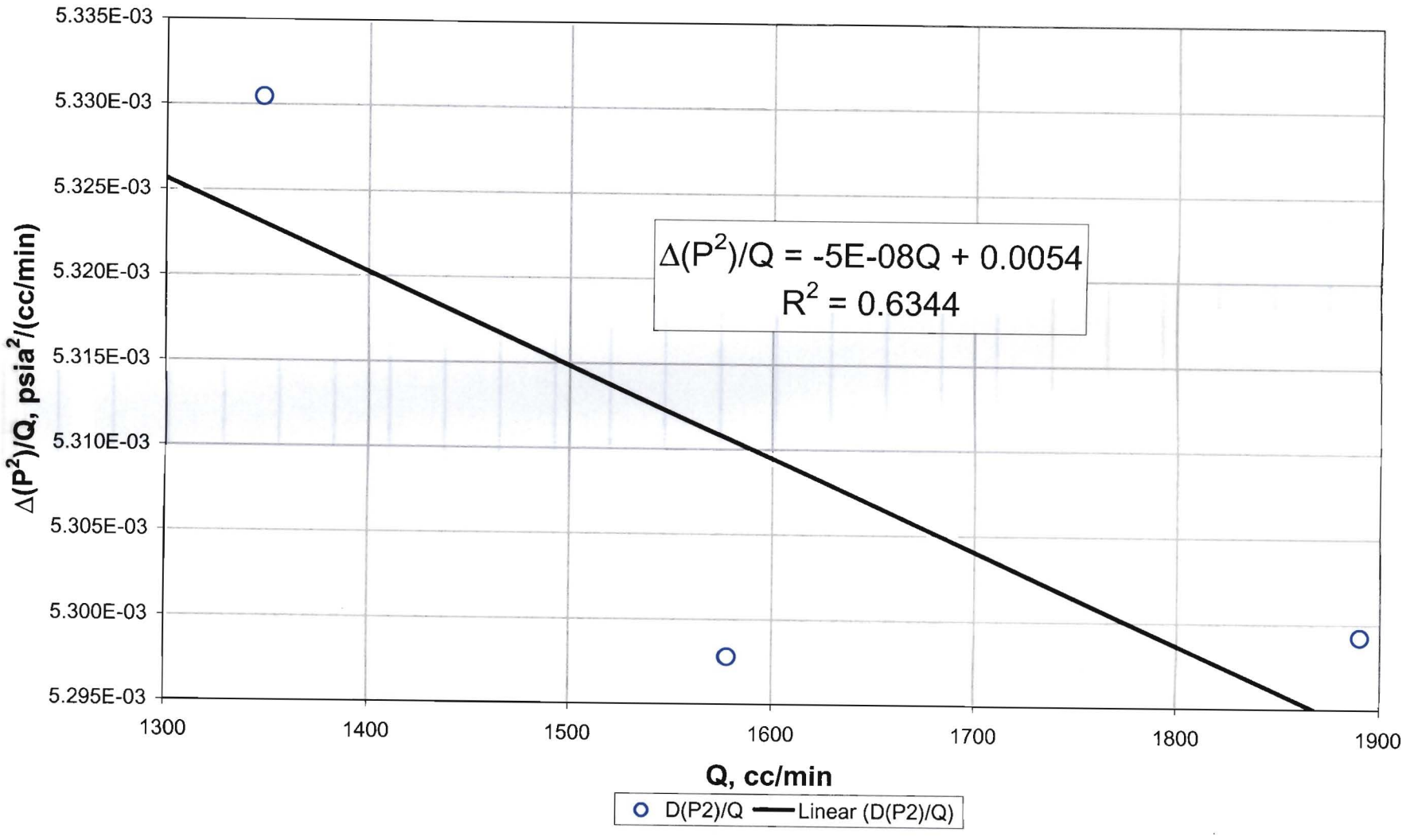
Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole - 7



RWM, 08/21/02

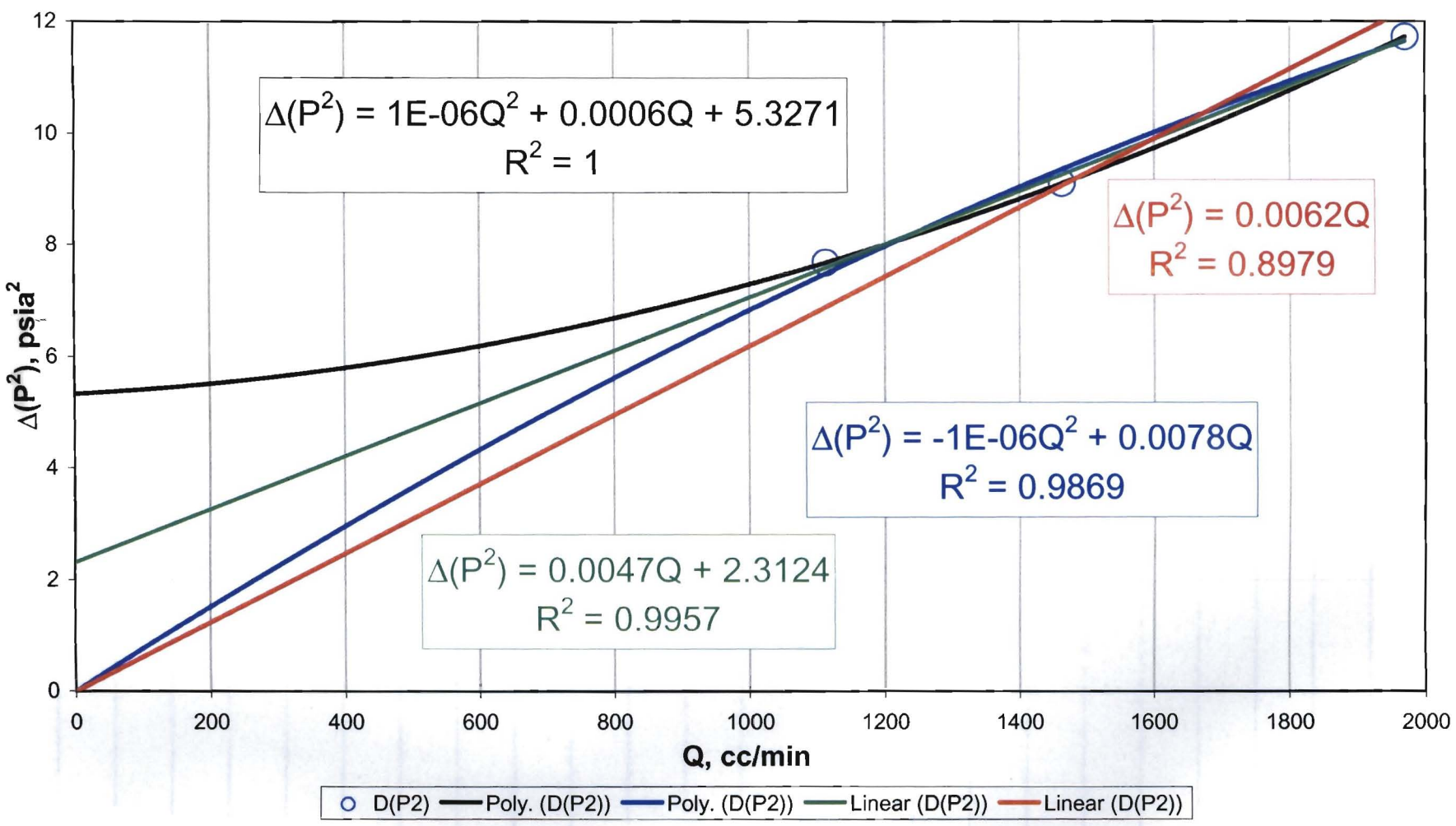
RNM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole - 7



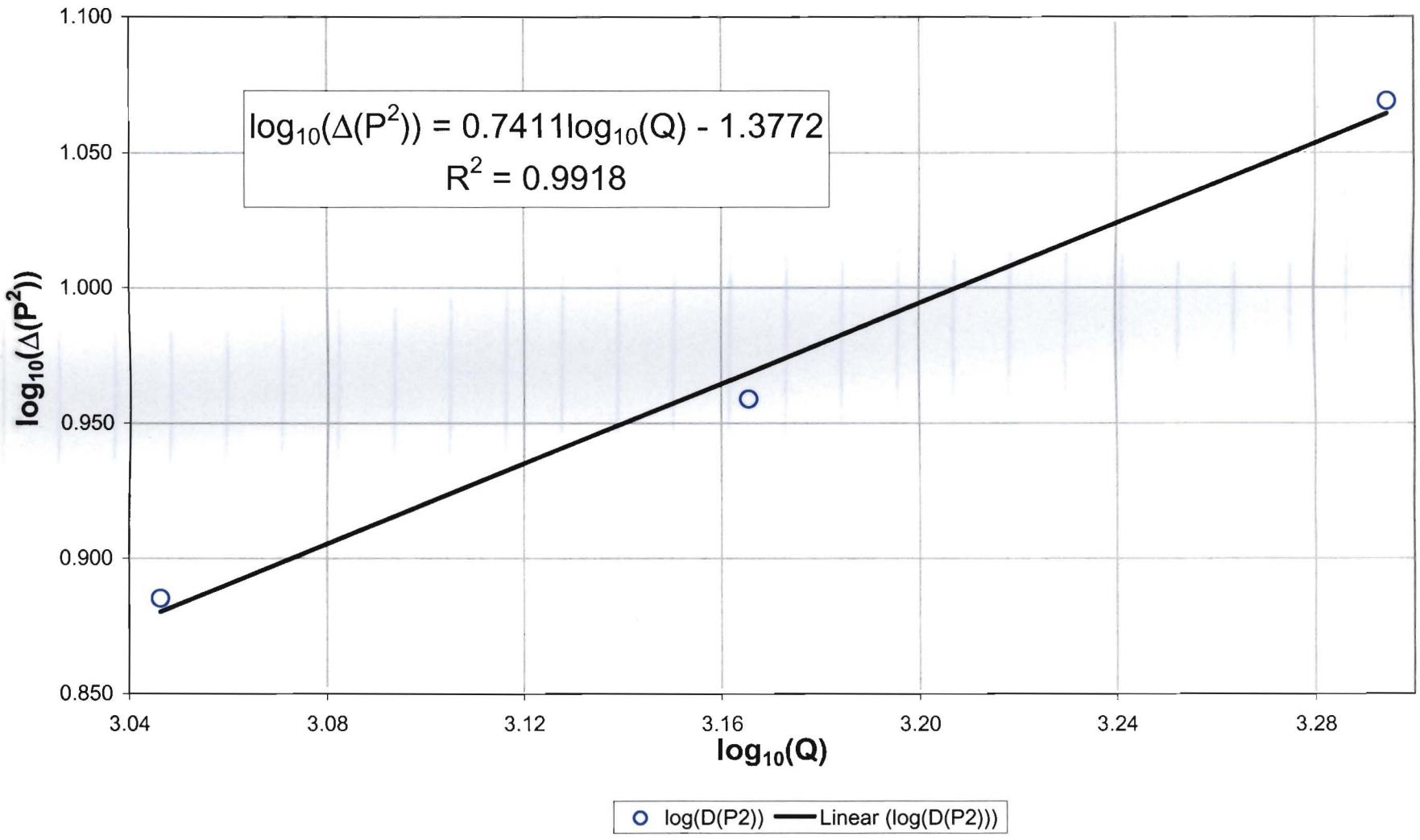
RNM, 08/21/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole -6



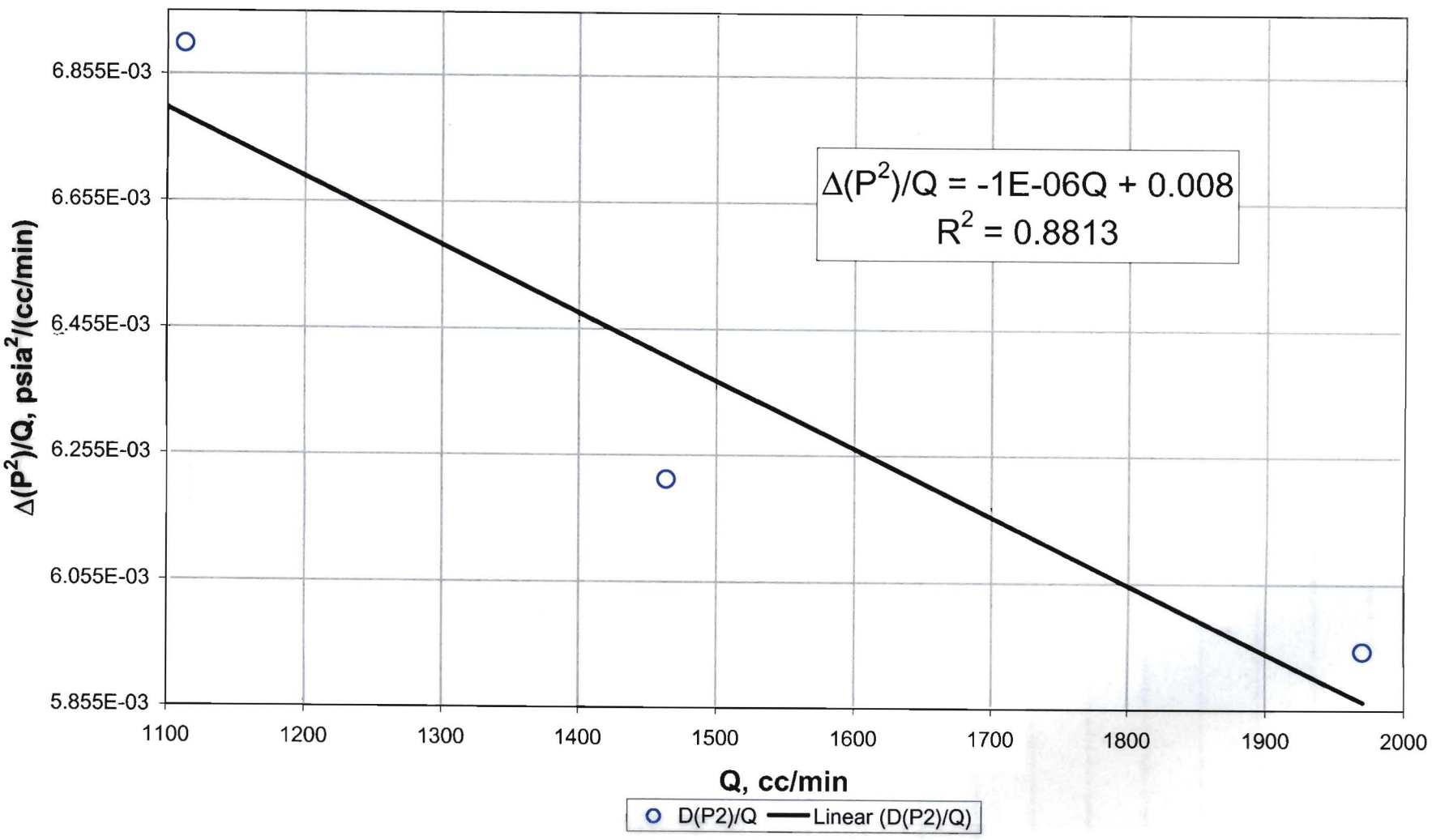
RNM, 08/21/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole -6



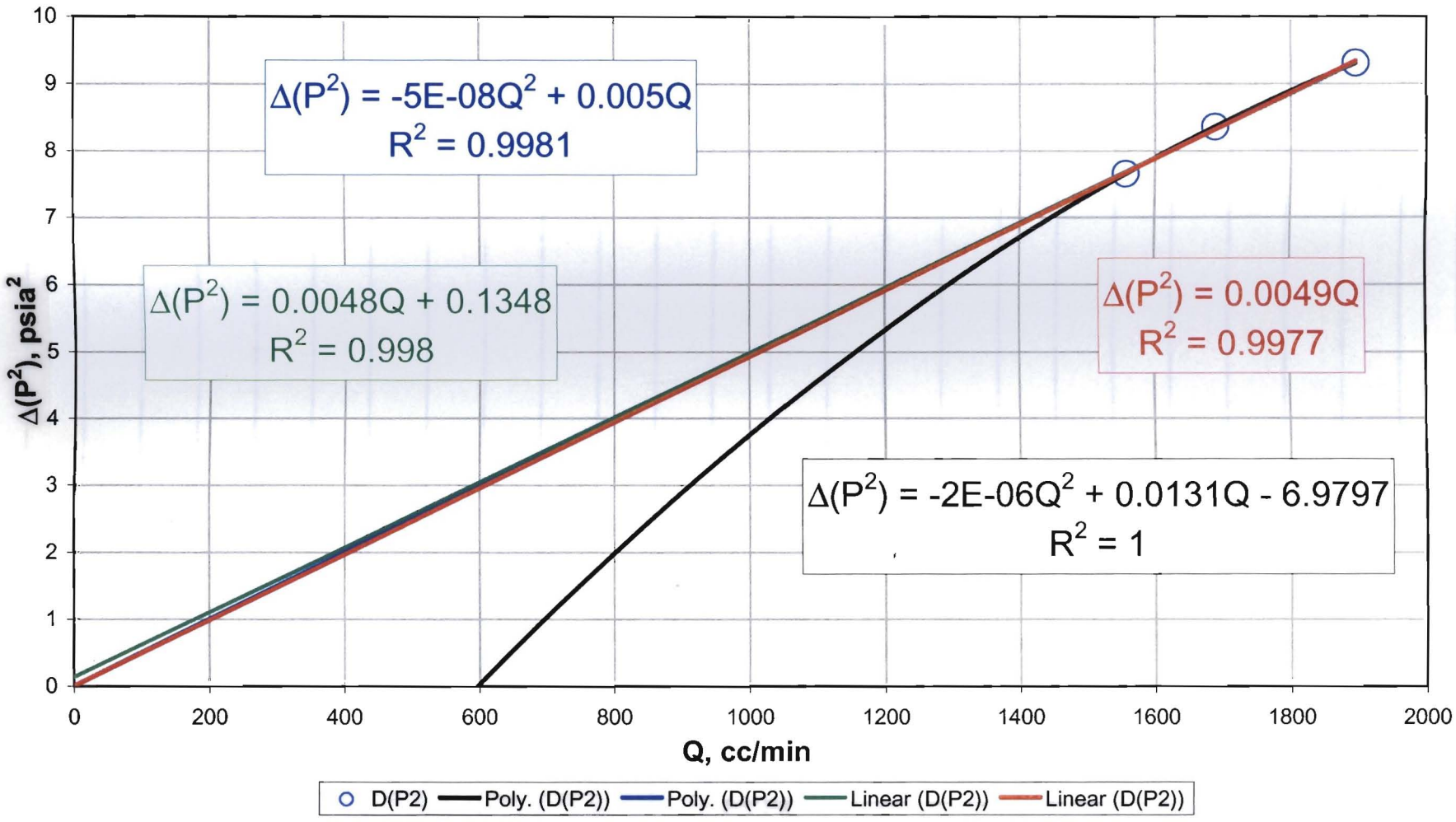
RNM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole -6



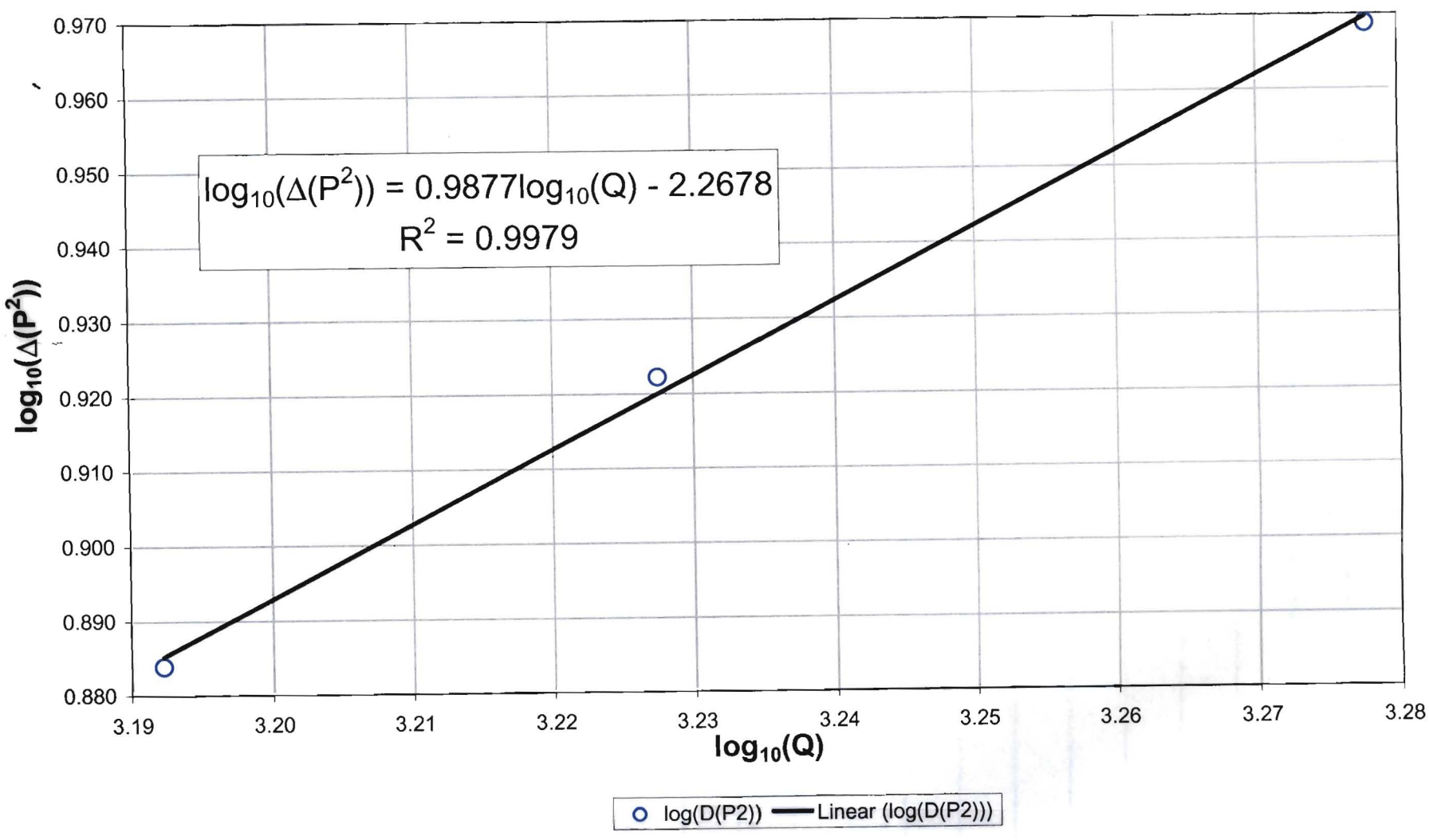
08/21/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole - 5



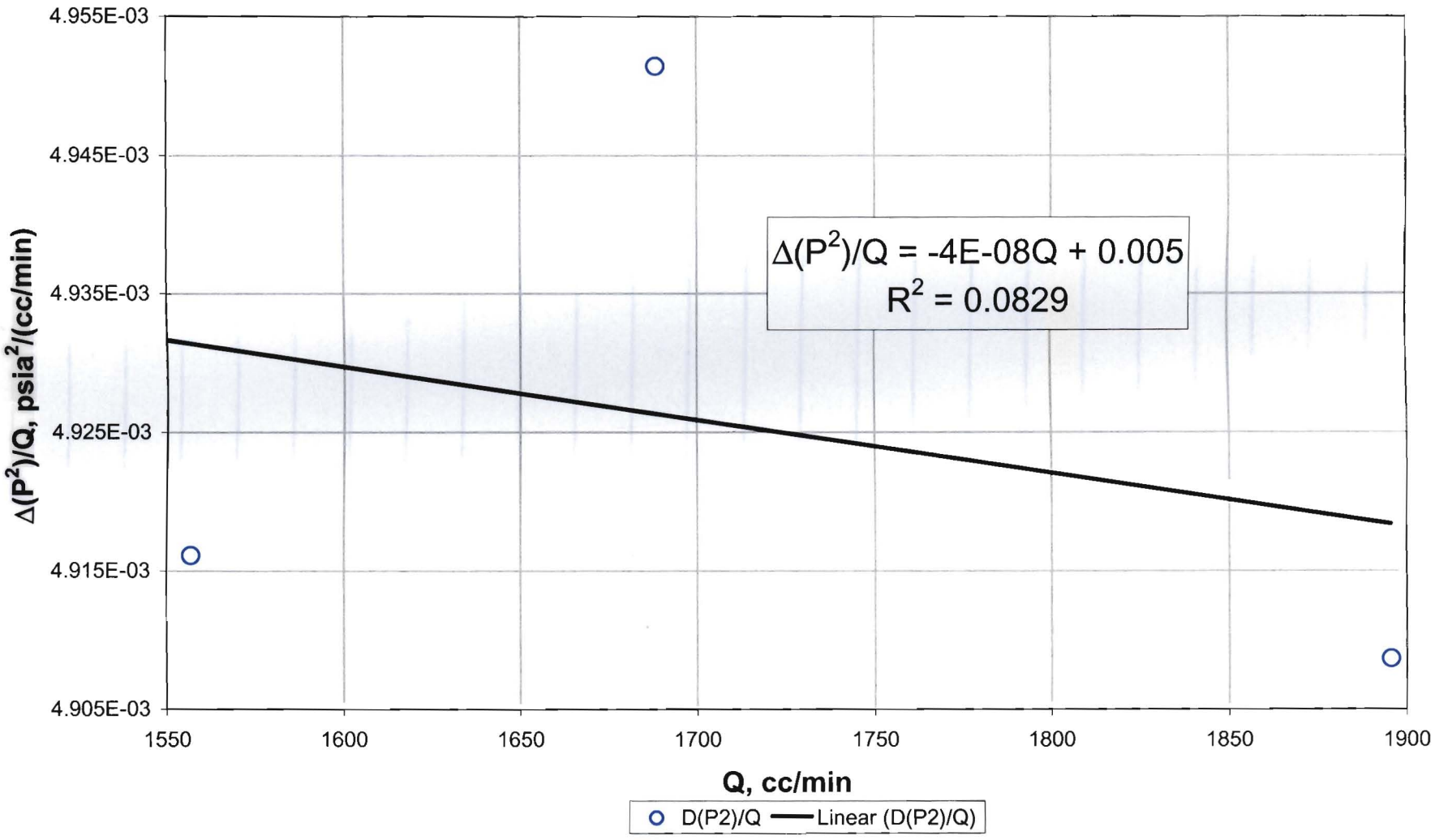
08/21/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole - 5



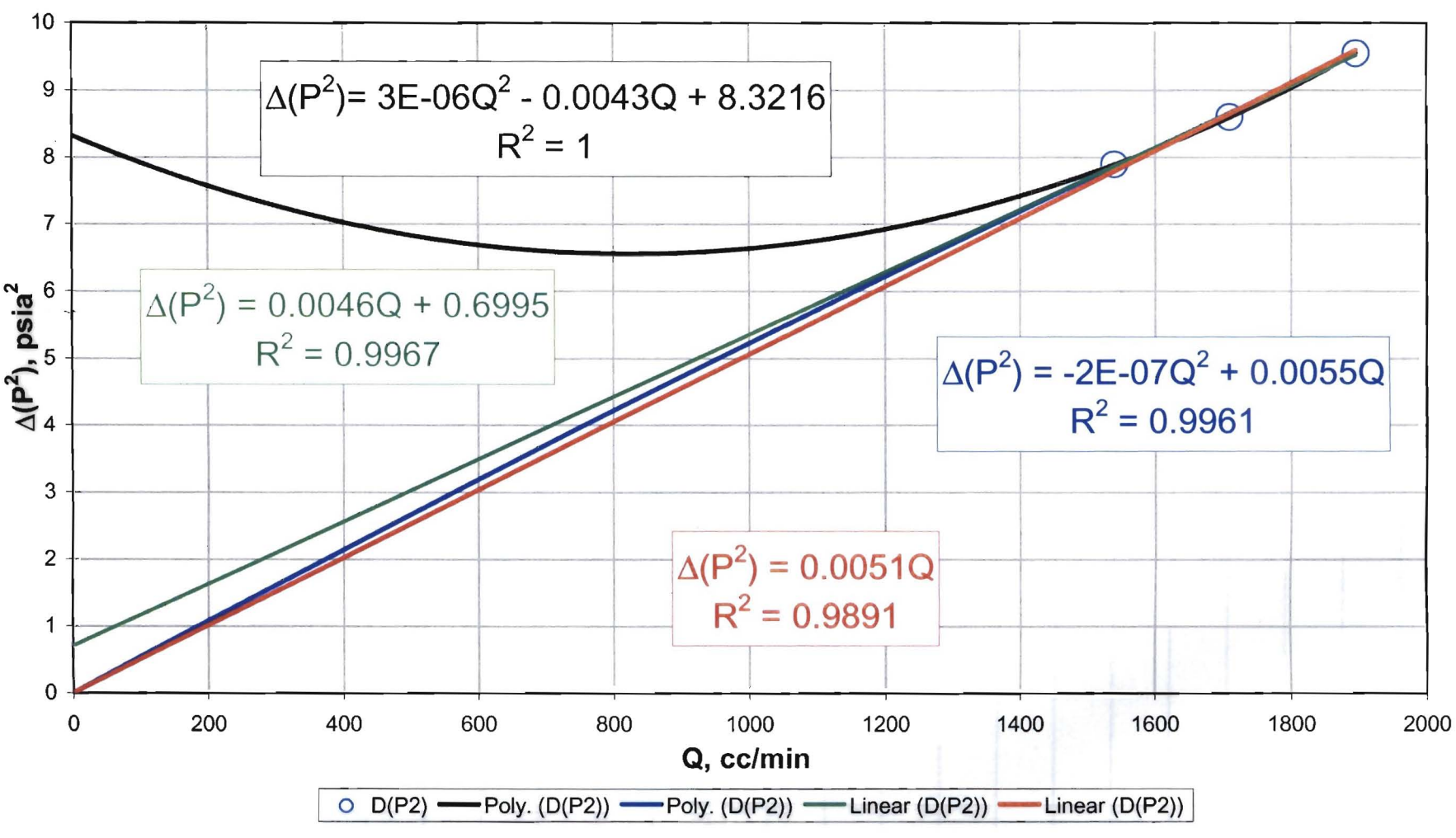
RWM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole - 5



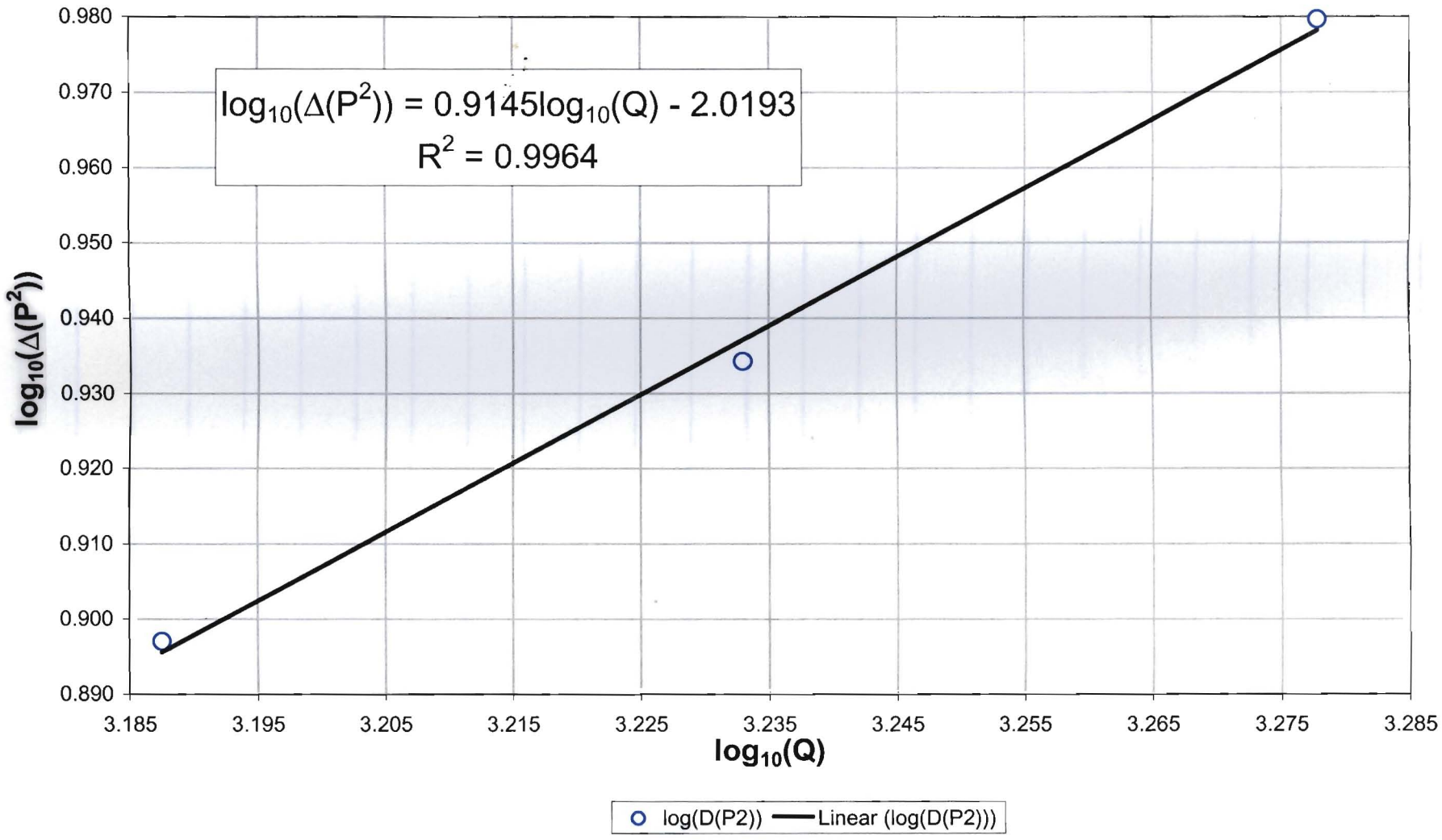
RWM, 08/31/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole - 4



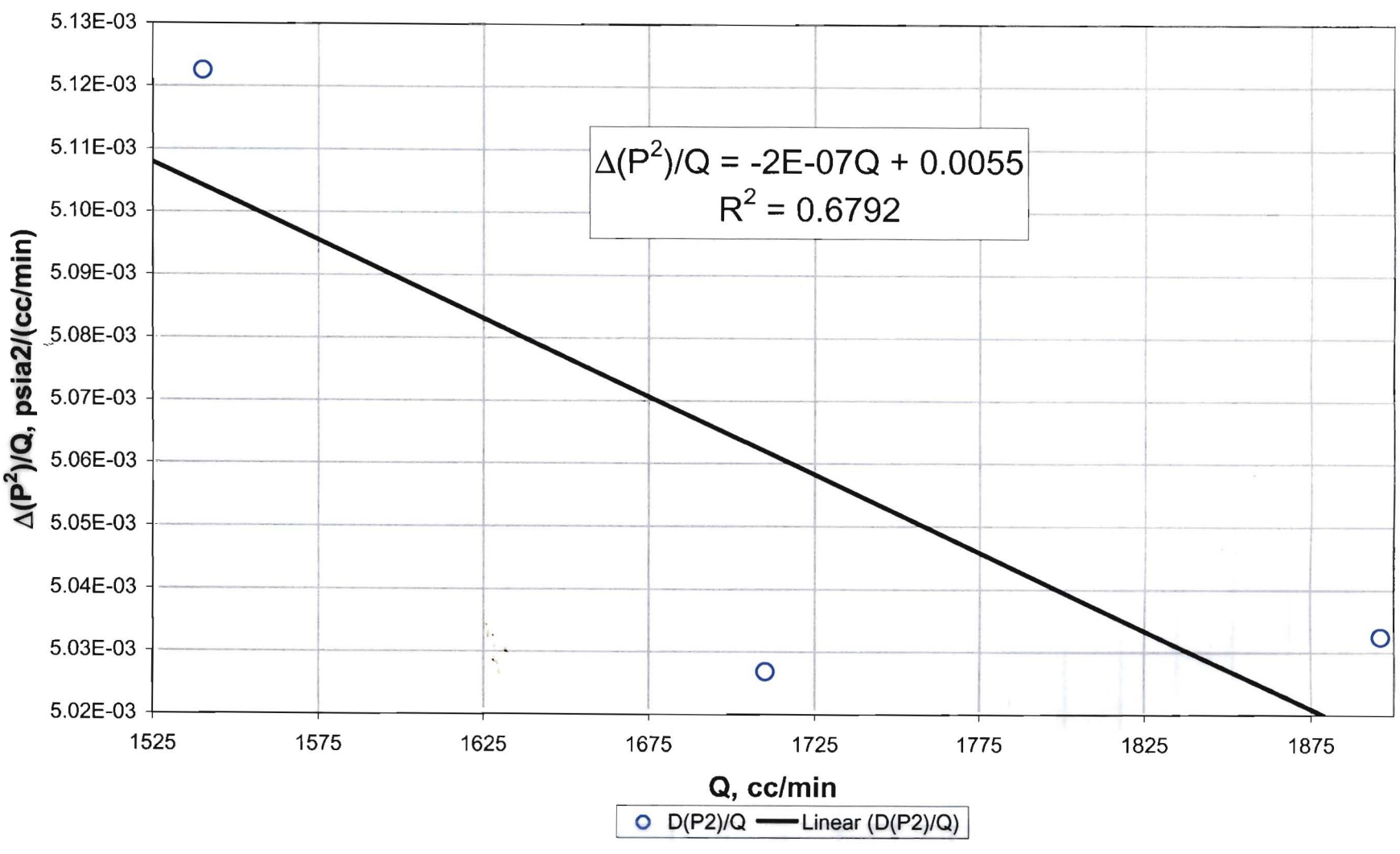
RWM, 08/21/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole - 4



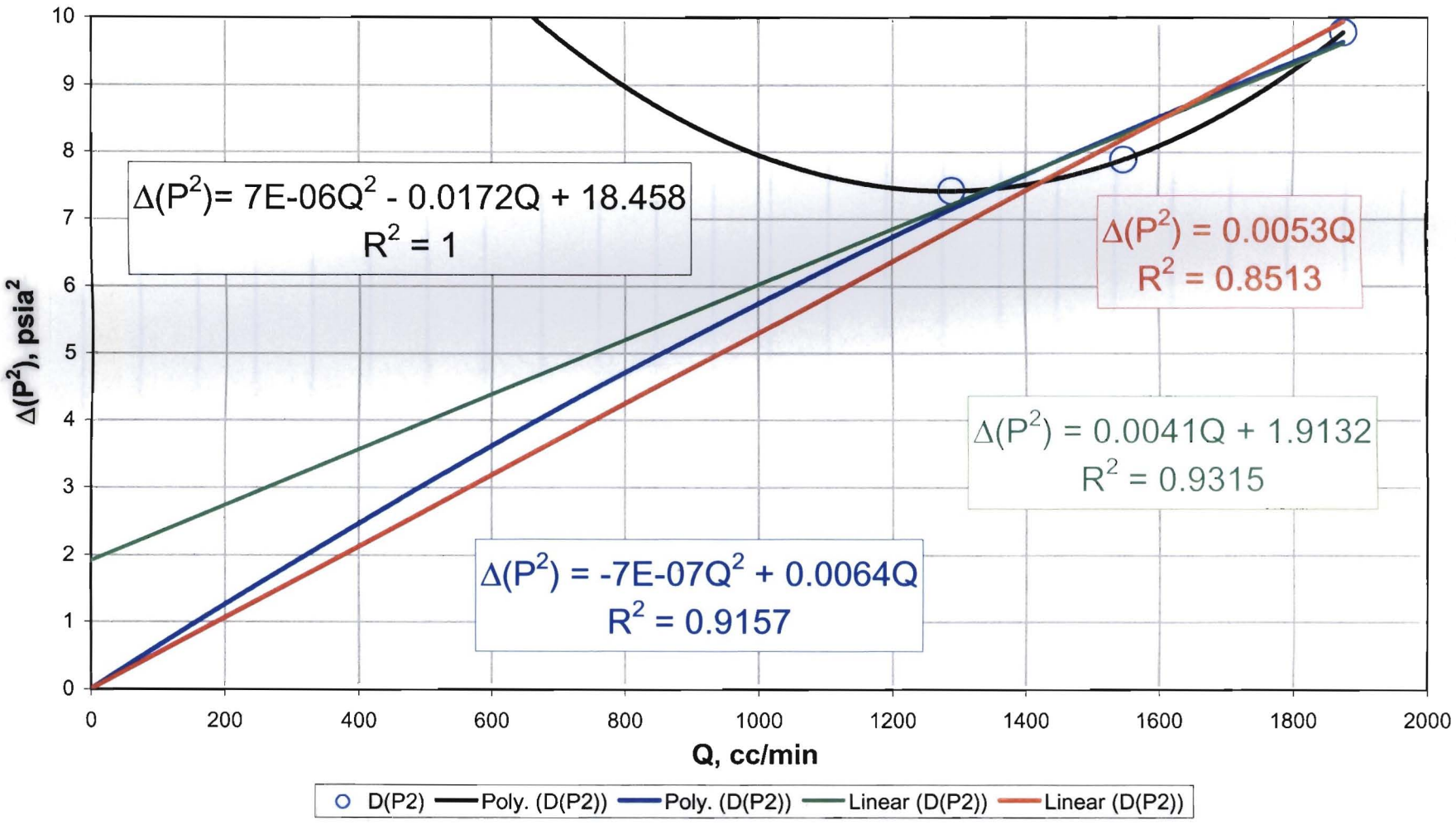
RWM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole - 4



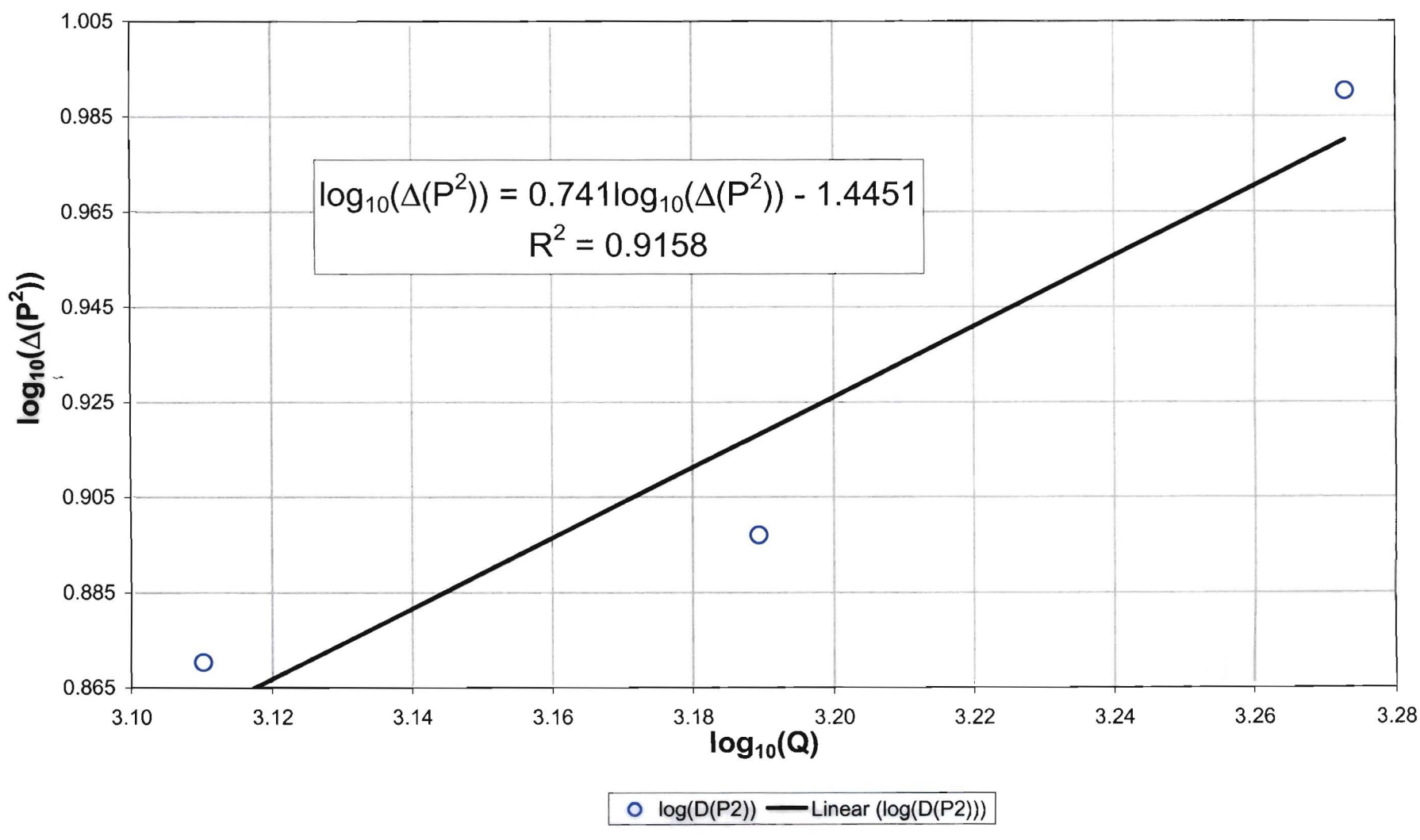
RNM, 08/21/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole -3



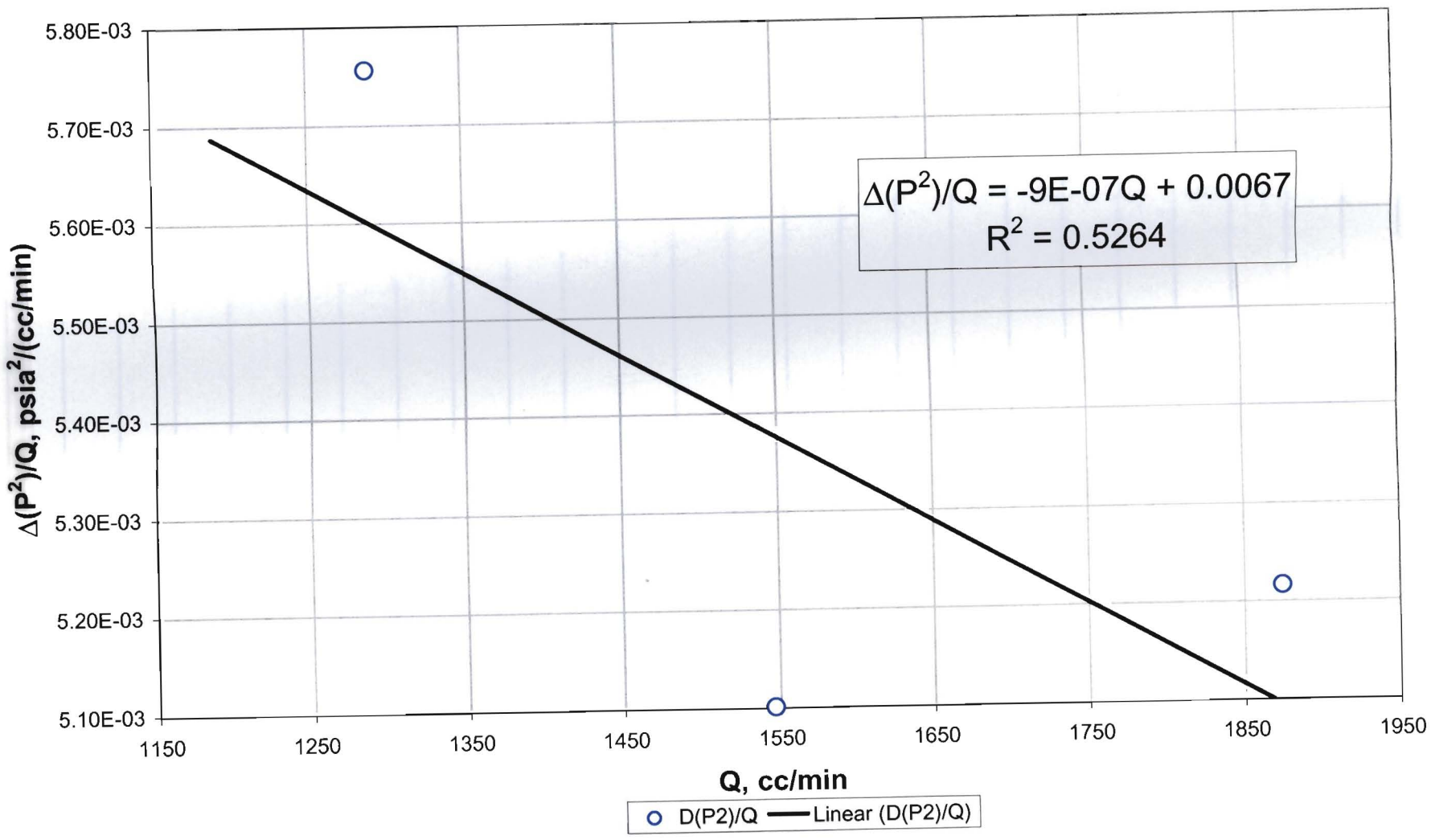
RNM, 08/21/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole -3



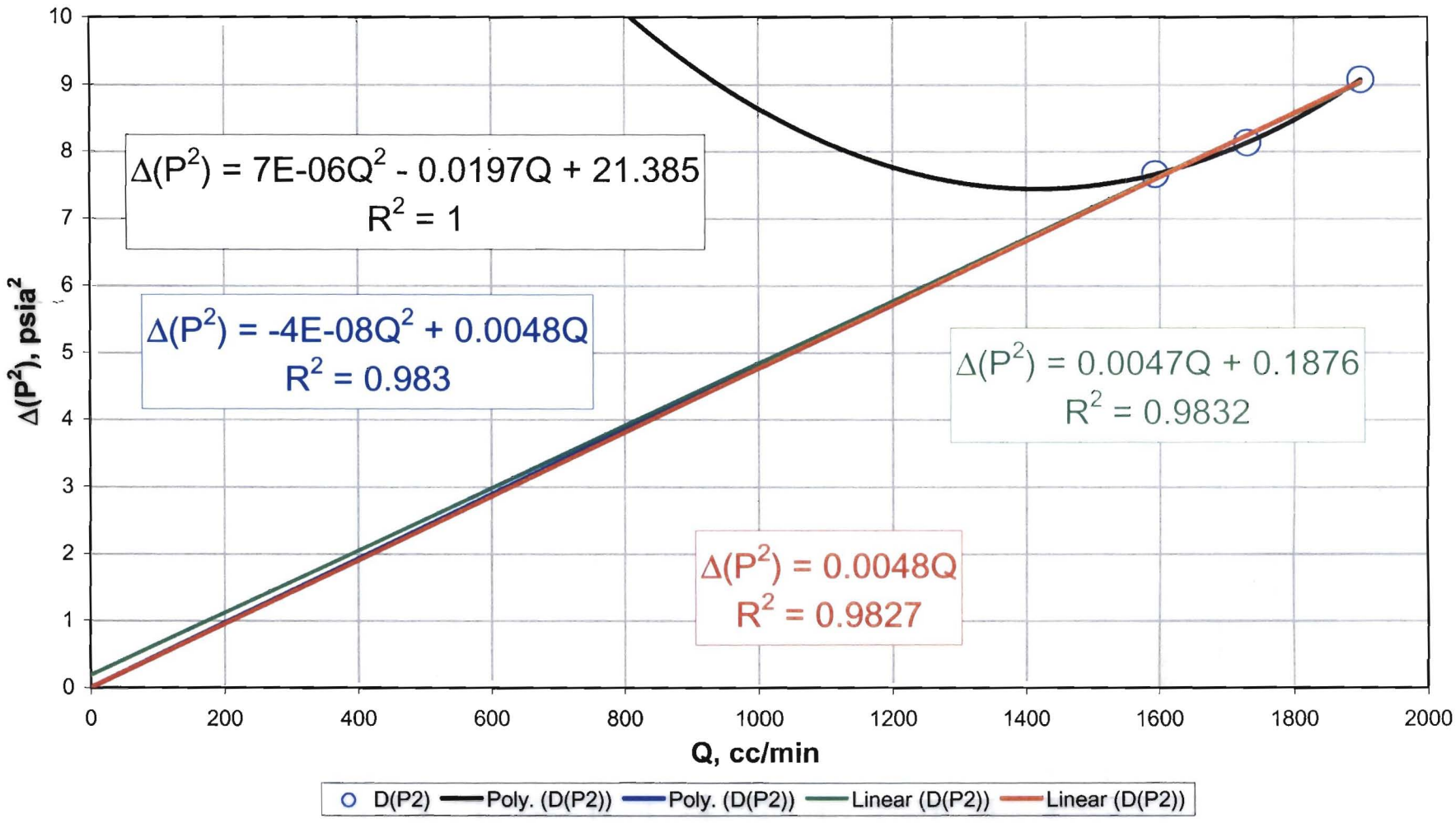
RNM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole - 3



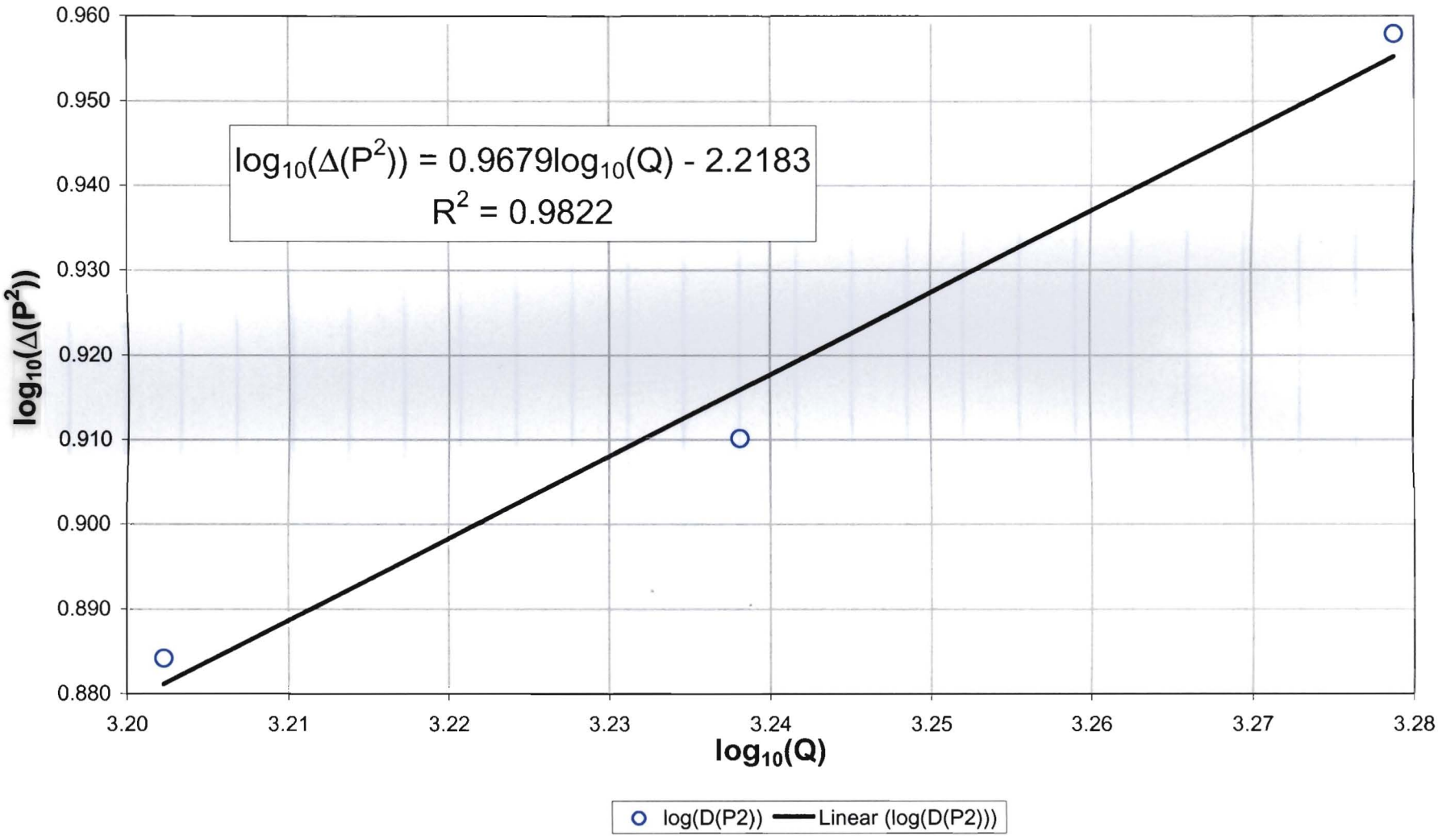
RNM, 08/21/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole - 2



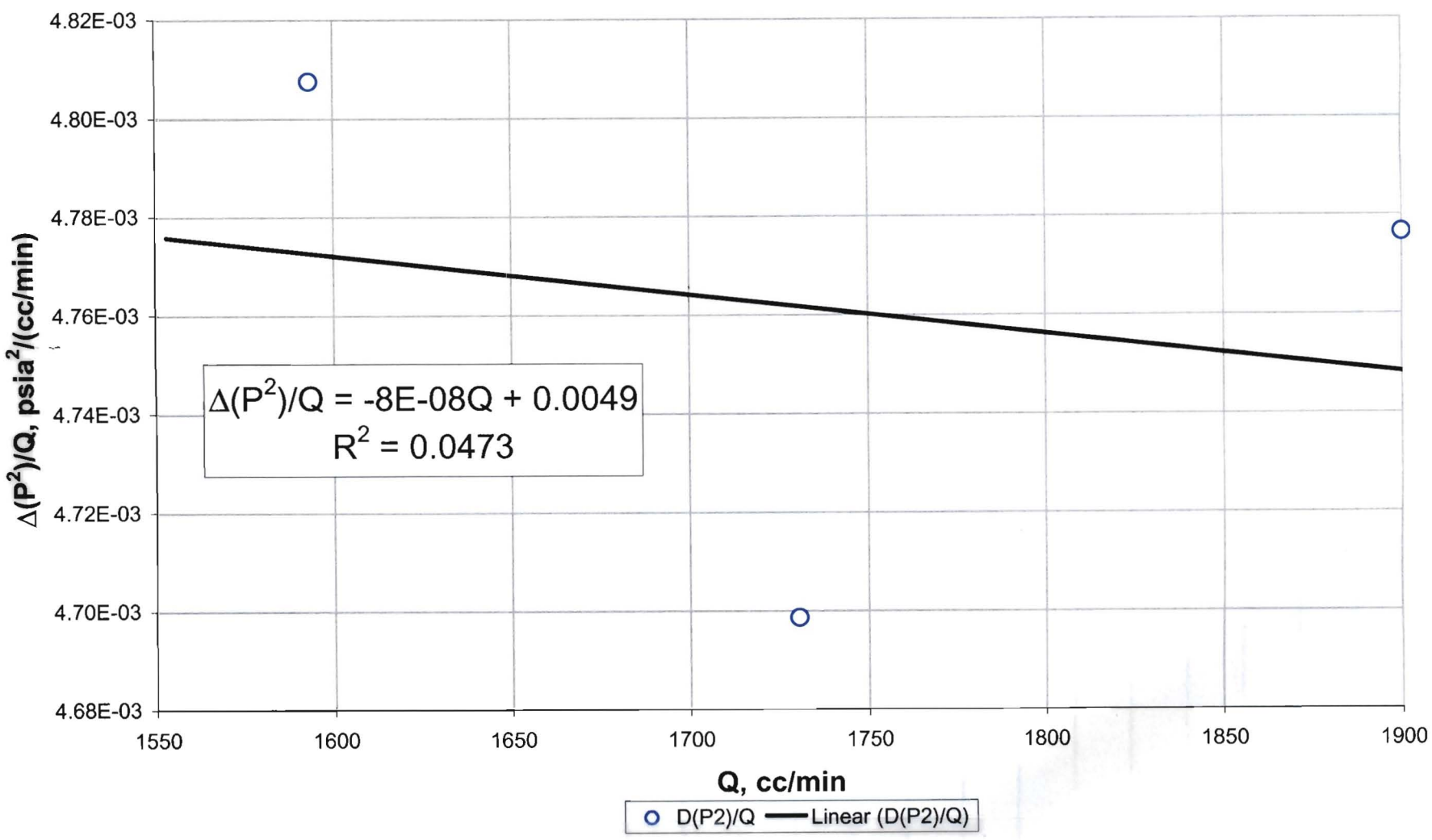
RWM, 08/21/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole - 2



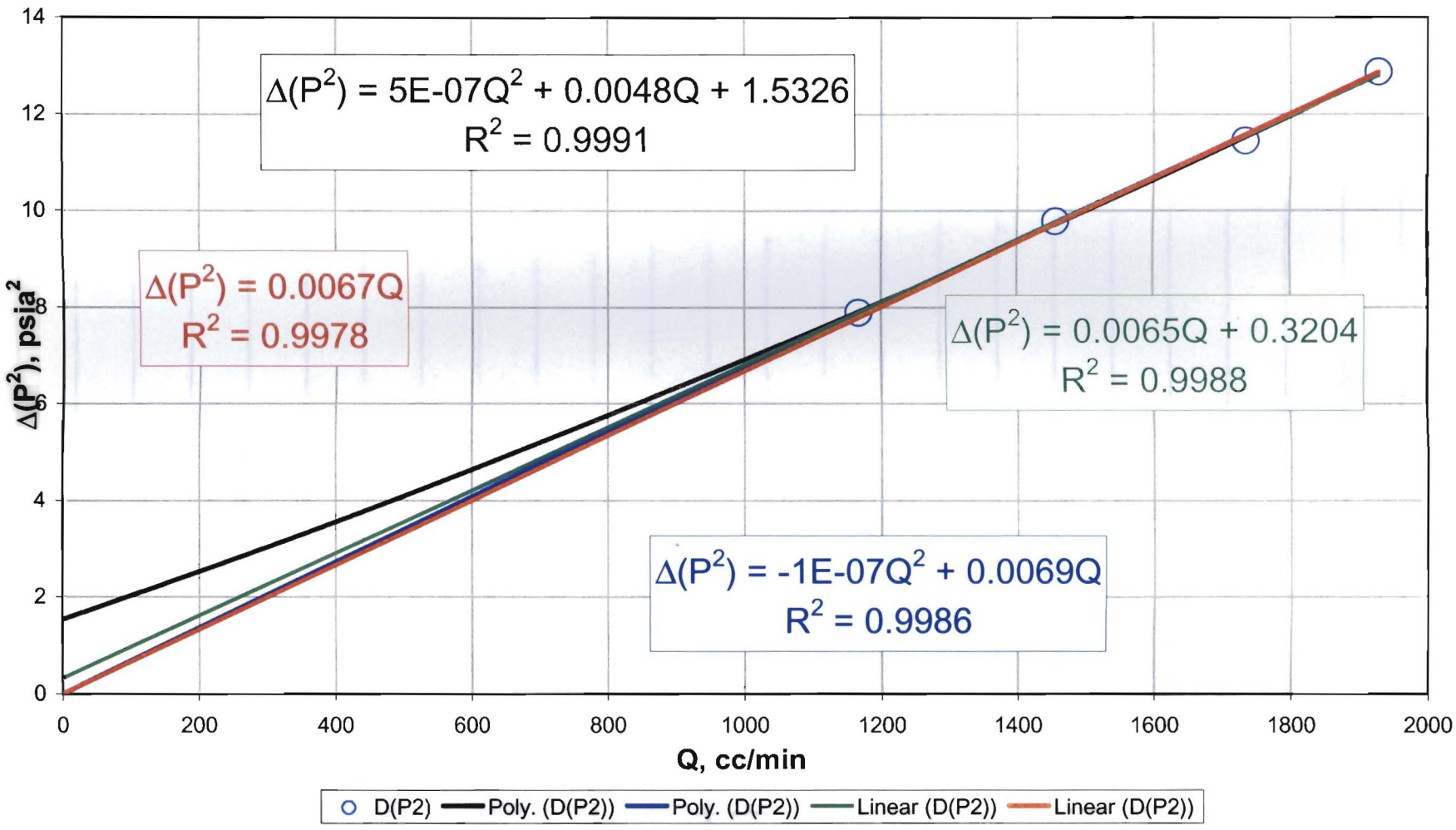
RWM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole - 2



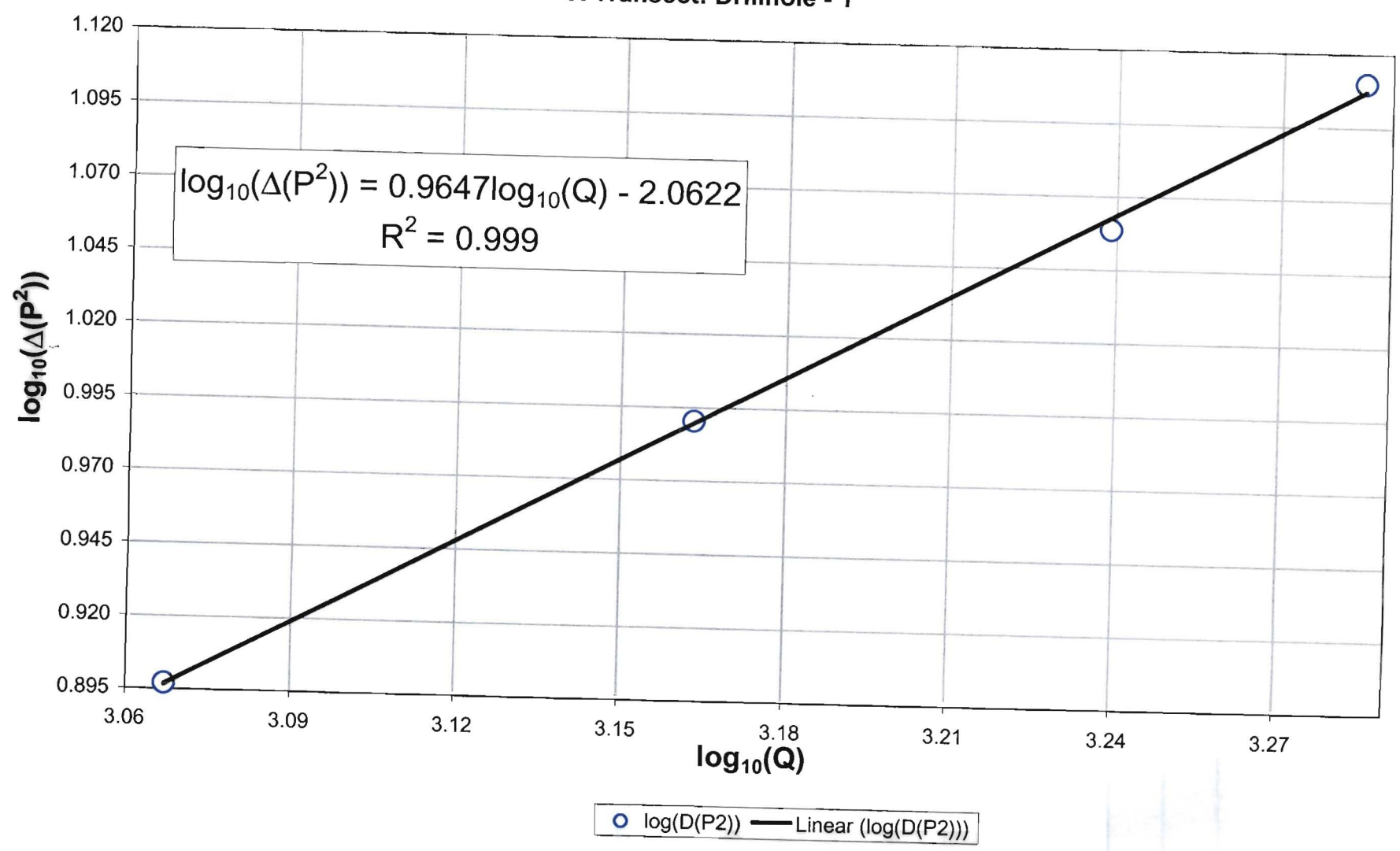
RNM, 08/21/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole -1



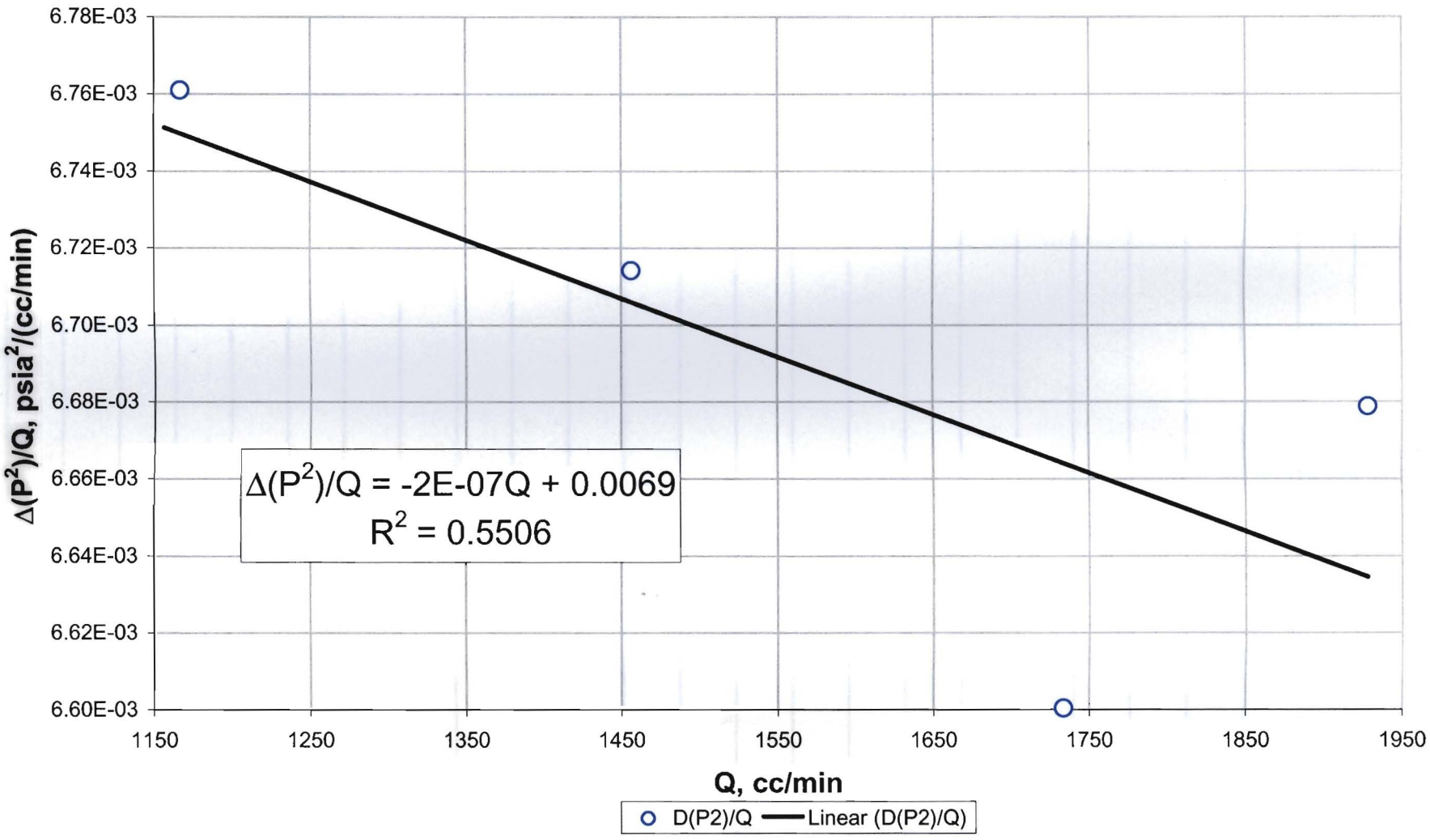
RNM, 08/21/02

Log-Log plot of differential pressures squared vs. flowrate-used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole - 1



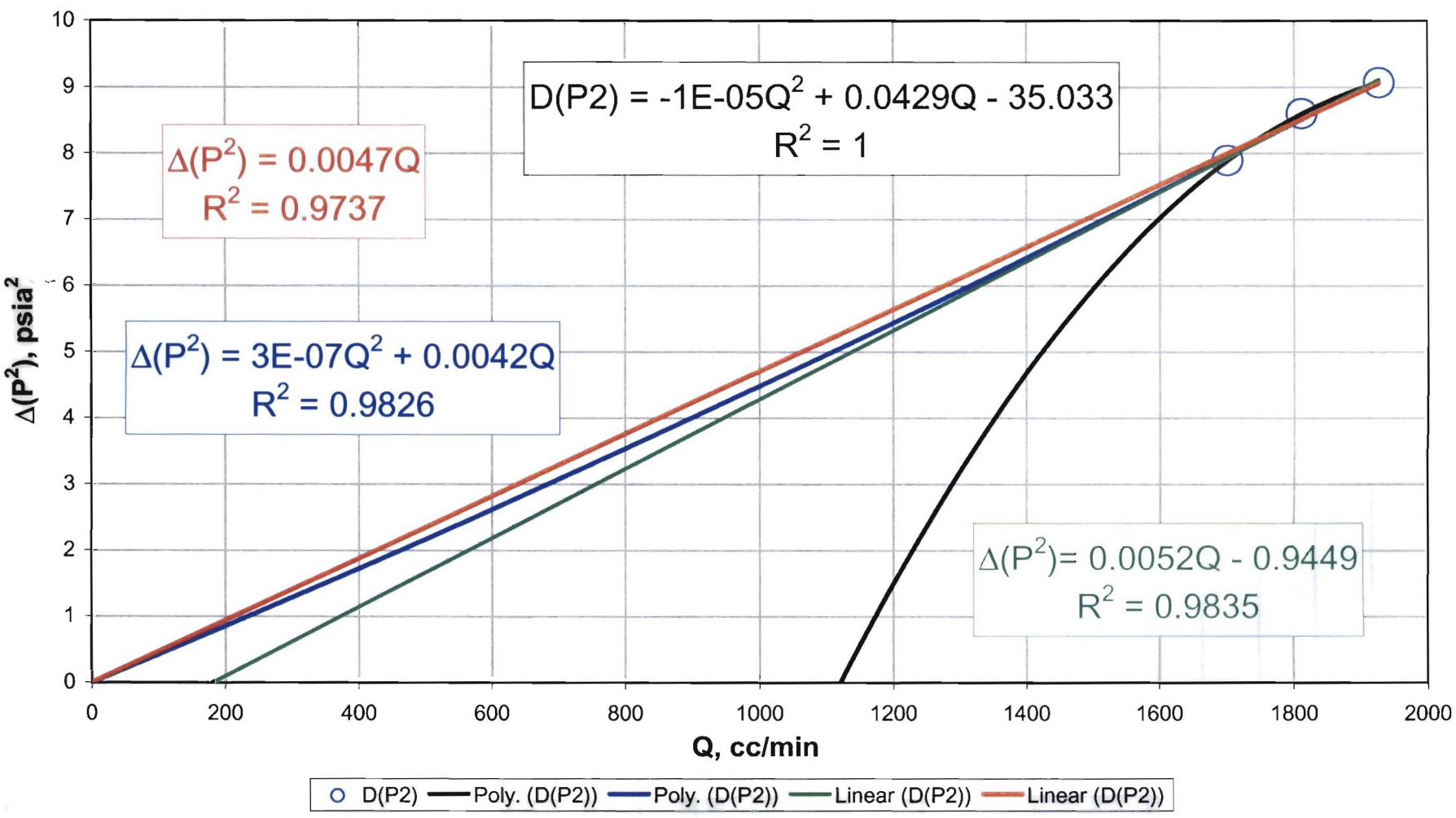
RWM, 08/21/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole -1



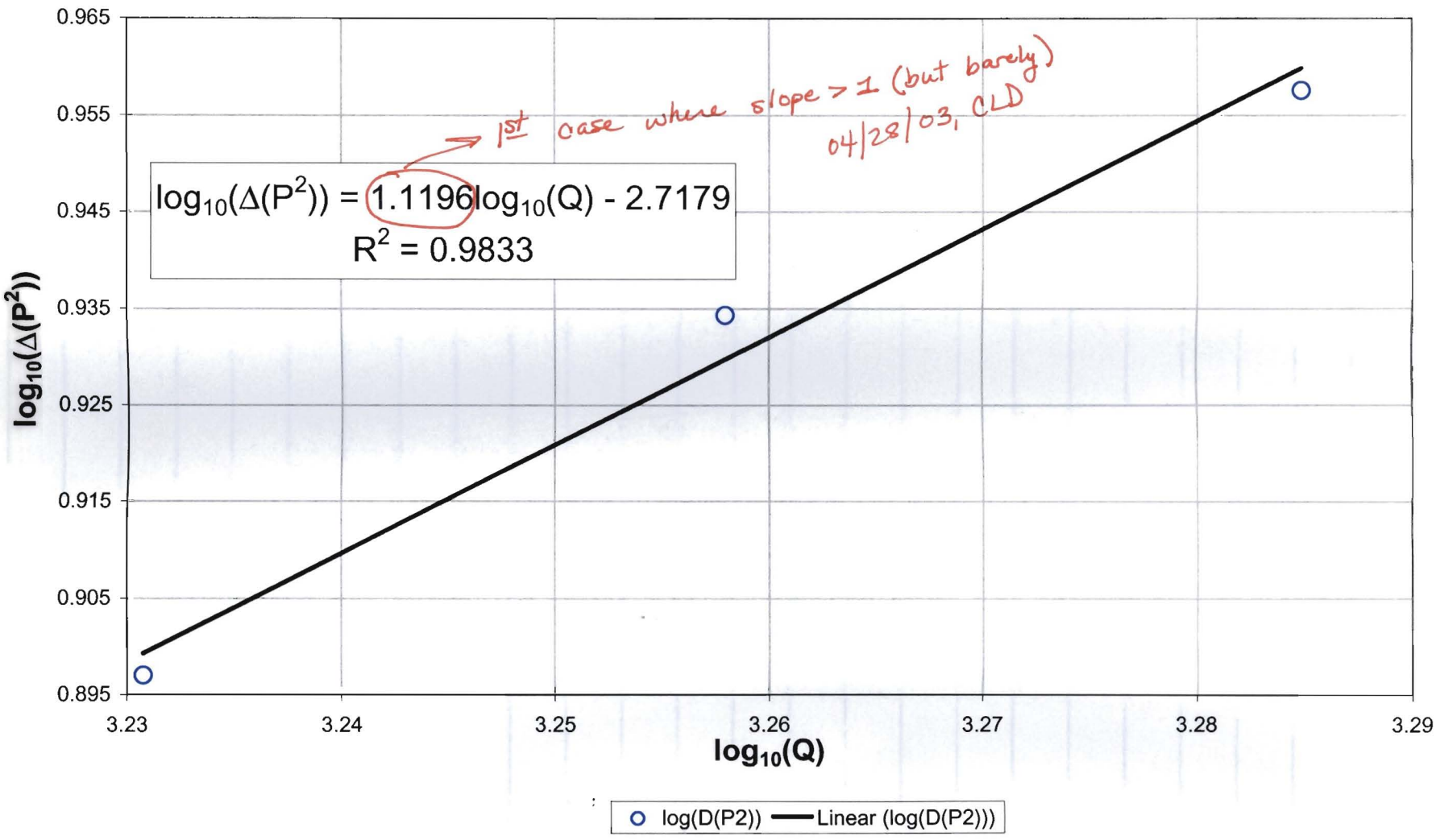
RWM, 08/21/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 0

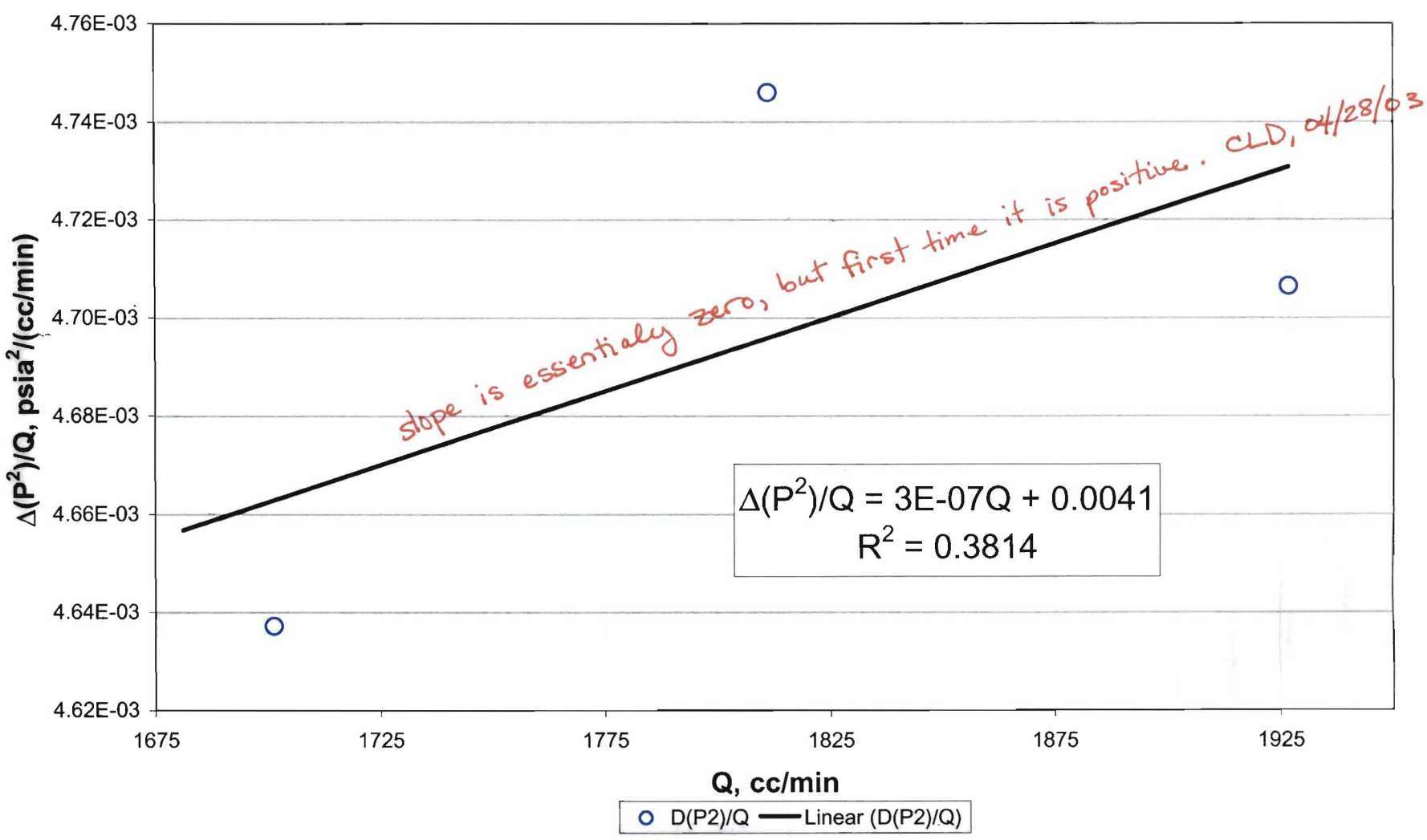


RWM, 08/21/02

Log-Log plot of differential pressures squared vs. flowrate-used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 0



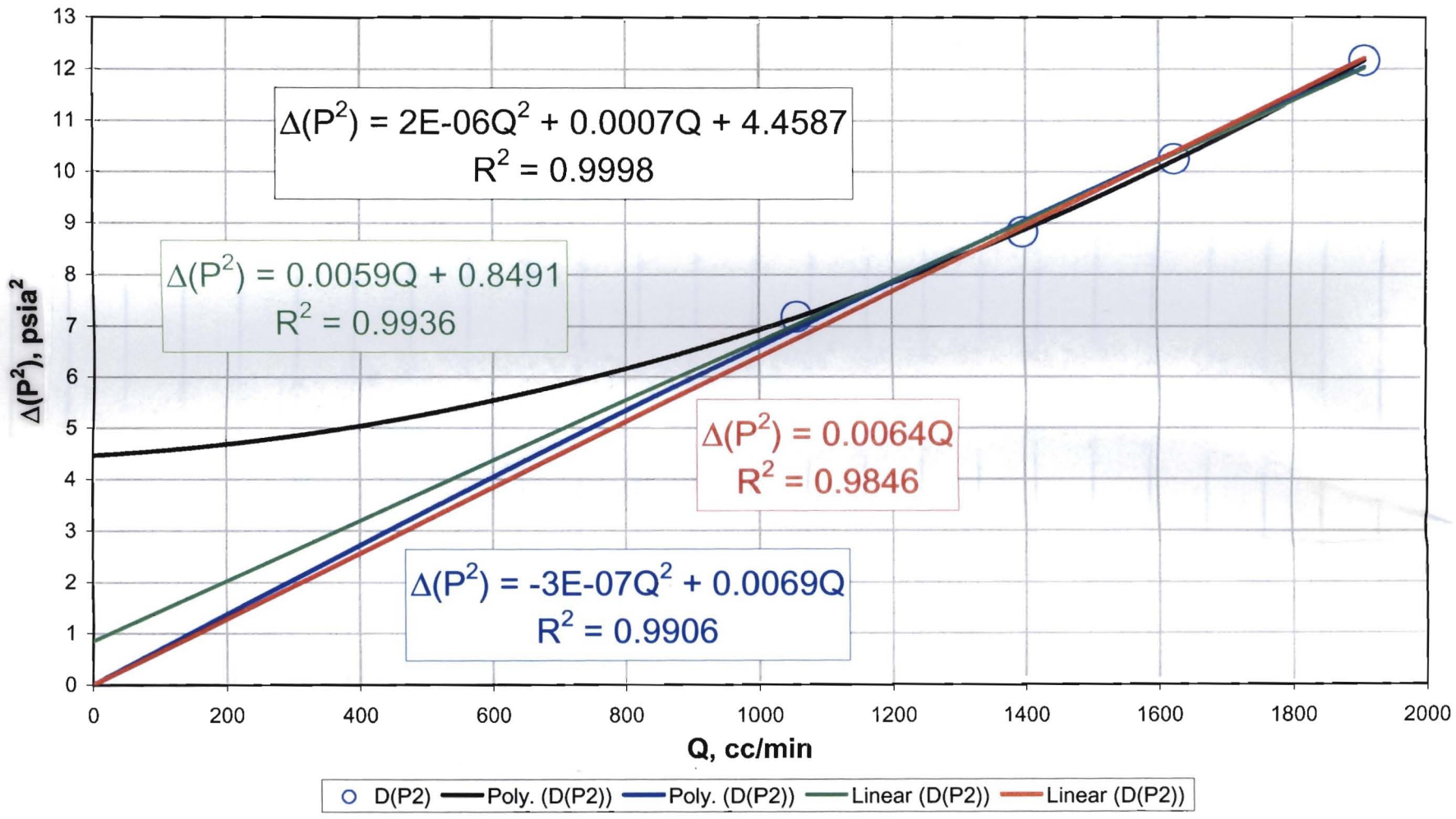
Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 0



RWM, 08/21/02

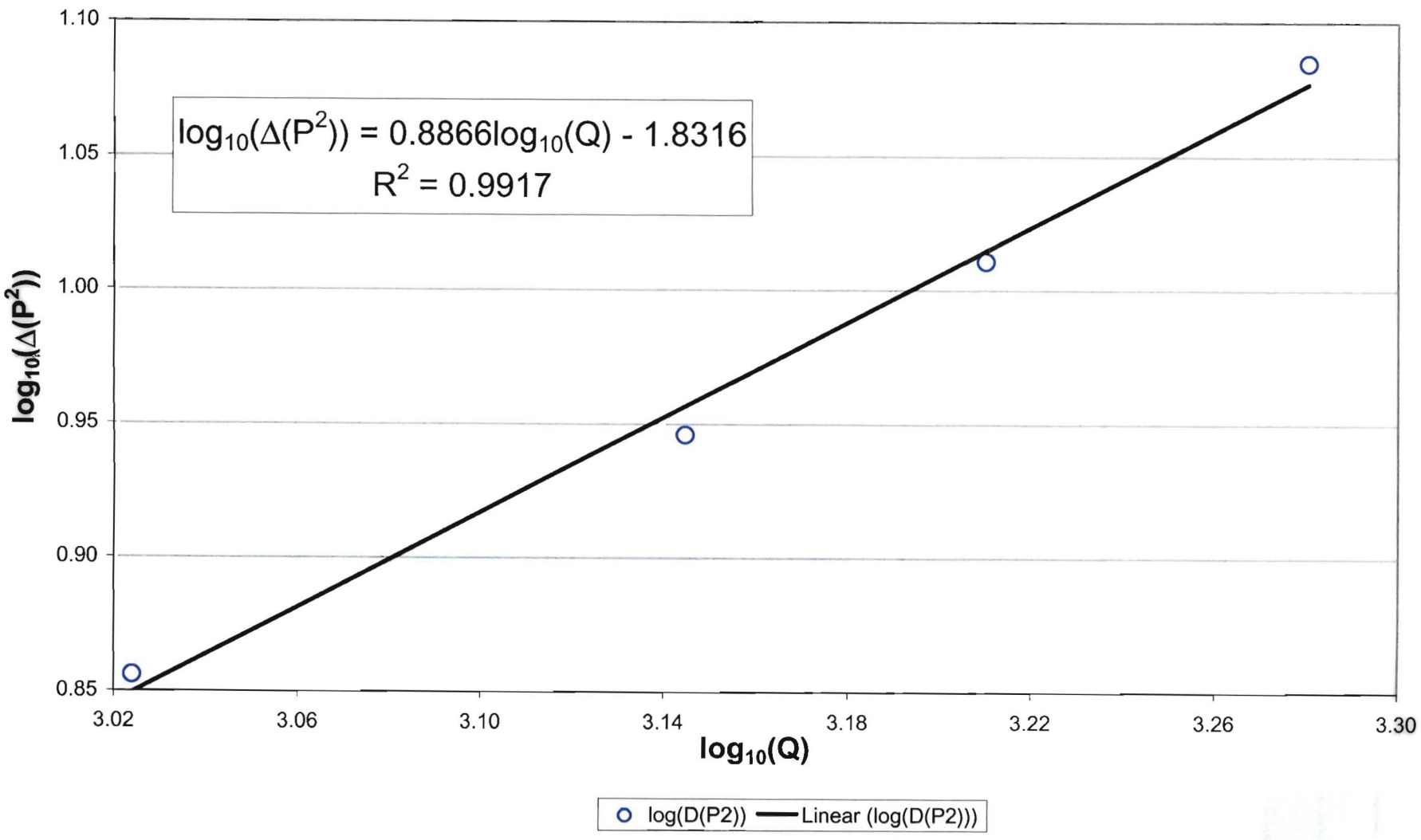
RWM, 08/22/08

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 1



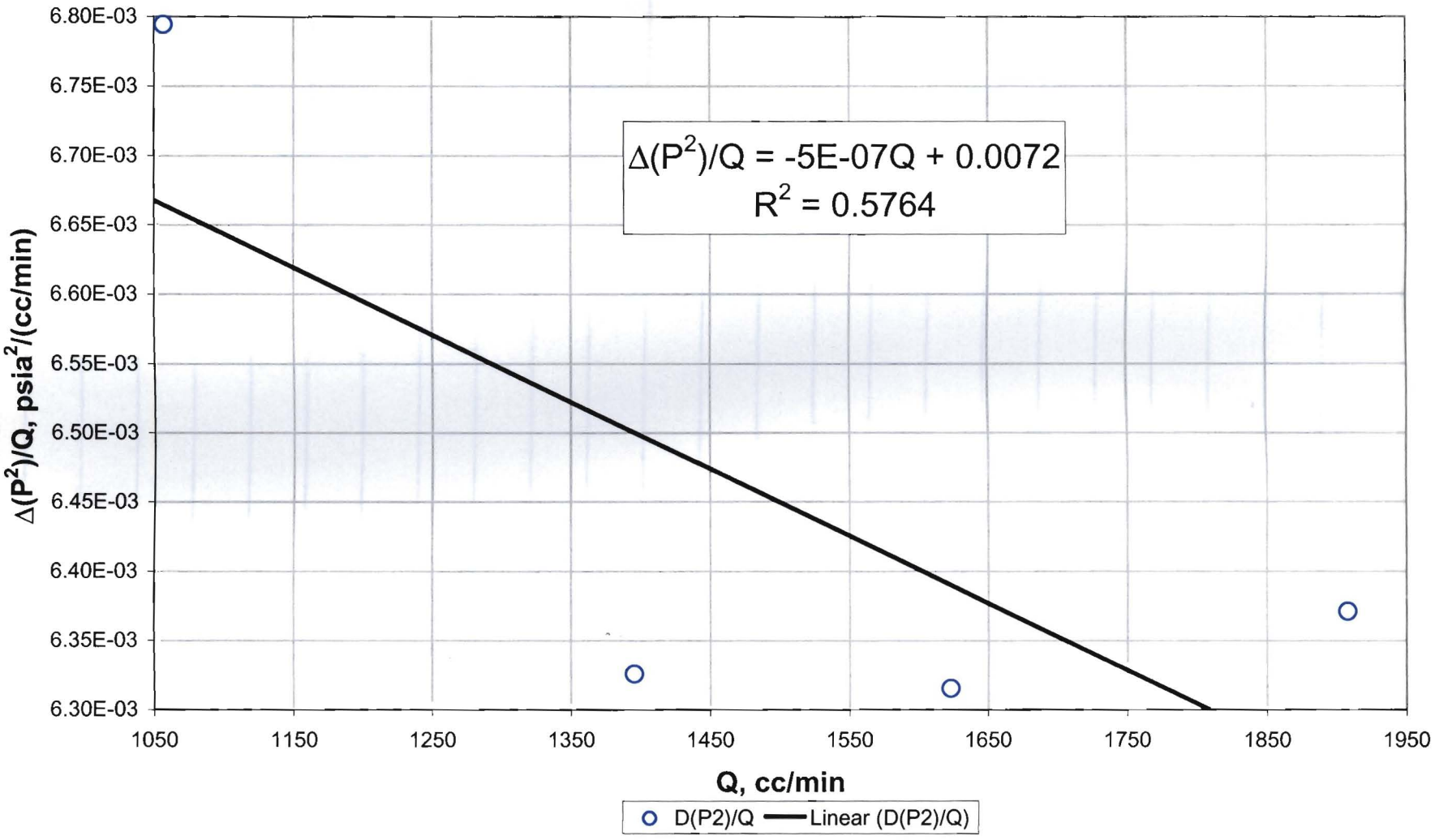
RWM, 08/22/08

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 1



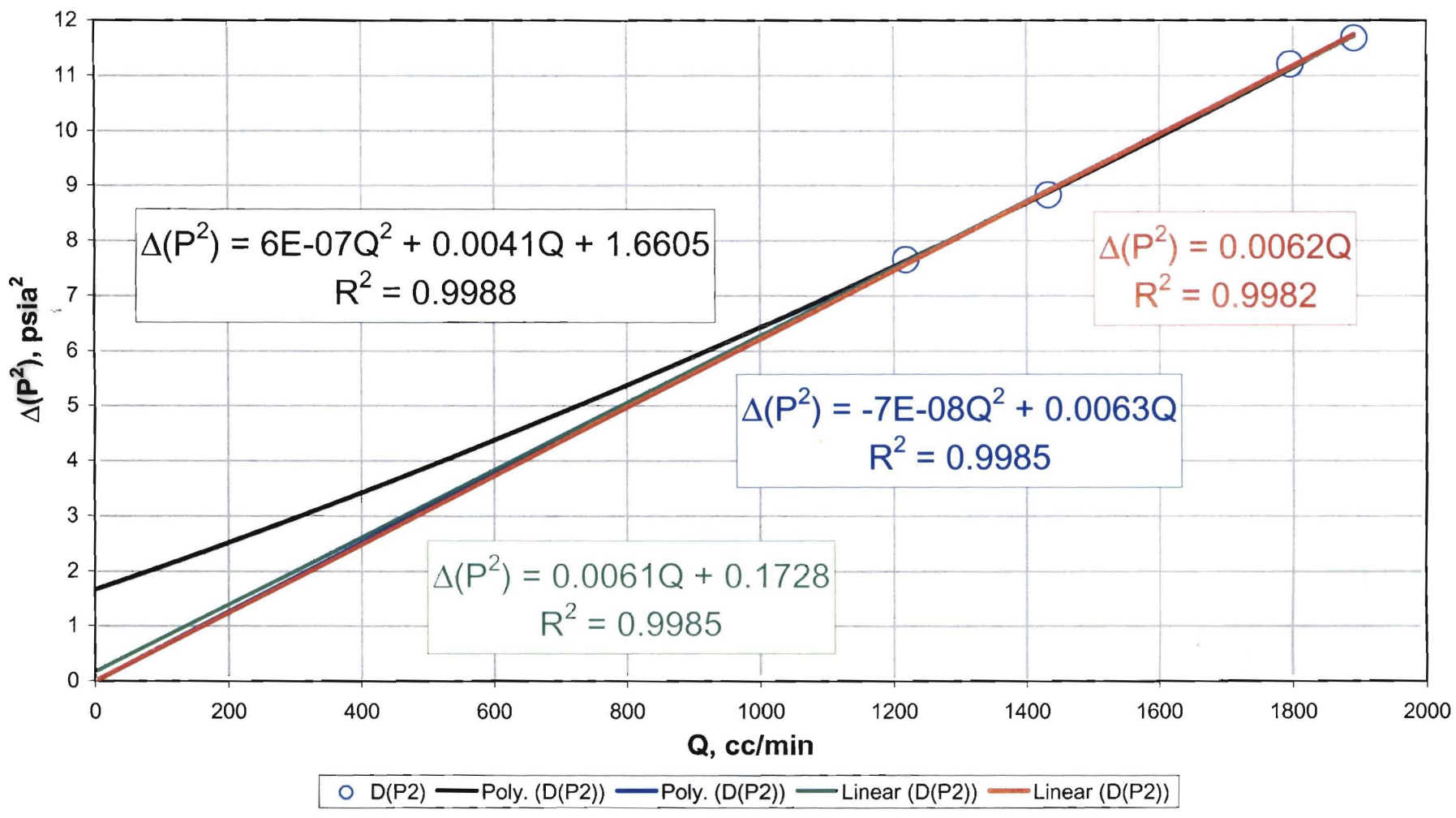
RWM, 08/22/03

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 1



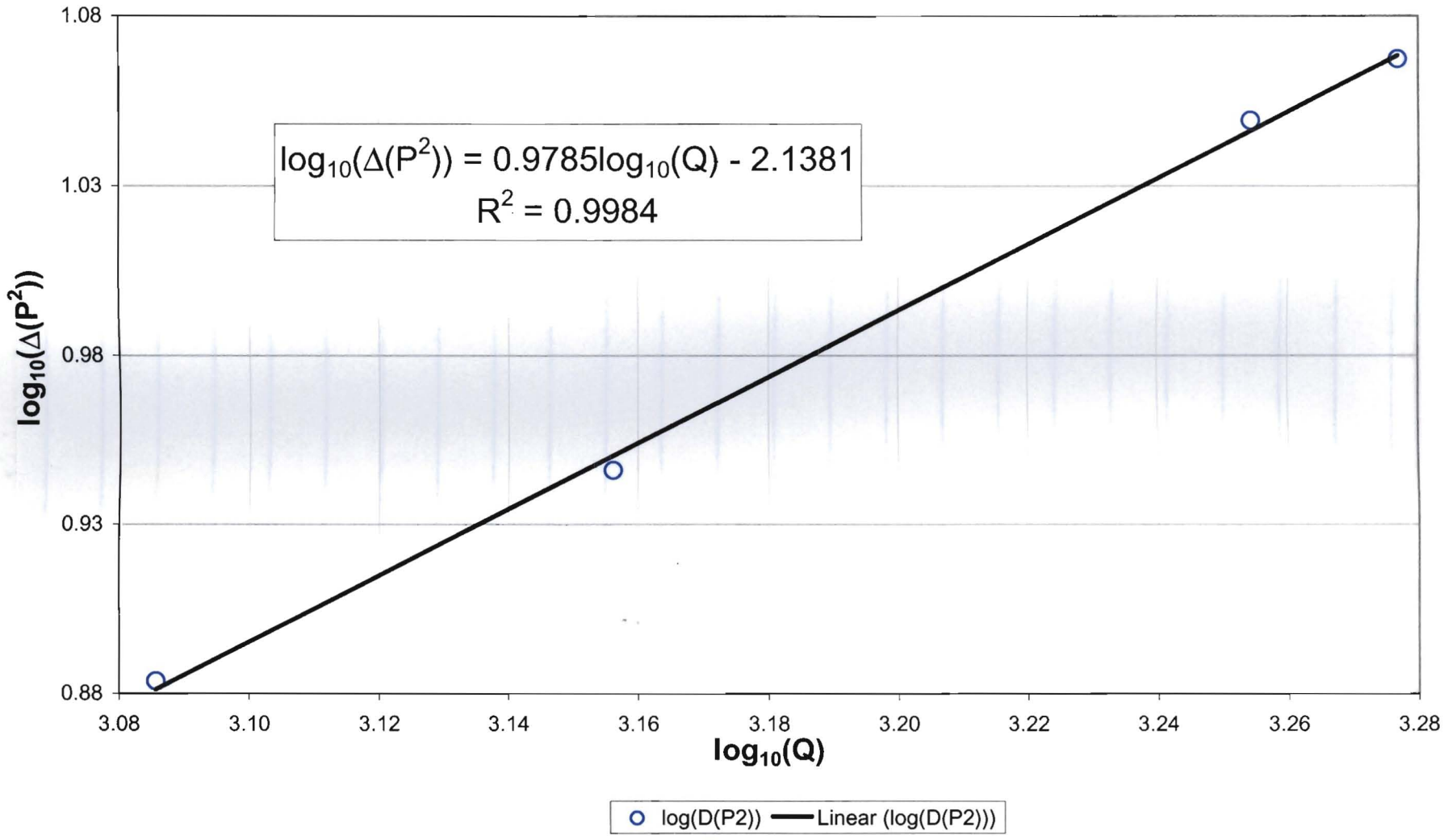
RWM, 08/22/03

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 2



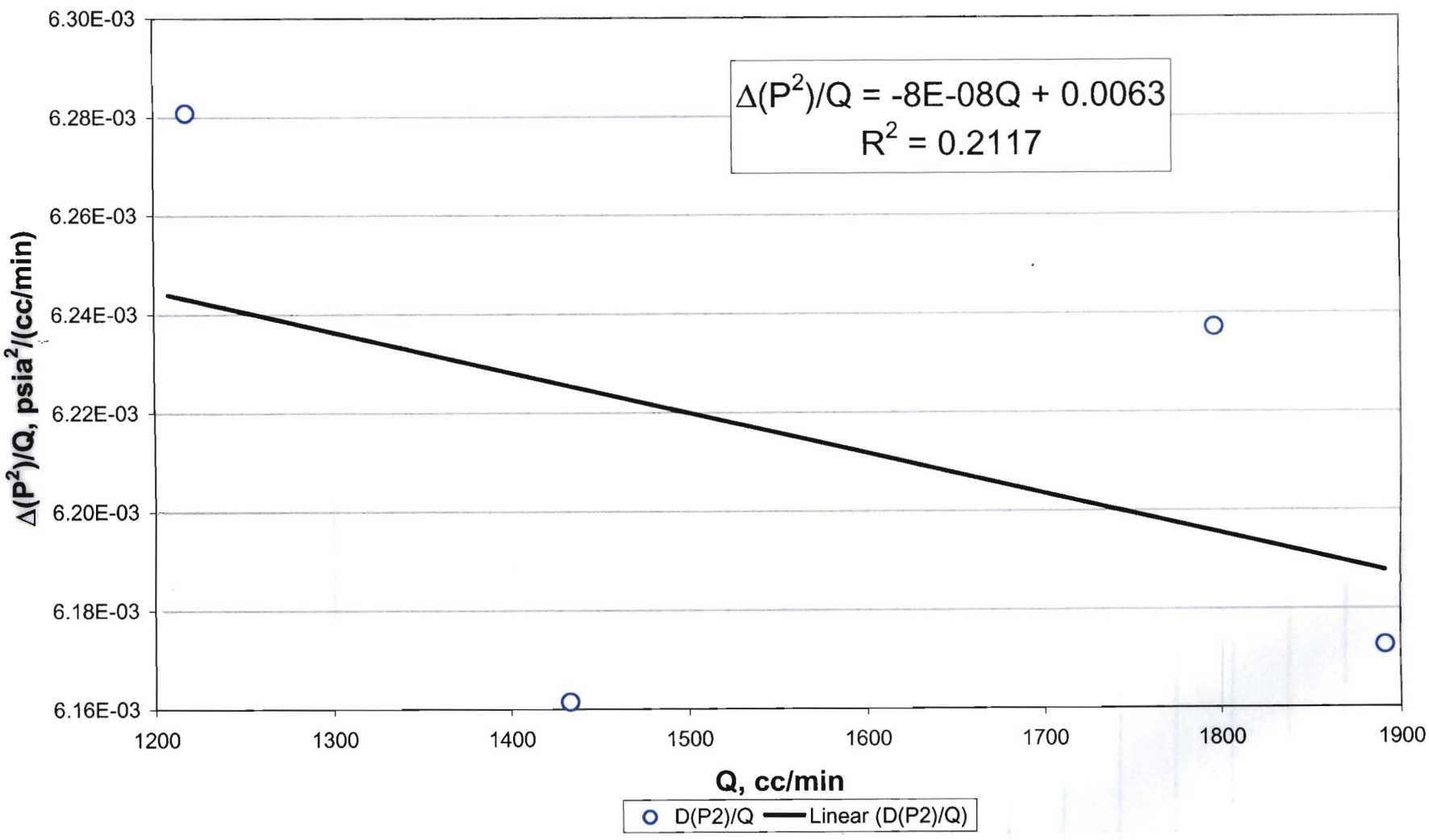
RNM, 08/22/08

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 2



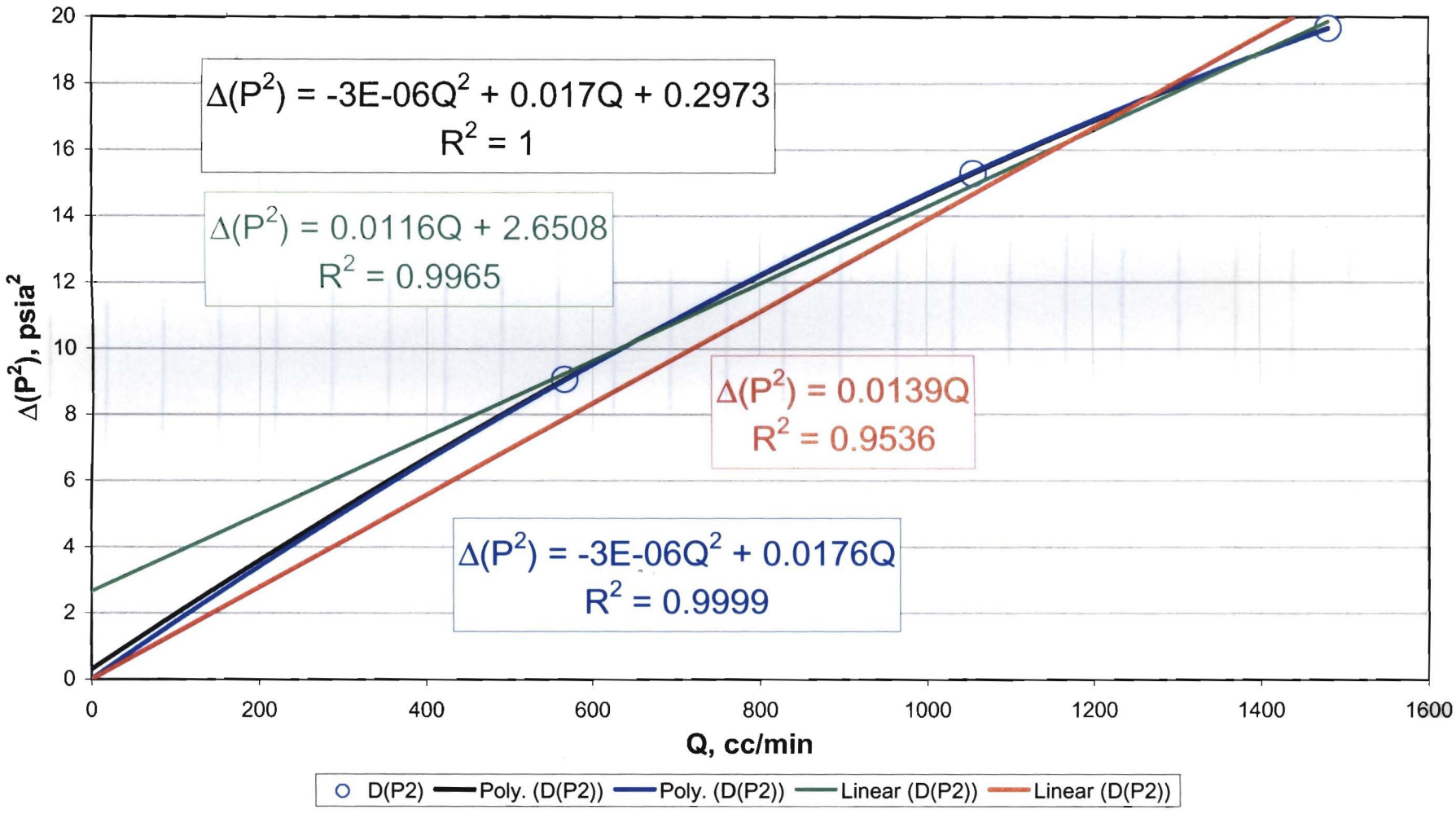
RNM, 08/22/08

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 2



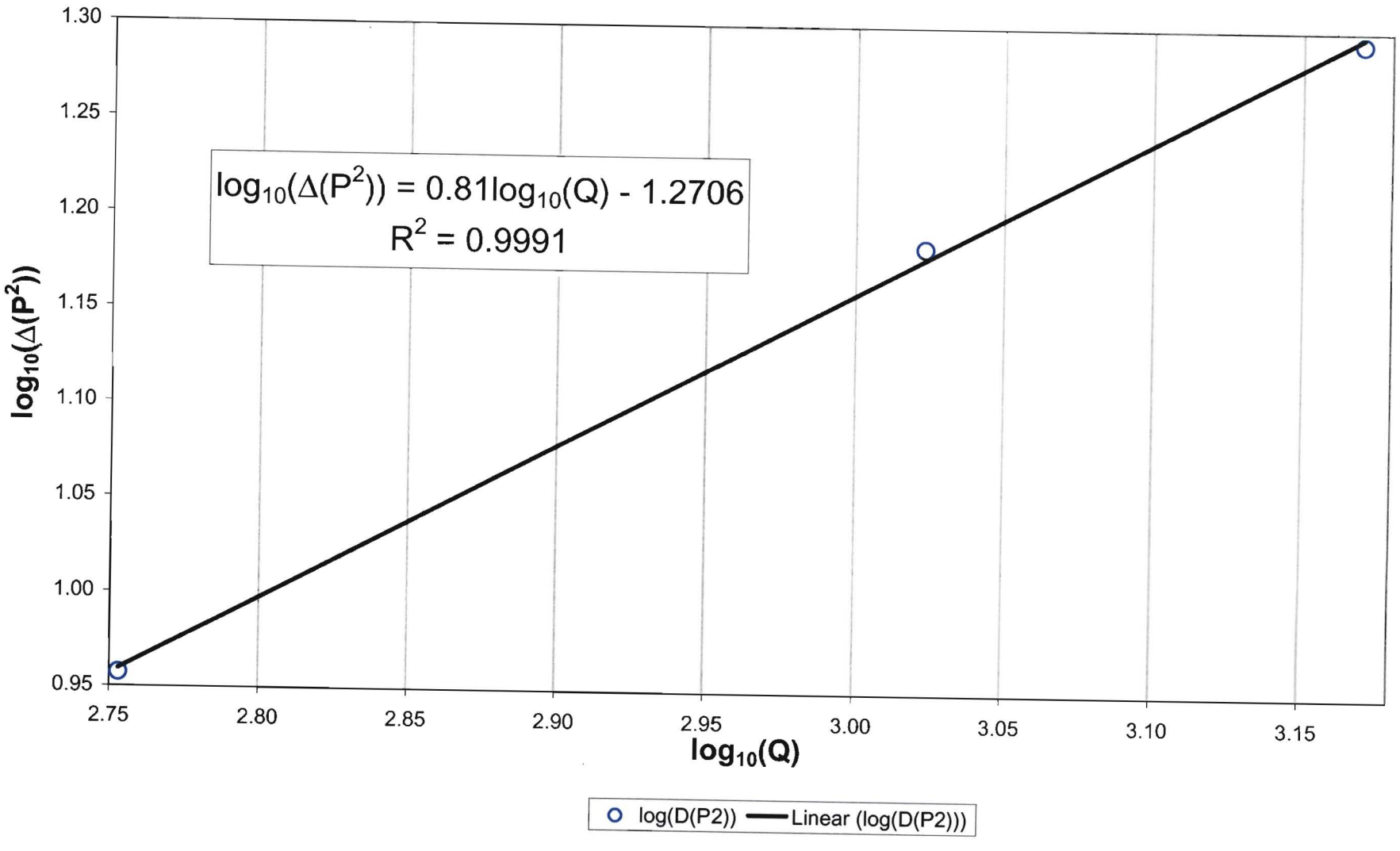
RWM, 08/22/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 3



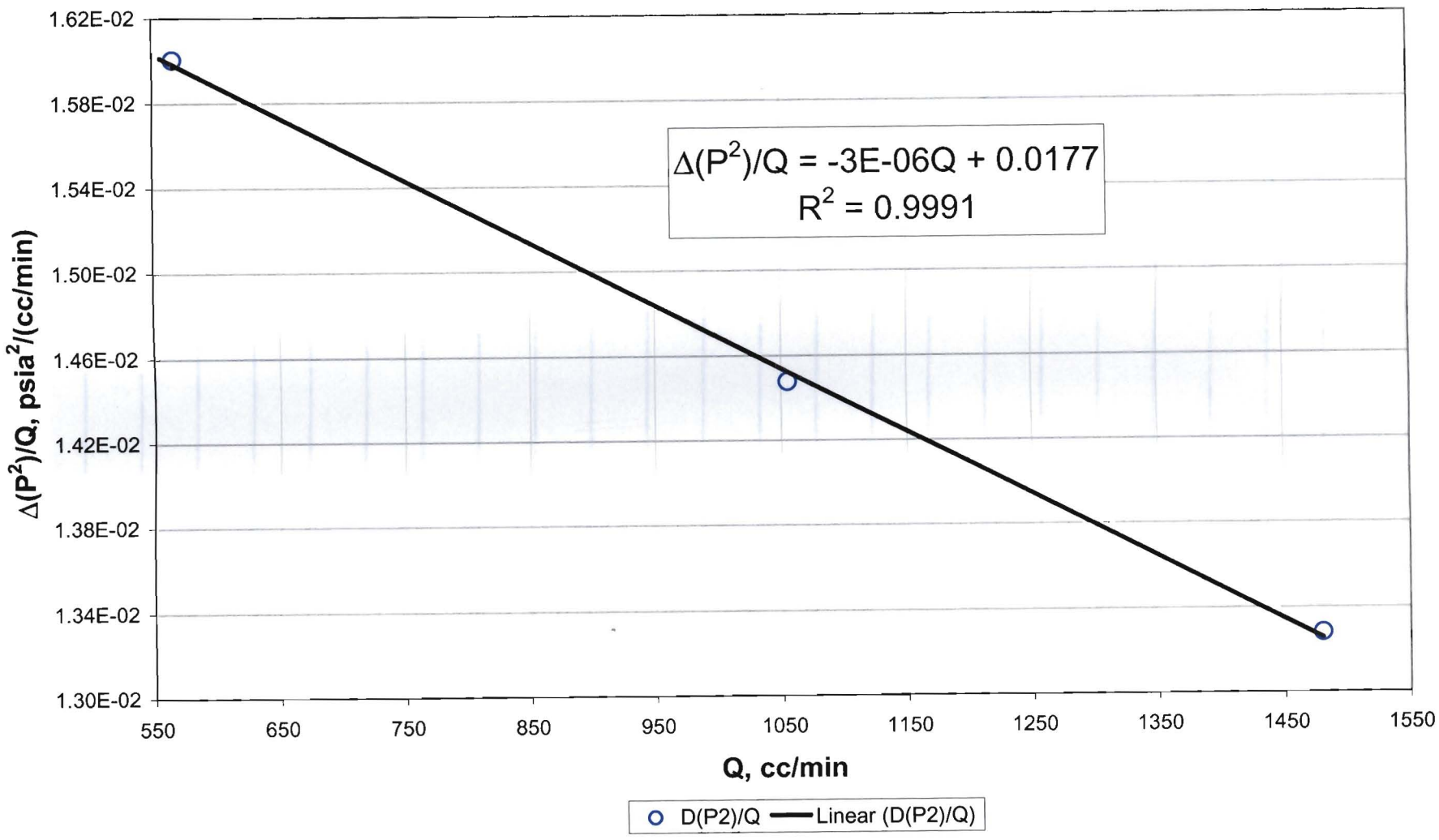
RWM, 08/22/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 3



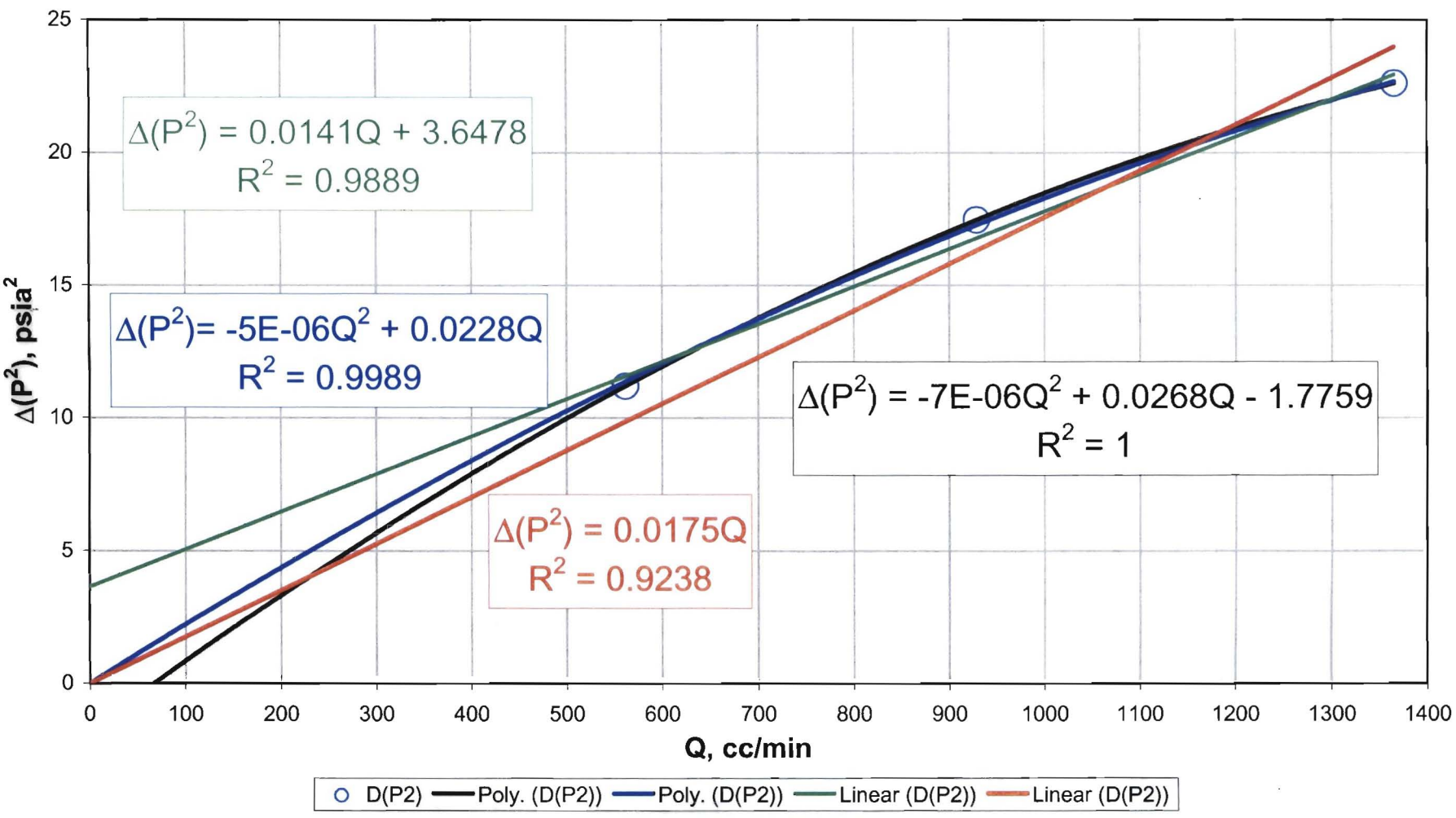
RNM, 08/22/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 3



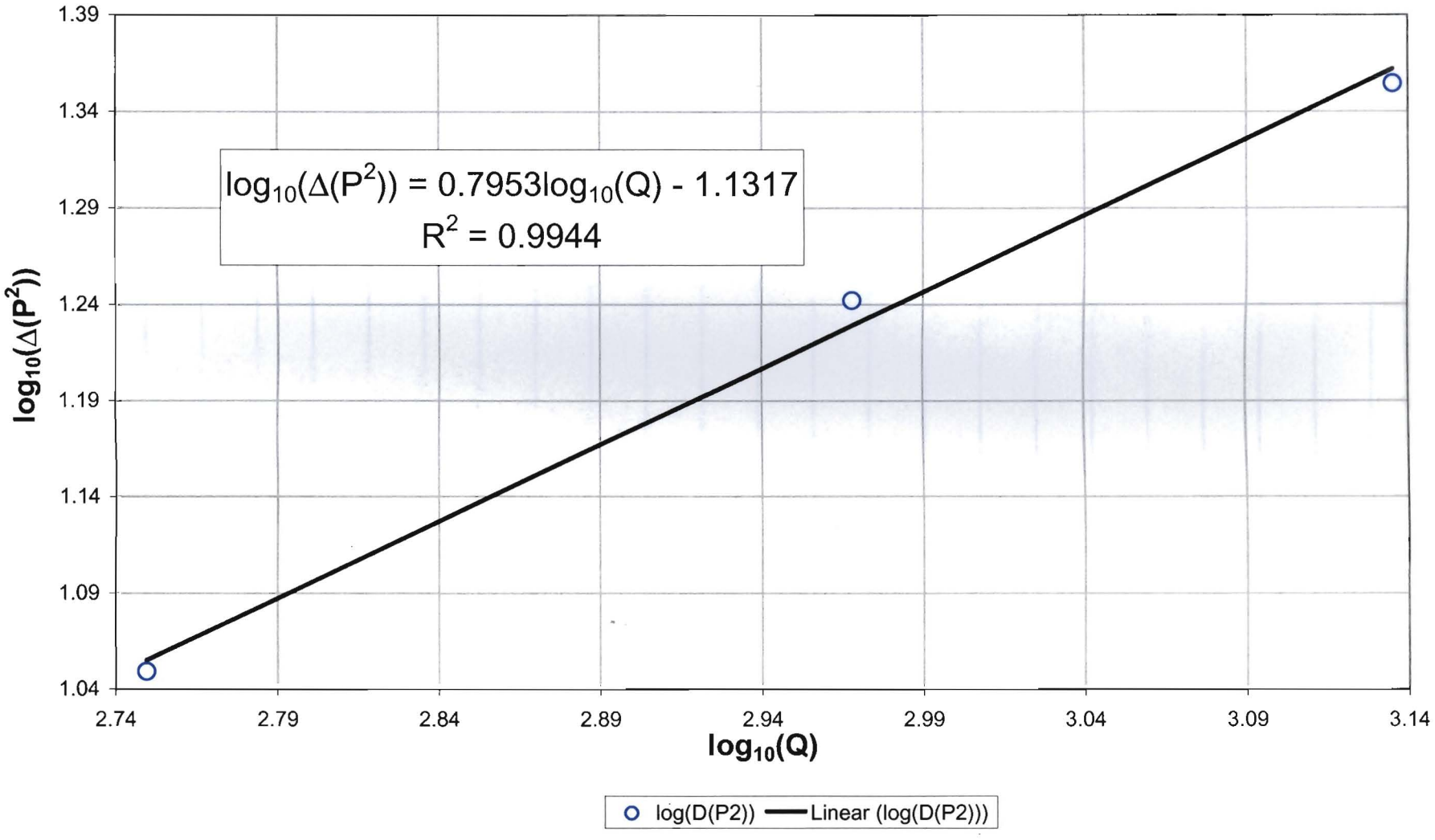
RNM, 08/22/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 4



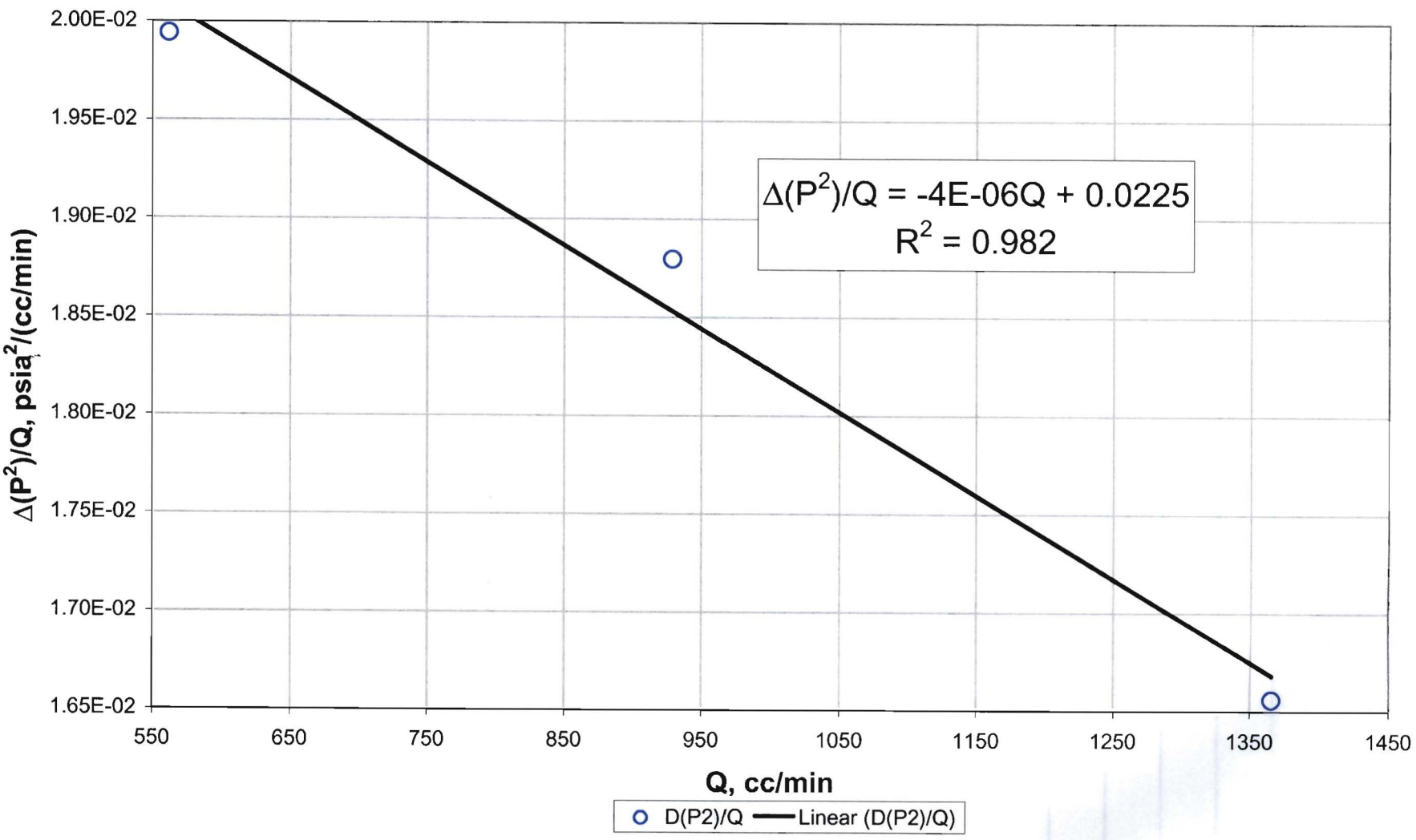
RNM, 08/22/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 4



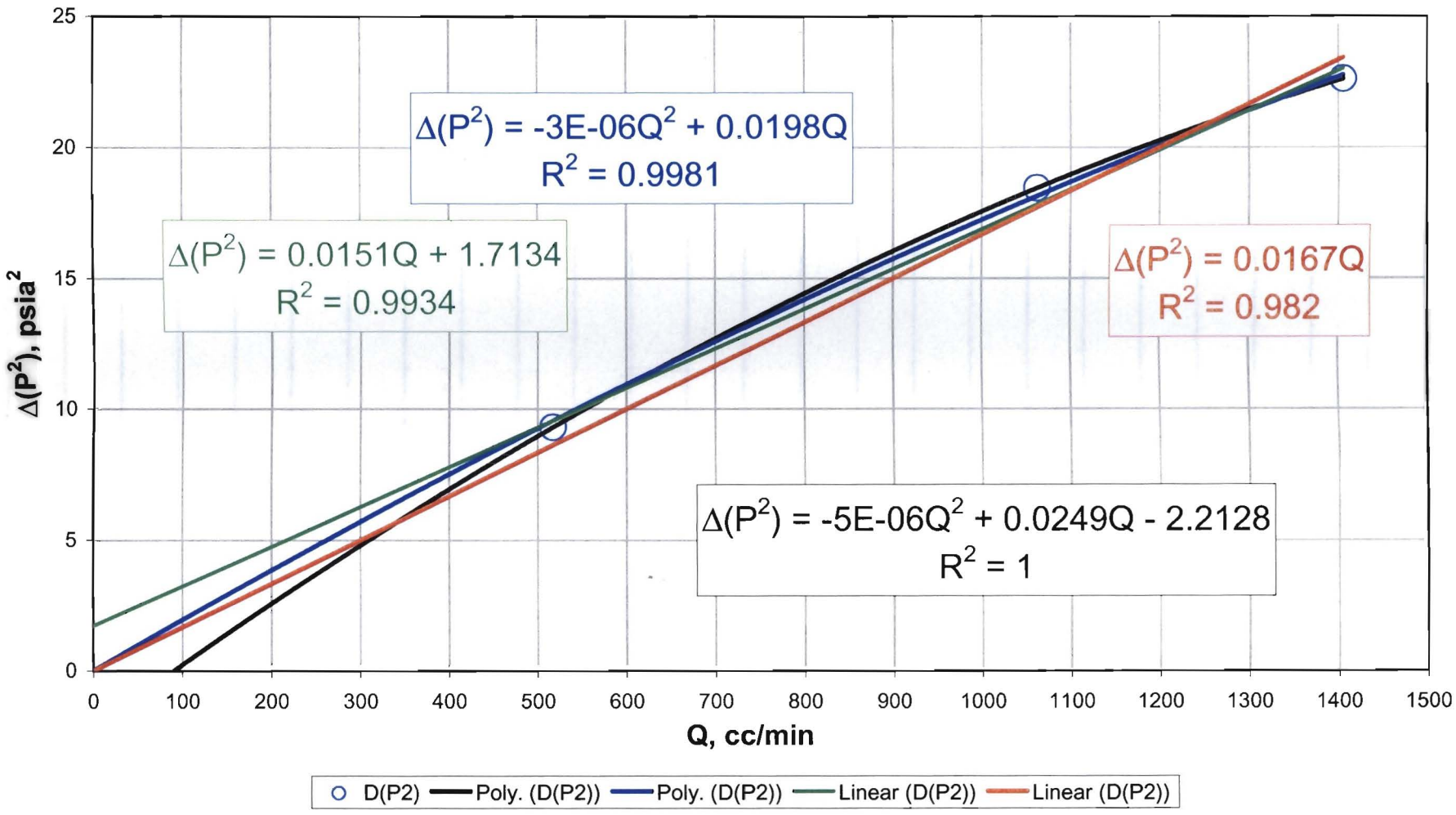
RNM, 08/22/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 4



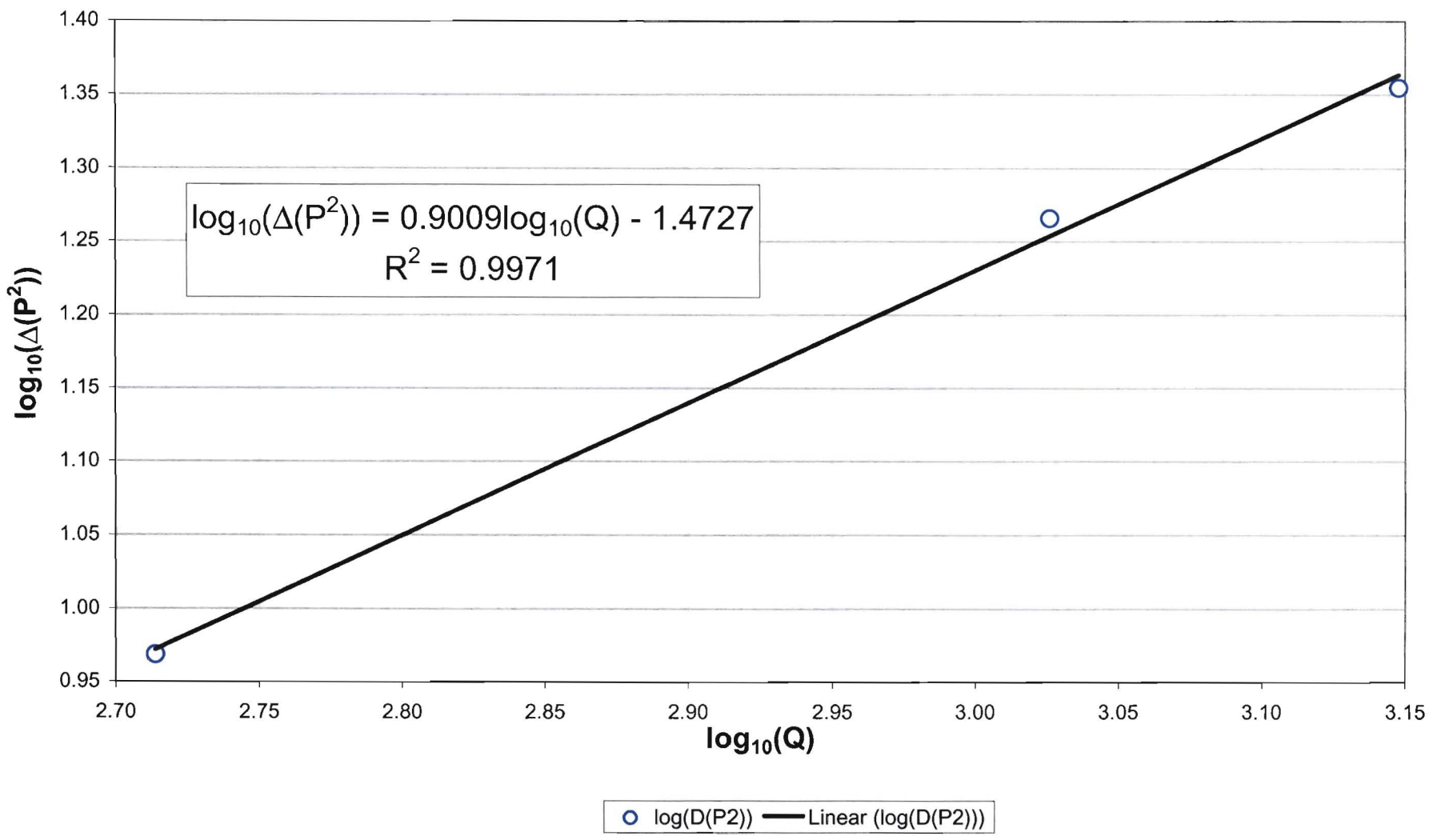
RNM, 08/28/08

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 5



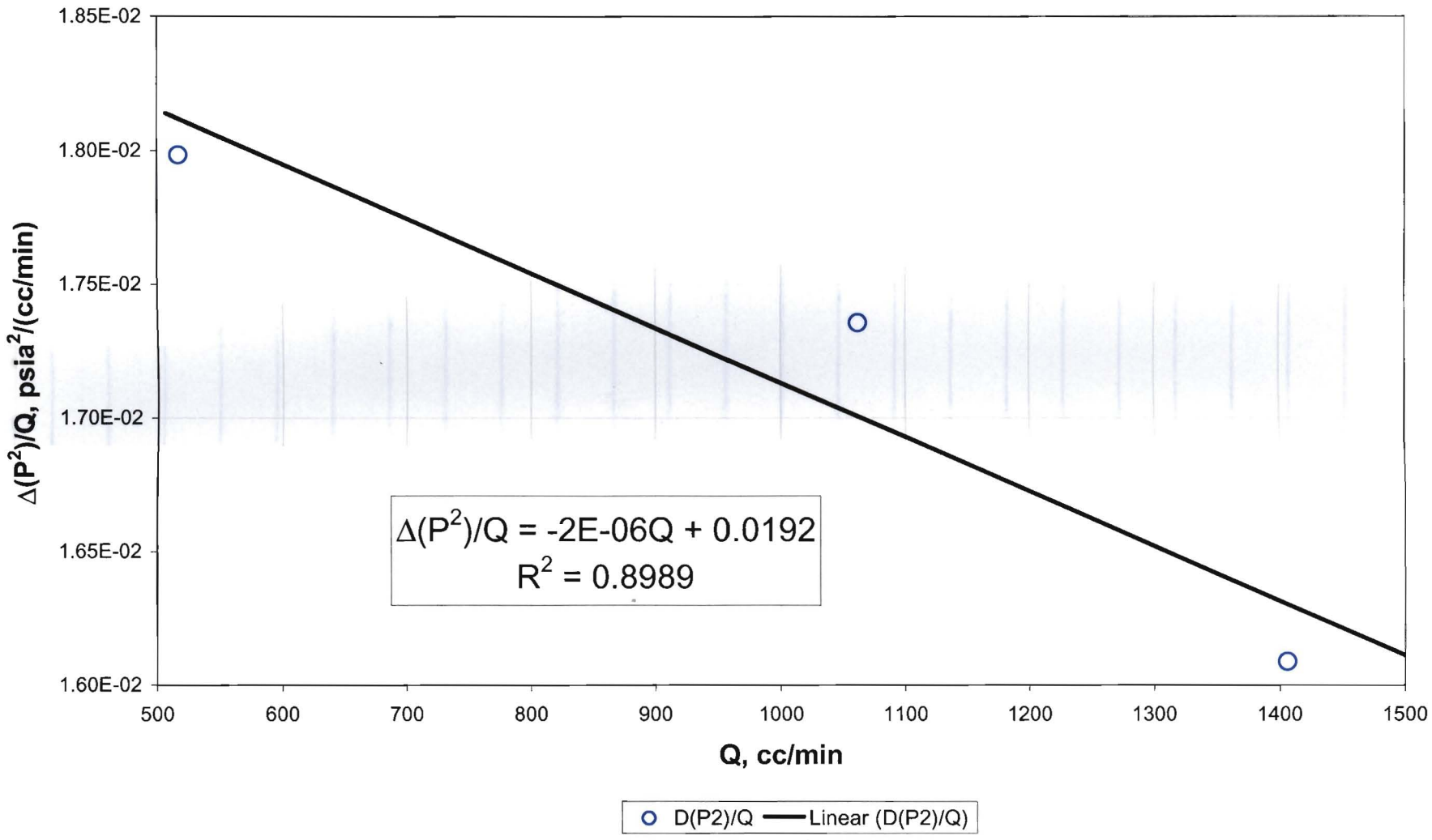
RNM, 08/28/08

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 5



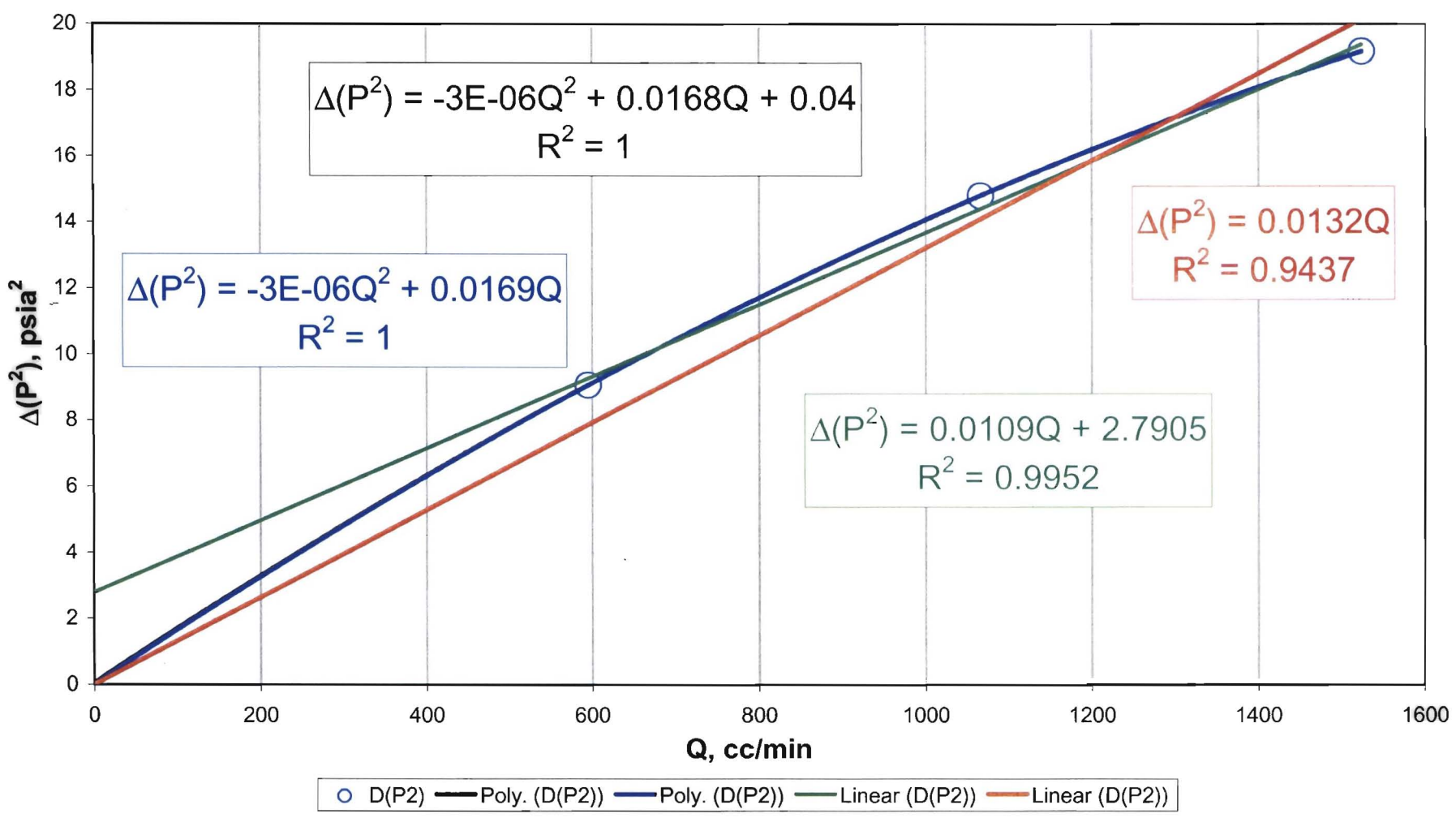
RNM, 08/27/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 5

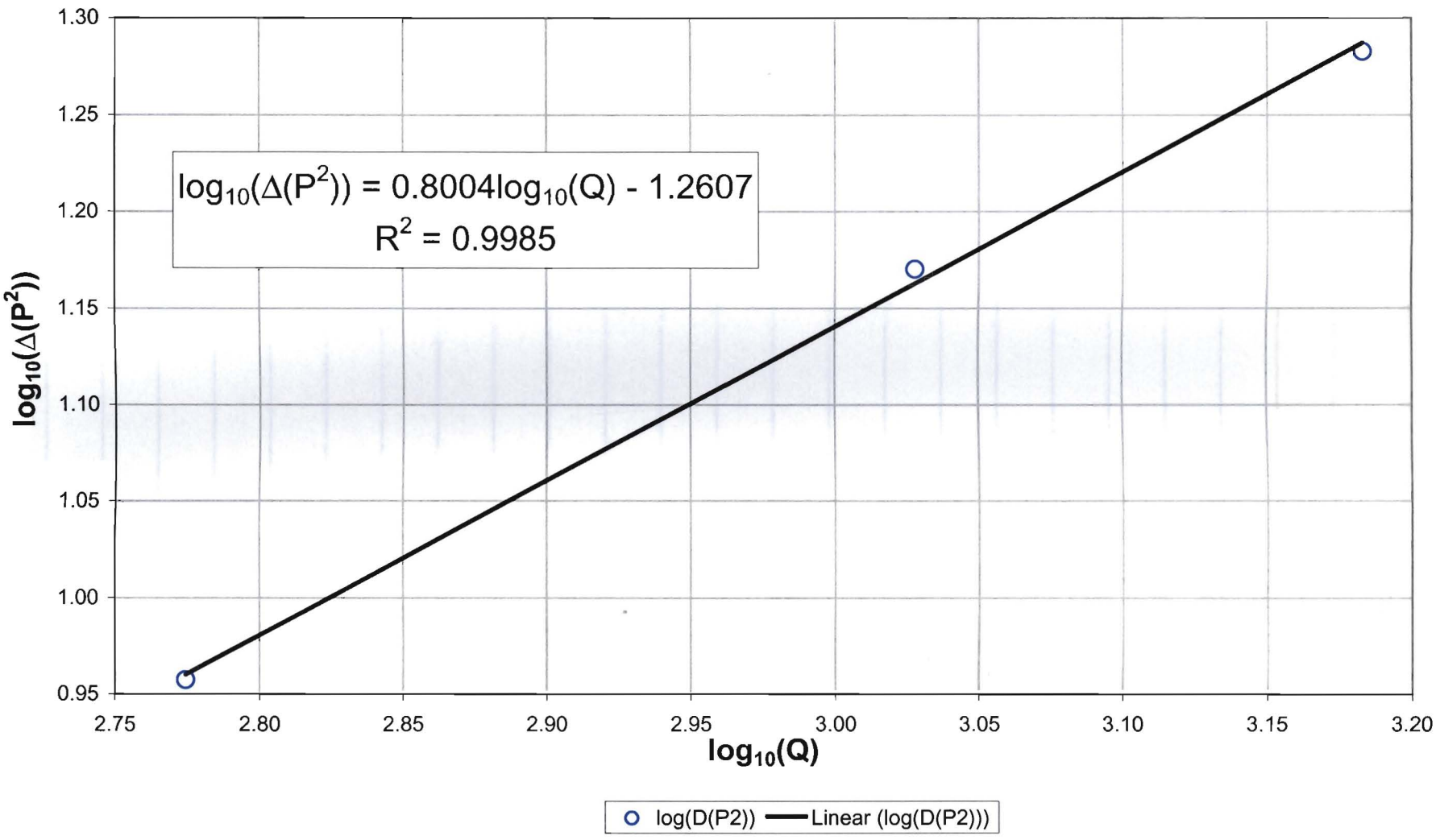


RNM, 08/27/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 6

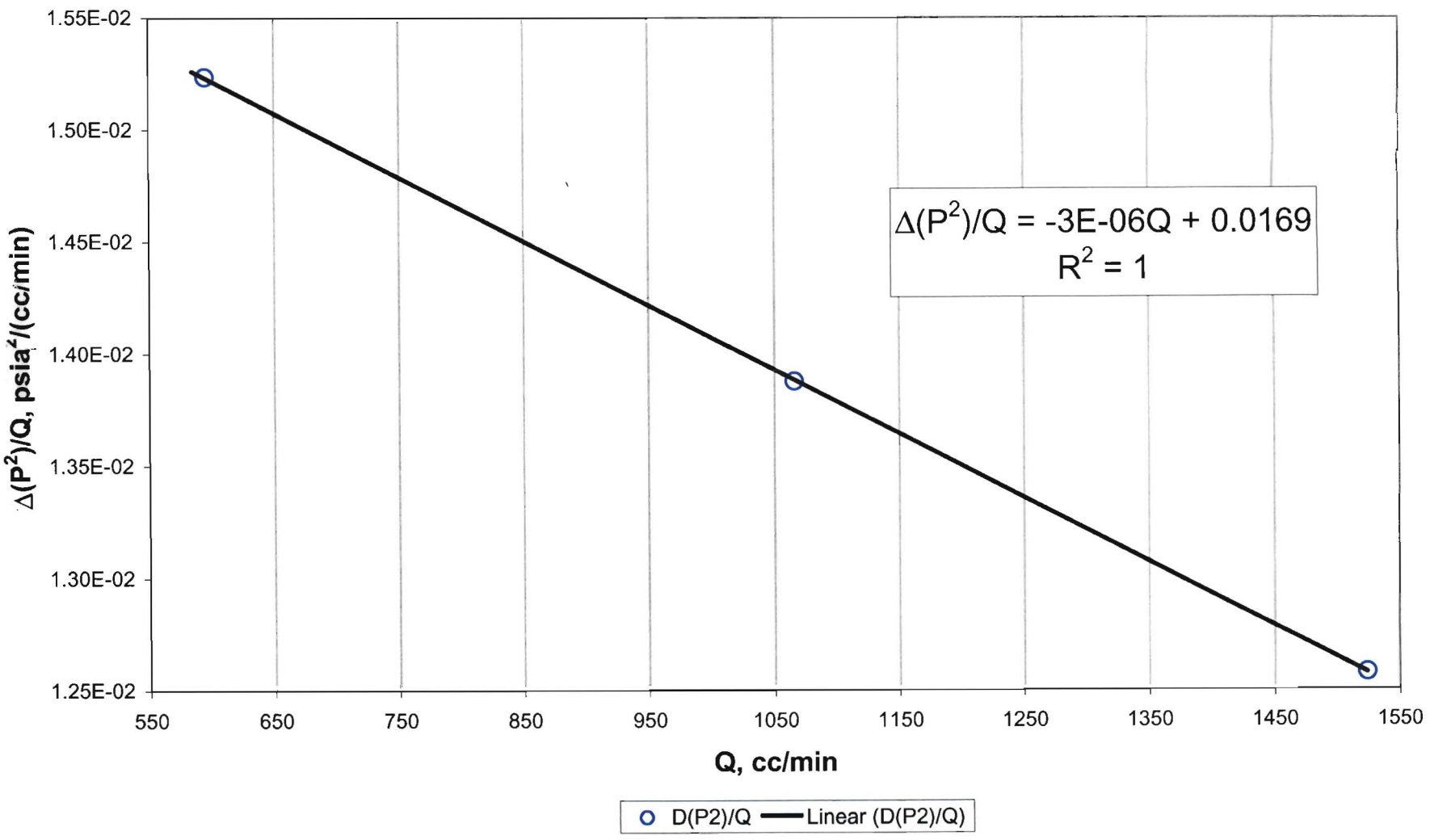


Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 6



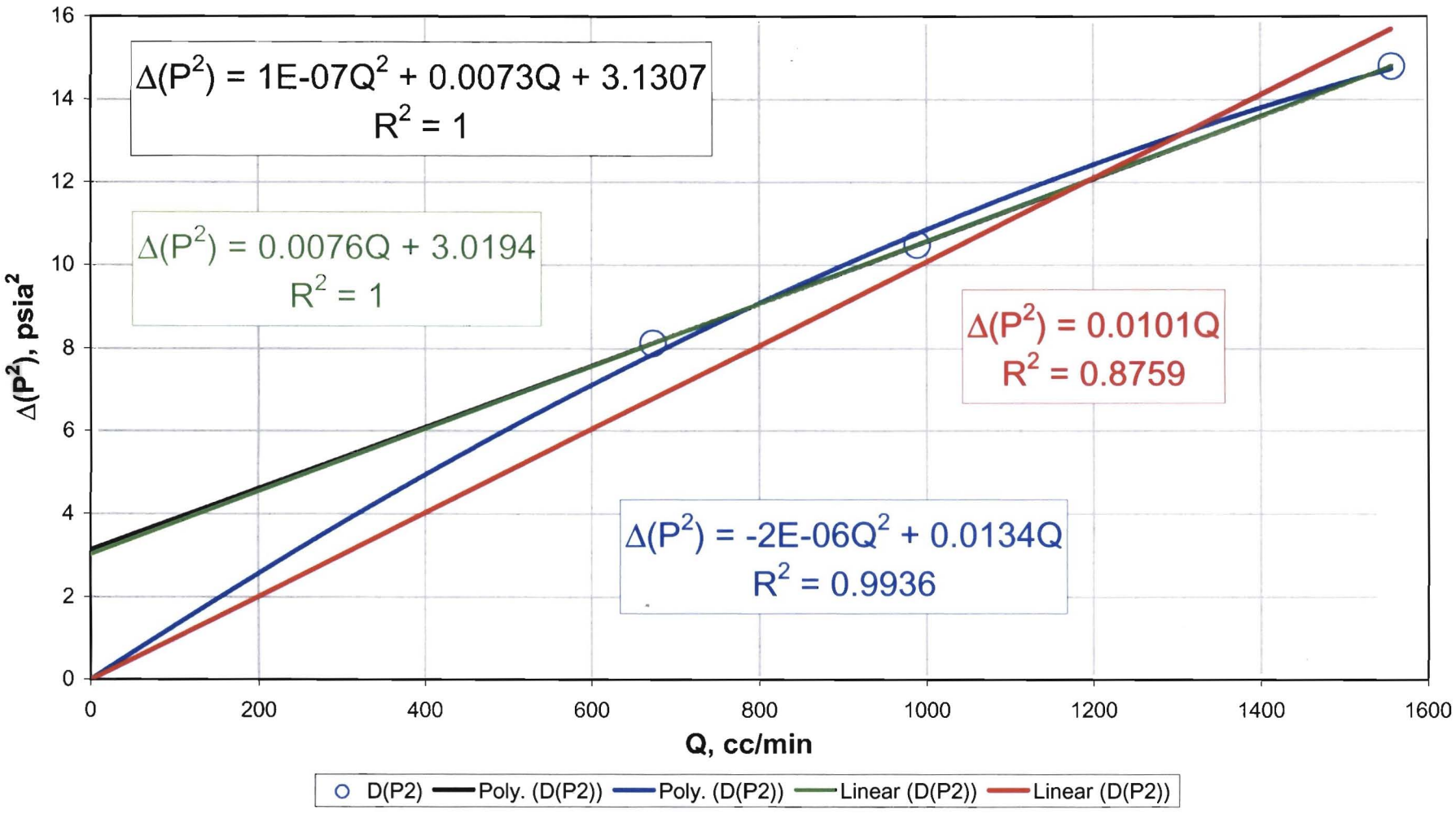
RNM, 08/22/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 6

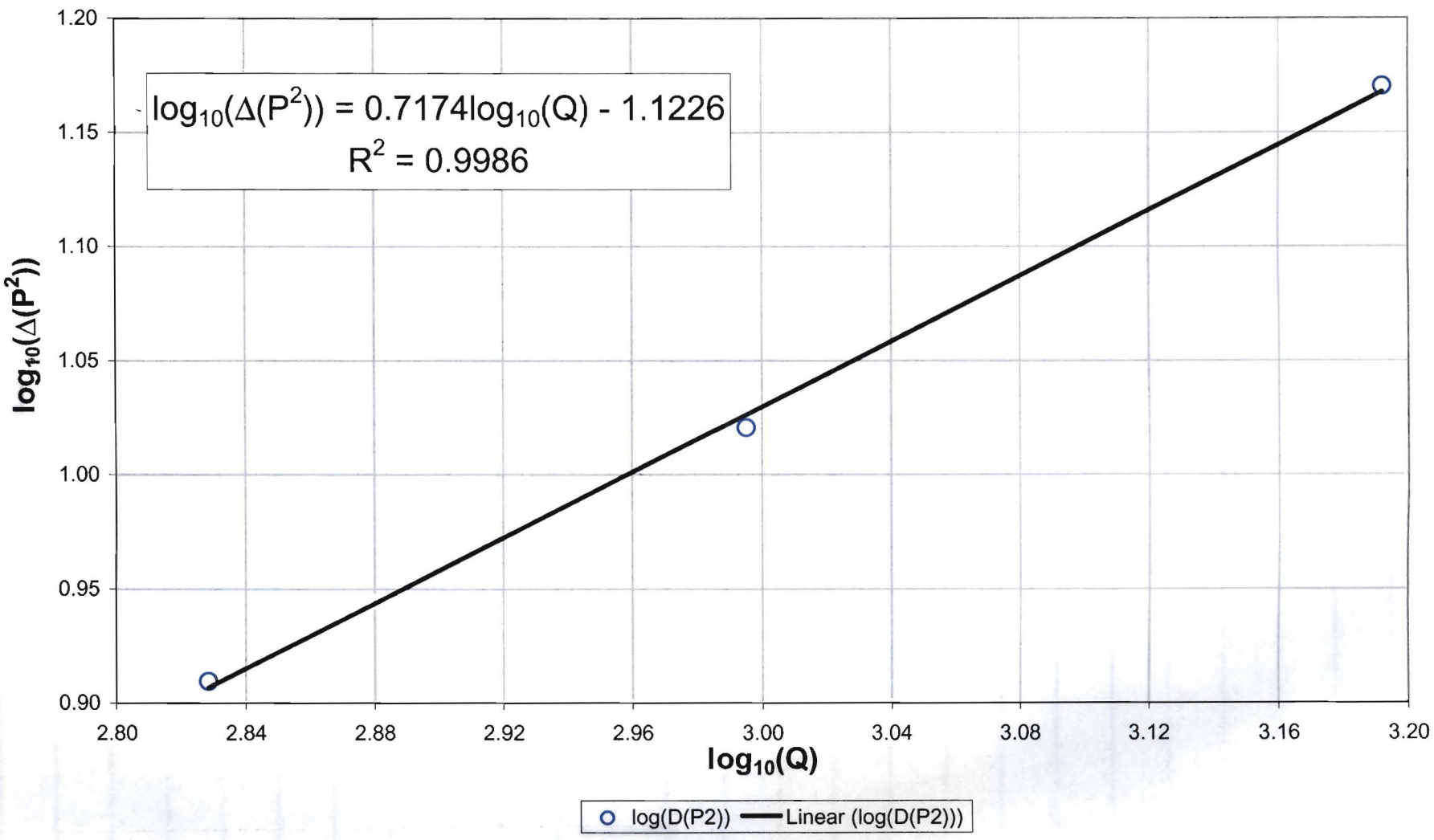


RNM, 08/22/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 7

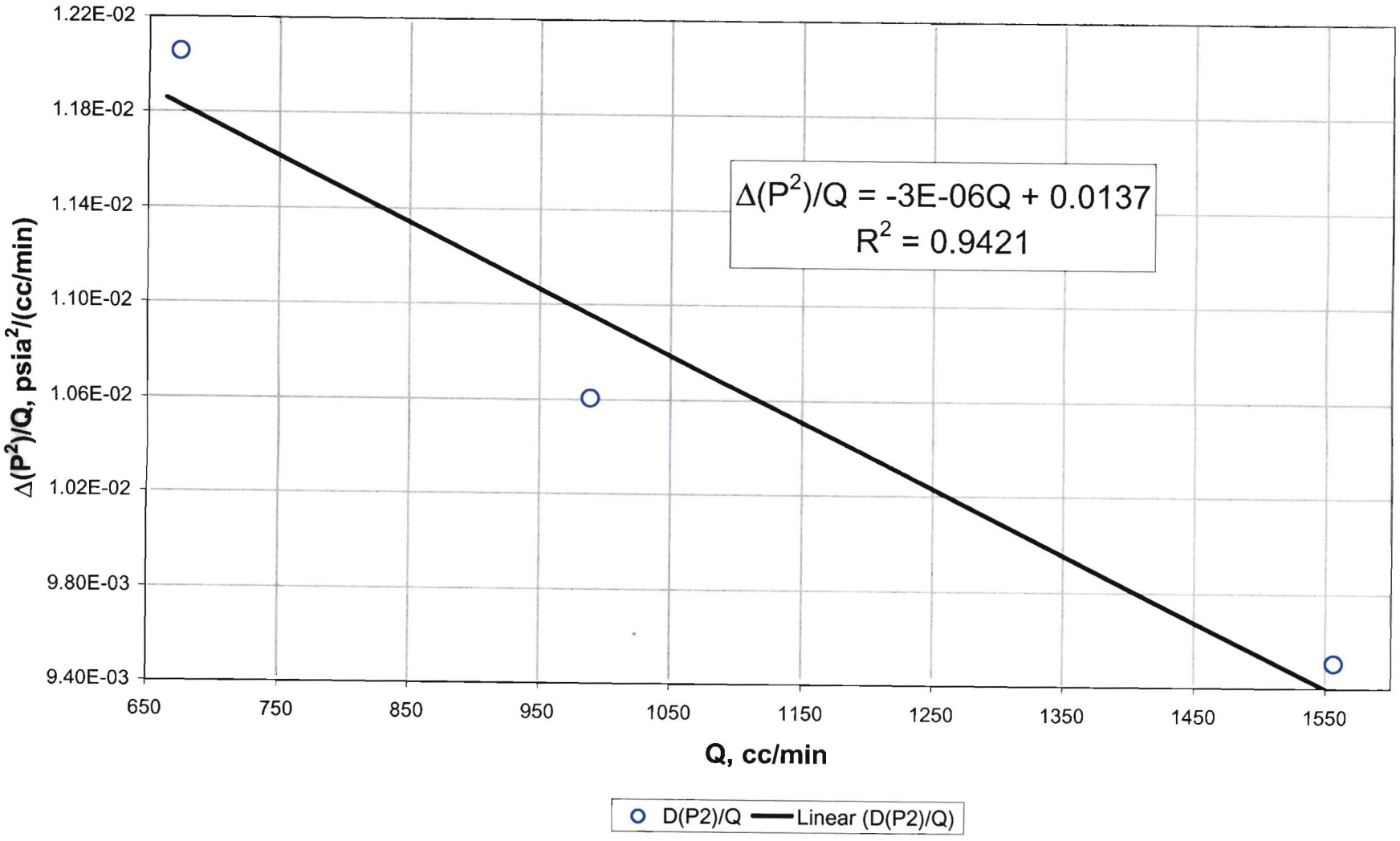


Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 7



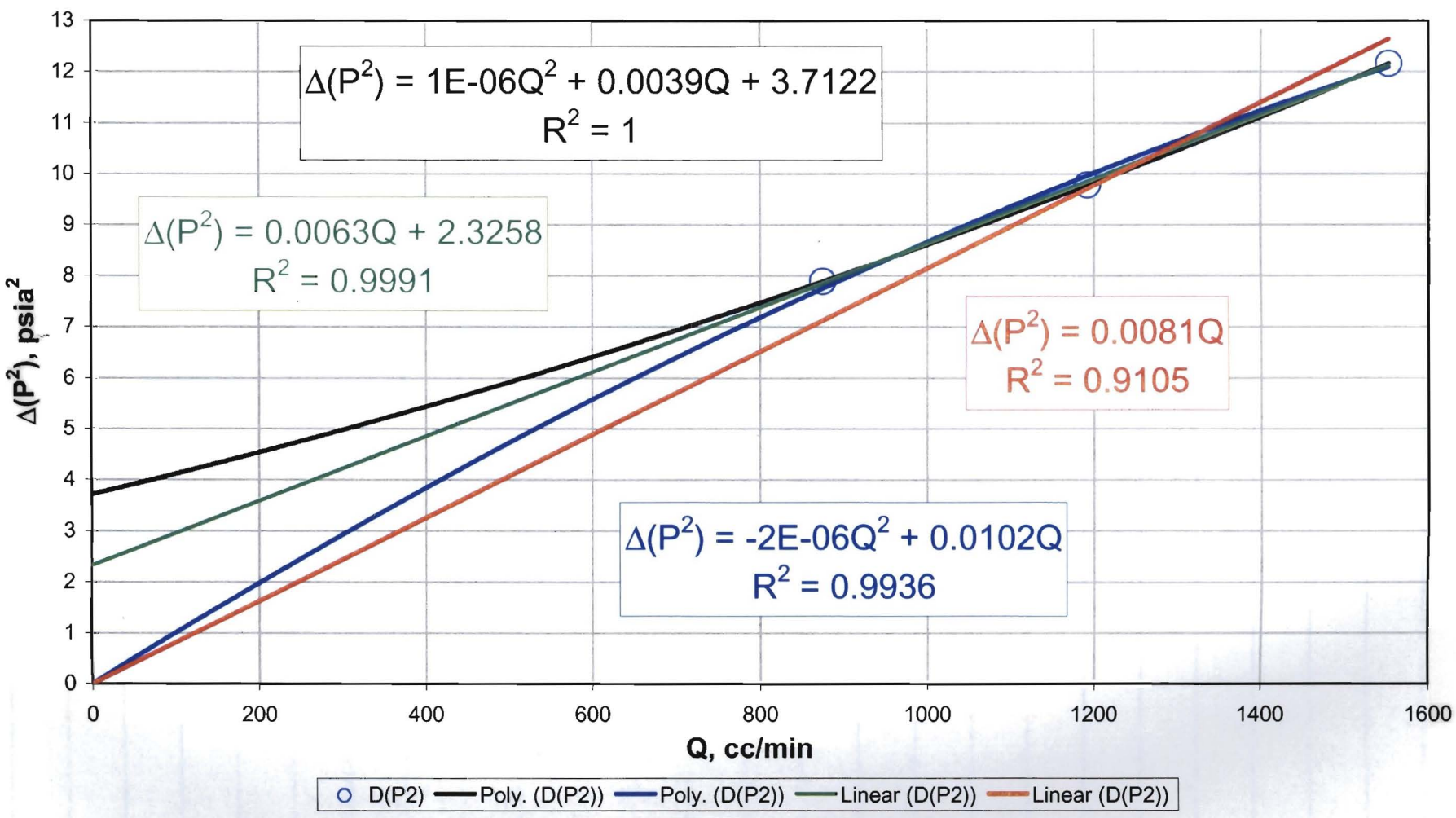
RNM, 08/22/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 7



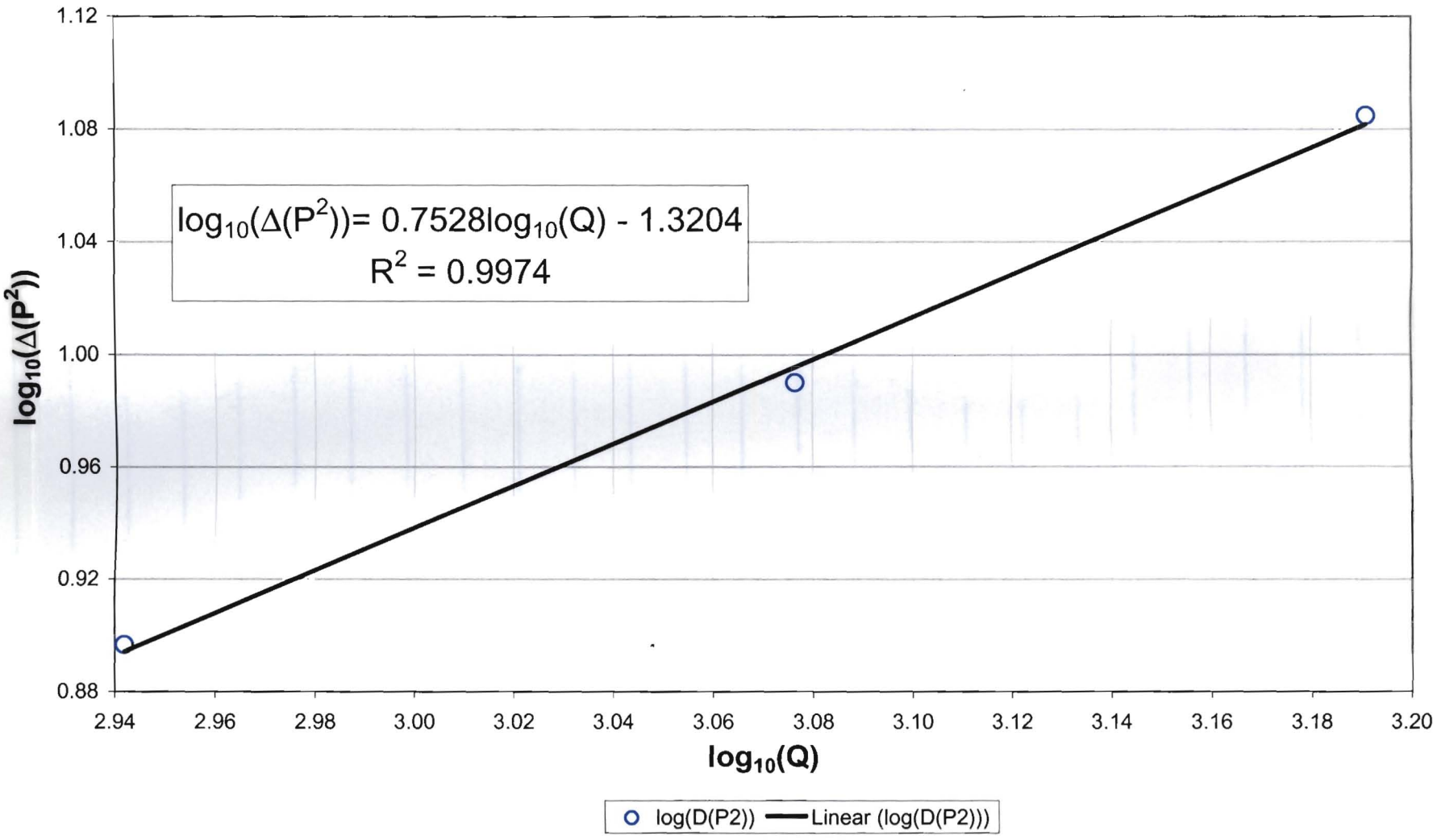
RNM, 08/22/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 8



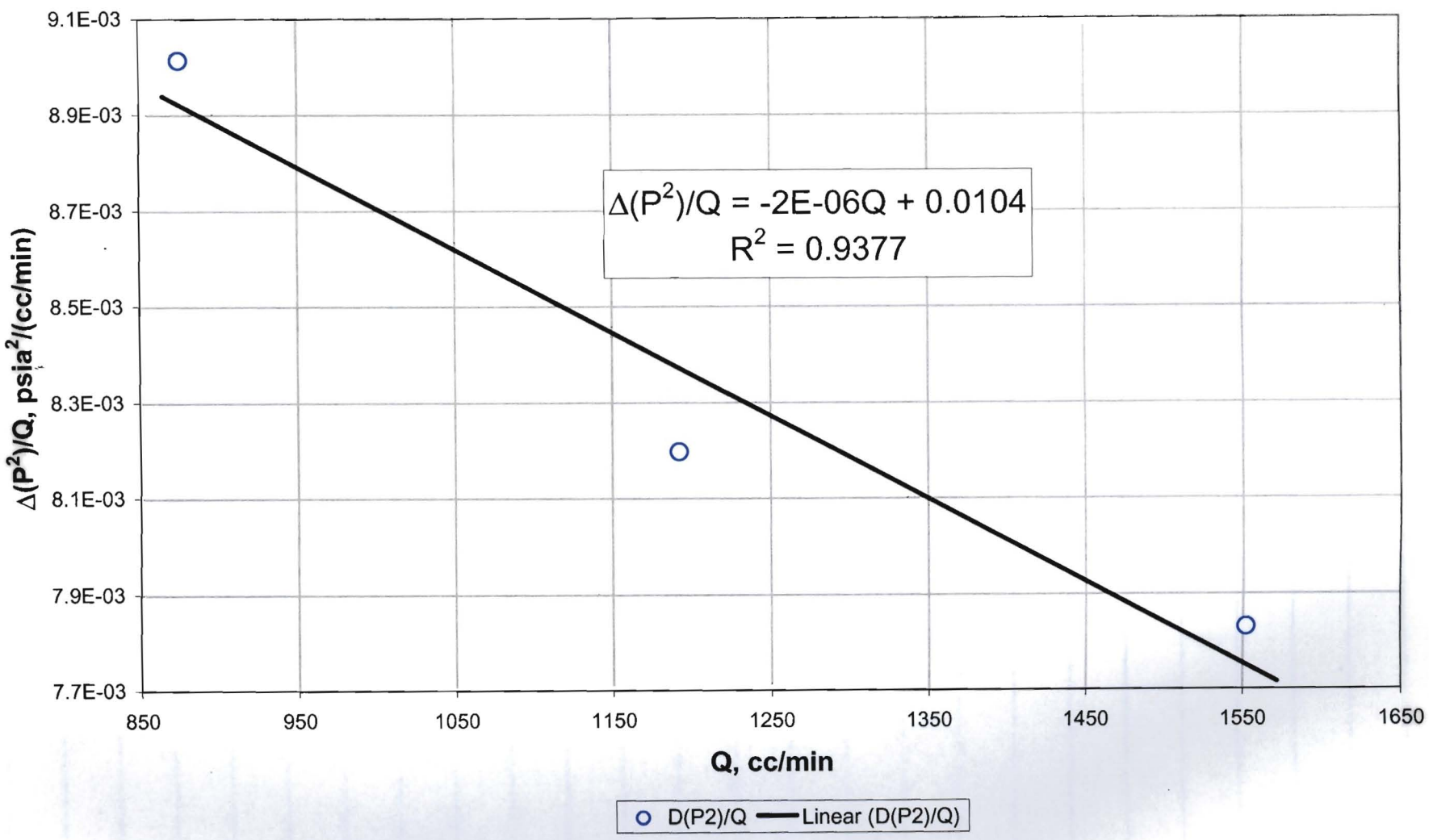
RNM, 08/28/08

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 8



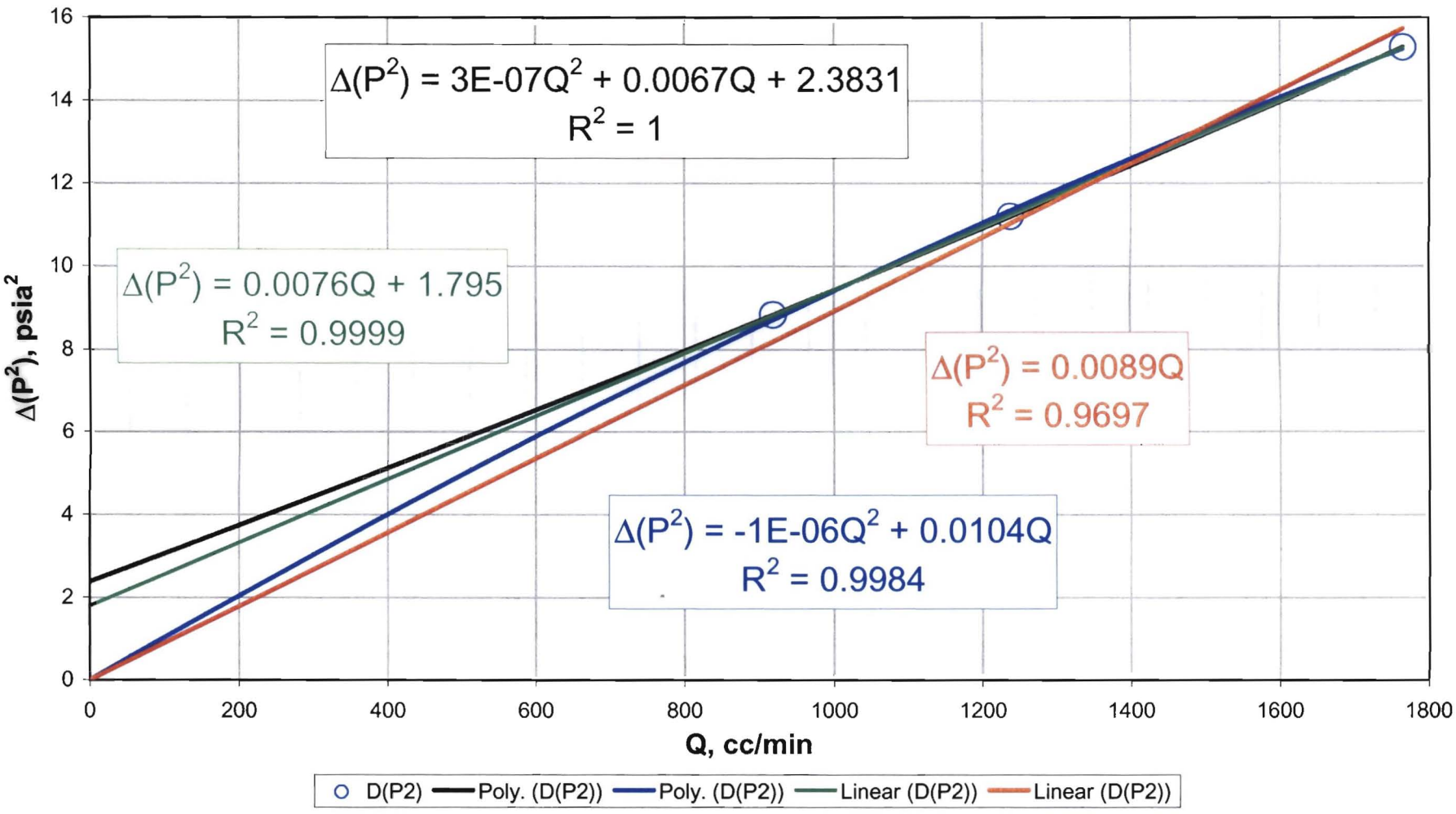
RNM, 08/28/08

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 8



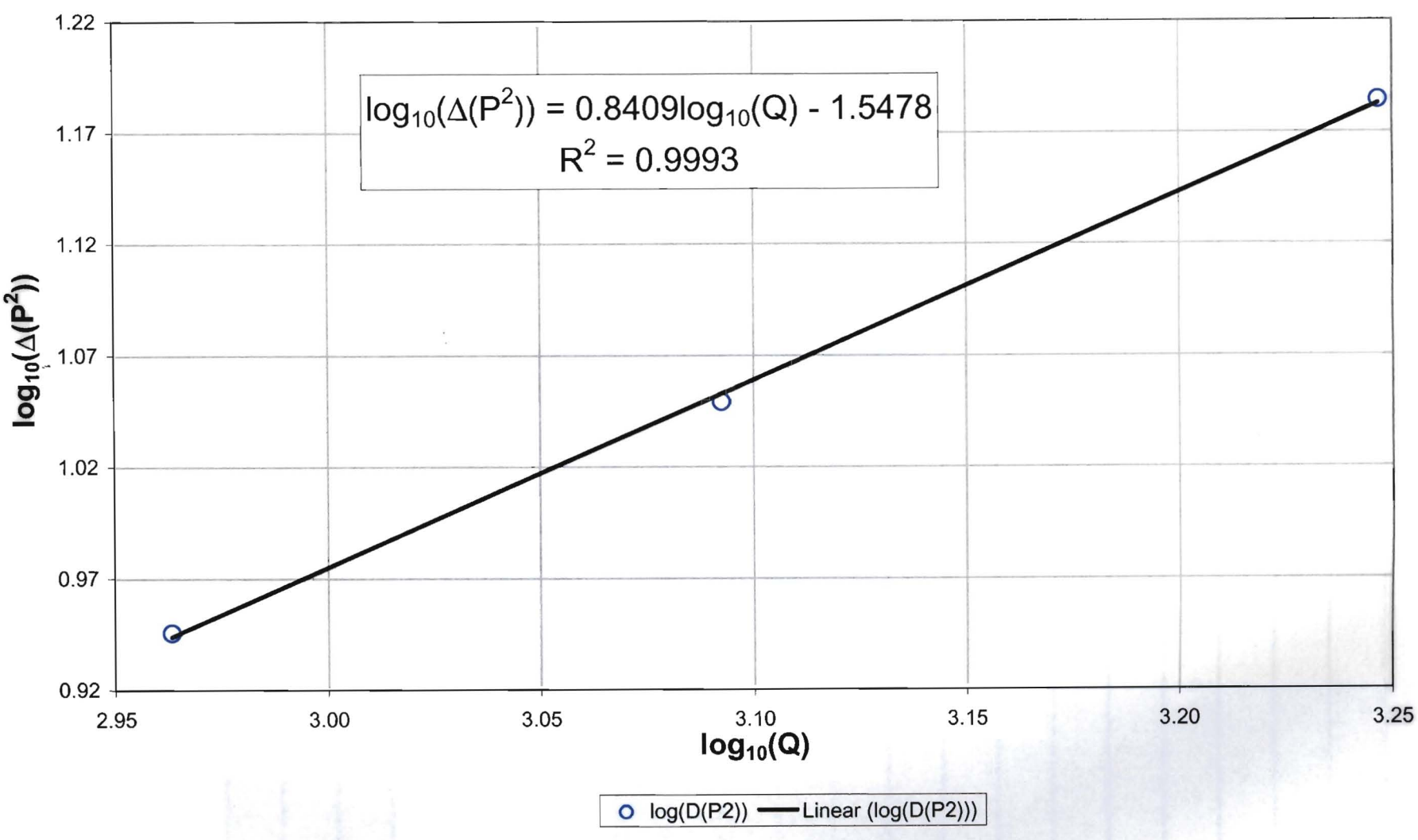
RNM, 08/22/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 9



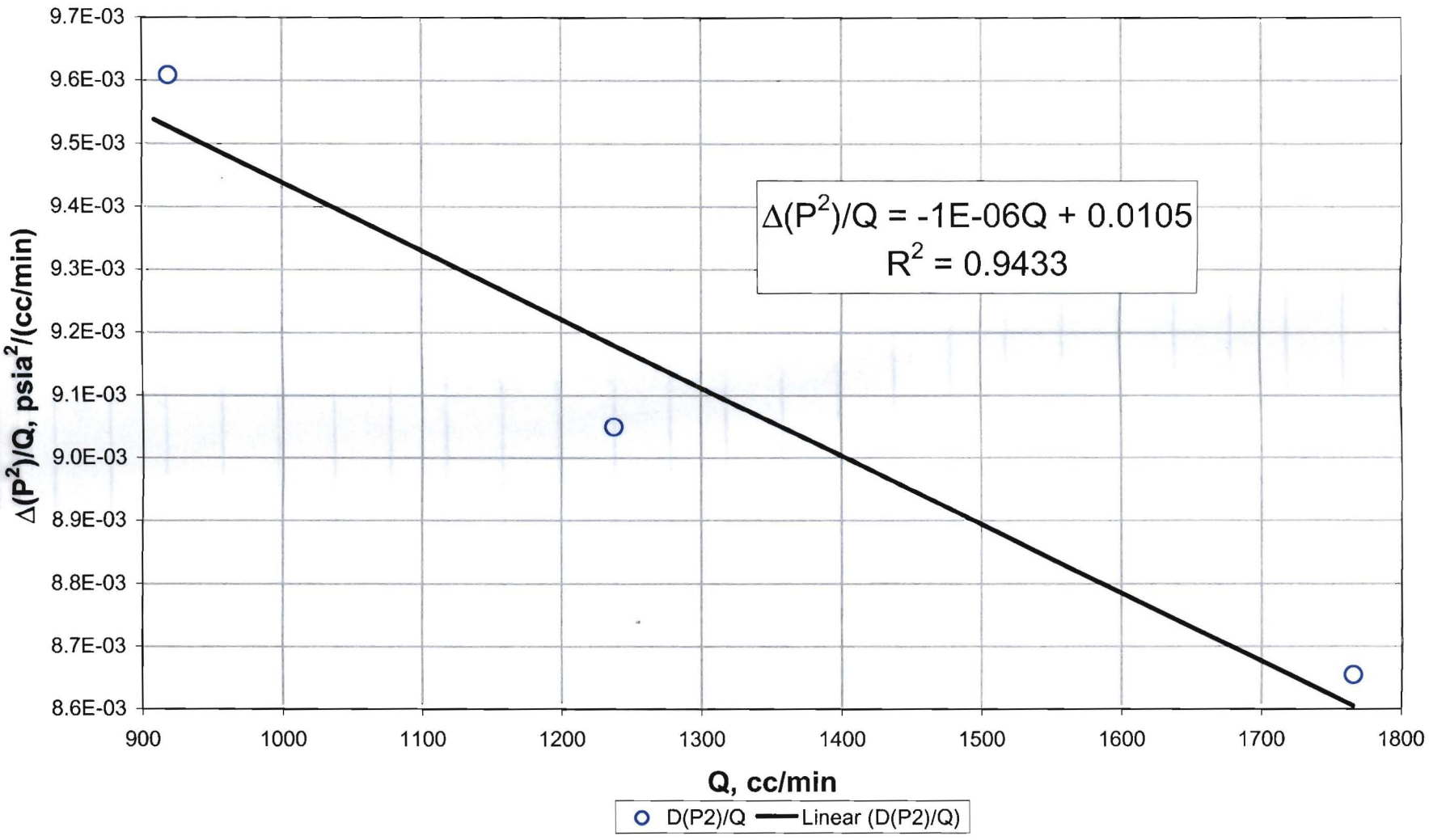
RNM, 08/22/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 9



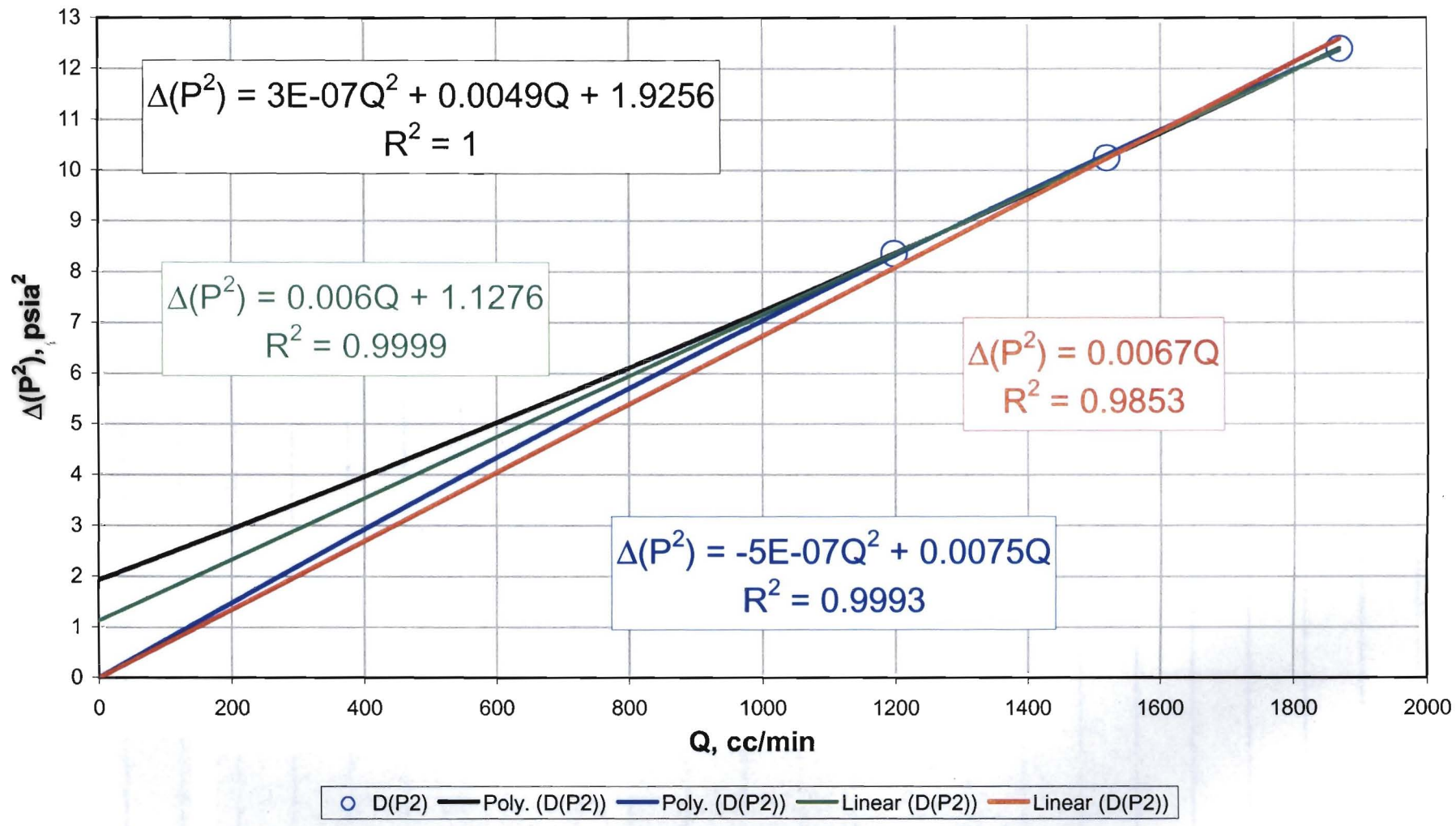
RNM, 08/28/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 9



RNM, 08/28/02

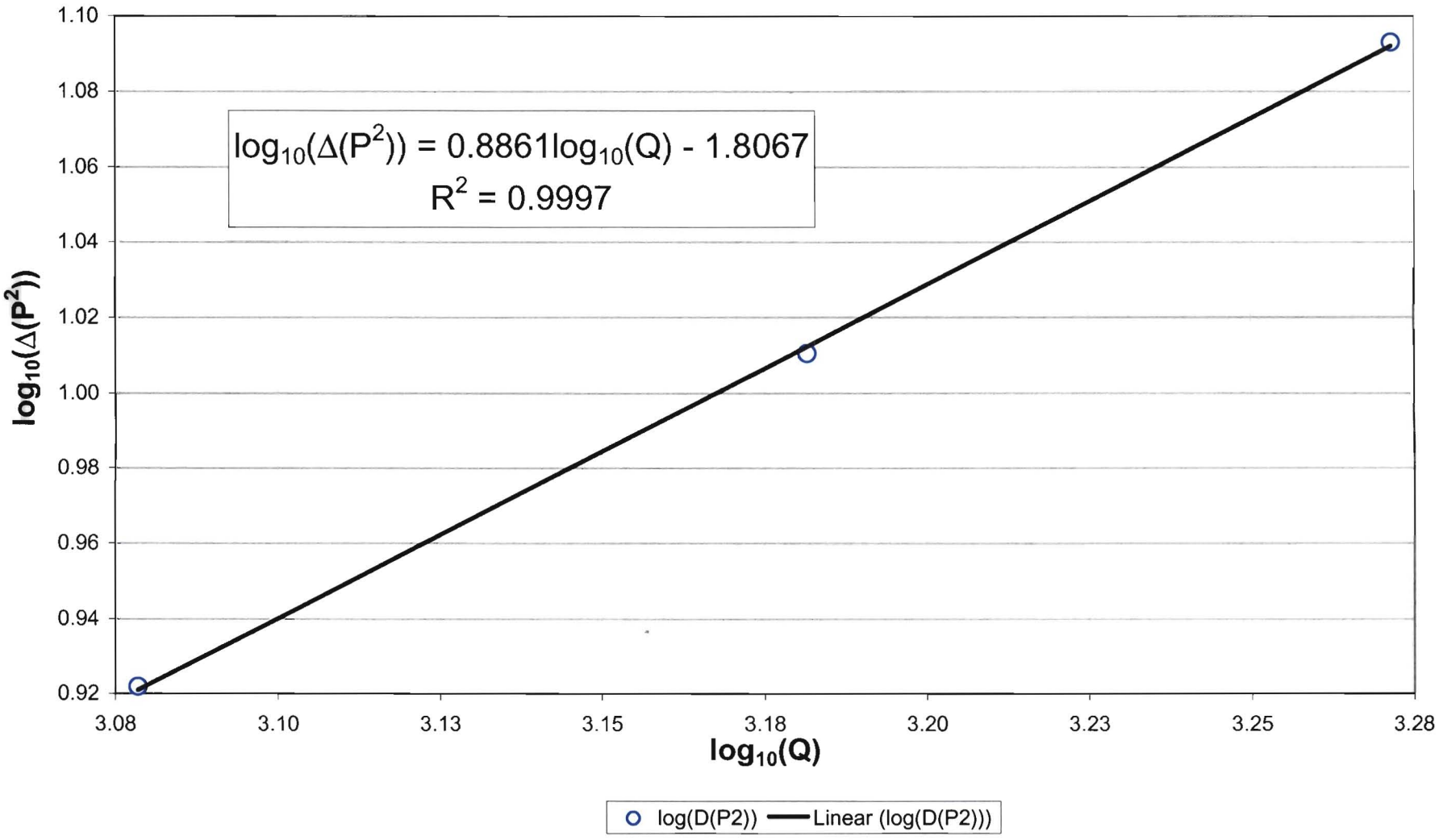
Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 10



RNM, 08/28/02

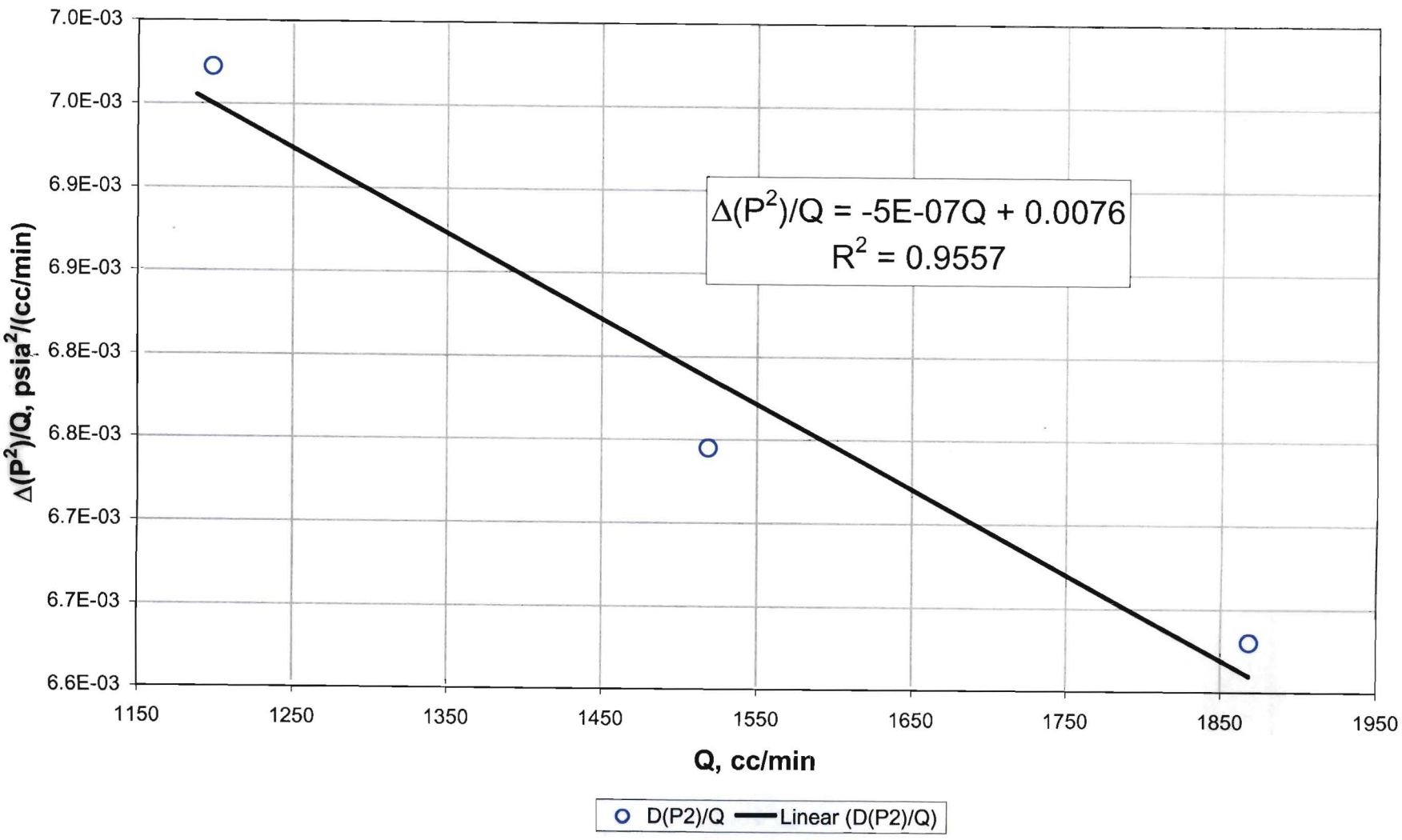
RNM, 08/22/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 10



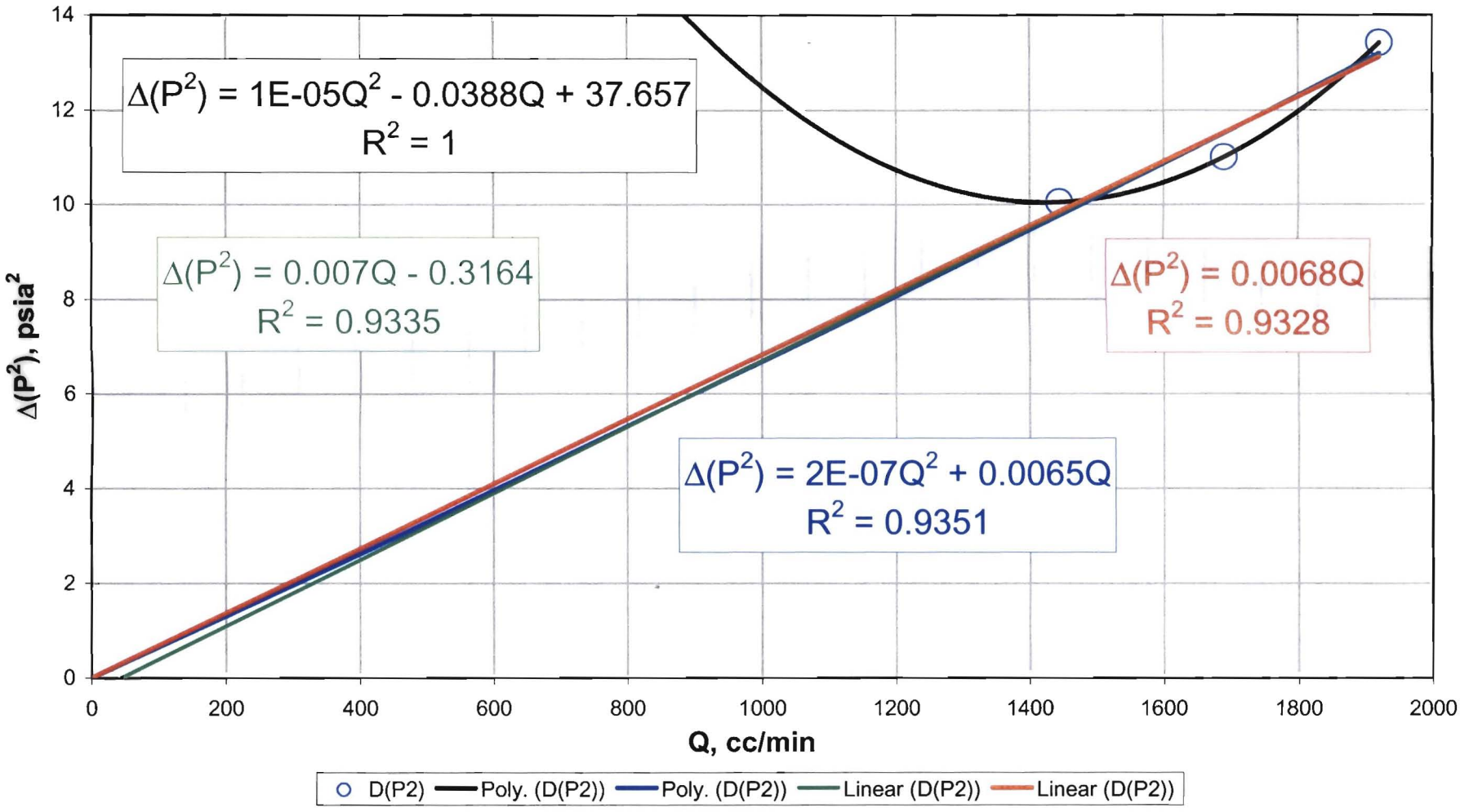
RNM, 08/22/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 10



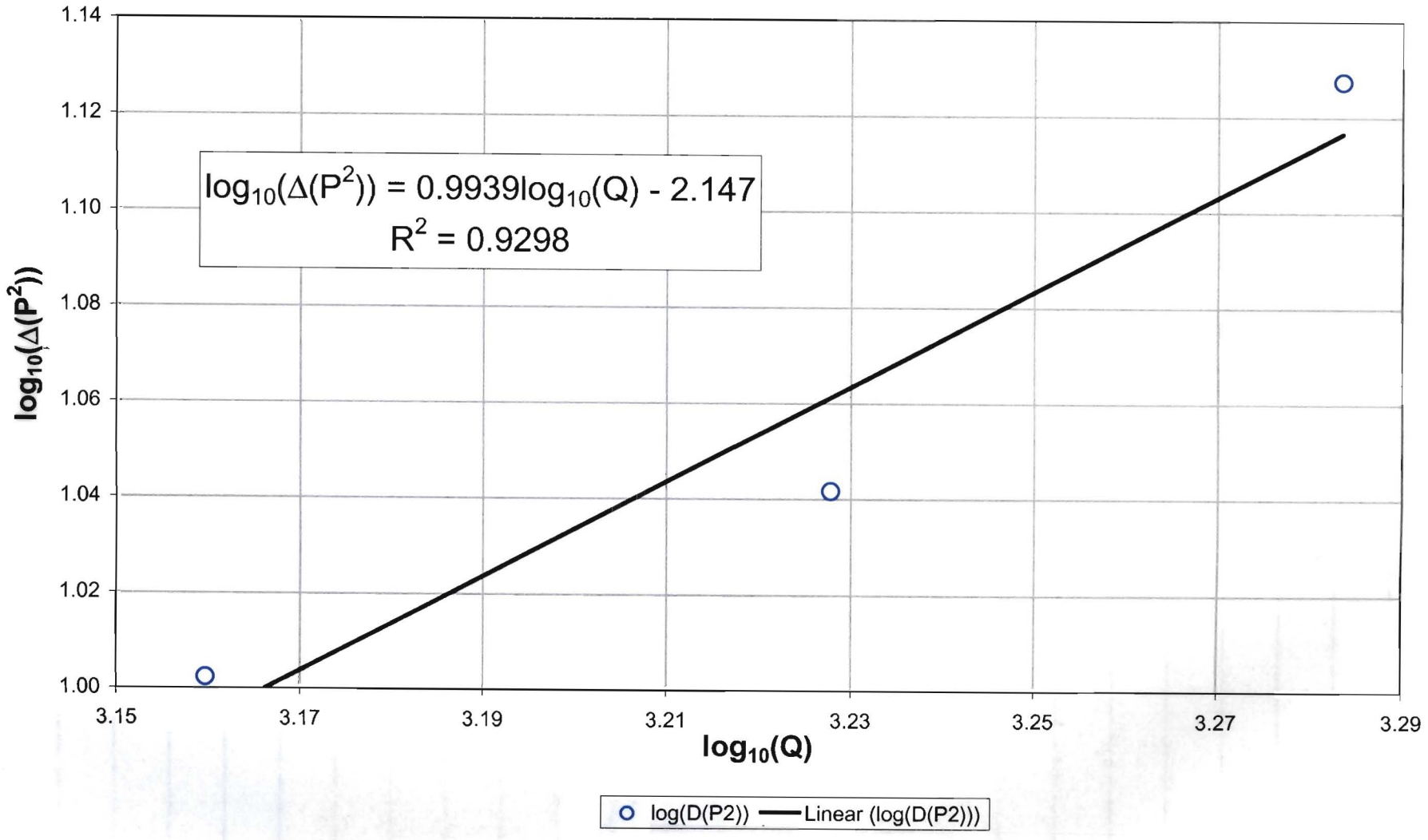
RNM, 08/22/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 11



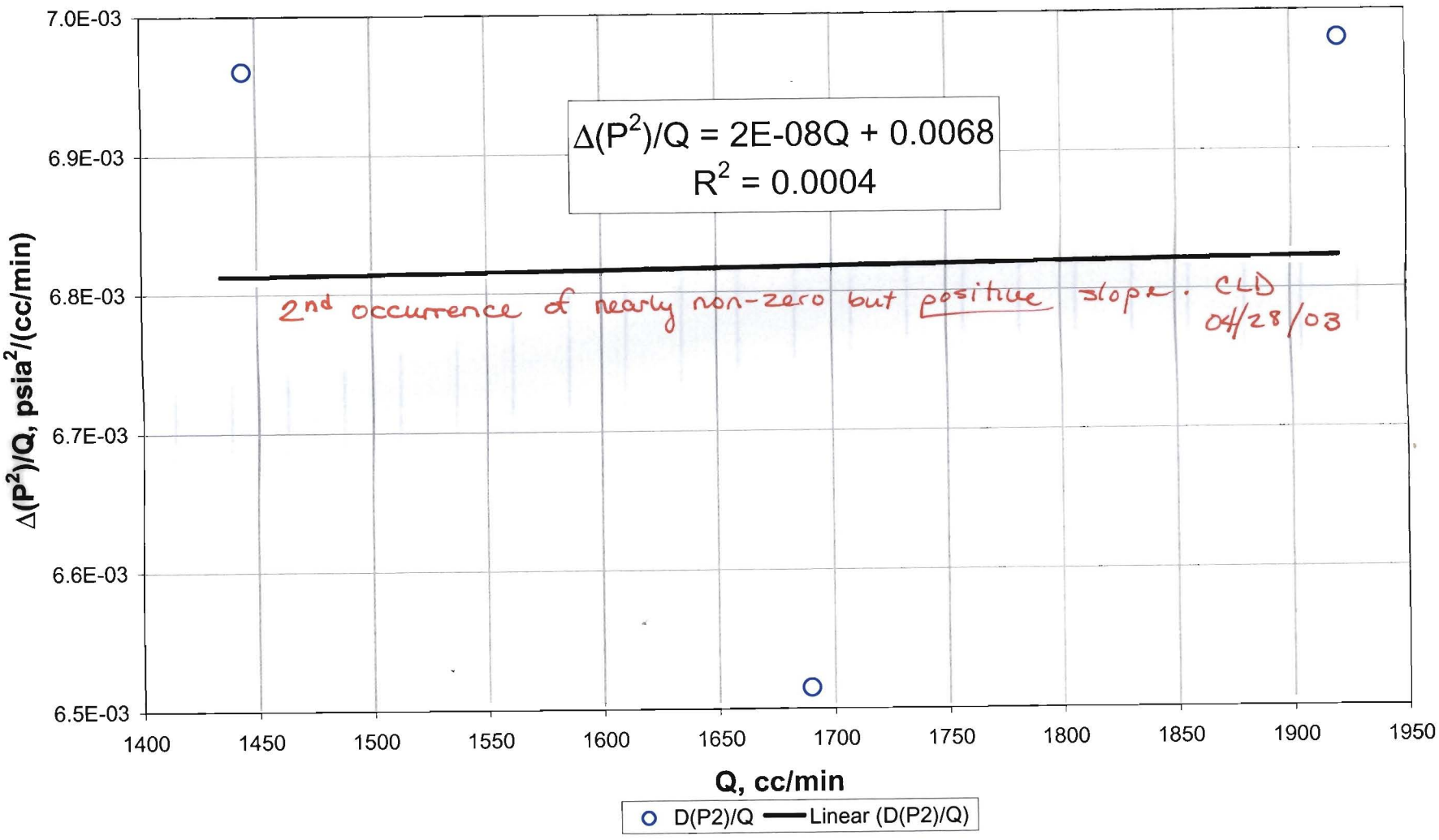
RNM, 08/22/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 11



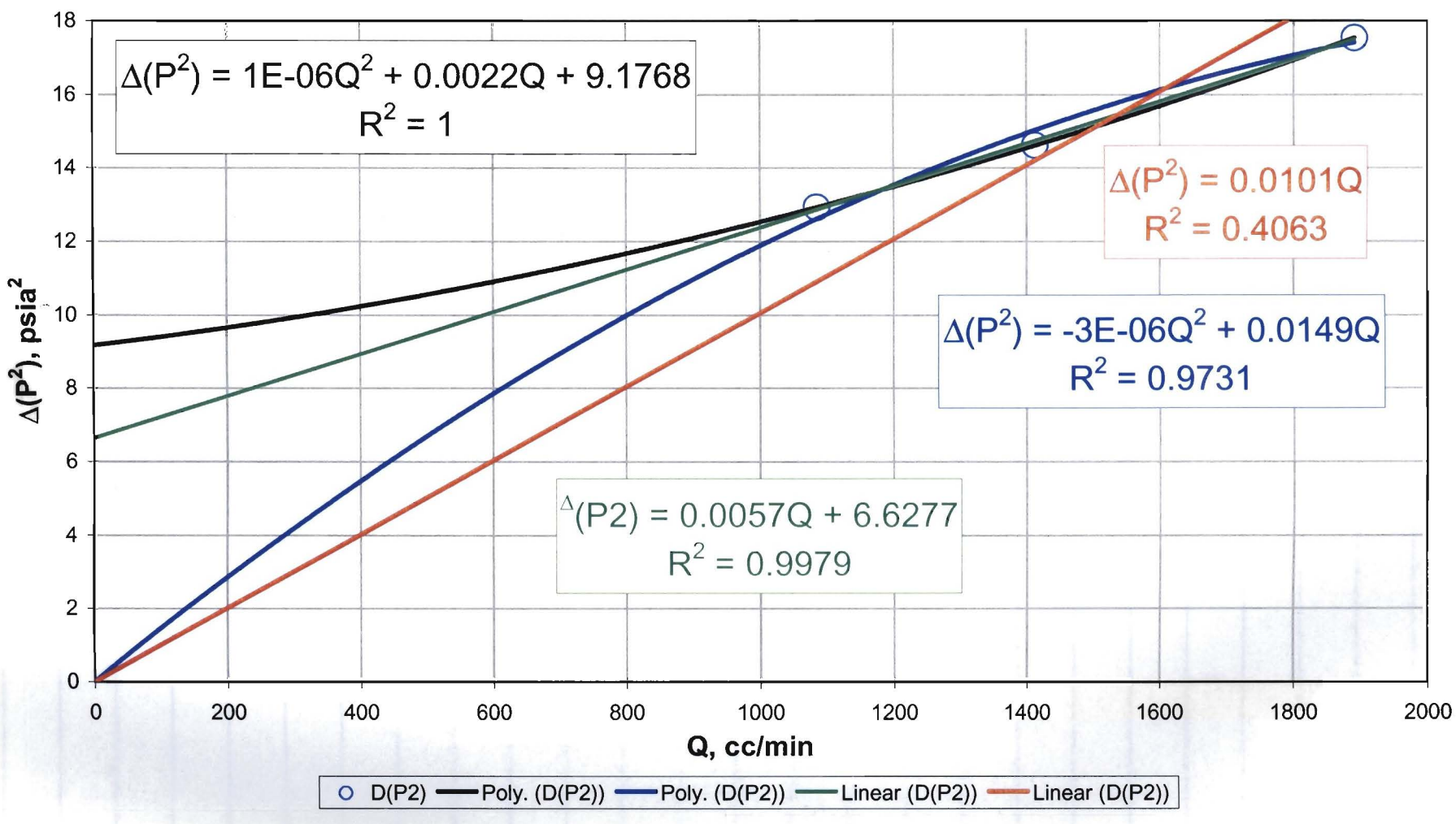
RWM, 08/28/03

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 11

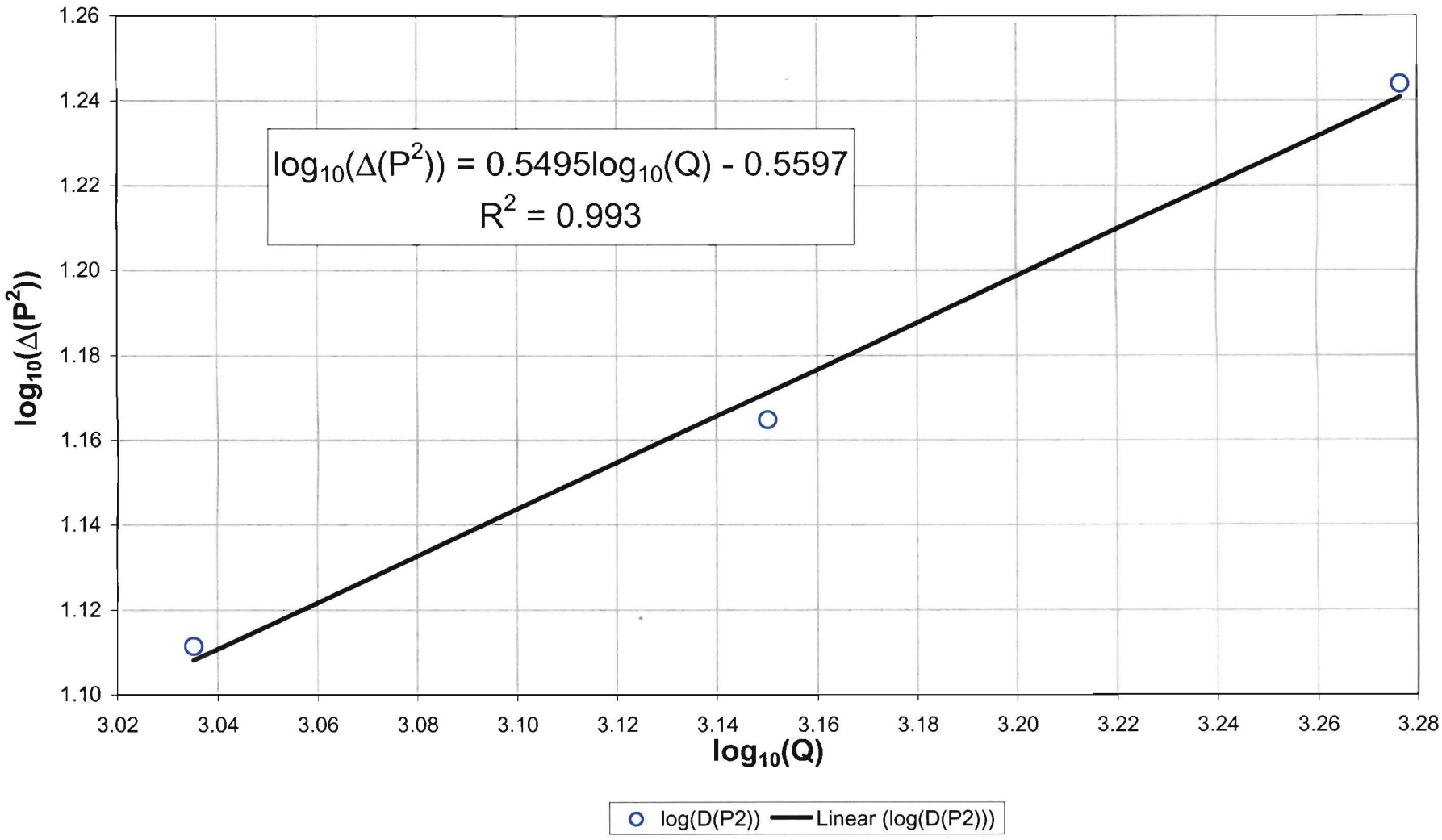


RWM, 08/28/03

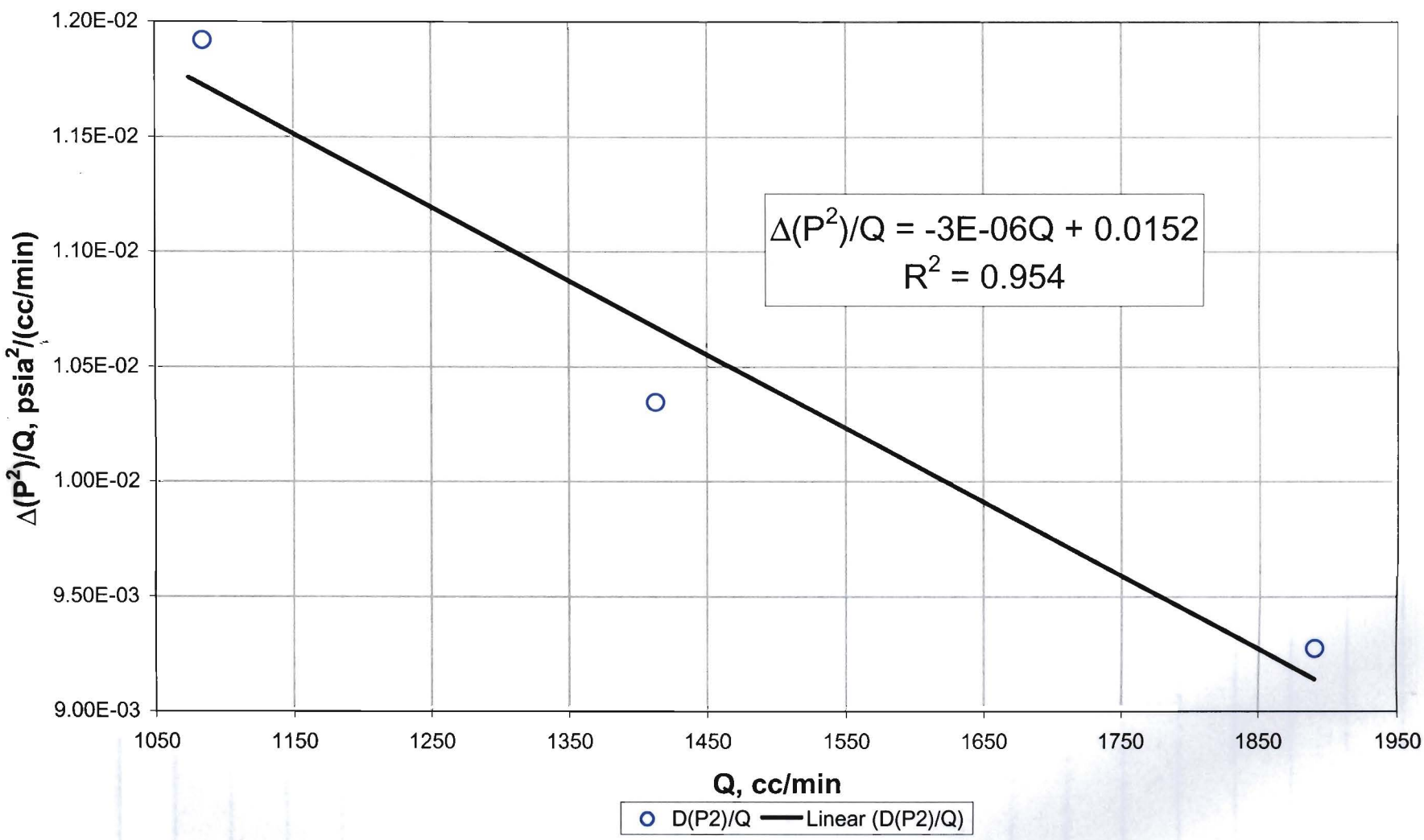
Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 12



Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 12

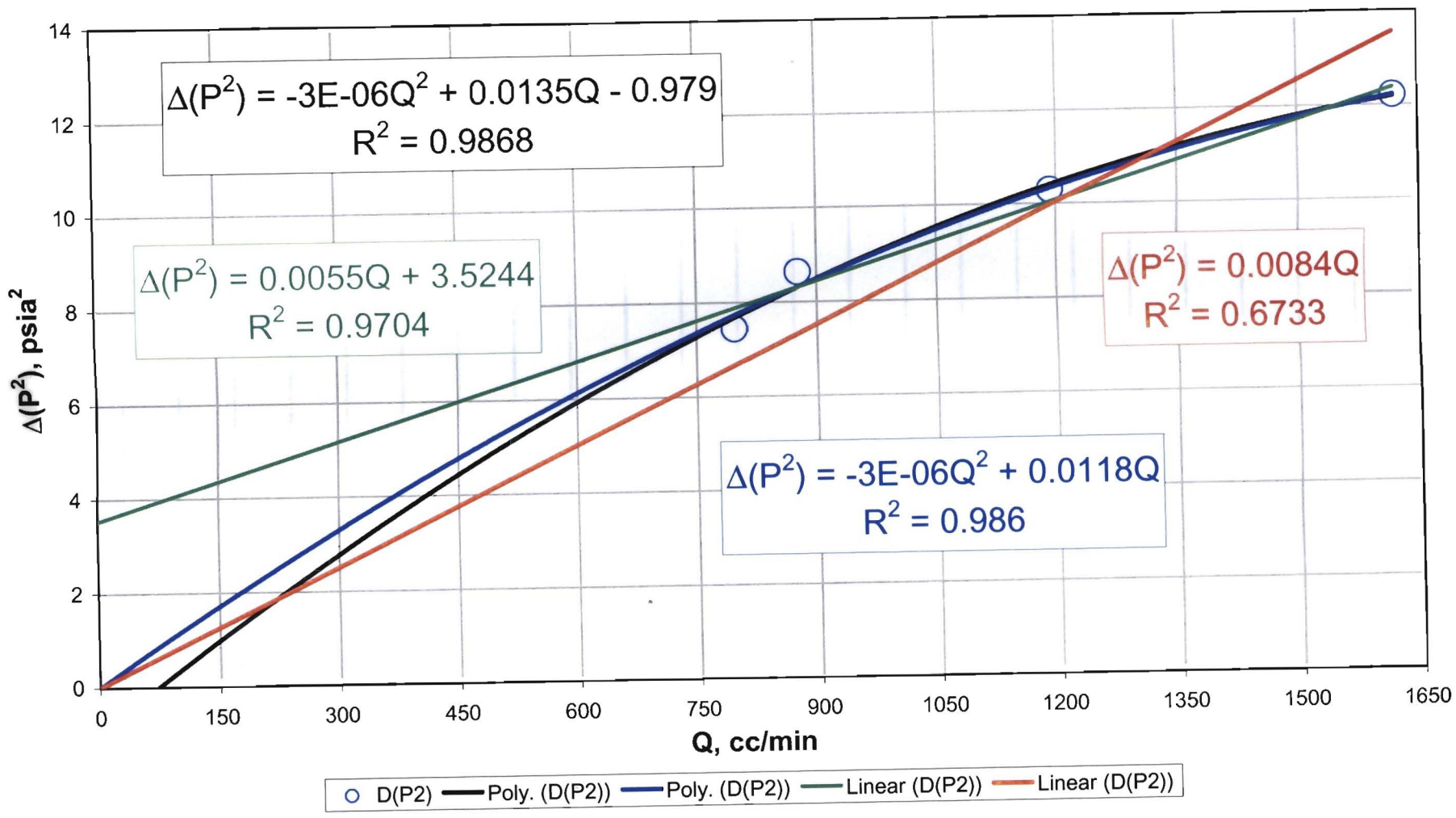


Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 12



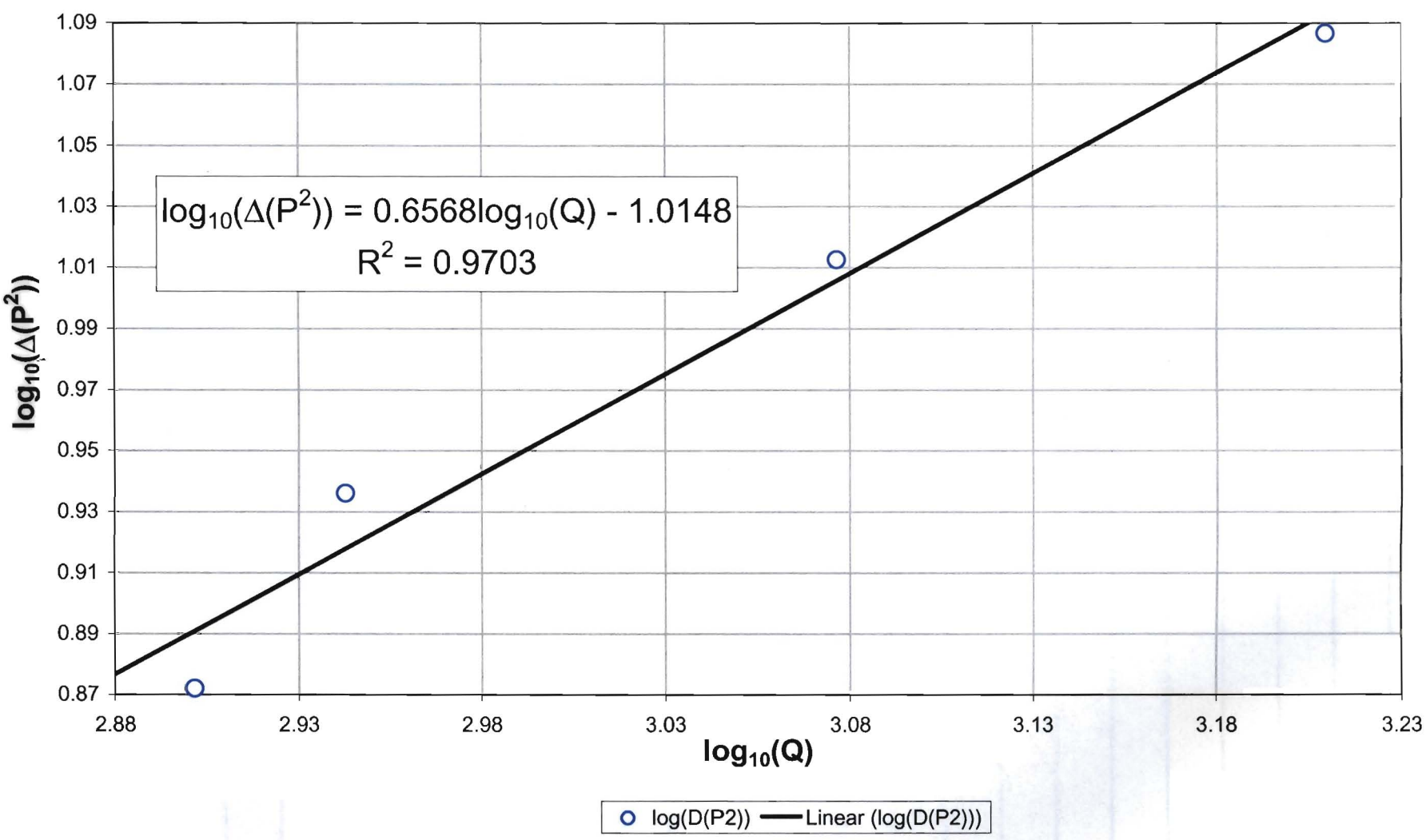
RNM, 08/22/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 13

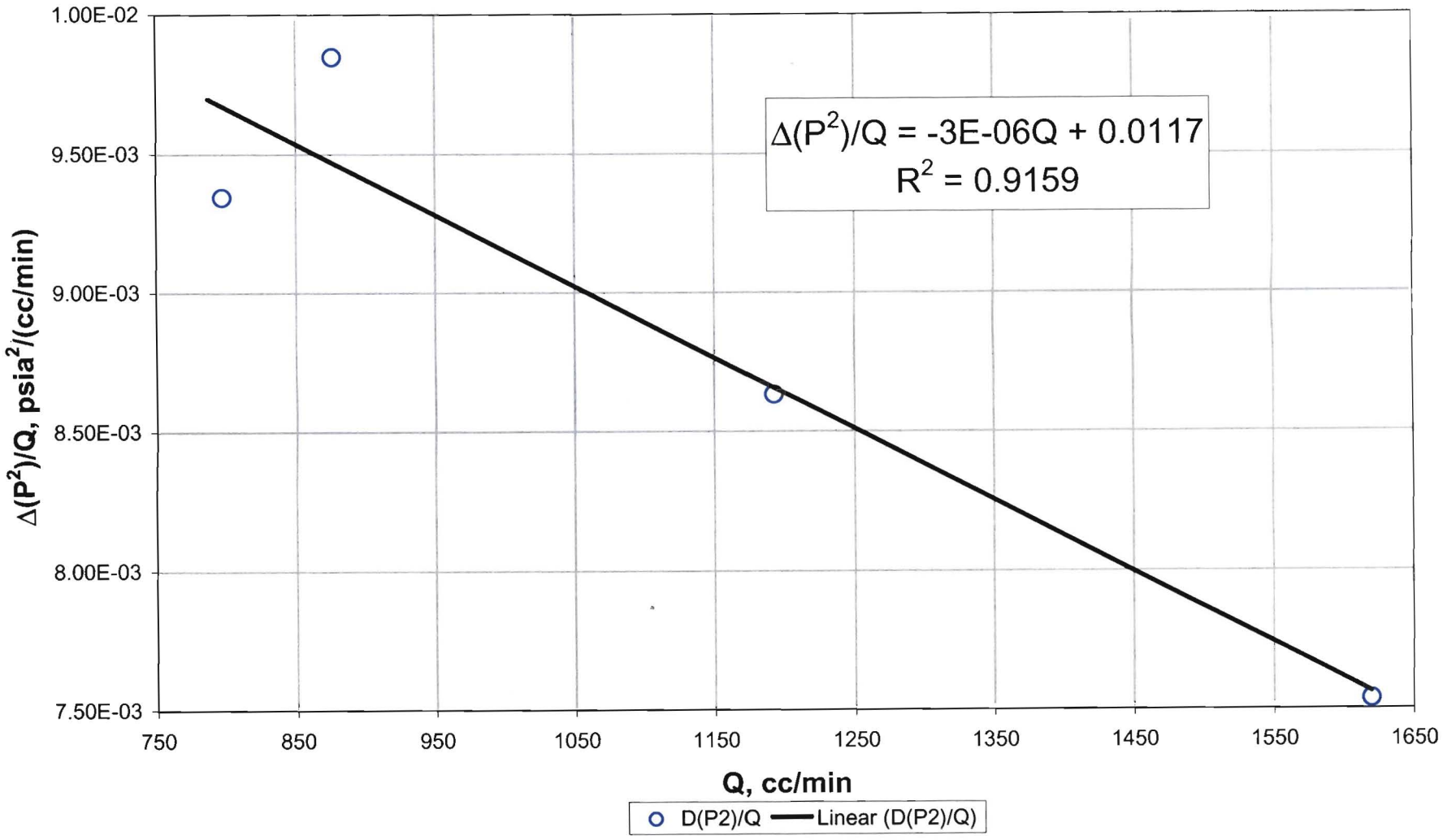


RNM, 08/22/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 13

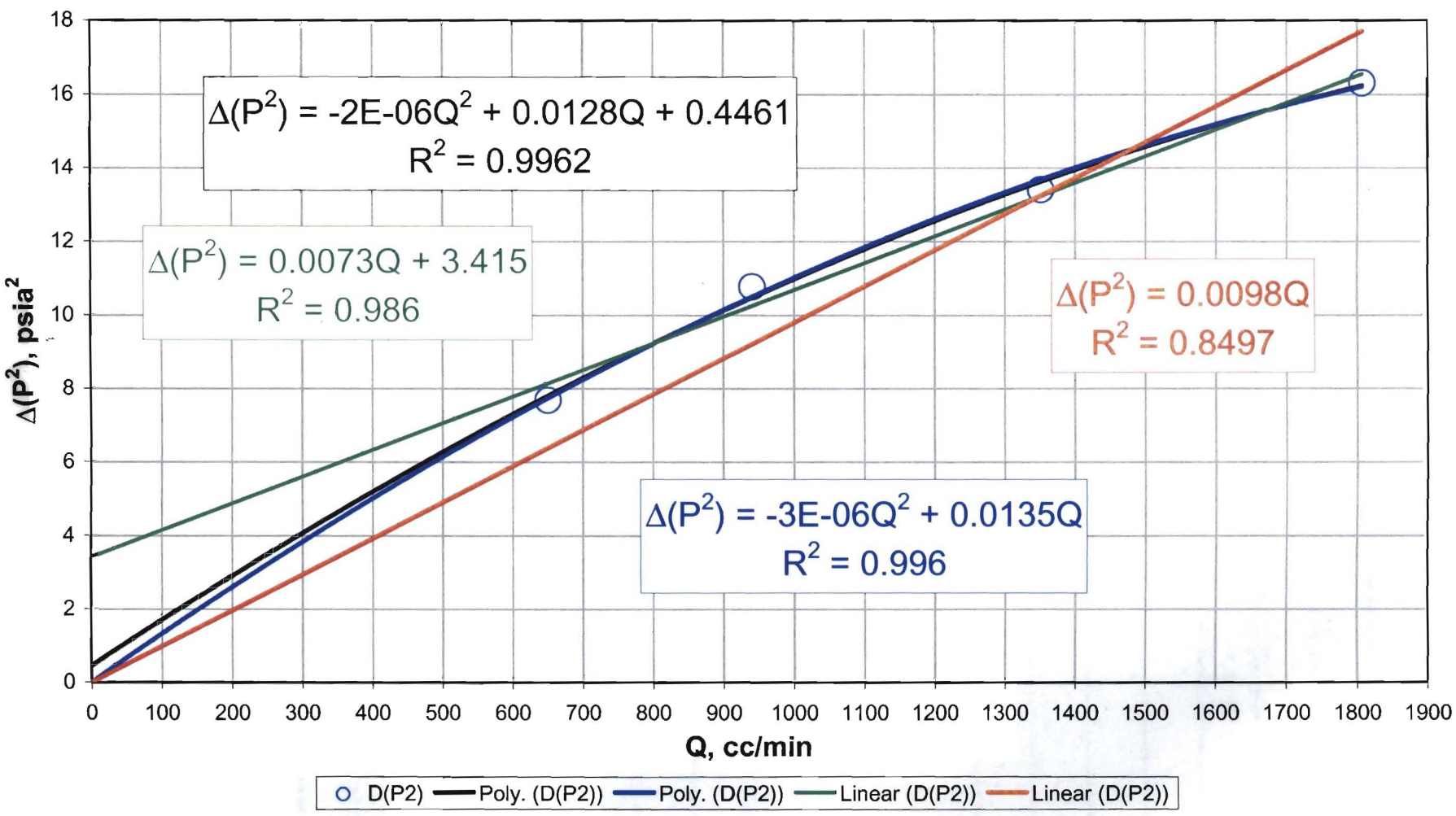


Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 13



RNM, 08/22/02

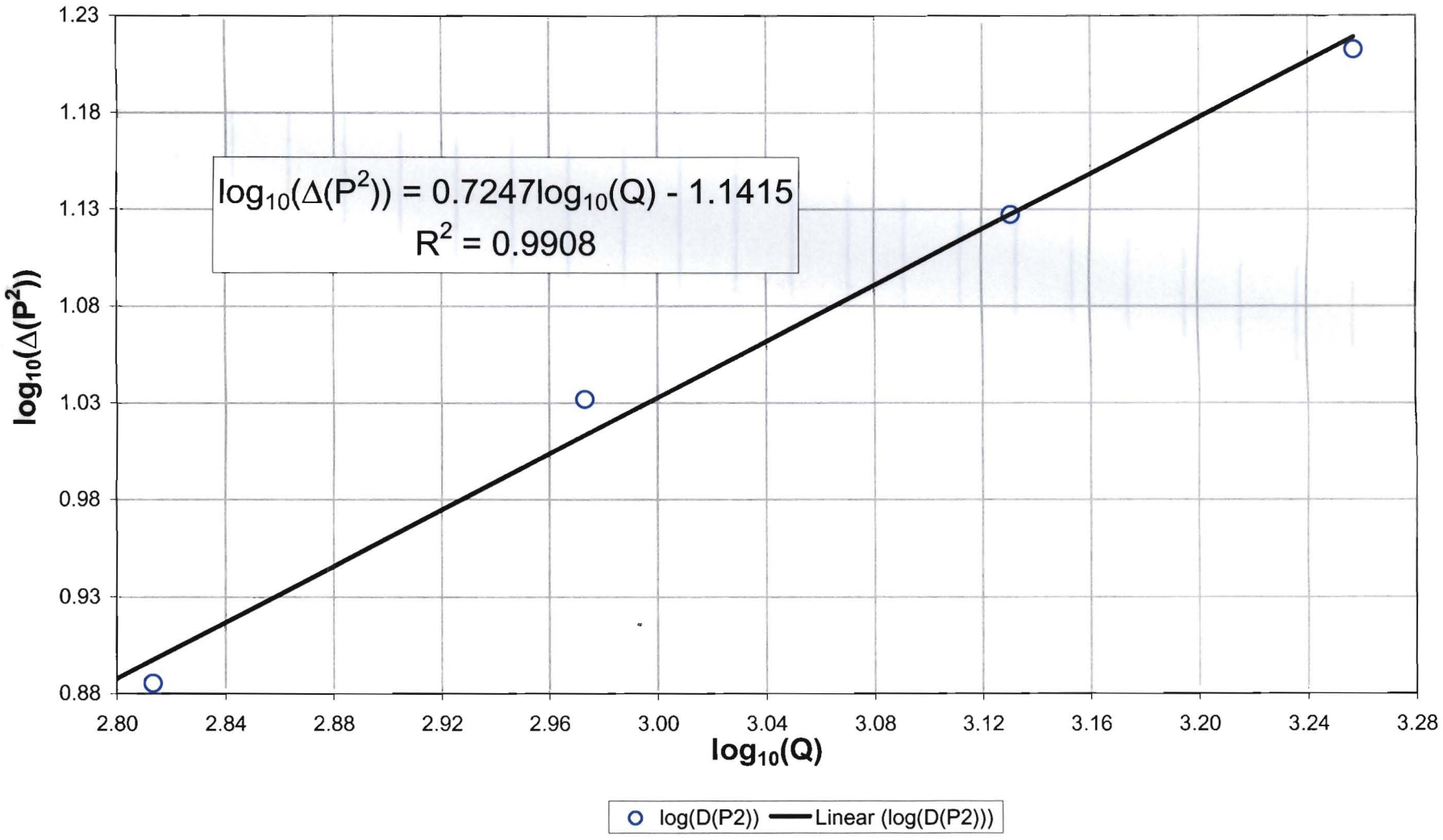
Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 14



RNM, 08/22/02

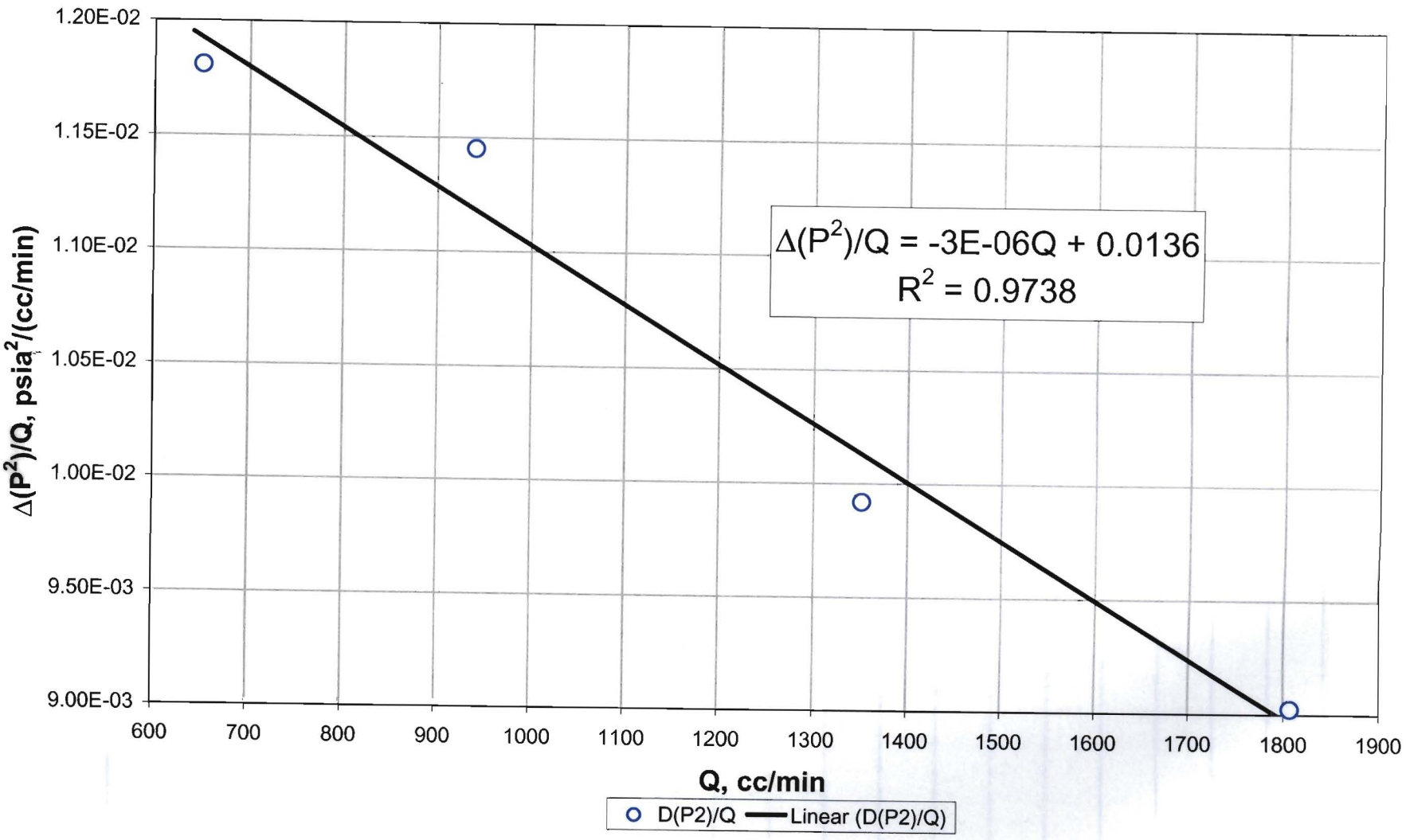
RWM, 08/22/02

Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 14

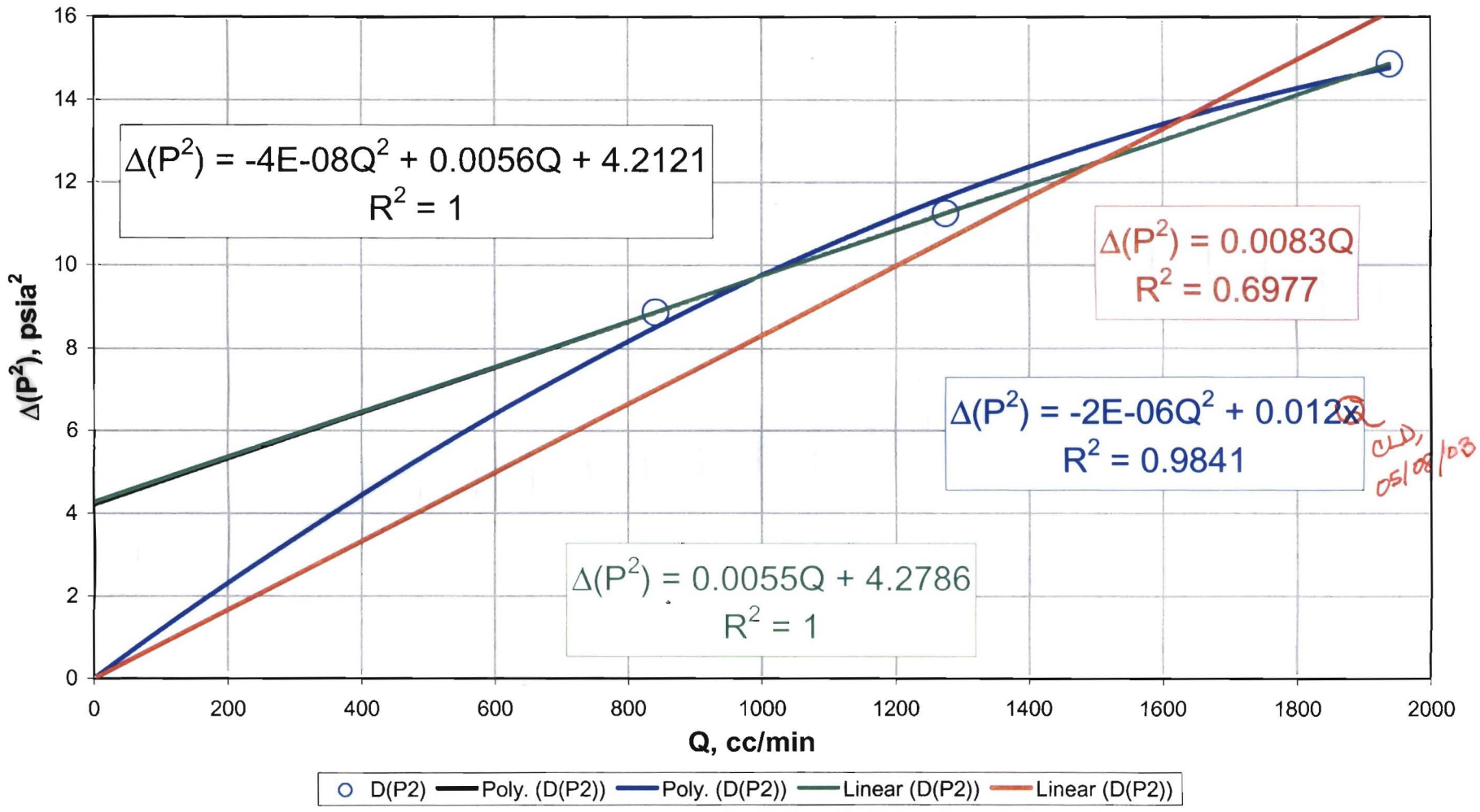


RWM, 08/22/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 14



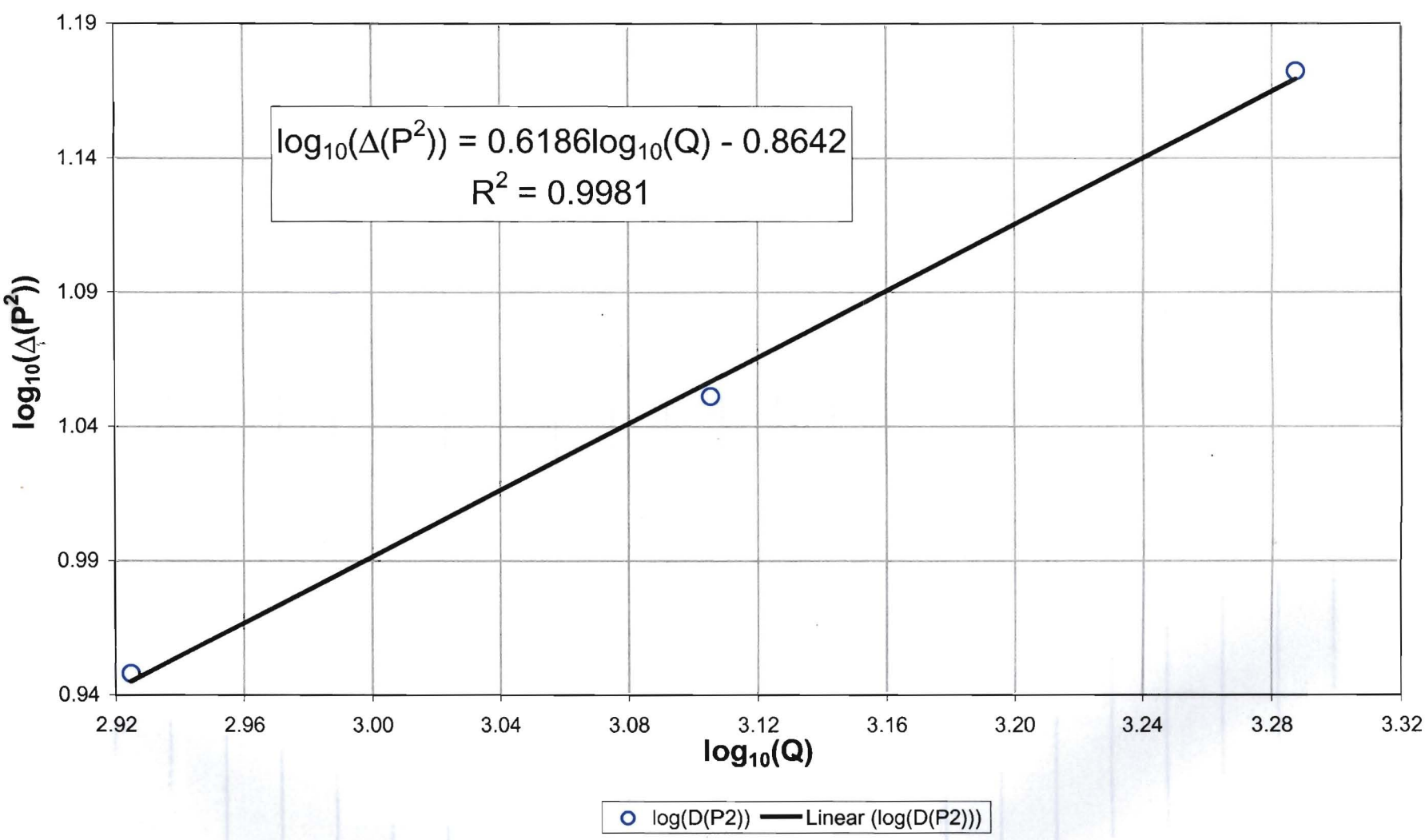
Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 15



CLD, 05/08/03

RNM, 08/22/02

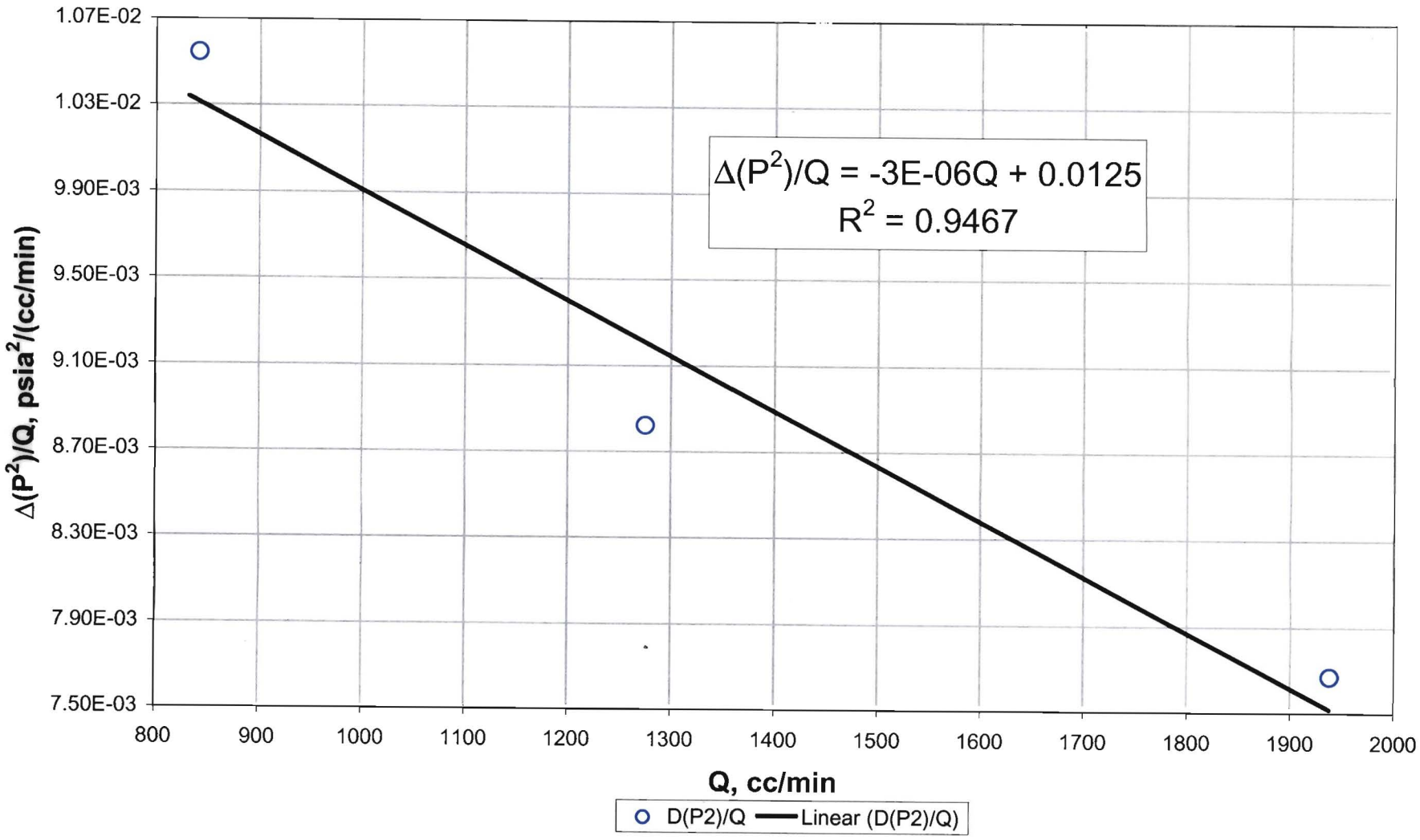
Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 15



RNM, 08/22/02

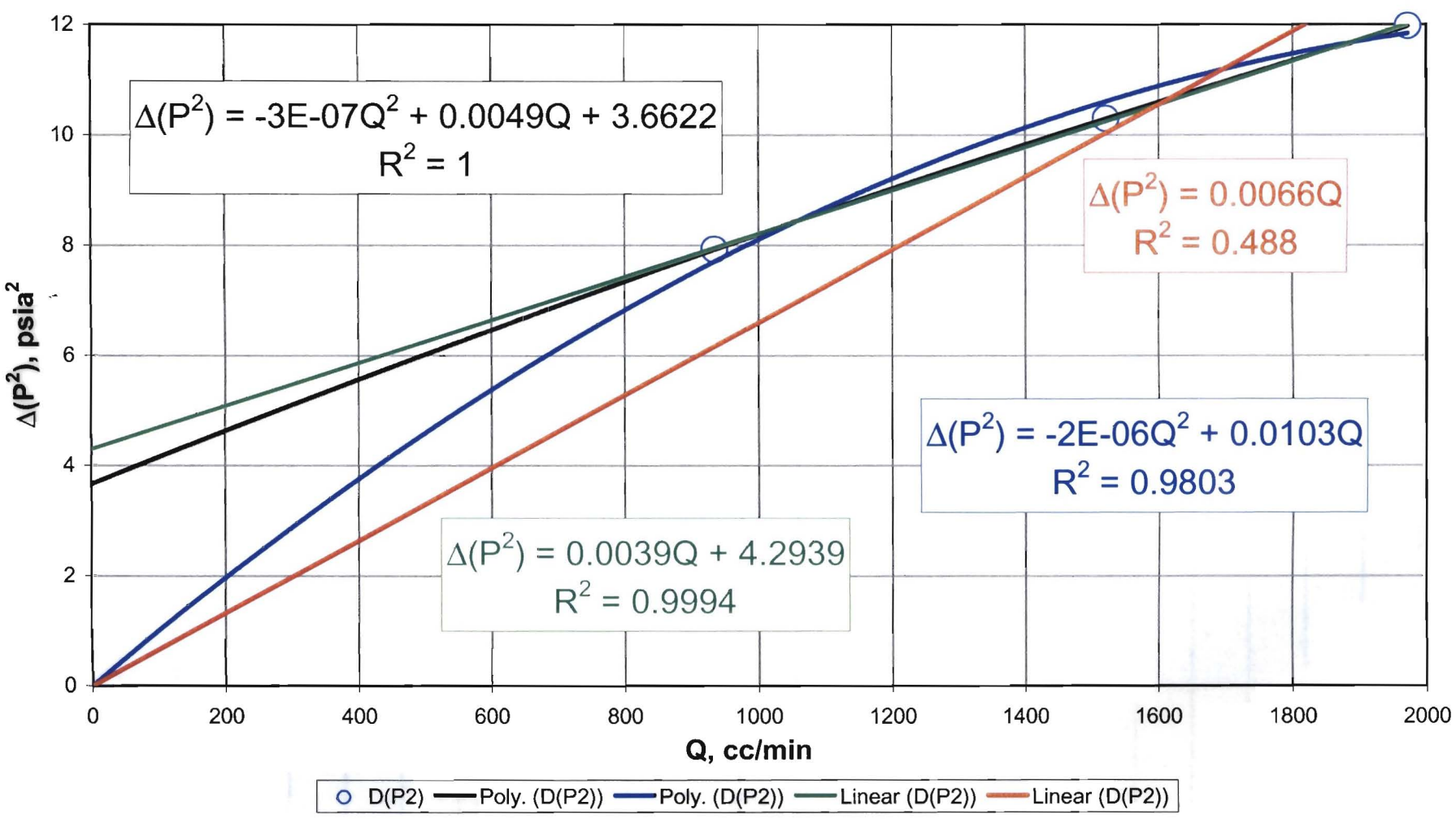
RWM, 08/22/02

Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 15

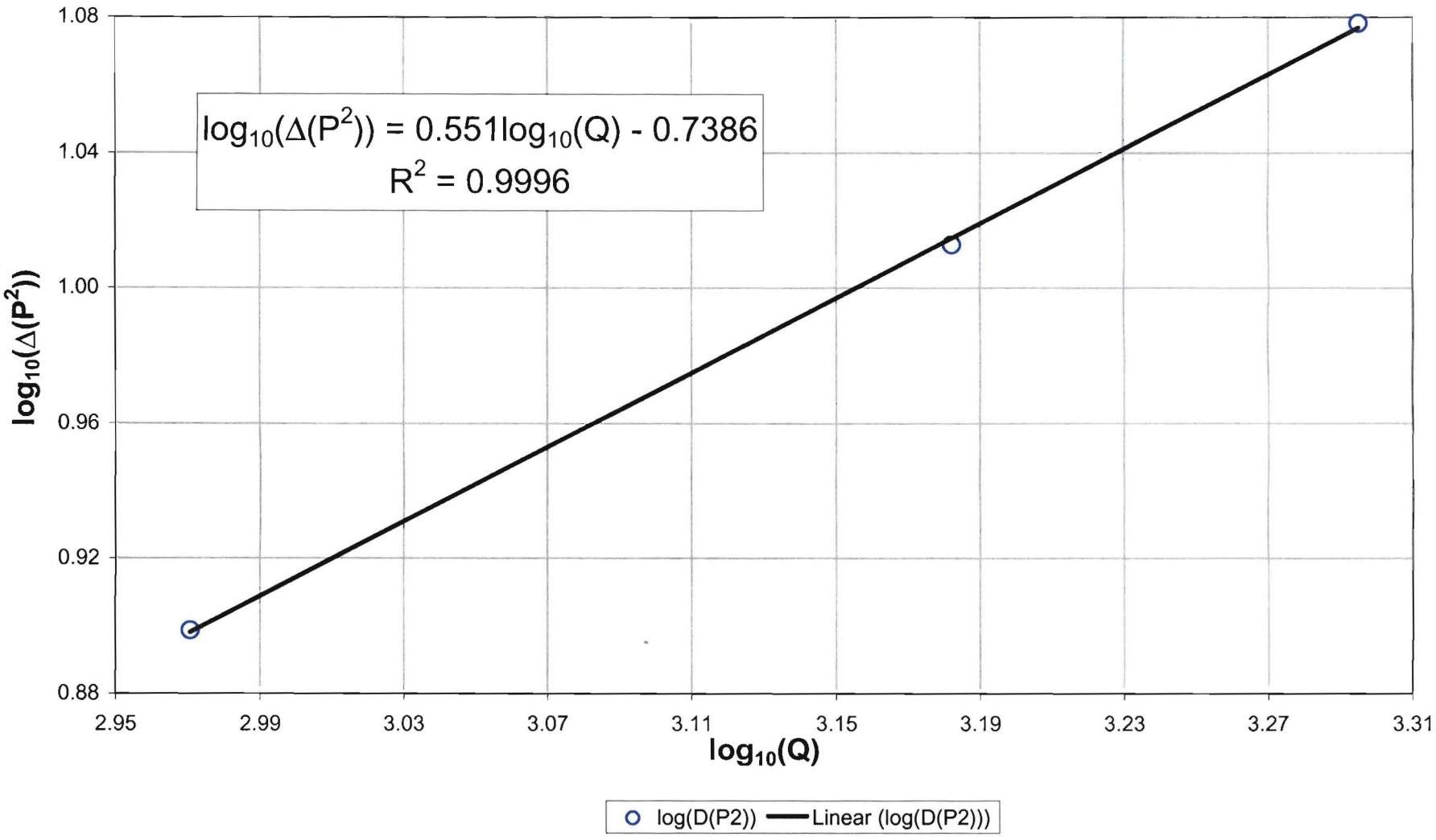


RWM, 08/22/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 16

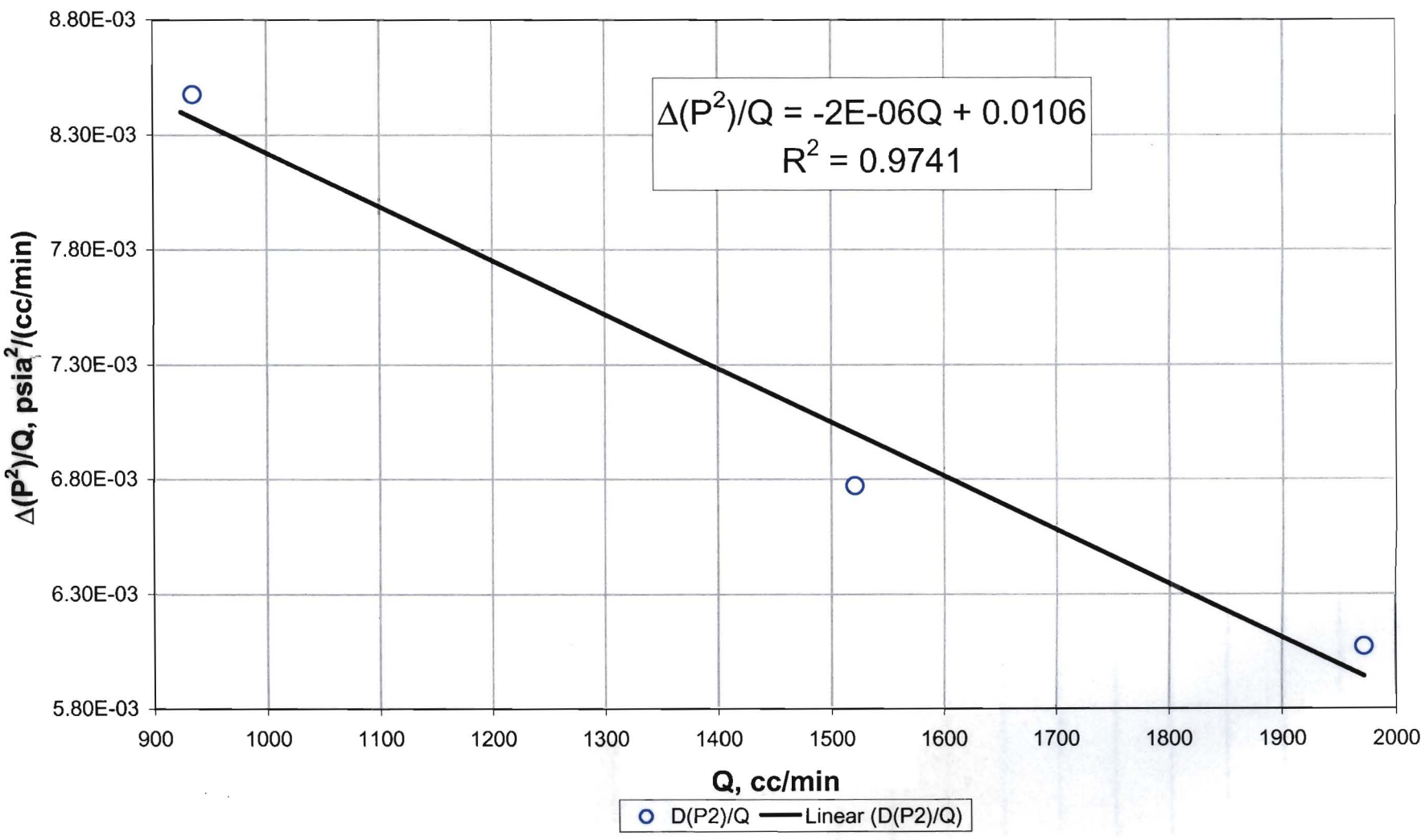


Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 16



RWM, 08/22/02

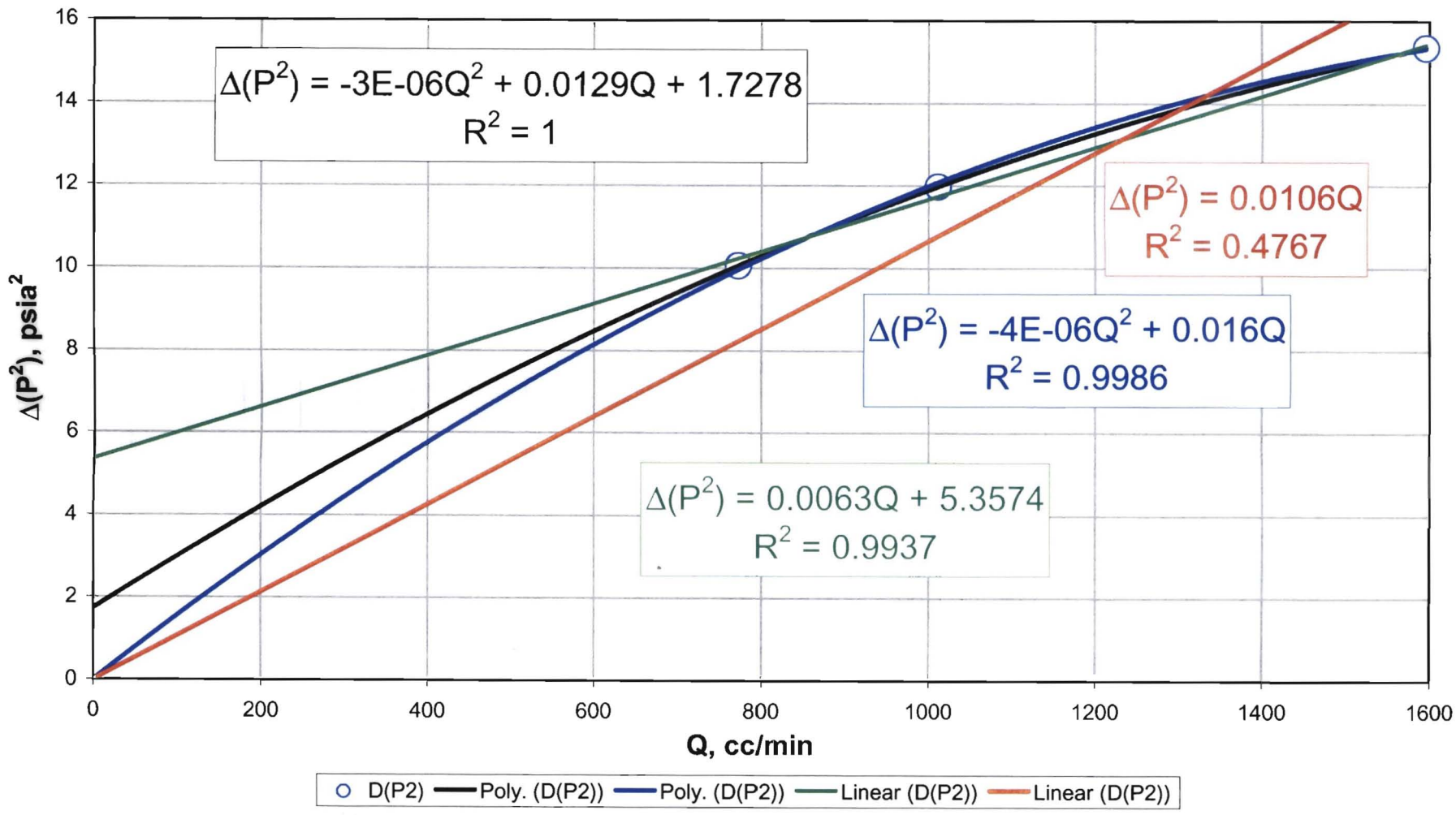
Final check for high velocity flow effects:
High velocity flow effects are present when the slope is non-zero and positive.
X Transect: Drillhole 16



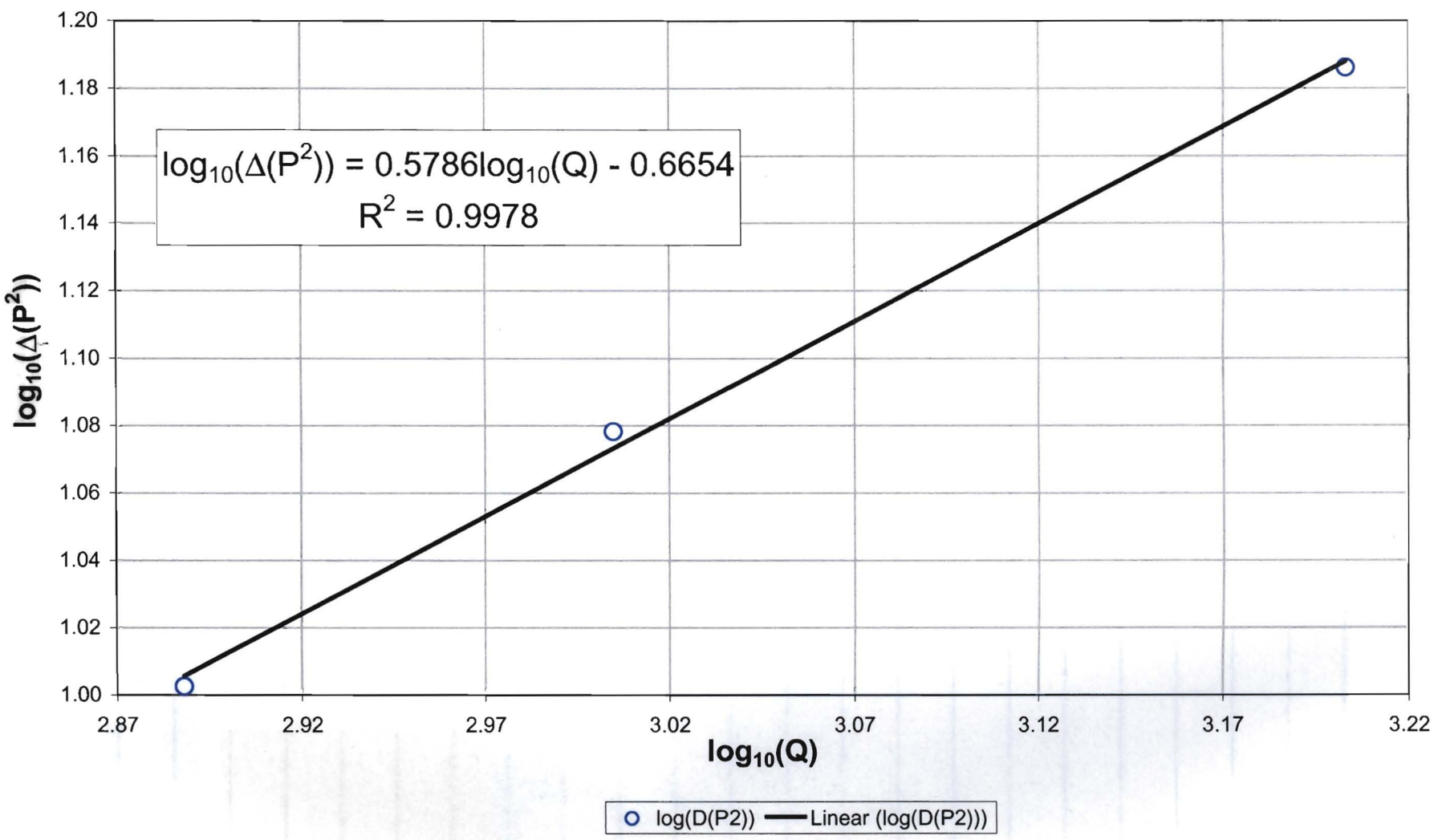
RWM, 08/22/02

RNM, 08/22/02

Relationship between steady-state differential pressures squared and flowrate:
If relationship is linear, with the ordinate intercept nearly zero,
there is no high velocity flow effect.
X Transect: Drillhole 17



Log-Log plot of differential pressures squared vs. flowrate--used to identify the presence of high-velocity flow effects (when the slope is greater than unity)
X Transect: Drillhole 17



RNM, 08/22/02