





Paul E. Hammond (497-15)

Table DR1. ANALYSES OF GRANDE RONDE BASALT LAVA FLOWS IN UPPER NACHES RIVER BASIN, YAKIMA AND KITTITAS COUNTIES, WASHINGTON

	MUSEUM-2	M2	M2	M2	M2	M2	M2	M2	M2	M2	M2	M2	M2	M2	M2	M2	M2	M2	M2
SN	93301	93303	94115	96192	02017	02095	03074	03075	04105	04106	04202	05028	05031	05034	05045	05051	05096	05097	05098
WSU run	0596	0695	0495	0897	0402	0402	0204	0204	0405(4)	0404(2)	0504(2)	0405(2)	0305(1)	0305(1)	0305(1)	0405(2)	0305(2)	0305(2)	0405(3)
7.5' Quad	Cliffdell	Cliffdell	Weeks Table	Cliffdell	Cliffdell	Weeks Table	Cliffdell	Cliffdell	lanastash Lak	anastash Lak	anastash Lak	Veddle Canyo	Veddle Canyo	Veddle Canyo	Veddle Canyo	Veddle Canyo	Veddle Canyo	Veddle Canyo	Veddle Canyo
UTM N*	5206645	5206620	5186790	5204240	5204860	5192920	5204240	5204240	5203240	5203380	5193660	5178630	5178260	5178210	5177040	5173340	5175840	5176040	5176040
UTM E*	643700	644230	643040	642710	643890	652110	642720	642720	656430	655890	653230	654220	656750	656920	658540	656630	654360	654580	654580
Unnormalized Major Elements (Weight %):																			
SiO2	53.99	53.78	54.96	53.28	54.41	54.39	54.53	54.61	53.23	53.86	53.63	53.49	53.21	53.53	53.70	52.86	53.44	53.66	53.68
Al2O3	13.73	13.70	14.01	13.84	13.98	14.16	1.833	14.33	14.40	14.60	1.796	14.22	13.99	14.14	14.02	13.95	14.06	14.15	14.59
TiO2	1.812	1.786	1.816	1.837	1.787	1.816	1.837	1.785	1.814	1.824	1.824	1.784	1.824	1.807	1.817	1.795	1.841	1.751	1.751
FeO	11.45	11.25	11.14	11.32	11.35	10.67	11.73	11.56	10.22	10.76	10.81	10.92	10.73	11.20	11.41	10.71	10.80	10.42	10.09
MnO	0.189	0.185	0.179	0.187	0.189	0.203	0.195	0.193	0.198	0.203	0.197	0.190	0.198	0.201	0.197	0.200	0.198	0.203	0.184
CaO	7.49	7.73	7.71	7.61	7.92	8.94	4.32	7.99	9.10	9.47	4.72	9.14	9.11	9.00	8.78	8.57	8.99	8.93	9.27
MgO	4.34	4.06	4.28	4.37	4.29	4.47	7.85	4.09	4.62	4.36	8.97	4.13	4.18	4.97	4.35	4.77	5.03	4.21	5.13
K2O	1.57	1.45	1.42	1.44	1.42	1.24	3.11	1.44	1.14	1.14	2.84	1.16	1.20	1.18	1.19	1.30	1.25	1.22	1.14
Na2O	3.48	3.22	3.35	3.12	3.04	2.76	1.56	3.14	2.84	2.81	1.28	2.76	2.77	2.78	2.78	2.83	2.82	2.82	2.90
P2O5	<u>0.308</u>	<u>0.293</u>	<u>0.295</u>	<u>0.302</u>	<u>0.289</u>	<u>0.312</u>	<u>0.303</u>	<u>0.304</u>	<u>0.269</u>	<u>0.278</u>	<u>0.300</u>	<u>0.270</u>	<u>0.330</u>	<u>0.276</u>	<u>0.322</u>	<u>0.327</u>	<u>0.272</u>	<u>0.326</u>	<u>0.263</u>
analysis total	98.36	97.45	99.16	97.26	98.68	98.96	99.56	99.49	97.79	99.31	98.78	98.06	97.54	99.11	98.56	97.34	98.65	97.79	99.00
Normalized Results (Weight %):																			
SiO2	54.89	55.19	55.43	54.78	55.14	54.96	54.77	54.89	54.43	54.24	54.29	54.55	54.55	54.01	54.48	54.31	54.18	54.88	54.22
Al2O3	13.96	14.06	14.13	14.23	14.17	14.31	14.19	14.40	14.72	14.70	14.41	14.50	14.35	14.26	14.22	14.33	14.26	14.47	14.74
TiO2	1.842	1.833	1.831	1.837	1.811	1.835	1.841	1.847	1.825	1.826	1.818	1.819	1.870	1.842	1.833	1.867	1.819	1.883	1.769
FeO*	11.64	11.54	11.23	11.64	11.50	10.78	11.78	11.62	10.45	10.83	10.95	11.13	11.00	11.30	11.58	11.00	10.95	10.66	10.19
MnO	0.192	0.190	0.181	0.192	0.192	0.205	0.195	0.194	0.202	0.205	0.199	0.194	0.203	0.203	0.200	0.206	0.200	0.208	0.186
CaO	7.61	7.93	7.78	7.82	8.03	9.03	7.89	8.04	9.30	9.54	9.08	9.32	9.34	9.08	8.91	8.81	9.11	9.14	9.36
MgO	4.41	4.17	4.32	4.49	4.35	4.52	4.34	4.11	4.72	4.39	4.78	4.21	4.28	5.02	4.41	4.90	5.10	4.30	5.18
K2O	1.60	1.49	1.43	1.48	1.44	1.25	1.56	1.44	1.17	1.15	1.29	1.18	1.23	1.19	1.20	1.34	1.26	1.25	1.15
Na2O	3.54	3.30	3.38	3.21	3.08	2.79	3.13	3.16	2.90	2.83	2.88	2.81	2.84	2.80	2.82	2.90	2.86	2.89	2.93
P2O5	<u>0.313</u>	<u>0.301</u>	<u>0.297</u>	<u>0.311</u>	<u>0.293</u>	<u>0.315</u>	<u>0.304</u>	<u>0.306</u>	<u>0.275</u>	<u>0.280</u>	<u>0.304</u>	<u>0.275</u>	<u>0.338</u>	<u>0.278</u>	<u>0.327</u>	<u>0.336</u>	<u>0.276</u>	<u>0.333</u>	<u>0.266</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalized Trace Elements (ppm):																			
Ni	2	6	10	6	16	11	13	16	19	20	19	23	21	25	23	18	24	22	20
Cr	1	17	25	20	29	58	12	12	51	49	48	51	45	50	46	43	49	45	56
Sc	38	34	32	32	37	34	32	32	39	37	37	38	38	39	38	38	38	39	40
V	329	327	330	327	320	312	339	338	324	332	319	331	313	329	304	306	329	312	328
Ba	624	557	541	615	571	861	589	600	488	485	527	486	723	487	535	506	479	635	435
Rb	41	38	38	39	39	28	41	40	25	29	26	27	28	26	29	29	28	30	25
Sr	312	320	316	318	327	335	322	332	312	324	302	324	325	314	319	306	311	327	316
Zr	155	155	154	154	153	154	161	161	150	151	145	155	159	157	160	158	155	162	149
Y	32	33	33	31	32	39	32	33	33.6	32	34	34	34	33	35	36	33	35	33
Nb	12.5	11.8	11.3	12.2	11.9	11.4	10.7	10.7	10.6	11.4	11.8	10.7	11.4	11.0	11.2	11.5	10.6	10.9	11.0
Ga	21	24	21	21	20	20	20	20	20	20	21	21	22	18	21	22	19	21	21
Cu	25	19	22	17	30	36	29	27	37	34	32	38	33	39	34	30	38	33	35
Zn	108	108	110	108	108	118	115	113	110	112	108	109	115	114	112	114	110	117	112
Pb	6	6	5	5	6	8	8	9	6	3	4	4	3	5	4	8	3	3	5
La	1	13	17	6	22	6	19	23	17	19	21	19	22	20	19	23	19	19	18
Ce	0	56	45	33	51	38	50	50	40	41	44	41	45	40	46	46	41	44	39
Th	4	3	2	6	5	4	5	4	2	4	3	1	2	1	1	3	0	1	2
Nd	nd	nd	nd	nd	nd	nd	nd	nd	23	23	21	24	28	24	25	26	24	24	24

\*to nearest 5 m  
"†" denotes values >120% of highest standard.  
nd, not determined

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Table DR1.

SN	93021	93041	93297	93299	93302	93304	93305	93306	93308	94084	94088	94161	94368	94388	94398	94404	94412	95099	95100
WSU run	0695	0695	0695	0695	0596	0596	0596	0695	0695	0495	0495	0495	1194(2)	1194	1194	1194	1194	0596	0596
7.5' Quad	Mt. Clifty	Mt. Clifty	Mt. Clifty	Quartz Mtn	Quartz Mtn	Mt. Clifty	Mt. Clifty	Mt. Clifty	Quartz Mtn	Old Scab Mtn	Old Scab Mtn	Old Scab Mtn	Old Scab Mtn	Cliffdell	Timberwolf Mtn	Weeks Table	Weeks Table	Cliffdell	Cliffdell
UTM N*	5209820	5208700	5207370	5206720	5209270	5209360	5209500	5209740	5209420	5199370	5193670	5204910	5199900	5193500	5191750	5192100	5188450	5202100	5202100
UTM E*	641735	635800	642500	642810	642710	640980	640670	641630	642900	640240	637660	640070	639200	643850	642250	645150	643300	644290	644290
UnnormalizedWeight %:																			
SiO2	53.05	53.28	53.49	52.76	53.19	53.27	53.92	53.07	52.87	54.41	53.68	53.69	55.24	55.15	54.48	54.74	55.06	54.82	52.84
Al2O3	13.88	14.07	13.95	13.71	13.95	13.96	14.21	13.76	13.79	13.99	14.36	14.02	14.46	14.33	13.93	14.43	14.37	14.24	13.85
TiO2	1.735	1.744	1.748	1.723	1.718	1.783	1.717	1.780	1.734	1.802	1.728	1.712	1.826	1.829	1.788	1.728	1.833	1.723	1.760
FeO	10.95	10.99	11.15	11.11	10.99	11.20	11.31	11.28	11.17	11.26	10.24	10.92	10.36	10.42	11.30	10.87	10.93	10.95	10.73
MnO	0.195	0.192	0.196	0.189	0.193	0.200	0.196	0.193	0.189	0.195	0.184	0.19	0.200	0.204	0.201	0.208	0.195	0.173	0.204
CaO	8.50	8.42	8.42	8.33	8.42	8.30	8.54	8.32	8.38	8.27	8.53	8.45	8.37	8.31	8.23	8.78	8.38	8.20	8.21
MgO	4.53	4.57	4.68	4.64	4.89	4.53	5.01	4.30	4.69	4.31	4.31	4.77	4.55	4.55	4.56	4.64	4.44	4.84	4.54
K2O	1.10	1.24	1.23	1.33	1.10	1.08	1.08	1.07	1.08	1.39	1.35	1.25	1.42	1.38	1.45	1.32	1.44	1.24	1.28
Na2O	3.03	3.14	3.06	2.87	3.17	3.21	3.26	3.19	3.02	2.98	3	3.11	3.03	3.08	3.04	3.11	3.11	3.52	3.11
P2O5	<u>0.310</u>	<u>0.322</u>	<u>0.318</u>	<u>0.312</u>	<u>0.313</u>	<u>0.344</u>	<u>0.314</u>	<u>0.336</u>	<u>0.308</u>	<u>0.366</u>	<u>0.305</u>	<u>0.309</u>	<u>0.347</u>	<u>0.368</u>	<u>0.348</u>	<u>0.303</u>	<u>0.370</u>	<u>0.317</u>	<u>0.341</u>
analysis total	97.28	97.97	98.24	96.97	97.93	97.88	99.56	97.30	97.23	98.973	97.687	98.421	99.80	99.62	99.33	100.13	100.13	100.02	96.87
Weight %:																			
SiO2	54.53	54.39	54.45	54.41	54.31	54.43	54.16	54.54	54.38	54.97	54.95	54.55	55.35	55.36	54.85	54.67	54.99	54.81	54.55
Al2O3	14.27	14.36	14.20	14.14	14.24	14.26	14.27	14.14	14.18	14.14	14.70	14.24	14.49	14.38	14.02	14.41	14.35	14.24	14.30
TiO2	1.784	1.780	1.779	1.777	1.754	1.822	1.725	1.829	1.783	1.821	1.769	1.739	1.830	1.836	1.800	1.726	1.831	1.723	1.817
FeO*	11.26	11.22	11.35	11.46	11.22	11.44	11.36	11.59	11.49	11.38	10.48	11.10	10.38	10.46	11.38	10.86	10.92	10.95	11.08
MnO	0.200	0.196	0.200	0.195	0.197	0.204	0.197	0.198	0.194	0.197	0.188	0.193	0.200	0.205	0.202	0.208	0.195	0.173	0.211
CaO	8.74	8.59	8.57	8.59	8.60	8.48	8.58	8.55	8.62	8.36	8.73	8.59	8.39	8.34	8.29	8.77	8.37	8.20	8.48
MgO	4.66	4.66	4.76	4.78	4.99	4.63	5.03	4.42	4.82	4.35	4.41	4.85	4.56	4.57	4.59	4.63	4.43	4.84	4.69
K2O	1.13	1.27	1.25	1.37	1.12	1.10	1.08	1.10	1.11	1.40	1.38	1.27	1.42	1.39	1.46	1.32	1.44	1.24	1.32
Na2O	3.11	3.21	3.11	2.96	3.24	3.28	3.27	3.28	3.11	3.01	3.07	3.16	3.04	3.09	3.06	3.11	3.11	3.52	3.21
P2O5	<u>0.319</u>	<u>0.329</u>	<u>0.324</u>	<u>0.322</u>	<u>0.320</u>	<u>0.351</u>	<u>0.315</u>	<u>0.345</u>	<u>0.317</u>	<u>0.370</u>	<u>0.312</u>	<u>0.314</u>	<u>0.348</u>	<u>0.369</u>	<u>0.350</u>	<u>0.303</u>	<u>0.370</u>	<u>0.317</u>	<u>0.352</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalizedelements (ppm):																			
Ni	3	4	6	3	9	5	11	4	7	4	5	5	5	7	1	5	4	8	12
Cr	40	40	40	41	43	42	41	37	40	38	42	41	39	37	38	44	33	32	35
Sc	32	31	32	34	44	43	43	31	39	28	33	33	36	38	36	44	38	40	41
V	311	301	298	300	306	300	309	309	307	295	320	313	326	294	293	322	308	295	297
Ba	509	522	504	483	524	531	503	502	506	526	544	493	548	566	<b>527</b>	<b>497</b>	581	506	609
Rb	32	32	32	30	30	32	30	30	31	34	33	31	34	34	34	31	34	31	31
Sr	320	314	314	306	309	314	308	321	314	315	323	311	308	306	307	318	311	299	314
Zr	156	156	157	156	154	159	152	162	156	165	156	154	160	160	162	155	164	152	159
Y	34	34	35	34	33	34	32	35	33	36	35	34	35	36	34	35	37	32	35
Nb	11.7	12.8	12.2	12.7	12.8	14.5	13.0	13.5	12.2	11.8	11.4	10.9	14.7	15.8	13.7	13.4	13.6	13.1	14.0
Ga	20	23	22	20	24	19	19	20	21	20	24	22	22	23	21	19	21	20	19
Cu	18	22	18	21	20	16	21	20	16	15	22	18	17	19	19	20	22	18	22
Zn	113	113	110	115	111	111	104	115	111	117	115	113	117	113	110	112	117	107	114
Pb	6	3	1	6	7	5	2	2	4	5	8	7	8	4	7	4	8	4	6
La	26	20	25	25	41	38	39	22	15	13	5	4	29	22	13	19	19	0	0
Ce	45	44	53	48	18	0	0	54	45	35	43	40	44	47	39	47	37	0	0
Th	4	3	3	2	3	4	6	2	5	3	4	5	4	3	4	0	5	4	5
Nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

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Table DR1.

SN	95101	95176	95177	96100	96101	96165	96170	96173	96174	96200	96201	96203	96245	99017	99033	99160	99164	01134	01206
WSU run	0596	0596	0596	0897(1)	0897(1)	0202	0203	0897	0897	0202	0897(1)	0202	0197	0799	0799	0300	0300	0202	0202
7.5' Quad	Cliffdell	Weeks Table	Weeks Table	Old Scab Mtn	Old Scab Mtn	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Old Scab Mtn	Old Scab Mtn	Old Scab Mtn	Old Scab Mtn	Cliffdell	Cliffdell	Weeks Table	Nile	Quartz Mtn	Cliffdell
UTM N*	5202100	5188190	5188210	5200590	5200590	5201200	5193750	5194630	5194090	5205960	5206010	5207360	5194530	5203490	5201580	5182130	5183530	5212155	5206210
UTM E*	644290	644120	644220	639600	639600	645890	643650	643310	643600	641510	639040	637150	638330	645630	647430	651370	654230	648060	644240
Unnormalized																			
SiO2	53.82	53.88	53.88	52.41	53.03	53.92	54.11	53.64	52.44	54.06	53.50	53.74	53.18	54.47	54.67	54.47	54.47	53.86	54.18
Al2O3	14.27	14.42	14.26	14.10	13.94	14.18	14.15	14.26	13.82	14.30	14.19	14.36	13.97	14.42	14.27	14.20	14.54	14.44	14.25
TiO2	1.739	1.772	1.795	1.736	1.731	1.761	1.748	1.715	1.706	1.760	1.728	1.808	1.767	1.833	1.829	1.754	1.797	1.782	1.785
FeO	10.40	10.85	11.11	11.64	10.86	10.96	10.71	11.01	10.88	10.45	11.12	11.31	11.12	10.45	10.67	11.27	9.30	10.81	10.50
MnO	0.191	0.192	0.204	0.210	0.191	0.196	0.197	0.189	0.191	0.211	0.197	0.208	0.194	0.215	0.205	0.196	0.215	0.197	0.203
CaO	8.49	8.54	8.36	8.34	8.35	8.69	8.67	8.51	8.34	8.76	8.40	8.72	8.28	8.58	8.49	8.53	9.25	8.65	8.66
MgO	4.74	4.75	4.61	4.71	4.87	4.80	4.89	4.69	4.77	4.95	4.97	4.07	4.62	4.23	4.61	4.83	4.24	4.79	4.73
K2O	1.33	1.26	1.38	1.07	1.28	1.21	1.31	1.28	1.26	1.28	1.26	1.27	1.39	1.30	1.48	1.24	1.51	1.22	1.30
Na2O	3.02	3.16	3.14	2.85	2.82	2.98	2.91	2.89	2.88	2.97	2.88	3.05	2.97	3.05	2.96	3.03	2.88	2.92	2.95
P2O5	<u>0.325</u>	<u>0.327</u>	<u>0.355</u>	<u>0.328</u>	<u>0.319</u>	<u>0.319</u>	<u>0.313</u>	<u>0.311</u>	<u>0.308</u>	<u>0.310</u>	<u>0.311</u>	<u>0.374</u>	<u>0.337</u>	<u>0.355</u>	<u>0.358</u>	<u>0.321</u>	<u>0.338</u>	<u>0.322</u>	<u>0.320</u>
analysis total	98.33	99.15	99.09	97.40	97.39	99.02	99.01	98.49	96.59	99.05	98.56	98.91	97.83	98.90	99.54	99.84	98.54	98.99	98.88
SiO2	54.74	54.34	54.37	53.81	54.45	54.46	54.65	54.46	54.29	54.58	54.28	54.33	54.36	55.07	54.92	54.56	55.28	54.41	54.79
Al2O3	14.51	14.54	14.39	14.48	14.31	14.32	14.29	14.48	14.31	14.44	14.40	14.52	14.28	14.58	14.34	14.22	14.76	14.59	14.41
TiO2	1.769	1.787	1.811	1.782	1.777	1.779	1.766	1.741	1.766	1.777	1.753	1.828	1.806	1.853	1.837	1.757	1.824	1.800	1.805
FeO*	10.58	10.94	11.21	11.95	11.15	11.07	10.82	11.17	11.26	10.55	11.29	11.44	11.37	10.57	10.72	11.28	9.43	10.92	10.62
MnO	0.194	0.194	0.206	0.216	0.196	0.198	0.199	0.192	0.198	0.213	0.200	0.210	0.198	0.217	0.206	0.196	0.218	0.199	0.205
CaO	8.63	8.61	8.44	8.56	8.57	8.78	8.76	8.64	8.63	8.84	8.52	8.82	8.46	8.68	8.53	8.54	9.39	8.74	8.76
MgO	4.82	4.79	4.65	4.84	5.00	4.85	4.94	4.76	4.94	5.00	5.04	4.11	4.72	4.28	4.63	4.84	4.30	4.84	4.78
K2O	1.35	1.27	1.39	1.10	1.31	1.22	1.32	1.30	1.30	1.29	1.28	1.42	1.31	1.49	1.49	1.24	1.53	1.23	1.31
Na2O	3.07	3.19	3.17	2.93	2.90	3.01	2.94	2.93	2.98	3.00	2.92	3.08	3.04	3.08	2.97	3.03	2.92	2.95	2.98
P2O5	<u>0.331</u>	<u>0.330</u>	<u>0.358</u>	<u>0.337</u>	<u>0.328</u>	<u>0.322</u>	<u>0.316</u>	<u>0.316</u>	<u>0.319</u>	<u>0.313</u>	<u>0.316</u>	<u>0.378</u>	<u>0.344</u>	<u>0.359</u>	<u>0.360</u>	<u>0.322</u>	<u>0.343</u>	<u>0.325</u>	<u>0.324</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalized	Trace Elements (ppm):																		
Ni	9	6	6	6	5	12	14	4	4	11	6	6	0	11	9	10	16	13	13
Cr	38	38	37	52	45	52	50	48	46	57	44	47	42	53	51	49	48	57	50
Sc	†56	51	50	32	27	36	40	29	34	40	30	45	31	41	38	35	37	40	38
V	317	329	301	309	309	292	282	316	314	315	310	315	289	297	299	294	303	306	320
Ba	630	596	593	508	556	533	529	514	532	543	556	585	559	576	586	524	864	582	522
Rb	31	30	32	26	32	30	31	32	32	33	32	32	35	32	34	32	33	32	31
Sr	314	316	316	325	309	317	311	314	311	309	313	317	313	322	309	314	334	315	312
Zr	153	156	161	149	156	158	157	153	154	153	157	158	158	164	162	155	161	158	158
Y	32	32	34	33	33	35	34	33	33	33	33	35	33	36	37	33	34	35	35
Nb	13.6	13.4	13.6	12.3	12.6	11.4	12.7	12.9	12.2	10.4	12.8	11.5	11.7	13.0	12.4	11.5	12.5	11.5	11.7
Ga	22	23	26	24	23	19	23	23	18	20	22	22	20	21	20	21	20	21	21
Cu	14	21	14	26	20	28	28	20	19	27	17	28	17	28	25	25	27	29	30
Zn	108	†118	114	112	109	112	108	106	108	108	107	112	116	121	115	109	116	112	114
Pb	3	6	6	6	7	6	14	7	6	9	5	6	6	5	8	10	5	7	6
La	15	11	10	21	16	28	24	4	14	17	16	18	37	23	29	21	27	20	26
Ce	0	0	2	41	54	54	53	25	47	37	47	51	42	34	34	32	42	57	44
Th	4	5	6	2	6	3	5	5	5	7	1	6	5	4	6	3	6	6	4
Nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

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Table DR1.

SN	02030	02039	02040	02072	02075	02102	02120	02122	02123	02127	02138	02139	02151	02202	02208	02209	03044	03047	03095
WSU run	0402	0402	0402	0402	0303	0402	0402	0402	0402	0402	0402	0402	0402	0402	0402	0303	0204	0204	0204
7.5' Quad	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Old Scab Mtn	Imberwolf Mtn	Mt. Clifty	Mt. Clifty	Mt. Clifty	Mt. Clifty	Tieton Basin	Tieton Basin	Old Scab Mtn	Old Scab Mtn	Cliffdell	Cliffdell	Mt. Clifty	Mt. Clifty	Mt. Clifty
UTM N*	5199920	5201900	5200920	5197540	5194460	5188910	5207260	5210100	5210240	5211260	5175320	5174950	5194600	5204650	5202180	5201280	5211580	5212360	5208240
UTM E*	645820	644290	645940	643960	641320	642200	640240	640100	639280	637400	644050	644820	639720	642480	646230	646550	637270	636320	640650
Unnormalized																			
SiO2	54.09	54.40	54.72	53.43	54.02	54.30	54.00	53.98	53.76	53.81	54.16	53.95	53.87	54.19	54.46	54.18	53.99	53.85	53.85
Al2O3	14.22	14.08	14.13	13.97	14.24	14.33	14.21	14.26	14.09	13.97	14.05	14.15	14.22	13.99	14.20	14.07	14.14	14.31	14.24
TiO2	1.756	1.786	1.812	1.807	1.740	1.761	1.757	1.761	1.729	1.757	1.792	1.743	1.748	1.815	1.792	1.797	1.729	1.736	1.729
FeO	11.02	11.33	11.03	11.33	10.71	10.59	10.71	10.85	11.36	11.30	11.31	10.87	10.94	11.28	11.08	11.20	11.52	11.33	11.54
MnO	0.188	0.195	0.198	0.209	0.195	0.195	0.200	0.196	0.199	0.220	0.199	0.195	0.196	0.210	0.214	0.196	0.199	0.217	0.196
CaO	8.65	8.44	8.42	9.03	8.65	8.70	8.70	8.70	8.67	8.48	8.43	8.65	8.61	8.39	8.55	8.51	8.55	8.64	8.58
MgO	4.33	4.49	4.66	4.69	4.91	4.80	4.84	4.81	4.83	4.64	4.59	4.68	4.89	4.48	4.02	4.59	5.01	4.87	4.92
K2O	1.27	1.28	1.28	1.21	1.25	1.28	1.18	1.17	1.11	1.16	1.38	1.40	1.25	1.35	1.30	1.19	1.14	0.98	1.24
Na2O	2.89	2.97	2.89	2.86	2.90	2.86	2.94	2.92	2.92	2.95	2.94	2.87	2.91	2.97	2.97	2.91	3.01	3.01	2.94
P2O5	<u>0.315</u>	<u>0.342</u>	<u>0.354</u>	<u>0.325</u>	<u>0.312</u>	<u>0.311</u>	<u>0.310</u>	<u>0.313</u>	<u>0.303</u>	<u>0.321</u>	<u>0.344</u>	<u>0.310</u>	<u>0.316</u>	<u>0.349</u>	<u>0.348</u>	<u>0.347</u>	<u>0.316</u>	<u>0.313</u>	<u>0.309</u>
analysis total	98.73	99.31	99.50	98.86	98.93	99.13	98.85	98.96	98.97	98.60	99.20	98.82	98.95	99.03	98.94	98.99	99.61	99.26	99.54
SiO2	54.79	54.78	55.00	54.04	54.60	54.78	54.63	54.55	54.32	54.57	54.60	54.59	54.44	54.72	55.05	54.73	54.20	54.26	54.10
Al2O3	14.40	14.18	14.20	14.13	14.39	14.46	14.38	14.41	14.24	14.17	14.16	14.32	14.37	14.13	14.35	14.21	14.20	14.42	14.30
TiO2	1.779	1.798	1.821	1.828	1.759	1.777	1.777	1.780	1.747	1.782	1.807	1.764	1.767	1.833	1.811	1.815	1.736	1.749	1.737
FeO*	11.16	11.41	11.09	11.46	10.83	10.68	10.83	10.96	11.48	11.46	11.40	11.00	11.06	11.39	11.20	11.31	11.57	11.41	11.59
MnO	0.190	0.196	0.199	0.211	0.197	0.197	0.202	0.198	0.201	0.223	0.201	0.197	0.198	0.212	0.216	0.198	0.200	0.219	0.197
CaO	8.76	8.50	8.46	9.13	8.74	8.78	8.80	8.79	8.76	8.60	8.50	8.75	8.70	8.47	8.64	8.60	8.58	8.70	8.62
MgO	4.39	4.52	4.68	4.74	4.96	4.84	4.90	4.86	4.88	4.71	4.63	4.74	4.94	4.52	4.06	4.64	5.03	4.90	4.94
K2O	1.29	1.29	1.29	1.22	1.26	1.29	1.19	1.18	1.12	1.18	1.39	1.42	1.26	1.36	1.31	1.20	1.15	0.99	1.25
Na2O	2.93	2.99	2.90	2.89	2.93	2.89	2.97	2.95	2.95	2.99	2.96	2.90	2.94	3.00	3.00	2.94	3.02	3.04	2.95
P2O5	<u>0.319</u>	<u>0.344</u>	<u>0.356</u>	<u>0.329</u>	<u>0.315</u>	<u>0.314</u>	<u>0.314</u>	<u>0.316</u>	<u>0.306</u>	<u>0.326</u>	<u>0.347</u>	<u>0.314</u>	<u>0.319</u>	<u>0.352</u>	<u>0.352</u>	<u>0.351</u>	<u>0.318</u>	<u>0.316</u>	<u>0.311</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalized																			
Ni	11	11	14	18	16	11	13	11	11	12	13	8	14	11	14	14	13	12	11
Cr	52	47	43	55	50	51	49	50	49	48	48	50	46	51	47	45	38	39	38
Sc	34	35	37	38	42	38	31	40	39	34	39	39	36	35	35	34	34	35	34
V	298	294	285	294	303	300	308	307	307	303	304	312	301	290	290	296	312	309	308
Ba	525	554	579	483	566	546	520	511	511	527	544	512	547	551	550	536	535	514	542
Rb	33	34	33	26	31	32	29	32	32	32	33	32	31	34	35	32	33	31	33
Sr	314	314	310	312	310	316	309	310	308	312	311	315	309	310	314	313	313	319	312
Zr	159	162	161	152	153	154	155	154	154	159	162	155	156	165	163	162	160	162	160
Y	34	34	36	34	33	34	34	33	32	35	34	34	33	35	35	35	33	33	32
Nb	11.6	12.0	11.9	9.7	12.4	11.0	10.7	11.9	12.0	11.9	12.2	12.2	11.9	11.8	11.6	12.3	11.1	10.8	10.5
Ga	19	21	22	19	21	24	17	23	20	20	20	20	18	19	20	21	19	21	20
Cu	32	28	25	31	27	27	29	30	27	28	29	26	28	28	30	25	27	24	24
Zn	112	113	118	112	111	116	114	111	109	115	116	112	111	118	113	109	114	115	113
Pb	8	5	6	5	5	5	7	7	6	7	4	9	7	5	10	4	7	9	6
La	70	23	32	17	33	20	22	29	13	22	16	21	28	19	22	27	22	20	20
Ce	56	48	36	43	35	63	51	44	39	42	54	47	44	45	48	18	48	39	44
Th	3	5	5	4	3	7	5	4	6	7	2	8	4	4	5	3	3	5	4
Nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

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Table DR1.

	M1																		
SN	'04049	04096	04098	04122	04125	04133	04189	04215	04230	05019	05021	05022	05024	05027	05046	05068	05069	05070	05071
WSU run	0404(1)	0404(2)	0404(2)	0404(2)	0405(4)	0405(4)	0504(1)	0504(2)	0504(1)	0305(1)	0305(1)	0305	0305(1)	0405(4)	0305(1)	0305(2)	0305(2)	0305(2)	%0305
7.5' Quad	Nile	Ianastash	LakManastash	LaManastash	LaManastash	LaManastash	Lak Meeks	Table	Ianastash	Lak Meeks	Table	Tieton Basin	Tieton Basin	Tieton Basin	Tieton Basin	Tieton Basin	Veddle Canyo	Nile	Nile
UTM N*	5182740	5200460	5202190	5196550	5195440	5202260	5192110	5196640	5197590	5172980	5174470	5172980	5174680	5174620	5175380	5184630	5184620	5184660	5184880
UTM E*	657570	656280	657220	656640	658530	655820	644340	657130	659470	649080	648640	648600	651300	649480	657420	658010	658060	658015	658015
Unnormalized																			
SiO2	54.48	54.22	54.03	54.31	54.02	54.23	54.31	54.28	54.37	54.59	53.98	54.56	54.24	54.06	54.45	54.02	54.52	54.16	55.05
Al2O3	14.35	14.16	14.14	14.18	14.10	14.12	1.809	14.15	1.766	14.18	14.07	14.20	14.06	14.08	14.35	13.96	14.35	14.12	14.39
TiO2	1.778	1.817	1.814	1.829	1.765	1.785	14.09	1.814	14.18	1.790	1.747	1.809	1.746	1.794	1.757	1.789	1.747	1.742	1.750
FeO	11.06	11.25	11.33	11.13	10.63	10.95	10.96	10.75	10.86	11.06	10.98	10.77	11.03	10.99	10.65	10.83	10.20	10.89	10.35
MnO	0.199	0.203	0.201	0.204	0.170	0.194	0.196	0.195	0.190	0.198	0.196	0.196	0.197	0.194	0.204	0.203	0.193	0.195	0.200
CaO	8.60	8.48	8.45	8.46	8.19	8.36	4.55	8.36	4.42	8.60	8.55	8.55	8.51	8.35	8.73	8.36	8.67	8.56	8.75
MgO	4.79	4.68	4.66	4.59	3.79	4.52	4.38	4.42	4.38	4.04	4.72	4.30	4.69	4.59	4.69	4.62	4.54	4.71	4.60
K2O	1.27	1.37	1.34	1.44	1.29	1.39	3.00	1.45	2.84	1.37	1.33	1.49	1.32	1.29	1.39	1.50	1.38	1.43	1.47
Na2O	2.97	3.04	2.97	2.95	2.83	2.95	1.33	2.93	1.31	2.89	2.91	2.96	2.99	2.97	2.98	2.87	2.93	2.88	2.88
P2O5	<u>0.321</u>	<u>0.359</u>	<u>0.350</u>	<u>0.359</u>	<u>0.329</u>	<u>0.340</u>	<u>0.363</u>	<u>0.354</u>	<u>0.331</u>	<u>0.350</u>	<u>0.318</u>	<u>0.351</u>	<u>0.322</u>	<u>0.341</u>	<u>0.320</u>	<u>0.346</u>	<u>0.324</u>	<u>0.318</u>	<u>0.319</u>
analysis total	99.82	99.56	99.28	99.47	97.11	98.84	98.89	98.66	98.70	99.07	98.79	99.20	99.10	98.65	99.52	98.50	98.87	99.02	99.76
Normalized Major Elements (Weight %):																			
SiO2	54.58	54.46	54.42	54.61	55.63	54.87	54.92	55.02	55.08	55.11	54.64	55.01	54.73	54.80	54.71	54.84	55.15	54.70	55.18
Al2O3	14.38	14.22	14.24	14.26	14.52	14.29	14.24	14.34	14.37	14.31	14.24	14.32	14.19	14.27	14.42	14.18	14.51	14.26	14.43
TiO2	1.781	1.825	1.827	1.839	1.817	1.806	1.830	1.838	1.790	1.807	1.768	1.824	1.762	1.819	1.766	1.817	1.767	1.759	1.754
FeO*	11.08	11.29	11.41	11.19	10.94	11.08	11.08	10.89	11.00	11.16	11.12	10.86	11.13	11.14	10.70	11.00	10.32	11.00	10.37
MnO	0.199	0.204	0.202	0.205	0.175	0.196	0.198	0.197	0.192	0.200	0.198	0.198	0.199	0.197	0.205	0.206	0.195	0.197	0.200
CaO	8.61	8.51	8.51	8.51	8.43	8.45	8.38	8.48	8.55	8.68	8.65	8.62	8.58	8.46	8.77	8.49	8.77	8.65	8.77
MgO	4.80	4.70	4.69	4.62	3.90	4.57	4.60	4.44	4.48	4.08	4.77	4.33	4.73	4.65	4.72	4.69	4.59	4.76	4.61
K2O	1.27	1.38	1.35	1.45	1.32	1.41	1.34	1.47	1.32	1.39	1.34	1.51	1.33	1.31	1.40	1.52	1.40	1.45	1.47
Na2O	2.98	3.05	2.99	2.97	2.92	2.98	3.03	2.97	2.88	2.92	2.95	2.99	3.02	3.01	2.99	2.91	2.97	2.91	2.88
P2O5	<u>0.321</u>	<u>0.360</u>	<u>0.353</u>	<u>0.361</u>	<u>0.339</u>	<u>0.344</u>	<u>0.367</u>	<u>0.359</u>	<u>0.335</u>	<u>0.353</u>	<u>0.322</u>	<u>0.354</u>	<u>0.325</u>	<u>0.346</u>	<u>0.321</u>	<u>0.351</u>	<u>0.328</u>	<u>0.321</u>	<u>0.319</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalized Unnormalized Trace Elements (ppm):																			
Ni	14	16	14	17	14	16	15	13	13	18	19	19	19	16	22	17	18	19	22
Cr	38	40	35	37	41	41	39	38	41	41	42	41	42	37	44	39	42	42	44
Sc	35	35	35	36	35	35	35	35	36	37	35	37	36	38	36	35	37	37	36
V	312	299	306	303	300	299	293	302	302	301	310	304	309	302	310	299	310	310	315
Ba	580	562	589	601	807	571	<b>593</b>	596	571	<b>575</b>	<b>563</b>	572	549	570	554	557	576	573	556
Rb	33	34	35	34	35	34	34	34	33	37	33	36	35	33	33	34	33	34	33
Sr	319	311	314	315	332	314	299	305	310	328	318	322	318	314	324	315	326	317	325
Zr	159	163	162	164	163	164	156	158	153	168	163	170	163	164	164	167	163	162	161
Y	32	34	34	35	39	36	34	35	33	36	34	36	34	37	35	35	34	35	33
Nb	12.3	12.3	11.6	12.3	11.7	11.9	12.4	11.0	11.2	11.5	11.0	11.6	10.1	10.9	10.5	12.3	10.9	11.0	11.4
Ga	20	22	19	19	21	20	20	20	19	20	19	21	21	21	21	21	20	20	21
Cu	19	19	16	19	24	24	20	21	22	25	26	25	26	26	22	24	27	31	26
Zn	114	116	117	121	123	117	113	116	113	116	113	116	114	117	112	116	114	118	116
Pb	7	5	6	6	6	7	8	8	6	4	4	5	5	7	4	4	5	5	4
La	21	19	22	22	25	25	22	18	19	22	21	22	21	23	20	21	22	22	22
Ce	48	49	50	47	48	48	48	41	46	47	45	46	50	42	45	44	47	47	44
Th	4	3	3	3	4	3	4	5	4	2	1	1	1	3	1	1	2	1	1
Nd	28	26	29	28	25	26	27	25	27	26	25	25	27	27	26	27	26	26	25

Paul E. Hamr  
Table DR1.

		M1	M1					M1											MUSEUM-1
SN	05093	05094	05110	05138	05139	05142	06006	06012	06029	06090	06126	06174	07009	07024	07028	07091	08022	08030	10069
WSU run	0305(2)	0405(3)	0405(2)	0405(2)	0405(2)	0405(2)	0106(3)	0106(3)	0106(4)	0206	0306(1)	0306(2)	0107(3)	0207	0207	0307	0108(2)	0108(2)	0210
7.5' Quad	Tieton Basin	Veddle Canyo	Veddle Canyo	lanastash La	lanastash La	lanastash Lak	Nile	Veddle Canyo	Cliffdell	lanastash Lak	lanastash Lak	Veddle Canyo	Cliffdell	Veddle Canyo	Veddle Canyo	Frost Mtn	Tieton	Nile	Quartz Mtn
UTM N*	5174320	5178700	5173740	5197410	5196100	5195710	5184180	5174490	5203970	5204600	5206820	5175720	5203720	5175220	5175680	5210160	5176820	5181660	5211680
UTM E*	651900	656570	659550	658230	656350	656110	658060	655800	644060	657040	654010	660100	646460	659420	655250	657750	666300	660170	648300
Unnormalized																			
SiO2	53.88	54.33	53.38	53.35	54.06	54.20	54.22	54.28	53.65	53.27	54.43	54.62	53.84	53.38	53.78	52.92	53.48	54.16	53.61
Al2O3	14.03	14.31	14.11	14.03	14.11	14.23	14.06	14.41	13.94	14.00	14.29	14.18	14.12	14.01	14.08	13.91	13.95	14.34	14.02
TiO2	1.740	1.759	1.724	1.769	1.783	1.752	1.802	1.755	1.774	1.736	1.808	1.846	1.739	1.808	1.736	1.724	1.738	1.799	1.749
FeO	10.43	10.74	10.64	10.28	10.60	10.66	11.03	10.47	10.84	10.81	10.99	11.02	10.98	11.15	10.72	10.90	10.58	10.20	11.08
MnO	0.196	0.195	0.192	0.194	0.200	0.182	0.200	0.195	0.202	0.195	0.195	0.203	0.198	0.197	0.189	0.191	0.185	0.184	0.191
CaO	8.51	8.50	8.49	8.65	8.37	8.27	8.31	8.66	8.32	8.35	8.41	8.39	8.51	8.31	8.37	8.35	8.40	8.52	8.47
MgO	4.59	4.77	4.83	4.71	4.49	4.25	4.63	4.71	4.46	4.69	4.61	4.41	4.78	4.23	4.44	4.72	4.48	4.58	4.80
K2O	1.39	1.32	1.28	1.43	1.45	1.29	1.35	1.38	1.29	1.25	1.36	1.47	1.26	1.30	1.31	1.20	1.31	1.42	1.17
Na2O	2.89	3.03	2.94	2.90	2.95	2.84	2.96	2.94	2.96	2.86	2.90	2.97	2.93	3.00	2.88	2.85	2.82	2.97	3.03
P2O5	<u>0.318</u>	<u>0.327</u>	<u>0.305</u>	<u>0.334</u>	<u>0.341</u>	<u>0.315</u>	<u>0.347</u>	<u>0.314</u>	<u>0.336</u>	<u>0.315</u>	<u>0.345</u>	<u>0.361</u>	<u>0.314</u>	<u>0.361</u>	<u>0.321</u>	<u>0.304</u>	<u>0.322</u>	<u>0.329</u>	<u>0.314</u>
analysis total	97.98	99.28	97.89	97.11	98.36	97.99	98.91	99.12	97.77	97.47	99.33	99.47	98.66	97.75	97.82	97.07	97.26	98.50	98.46
SiO2	54.99	54.73	54.53	54.94	54.96	55.31	54.82	54.76	54.87	54.65	54.79	54.91	54.57	54.61	54.97	54.51	54.98	54.98	54.45
Al2O3	14.32	14.41	14.42	14.44	14.35	14.52	14.21	14.54	14.26	14.36	14.38	14.26	14.31	14.34	14.39	14.33	14.34	14.56	14.24
TiO2	1.776	1.771	1.762	1.822	1.813	1.788	1.822	1.770	1.815	1.781	1.820	1.856	1.762	1.850	1.775	1.776	1.787	1.827	1.777
FeO*	10.65	10.82	10.87	10.58	10.78	10.88	11.15	10.56	11.08	11.09	11.06	11.08	11.13	11.41	10.96	11.23	10.88	10.36	11.26
MnO	0.200	0.196	0.196	0.200	0.204	0.186	0.202	0.197	0.207	0.200	0.197	0.204	0.201	0.201	0.193	0.197	0.191	0.187	0.194
CaO	8.69	8.56	8.68	8.90	8.51	8.44	8.40	8.73	8.50	8.56	8.46	8.43	8.62	8.50	8.55	8.60	8.64	8.65	8.61
MgO	4.69	4.81	4.93	4.31	4.56	4.34	4.68	4.76	4.56	4.82	4.64	4.43	4.84	4.33	4.54	4.86	4.60	4.65	4.88
K2O	1.42	1.33	1.30	1.47	1.48	1.32	1.37	1.40	1.32	1.28	1.37	1.48	1.28	1.33	1.34	1.24	1.34	1.44	1.19
Na2O	2.95	3.05	3.00	2.99	3.00	2.90	2.99	2.97	3.03	2.93	2.92	2.99	2.97	3.07	2.94	2.94	2.90	3.02	3.08
P2O5	<u>0.325</u>	<u>0.329</u>	<u>0.311</u>	<u>0.344</u>	<u>0.346</u>	<u>0.322</u>	<u>0.351</u>	<u>0.317</u>	<u>0.344</u>	<u>0.323</u>	<u>0.347</u>	<u>0.363</u>	<u>0.319</u>	<u>0.369</u>	<u>0.328</u>	<u>0.313</u>	<u>0.331</u>	<u>0.334</u>	<u>0.319</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalized																			
Ni	21	17	17	19	17	17	21	23	10	21	15	14	15	6	9	9	10	10	15.3
Cr	42	41	42	37	39	40	37	42	40	41	38	36	39	36	39	37	39	38	38.9
Sc	37	37	36	35	35	36	35	37	35	35	36	35	36	35	35	35	35	36	34
V	308	308	310	302	299	310	301	315	300	309	299	300	310	302	302	309	304	318	304.4
Ba	562	556	529	<b>552</b>	<b>572</b>	566	580	543	548	600	585	594	550	587	559	546	618	562	539.6
Rb	33	31	31	34	35	32	33	31	33	33	32	34	32	32	32	31	30	33	25.3
Sr	320	315	309	314	314	320	315	316	309	310	325	323	318	319	322	314	319	320	317.7
Zr	162	162	155	162	165	160	163	159	161	156	167	170	160	169	161	157	160	167	163
Y	34	35	33	35	34	35	33	33	32	33	36	35	34	36	34	32	32	34	33
Nb	10.7	11.9	10.7	11.3	11.9	11.7	10.4	10.9	10.0	10.4	10.3	10.7	10.2	10.2	9.6	9.6	10.2	10.8	11.5
Ga	21	22	21	20	20	21	22	22	20	20	20	20	19	19	19	20	20	21	19.6
Cu	25	24	24	23	26	27	23	26	24	27	25	25	26	25	25	27	26	24	27.4
Zn	112	116	112	116	119	115	117	117	116	117	118	121	112	119	116	116	121	122	120.9
Pb	5	6	7	6	8	6	9	7	7	7	7	6	5	5	6	6	6	8	5.6
La	20	21	17	22	23	22	23	22	24	21	21	23	21	24	19	23	24	24	19.1
Ce	49	48	45	43	46	42	52	47	42	48	43	46	42	46	43	45	44	45	44.4
Th	2	2	6	3	3	2	3	2	3	4	4	5	5	4	4	5	4	4	2.6
Nd	26	29	26	25	26	23	28	24	23	26	26	27	21	nd	nd	25	25	26	24.9

Paul E. Hamr  
Table DR1.

SN		
WSU run		
7.5' Quad		
UTM N*		
UTM E*		
Unnormalized		
SiO2		
Al2O3		
TiO2		
FeO		
MnO		
CaO		
MgO		
K2O	MUSEUM-1	
Na2O	97	
P2O5	<u>averages</u>	<u>std dev</u>
analysis total	98.67	0.81

SiO2	54.68	0.32
Al2O3	14.34	0.13
TiO2	1.791	0.032
FeO*	11.05	0.36
MnO	0.200	0.008
CaO	8.61	0.16
MgO	4.67	0.23
K2O	1.31	0.11
Na2O	3.02	0.11
P2O5	0.334	0.018

Unnormalized		
Ni	12	5
Cr	43	5
Sc	36	4
V	305	8
Ba	556	52
Rb	32	2
Sr	315	6
Zr	159	4
Y	34	1
Nb	11.8	1.2
Ga	21	2
Cu	24	4
Zn	114	4
Pb	6	2
La	21	9
Ce	41	13
Th	4	2
Nd	26	2

Table DR1 (continued). ANALYSES OF GRANDE RONDE BASALT LAVA FLOWS IN UPPER NACHES RIVER BASIN, YAKIMA AND KITTITAS COUNTIES, WASHINGTON

STEMBER CREEK																				
SN	95071	04048	'04072	04114	04207	'05067	05082	05083	05091	05109	'05124	06002	06022	06031	06032	06089	06099	06107	06177	07026
WSU run	0203(1)	0404(1)	0404(1)	0404(2)	0504(1)	0305(2)	0305(2)	0305(2)	0305(2)	0405(3)	0305(3)	0106(3)	0106(3)	0106(4)	0106(4)	0206	0206	0306(1)	0306(2)	0207
7.5' Quad	Nile	Nile	Nile	Nile	Nile	Nile	lanastash Lak	lanastash Lak	Weddle Canyon	Weddle Canyon	Nile	Weddle Canyon	Weddle Canyon	Nile	Nile	lanastash Lak	Nile	Nile	Weddle Canyon	Weddle Canyon
UTM N*	5185620	5182760	5189860	5190800	5187860	5183500	5206680	5206680	5176650	5173670	5183100	5178160	5174250	5183560	5184360	5204980	5184560	5190280	5175440	5176040
UTM E*	656670	657650	656460	658790	657630	657900	658250	658250	657660	659600	657146	660440	656130	657040	656900	656900	658220	657530	659420	656580
Unnormalized Major Elements (Weight %):																				
SiO2	53.36	53.94	53.76	53.25	53.35	53.46	52.98	53.14	53.35	53.25	53.37	54.63	53.59	52.77	53.07	52.69	53.44	53.46	53.57	53.28
Al2O3	14.11	14.39	14.31	14.17	1.757	14.16	14.06	14.14	14.27	14.17	14.07	14.79	14.29	14.15	14.21	14.10	14.23	14.24	14.18	14.24
TiO2	1.784	1.801	1.780	1.773	14.17	1.775	1.736	1.740	1.720	1.798	1.776	1.863	1.804	1.725	1.766	1.749	1.782	1.746	1.785	1.785
FeO	11.27	11.26	11.38	11.51	11.15	10.84	10.91	10.84	10.41	11.07	10.86	9.47	11.01	10.88	10.63	10.76	11.35	11.14	10.98	10.99
MnO	0.204	0.202	0.203	0.204	0.198	0.195	0.200	0.198	0.197	0.199	0.196	0.171	0.204	0.195	0.195	0.196	0.199	0.201	0.198	0.199
CaO	9.02	9.11	9.06	9.04	9.04	9.11	9.09	9.11	9.24	8.93	9.02	8.98	9.03	8.95	9.05	8.98	8.95	8.97	8.97	9.02
MgO	5.28	5.24	5.29	5.26	8.94	4.91	5.24	5.19	5.27	5.18	4.92	4.84	5.11	5.30	5.04	5.16	5.16	5.29	5.11	5.27
K2O	1.20	1.22	1.22	1.12	2.84	1.16	1.10	1.13	1.17	1.17	1.18	1.22	1.19	1.11	1.18	1.05	1.13	1.06	1.16	1.19
Na2O	2.80	2.84	2.83	2.87	1.09	2.81	2.85	2.87	2.77	2.83	2.82	2.86	2.79	2.80	2.75	2.86	2.81	2.81	2.84	2.82
P2O5	<u>0.273</u>	<u>0.276</u>	<u>0.274</u>	<u>0.276</u>	<u>0.276</u>	<u>0.268</u>	<u>0.263</u>	<u>0.261</u>	<u>0.258</u>	<u>0.287</u>	<u>0.270</u>	<u>0.296</u>	<u>0.271</u>	<u>0.257</u>	<u>0.266</u>	<u>0.263</u>	<u>0.270</u>	<u>0.278</u>	<u>0.272</u>	<u>0.275</u>
analysis tota	99.31	100.27	100.10	99.47	98.95	98.62	98.43	98.63	98.65	98.88	98.48	99.12	99.29	98.14	98.16	97.82	99.31	99.19	99.06	99.07
Normalized Major Elements (Weight %):																				
SiO2	53.73	53.79	53.70	53.53	53.92	54.21	53.82	53.88	54.07	53.86	54.19	55.11	53.97	53.77	54.07	53.87	53.81	53.89	54.08	53.78
Al2O3	14.21	14.35	14.30	14.24	14.32	14.36	14.29	14.34	14.46	14.33	14.29	14.92	14.39	14.42	14.48	14.42	14.33	14.36	14.31	14.37
TiO2	1.796	1.796	1.778	1.782	1.775	1.799	1.764	1.765	1.743	1.819	1.803	1.880	1.817	1.758	1.799	1.788	1.795	1.760	1.802	1.802
FeO*	11.35	11.23	11.37	11.57	11.27	10.99	11.09	10.99	10.55	11.19	11.03	9.56	11.09	11.08	10.83	11.00	11.43	11.23	11.08	11.09
MnO	0.205	0.202	0.203	0.206	0.200	0.198	0.203	0.201	0.199	0.202	0.199	0.172	0.205	0.199	0.198	0.201	0.200	0.202	0.200	0.200
CaO	9.08	9.08	9.05	9.09	9.04	9.17	9.23	9.24	9.36	9.03	9.16	9.06	9.09	9.12	9.21	9.18	9.01	9.04	9.05	9.10
MgO	5.32	5.23	5.28	5.29	5.24	4.97	5.33	5.27	5.35	5.24	4.99	4.88	5.15	5.41	5.14	5.28	5.19	5.33	5.16	5.32
K2O	1.21	1.22	1.21	1.13	1.10	1.18	1.11	1.14	1.19	1.18	1.20	1.23	1.20	1.13	1.20	1.07	1.13	1.07	1.17	1.20
Na2O	2.82	2.83	2.83	2.89	2.87	2.85	2.90	2.91	2.81	2.86	2.86	2.89	2.81	2.85	2.80	2.92	2.83	2.83	2.87	2.85
P2O5	<u>0.275</u>	<u>0.276</u>	<u>0.274</u>	<u>0.278</u>	<u>0.279</u>	<u>0.272</u>	<u>0.267</u>	<u>0.265</u>	<u>0.262</u>	<u>0.290</u>	<u>0.274</u>	<u>0.299</u>	<u>0.273</u>	<u>0.262</u>	<u>0.271</u>	<u>0.269</u>	<u>0.272</u>	<u>0.280</u>	<u>0.274</u>	<u>0.278</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalized Trace Elements (ppm):																				
Ni	15	17	20	20	18	21	23	25	25	19	24	19	27	17	19	27	24	20	19	11
Cr	55	46	48	47	51	50	54	53	54	49	50	52	56	52	51	51	52	51	47	50
Sc	38	37	38	38	37	39	38	37	38	38	37	39	38	38	37	37	38	36	36	38
V	323	330	324	326	322	331	322	324	324	321	330	312	330	327	326	322	330	318	323	327
Ba	449	471	456	459	453	467	440	444	448	458	470	507	470	450	449	433	470	472	451	457
Rb	26	28	28	28	26	27	25	25	25	26	27	26	26	25	24	25	26	24	26	26
Sr	302	307	303	307	297	314	309	310	315	306	312	329	310	304	313	301	300	316	313	311
Zr	148	150	149	148	140	153	149	151	146	155	154	158	152	143	148	145	148	148	153	155
Y	32	31	31	31	32	33	31	32	32	34	34	32	31	30	31	32	33	33	32	32
Nb	10.6	11.1	11.2	11.0	9.7	10.8	10.6	10.8	10.4	10.7	10.5	10.8	10.7	9.4	9.7	9.4	10.2	8.9	9.4	9.7
Ga	22	21	21	22	19	21	20	20	20	20	20	21	21	21	21	20	20	21	22	19
Cu	36	28	31	29	33	39	39	41	33	36	39	33	37	35	34	38	37	34	38	39
Zn	111	111	111	109	108	108	107	109	106	115	108	123	116	109	110	111	110	113	112	113
Pb	12	7	8	6	7	3	3	4	3	5	5	6	7	6	7	5	5	6	5	5
La	14	18	15	19	21	16	18	19	16	24	19	21	20	19	17	18	19	20	19	19
Ce	44	46	40	49	39	43	43	38	37	41	43	45	37	38	42	43	45	36	37	42
Th	4	3	3	2	4	1	0	0	1	3	1	2	1	4	3	4	2	4	3	4
Nd		23	22	27	23	23	23	21	19	21	24	26	21	22	25	27	24	22	21	
U						2					0									

\*to nearest 5 m  
"†" denotes values >120% of highest standard.  
nd, not determined

Table DR1 (c

SC					upper McCOY CANYON					SF					SF					SF				
SN	07027	07092			93307	95074	95173	95174	96187	96190	96191	96193	96197	96199	96204	96271	96272	96280	97170					
WSU run	0207	0307			0695	0203(1)	0596	0800	0897	0202	0202	0202	0897(1)	0890	0897	0202	0197	0197	0202					
7.5' Quad	Veddle Canyo	Frost Mtn			Mt. Clifty	Nile	Weeks Table	Weeks Table	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Old Scab Mtn	Old Scab Mtn	Mt. Clifty	Cliffdell	Cliffdell	Mt. Clifty	Cliffdell					
UTM N*	5175840	5210260			5210210	5185220	5188190	5188190	5204810	5201150	5201150	5205230	5205950	5205850	5207230	5205315	5205390	5211510	5203200					
UTM E*	656260	657720			641380	656630	644120	644120	643760	646770	646770	644540	641690	641480	640840	644215	644620	637370	644030					
Unnormalize																								
SiO2	53.24	52.69			52.68	53.65	52.79	53.65	52.05	52.76	54.15	53.20	52.19	53.46	53.12	53.47	52.12	52.25	53.71					
Al2O3	14.34	14.07			13.80	14.02	13.87	13.91	13.64	14.16	14.12	13.92	13.79	13.83	14.05	13.99	13.61	13.73	13.95					
TiO2	1.760	1.771			1.805	1.827	1.754	1.814	1.747	1.848	1.825	1.825	1.683	1.810	1.699	1.822	1.787	1.663	1.825					
FeO	10.76	10.73			11.27	11.17	11.31	11.46	11.46	10.74	10.61	11.36	10.98	11.57	10.68	11.60	11.39	10.42	11.23					
MnO	0.192	0.198			0.203	0.203	0.199	0.203	0.201	0.218	0.200	0.210	0.200	0.204	0.211	0.207	0.193	0.190	0.202					
CaO	9.13	8.94			8.59	8.80	8.48	8.79	8.45	9.23	8.53	8.84	8.43	8.76	8.42	8.81	8.52	8.26	8.85					
MgO	5.23	4.92			4.69	4.99	5.17	4.91	5.15	4.43	4.73	5.08	5.05	4.85	5.34	5.21	4.84	5.14	4.92					
K2O	1.18	1.13	STEMBER CREEK		1.02	1.23	1.14	1.18	1.15	1.20	1.22	1.18	1.20	1.19	1.24	1.10	1.03	1.12	1.17					
Na2O	2.87	2.80	22		3.23	2.86	3.36	2.93	2.82	2.99	3.09	2.95	2.77	2.89	2.78	3.05	3.12	2.94	2.94					
P2O5	<u>0.267</u>	<u>0.273</u>	<u>average</u>	<u>std dev</u>	<u>0.324</u>	<u>0.327</u>	<u>0.316</u>	<u>0.330</u>	<u>0.320</u>	<u>0.328</u>	<u>0.361</u>	<u>0.329</u>	<u>0.298</u>	<u>0.323</u>	<u>0.306</u>	<u>0.326</u>	<u>0.321</u>	<u>0.300</u>	<u>0.323</u>					
analysis tota	98.97	97.53	98.88	0.66	97.61	99.07	98.39	99.18	96.98	97.90	98.84	98.89	96.60	98.89	97.85	99.58	96.93	96.01	99.12					
Normalized I																								
SiO2	53.79	54.02	53.95	0.31	53.97	54.15	53.65	54.10	53.67	53.89	54.79	53.80	54.03	54.06	54.29	53.69	53.77	54.42	54.19					
Al2O3	14.49	14.42	14.38	0.14	14.14	14.15	14.10	14.03	14.06	14.46	14.29	14.08	14.28	13.99	14.36	14.05	14.04	14.30	14.07					
TiO2	1.778	1.816	1.792	0.028	1.849	1.844	1.783	1.829	1.801	1.888	1.846	1.845	1.742	1.830	1.736	1.830	1.844	1.732	1.841					
FeO*	10.87	11.01	11.04	0.41	11.55	11.27	11.50	11.55	11.81	10.97	10.74	11.48	11.37	11.70	10.92	11.65	11.75	10.85	11.33					
MnO	0.194	0.203	0.200	0.007	0.208	0.205	0.202	0.205	0.207	0.223	0.202	0.212	0.207	0.206	0.216	0.208	0.199	0.198	0.204					
CaO	9.23	9.17	9.13	0.09	8.80	8.88	8.62	8.86	8.71	9.43	8.63	8.94	8.73	8.86	8.61	8.85	8.79	8.60	8.93					
MgO	5.28	5.04	5.21	0.13	4.80	5.04	5.25	4.95	5.31	4.53	4.79	5.14	5.23	4.90	5.46	5.23	4.99	5.35	4.96					
K2O	1.19	1.16	1.16	0.05	1.04	1.24	1.16	1.19	1.19	1.23	1.23	1.19	1.24	1.20	1.27	1.10	1.06	1.17	1.18					
Na2O	2.90	2.88	2.86	0.04	3.31	2.89	3.42	2.95	2.91	3.05	3.13	2.98	2.87	2.92	2.84	3.06	3.22	3.06	2.97					
P2O5	<u>0.270</u>	<u>0.280</u>	0.275	0.009	<u>0.332</u>	<u>0.330</u>	<u>0.321</u>	<u>0.333</u>	<u>0.330</u>	<u>0.335</u>	<u>0.365</u>	<u>0.333</u>	<u>0.309</u>	<u>0.327</u>	<u>0.313</u>	<u>0.327</u>	<u>0.331</u>	<u>0.312</u>	<u>0.326</u>					
	100.00	100.00			100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00					
Unnormalize																								
Ni	15	14	20	4	4	14	10	14	5	10	11	13	5	11	6	12	3	4	12					
Cr	50	47	51	3	44	48	43	55	48	52	45	52	48	52	48	52	48	40	54					
Sc	37	36	38	1	34	38	50	40	35	42	36	38	31	35	33	34	30	29	42					
V	325	322	324	4	291	314	301	309	306	323	300	299	302	309	319	298	308	289	296					
Ba	461	444	458	16	446	482	537	477	480	520	573	480	557	488	529	480	499	538	481					
Rb	25	25	26	1	27	27	26	28	28	30	26	28	31	28	33	25	27	30	29					
Sr	317	312	309	7	313	306	299	307	303	316	311	306	309	305	307	304	303	304	308					
Zr	153	150	150	4	154	154	149	153	151	154	163	155	153	153	153	155	153	150	153					
Y	32	31	32	1	34	35	33	35	33	34	36	34	33	35	32	34	34	32	34					
Nb	9.1	9.0	10.2	0.7	13.3	10.1	13.8	11.0	12.6	11.1	12.1	11.0	13.1	12.1	11.9	11.4	11.7	10.4	11.4					
Ga	19	19	20	1	21	22	20	20	20	22	21	19	21	20	21	22	23	19	19					
Cu	34	39	36	3	31	33	26	32	24	34	25	34	23	34	23	35	26	14	36					
Zn	112	111	111	4	108	114	108	114	108	112	118	115	107	111	106	111	115	110	115					
Pb	5	5	6	2	4	14	1	7	3	8	7	8	6	5	8	6	6	5	4					
La	18	22	19	2	26	5	21	18	22	23	4	20	8	13	23	23	25	17	9					
Ce	45	40	41	4	33	51	0	48	49	31	48	47	39	32	52	41	35	47	45					
Th	3	4	2	1	4	3	4	4	3	4	5	3	5	8	5	3	1	4	2					
Nd		23	23	2																				
U		1																						

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														SF						
SN	99024	99031	99063	99159	99163	01207	01208	01214	02011	02013	02014	02074	02076	'02087	02101	02113	02119	02134	02140	02148
WSU run	0799	0799	0799	0300	0300	0202	0202	0202	0402	0106	0106	0402	0402	0402	0402	0402	0402	0402	0402	0402
7.5' Quad	Cliffdell	Cliffdell	Quartz Mtn	Meeks Table	Nile	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Old Scab Mtn	Old Scab Mtn	Meeks Table	Imberwolf Mt	Old Scab Mtn	Old Scab Mtn	Mt. Clifty	Tieton Basin	Old Scab Mtn
UTM N*	5204650	5303100	5207830	5182130	5183530	5205660	5204990	5202730	5204220	5204480	5204880	5196060	5195220	5186030	5188890	5193320	5204920	5208580	5175150	5191190
UTM E*	6455570	647630	650900	651370	654230	644800	645180	645730	643800	644270	644500	642580	641820	648890	642080	641640	639590	637980	644520	642290
Unnormalize																				
SiO2	53.50	54.09	53.39	53.30	53.65	53.37	53.36	53.40	53.54	53.04	53.10	53.68	53.97	54.27	53.98	53.70	53.63	53.39	53.62	53.60
Al2O3	14.11	14.17	13.89	13.95	13.99	13.96	13.96	13.89	14.05	13.96	13.92	14.03	14.15	14.26	14.17	14.01	14.06	13.92	14.49	14.01
TiO2	1.816	1.839	1.819	1.807	1.823	1.837	1.840	1.817	1.797	1.799	1.795	1.821	1.844	1.891	1.840	1.831	1.844	1.822	1.836	1.802
FeO	11.36	11.22	11.41	11.68	11.53	11.32	11.27	11.36	11.50	11.13	11.27	10.82	11.05	10.43	10.96	11.11	11.21	11.73	10.85	11.74
MnO	0.208	0.212	0.188	0.204	0.202	0.209	0.213	0.197	0.206	0.200	0.205	0.205	0.202	0.201	0.203	0.205	0.206	0.217	0.200	0.203
CaO	8.78	8.82	8.55	8.78	8.78	8.81	8.79	8.66	8.82	8.62	8.59	8.83	8.84	8.92	8.87	8.81	8.79	8.79	9.11	8.78
MgO	5.07	4.83	5.16	4.96	4.98	5.15	5.15	5.07	4.92	4.79	4.94	5.01	4.90	4.81	4.80	4.96	4.97	4.82	4.97	4.98
K2O	1.14	1.25	1.11	1.12	1.26	1.12	1.14	1.11	1.22	1.21	1.15	1.22	1.24	1.09	1.20	1.17	1.23	1.15	1.13	1.19
Na2O	3.01	2.96	3.06	2.93	2.84	2.88	2.87	3.01	2.84	2.86	2.87	2.86	2.86	3.02	2.81	2.88	2.87	2.89	2.87	2.84
P2O5	<u>0.323</u>	<u>0.334</u>	<u>0.324</u>	<u>0.322</u>	<u>0.326</u>	<u>0.324</u>	<u>0.331</u>	<u>0.329</u>	<u>0.324</u>	<u>0.323</u>	<u>0.317</u>	<u>0.323</u>	<u>0.326</u>	<u>0.342</u>	<u>0.331</u>	<u>0.325</u>	<u>0.329</u>	<u>0.324</u>	<u>0.326</u>	<u>0.329</u>
analysis tota	99.31	99.73	98.90	99.05	99.38	98.98	98.93	98.84	99.21	97.94	98.15	98.80	99.39	99.24	99.16	99.00	99.14	99.06	99.40	99.48
Normalized I																				
SiO2	53.87	54.24	53.99	53.81	53.99	53.92	53.94	54.03	53.97	54.15	54.10	54.33	54.30	54.69	54.44	54.24	54.10	53.90	53.94	53.88
Al2O3	14.21	14.21	14.04	14.08	14.08	14.10	14.11	14.05	14.16	14.25	14.18	14.20	14.24	14.37	14.29	14.15	14.18	14.05	14.58	14.08
TiO2	1.829	1.844	1.839	1.824	1.834	1.856	1.860	1.838	1.811	1.837	1.829	1.843	1.855	1.906	1.856	1.850	1.860	1.839	1.847	1.811
FeO*	11.43	11.25	11.53	11.79	11.60	11.44	11.40	11.49	11.59	11.37	11.48	10.95	11.12	10.51	11.05	11.22	11.31	11.85	10.91	11.80
MnO	0.209	0.213	0.190	0.206	0.203	0.211	0.215	0.199	0.208	0.204	0.208	0.207	0.203	0.203	0.205	0.207	0.208	0.219	0.201	0.204
CaO	8.84	8.84	8.65	8.86	8.83	8.90	8.89	8.76	8.89	8.80	8.75	8.94	8.89	8.99	8.94	8.90	8.87	8.87	9.17	8.83
MgO	5.11	4.84	5.22	5.01	5.01	5.20	5.21	5.13	4.96	4.89	5.03	5.07	4.93	4.85	4.84	5.01	5.01	4.87	5.00	5.01
K2O	1.15	1.25	1.12	1.13	1.27	1.13	1.15	1.12	1.23	1.24	1.17	1.23	1.25	1.10	1.21	1.18	1.24	1.16	1.14	1.20
Na2O	3.03	2.97	3.09	2.96	2.86	2.91	2.90	3.05	2.86	2.92	2.93	2.89	2.88	3.04	2.83	2.91	2.89	2.92	2.89	2.85
P2O5	<u>0.325</u>	<u>0.335</u>	<u>0.328</u>	<u>0.325</u>	<u>0.328</u>	<u>0.327</u>	<u>0.335</u>	<u>0.333</u>	<u>0.327</u>	<u>0.330</u>	<u>0.323</u>	<u>0.327</u>	<u>0.328</u>	<u>0.345</u>	<u>0.334</u>	<u>0.328</u>	<u>0.332</u>	<u>0.327</u>	<u>0.328</u>	<u>0.331</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize																				
Ni	12	12	12	10	12	12	16	12	13	30	31	14	11	13	11	14	13	13	14	11
Cr	56	52	55	51	52	52	53	54	51	45	46	53	52	<b>53</b>	53	52	51	49	55	52
Sc	31	41	30	39	32	37	45	35	42	35	36	40	41	28	42	33	32	41	40	38
V	301	305	287	302	304	296	303	298	303	304	307	299	305	312	311	302	310	299	304	293
Ba	453	474	486	461	483	477	470	468	474	478	468	468	487	503	<b>517</b>	487	496	477	480	488
Rb	26	27	29	26	28	28	28	24	28	28	26	28	29	24	27	28	29	29	23	28
Sr	304	306	298	308	307	299	303	301	309	301	299	301	305	316	313	303	305	307	319	309
Zr	152	155	153	154	153	154	152	153	156	151	152	151	155	158	155	153	153	156	154	156
Y	35	35	33	33	34	34	34	34	35	31	32	33	34	36	36	33	33	34	34	34
Nb	12.3	11.8	12.8	12.3	12.0	13.3	11.8	12.3	12.0	9.2	9.8	10.6	12.2	10.6	11.3	12.0	12.3	12.2	12.7	11.5
Ga	22	22	21	20	22	18	22	19	21	20	22	22	21	19	21	19	18	21	21	24
Cu	35	33	34	33	32	36	30	32	36	33	33	36	35	35	34	33	35	36	33	33
Zn	108	111	109	114	115	116	111	113	115	116	113	111	114	114	114	114	114	115	115	114
Pb	3	5	8	7	3	5	5	1	3	6	6	5	7	4	6	4	5	6	6	8
La	22	26	17	9	22	20	13	19	24	19	19	16	19	27	24	25	14	15	29	13
Ce	29	38	34	35	44	44	31	25	55	39	41	51	25	27	44	32	41	33	56	49
Th	3	2	6	3	6	5	3	0	2	3	3	3	4	5	5	6	6	5	1	1
Nd										24										
U																				

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SN	04200	04201	04211	04212	04213	04214	05025	05026	05032	05033	05035	05037	05038	'05064	'05065	'05066	'05072	'05084	05089	05090
WSU run	0504(1)	0504(1)	0504(1)	0504(1)	0405(4)	0504(2)	0305(1)	0305(1)	0305(1)?	0305(1)	0305(1)	0305(1)	0405(3)	0305(2)	0305(2)	%0305(4)	0305(2)	0305(2)	0405(4)	0405(3)
7.5' Quad	Mt. Clifty	Ianastash La	Ianastash La	Ianastash La	Ianastash La	Ianastash La	Tieton Basin	Tieton Basin	/eddle Canyo	/eddle Canyo	Tieton Basin	/eddle Canyo	/eddle Canyo	Nile	Nile	Nile	Nile	Nile	/eddle Canyo	/eddle Canyo
UTM N*	5208820	5193540	5193180	5194270	5194270	5196880	5174280	5175660	5178260	5178220	5175910	5174840	5174440	5184000	5183800	5183720	5184220	5189770	5176920	5176670
UTM E*	635640	653370	656710	657750	657750	657260	650160	650940	656750	656880	652050	654490	654120	657900	657880	657860	656760	657520	653640	653680
Unnormalize																				
SiO2	53.69	53.97	53.47	53.52	53.10	53.18	53.65	53.14	53.66	53.80	54.05	53.52	53.23	53.47	53.30	54.05	53.36	53.39	53.14	53.12
Al2O3	14.10	14.36	13.99	14.00	13.96	14.01	13.98	13.91	14.04	13.98	14.64	14.07	13.97	14.07	13.87	14.03	13.85	13.94	13.95	14.00
TiO2	1.818	1.840	1.815	1.814	1.796	1.805	1.812	1.810	1.817	1.830	1.880	1.843	1.807	1.842	1.805	1.844	1.802	1.806	1.814	1.808
FeO	11.26	10.82	11.54	11.36	10.99	11.02	11.29	11.41	11.21	11.34	10.21	11.27	11.20	10.74	10.90	11.17	11.24	10.92	11.55	10.81
MnO	0.201	0.233	0.202	0.201	0.202	0.204	0.201	0.200	0.203	0.201	0.194	0.206	0.202	0.200	0.203	0.200	0.204	0.205	0.213	0.198
CaO	8.71	8.85	8.67	8.67	8.64	8.72	8.82	8.86	8.83	8.71	9.15	8.83	8.61	8.81	8.65	8.82	8.69	8.77	8.57	8.63
MgO	4.87	4.68	4.97	4.94	4.94	4.75	4.70	4.66	4.68	4.79	4.46	4.94	4.97	4.35	4.61	4.55	4.87	4.88	4.68	4.87
K2O	1.13	1.27	1.14	1.20	1.17	1.20	1.28	1.13	1.30	1.23	1.19	1.17	1.23	1.28	1.21	1.21	1.31	1.20	1.10	1.25
Na2O	2.97	2.90	2.93	2.93	2.94	2.88	2.84	2.90	2.88	2.84	2.96	2.96	2.92	2.84	2.79	2.78	2.84	2.91	2.67	2.89
P2O5	<u>0.334</u>	<u>0.323</u>	<u>0.332</u>	<u>0.332</u>	<u>0.317</u>	<u>0.321</u>	<u>0.326</u>	<u>0.319</u>	<u>0.328</u>	<u>0.328</u>	<u>0.329</u>	<u>0.331</u>	<u>0.321</u>	<u>0.333</u>	<u>0.325</u>	<u>0.339</u>	<u>0.324</u>	<u>0.322</u>	<u>0.325</u>	<u>0.319</u>
analysis tota	99.08	99.23	99.06	98.97	98.04	98.09	98.90	98.33	98.95	99.04	99.06	99.14	98.44	97.94	97.65	99.00	98.48	98.36	98.00	97.91
Normalized I				Normalized Major Elements (Weight %):																
SiO2	54.18	54.38	53.98	54.08	54.15	54.22	54.25	54.04	54.23	54.32	54.56	53.98	54.07	54.60	54.58	54.59	54.18	54.28	54.22	54.26
Al2O3	14.23	14.47	14.12	14.14	14.23	14.28	14.14	14.15	14.19	14.11	14.78	14.20	14.19	14.37	14.20	14.17	14.06	14.17	14.23	14.30
TiO2	1.834	1.855	1.832	1.833	1.832	1.840	1.832	1.841	1.837	1.847	1.898	1.859	1.835	1.880	1.849	1.862	1.830	1.836	1.851	1.847
FeO*	11.37	10.90	11.65	11.48	11.21	11.23	11.42	11.61	11.33	11.45	10.30	11.37	11.37	10.96	11.16	11.28	11.41	11.10	11.78	11.04
MnO	0.203	0.235	0.204	0.203	0.206	0.208	0.203	0.203	0.205	0.203	0.196	0.208	0.206	0.204	0.208	0.202	0.207	0.208	0.217	0.202
CaO	8.79	8.92	8.75	8.76	8.81	8.89	8.92	9.01	8.92	8.79	9.24	8.91	8.74	9.00	8.86	8.91	8.83	8.92	8.75	8.82
MgO	4.92	4.71	5.01	4.99	5.04	4.85	4.75	4.74	4.73	4.83	4.50	4.98	5.05	4.45	4.72	4.60	4.94	4.96	4.77	4.97
K2O	1.14	1.28	1.16	1.21	1.19	1.22	1.29	1.14	1.31	1.24	1.21	1.18	1.25	1.30	1.24	1.22	1.33	1.22	1.12	1.28
Na2O	3.00	2.92	2.95	2.96	3.00	2.93	2.87	2.95	2.91	2.87	2.99	2.99	2.97	2.90	2.85	2.81	2.88	2.96	2.72	2.96
P2O5	<u>0.337</u>	<u>0.325</u>	<u>0.335</u>	<u>0.336</u>	<u>0.323</u>	<u>0.327</u>	<u>0.330</u>	<u>0.324</u>	<u>0.331</u>	<u>0.332</u>	<u>0.333</u>	<u>0.334</u>	<u>0.326</u>	<u>0.340</u>	<u>0.333</u>	<u>0.343</u>	<u>0.329</u>	<u>0.328</u>	<u>0.331</u>	<u>0.326</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalized Trace Elements (ppm):				Unnormalized Trace Elements (ppm):																
Ni	21	17	13	17	20	15	22	22	23	21	22	22	16	22	19	24	20	21	16	18
Cr	47	47	45	45	45	47	47	47	46	45	49	46	44	49	45	45	46	45	44	44
Sc	38	38	36	36	36	37	38	38	37	38	39	38	38	38	37	36	37	38	36	38
V	309	310	306	308	306	310	308	306	307	307	316	311	305	311	305	307	308	311	308	307
Ba	480	529	504	491	486	479	499	492	505	513	519	503	487	526	578	516	494	487	509	488
Rb	28	26	27	27	28	28	32	28	29	29	27	27	28	28	28	28	30	29	28	27
Sr	294	305	295	292	305	299	319	319	318	314	332	315	304	319	314	320	310	310	306	306
Zr	148	150	147	147	155	149	160	160	161	162	166	163	156	161	159	162	159	159	158	157
Y	33	36	35	33	34	34	36	34	35	36	37	36	34	35	33	35	35	34	35	34
Nb	11.3	10.4	9.8	11.2	11.4	9.7	10.8	11.4	11.1	11.3	11.0	11.8	11.8	10.9	10.8	10.9	11.3	11.3	11.4	11.2
Ga	22	20	20	20	20	19	24	20	20	20	22	22	20	20	20	19	20	20	21	20
Cu	29	26	29	30	32	31	33	33	33	31	29	32	32	33	31	32	31	32	32	32
Zn	110	112	112	111	115	113	114	112	114	114	123	114	113	115	116	116	112	112	115	117
Pb	7	8	5	4	5	5	3	4	4	4	4	3	7	3	2	4	4	3	6	6
La	20	20	19	22	18	19	18	21	19	19	20	21	18	20	22	21	20	20	21	21
Ce	36	40	44	40	42	39	44	41	45	42	49	49	40	43	45	46	43	46	46	42
Th	3	3	4	2	2	5	1	2	1	1	1	1	3	1	0	1	0	1	3	2
Nd		29	25	26	25	23	24	23	25	26	27	27	22	25	25	26	24	25	23	26
U														1	0		1	0		

Table DR1 (c

SN	05092	05102	05108	05132	05137	05143	06018	06019	06028	06030	06061	06088	06111	06127	06142	06148	06153	06157	06174	06178
WSU run	0405(3)	0305(2)	0405(3)	0305(3)	0405(2)	0405(2)	0106(3)	0106(3)	0106(3)	0106(4)	0106(4)	0206	0306(1)	0306(1)	0306(1)	0306(1)	0306(1)	0306(1)	0306(2)	0306(2)
7.5' Quad	veddle Canyo	Tieton Basin	veddle Canyo	Meeks Table	lanastash La	lanastash La	veddle Canyo	veddle Canyo	Cliffdell	Nile	Nile	lanastash La	Nile	Frost Mtn	eeks Table 7.	Nile	lanastash La	Nile	veddle Canyo	veddle Canyo
UTM N*	5176850	5174820	5173600	5186010	5197480	5195100	5173060	5173010	5201560	5185870	5189420	5195060	5188060	5207080	5181850	5182120	5195780	5190300	5175720	5175440
UTM E*	653620	646140	659580	648890	658220	656300	657070	657120	644960	654770	657600	657900	657670	653370	651240	655960	656150	657390	660100	659040
Unnormalize																				
SiO2	53.87	53.42	53.65	53.49	53.35	53.38	53.52	53.31	53.47	53.06	53.28	53.79	53.66	53.70	53.52	53.80	53.74	53.39	54.62	54.08
Al2O3	14.09	13.95	14.01	13.96	14.15	14.11	14.09	13.96	13.96	13.95	13.98	14.31	14.15	14.23	13.98	14.12	14.02	14.11	14.18	14.36
TiO2	1.756	1.793	1.846	1.808	1.814	1.833	1.820	1.839	1.831	1.803	1.813	1.848	1.825	1.818	1.754	1.831	1.826	1.779	1.846	1.861
FeO	10.40	11.13	11.09	11.20	10.40	10.64	10.99	10.68	11.25	11.06	10.94	10.43	11.10	11.35	11.25	11.33	11.23	11.46	11.02	10.95
MnO	0.197	0.212	0.201	0.204	0.192	0.202	0.205	0.199	0.205	0.204	0.204	0.206	0.213	0.208	0.204	0.206	0.204	0.212	0.203	0.202
CaO	8.38	8.78	8.61	8.73	8.92	8.75	8.65	8.74	8.74	8.62	8.68	8.90	8.75	8.79	8.80	8.70	8.71	8.73	8.39	8.81
MgO	4.79	4.88	4.58	4.86	4.69	4.60	4.94	4.75	4.74	4.90	4.94	4.66	4.63	5.06	5.16	4.95	4.73	5.21	4.41	4.66
K2O	1.29	1.18	1.21	1.17	1.24	1.30	1.20	1.29	1.16	1.25	1.15	1.28	1.20	1.16	1.09	1.31	1.25	1.05	1.47	1.26
Na2O	2.97	2.94	2.92	2.92	2.80	2.92	2.90	2.86	2.92	2.84	2.91	2.94	2.86	2.91	2.97	2.89	2.82	2.97	2.97	2.93
P2O5	0.317	0.322	0.345	0.319	0.301	0.329	0.323	0.336	0.322	0.317	0.317	0.328	0.326	0.314	0.312	0.325	0.319	0.294	0.361	0.331
analysis tota	98.07	98.61	98.46	98.66	97.86	98.06	98.64	97.98	98.61	98.01	98.20	98.69	98.71	99.54	99.24	99.46	98.85	99.20	99.47	99.45
Normalized INormalized Major Elements (Weight %):																				
SiO2	54.93	54.17	54.49	54.22	54.51	54.43	54.25	54.41	54.23	54.14	54.25	54.50	54.36	53.95	53.93	54.09	54.36	53.82	54.91	54.38
Al2O3	14.37	14.15	14.23	14.15	14.46	14.39	14.28	14.25	14.15	14.23	14.24	14.50	14.34	14.30	14.29	14.19	14.19	14.22	14.26	14.44
TiO2	1.791	1.818	1.875	1.832	1.854	1.869	1.845	1.877	1.857	1.840	1.847	1.873	1.849	1.826	1.767	1.841	1.847	1.793	1.856	1.871
FeO*	10.60	11.29	11.27	11.35	10.63	10.85	11.14	10.90	11.41	11.29	11.14	10.56	11.25	11.40	11.33	11.39	11.37	11.55	11.08	11.01
MnO	0.201	0.215	0.204	0.207	0.196	0.206	0.208	0.203	0.207	0.208	0.207	0.209	0.216	0.209	0.206	0.207	0.206	0.213	0.204	0.203
CaO	8.54	8.90	8.74	8.85	9.11	8.92	8.77	8.92	8.86	8.80	8.84	9.02	8.86	8.83	8.86	8.75	8.81	8.80	8.43	8.86
MgO	4.88	4.95	4.65	4.93	4.80	4.69	5.01	4.85	4.81	5.00	5.03	4.72	4.69	5.09	5.20	4.97	4.79	5.26	4.43	4.68
K2O	1.32	1.20	1.22	1.19	1.27	1.33	1.22	1.32	1.17	1.28	1.17	1.30	1.21	1.16	1.10	1.31	1.27	1.06	1.48	1.27
Na2O	3.03	2.98	2.97	2.96	2.86	2.98	2.94	2.92	2.97	2.89	2.96	2.98	2.89	2.92	3.00	2.91	2.85	2.99	2.99	2.95
P2O5	0.324	0.327	0.351	0.323	0.307	0.336	0.328	0.343	0.326	0.323	0.323	0.333	0.331	0.315	0.315	0.327	0.323	0.297	0.363	0.333
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
UnnormalizeUnnormalized Trace Elements (ppm):																				
Ni	16	23	17	23	21	21	26	22	23	15	14	23	17	17	17	16	17	20	14	15
Cr	39	47	42	46	46	44	46	43	45	45	45	46	43	44	47	43	42	44	36	42
Sc	36	37	36	38	38	36	36	37	37	36	38	39	37	37	37	37	36	37	35	37
V	310	307	301	309	318	309	306	305	310	306	312	317	307	312	301	306	313	315	300	313
Ba	579	491	526	477	496	531	493	496	475	474	480	504	480	484	464	498	544	469	594	510
Rb	33	29	29	29	26	29	28	29	28	28	27	29	30	27	28	28	31	27	34	29
Sr	312	311	312	311	311	312	307	307	304	305	304	312	317	316	316	315	318	309	323	322
Zr	160	158	162	159	156	159	155	158	156	154	154	156	159	154	151	159	158	153	170	161
Y	34	34	35	34	35	35	32	32	32	32	32	35	34	34	32	33	33	32	35	34
Nb	12.1	12.3	11.1	11.7	10.9	11.8	10.1	10.3	9.9	10.2	10.8	10.4	9.9	9.5	9.1	10.1	9.8	9.8	10.7	10.4
Ga	21	20	20	21	21	21	21	21	20	20	21	22	21	20	20	21	21	18	20	19
Cu	23	32	30	34	35	33	32	32	32	32	33	34	33	31	31	30	33	34	25	31
Zn	115	115	117	113	117	118	117	118	116	115	116	120	118	119	112	118	116	113	121	120
Pb	6	4	7	4	6	6	6	8	7	6	7	7	5	5	5	5	5	4	6	6
La	19	19	19	17	20	20	18	21	19	20	20	21	20	20	18	19	22	21	23	18
Ce	47	48	44	41	36	40	45	46	47	44	41	42	39	43	37	43	45	42	46	46
Th	3	1	2	1	3	3	2	2	1	3	5	3	4	4	4	4	4	3	5	4
Nd	25	25	25	25	21	23	25	25	28	23	23	23	25	25	22	24	22	27	24	24
U				1																

Table DR1 (c

SN	06179	07022	07029	07034	08017	08019	08032	08066	08068	8084	08097	08098	09046		
WSU run	0306(2)	0110	0207	0207	0108(2)	0108(2)	0108(2)	0108(2)	0108(2)	0108(3)	0208	0208	0109(2)		
7.5' Quad	veddle Canyc	Mt. Clifty	veddle Canyc	Old Scab Mtn	veddle Canyc	Tieton	Nile	Frost Mtn	Frost Mtn	Tieton	Frost Mtn	Frost Mtn	Frost Mtn		
UTM N*	5175590	5210100	5177960	5195020	5178220	5176220	5181360	5209060	5209480	5178980	5213930	5214460	5207980		
UTM E*	658870	640100	656140	639920	661670	667780	662060	658630	658570	663310	659220	656810	660760		
Unnormalize															
SiO2	54.00	53.40	53.52	51.90	53.18	52.89	53.59	53.51	52.79	54.55	53.15	53.37	53.18		
Al2O3	14.19	13.89	14.02	13.68	14.00	13.94	14.85	14.08	14.52	14.50	14.14	14.14	13.97		
TiO2	1.835	1.831	1.861	1.772	1.853	1.816	1.829	1.853	1.758	1.918	1.830	1.838	1.818		
FeO	11.36	11.64	11.35	11.32	11.07	11.26	9.33	11.20	10.13	9.26	10.52	10.89	11.34		
MnO	0.204	0.197	0.205	0.200	0.203	0.202	0.162	0.201	0.187	0.160	0.196	0.196	0.199		
CaO	8.75	8.63	8.62	8.72	8.65	8.62	8.20	8.70	9.12	8.34	8.74	8.70	8.67		
MgO	4.88	4.73	4.83	4.73	4.79	4.90	4.29	4.90	4.91	4.35	4.69	4.75	4.98		
K2O	1.26	1.04	1.39	1.21	1.30	1.13	1.28	1.26	1.17	1.38	1.21	1.13	1.16		
Na2O	2.90	2.90	2.87	2.87	2.83	2.98	2.81	2.90	2.85	2.91	2.88	2.94	2.89		
P2O5	<u>0.330</u>	<u>0.332</u>	<u>0.351</u>	<u>0.314</u>	<u>0.333</u>	<u>0.325</u>	<u>0.314</u>	<u>0.325</u>	<u>0.292</u>	<u>0.351</u>	<u>0.323</u>	<u>0.323</u>	<u>0.321</u>	<u>averages</u>	<u>std dev</u>
analysis tota	99.71	98.60	99.01	96.70	98.21	98.06	96.66	98.93	97.72	97.71	97.67	98.28	98.53	98.70	0.78
Normalized I															
SiO2	54.16	54.16	54.06	53.67	54.15	53.93	55.44	54.09	54.02	55.83	54.41	54.31	53.97	54.18	0.35
Al2O3	14.23	14.09	14.16	14.14	14.25	14.21	15.36	14.23	14.86	14.84	14.48	14.39	14.18	14.26	0.20
TiO2	1.840	1.857	1.880	1.833	1.887	1.852	1.892	1.873	1.799	1.963	1.874	1.870	1.845	1.841	0.035
FeO*	11.39	11.81	11.46	11.71	11.27	11.48	9.65	11.32	10.36	9.48	10.77	11.08	11.51	11.24	0.42
MnO	0.204	0.200	0.207	0.206	0.206	0.206	0.167	0.204	0.191	0.164	0.200	0.200	0.202	0.205	0.008
CaO	8.78	8.75	8.71	9.01	8.81	8.79	8.48	8.80	9.33	8.53	8.95	8.85	8.80	8.85	0.16
MgO	4.90	4.80	4.87	4.89	4.87	5.00	4.44	4.95	5.02	4.45	4.81	4.83	5.05	4.92	0.20
K2O	1.26	1.06	1.40	1.25	1.33	1.15	1.33	1.27	1.19	1.41	1.24	1.15	1.18	1.22	0.08
Na2O	2.91	2.94	2.90	2.97	2.88	3.04	2.91	2.93	2.92	2.97	2.95	2.99	2.93	2.94	0.09
P2O5	<u>0.331</u>	<u>0.337</u>	<u>0.354</u>	<u>0.325</u>	<u>0.339</u>	<u>0.331</u>	<u>0.325</u>	<u>0.329</u>	<u>0.299</u>	<u>0.360</u>	<u>0.331</u>	<u>0.329</u>	<u>0.326</u>	0.329	0.011
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		
Unnormalize															
Ni	18	18	9	11	12	13	11	14	15	13	13	15	18	16	5
Cr	42	40	41	43	41	41	40	41	53	42	42	42	39	46	4
Sc	36	35	37	36	38	36	37	38	38	38	36	37	36	37	3
V	309	311	308	301	305	304	286	312	315	300	314	308	306	307	7
Ba	488	461	510	478	508	490	611	499	465	576	495	504	471	496	30
Rb	28	28	29	29	27	29	28	28	25	31	29	29	28	28	2
Sr	317	311	312	312	309	305	336	311	317	333	313	313	309	309	8
Zr	160	164	166	157	162	159	169	162	154	170	162	163	158	156	5
Y	34	35	35	32	34	32	33	34	34	39	36	42	35	34	2
Nb	10.7	12.2	10.2	9.9	9.9	9.8	10.7	9.8	9.0	10.7	9.7	10.0	11.3	11.2	1.0
Ga	19	21	19	20	19	20	20	20	20	19	21	20	21	20	1
Cu	32	34	32	33	33	32	22	34	36	28	34	36	33	31	4
Zn	118	117	119	113	126	121	130	123	119	145	121	126	116	115	5
Pb	6	5	5	5	7	7	7	6	6	6	6	6	5	5	2
La	20	22	21	20	22	22	24	20	22	25	21	22	22	19	4
Ce	45	52	47	41	42	41	44	42	37	41	44	45	39	42	7
Th	4	2	4	4	4	4	4	3	4	3	5	6	4	3	2
Nd	27	26		23	25	25	27	23	22	25	25	26	22	25	2
U		1					1	1	1		3	2	1	1	1

Table DR1 (continued). ANALYSES OF GRANDE RONDE BASALT LAVA FLOWS IN UPPER NACHES RIVER BASIN, YAKIMA AND KITTITAS COUNTIES, WASHINGTON

lower McCOY CANYON																				
SN	96123	96194	99016	99029	99061	99161	99162	02021	03006	03179	03180	03182	03183	'04045	'04046	'04050	'04051	'04052	'04053	'04078
WSU run	0897(1)	0202	0799	0799	0799	0300	0300	0402	0204	0204	0106(1)	0204	0106(1)	0404(1)	0404(1)	0404(1)	0404(1)	0404(1)	0404(1)	0404(1)
7.5' Quad	Old Scab Mtn	Cliffdell	Cliffdell	Cliffdell	Quartz Mtn	Nile	Nile	Cliffdell	Quartz Mtn	Ianastash Lak	Manastash Llanastash Lak	Manastash Lak	Manastash Lak	Nile	Nile	Nile	Nile	Nile	Nile	Nile
UTM N*	5196380	5204810	5203880	5303100	5207830	5183530	5183530	5205090	5207000	5199520	5198040	5196950	5196900	5184780	5182845	5182840	5182830	5183340	5184260	5186670
UTM E*	640820	644830	646920	647630	650900	654230	654230	644440	644700	656700	656260	654690	654840	656460	657860	657920	658020	658340	657960	658400
Unnormalized Major Elements (Weight %):																				
SiO2	53.75	53.24	53.82	53.79	53.37	53.91	53.72	53.07	53.49	53.66	53.28	53.46	53.47	53.98	53.90	53.90	53.97	53.91	54.03	53.84
Al2O3	13.54	13.77	14.07	14.20	13.86	13.86	13.82	13.68	13.98	14.10	13.86	13.81	14.03	13.90	14.08	13.86	13.96	13.89	14.17	14.01
TiO2	1.919	1.933	1.941	1.934	1.936	1.971	1.937	1.903	1.904	1.917	1.899	1.895	1.896	1.963	1.943	1.976	1.972	1.985	1.941	1.935
FeO	11.58	11.55	11.35	11.51	11.49	11.82	12.03	12.07	12.23	12.05	11.29	12.66	10.88	12.12	11.72	12.09	12.04	12.24	11.71	12.08
MnO	0.187	0.226	0.208	0.217	0.193	0.207	0.207	0.215	0.225	0.207	0.205	0.205	0.206	0.214	0.208	0.214	0.213	0.215	0.209	0.216
CaO	7.47	8.65	8.67	8.62	8.55	8.63	8.63	8.51	8.64	8.65	8.44	8.42	8.56	8.39	8.69	8.47	8.49	8.43	8.72	8.49
MgO	4.26	4.88	4.73	4.47	4.58	4.54	4.60	4.71	4.89	4.83	4.64	4.56	4.64	4.55	4.84	4.53	4.55	4.57	4.42	4.73
K2O	1.60	1.11	1.24	1.25	1.05	1.33	1.21	1.19	0.92	1.33	1.28	1.12	1.32	1.31	1.12	1.25	1.28	1.33	1.22	1.25
Na2O	3.07	2.92	2.97	2.96	3.03	2.85	2.85	2.87	3.07	2.86	2.88	3.03	2.88	2.98	3.02	2.96	2.95	2.94	2.94	2.96
P2O5	0.321	0.291	0.302	0.307	0.294	0.303	0.296	0.285	0.290	0.290	0.285	0.290	0.286	0.320	0.293	0.315	0.311	0.318	0.298	0.326
analysis tota	97.69	98.57	99.30	99.26	98.35	99.43	99.30	98.51	99.64	99.89	98.06	99.45	98.17	99.72	99.81	99.57	99.73	99.83	99.64	99.85
Normalized Major Elements (Weight %):																				
SiO2	55.02	54.01	54.20	54.19	54.27	54.22	54.10	53.87	53.68	53.72	54.33	53.76	54.47	54.13	54.00	54.14	54.12	54.00	54.22	53.92
Al2O3	13.86	13.97	14.17	14.31	14.09	13.94	13.92	13.89	14.03	14.11	14.14	13.89	14.29	13.94	14.10	13.92	13.99	13.92	14.22	14.03
TiO2	1.964	1.961	1.955	1.948	1.968	1.982	1.951	1.932	1.910	1.919	1.937	1.905	1.931	1.969	1.947	1.985	1.977	1.988	1.948	1.938
FeO*	11.85	11.72	11.43	11.60	11.68	11.89	12.12	12.26	12.28	12.06	11.51	12.73	11.09	12.15	11.74	12.15	12.07	12.26	11.75	12.10
MnO	0.191	0.229	0.209	0.219	0.196	0.208	0.208	0.218	0.226	0.207	0.209	0.206	0.210	0.214	0.208	0.215	0.214	0.216	0.209	0.216
CaO	7.65	8.78	8.73	8.68	8.69	8.68	8.69	8.64	8.67	8.65	8.61	8.46	8.72	8.41	8.70	8.51	8.51	8.44	8.75	8.50
MgO	4.36	4.95	4.76	4.50	4.66	4.57	4.63	4.78	4.91	4.84	4.74	4.59	4.72	4.57	4.85	4.55	4.57	4.57	4.44	4.74
K2O	1.64	1.13	1.25	1.26	1.07	1.34	1.22	1.21	0.92	1.34	1.30	1.12	1.35	1.32	1.12	1.26	1.29	1.34	1.22	1.26
Na2O	3.14	2.96	2.99	2.98	3.08	2.87	2.87	2.91	3.08	2.86	2.94	3.05	2.94	2.98	3.03	2.97	2.95	2.94	2.95	2.97
P2O5	0.329	0.295	0.304	0.309	0.299	0.305	0.298	0.289	0.291	0.290	0.290	0.292	0.291	0.320	0.294	0.316	0.312	0.318	0.299	0.326
analysis total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalized Trace Elements (ppm):																				
Ni	6	10	9	7	10	8	11	9	8	7	26	8	26	12	12	11	11	9	15	14
Cr	26	36	37	33	37	34	35	37	19	19	25	18	26	18	21	20	20	20	22	23
Sc	26	41	43	39	40	37	37	36	37	36	36	36	36	36	38	37	37	37	38	37
V	350	326	347	334	359	330	328	325	338	341	337	336	335	345	347	345	345	344	342	341
Ba	624	448	464	468	458	486	453	451	451	469	466	461	462	510	466	514	503	514	465	495
Rb	40	26	27	29	22	30	28	26	27	29	28	28	28	33	27	32	31	32	31	32
Sr	309	312	311	316	311	317	318	310	314	317	309	309	314	318	316	320	317	316	326	316
Zr	163	151	150	153	154	158	154	153	157	157	151	155	151	157	155	158	158	158	155	153
Y	34	34	34	35	33	34	34	33	33	33	30	33	30	32	32	33	33	33	32	32
Nb	13.2	10.8	12.4	13.8	12.7	12.9	11.2	12.0	10.7	10.7	9.9	11.7	9.4	12.4	11.5	11.6	12.3	12.2	12.6	11.9
Ga	21	21	21	20	20	21	22	20	22	22	22	18	22	22	20	21	22	20	22	21
Cu	21	26	25	27	30	28	30	25	22	23	26	21	27	17	17	16	15	15	18	15
Zn	109	108	112	114	113	115	111	112	115	119	114	113	113	118	116	118	118	118	117	116
Pb	7	6	3	6	6	8	7	3	5	7	5	6	7	7	5	7	6	5	5	5
La	33	22	10	15	25	24	23	15	18	19	15	14	23	18	19	15	17	19	18	15
Ce	35	33	40	32	41	39	60	37	43	38	37	42	42	41	48	47	39	38	42	44
Th	7	1	5	4	6	5	4	4	2	4	3	4	1	3	3	4	3	4	3	3
Nd	nd										24		24	25	22	29	24	22	26	25
U	nd																			

\*to nearest 5 m  
"†" denotes values >120% of highest standard.  
nd, not determined

Table DR1 (c

MT?																				
SN	04099	04100	04108	04123	04129	04134	'04135	'04177	04203	04229	05029	05030	05040	05041	05044	05047	05048	05049	05050	05086
WSU run	0404(2)	0405(2)	0405(4)	0504(2)	0404(2)	0404(2)	0404(2)	0504(1)	0504(2)	0405(2)	0405(2)	0405(4)	0405(4)	0305(1)	0305(1)	0305(1)	0305(1)	0305(1)	0305(1)	0405(4)
7.5' Quad	lanastash La	Kanastash La	Kanastash La	Kanastash La	Kanastash La	Kanastash La	Nile	Nile	lanastash La	Kanastash La	Weddle Canyo	Weddle Canyo	Weddle Canyo	Weddle Canyo	Weddle Canyo	Weddle Canyo	Weddle Canyo	Weddle Canyo	Weddle Canyo	Weddle Canyo
UTM N*	5204210	5204630	5205820	5195900	5202320	5200260	5190060	5185680	5193090	5197410	5178290	5178370	5174890	5174860	5176810	5173620	5173580	5173900	5173760	5176540
UTM E*	658460	657850	655190	656600	658290	656900	656560	658500	653650	657440	656620	656880	655320	655490	657880	657240	657040	656545	656315	653640
Unnormalize																				
SiO2	53.59	53.77	53.13	53.66	53.60	53.38	53.52	53.68	53.52	53.02	53.71	53.56	54.66	53.98	53.07	53.55	53.66	54.12	54.78	53.31
Al2O3	13.93	14.11	13.84	14.05	14.02	13.96	13.91	1.967	13.95	13.78	13.72	14.33	14.52	14.07	13.61	13.82	13.83	14.00	14.48	13.82
TiO2	1.940	1.933	1.909	1.902	1.932	1.922	1.929	13.79	1.913	1.905	2.022	1.936	2.039	1.943	1.888	1.911	1.931	1.940	1.976	1.922
FeO	11.91	11.20	11.75	11.20	12.11	11.82	11.98	11.86	11.59	11.67	11.86	10.51	9.21	10.95	11.58	11.79	11.64	11.29	9.92	11.58
MnO	0.213	0.217	0.210	0.203	0.209	0.213	0.215	0.214	0.221	0.207	0.209	0.189	0.184	0.199	0.208	0.207	0.208	0.197	0.182	0.207
CaO	8.63	8.77	8.54	8.68	8.66	8.71	8.64	4.40	8.60	8.44	8.31	8.82	8.64	8.78	8.52	8.66	8.53	8.77	8.83	8.51
MgO	4.74	4.71	4.64	4.51	4.63	4.78	4.85	8.38	4.64	4.69	4.32	4.41	4.27	4.52	4.71	4.67	4.69	4.23	4.51	4.72
K2O	1.39	1.25	1.07	1.30	1.33	1.36	1.33	2.93	1.29	1.25	1.31	1.22	1.35	1.29	1.23	1.22	1.30	1.33	1.42	1.26
Na2O	2.86	2.83	2.87	2.85	2.85	2.90	2.85	1.25	2.86	2.91	2.98	2.91	2.93	2.91	2.91	2.91	2.89	2.87	2.94	2.88
P2O5	<u>0.290</u>	<u>0.292</u>	<u>0.318</u>	<u>0.292</u>	<u>0.294</u>	<u>0.302</u>	<u>0.291</u>	<u>0.320</u>	<u>0.320</u>	<u>0.289</u>	<u>0.324</u>	<u>0.287</u>	<u>0.305</u>	<u>0.293</u>	<u>0.280</u>	<u>0.287</u>	<u>0.295</u>	<u>0.289</u>	<u>0.311</u>	<u>0.290</u>
analysis tota	99.50	99.07	98.27	98.63	99.63	99.34	99.50	98.78	98.90	98.18	98.77	98.18	98.10	98.94	98.01	99.03	98.98	99.03	99.35	98.51
Normalized I																				
Normalized Major Elements (Weight %):																				
SiO2	53.87	54.27	54.07	54.40	53.79	53.73	54.34	54.11	54.00	54.38	54.55	55.72	54.55	54.15	54.08	54.22	54.65	55.14	54.12	
Al2O3	14.00	14.24	14.08	14.24	14.07	14.05	13.98	13.96	14.11	14.04	13.89	14.60	14.81	14.22	13.88	13.95	13.97	14.13	14.57	14.03
TiO2	1.949	1.952	1.943	1.928	1.939	1.935	1.938	1.991	1.934	1.940	2.047	1.971	2.079	1.963	1.927	1.930	1.951	1.959	1.989	1.952
FeO*	11.97	11.30	11.95	11.35	12.16	11.90	12.04	12.01	11.72	11.89	12.01	10.70	9.39	11.07	11.81	11.91	11.76	11.40	9.98	11.75
MnO	0.214	0.219	0.213	0.206	0.210	0.215	0.216	0.216	0.224	0.211	0.211	0.193	0.188	0.201	0.212	0.209	0.210	0.199	0.183	0.210
CaO	8.68	8.85	8.69	8.80	8.69	8.76	8.68	8.48	8.70	8.60	8.41	8.99	8.81	8.88	8.69	8.74	8.62	8.86	8.89	8.64
MgO	4.76	4.75	4.72	4.57	4.65	4.82	4.87	4.45	4.69	4.78	4.38	4.50	4.35	4.57	4.81	4.72	4.74	4.27	4.54	4.79
K2O	1.39	1.26	1.09	1.32	1.34	1.37	1.34	1.27	1.30	1.28	1.33	1.25	1.37	1.31	1.26	1.23	1.31	1.35	1.43	1.28
Na2O	2.87	2.86	2.92	2.89	2.86	2.92	2.86	2.96	2.89	2.96	3.02	2.97	2.98	2.94	2.97	2.94	2.92	2.90	2.96	2.93
P2O5	<u>0.292</u>	<u>0.295</u>	<u>0.323</u>	<u>0.296</u>	<u>0.295</u>	<u>0.304</u>	<u>0.293</u>	<u>0.324</u>	<u>0.323</u>	<u>0.294</u>	0.328	0.292	0.311	0.296	0.286	0.290	0.298	0.291	0.313	0.295
analysis total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize																				
Unnormalized Trace Elements (ppm):																				
Ni	13	16	14	11	16	16	15	13	10	16	17	15	14	20	19	20	20	19	18	13
Cr	21	23	24	24	22	20	21	23	23	24	23	25	24	26	26	26	25	26	26	22
Sc	38	39	37	37	37	38	37	37	37	37	38	39	41	39	39	39	38	38	40	38
V	344	366	349	337	341	342	341	344	344	336	351	342	348	346	338	344	341	343	346	339
Ba	471	528	500	481	476	475	465	508	477	468	520	504	641	489	461	466	493	465	520	493
Rb	30	28	27	28	28	30	31	30	28	29	31	24	31	29	28	30	30	33	32	29
Sr	312	327	315	312	315	314	312	311	305	315	321	329	344	329	313	321	321	329	341	314
Zr	154	157	155	146	153	153	152	150	146	155	165	156	166	159	157	158	160	160	167	156
Y	32	35	34	33	34	32	32	33	32	33	35	36	42	34	34	33	34	34	36	34
Nb	11.9	10.8	12.1	10.9	11.4	11.5	11.5	10.8	10.9	12.2	11.6	10.6	11.9	11.0	11.0	11.1	11.5	11.0	11.6	11.0
Ga	23	20	19	21	21	22	20	22	21	18	20	22	23	21	20	22	21	21	22	21
Cu	11	26	26	23	18	17	17	22	24	24	24	24	27	27	26	29	26	28	28	25
Zn	116	121	117	114	115	114	115	114	115	114	117	120	128	116	113	113	116	115	120	115
Pb	7	6	6	8	4	3	6	6	6	8	4	7	7	4	4	4	4	4	4	7
La	20	20	18	17	21	17	22	23	18	20	23	23	28	14	17	18	19	18	20	19
Ce	44	42	40	37	49	38	41	37	42	41	47	40	43	44	40	39	44	43	44	44
Th	4	3	3	3	3	4	4	4	4	3	2	3	3	0	1	1	1	1	1	1
Nd	23	25	23	24	27	21	23	24	24	23	26	23	27	24	22	23	26	23	23	24
U																				

Table DR1 (c

SN	05087	05088	05095	05106	05107	05123	05125	05126	05140	05141	06004	06007	06024	06037	06040	06041	06042	06044	06048	06049
WSU run	0305(2)	0305(2)	0305(2)	0405(3)	0405(3)	0305(3)	0305(3)	0305(3)	0405(2)	0405(2)	0106(3)	0106(3)	0106(3)	0106(4)	0106(4)	0106(4)	0106(4)	0106(4)	0106(4)	0106(4)
7.5' Quad	Weddle Canyon	Weddle Canyon	Nile	Weddle Canyon	Weddle Canyon	Nile	Nile	Nile	Ianastash La	Ianastash La	Weddle Canyon	Nile	Weddle Canyon	Nile	Nile	Nile	Nile	Nile	Nile	Nile
UTM N*	5176540	5176920	5179340	5173520	5173560	5182350	5184040	5183185	5196010	5196140	5177640	5184040	5175140	5180060	5182020	5181420	5181690	5183140	5184690	5184170
UTM E*	653640	653640	655280	659550	659570	655475	656880	656840	656620	656670	660290	658070	654630	654020	654920	655080	655180	654300	656740	656900
Unnormalize																				
SiO2	53.48	53.49	52.79	53.40	53.45	53.40	53.55	53.24	53.69	53.74	53.67	53.41	53.03	53.10	53.06	53.02	52.91	53.36	53.03	52.97
Al2O3	13.85	13.81	13.57	13.71	13.61	14.11	13.83	13.84	14.06	13.61	13.95	13.80	13.73	13.83	13.84	13.81	13.71	13.79	13.67	13.78
TiO2	1.916	1.946	1.893	1.995	2.017	1.932	1.910	1.907	1.946	1.902	1.930	1.933	1.922	1.945	1.922	1.929	1.929	1.903	1.921	1.894
FeO	11.23	11.10	11.39	11.56	11.69	11.69	11.44	11.52	10.98	9.84	11.90	11.68	11.76	11.31	11.49	11.71	11.00	11.74	11.57	11.28
MnO	0.209	0.203	0.205	0.203	0.205	0.208	0.207	0.209	0.210	0.212	0.209	0.208	0.205	0.205	0.201	0.205	0.201	0.209	0.208	0.207
CaO	8.63	8.63	8.51	8.19	8.08	8.82	8.66	8.63	8.63	8.89	8.51	8.50	8.53	8.57	8.48	8.53	8.58	8.57	8.44	8.50
MgO	4.53	4.52	4.67	4.39	4.32	4.78	4.60	4.49	4.40	4.43	4.81	4.69	4.66	4.44	4.27	4.42	4.20	4.85	4.65	4.78
K2O	1.27	1.34	1.17	1.36	1.35	1.16	1.23	1.15	1.24	1.23	1.17	1.23	1.14	1.24	1.07	1.05	1.22	1.26	1.17	1.22
Na2O	2.86	2.88	2.84	2.97	2.98	2.89	2.87	2.90	2.89	2.91	2.93	2.90	2.79	2.85	2.73	2.72	2.78	2.79	2.89	2.83
P2O5	0.284	0.292	0.280	0.318	0.329	0.282	0.294	0.283	0.295	0.284	0.284	0.288	0.286	0.288	0.287	0.315	0.292	0.279	0.285	0.288
analysis tota	98.26	98.20	97.31	98.09	98.04	99.27	98.60	98.17	98.35	97.95	99.36	98.64	98.05	97.78	97.34	97.72	96.82	98.75	97.84	97.73
Normalized I																				
SiO2	54.43	54.47	54.24	54.44	54.52	53.79	54.31	54.23	54.59	54.86	54.01	54.15	54.08	54.30	54.51	54.26	54.64	54.03	54.20	54.19
Al2O3	14.10	14.06	13.95	13.98	13.89	14.21	14.03	14.10	14.30	14.82	14.04	13.99	14.00	14.14	14.21	14.14	14.16	13.96	13.97	14.09
TiO2	1.950	1.982	1.945	2.034	2.057	1.946	1.938	1.943	1.978	1.942	1.943	1.960	1.960	1.990	1.974	1.974	1.992	1.927	1.963	1.938
FeO*	11.43	11.30	11.70	11.78	11.93	11.78	11.60	11.73	11.17	10.05	11.98	11.84	12.00	11.56	11.80	11.99	11.36	11.89	11.82	11.54
MnO	0.212	0.206	0.211	0.207	0.209	0.210	0.210	0.212	0.213	0.217	0.211	0.210	0.209	0.210	0.206	0.209	0.207	0.212	0.213	0.211
CaO	8.78	8.79	8.75	8.35	8.24	8.89	8.79	8.80	8.78	9.08	8.57	8.62	8.70	8.77	8.71	8.73	8.86	8.68	8.63	8.69
MgO	4.61	4.60	4.80	4.48	4.41	4.81	4.67	4.57	4.47	4.52	4.84	4.76	4.76	4.54	4.39	4.53	4.34	4.92	4.75	4.89
K2O	1.29	1.37	1.20	1.38	1.38	1.17	1.24	1.17	1.27	1.26	1.18	1.24	1.16	1.27	1.09	1.07	1.26	1.28	1.20	1.24
Na2O	2.92	2.93	2.92	3.03	3.04	2.91	2.91	2.96	2.94	2.97	2.95	2.94	2.84	2.91	2.81	2.78	2.87	2.82	2.95	2.89
P2O5	0.289	0.297	0.288	0.324	0.336	0.284	0.298	0.289	0.300	0.290	0.285	0.292	0.291	0.294	0.294	0.323	0.302	0.283	0.292	0.295
analysis total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize																				
Ni	17	17	17	13	11	17	18	17	15	20	18	18	20	12	8	9	10	11	10	10
Cr	25	26	25	21	19	28	26	26	22	27	26	25	23	25	24	24	23	25	25	25
Sc	39	38	36	37	36	39	38	38	38	38	38	38	38	37	37	38	37	38	37	37
V	343	346	338	344	345	349	341	339	343	333	340	338	339	346	348	377	344	342	339	337
Ba	534	468	436	501	512	463	479	493	513	500	463	465	434	460	511	468	555	450	463	463
Rb	29	29	26	32	32	25	28	27	28	25	29	29	25	27	26	26	28	27	28	26
Sr	322	319	314	313	314	327	322	323	330	337	312	313	311	318	315	312	318	313	311	312
Zr	158	161	156	160	163	159	157	157	159	154	154	155	153	155	153	154	154	152	153	150
Y	32	34	32	35	35	35	33	34	35	34	31	32	30	31	32	34	31	31	31	30
Nb	11.1	11.5	11.9	11.1	11.3	10.9	11.2	10.9	11.5	10.9	10.6	10.7	10.0	10.1	10.5	10.9	9.7	10.7	10.3	10.3
Ga	21	22	21	22	21	23	22	20	21	23	22	22	21	22	20	21	21	21	22	22
Cu	26	28	29	22	21	26	28	27	25	25	27	26	26	26	26	27	25	25	27	26
Zn	114	115	113	118	123	112	113	115	117	117	119	117	118	119	120	122	119	114	119	117
Pb	3	3	4	6	8	3	5	3	5	5	7	7	7	8	8	6	6	7	7	6
La	19	23	17	22	22	23	21	20	21	18	17	13	21	18	18	18	17	19	19	16
Ce	44	45	40	44	44	38	44	42	43	46	46	40	41	42	43	41	41	46	44	45
Th	0	1	1	3	3	2	1	0	2	3	2	3	2	3	3	4	4	3	3	3
Nd	23	26	24	23	25	25	25	26	24	26	26	23	25	23	22	24	24	22	23	23
U			1			0	0	0												
Unnormalized Trace Elements (ppm):																				

Table DR1 (c

MC																				
SN	06052	06056	06057	06063	06071	06072	06093	06096	06098	06101	06114	06116	06155	07003	07004	07012	07030	08013	08020	08024
WSU run	0106(4)	0306(2)	0106(4)	0106(4)	0206	0206	0206	0206	0206	0306(1)	0306(1)	0306(1)	0306(1)	0107(3)	0107(3)	0107(3)	0207	0108(3)	0108(2)	0108(2)
7.5' Quad	Nile	Ianastash Lak	Ianastash Lak	Nile	Nile	Nile	Ianastash Lak	Ianastash Lak	Cliffdell	Nile	Nile	Nile	Nile	Cliffdell	Cliffdell	Cliffdell	Veddle Canyons	Veddle Canyons	Tieton	Tieton
UTM N*	5183570	5193140	5194950	5189840	5179470	5179380	5193920	5195300	5205530	5182100	5188180	5187860	5190400	5202060	5201940	5203200	5177870	5178000	5177960	5177360
UTM E*	658330	653000	655220	657680	654260	654430	655890	655590	645100	655230	657740	658230	657140	646710	646800	645340	656090	662120	668760	665520
Unnormalize																				
SiO2	52.96	54.43	54.08	53.67	53.59	53.47	53.42	52.96	53.17	53.83	54.00	54.53	53.89	53.53	53.22	52.87	52.97	53.54	52.88	52.39
Al2O3	13.63	14.15	14.20	13.99	13.67	13.72	13.77	13.72	13.72	13.71	14.32	14.30	13.88	13.82	13.74	13.66	13.81	14.06	13.70	13.63
TiO2	1.912	1.950	1.968	1.922	2.025	2.025	1.917	1.906	1.924	2.036	1.964	1.996	1.949	1.939	1.918	1.878	1.908	1.903	1.953	1.907
FeO	11.67	11.59	10.23	10.92	12.21	11.94	11.92	11.72	12.17	12.03	11.18	11.04	11.72	11.66	11.91	11.46	11.94	11.34	11.86	11.75
MnO	0.210	0.194	0.190	0.206	0.210	0.208	0.208	0.208	0.213	0.209	0.209	0.202	0.212	0.213	0.213	0.207	0.207	0.204	0.208	0.206
CaO	8.42	8.20	8.64	8.58	8.12	8.21	8.45	8.43	8.43	8.15	8.74	8.68	8.53	8.56	8.54	8.64	8.48	8.64	8.33	8.42
MgO	4.82	4.16	4.47	4.66	4.39	4.39	4.67	4.73	4.76	4.42	4.30	4.45	4.73	4.56	4.66	4.52	4.78	4.80	4.60	4.73
K2O	1.12	1.07	1.32	1.23	1.35	1.30	1.17	1.26	1.18	1.32	1.14	1.30	1.17	1.21	1.20	1.15	1.10	1.27	1.19	1.14
Na2O	2.93	2.64	2.91	2.91	3.01	2.98	2.93	2.91	2.95	3.00	2.98	2.98	2.96	2.96	2.91	2.93	2.87	2.98	2.92	2.83
P2O5	<u>0.285</u>	<u>0.276</u>	<u>0.292</u>	<u>0.285</u>	<u>0.325</u>	<u>0.324</u>	<u>0.287</u>	<u>0.288</u>	<u>0.289</u>	<u>0.332</u>	<u>0.308</u>	<u>0.301</u>	<u>0.293</u>	<u>0.294</u>	<u>0.292</u>	<u>0.279</u>	<u>0.289</u>	<u>0.280</u>	<u>0.303</u>	<u>0.282</u>
analysis tota	97.95	98.65	98.29	98.37	98.91	98.56	98.75	98.13	98.80	99.03	99.09	99.77	99.35	98.69	98.62	97.54	98.46	98.96	97.96	97.29
Normalized I	Normalized Major Elements (Weight %):																			
SiO2	54.07	55.18	55.02	54.56	54.18	54.26	54.09	53.96	53.82	54.35	54.49	54.65	54.25	54.24	53.97	54.21	53.79	54.11	53.98	53.85
Al2O3	13.91	14.34	14.44	14.22	13.82	13.92	13.94	13.98	13.88	13.84	14.45	14.33	13.98	14.01	13.93	14.01	14.03	14.21	13.99	14.01
TiO2	1.952	1.977	2.002	1.954	2.047	2.055	1.942	1.943	1.948	2.056	1.982	2.001	1.962	1.965	1.945	1.925	1.937	1.923	1.993	1.960
FeO*	11.91	11.74	10.41	11.10	12.35	12.11	12.07	11.94	12.31	12.15	11.29	11.06	11.80	11.81	12.07	11.75	12.12	11.46	12.10	12.08
MnO	0.215	0.197	0.194	0.209	0.212	0.211	0.211	0.212	0.215	0.211	0.211	0.203	0.213	0.215	0.216	0.213	0.210	0.206	0.213	0.212
CaO	8.60	8.32	8.79	8.73	8.21	8.33	8.56	8.60	8.54	8.23	8.82	8.70	8.59	8.67	8.66	8.86	8.62	8.73	8.50	8.66
MgO	4.92	4.21	4.54	4.73	4.44	4.45	4.73	4.82	4.81	4.46	4.34	4.46	4.76	4.62	4.63	4.63	4.85	4.85	4.70	4.86
K2O	1.14	1.08	1.34	1.25	1.37	1.32	1.19	1.28	1.20	1.34	1.15	1.30	1.18	1.22	1.21	1.18	1.12	1.28	1.21	1.17
Na2O	3.00	2.67	2.96	2.96	3.05	3.02	2.96	2.96	2.98	3.03	2.96	2.98	2.98	2.95	2.97	2.94	3.03	2.95	3.00	2.91
P2O5	<u>0.291</u>	<u>0.280</u>	<u>0.297</u>	<u>0.290</u>	<u>0.328</u>	<u>0.328</u>	<u>0.291</u>	<u>0.293</u>	<u>0.293</u>	<u>0.335</u>	<u>0.311</u>	<u>0.302</u>	<u>0.295</u>	<u>0.298</u>	<u>0.297</u>	<u>0.286</u>	0.294	<u>0.283</u>	0.309	<u>0.290</u>
analysis total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize	Unnormalized Trace Elements (ppm):										Unnormalized Trace Elements (ppm):									
Ni	12	9	10	12	16	18	17	17	17	10	11	12	14	13	12	13	7	10	8	R
Cr	23	27	23	25	21	21	23	24	23	19	23	22	22	21	22	23	23	23	22	21
Sc	38	37	39	38	37	37	38	36	37	37	39	37	37	38	39	37	37	38	35	36
V	341	326	345	345	346	353	342	341	342	347	348	345	343	339	336	333	336	339	334	336
Ba	465	581	530	470	525	519	467	461	459	515	469	482	480	463	464	472	460	459	473	444
Rb	27	28	28	28	32	31	28	29	28	33	27	29	28	30	28	29	28	26	29	27
Sr	306	329	323	316	311	312	307	304	304	321	331	329	323	320	315	321	317	319	315	311
Zr	151	161	159	154	160	159	153	151	163	159	159	163	159	158	157	155	157	157	158	157
Y	31	37	34	31	35	35	34	32	33	33	35	34	34	33	33	32	33	32	33	32
Nb	10.2	10.9	10.5	10.6	10.8	11.8	10.5	10.3	10.8	10.4	10.0	10.8	10.9	10.1	10.7	9.9	9.4	10.1	9.8	9.7
Ga	20	21	24	21	21	21	20	20	20	21	20	22	21	21	21	21	19	20	19	21
Cu	25	26	26	26	23	25	27	27	25	21	26	24	26	27	26	27	27	28	25	27
Zn	118	122	122	117	120	120	116	114	113	121	120	122	118	117	114	115	118	121	121	122
Pb	8	6	7	7	8	7	6	7	5	6	6	5	6	6	5	4	5	6	7	6
La	19	22	20	18	20	23	23	21	23	20	20	18	19	18	17	18	20	24	17	21
Ce	40	38	43	39	47	41	44	42	43	45	39	39	46	41	44	39	44	41	42	44
Th	3	5	3	4	5	4	3	2	4	5	4	4	4	6	4	6	4	4	4	4
Nd	21	28	26	21	27	24	25	24	24	26	24	23	24	25	23	21		22	26	26
U																				

Table DR1 (c

					ORTLEY														
SN	08028	08063			94086	96239	99019	99023	02186	03005	'04080	04089	04090	04091	04119	'04138	04139	04164	04217
WSU run	0108(2)	0108(2)			0495	0197	0799	0799	0107(3)	0204	0404(1)	0404(1)	0405(4)	0404(1)	0404(2)	0404(2)	0404(2)	0405(4)	0504(2)
7.5' Quad	Nile	Frost Mtn			Old Scab Mtn	Old Scab Mtn	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Nile 7.5'	Veddle Canyo	Veddle Canyo	Veddle Canyo	clanastash Lak	Nile	Veddle Canyo	Veddle Canyo	clanastash Lak
UTM N*	5181220	5209360			5195810	5199750	5201970	5204730	5201940	5203410	5182620	5176390	5177740	5177450	5194320	5187320	5173000	5172740	5194800
UTM E*	660200	657960			639730	638900	646830	646000	646820	644130	659550	653550	659700	660560	656550	657930	659000	658640	655500
Unnormalize																			
SiO2	52.69	52.86			54.58	52.73	57.51	55.76	56.60	54.71	53.53	56.91	56.32	56.57	54.71	55.69	55.79	55.53	54.94
Al2O3	13.72	13.81			13.65	13.46	14.94	14.24	14.69	13.97	13.74	13.90	13.80	13.80	14.24	13.59	13.64	13.37	13.91
TiO2	1.914	1.929			1.981	1.961	2.101	2.000	2.079	2.018	1.970	2.021	1.996	2.046	2.056	2.021	1.973	2.026	2.000
FeO	11.58	11.64			11.51	11.23	8.44	10.48	8.30	11.57	12.72	10.68	10.33	11.25	11.49	11.33	11.43	10.65	11.25
MnO	0.207	0.210			0.203	0.190	0.154	0.153	0.146	0.323	0.362	0.203	0.202	0.195	0.195	0.205	0.191	0.186	0.214
CaO	8.50	8.56			7.50	7.78	7.77	7.34	7.54	7.76	7.67	7.05	6.80	6.94	7.83	7.06	7.09	6.75	7.63
MgO	4.71	4.65			3.48	3.48	3.38	3.62	3.19	3.54	3.40	3.29	3.29	3.25	3.52	3.24	3.37	3.20	3.51
K2O	1.19	1.19	McCOY CANYON		1.55	1.57	1.70	1.56	1.63	1.67	1.67	2.15	1.92	1.93	1.49	2.01	1.81	2.06	1.71
Na2O	2.86	2.87	82		3.23	3.16	3.66	3.43	3.24	3.13	3.06	3.15	3.11	3.25	3.16	3.07	3.14	3.01	3.12
P2O5	<u>0.283</u>	<u>0.307</u>	average	std dev	<u>0.327</u>	<u>0.322</u>	<u>0.355</u>	<u>0.340</u>	<u>0.343</u>	<u>0.343</u>	<u>0.376</u>	<u>0.375</u>	<u>0.357</u>	<u>0.378</u>	<u>0.353</u>	<u>0.424</u>	<u>0.335</u>	<u>0.333</u>	<u>0.352</u>
analysis tota	97.65	98.01	98.65	0.72	98.011	95.88	100.01	98.93	97.77	99.03	98.49	99.74	98.12	99.61	99.05	98.63	98.77	97.12	98.65
Normalized Major Elements (Weight %):																			
Normalized I					Normalized Major Elements (Weight %):														
SiO2	53.95	53.93	54.24	0.36	55.69	54.99	57.51	56.36	57.89	55.24	54.35	57.06	57.39	56.79	55.23	56.47	56.49	57.18	55.69
Al2O3	14.05	14.09	14.09	0.20	13.93	14.04	14.94	14.39	15.02	14.10	13.95	13.94	14.06	13.85	14.38	13.78	13.81	13.77	14.10
TiO2	1.960	1.969	1.963	0.035	2.021	2.045	2.101	2.022	2.126	2.037	2.000	2.027	2.034	2.054	2.076	2.049	1.997	2.086	2.028
FeO*	11.86	11.88	11.71	0.53	11.74	11.71	8.44	10.60	8.49	11.69	12.91	10.71	10.53	11.30	11.60	11.48	11.57	10.96	11.41
MnO	0.212	0.214	0.210	0.007	0.207	0.198	0.154	0.155	0.149	0.326	0.368	0.204	0.205	0.196	0.197	0.208	0.193	0.192	0.217
CaO	8.71	8.73	8.65	0.20	7.65	8.11	7.77	7.42	7.72	7.83	7.79	7.07	6.93	6.97	7.91	7.16	7.18	6.95	7.74
MgO	4.82	4.74	4.65	0.17	3.55	3.63	3.38	3.66	3.27	3.58	3.45	3.30	3.36	3.26	3.55	3.28	3.41	3.30	3.56
K2O	1.22	1.21	1.25	0.10	1.58	1.64	1.70	1.58	1.67	1.69	1.69	2.15	1.96	1.94	1.51	2.03	1.83	3.10	1.74
Na2O	2.93	2.92	2.94	0.07	3.30	3.30	3.66	3.47	3.32	3.16	3.10	3.16	3.17	3.27	3.19	3.11	3.18	2.12	3.17
P2O5	<u>0.290</u>	<u>0.313</u>	0.301	0.014	<u>0.334</u>	<u>0.336</u>	<u>0.355</u>	<u>0.344</u>	<u>0.351</u>	<u>0.346</u>	<u>0.382</u>	<u>0.376</u>	<u>0.364</u>	<u>0.379</u>	<u>0.357</u>	<u>0.430</u>	<u>0.339</u>	<u>0.343</u>	<u>0.357</u>
analysis total	100.00	100.00			100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize																			
Ni	10	10	13	4	9	5	11	13	12	15	20	9	9	6	18	10	10	9	18
Cr	22	22	24	4	19	26	30	27	13	8	13	4	6	4	11	5	2	4	13
Sc	37	36	37	2	30	31	44	41	35	33	34	31	31	31	35	31	31	31	35
V	334	339	342	8	351	349	376	357	363	359	353	302	300	300	367	294	327	335	362
Ba	462	486	485	36	607	788	799	633	793	685	688	757	781	754	714	898	746	733	663
Rb	28	27	29	3	43	46	50	41	48	45	45	55	51	54	40	55	51	54	42
Sr	313	319	317	8	323	320	350	319	354	335	326	333	338	329	333	332	312	305	303
Zr	155	156	156	4	168	164	176	169	181	176	171	192	193	191	174	188	174	178	163
Y	32	33	33	2	36	34	38	36	38	36	35	36	37	35	37	36	34	35	35
Nb	10.0	9.7	11.0	0.9	12.6	12.1	13.8	12.6	10.5	11.4	12.5	13.9	13.6	15.0	13.1	13.6	12.0	12.4	11.8
Ga	20	21	21	1	20	21	23	22	22	22	20	22	20	23	20	24	21	23	21
Cu	27	28	24	4	29	22	47	29	30	29	24	4	14	4	27	3	8	18	28
Zn	121	118	117	3	125	118	127	120	143	124	123	124	126	125	124	122	118	119	119
Pb	7	6	6	1	5	9	8	8	7	11	6	8	10	9	10	10	9	9	8
La	20	22	19	3	11	22	41	27	28	20	19	27	28	27	21	28	25	26	19
Ce	43	44	42	4	42	45	51	42	47	47	46	57	60	54	45	60	51	55	40
Th	3	4	3	1	5	8	5	5	4	5	4	7	5	6	5	6	5	4	5
Nd	23	24	24	2					24		28	30	29	31	27	35	28	29	26
U	0	1	1	1															

Table DR1 (c

O																				
SN	04223	05085	05100	05101	05105	05117	05118	05127	05128	05144	06034	06039	06046	06073	06105	06115	06118	06143	07016	07017
WSU run	0504(2)	0305(2)	0305(2)	0305(2)	0405(3)	0405(3)	0405(3)	0305(3)	0405(2)	0405(2)	0106(4)	0106(4)	0106(4)	0206	0306(1)	0306(1)	0306(1)	0306(1)	0107(3)	0107(3)
7.5' Quad	Ianastash Lak	Nile	Tieton Basin	Tieton Basin	Veddle Canyon	Veddle Canyon	Veddle Canyon	Nile	Nile	Ianastash Lak	Weeks Table	Nile	Nile	Nile	Nile	Nile	Nile	Weeks Table	Milk Canyon	Milk Canyon
UTM N*	5194160	5189860	5174820	5174820	5173480	5173460	5173250	5183310	5184920	5195000	5182040	5182520	5183200	5179580	5190060	5187860	5183260	5181810	5179970	5179850
UTM E*	656240	657740	646140	646140	659520	659440	659510	656000	660120	655840	652520	655030	655490	656780	657700	658260	659140	650980	666520	666680
Unnormalize																				
SiO2	55.59	56.70	55.74	55.52	55.79	56.13	56.15	56.37	55.08	56.28	55.99	54.39	56.38	55.57	57.07	56.50	53.73	55.17	55.46	55.73
Al2O3	14.08	13.76	13.73	13.53	13.76	13.74	13.64	13.89	14.58	14.51	13.88	13.79	13.88	13.55	13.94	13.83	14.30	14.12	13.50	13.36
TiO2	2.027	1.991	1.945	1.937	1.955	1.976	1.949	2.043	2.025	2.080	2.015	1.979	1.997	1.974	2.050	2.009	2.052	2.030	1.999	2.052
FeO	10.54	9.67	10.70	11.09	10.80	10.93	10.81	9.55	9.23	8.35	9.86	10.91	9.84	11.25	9.97	10.32	11.56	9.80	11.30	11.59
MnO	0.193	0.177	0.184	0.189	0.184	0.186	0.188	0.176	0.135	0.154	0.182	0.211	0.191	0.189	0.175	0.194	0.190	0.393	0.189	0.186
CaO	7.73	6.97	6.97	6.96	6.97	6.90	6.90	6.78	7.09	7.64	6.96	7.60	7.05	6.82	6.79	6.92	7.78	7.70	6.84	6.78
MgO	3.54	3.30	3.34	3.32	3.41	3.38	3.37	3.16	3.14	3.49	3.34	3.57	3.37	3.29	3.23	3.33	3.55	3.49	3.28	3.24
K2O	1.75	1.94	1.68	1.81	1.83	1.87	1.90	2.05	1.61	1.85	1.88	1.66	1.89	1.75	1.92	1.98	1.22	1.80	1.96	1.80
Na2O	3.14	3.14	3.21	3.15	3.12	3.17	3.11	3.19	3.44	3.20	3.14	3.10	3.17	3.22	3.24	3.12	3.12	3.09	2.94	3.11
P2O5	0.347	0.355	0.336	0.341	0.332	0.344	0.319	0.368	0.454	0.378	0.361	0.340	0.351	0.352	0.361	0.374	0.367	0.349	0.348	0.332
analysis tota	98.94	98.00	97.83	97.85	98.15	98.63	98.33	97.57	96.78	97.93	97.61	97.55	98.11	97.97	98.76	98.57	97.87	97.94	97.83	98.17
Normalized I																				
SiO2	56.18	57.86	56.98	56.74	56.84	56.91	57.10	57.77	56.91	57.46	57.36	55.76	57.47	56.73	57.79	57.32	54.90	56.33	56.70	56.77
Al2O3	14.23	14.04	14.03	13.82	14.02	13.93	13.87	14.24	15.06	14.82	14.22	14.13	14.14	13.83	14.12	14.03	14.61	14.41	13.81	13.60
TiO2	2.048	2.031	1.989	1.980	1.992	2.004	1.982	2.094	2.093	2.124	2.065	2.029	2.036	2.015	2.076	2.039	2.096	2.073	2.043	2.090
FeO*	10.65	9.87	10.93	11.33	11.01	11.08	10.99	9.79	9.53	8.53	10.10	11.19	10.03	11.48	10.10	10.47	11.81	10.00	11.55	11.81
MnO	0.195	0.180	0.188	0.193	0.187	0.189	0.191	0.180	0.140	0.157	0.186	0.217	0.194	0.193	0.177	0.197	0.194	0.401	0.193	0.190
CaO	7.81	7.11	7.12	7.12	7.10	7.00	7.02	6.95	7.33	7.80	7.13	7.79	7.18	6.97	6.87	7.02	7.95	7.87	6.99	6.90
MgO	3.58	3.36	3.41	3.39	3.48	3.43	3.43	3.24	3.24	3.56	3.42	3.66	3.43	3.36	3.27	3.37	3.62	3.57	3.35	3.30
K2O	1.77	1.98	3.28	3.22	3.18	1.90	1.94	2.10	1.67	1.89	1.93	1.70	1.93	1.79	1.95	2.01	1.25	1.84	2.01	1.83
Na2O	3.17	3.20	1.72	1.85	1.87	3.22	3.16	3.27	3.56	3.27	3.21	3.18	3.23	3.28	3.28	3.16	3.19	3.15	3.00	3.17
P2O5	0.351	0.362	0.343	0.349	0.338	0.349	0.324	0.377	0.469	0.386	0.370	0.348	0.358	0.359	0.366	0.379	0.375	0.356	0.356	0.338
analysis total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize																				
Ni	20	12	14	13	11	9	7	13	20	20	5	13	7	12	7	7	8	7	7	6
Cr	13	10	8	9	5	7	4	9	15	13	7	14	6	6	6	6	7	6	6	6
Sc	34	32	32	30	30	31	31	31	35	35	31	35	32	32	30	31	31	31	31	31
V	362	299	300	300	308	302	325	306	361	368	308	358	309	300	296	302	303	300	297	294
Ba	696	752	753	693	746	725	731	789	684	865	772	655	725	722	898	736	797	803	809	814
Rb	41	53	49	50	48	52	52	53	44	44	50	42	51	51	52	53	51	51	51	51
Sr	312	344	335	325	325	329	312	344	339	353	344	318	335	320	347	336	341	342	343	344
Zr	166	197	192	192	190	192	178	199	177	181	193	169	191	188	197	196	195	196	197	198
Y	35	37	36	35	37	37	35	39	36	44	35	34	34	36	38	36	37	37	36	36
Nb	12.3	13.4	13.2	12.5	13.2	12.7	11.5	12.6	11.9	12.5	11.9	11.0	12.2	13.0	12.5	12.2	12.5	12.5	12.5	12.5
Ga	21	21	21	21	21	21	20	23	22	22	25	21	23	22	22	22	23	23	23	23
Cu	29	14	14	12	15	13	16	13	32	31	13	32	13	13	12	12	13	13	12	11
Zn	123	123	120	118	122	124	118	128	125	131	126	123	129	122	127	128	128	129	129	129
Pb	9	8	7	7	10	11	10	7	8	9	11	10	10	10	9	10	10	10	10	10
La	24	28	27	31	24	29	26	29	24	28	30	20	28	28	28	24	27	27	27	27
Ce	50	58	60	58	56	56	50	59	48	55	63	44	55	56	60	56	58	59	59	60
Th	5	4	3	4	5	4	5	4	4	4	5	3	5	6	7	7	7	7	8	8
Nd	25	31	32	30	31	29	28	30	28	31	32	25	29	25	33	29	30	30	30	30
U		0						0				nd							0	

Table DR1 (c

SN	08015	08025	08026	08036	08065	08082	08083	09007	09013	09016	09064	09066	10030	10031	10049	10050	10061	10062		
WSU run	0108(2)	0108(2)	0108(3)	0108(2)	0108(2)	0108(3)	0108(3)	0109	0109	0109	0109(2)	0109(2)	0110PHA(3)	0110PHA(3)	0110PHA(3)	0110PHA(3)	0110PHA(3)	0110PHA(3)		
7.5' Quad	Veddle Canyo	Tieton	Tieton	Nile	Frost Mtn	Nile	Nile	Milk Canyon	Milk Canyon	Milk Canyon	Veddle Canyo	eddle Canyo	Tieton	Tieton	Tieton	Veddle Canyo	eddle Canyo	eddle Canyo		
UTM N*	5178670	5177240	5177320	5183340	5209360	5182320	5182600	5180570	5181280	5180600	5172840	5172830	5176454	5176454	5175460	5175200	5173060	5174800		
UTM E*	662100	663100	661970	662420	658000	662220	661900	665820	665300	665620	658900	658880	664622	664622	662990	662220	660160	661750		
Unnormalize																				
SiO2	55.40	54.53	56.35	54.88	54.74	55.81	55.71	56.01	56.07	55.59	55.73	55.93	56.93	56.72	55.89	55.84	55.66	55.50		
Al2O3	13.66	13.37	13.79	13.34	14.23	13.52	13.68	13.48	13.51	13.46	13.46	13.55	13.88	13.97	13.57	13.64	13.58	13.55		
TiO2	1.967	1.953	2.073	2.034	1.999	2.045	2.021	1.989	1.995	1.986	2.045	2.059	2.063	2.013	2.025	2.017	1.950	1.997		
FeO	10.97	11.17	10.42	11.42	9.21	11.52	11.23	11.72	10.93	11.63	11.77	11.35	11.06	9.90	11.64	11.69	11.44	11.43		
MnO	0.187	0.188	0.190	0.187	0.165	0.192	0.196	0.183	0.181	0.185	0.186	0.185	0.192	0.195	0.191	0.192	0.186	0.188		
CaO	6.98	6.80	6.76	6.72	8.02	6.81	6.70	6.71	6.75	6.83	6.79	6.86	6.87	7.02	6.77	6.77	6.89	6.74		
MgO	3.38	3.29	3.21	3.18	3.44	3.27	3.19	3.19	3.17	3.30	3.24	3.28	3.30	3.37	3.24	3.24	3.32	3.22		
K2O	1.88	1.79	1.97	1.78	1.75	1.94	1.88	1.91	2.03	1.91	1.91	1.90	2.00	2.02	1.85	1.89	1.83	1.79		
Na2O	3.07	3.18	3.14	3.14	3.02	3.10	3.11	3.21	3.15	3.14	3.05	3.00	3.31	3.19	3.19	3.21	3.08	3.20		
P2O5	<u>0.338</u>	<u>0.340</u>	<u>0.364</u>	<u>0.329</u>	<u>0.430</u>	<u>0.331</u>	<u>0.360</u>	<u>0.318</u>	<u>0.322</u>	<u>0.325</u>	<u>0.334</u>	<u>0.325</u>	<u>0.383</u>	<u>0.361</u>	<u>0.376</u>	<u>0.366</u>	<u>0.322</u>	<u>0.361</u>		
analysis tota	97.83	96.62	98.28	97.01	97.00	98.53	98.09	98.73	98.10	98.36	98.51	98.44	99.99	98.77	98.74	98.84	98.27	97.97		
Normalized I																				
SiO2	56.63	56.44	57.34	56.57	56.44	56.64	56.79	56.73	57.15	56.52	56.57	56.82	56.93	57.43	56.61	56.49	56.64	56.66	56.67	0.76
Al2O3	13.96	13.84	14.03	13.75	14.67	13.72	13.95	13.66	13.77	13.69	13.66	13.76	13.88	14.15	13.75	13.80	13.82	13.83	14.05	0.35
TiO2	2.010	2.021	2.110	2.097	2.061	2.075	2.060	2.015	2.034	2.019	2.076	2.091	2.063	2.038	2.051	2.040	1.984	2.038	2.047	0.037
FeO*	11.22	11.57	10.60	11.77	9.49	11.69	11.45	11.87	11.15	11.82	11.94	11.53	11.06	10.02	11.79	11.83	11.64	11.66	10.97	0.95
MnO	0.191	0.195	0.193	0.193	0.170	0.195	0.200	0.185	0.184	0.188	0.189	0.187	0.192	0.198	0.194	0.195	0.190	0.192	0.199	0.044
CaO	7.13	7.04	6.88	6.93	8.27	6.91	6.84	6.80	6.88	6.95	6.89	6.97	6.87	7.11	6.85	6.85	7.01	6.88	7.23	0.40
MgO	3.45	3.40	3.27	3.28	3.54	3.32	3.25	3.23	3.23	3.35	3.29	3.33	3.30	3.42	3.28	3.28	3.38	3.29	3.39	0.12
K2O	1.92	1.85	2.01	1.84	1.81	1.97	1.92	1.94	2.06	1.94	1.94	1.93	2.00	2.04	1.88	1.91	1.86	1.82	1.95	0.39
Na2O	3.14	3.29	3.20	3.24	3.11	3.14	3.17	3.25	3.21	3.20	3.10	3.05	3.31	3.23	3.23	3.24	3.14	3.27	3.12	0.37
P2O5	<u>0.345</u>	<u>0.352</u>	<u>0.370</u>	<u>0.339</u>	<u>0.444</u>	<u>0.336</u>	<u>0.367</u>	<u>0.322</u>	<u>0.328</u>	<u>0.330</u>	<u>0.339</u>	<u>0.330</u>	<u>0.383</u>	<u>0.366</u>	<u>0.381</u>	<u>0.370</u>	<u>0.328</u>	<u>0.368</u>	0.359	0.028
analysis total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00		
Unnormalize																				
Ni	6	5	5	4	4	3	2	2	1	1	0	0	10	10	8	9	9	8	9	5
Cr	6	5	5	5	5	4	4	4	4	3	3	3	4	5	4	3	3	4	8	6
Sc	31	31	31	31	31	31	31	30	30	30	30	30	32	32	30	32	31	31	32	3
V	291	289	286	283	280	278	275	272	269	266	264	261	304	308	299	298	322	299	312	32
Ba	820	826	832	838	844	850	855	861	867	873	879	885	753	811	720	726	706	715	771	72
Rb	51	51	51	52	52	52	52	52	52	52	52	52	56	55	55	54	52	53	50	4
Sr	345	346	347	348	349	350	351	352	353	354	355	356	337	346	334	330	317	332	336	14
Zr	199	200	201	202	203	204	205	206	207	208	209	210	205	202	199	200	182	197	190	13
Y	36	36	36	36	36	36	36	36	36	36	36	36	39	39	36	37	36	37	36	2
Nb	12.6	12.6	12.6	12.7	12.7	12.7	12.8	12.8	12.8	12.8	12.9	12.9	14.9	14.6	14.2	14.9	13.3	13.7	12.8	0.9
Ga	23	23	23	23	24	24	24	24	24	24	24	24	23	23	21	23	21	22	22	1
Cu	11	10	9	9	8	7	7	6	5	5	4	4	14	15	13	14	17	15	16	9
Zn	130	130	131	131	132	132	132	133	133	134	134	135	129	129	128	126	121	126	127	5
Pb	10	10	10	10	10	10	10	10	10	10	10	10	9	10	11	9	9	10	9	1
La	26	26	26	26	26	26	26	26	25	25	25	25	29	27	29	31	24	29	26	4
Ce	60	61	61	62	62	63	63	64	64	65	65	66	55	61	58	62	52	58	56	7
Th	8	8	9	9	9	10	10	10	11	11	11	12	6	7	6	6	6	6	6	2
Nd	31	31	31	31	31	31	31	31	31	32	32	32	30	32	31	32	27	31	30	2
U								0					2	4	2	2	2	3	2	1

ORTLEY  
53  
average std dev  
98.23 0.79

Table DR1 (c

SN
WSU run
7.5' Quad
UTM N*
UTM E*
Unnormalize
SiO2
Al2O3
TiO2
FeO
MnO
CaO
MgO
K2O
Na2O
P2O5
analysis tota
Normalized I
SiO2
Al2O3
TiO2
FeO*
MnO
CaO
MgO
K2O
Na2O
P2O5
analysis total
Unnormalize
Ni
Cr
Sc
V
Ba
Rb
Sr
Zr
Y
Nb
Ga
Cu
Zn
Pb
La
Ce
Th
Nd
U

Table DR1 (continued). ANALYSES OF GRANDE RONDE BASALT LAVA FLOWS IN UPPER NACHES RIVER BASIN, YAKIMA AND KITTITAS COUNTIES, WASHINGTON

MEEKS TABLE																				
SN	77024	77025	94114	94349	94372	95057	95183	96188	96189	96267	96269	96270	99002	99060	00179	01210	01212	02012	02016	02018
WSU run	0202	0202	0202	1194(2)	1194(2)	0596	0596	0897	0202	0197	0197	0197	0799	0799	0203	0202	0202	0106	0402	0402
7.5' Quad	Mt. Clifty	Mt. Clifty	Weeks Table	Old Scab Mtn	Old Scab Mtn	imberwolf Mt	Weeks Table	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Quartz Mtn	Mt. Clifty	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Cliffdell
UTM N*	5210230	5211080	5186740	5195850	5198200	5186170	5188020	5204870	5203560	5204910	5205150	5205240	5205040	5207830	5208420	5204370	5203410	5204580	5204830	5204350
UTM E*	640170	638470	643460	639800	641600	638280	644070	643950	644400	642850	645340	643640	645850	650900	641980	645020	645035	643910	644130	644440
Unnormalized Major Elements (Weight %):																				
SiO2	54.42	54.76	55.06	55.97	55.54	55.35	54.63	53.65	55.02	51.93	52.78	53.23	55.22	55.03	54.90	54.41	54.09	53.81	54.95	54.68
Al2O3	13.73	13.90	13.77	13.93	13.94	14.00	13.80	13.51	13.94	13.03	13.31	13.40	13.99	13.96	13.82	13.88	13.71	13.53	13.77	13.80
TiO2	1.974	1.985	2.002	1.979	1.978	1.926	1.923	1.894	2.010	1.891	1.848	1.908	1.973	1.919	1.974	1.975	1.973	1.964	1.973	1.964
FeO	11.25	10.63	11.18	11.09	11.01	11.18	11.49	11.36	10.07	11.39	11.37	11.27	11.24	11.42	11.37	11.29	11.70	11.43	11.59	11.86
MnO	0.204	0.215	0.174	0.169	0.193	0.190	0.191	0.195	0.204	0.185	0.181	0.190	0.195	0.189	0.195	0.210	0.195	0.195	0.180	0.193
CaO	7.74	8.03	7.46	7.40	7.56	8.56	7.60	7.47	7.91	7.41	7.35	7.59	7.80	7.69	7.70	7.80	7.69	7.43	7.43	7.73
MgO	4.06	3.81	3.81	3.88	4.00	3.92	4.17	4.14	3.95	3.61	3.75	3.89	3.64	4.27	3.94	4.09	4.21	3.78	3.88	3.74
K2O	1.35	1.35	1.56	1.53	1.53	1.46	1.56	1.53	1.67	1.48	1.47	1.49	1.47	1.58	1.47	1.49	1.40	1.61	1.54	1.55
Na2O	3.17	3.33	3.31	3.38	3.30	3.88	3.40	3.03	3.21	2.99	3.08	3.03	3.17	3.38	3.16	3.05	3.13	3.06	3.17	3.14
P2O5	<u>0.328</u>	<u>0.337</u>	<u>0.340</u>	<u>0.332</u>	<u>0.333</u>	<u>0.326</u>	<u>0.335</u>	<u>0.316</u>	<u>0.335</u>	<u>0.306</u>	<u>0.297</u>	<u>0.310</u>	<u>0.346</u>	<u>0.319</u>	<u>0.324</u>	<u>0.327</u>	<u>0.322</u>	<u>0.328</u>	<u>0.328</u>	<u>0.329</u>
analysis tota	98.23	98.35	98.66	99.66	99.38	100.79	99.10	97.09	98.32	94.23	95.44	96.31	99.05	99.76	98.85	98.52	98.42	97.14	98.81	98.98
Normalized Major Elements (Weight %):																				
SiO2	55.40	55.68	55.81	56.16	55.88	54.92	55.13	55.26	55.96	55.11	55.30	55.27	55.75	55.16	55.54	55.23	54.96	55.40	55.61	55.24
Al2O3	13.98	14.13	13.96	13.98	14.03	13.89	13.93	13.91	14.18	13.83	13.95	13.91	14.12	13.99	13.98	14.09	13.93	13.93	13.94	13.94
TiO2	2.010	2.018	2.029	1.986	1.990	1.911	1.940	1.951	2.044	2.007	1.936	1.981	1.992	1.924	1.997	<b>2.005</b>	<b>2.005</b>	2.022	1.997	1.984
FeO*	11.45	10.81	11.33	11.13	11.08	11.09	11.59	11.70	10.24	12.09	11.92	11.70	11.35	11.45	11.50	11.46	11.89	11.77	11.73	11.98
MnO	0.208	0.219	0.176	0.170	0.194	0.189	0.193	0.201	0.207	0.196	0.190	0.197	0.20	0.189	0.197	0.213	0.198	0.201	0.182	0.195
CaO	7.88	8.17	7.56	7.43	7.61	8.49	7.67	7.69	8.05	7.86	7.70	7.88	7.88	7.71	7.79	7.92	7.81	7.65	7.52	7.81
MgO	4.13	3.87	3.86	3.89	4.02	3.89	4.21	4.26	4.02	3.83	3.93	4.04	3.68	4.28	3.99	4.15	4.28	3.89	3.93	3.78
K2O	1.37	1.37	1.58	1.54	1.54	1.45	1.57	1.58	1.70	1.57	1.54	1.55	1.48	1.58	1.49	1.51	1.42	1.66	1.56	1.57
Na2O	3.23	3.39	3.35	3.39	3.32	3.85	3.43	3.12	3.26	3.17	3.23	3.15	3.20	3.39	3.20	3.10	3.18	3.15	3.21	3.17
P2O5	<u>0.334</u>	<u>0.343</u>	<u>0.345</u>	<u>0.333</u>	<u>0.335</u>	<u>0.323</u>	<u>0.338</u>	<u>0.325</u>	<u>0.341</u>	<u>0.325</u>	<u>0.311</u>	<u>0.322</u>	<u>0.35</u>	<u>0.320</u>	<u>0.328</u>	<u>0.332</u>	<u>0.327</u>	<u>0.337</u>	<u>0.332</u>	<u>0.332</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalized Trace Elements (ppm):											Trace Elements (ppm):									
Ni	12	11	9	7	7	9	7	4	12	7	5	5	10	12	16	14	15	30	15	11
Cr	27	25	29	19	17	20	15	21	24	19	24	23	29	28	19	30	26	14	26	27
Sc	40	42	33	36	35	31	45	27	37	32	25	26	44	41	37	40	37	33	35	34
V	346	351	347	361	346	342	349	345	343	329	326	336	346	352	340	341	340	349	346	346
Ba	618	691	649	598	598	629	674	657	667	639	628	629	632	619	607	604	634	626	613	623
Rb	39	41	40	41	37	41	41	43	43	44	40	41	42	40	39	40	32	41	40	40
Sr	309	320	312	306	303	314	311	311	321	315	314	315	321	314	308	315	312	305	311	321
Zr	163	168	166	165	162	163	161	163	168	163	159	163	165	161	165	164	164	166	168	167
Y	34	35	35	34	34	33	35	34	34	33	34	34	37	33	35	35	33	33	36	35
Nb	11.4	11.1	12.5	12.9	15.2	13.5	12.5	12.2	12.1	11.6	11.5	11.6	12.5	12.4	11.9	12.6	13.0	11.1	12.4	13.0
Ga	19	22	20	22	22	18	22	24	25	23	21	22	20	22	19	21	21	23	20	18
Cu	36	31	32	33	25	24	17	23	31	22	18	19	37	36	35	33	35	31	33	34
Zn	116	119	116	†124	115	115	117	111	116	120	116	114	116	112	118	116	117	120	118	120
Pb	9	7	7	7	6	8	8	9	6	5	4	8	6	10	16	6	5	8	6	9
La	28	15	25	36	6	28	18	23	18	27	16	25	25	23	25	24	17	21	28	15
Ce	51	48	43	51	48	0	0	42	59	34	42	36	62	32	36	44	42	41	46	56
Th	5	2	7	3	5	5	1	4	6	7	6	4	5	5	6	4	7	3	5	7
Nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	26	nd	nd
U	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

\*to nearest 5 m  
"†" denotes values >120% of highest standard.  
nd, not determined

Table DR1 (c

M																				
SN	02020	02073	02124	02137	02142	02201	03007	03076	03077	04019	04024	4033	04055	'04056	'04066	04077	04087	04097	04102	04107
WSU run	0402	0402	0402	0402	0402	0402	0204	0204	0204	0404(1)	0404(1)	0404(1)	0404(1)	0404(1)	0404(1)	0404(1)	0404(1)	0404(2)	0405(2)	0404(2)
7.5' Quad	Cliffdell	Old Scab Mtn	Mt. Clifty	Tieton Basin	Tieton Basin	Cliffdell	Cliffdell	Cliffdell	Cliffdell	Meeks Table	Meeks Table	Meeks Table	Nile	Nile	Nile	Nile	Veddle Canyon	clanastash Lsk	lanastash Lsk	lanastash Lsk
UTM N*	5204980	5197720	5210480	5175040	5174630	5203820	5206620	5204240	5204240	5181580	5181420	5179200	5185820	5186510	5191140	5192680	5177600	5197590	5203090	5205430
UTM E*	644030	641300	639560	645530	644260	644850	644900	642720	642720	648700	647040	650920	657790	657460	656130	654900	653100	654440	657850	655040
Unnormalize																				
SiO2	54.60	55.36	54.70	54.95	52.39	54.54	54.92	54.77	54.59	54.57	55.05	54.83	54.80	55.20	55.15	54.78	55.48	53.56	54.18	53.36
Al2O3	13.65	13.82	13.77	13.79	13.40	13.72	13.94	13.91	13.86	13.91	13.98	13.82	13.87	14.02	13.89	14.05	14.94	14.33	14.30	13.93
TiO2	1.938	2.024	1.944	1.981	1.909	1.999	1.887	1.963	1.900	1.979	1.976	1.951	1.966	1.892	1.942	1.903	2.048	1.859	1.975	1.942
FeO	11.83	11.33	11.72	11.62	12.54	12.03	11.54	11.55	11.88	11.65	11.78	12.01	11.86	11.55	11.53	11.66	9.37	10.65	10.48	12.03
MnO	0.205	0.194	0.205	0.182	0.196	0.207	0.193	0.201	0.192	0.199	0.196	0.201	0.199	0.192	0.203	0.194	0.196	0.205	0.196	0.213
CaO	7.66	7.66	7.71	7.39	8.11	7.63	7.83	7.79	7.75	7.79	7.75	7.75	7.75	7.87	7.85	7.97	9.15	9.86	8.81	8.82
MgO	3.91	3.85	3.97	3.77	3.72	3.89	4.16	4.05	4.14	3.80	3.94	4.14	3.96	4.10	4.04	4.21	3.83	4.04	4.17	4.22
K2O	1.54	1.61	1.36	1.56	1.56	1.53	1.58	1.61	1.80	1.38	1.57	1.62	1.58	1.67	1.63	1.61	1.34	1.29	1.18	1.19
Na2O	3.06	3.05	3.22	3.19	3.03	3.14	3.12	3.07	2.98	3.26	3.18	3.13	3.06	3.05	3.02	3.04	2.99	2.85	3.04	2.77
P2O5	<u>0.321</u>	<u>0.337</u>	<u>0.325</u>	<u>0.333</u>	<u>0.307</u>	<u>0.337</u>	<u>0.314</u>	<u>0.324</u>	<u>0.307</u>	<u>0.333</u>	<u>0.333</u>	<u>0.325</u>	<u>0.327</u>	<u>0.313</u>	<u>0.315</u>	<u>0.300</u>	<u>0.320</u>	<u>0.333</u>	<u>0.298</u>	<u>0.292</u>
analysis tota	98.72	99.24	98.93	98.76	97.16	99.03	99.48	99.23	99.41	98.87	99.76	99.78	99.38	99.86	99.58	99.71	99.66	98.97	98.62	98.76
Normalized I																				
SiO2	55.31	55.79	55.29	55.64	53.92	55.08	55.21	55.19	54.91	55.19	55.18	54.95	55.15	55.28	55.38	54.94	55.67	54.12	54.94	54.03
Al2O3	13.83	13.93	13.92	13.96	13.79	13.85	14.01	14.01	13.95	14.07	14.01	13.86	13.96	14.04	13.95	14.09	14.99	14.47	14.50	14.11
TiO2	1.963	<b>2.040</b>	1.965	2.006	1.965	2.019	1.897	1.978	1.911	2.002	1.981	1.955	1.978	1.895	1.950	1.909	2.055	1.878	2.003	1.966
FeO*	11.99	11.42	11.85	11.76	12.90	12.15	11.60	11.64	11.95	11.78	11.81	12.03	11.93	11.57	11.58	11.69	9.41	10.76	10.63	12.18
MnO	0.208	0.195	0.207	0.184	0.202	0.209	0.194	0.202	0.193	0.201	0.197	0.201	0.200	0.193	0.204	0.195	0.197	0.207	0.199	0.216
CaO	7.76	7.72	7.79	7.48	8.35	7.70	7.87	7.85	7.80	7.87	7.77	7.77	7.80	7.89	7.88	7.99	9.18	9.96	8.93	8.93
MgO	3.96	3.88	4.01	3.82	3.83	3.93	4.18	4.08	4.17	3.85	3.95	4.15	3.99	4.11	4.06	4.22	3.84	4.08	4.22	4.27
K2O	1.56	1.62	1.37	1.58	1.61	1.55	1.59	1.62	1.81	1.40	1.58	1.62	1.59	1.67	1.64	1.61	1.34	1.30	1.19	1.20
Na2O	3.10	3.07	3.25	3.23	3.12	3.17	3.14	3.09	3.00	3.29	3.18	3.14	3.08	3.06	3.03	3.05	3.00	2.88	3.08	2.81
P2O5	<u>0.325</u>	<u>0.340</u>	<u>0.329</u>	<u>0.337</u>	<u>0.316</u>	<u>0.340</u>	<u>0.315</u>	<u>0.326</u>	<u>0.309</u>	<u>0.337</u>	<u>0.334</u>	<u>0.326</u>	<u>0.329</u>	<u>0.313</u>	<u>0.316</u>	<u>0.301</u>	<u>0.321</u>	<u>0.337</u>	<u>0.302</u>	<u>0.296</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize																				
Ni	13	10	16	14	13	15	14	13	12	14	13	15	17	17	16	21	10	16	18	14
Cr	23	26	23	26	24	26	10	7	10	11	10	13	11	12	12	14	23	43	23	23
Sc	30	37	37	35	34	31	33	33	32	34	34	33	32	33	33	35	39	38	38	38
V	337	358	333	344	346	344	343	359	347	355	360	353	351	339	345	356	364	314	348	343
Ba	618	638	615	625	705	617	619	624	604	663	670	630	625	<b>628</b>	<b>616</b>	<b>611</b>	705	546	572	665
Rb	45	43	40	41	43	42	43	44	43	43	42	43	42	42	44	42	32	31	31	30
Sr	316	309	315	306	340	313	321	322	318	330	318	313	320	321	316	323	365	323	332	331
Zr	166	168	165	168	163	168	166	173	167	172	167	164	169	163	168	157	164	158	161	155
Y	35	36	34	35	35	35	34	34	34	34	33	34	33	32	33	31	34	34	35	33
Nb	12.2	11.8	13.4	13.1	12.8	11.5	10.5	11.6	11.3	13.2	11.9	12.6	12.9	12.3	12.0	11.3	13.1	12.1	11.6	11.5
Ga	21	23	21	22	18	20	22	21	19	22	24	22	22	21	22	22	23	21	22	20
Cu	31	31	35	34	32	36	25	29	26	25	22	19	24	17	25	21	24	27	29	17
Zn	116	119	115	116	119	116	115	124	119	117	119	118	119	116	117	116	125	117	123	117
Pb	8	8	6	6	9	6	8	7	7	6	8	8	7	7	7	7	6	5	8	6
La	20	25	26	25	20	26	23	20	23	21	18	20	22	26	22	17	19	17	21	13
Ce	46	68	52	49	39	55	46	49	47	58	49	49	50	46	40	44	41	39	42	44
Th	6	7	7	6	4	7	5	6	4	4	4	4	5	5	4	4	4	4	4	2
Nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	30	27	26	23	24	22	24	27	21	23	25
U	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Table DR1 (c

M																				
SN	'04118	04130	04132	04175	04204	04208	04209	'04210	04216	04220	04225	04228	04234	04240	04241	04242	05039	'05081	05103	05116
WSU run	0404(2)	0404(2)	0404(2)	0504(2)	0504(2)	0504(2)	0504(1)	0504(1)	0504(1)	0504(1)	0504(2)	0504(2)	0504(1)	0504(1)	0504(2)	0504(2)	0305(1)	0305(2)	0405(3)	0405(2)
7.5' Quad	Nile	Ianastash Lsk	Ianastash Lsk	Nile	Ianastash Lsk	Ianastash Lsk	Nile	Nile	Ianastash Lake	Ianastash La	Ianastash La	Ianastash La	Ianastash La	Weeks Table	Nile	Ianastash La	Ianastash La	Weddle Canyoc	Nile	Weddle Canyoc
UTM N*	5192650	5201420	5203140	5192710	5193060	5197380	5188060	5188440	5195240	5194420	5195880	5197210	5187000	5190830	5194700	5194160	5175010	5182870	5173360	5173290
UTM E*	655460	659130	655580	654600	653940	653740	658780	658680	655860	657060	654800	656810	643440	656130	654010	654280	655200	660660	659680	659610
Unnormalize																				
SiO2	54.80	54.87	55.38	54.53	54.55	55.79	55.32	54.84	54.75	55.15	54.96	54.90	54.78	54.70	54.75	54.84	53.31	54.34	54.72	53.95
Al2O3	13.86	13.90	14.12	13.78	13.80	15.16	13.88	13.84	13.81	14.03	13.92	14.00	13.72	13.61	13.81	1.882	13.85	13.65	13.82	13.57
TiO2	2.000	1.899	1.936	1.909	1.887	1.961	1.902	1.892	1.920	1.954	1.912	1.941	1.973	1.944	1.911	13.81	1.919	1.935	1.894	1.931
FeO	11.74	11.53	10.86	11.54	11.44	8.03	10.65	11.32	11.62	10.87	11.28	11.15	11.76	11.41	11.42	11.38	11.38	11.19	11.04	11.23
MnO	0.236	0.178	0.156	0.194	0.186	0.155	0.193	0.169	0.188	0.176	0.188	0.168	0.181	0.189	0.192	0.191	0.197	0.193	0.187	0.192
CaO	7.75	7.68	7.50	7.63	7.63	8.87	7.74	7.38	7.67	7.81	7.66	7.36	7.35	7.61	7.61	3.97	8.65	7.66	7.62	7.49
MgO	3.90	4.15	4.11	4.02	4.00	3.93	4.04	3.97	4.04	3.99	3.94	4.06	3.92	3.88	4.07	7.70	3.82	3.85	4.05	3.84
K2O	1.71	1.52	1.57	1.66	1.61	1.48	1.62	1.52	1.64	1.46	1.65	1.52	1.53	1.68	1.70	3.04	1.15	1.58	1.61	1.61
Na2O	3.17	3.22	3.28	3.03	3.09	2.92	3.04	3.21	3.08	3.14	3.11	3.24	3.23	2.99	3.06	1.65	2.77	3.05	3.14	3.07
P2O5	<u>0.350</u>	<u>0.306</u>	<u>0.315</u>	<u>0.320</u>	<u>0.313</u>	<u>0.359</u>	<u>0.312</u>	<u>0.312</u>	<u>0.315</u>	<u>0.336</u>	<u>0.318</u>	<u>0.316</u>	<u>0.333</u>	<u>0.317</u>	<u>0.325</u>	<u>0.321</u>	<u>0.283</u>	<u>0.322</u>	<u>0.310</u>	<u>0.322</u>
analysis tota	99.51	99.25	99.24	98.59	98.50	98.67	98.69	98.46	99.03	98.91	98.94	98.67	98.78	98.32	98.85	98.79	97.33	97.78	98.38	97.20
Normalized I																				
SiO2	55.07	55.28	55.81	55.31	55.38	56.55	56.05	55.70	55.29	55.76	55.55	55.64	55.45	55.63	55.39	55.52	54.77	55.58	55.62	55.50
Al2O3	13.93	14.01	14.23	13.97	14.01	15.36	14.06	14.06	13.94	14.18	14.06	14.19	13.89	13.84	13.97	13.98	14.23	13.96	14.05	13.96
TiO2	2.010	1.913	1.951	1.937	1.915	1.987	1.927	1.922	1.938	1.975	1.933	1.967	1.998	1.977	1.933	1.905	1.972	1.979	1.925	1.986
FeO*	11.80	11.62	10.95	11.70	11.61	8.14	10.79	11.50	11.74	10.99	11.40	11.30	11.91	11.60	11.55	11.52	11.69	11.44	11.22	11.55
MnO	0.237	0.179	0.157	0.197	0.189	0.157	0.195	0.172	0.190	0.178	0.190	0.171	0.183	0.192	0.194	0.193	0.203	0.197	0.190	0.198
CaO	7.79	7.74	7.56	7.73	7.75	8.99	7.84	7.49	7.74	7.89	7.74	7.46	7.44	7.74	7.70	7.79	8.88	7.84	7.74	7.70
MgO	3.91	4.18	4.14	4.08	4.06	3.98	4.09	4.04	4.08	4.04	3.98	4.12	3.97	3.94	4.11	4.02	3.93	3.94	4.12	3.95
K2O	1.71	1.53	1.58	1.68	1.63	1.50	1.64	1.55	1.66	1.48	1.67	1.54	1.55	1.71	1.72	1.67	1.18	1.61	1.64	1.65
Na2O	3.18	3.24	3.31	3.07	3.13	2.96	3.08	3.26	3.11	3.17	3.14	3.29	3.27	3.04	3.09	3.08	2.85	3.12	3.19	3.16
P2O5	<u>0.352</u>	<u>0.309</u>	<u>0.317</u>	<u>0.325</u>	<u>0.317</u>	<u>0.364</u>	<u>0.316</u>	<u>0.317</u>	<u>0.318</u>	<u>0.339</u>	<u>0.322</u>	<u>0.321</u>	<u>0.337</u>	<u>0.322</u>	<u>0.328</u>	<u>0.325</u>	<u>0.291</u>	<u>0.329</u>	<u>0.315</u>	<u>0.332</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize																				
Ni	19	19	20	14	14	16	14	16	13	14	20	20	15	12	13	14	17	19	18	18
Cr	11	14	13	15	16	49	14	15	15	15	15	15	13	13	16	16	26	16	15	11
Sc	34	34	34	33	33	40	34	33	34	34	34	33	34	34	33	34	39	35	34	34
V	355	345	350	347	341	317	342	344	346	356	345	354	354	348	344	341	343	349	339	345
Ba	<b>648</b>	615	637	612	613	709	<b>637</b>	<b>623</b>	619	643	634	625	<b>635</b>	<b>644</b>	625	630	643	<b>638</b>	639	624
Rb	44	42	43	42	39	35	43	40	41	31	41	40	40	43	41	42	33	44	42	42
Sr	315	308	322	303	303	345	311	298	302	315	303	302	291	301	300	307	337	320	316	311
Zr	168	162	166	156	154	163	158	154	158	157	157	157	159	162	156	156	158	169	165	167
Y	34	33	34	34	32	45	33	33	31	35	32	32	33	34	33	33	36	34	34	35
Nb	12.4	12.4	11.9	10.4	11.5	12.5	10.3	12.0	10.3	10.0	11.3	10.9	11.7	10.5	11.8	10.1	11.0	11.6	11.0	12.1
Ga	23	20	23	20	19	24	20	21	20	19	21	21	20	22	21	21	20	19	21	22
Cu	21	20	23	26	24	29	29	29	25	24	26	25	26	29	26	25	28	30	28	31
Zn	120	116	118	116	111	124	115	117	114	116	115	116	115	116	113	115	112	116	114	119
Pb	7	7	7	7	7	5	10	9	9	10	8	9	8	10	8	9	5	6	8	8
La	22	23	20	21	22	19	22	21	22	26	23	14	20	20	23	21	20	22	23	24
Ce	51	54	50	45	43	45	46	46	51	44	50	40	44	46	44	49	38	48	48	49
Th	5	5	4	5	4	4	4	5	5	5	5	5	4	4	4	4	1	2	4	4
Nd	28	27	25	24	26	26	22	24	28	25	28	25	25	27	30	26	25	27	24	24
U	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Table DR1 (c

M																				
SN	'05121	'05122	05136	06008	06009	06038	06047	06056	06058	06059	06060	06062	06064	06091	06092	06100	06102	06104	06106	06156
WSU run	0305(2)	0305(3)	0405(2)	0106(3)	0106(3)	0106(4)	0106(4)	0306(2)	0106(4)	0106(4)	0106(4)	0106(4)	0106(4)	0206	0206	0206	0306(1)	0206	0306(1)	0306(1)
7.5' Quad	Nile	Nile	lanastash Lak	Nile	Nile	Nile	Nile	lanastash Lak	lanastash Lak	lanastash Lak	lanastash Lak	Nile	Nile	lanastash Lak	lanastash Lak	Nile	Nile	Nile	Nile	Nile
UTM N*	5181240	5181680	5197250	5184920	5184920	5181920	5183200	5193140	5194620	5194900	5194930	5189860	5190220	5193620	5194040	5184030	5182470	5182870	5190160	5190440
UTM E*	654100	654590	657860	660120	660120	654710	655490	653000	655170	655780	655650	657020	658060	654800	655100	658700	655200	656400	657780	656960
Unnormalize																				
SiO2	53.13	53.93	54.08	54.46	54.59	53.66	54.11	54.43	55.22	54.04	55.08	55.40	55.14	54.67	55.03	54.51	55.20	55.33	55.03	55.07
Al2O3	13.43	14.33	14.33	13.62	13.72	13.55	13.81	14.15	14.20	13.94	14.02	14.05	14.38	13.95	13.96	13.75	13.92	14.20	13.99	13.83
TiO2	1.851	1.848	1.840	1.943	1.936	1.927	1.906	1.950	1.908	1.890	1.925	1.961	1.867	1.873	1.965	1.919	1.916	1.910	1.913	1.895
FeO	11.49	10.17	9.97	11.51	11.41	11.22	10.92	11.59	10.17	10.58	10.11	9.87	10.01	10.95	10.99	11.50	11.49	10.71	11.00	10.84
MnO	0.198	0.189	0.179	0.196	0.197	0.191	0.182	0.194	0.186	0.172	0.193	0.178	0.188	0.187	0.187	0.190	0.191	0.184	0.194	0.193
CaO	7.17	8.89	8.62	7.60	7.63	7.29	7.69	8.20	7.86	7.70	7.91	7.73	8.00	7.76	7.68	7.62	7.66	7.85	7.72	7.70
MgO	4.07	4.03	3.96	4.11	4.03	3.81	3.85	4.16	3.86	3.87	3.51	3.66	3.76	3.80	3.68	3.92	4.09	3.72	3.97	4.12
K2O	1.50	1.27	1.39	1.56	1.62	1.52	1.49	1.07	1.78	1.45	1.72	1.70	1.57	1.64	1.74	1.72	1.58	1.62	1.74	1.70
Na2O	3.11	2.86	2.82	3.15	3.12	3.18	3.13	2.64	3.08	3.03	3.03	3.08	3.17	3.04	3.11	3.02	3.14	3.14	3.04	2.99
P2O5	<u>0.307</u>	<u>0.329</u>	<u>0.324</u>	<u>0.320</u>	<u>0.341</u>	<u>0.320</u>	<u>0.315</u>	<u>0.276</u>	<u>0.317</u>	<u>0.305</u>	<u>0.317</u>	<u>0.338</u>	<u>0.328</u>	<u>0.306</u>	<u>0.328</u>	<u>0.346</u>	<u>0.316</u>	<u>0.316</u>	<u>0.339</u>	<u>0.305</u>
analysis tota	96.25	97.85	97.50	98.47	98.59	96.67	97.40	98.65	98.58	96.98	97.82	97.99	98.42	98.17	98.68	98.50	99.52	98.97	98.93	98.64
Normalized I																				
SiO2	55.20	55.11	55.46	55.31	55.37	55.51	55.55	55.18	56.01	55.72	56.31	56.54	56.03	55.69	55.77	55.34	55.47	55.90	55.63	55.83
Al2O3	13.95	14.65	14.69	13.83	13.91	14.02	14.18	14.34	14.41	14.38	14.34	14.34	14.61	14.21	14.15	13.96	13.99	14.35	14.14	14.02
TiO2	1.924	1.889	1.887	1.974	1.964	1.994	1.957	1.977	1.935	1.949	1.968	2.002	1.897	1.908	1.991	1.948	1.925	1.930	1.934	1.921
FeO*	11.93	10.40	10.23	11.69	11.57	11.61	11.21	11.74	10.31	10.90	10.33	10.08	10.18	11.15	11.14	11.68	11.55	10.82	11.11	10.99
MnO	0.205	0.193	0.183	0.199	0.200	0.197	0.187	0.197	0.189	0.177	0.198	0.182	0.191	0.190	0.189	0.192	0.192	0.186	0.196	0.196
CaO	7.45	9.09	8.84	7.72	7.74	7.54	7.90	8.32	7.98	7.94	8.09	7.89	8.13	7.90	7.79	7.74	7.70	7.93	7.80	7.80
MgO	4.23	4.11	4.06	4.18	4.09	3.94	3.95	4.21	3.92	3.99	3.59	3.74	3.82	3.87	3.73	3.98	4.11	3.76	4.01	4.18
K2O	1.56	1.30	1.42	1.58	1.64	1.57	1.53	1.08	1.81	1.50	1.76	1.74	1.60	1.67	1.76	1.75	1.59	1.64	1.76	1.72
Na2O	3.23	2.92	2.90	3.20	3.16	3.29	3.22	2.67	3.12	3.12	3.10	3.14	3.22	3.10	3.15	3.07	3.16	3.17	3.07	3.03
P2O5	<u>0.319</u>	<u>0.34</u>	<u>0.332</u>	<u>0.325</u>	<u>0.346</u>	<u>0.331</u>	<u>0.324</u>	<u>0.280</u>	<u>0.321</u>	<u>0.315</u>	<u>0.324</u>	<u>0.345</u>	<u>0.333</u>	<u>0.312</u>	<u>0.333</u>	<u>0.351</u>	<u>0.317</u>	<u>0.319</u>	<u>0.343</u>	<u>0.309</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize																				
Ni	19	23	14	21	21	14	16	9	14	13	17	14	12	22	20	20	16	21	15	16
Cr	16	45	44	14	15	13	16	27	17	15	17	17	18	16	13	33	34	34	34	33
Sc	33	38	38	33	34	33	33	37	35	34	34	33	34	33	33	339	340	346	343	340
V	343	311	307	355	347	346	348	326	341	348	346	347	346	338	352	622	631	653	637	618
Ba	<b>606</b>	<b>528</b>	<b>535</b>	624	620	621	615	581	637	620	729	653	637	611	645	44	41	41	42	43
Rb	40	28	30	41	42	40	40	28	41	39	44	43	41	43	43	309	323	323	326	322
Sr	306	327	321	308	312	303	319	329	326	322	331	329	332	319	315	162	168	164	168	167
Zr	163	163	159	166	165	166	163	161	164	158	166	169	159	161	167	33	33	36	34	34
Y	33	35	41	33	32	32	31	37	31	31	32	32	31	33	35	10.8	10.3	10.7	10.7	10.7
Nb	10.9	10.9	11.3	11.0	10.9	11.3	11.0	10.9	10.4	10.0	9.9	10.3	10.0	10.0	10.1	21	20	21	20	19
Ga	19	22	20	22	22	21	24	21	21	22	21	22	23	21	22	28	28	29	27	30
Cu	30	34	24	27	30	27	31	26	28	29	30	31	28	29	30	117	119	117	117	117
Zn	112	115	126	120	119	118	120	122	119	118	119	123	117	115	118	9	8	9	8	7
Pb	6	4	5	9	11	9	9	6	10	10	10	9	8	9	9	23	20	25	19	23
La	21	21	22	22	19	21	18	22	25	22	19	24	19	20	21	48	45	47	43	44
Ce	46	47	45	50	42	51	50	38	44	41	50	47	43	44	48	4	5	3	6	5
Th	1	1	2	3	3	5	4	5	5	4	4	5	4	4	5	27	27	27	23	24
Nd	23	27	24	27	25	28	26	28	25	26	29	25	26	25	26	nd	nd	nd	nd	nd
U	1	0	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Unnormalized Trace Elen																				

Table DR1 (c

MEEKS TABL																			
M																			
SN	06167	07090	08014	08038	08039	08046	08047	08062	08064	08069	08070	09008	09012	09015	09017	09021	09022	09034	10053
WSU run	0306(1)	0307	0108(3)	0108(2)	0108(2)	0108(2)	0108(2)	0108(2)	0108(2)	0108(2)	0108(2)	0109	0109	0109	0109	0109	0109	0109	0110PHA(3)
7.5' Quad	Nile	Frost Mtn	/eddehl Canyc	Frost Mtn	Frost Mtn	Frost Mtn	Frost Mtn	Frost Mtn	Frost Mtn	Frost Mtn	Frost Mtn	Milk Canyon	Milk Canyon	Milk Canyon	Milk Canyon	Nile	Nile	Tieton Basin	Nile
UTM N*	5184350	5209420	5178400	5209240	5209220	5210220	5208510	5208760	5209360	5209320	5209080	5180490	5180830	5180810	5183350	5184920	5184940	5174100	5184920
UTM E*	659990	656930	662260	653670	653980	653600	654810	658270	658000	656070	656940	665700	665635	665520	663300	660120	660110	646060	660120
Unnormalize																			
SiO2	55.15	53.94	53.31	53.30	54.29	54.18	54.19	54.20	53.53	53.79	53.51	54.99	56.83	55.69	54.96	54.52	54.81	54.96	54.82
Al2O3	13.98	13.63	13.92	13.49	13.87	13.79	13.77	13.74	14.28	13.91	13.64	13.88	13.89	13.83	13.85	13.74	13.94	13.62	13.93
TiO2	1.949	1.935	1.917	1.920	1.880	1.895	1.884	1.895	2.000	1.879	1.874	1.957	1.919	1.909	1.970	1.958	1.913	2.042	1.946
FeO	11.39	11.29	11.58	11.50	11.28	11.22	11.32	11.23	9.95	11.04	11.24	11.82	10.32	11.27	11.44	11.61	11.58	12.20	11.50
MnO	0.193	0.194	0.194	0.203	0.191	0.192	0.192	0.190	0.191	0.187	0.188	0.200	0.183	0.183	0.196	0.201	0.199	0.194	0.194
CaO	7.69	7.52	8.47	7.29	7.65	7.60	7.69	7.64	8.85	7.77	7.58	7.64	7.16	7.18	7.63	7.60	7.80	7.45	7.65
MgO	3.73	3.86	3.88	3.93	4.08	4.01	4.07	4.04	3.92	3.72	3.99	4.00	3.55	3.62	3.96	3.86	4.17	3.84	3.76
K2O	1.58	1.64	1.16	1.49	1.54	1.58	1.53	1.57	1.41	1.46	1.51	1.60	1.99	1.70	1.73	1.51	1.54	1.62	1.58
Na2O	3.12	3.04	2.81	3.15	3.16	3.08	3.11	3.10	2.86	3.13	3.07	3.12	3.12	3.09	3.07	3.11	3.11	3.16	3.14
P2O5	<u>0.323</u>	<u>0.318</u>	<u>0.287</u>	<u>0.314</u>	<u>0.305</u>	<u>0.309</u>	<u>0.302</u>	<u>0.308</u>	<u>0.305</u>	<u>0.309</u>	<u>0.303</u>	<u>0.323</u>	<u>0.305</u>	<u>0.338</u>	<u>0.329</u>	<u>0.327</u>	<u>0.327</u>	<u>0.340</u>	<u>0.336</u>
analysis tota	99.12	97.37	97.55	96.60	98.25	97.85	98.05	97.90	97.29	97.19	96.90	99.52	99.26	98.81	99.13	98.44	99.39	99.43	98.85
Normalized I																			
SiO2	55.64	55.40	54.65	55.18	55.25	55.37	55.27	55.36	55.02	55.35	55.22	55.25	57.25	56.35	55.44	55.39	55.15	55.27	55.46
Al2O3	14.11	14.00	14.27	13.97	14.12	14.09	14.04	14.04	14.67	14.31	14.08	13.94	13.99	14.00	13.97	13.96	14.03	13.70	14.09
TiO2	1.967	1.987	1.965	1.988	1.914	1.937	1.921	1.936	2.056	1.933	1.934	1.966	1.934	1.932	1.987	1.989	1.925	2.054	1.968
FeO*	11.50	11.59	11.88	11.90	11.48	11.46	11.54	11.47	10.23	11.36	11.60	11.87	10.39	11.41	11.54	11.80	11.65	12.27	11.64
MnO	0.195	0.199	0.199	0.210	0.194	0.196	0.196	0.194	0.196	0.192	0.194	0.201	0.184	0.185	0.198	0.204	0.201	0.196	0.197
CaO	7.76	7.73	8.68	7.55	7.79	7.76	7.84	7.80	9.10	7.99	7.82	7.68	7.21	7.26	7.69	7.72	7.85	7.50	7.74
MgO	3.76	3.96	3.98	4.07	4.16	4.10	4.15	4.12	4.03	3.83	4.12	4.02	3.58	3.66	4.00	3.92	4.19	3.86	3.80
K2O	1.60	1.69	1.19	1.55	1.57	1.61	1.56	1.60	1.45	1.50	1.56	1.61	2.00	1.72	1.74	1.54	1.55	1.63	1.60
Na2O	3.15	3.12	2.88	3.27	3.21	3.15	3.18	3.16	2.94	3.22	3.17	3.14	3.15	3.13	3.10	3.16	3.13	3.17	3.15
P2O5	<u>0.326</u>	<u>0.326</u>	<u>0.294</u>	<u>0.325</u>	<u>0.310</u>	<u>0.316</u>	<u>0.308</u>	<u>0.315</u>	<u>0.313</u>	<u>0.318</u>	<u>0.313</u>	<u>0.325</u>	<u>0.307</u>	<u>0.342</u>	<u>0.332</u>	<u>0.332</u>	<u>0.329</u>	<u>0.342</u>	<u>0.340</u>
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
nents (ppm):																			
Unnormalize	17	12	7	13	15														
Ni	12	11	20	12	16	13	13	14	12	16	11	17	12	9	16	17	18	16	17
Cr	34	34	37	33	33	14	13	14	21	13	14	10	7	5	11	11	18	8	11
Sc	352	343	335	345	339	32	33	34	39	32	33	34	33	31	33	34	35	34	34
V	627	646	509	617	613	340	337	339	348	341	334	347	328	311	349	347	343	360	354
Ba	42	41	28	39	41	637	613	617	584	652	606	629	699	691	630	630	629	643	742
Rb	327	317	323	303	320	41	41	44	29	39	41	46	54	51	44	44	43	46	44
Sr	171	168	158	167	166	316	316	318	333	328	316	324	321	325	322	322	323	314	329
Zr	35	33	32	33	33	166	166	165	163	164	164	172	188	173	171	170	168	178	176
Y	11.3	10.2	9.7	10.3	10.3	32	32	32	34	34	32	35	37	34	35	36	35	37	35
Nb	21	19	20	20	19	10.0	9.7	10.2	10.5	9.9	10.2	12.5	12.9	12.2	12.5	11.6	12.2	13.1	12.7
Ga	29	33	28	32	31	20	20	20	22	21	18	20	21	20	20	21	20	21	22
Cu	118	119	124	124	121	32	34	32	28	32	30	30	17	17	32	32	32	33	33
Zn	8	8	5	8	8	121	120	121	127	122	119	120	124	119	120	122	121	127	122
Pb	22	22	22	23	21	7	7	7	6	8	8	6	9	8	8	7	7	8	8
La	45	49	45	45	47	25	28	27	24	23	20	21	25	26	23	20	19	23	22
Ce	5	5	4	4	5	48	47	43	41	46	48	48	54	51	49	47	47	53	49
Th	27	24	23	25	25	4	5	5	4	5	4	5	6	6	5	5	5	6	4
Nd	nd	1	nd	2	1	24	24	24	24	24	25	27	28	27	25	23	26	28	26
U	nd	nd	nd	nd	nd	1	2	2	1	2	2	4	2	2	3	2	2	nd	3

Table DR1 (c

ME			WAPSHILLA RIDGE																
SN			95068	95075	95199	99215	99216	02144	03178	03184	03185	04042	'04068	'04069	'04079	'04185	'04187	04224	05112
WSU run			0596	0596	0596	0300	0300	0402	na	0404	0204	0404(1)	0504(1)	0404(1)	0404(1)	0504(1)	0504(1)	0504(2)	0405(3)
7.5' Quad			Timberwolf Mt	Timberwolf Mt	Meeks Table	Meeks Table	Meeks Table	Meeks Table	anastash Lak	anastash Lak	anastash Lak	Nile	Nile	Nile	Meeks Table	Nile	Meeks Table	anastash Lak	Tieton Basin
UTM N*			5184220	5183160	5184810	5184300	5184470	5184100	5196040	5193300	5193300	5182100	5191090	5191090	5185890	5185790	5185580	5195140	5174440
UTM E*			642130	648090	646680	646730	646680	647650	655040	653100	653100	653680	656130	656130	644060	647310	647440	655030	648160
Unnormalize																			
SiO2			53.88	56.00	53.16	53.64	53.76	53.87	54.20	54.72	54.61	53.80	54.79	54.48	54.11	53.95	53.57	53.79	54.24
Al2O3			13.57	14.51	13.42	13.51	13.44	13.55	13.57	13.91	13.72	13.69	2.237	13.78	13.78	2.183	2.221	13.49	13.66
TiO2			2.158	2.295	2.155	2.234	2.245	2.258	2.241	2.258	2.271	2.237	13.60	2.211	2.243	13.61	13.55	2.181	2.213
FeO			12.39	10.46	11.83	12.49	12.53	12.71	12.36	11.85	12.15	12.30	11.93	12.31	12.51	12.07	12.21	12.36	11.98
MnO			0.194	0.223	0.192	0.210	0.206	0.207	0.202	0.198	0.201	0.215	0.201	0.206	0.213	0.192	0.208	0.197	0.200
CaO			7.59	7.96	7.27	7.69	7.71	7.70	7.28	7.63	7.37	7.77	3.66	7.56	7.80	3.74	3.83	7.36	7.41
MgO			3.86	3.58	3.82	3.80	3.72	3.85	3.76	3.58	3.64	3.97	7.16	3.80	3.87	7.39	7.66	3.80	3.80
K2O	MEEKS TABLE		1.62	1.31	1.52	1.42	1.41	1.44	1.65	1.94	1.98	1.43	3.12	1.69	1.36	3.13	3.22	1.70	1.72
Na2O	100		3.37	3.99	3.25	3.18	3.17	3.16	3.07	2.99	3.01	3.15	1.86	3.12	3.25	1.61	1.42	3.08	3.12
P2O5	average	std dev	<u>0.388</u>	<u>0.444</u>	<u>0.390</u>	<u>0.433</u>	<u>0.436</u>	<u>0.435</u>	<u>0.399</u>	<u>0.412</u>	<u>0.401</u>	<u>0.424</u>	<u>0.408</u>	<u>0.398</u>	<u>0.430</u>	<u>0.397</u>	<u>0.428</u>	<u>0.390</u>	<u>0.392</u>
analysis tota			99.02	100.77	97.01	98.60	98.63	99.18	98.73	99.47	99.36	98.97	98.96	99.56	99.56	98.28	98.31	98.36	98.73
Normalized I			Normalized Major Element																
SiO2	55.43	0.47	54.41	55.57	54.80	54.40	54.51	54.31	54.90	55.01	54.97	54.35	55.37	54.72	54.35	54.89	54.49	54.69	54.93
Al2O3	14.09	0.25	13.70	14.40	13.83	13.70	13.63	13.66	13.74	13.98	13.81	13.83	13.74	13.84	13.84	13.85	13.78	13.72	13.83
TiO2	1.962	0.041	2.179	2.277	2.221	2.266	2.276	2.277	2.270	2.270	2.286	2.260	2.261	2.221	2.253	2.221	2.259	2.218	2.241
FeO*	11.38	0.64	12.51	10.38	12.19	12.66	12.70	12.82	12.52	11.91	12.23	12.43	12.05	12.36	12.57	12.28	12.42	12.57	12.13
MnO	0.194	0.011	0.196	0.221	0.198	0.213	0.209	0.209	0.205	0.199	0.203	0.217	0.203	0.207	0.214	0.195	0.211	0.200	0.203
CaO	7.91	0.44	7.67	7.90	7.49	7.80	7.82	7.76	7.37	7.67	7.41	7.85	7.24	7.59	7.84	7.52	7.79	7.48	7.51
MgO	4.00	0.16	3.90	3.55	3.94	3.85	3.77	3.88	3.81	3.60	3.66	4.01	3.70	3.82	3.88	3.81	3.90	3.86	3.85
K2O	1.57	0.14	1.64	1.30	1.57	1.44	1.43	1.45	1.67	1.95	1.99	1.44	1.88	1.70	1.36	1.64	1.45	1.73	1.74
Na2O	3.15	0.14	3.40	3.96	3.35	3.23	3.21	3.19	3.11	3.00	3.03	3.18	3.15	3.14	3.26	3.19	3.27	3.14	3.16
P2O5	<u>0.326</u>	<u>0.014</u>	<u>0.392</u>	<u>0.441</u>	<u>0.402</u>	<u>0.439</u>	<u>0.442</u>	<u>0.439</u>	<u>0.405</u>	<u>0.414</u>	<u>0.404</u>	<u>0.428</u>	<u>0.412</u>	<u>0.400</u>	<u>0.432</u>	<u>0.404</u>	<u>0.435</u>	<u>0.396</u>	<u>0.397</u>
			100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Unnormalize			Unnormalized Trace Element																
Ni	14	4	9	13	7	8	7	12	20	15	12	10	13	20	18	19	11	16	18
Cr	20	9	17	19	19	28	29	30	17	12	6	14	25	13	15	14	17	16	15
Sc	65	93	35	35	33	32	35	33	34	35	32	35	32	34	36	33	35	34	34
V	371	84	385	385	404	363	358	369	389	409	393	376	352	399	377	397	370	399	401
Ba	572	181	635	748	689	592	581	580	669	691	698	590	675	665	591	658	602	661	663
Rb	68	84	46	36	41	35	32	38	44	50	50	38	47	45	36	41	35	43	44
Sr	302	47	326	357	322	335	326	331	327	341	333	337	317	331	329	316	320	310	326
Zr	151	40	172	166	173	167	166	168	171	182	186	169	181	178	167	170	159	169	182
Y	32	7	35	39	37	38	39	39	36	36	37	37	38	35	36	37	37	35	38
Nb	12.5	2.8	13.6	14.1	16.7	13.3	11.2	11.2	14.8	13.5	12.0	11.9	11.7	13.7	11.7	14.1	10.3	12.8	12.1
Ga	22	3	22	20	21	22	25	22	21	22	21	21	23	21	21	20	21	20	22
Cu	37	28	32	16	27	19	26	24	32	30	28	12	14	31	10	34	17	35	38
Zn	107	33	†121	†132	†118	126	124	127	121	129	125	130	126	126	129	120	126	123	127
Pb	9	5	7	5	8	6	6	9	8	7	9	6	8	9	6	8	6	7	8
La	24	8	38	0	44	3	23	21	23	21	28	19	30	24	22	25	21	20	24
Ce	41	15	0	0	55	48	57	53	57	59	55	50	59	46	46	48	48	48	54
Th	7	6	6	4	7	5	2	6	5	4	5	4	5	5	3	5	4	5	4
Nd	24	5	nd	nd	nd	nd	nd	nd	32	33	nd	29	35	26	26	28	29	30	29
U	2	1	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

Table DR1 (c

M													
SN	'05120	05129	05130	06094	06150	07014	07015	08072	09019	09073(43)	10052	10058	10101
WSU run	0305(3)	0405(2)	0405(2)	0206	0107(2)	0107(3)	0107(3)	0108(2)	0109	0110(2)	0110PHA(3)	0110PHA(3)	0210PHA
7.5' Quad	Weeks Tablelanastash	LaKananastash	LaKananastash	LaKananastash	LaKananastash	Lak Milk Canyon	Milk Canyon	Frost Mtn	Milk Canyon	Nile	Milk Canyon	Nile	Nile
UTM N*	5181320	5193790	5197040	5196120	5193300	5183620	5179970	5208840	5183770	5186700	5188140	5186560	5185600
UTM E*	650040	654820	655970	655720	653100	662750	666520	657220	663620	658660	662990	658620	659960
Unnormalize													
SiO2	53.96	54.16	53.77	53.96	54.33	53.74	53.98	53.07	54.40	53.58	54.14	54.38	54.71
Al2O3	13.54	13.50	13.38	13.53	13.52	13.58	13.51	13.58	13.65	13.38	13.63	13.54	13.63
TiO2	2.175	2.258	2.231	2.266	2.274	2.195	2.239	2.192	2.244	2.225	2.197	2.262	2.307
FeO	11.87	11.70	11.88	12.09	12.04	11.86	12.14	11.94	12.11	12.27	12.31	12.18	11.87
MnO	0.201	0.202	0.201	0.214	0.207	0.199	0.199	0.198	0.199	0.192	0.197	0.198	0.182
CaO	7.48	7.19	7.16	7.30	7.27	7.45	7.34	7.34	7.40	7.15	7.36	7.01	6.64
MgO	3.76	3.50	3.61	3.63	3.48	3.78	3.77	3.77	3.74	3.57	3.72	3.51	3.41
K2O	1.59	1.92	1.82	1.72	1.76	1.74	1.81	1.55	1.82	1.76	1.85	1.73	1.73
Na2O	3.16	3.01	3.00	3.07	3.04	3.02	2.97	3.15	3.04	3.05	3.01	3.19	3.37
P2O5	0.390	0.398	0.384	0.397	0.405	0.389	0.389	0.389	0.395	0.390	0.393	0.422	0.435
analysis tota	98.13	97.83	97.44	98.18	98.33	97.95	98.35	97.18	99.00	97.57	98.80	98.42	98.28
WAPSHILLA RIDGE													
30													
average std dev													
98.57 0.78													
Normalized ls (Weight %):													
SiO2	54.99	55.36	55.19	54.97	55.25	54.87	54.89	54.60	54.95	54.92	54.80	55.25	55.67
Al2O3	13.80	13.80	13.73	13.79	13.75	13.86	13.74	13.97	13.79	13.71	13.80	13.76	13.87
TiO2	2.217	2.308	2.290	2.309	2.312	2.241	2.276	2.256	2.267	2.280	2.223	2.299	2.347
FeO*	12.10	11.96	12.19	12.32	12.24	12.10	12.34	12.29	12.23	12.57	12.46	12.37	12.08
MnO	0.205	0.207	0.206	0.218	0.210	0.203	0.203	0.204	0.201	0.197	0.199	0.201	0.185
CaO	7.63	7.35	7.35	7.43	7.39	7.61	7.46	7.55	7.48	7.32	7.44	7.12	6.75
MgO	3.83	3.58	3.71	3.70	3.54	3.86	3.84	3.88	3.78	3.66	3.76	3.56	3.47
K2O	1.62	1.96	1.87	1.75	1.79	1.77	1.84	1.60	1.84	1.81	1.87	1.76	1.76
Na2O	3.22	3.08	3.08	3.12	3.09	3.08	3.02	3.24	3.07	3.13	3.04	3.24	3.43
P2O5	0.398	0.406	0.394	0.404	0.412	0.398	0.396	0.400	0.399	0.400	0.398	0.429	0.442
100.00 100.00 100.00 100.00 100.00 100.00 100.00 100.00 100.00 100.00 100.00 100.00 100.00 100.00													
Unnormalizements (ppm):													
Ni	23	19	17	21	14	18	17	13	19	15	18	12	11
Cr	17	11	11	12	10	12	11	10	9	9	11	17	15
Sc	34	34	33	33	34	34	33	35	34	32	34	31	32
V	399	388	384	392	382	393	389	393	397	391	389	350	347
Ba	661	702	677	705	692	678	662	675	650	668	656	678	691
Rb	45	51	47	46	47	45	46	42	48	53	49	50	49
Sr	332	326	325	325	333	333	331	327	338	331	333	324	323
Zr	184	184	180	181	185	185	184	183	184	188	188	202	203
Y	38	38	38	37	37	36	37	34	38	37	38	39	40
Nb	12.8	12.7	13.7	11.6	11.7	11.5	12.6	11.2	13.9	13.5	13.3	13.8	13.1
Ga	22	21	22	22	21	20	21	20	22	22	21	22	24
Cu	41	30	30	33	30	38	30	39	35	32	39	18	17
Zn	122	126	127	129	129	125	127	132	130	130	130	134	137
Pb	6	9	8	9	6	7	7	8	6	9	9	9	8
La	25	27	25	26	29	23	20	28	23	24	25	28	26
Ce	55	53	54	57	48	56	53	55	52	57	53	59	56
Th	2	4	4	5	7	7	7	6	6	4	5	4	5
Nd	30	30	30	31	28	33	30	31	30	31	27	31	32
U	2	nd	nd	nd	nd	nd	nd	1	3	2	2	4	4