APPENDIX: NORM CALCULATIONS

(DATA REPOSITORY ITEM 2002136)

The following methodology was used to calculate QF*L* parameters (Table DR2). A Microsoft Excel spreadsheet that performs the these calculations is available on request from Rónadh Cox (rcox@williams.edu). Minor phases (MnO, S, P_2O_5, TiO_2) are ignored in this study, but provision for the phases pyrolusite, apatite and rutile exists in the spreadsheet.

1. Point-count data (volume %) are converted to weight % by multiplying each component by its density to get weight/volume, and then normalizing to 100%.
2. Chemical data (weight %) are recalculated volatile-free by subtracting LOI and normalizing to 100%.
3. The weight % values for both point-count data and chemical data are converted to moles by dividing by molecular weights.
4. The weight % values for framework quartz from the point count data (Q+Ch+silica cement) are subtracted from the weight % SiO_2 from the chemical analysis. This quantity (minus the silica cement) is Q_t. The remaining SiO_2 plus all other constituents is the sum of feldspar+lithics+other minerals.
5. A normative mineralogy is constructed as follows:
   (a) All K_2O plus amounts of Al_2O_3 and SiO_2 in the ratio 1:1:6 are assigned to K-spar.
   (b) All MgO is assigned to chlorite, using MgO, Al_2O_3 and SiO_2 in the ratio 5:1:3. (The case Al_2O_3< 5*MgO was not encountered.)
   (c) All Na2O plus amounts of Al_2O_3 and SiO_2 in the ratio 1:1:6 are assigned to albite.
   (d) CaO is assigned to anorthite using the following protocol: if CaO < Al_2O_3, use all CaO. If CaO > Al_2O_3, use an amount of CaO equal to the amount of Al_2O_3 remaining. In either case, use CaO, Al_2O_3 and SiO_2 in the ratio 1:1:2.
   (e) If in step "c" CaO > Al_2O_3, assign excess CaO to calcite.
   (f) All Fe_2O_3 goes to Fe oxide.
   (g) Any remaining Al_2O_3 goes to kaolinite, using Al_2O_3 and SiO_2 in the ratio 1:2.
   (h) Any remaining SiO_2 is assigned to quartz.

12. The molar quantities of the normative minerals are converted to weight % by multiplying by molecular weight. The quantity F* is the sum of normative k-spar+anorthite (+albite, if present) (=a+c+d). The quantity L* is the sum of all other components (=b+e+f+g+h).

Note: Assuming no mass-transfer of material, F* is a *maximum estimate* of the amount of feldspar in the original sediment. Some of the K_2O, which is assigned to F* may have been present in microphenocrysts in volcanic fragments, as illitic material in sedimentary fragments, or as detrital muscovite grains. Similarly, L* is a *minimum estimate* of the amount of lithic material in the original deposit, because some of the material assigned to feldspar may have actually occurred in lithic grains. In addition, some material which may have occurred as non-feldspar detrital mineral grains, e.g. garnet, epidote etc., is also unavoidably included in L*.

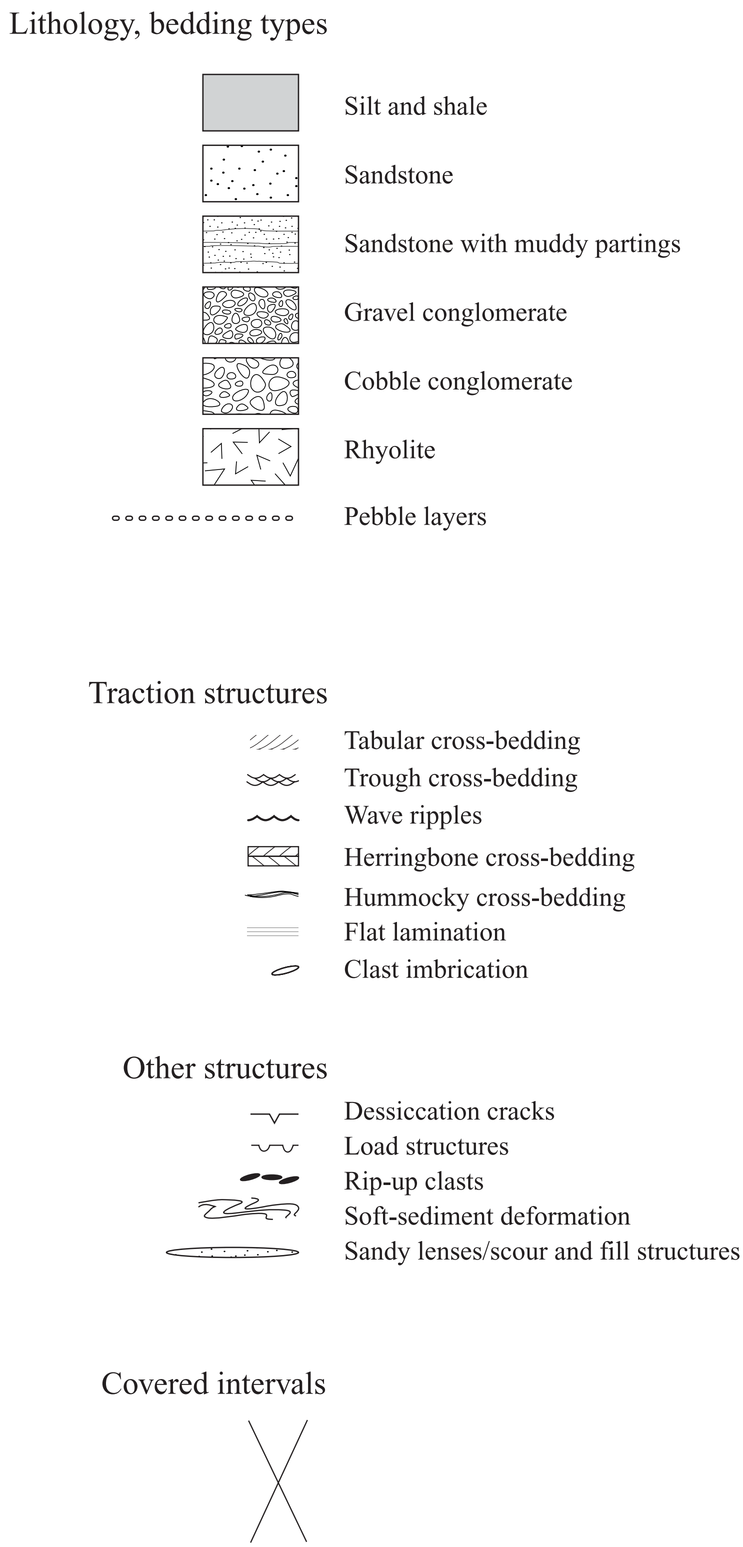
DATA REPOSITORY FIGURE CAPTIONS

Fig. DR1. Stratigraphic log of the Pine Creek Conglomerate type section at Pine Creek. Thicknesses in metres. This log, and the logs in Figs. 7-9, represent data collected at cm-scale for sections up to 160 m thick. For this reason the logs are highly stylized. Sedimentary structures are below the resolution of the logs, so their positions in the sections are indicated at the side.

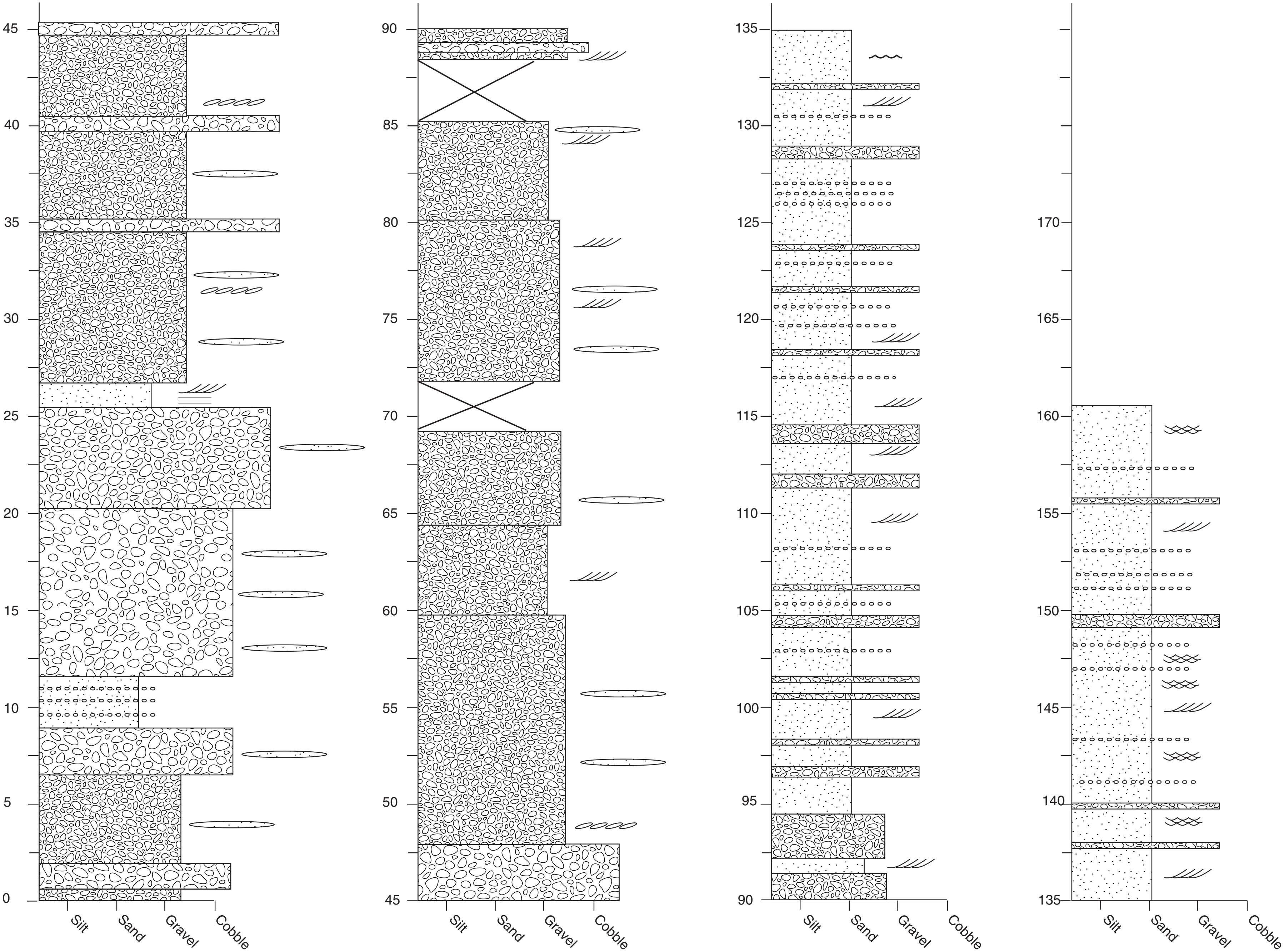
Fig. DR2. Logs of the lower part of the Deadman Quartzite at two locations in the Mazatzal Mountains and at Pine Creek. The unit is sedimentologically homogeneous throughout the outcrop area, but the more proximal deposits in the Pine Creek area show soft-sediment deformation, indicating a steeper depositional slope. Thicknesses in metres. Legend and explanation as for Fig. DR1.

Fig. DR3. Stratigraphic logs of the Maverick Shale. The logs represent the complete formation, but were measured in separate areas where structurally coherent sequences were available. Stratigraphic height increases from left to right. Thicknesses in metres. Legend and explanation as for Fig. DR1.

Fig. DR4. Logs of representative portions of the Mazatzal Peak Quartzite. Stratigraphic height increases from left to right. Thicknesses in metres. Legend and explanation as for Fig. DR1.

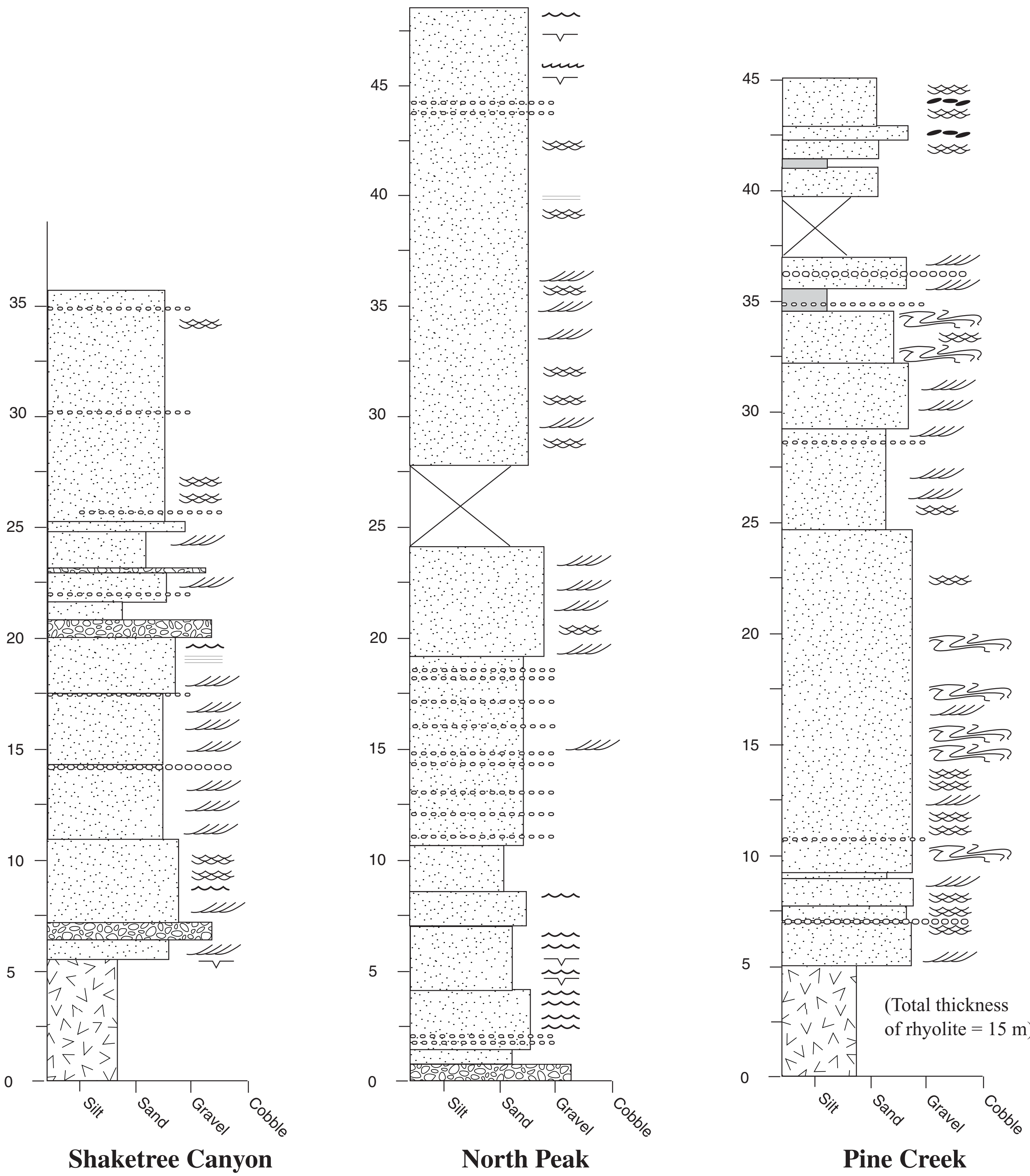


Cox et al., Legend to stratigraphic logs (Figs. DR1-DR4)

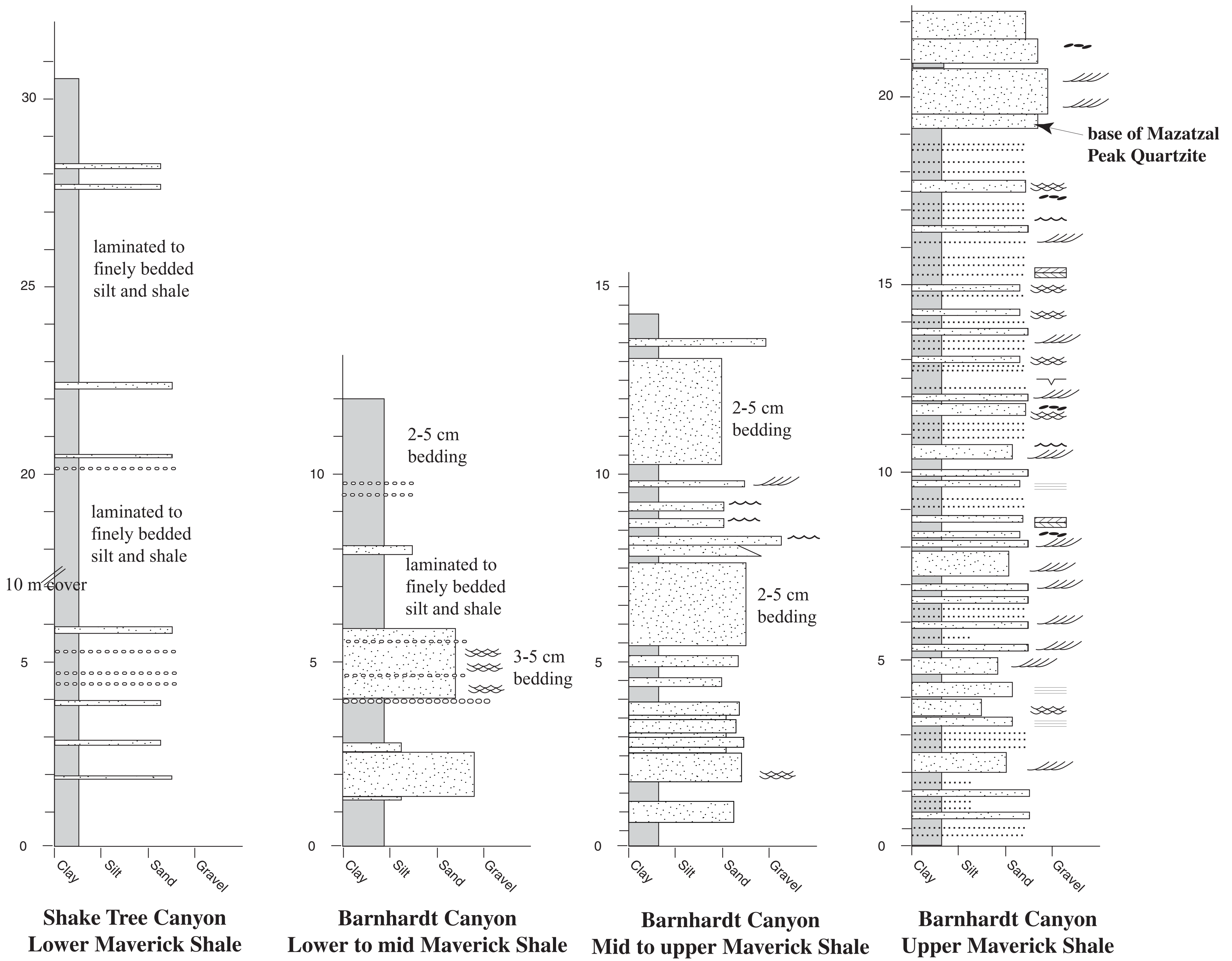


Cox et al. Fig. DR 1

Cox et al. Fig. DR 1

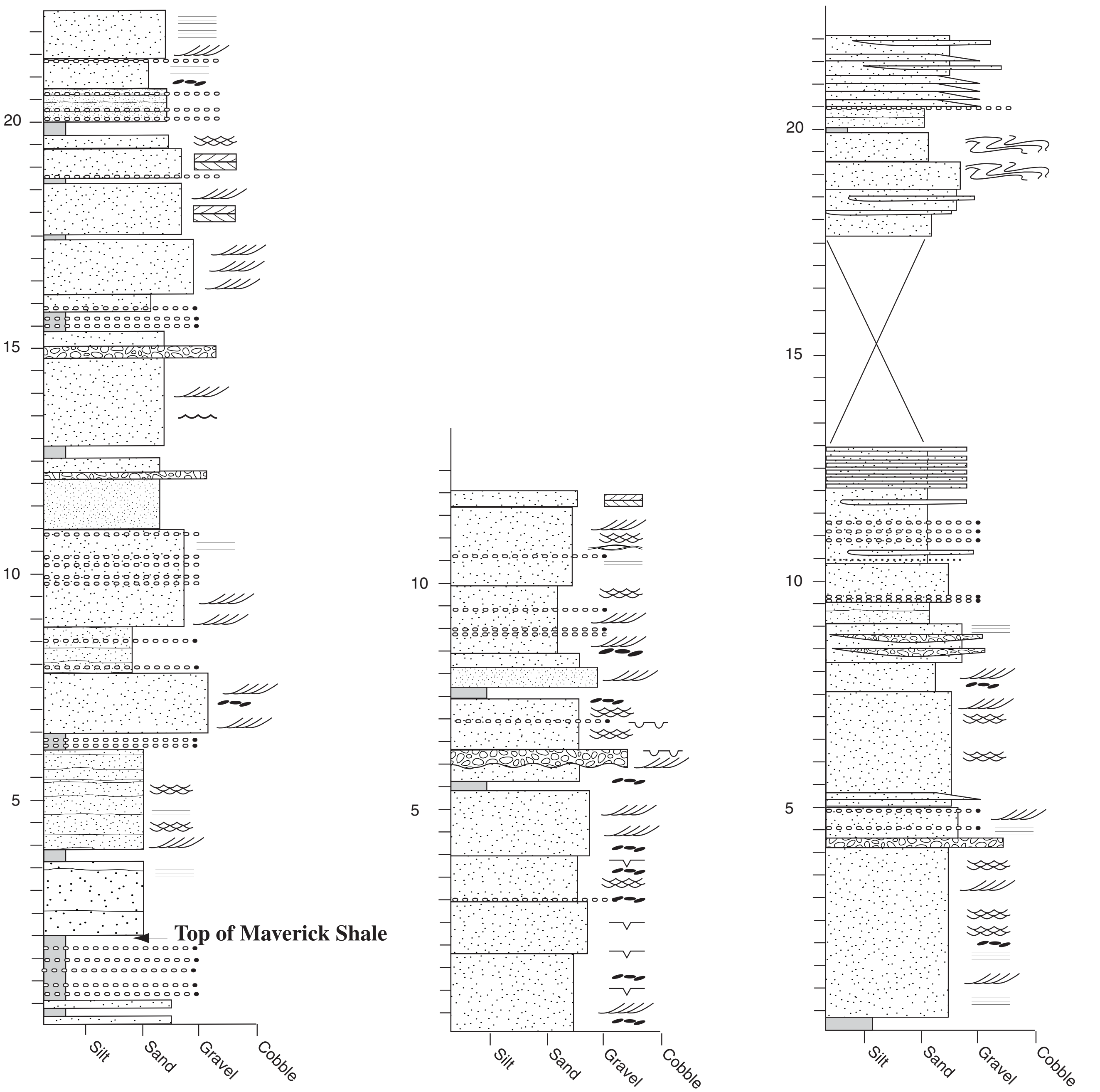


Cox et al. Fig. DR2



Cox et al. Fig. DR 3

Cox et al. Fig. DR 3



Shaketree Canyon Lower Mazatzal Peak Quartzite

Lower Barnhardt Canyon Middle Mazatzal Peak Quartzite

Upper Barnhardt Canyon Middle to Upper Mazatzal Peak Quartzite

Cox et al. Fig. DR 4

Table DR1. Petrographic analysis of Mazatzal Group sandstones in volume percent. Data were collected using a modified Gazzi-Dickinson method (Cox, 1995). 400 framework grains were counted per thin section. Matrix and cement were also recorded, so the total number of datapoints per section ranged up to 680. The error on the compositional estimates therefore ranges from ±3% to ±5% (Van der Plas and Tobi, 1965). QFL point count data notation is from Dickinson and Suczek (1979). Normative QF*L* values are calculated from petrologic and chemical data (Table DR2), using methods of Cox and Lowe (1995); F*=normative detrital feldspar, L*=normative detrital lithic fragments (see text and Appendix for explaination). • = Chemically analyzed samples; see Table DR2. t = Point count data from Trevena (1979)

				POINT-COUNT COMPOSITION IN VOLUME PERCENT												QFL PARAMETERS					
				Detrital Grains								Authigenic components				Dickinson QtFL			Normative QtF*L*		
Sample Number		Formation	Locality	Qm	Qp	Ft	Lv	Ls	Lu	Chert	Other	Matrix	Silica	Fe Oxide	Total	**Qt**	**F**	**L**	**Qt**	**F***	**L***
DM.STC.443		Deadman Quartzite	Shaketree Canyo	68	2	-	1	-	-	2	-	24	3	-	100	99	-	1			
DM.STC.44	•	Deadman Quartzite	Shaketree Canyo	68	3	-	-	-	-	2	-	18	10	-	100	100	-	0	80	-	20
MQP707101		Deadman Quartzite	Shaketree Canyo	73	1	-	-	3	-	3	-	19	1	1	100	96	-	4			
MQP707102		Deadman Quartzite	Shaketree Canyo	84	2	-	-	-	-	3	-	-	10	-	100	100	-	-			
MQP707103		Deadman Quartzite	Shaketree Canyo	81	-	-	-	-	-	1	1	-	17	-	100	100	-	-			
MQP707104		Deadman Quartzite	Shaketree Canyo	84	-	-	-	-	-	-	2	4	10	-	100	100	-	0			
MQP707105		Deadman Quartzite	Shaketree Canyo	81	3	-	-	-	-	1	-	0	12	4	100	100	-	-			
MQP62622		Deadman Quartzite	Shaketree Canyo	78	-	-	-	-	-	2	-	8	11	1	100	100	-	-			
MQP62623	•	Deadman Quartzite	Shaketree Canyo	62	2	1	-	-	-	2	-	16	16	2	100	99	1	-	76	2	22
MQP62625		Deadman Quartzite	Shaketree Canyo	71	-	-	-	-	-	-	-	20	8	1	100	100	-	-			
MD4+	t	Deadman Quartzite	Maverick Basin	74	3	-	-	-	1	1	2	3	17	-	100	99	-	1			
MQP7026B		Deadman Quartzite	North Peak	71	3	-	-	1	-	2	-	3	17	3	100	99	-	1			
MQP70371		Deadman Quartzite	North Peak	78	-	-	-	-	-	2	-	4	17	-	100	100	-	-			
MQP70372		Deadman Quartzite	North Peak	79	4	-	-	-	-	2	-	5	11	-	100	100	-	0			
MQP70373		Deadman Quartzite	North Peak	83	-	-	-	-	-	2	-	5	10	-	100	99	0	0			
MQP70374	•	Deadman Quartzite	North Peak	69	-	-	-	-	-	4	-	12	12	3	100	100	-	0	80	3	17
MQP62730		Deadman Quartzite	Pine Creek	70	2	1	-	-	-	-	1	19	6	3	100	99	1	-			
MQP62731		Deadman Quartzite	Pine Creek	73	4	-	1	-	-	7	1	3	10	1	100	99	0	1			
MQP62732		Deadman Quartzite	Pine Creek	76	-	-	-	-	-	9	-	8	4	4	100	100	-	-			
MQP62733		Deadman Quartzite	Pine Creek	68	-	-	-	-	-	7	1	9	10	6	100	100	-	-			
MQP62733A	•	Deadman Quartzite	Pine Creek	59	-	1	-	9	-	12	1	10	7	2	100	88	1	11	74	2	24
MQP62734		Deadman Quartzite	Pine Creek	71	4	-	-	1	-	5	-	13	4	4	100	99	-	1			
MQP62737		Deadman Quartzite	Pine Creek	74	-	-	-	-	-	2	-	11	15	-	100	100	-	-			
MQP62739		Deadman Quartzite	Pine Creek	84	-	-	-	-	-	2	-	6	8	-	100	100	0	-			
TB6A	t	Deadman Quartzite	Pine Creek	52	4	-	-	-	1	1	1	30	12	-	100	98	-	2			
TB10A+	t	Deadman Quartzite	Pine Creek	51	6	-	-	1	1	-	1	33	8	-	100	98	-	2			
TB12H	t	Deadman Quartzite	Pine Creek	63	3	-	-	-	2	1	1	18	12	-	100	97	-	3			
AVERAGE				**72**	**3**	**1**	**1**	**3**	**1**	**3**	**1**	**12**	**10**	**2**	**100**	**99**	**0**	**2**	**78**	**2**	**21**
MM5A	t	Maverick Shale	Maverick Basin	62	1	-	-	1	4	1	-	9	22	-	100	93	-	7			
MM7A+	t	Maverick Shale	Maverick Basin	65	7	3	3	1	-	3	1	1	17	-	100	93	3	4			
MM9E	t	Maverick Shale	Maverick Basin	75	2	-	-	-	-	2	-	2	18	-	100	100	-	-			
TB15B+	t	Maverick Shale	Pine Creek	61	5	-	-	-	-	2	4	19	9	-	100	100	-	-			
M.TB.172	•	Mazatzal Peak Quart	Barnhardt Canyo	58	12	-	-	-	-	2	-	14	14	-	100	100	-	0	84	3	13
M.TB.175	•	Mazatzal Peak Quart	Barnhardt Canyo	56	14	-	-	-	-	4	1	12	13	1	100	100	-	-	84	1	15
M.BC.450	•	Mazatzal Peak Quart	Barnhardt Canyo	60	3	-	3	-	-	6	-	23	5	-	100	95	0	5	73	6	21
M.BC.452		Mazatzal Peak Quart	Barnhardt Canyo	60	3	-	3	1	-	2	-	26	4	-	100	94	0	6			
MQP62511		Mazatzal Peak Quart	Barnhardt Canyo	64	-	-	-	-	-	6	-	25	5	1	100	100	-	0			
MQP62512	•	Mazatzal Peak Quart	Barnhardt Canyo	64	1	2	2	1	-	4	1	21	2	3	100	95	2	3	69	10	22
MQP62513		Mazatzal Peak Quart	Barnhardt Canyo	64	-	-	-	1	-	7	-	23	4	2	100	99	0	1			
MQP62514		Mazatzal Peak Quart	Barnhardt Canyo	72	-	-	-	3	-	6	-	12	6	2	100	96	-	4			
MQP62515		Mazatzal Peak Quart	Barnhardt Canyo	66	-	-	-	1	-	8	-	16	8	1	100	98	-	2			
MQP6304B	•	Mazatzal Peak Quart	Barnhardt Canyo	80	1	1	-	-	-	-	1	3	10	5	100	99	1	-	86	7	7
MQP63047	•	Mazatzal Peak Quart	Barnhardt Canyo	81	-	-	-	1	-	1	-	7	10	2	100	99	-	1	89	2	9
MQP63053	•	Mazatzal Peak Quart	Barnhardt Canyo	73	-	-	-	1	-	-	-	13	14	-	100	99	-	1	84	6	10
MQP70485		Mazatzal Peak Quart	Barnhardt Canyo	75	-	-	-	-	-	11	-	7	3	4	100	100	-	0			
BC1C	t	Mazatzal Peak Quart	Barnhardt Canyo	67	3	1	1	-	-	2	1	4	22	-	100	98	1	1			
BC2A	t	Mazatzal Peak Quart	Barnhardt Canyo	76	4	-	1	2	2	-	-	4	12	-	100	95	-	5			
BC5A	t	Mazatzal Peak Quart	Barnhardt Canyo	45	3	1	-	-	3	3	-	23	23	-	100	93	2	5			
BC7N	t	Mazatzal Peak Quart	Barnhardt Canyo	74	2	-	-	-	3	-	-	15	6	-	100	96	-	4			
BC9C	t	Mazatzal Peak Quart	Barnhardt Canyo	87	5	-	-	-		1	-	2	6	-	100	100	-	-			
BC10C	t	Mazatzal Peak Quart	Barnhardt Canyo	62	1	-	-	-	1	2	1	14	19	-	100	98	-	2			
BC12AA	t	Mazatzal Peak Quart	Barnhardt Canyo	81	4	-	-	-	1	2	-	1	12	-	100	99	-	1			
BC12I	t	Mazatzal Peak Quart	Barnhardt Canyo	83	4	-	-	-	1	1	-	4	8	-	100	99	-	1			
MQP707111		Mazatzal Peak Quar	Shaketree Canyo	61	-	-	-	2	-	12	1	14	7	3	100	97	0	3			

Table DR2. XRF analyses for Mazatzal Group quartzites. Samples were analysed commercially by Activation Laboratories*. Data are ir

Sample Number	Formation	Locality	Major oxide concentrations									
			SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	TiO_2	MnO	P
DM.STC.444	Deadman Quartzite	Shaketree Canyon	92.8	4.6	1.0	0.00	0.00	0.00	0.00	0.10	0.01	0
MQP62623	Deadman Quartzite	Shaketree Canyon	94.8	2.1	1.5	0.18	0.02	0.14	0.09	0.13	0.00	0
MQP70374	Deadman Quartzite	North Peak	90.9	1.9	6.0	0.11	0.07	0.13	0.18	0.09	0.07	0
MQP62733A	Deadman Quartzite	Pine Creek	88.3	3.7	4.4	1.27	0.03	0.15	0.05	0.38	0.02	0
M.TB.172	Deadman Quartzite	Pine Creek	93.1	3.6	2.1	0.00	0.00	0.00	0.40	0.10	0.02	0
M.TB.175	Deadman Quartzite	Pine Creek	94.9	1.9	2.0	0.00	0.00	0.00	0.10	0.10	0.01	0
M.BC.450	Mazatzal Peak Quartzite	Barnhardt Canyon	92.7	3.8	0.8	0.20	0.00	0.00	1.00	0.20	0.01	0
MQP62512	Mazatzal Peak Quartzite	Barnhardt Canyon	89.9	4.7	2.2	0.26	0.05	0.19	1.30	0.12	0.00	0
MQP6304B	Mazatzal Peak Quartzite	Barnhardt Canyon	92.6	3.1	1.4	0.15	0.02	0.17	0.82	0.18	0.00	0
MQP63047	Mazatzal Peak Quartzite	Barnhardt Canyon	98.1	0.7	0.8	0.05	0.05	0.15	0.08	0.03	0.00	0
MQP63053	Mazatzal Peak Quartzite	Barnhardt Canyon	95.7	2.0	0.7	0.11	0.03	0.15	0.59	0.08	0.00	0
MQP707113	Mazatzal Peak Quartzite	Shaketree Canyon	92.3	3.6	1.1	0.33	0.09	0.15	0.85	0.17	0.01	0
MQP702FL	Mazatzal Peak Quartzite	North Peak	93.4	2.5	1.2	0.11	0.03	0.13	0.21	0.24	0.00	0
MEDIAN			**92.8**	**3.1**	**1.4**	**0.1**	**0.0**	**0.1**	**0.2**	**0.1**	**0.0**	**0**

* Ancaster, Ontario, Canada