UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

PRELIMINARY ANALYTICAL DATA ON THE MEADE PEAK MEMBER OF THE PHOSPHORIA FORMATION AT HOT SPRINGS UNDERGROUND MINE, TRAIL CANYON TRENCH AND CONDA UNDERGROUND MINE, SOUTHEASTERN IDAHO

By

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Open-File Report

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This report is preliminary and has not been edited or reviewed for conformith with Geological Survey standards or nomenclature

Contents

Introduction

Analytical data on the Meade Peak Member of the Phosphoria Formation at 3 localities (fig. 1) are presented here. The Hot Springs underground mine section is being studied for the first time and I especially thank Duncan L. King, Jr., Manager of Phosphate Rock Operations for Stauffer Chemical Company, for permission to work in the mine. Stratigraphic sections and some analytical data of the Trail Canyon section and Conda underground mine section are included in the reports of McKelvey, Armstrong, Gulbrandsen, and Campbell (1953), and McKelvey, Davidson, O'Malley, and Smith (1953) respectively. Samples collected in those studies have been used for the analyses reported here. All of the data are preliminary in character but are released at this time so as to be available for public use.

Other recent analytical data on the Phosphoria Formation are included in reports by Powell, Cook, and McKirdy (1975); Maughan (1975 and 1976); Desborough (1977); Claypool, Love, and Maughan (1978); and Gulbrandsen (1975), which also contains references to the major earlier sources of analytical data.

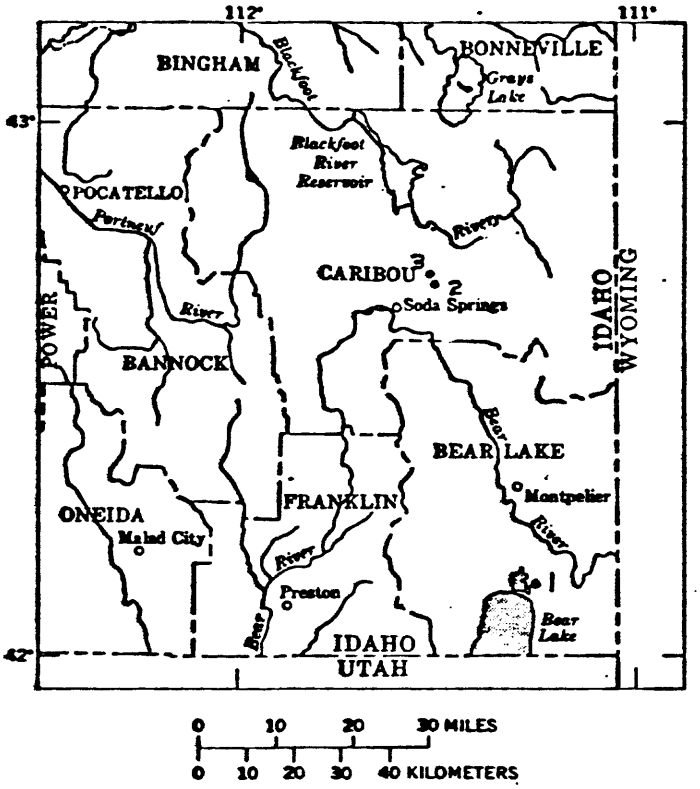

Figure 1. Map showing location of the stratigraphic sections of the Meade Peak Member for which analytical data are presented.

1. Hot Springs underground mine

2. Trail Canyon trench

3. Conda underground mine

Table 1. Analytical data of the Meade Peak Member at Hot Springs underground mine, Idaho. [Beds are numbered from base to top of member. Cumulative thickness is measured from base to top. Rock type: P = phosphorite, QS = quartz-silicate rock, CH = chert, D = dolomite, and L = limestone. P_2O_5 analyses by R. Humphrey, R. Gulbrandsen, and D. Krier. OM, organic matter analyses (ignition loss between about 105°C and 500°C), by R. Humphrey and D. Fuerst. All element determinations are semiquantitative spectrographic analyses by L. Mei and J. Mountjoy.]

Table 1. Analytical data of the Meade Peak Member at Hot Springs underground mine.

Bed no.	MP-306	MP-305	MP-304	MP-303	MP-302	MP-301	MP-300	MP-299	MP-298	MP-297	MP-296	MP-295	MP-294	MP-293	MP-292	MP-291
Thickness (m)	.10	.12	.34	.15	.16	.30	.39	.14	.14	.06	.11	.06	.05	.09	.17	.08
Cumulative thickness (m)	52.51	52.41	52.29	51.95	51.80	51.64	51.34	50.95	50.81	50.67	50.61	50.50	50.44	50.39	50.30	50.13
Sample no.	192-76	584-77	189-76	583-77	582-77	188-76	187-76	581-77	580-77	579-77	578-77	577-77	576-77	575-77	574-77	573-77
Lab no.	M-132555	M-132554	M-132553	M-132552	M-132551	M-132550	M-132549	M-132548	M-132547	M-132546	M-132545	M-132544	M-132543	M-132542	M-132541	M-132540
Rock type	P	QS	QS	QS	QS	QS	QS	QS	P	P	P	P	P	P	QS	QS
									percent							
P_2O_5	27.0	2.2	2.1	1.4	0.6	.8	1.0	3.4	36.2	36.1	35.3	35.1	36.0	34.7	2.2	2.2
OM	2.1	4.4	3.4	5.2	4.5	3.9	4.3	3.9	4.0	3.8	4.2	3.6	3.6	3.1	1.3	4.1
									ppm							
Ag	< .1	< .1	< .1	2.7	.4	< .1	< .1	1.7	.6	.6	.7	.6	.8	2.1	2.1	3.0
B	96	200	150	180	160	170	150	160	< 4.6	< 4.6	6.7	< 4.6	7.1	12	51	150
Ba	270	300	260	320	220	220	220	240	210	250	330	260	370	340	120	240
Be	2.3	3.2	1.9	3.1	2.2	2.1	2.2	2.1	< 1.0	1.3	1.5	1.5	2.3	1.9	< 1.0	2.9
Cd	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 46	< 46	< 46	50	84	< 46	< 32	< 32
Ce	150	92	< 93	90	63	50	48	57	< 93	96	120	< 93	< 93	95	< 93	63
Co	1.5	4.6	3.5	4.1	4.7	3.7	3.3	3.2	< 1.0	< 1.0	1.1	1.0	1.2	1.2	2.3	3.1
Cr	400	380	330	420	240	130	140	250	200	260	250	290	390	380	130	250
Cu	27	40	29	40	25	21	17	35	9.5	7.8	14	10	15	21	14	25
Dy	27	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Er	22	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	11	14	< 10	< 10
Eu	6.5	< 1.5	2.4	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.9	3.3	< 1.5	< 1.5	3.8	4.7	< 1.5	< 1.5
Ga	1.8	6.8	5.1	6.2	6.4	4.2	3.7	4.4	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.0	4.2
Gd	33	14	15	13	12	< 6.8	12	13	12	< 6.8	< 6.8	11	13	20	11	14
Ho	8.7	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	390	73	62	71	36	32	32	57	170	180	210	160	220	210	35	38
Mn	76	300	350	360	330	390	440	380	18	34	38	24	25	45	820	370
Mo	10	22	17	28	16	7.8	3.2	5.4	8.9	10	15	10	12	9.9	8.3	8.9
Nb	< 2.2	11	4.7	7.3	3.9	2.8	8.1	5.3	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	4.3
Nd	100	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46
Ni	100	160	120	180	83	56	54	74	46	49	51	52	60	71	32	78
Pb	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
Pr	83	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	< 1.0	11	8.8	11	8.4	9.2	9.3	8.0	3.3	3.5	3.4	3.3	< 1.0	4.9	5.6	8.6
Sn	3.8	3.2	1.5	3.2	2.1	< 1.5	< 1.5	< 1.8	< 1.5	< 1.5	< 1.5	1.7	< 1.5	< 1.5	1.5	< 1.5
Sr	1600	240	270	240	140	140	160	250	1700	2300	3400	1900	3200	1900	310	240
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.7	< 3.5	< 3.2	< 3.2	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<460	<320	<310	<320
V	67	82	65	100	74	65	66	72	130	170	180	220	320	210	110	130
Y	400	97	73	95	35	20	30	65	190	160	170	180	240	270	31	43
Yb	14	5.1	5.8	6.0	4.1	2.8	2.9	4.9	6.5	7.2	6.6	6.8	9.1	9.5	3.7	3.8
Zn	630	540	320	580	170	100	83	220	510	780	1100	1100	2000	710	100	250
Zr	410	510	240	430	180	170	240	180	66	37	60	73	84	120	220	330

Table 1. Hot Springs analyses (cont.)

Bed no.	MP-290	MP-289	MP-288	MP-287	MP-286	MP-285	MP-284	MP-283	MP-282	MP-281	MP-280	MP-279	MP-278	MP-277	MP-276	MP-275
Thickness (m)	.26	.08	.11	.05	.15	.10	.20	.20	.09	.05	.10	.09	.05	.05	.19	.05
Cumulative thickness (m)	50.05	49.79	49.71	49.60	49.55	49.40	49.30	49.10	48.90	48.81	48.76	48.66	48.57	48.52	48.47	48.28
Sample no.	572-77	571-77	184-76	570-77	569-77	568-77	183-76	567-77	566-77	565b-77	565a-77	182-76	564-77	563-77	562-77	561-77
Lab no.	M-132539	M-132538	M-132537	M-132536	M-132535	M-132534	M-132533	M-132532	M-132531	M-132530	M-132529	M-132528	M-132527	M-132526	M-132525	M-132524
Rock type	D	P	P	P	L	L	P	P	P	P	P	P	P	P	P	P
								percent								
P_2O_5	1.2	33.6	24.4	18.2	1.2	1.0	33.8	33.3	16.0	27.4	30.5	29.9	30.3	13.7	29.0	26.0
OM	1.4	4.6	4.1	4.7	2.0	1.6	3.8	3.5	3.9	3.8	4.8	4.6	4.8	4.1	4.0	5.9
									ppm							
Ag	.3	1.0	3.1	3.5	2.5	4.0	1.4	2.9	7.8	.8	1.1	3.6	2.1	7.0	1.0	7.0
B	40	6.9	70	85	47	39	6.1	20	100	< 4.6	6.6	31	19	71	6.8	48
Ba	110	110	290	240	120	130	120	180	240	140	140	250	190	200	140	250
Be	1.1	1.5	3.4	3.0	1.1	1.3	1.8	3.1	2.7	< 1.0	2.0	2.7	2.3	< 1.0	< 1.0	< 1.0
Cd	< 32	< 46	120	110	< 32	< 46	< 46	110	85	41	74	94	97	79	47	220
Ce	< 93	110	< 93	< 93	< 93	< 93	130	< 93	< 93	< 93	< 93	89	< 93	< 93	< 93	98
Co	2.1	1.2	2.7	3.2	2.5	3.3	< 1.0	1.8	3.1	< 1,0	< 1.1	1.5	1.3	2.2	< 1.0	3.6
Cr	91	150	340	360	130	170	300	180	370	140	180	310	210	370	150	500
Cu	14	14	32	43	21	22	14	38	42	6.5	18	24	19	41	20	61
Dy	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Er	< 10	12	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	11
Eu	< 1.5	4.0	2.1	< 1.5	< 1.5	< 1.5	3.7	2.0	< 1.5	< 1.5	2.0	< 1.5	< 1.5	< 1.5	1.9	< 1.5
Ga	< 1.5	< 1.5	2.2	2.2	2.0	1.6	< 1.5	< 1.5	2.9	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	3.7
Gd	7.5	12	13	10	9.6	< 6.8	11	< 6.8	14	< 6.8	11	7.1	7.8	11	6.8	14
Ho	< 6.8	< 6.8	< 6.8	< 6.8	6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	2.8	190	110	90	44	35	220	110	53	130	100	130	100	65	110	130
Mn	580	70	95	130	800	860	52	54	140	160	67	73	100	450	170	110
Mo	6.1	6.7	40	35	16	26	14	33	36	14	24	20	15	27	12	110
Nb	2.3	< 2.2	2.8	< 2.2	< 2.2	4.2	< 2.2	< 2.2	2.7	< 2.2	< 2.2	< 2.2	< 2.2	2.4	< 2.2	< 2.2
Nd	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46
Ni	32	48	100	120	61	68	62	520	130	59	110	88	88	95	56	550
Pb	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	5.1	4.2	6.3	6.2	6.8	5.9	5.0	4.8	6.4	5.1	3.6	7.2	5.9	7.1	4.4	7.4
Sn	< 1.5	2.8	< 1.5	2.1	2.8	2.3	3.4	< 1.5	1.7	< 1.5	< 1.5	< 1.5	< 1.5	2.4	< 1.5	2.9
Sr	320	1800	1600	1200	530	460	3200	2800	830	2700	1800	1800	1600	710	1500	1500
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	3.3	< 3.2	3.4	3.4	< 3.2	13	10	< 3.2	< 3.2	5.1	3.5	7.9	3.3	37
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	<320	<460	<320	<320	<460	<320	320	<320	<460	<320
V	74	120	210	220	120	140	250	350	430	380	260	370	280	530	340	740
Y	21	200	130	110	42	21	230	130	58	130	150	150	130	88	120	180
Yb	2.0	8.5	5.9	5.7	3.2	2.6	9.1	6.3	5.2	7.8	6.8	7.4	6.5	7.5	6.1	12
Zn	120	550	2500	2000	270	450	590	4800	1900	620	2500	1700	2300	1300	710	10000
Zr	240	110	540	300	200	240	71	160	160	57	84	350	200	340	100	310

Table 1. Hot Springs analyses (cont.)

Bed No.	MP-274	MP-273	MP-272	MP-271	MP-270	MP-269	MP-268	MP-267	MP-266	MP-265	MP-264	MP-263	MP-262	MP-261	MP-260	MP-259	MP-258
Thickness(m)	.14	.05	.19	.10	.21	.10	.07	.06	.09	.06	.06	.07	.12	.06	.08	.08	.08
Cummulative Thickness(m)	48.23	48.09	48.04	47.85	47.75	47.54	47.44	47.37	47.31	47.22	47.16	47.10	47.03	46.91	46.85	46.77	46.69
Sample No.	560-77	559-77	558-77	557-77	556-77	555-77	554-77	553-37	552-77	551-77	550-77	549-77	180-76	548-77	547-77	546-77	545-77
Lab No.	M-132523	M-132522	M-132521	M-132520	M-132519	M-132518	M-132517	M-132516	M-132515	M-132514	M-132513	M-132512	M-132561	M-132511	M-132510	M-132509	M-132508
Rock Type	P	P	P	P	P	P	P	P	P	L	P	P	P	P	P	QS	P
									percent								
P_2O_5	17.5	20.3	37.7	35.8	33.1	33.7	26.2	27.1	33.0	10.3	30.5	29.7	20.4	26.9	12.9	2.9	27.9
OM	4.7	5.1	6.7	6.0	4.5	5.5	4.2	5.3	7.1	2.5	8.3	6.6	7.3	6.2	14.4	13.9	4.6
									ppm								
Ag	6.8	11	.5	1.8	1.5	2.7	3.5	3.0	3.0	< 1.1	8.1	6.8	9.2	6.6	11	17	5.1
B	47	93	< 4.6	< 4.6	< 4.6	14	9.6	8.1	5.9	4.6	21	37	72	55	99	220	40
Ba	220	240	47	130	140	210	180	150	180	120	230	220	240	210	270	370	210
Be	< 1.0	3.6	< 1.0	2.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.3	< 1.0	< 1.0	< 1.0	< 1.0
Cd	110	86	57	120	70	150	220	72	170	52	260	61	70	82	340	280	210
Ce	< 93	< 93	< 93	< 93	< 93	< 93	99	<93	100	< 93	120	87	92	< 93	< 93	85	< 93
Co	2.3	3.0	1.0	1.4	1.1	1.7	2.3	1.7	1.7	1.1	2.7	1.7	2.3	1.0	3.4	5.9	2.0
Cr	340	570	85	390	260	530	370	280	390	220	460	500	430	500	960	1600	330
Cu	48	52	11	25	37	35	35	29	45	23	56	36	34	48	78	100	39
Dy	< 22	< 22	< 22	< 22	< 22	<	< 22	< 22	< 22	< 22	< 22	24	< 22	< 22	< 22	< 22	< 22
Er	< 10	10	< 10	12	< 10	11	< 10	< 10	10	< 10	13	15	11	14	< 10	< 10	< 10
Eu	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	1.9	< 1.5	3.7	< 1.5	3.0	3.0	1.6	< 1.5	< 1.5
Ga	1.5	1.7	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	1.9	< 1.5	< 1.5	< 1.5	2.1	7.0	< 1.5
Gd	< 6.8	14	< 6.8	< 6.8	< 6.8	10	7.8	8.7	< 6.8	< 6.8	13	13	18	12	13	13	8.7
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	70	85	120	170	120	180	130	89	170	79	190	230	120	180	120	62	73
Mn	610	110	390	66	110	57	180	170	73	820	59	66	150	84	190	230	74
Mo	49	47	20	36	17	68	140	29	60	27	230	49	46	54	370	170	120
Nb	< 2.2	2.8	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	3.4	< 2.2
Nd	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	89	< 46
Ni	290	170	45	150	56	150	220	90	170	78	620	130	120	150	670	620	160
Pb	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	11	< 6.8	< 6.8	< 6.8	7.0	16	< 6.8
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	86	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	6.3	6.8	3.5	5.2	4.7	6.4	5.4	4.9	4.9	5.6	7.3	8.4	8.6	9.0	10	12	5.3
Sn	3.5	3	< 1.5	< 1.5	< 1.5	< 1.5	5.1	2.5	< 1.5	< 1.5	4.6	2.6	3.6	< 1.5	4.9	3.0	< 15
Sr	1100	910	1600	1600	1900	3000	1900	1600	2500	1500	2100	1700	1100	1600	1000	280	1500
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	10	< 3.2	5.0	4.4	10	11	5.6	11	5.1	35	3.2	8.8	9.4	29	41	25
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<460	<460	<320	<460	<460	<320	<460	<320	620	<320	<320	<320	<320	<320	<320
V	560	560	300	550	420	750	680	520	680	390	810	680	510	600	>1000	>1000	720
Y	80	120	140	190	130	190	170	120	190	89	210	280	160	250	160	76	110
Yb	6.1	8.7	6.3	9.9	7.1	9.8	9.0	6.9	9.2	6.0	13	12	8.7	13	15	14	9.3
Zn	7900	1700	1500	2500	990	3000	7900	1600	5100	1400	>10000	1300	1300	1500	>10000	4800	9600
Zr	230	250	62	82	61	190	93	120	130	80	210	360	390	330	310	300	280

Table 1. Hot Springs analyses (cont.)

Bed No.	MP-257	MP-256	MP-255	MP-254	MP-253	MP-252	MP-251	MP-250	MP-249	MP-248	MP-247	MP-246	MP-245	MP-244	MP-243	MP-242
Thickness (m)	.07	.05	.07	.05	.06	.06	.06	.12	.11	.08	.08	.09	.14	.17	.06	.26
Cummulative thickness (m)	46.61	46.54	46.49	46.42	46.37	46.31	46.25	46.19	46.07	45.96	45.88	45.80	45.71	45.57	45.40	45.34
Sample No.	544-77	543-77	542-77	541-77	540-77	539-77	538-77	537-77	536-77	177-76	535-77	178-76	534-77	176-76	533-77	532-77
Lab No.	M-132507	M-132506	M-132505	M-132504	M-132502	M-132503	M-132501	M-132500	M-132499	M-132498	M-132497	M-132496	M-132495	M-132494	M-132493	M-132492
Rock type	P	P	P	L	L	P	P	P	P	P	P	P	P	P	P	P
									percent							
P_2O_5	31.2	19.1	19.7	1.2	1.0	18.4	29.2	20.2	31.5	29.7	32.0	28.9	29.3	30.0	30.7	25.9
OM	4.3	7.7	2.6	1.9	2.0	1.8	3.6	1.9	8.9	3.4	9.8	8.9	9.4	11.6	12.0	16.4
									ppm							
Ag	.9	7.6	.8	.5	.5	.8	1.4	.8	1.0	2.7	1.6	2.5	1.0	4.0	2.8	5.4
B	5.1	100	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	12	7.7	9.5	< 4.6	17	11	35
Ba	100	250	100	18	17	94	110	120	140	160	150	140	100	170	170	180
Be	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Cd	91	180	< 32	< 32	< 32	< 32	38	49	100	180	110	200	83	240	190	240
Ce	< 93	< 93	< 93	< 93	< 43	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93
Co	< 1.0	3.3	1.1	< 1.0	< 1.0	< 1.0	1.0	< 1.0	1.0	1.1	1.2	1.2	< 1	1.6	1.5	1.5
Cr	91	440	76	120	88	89	200	94	150	370	500	400	270	590	470	520
Cu	14	52	9.3	8.6	5.9	5.6	9.7	8.8	20	40	36	41	30	46	46	51
Dy	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Er	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	14	< 10	< 10	17	19	14
Eu	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.3	< 1.5	< 1.5	< 1.5	2.2	2.1
Ga	< 1.5	1.8	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Gd	7.7	12	< 6.8	< 6.8	< 6.8	< 6.8	9.8	< 6.8	7.2	8.4	< 6.8	8.4	8.0	< 6.8	< 6.8	13
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	85	67	82	< 10	< 10	85	140	55	75	100	140	110	83	140	140	190
Mn	120	120	200	410	480	160	130	180	81	70	69	87	70	43	44	55
Mo	18	180	13	15	12	6.5	15	12	29	110	75	110	37	150	130	93
Nb	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
Nd	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46
Ni	46	250	32	30	30	22	51	30	56	160	140	170	100	310	280	280
Pb	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	4.3	7.1	4.1	5.0	4.6	4.2	3.5	3.5	4.3	4.3	4.2	< 1	3.1	4.7	4.1	7.2
Sn	< 1.5	< 1.5	< 1.5	< 1.5	5.2	2.7	< 1.5	3.7	< 1.5	2.1	< 1.5	2.7	< 1.5	3.3	3.1	4.0
Sr	1500	1100	1400	760	750	1600	1800	1600	2700	3100	1800	2600	1800	1800	2400	1700
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	6.9	30	< 3.2	< 3.2	< 3.2	< 3.2	3.7	< 3.2	4.3	< 3.2	13	8.1	4.9	25	21	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	<460	<320	<460	<320	<320	<320	<320	<320	<460	<460
V	440	960	220	280	210	190	420	220	500	780	910	700	660	>1000	>1000	950
Y	120	94	110	11	10	91	180	74	120	150	160	140	110	140	140	240
Yb	6.7	10	6.2	1.3	1.6	4.4	8.2	4.8	6.2	11	9.4	9.6	8.6	13	12	15
Zn	3000	6900	540	320	290	300	470	1100	3600	6300	2500	6700	1500	7500	5800	4700
Zr	110	350	95	35	60	66	71	37	60	100	93	89	63	100	100	250

Table 1. Hot Springs analyses (cont.)

Bed No.	MP-241	MP-240	MP-239	MP-238	MP-237	MP-236	MP-235	MP-234	MP-233	MP-232	MP-231	MP-230	MP-229	MP-228	MP-227	MP-226
Thickness (m)	.16	.13	.24	.13	.07	.13	.04	.14	.16	.13	.07	.16	.17	.06	.19	.19
Cummulative thickness (m)	45.08	44.92	44.79	44.55	44.42	44.35	44.22	44.18	44.04	43.88	43.75	43.68	43.52	43.35	43.29	43.10
Sample no.	531-77	175-76	530-77	174-77	529-77	528-77	527-77	173-76	172-76	526-77	525-77	171-76	524-77	523-77	170-76	522-77
Lab No.	M-132491	M-132490	M-132489	M-132488	M-132487	M-132486	M-132485	M-132484	M-132483	M-132482	M-132481	M-132480	M-132479	M-132478	M-132477	M-132476
Rock type	P	P	P	P	P	P	P	P	P	P	P	P	P	L	P	P
									percent							
P_2O_5	20.2	18.3	26.8	22.8	18.2	18.6	18.7	13.3	28.8	24.7	26.3	16.0	13.0	2.9	13.2	18.6
OM	12.7	16.4	14.6	14.4	14.2	14.8	17.1	17.0	13.7	11.5	14.7	14.6	14.4	2.3	17.4	12.6
									ppm							
Ag	9.5	22	6.3	8.5	10	12	14	16	5.4	6.8	10	15	14	.8	20	11
B	50	120	43	67	120	100	130	170	27	29	74	79	62	< 4.6	130	42
Ba	80	180	130	210	220	210	230	240	80	83	180	180	170	41	280	200
Be	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cd	250	370	320	270	270	240	510	410	160	84	190	70	120	< 32	270	46
Ce	< 93	< 93	< 93	96	< 93	110	140	< 93	< 93	98	< 93	< 93	< 93	< 93	< 93	88
Co	2.0	4.5	2.1	2.6	3.4	3.6	4.0	4.7	1.2	1.4	2.1	2.0	2.3	1.2	2.8	2.0
Cr	860	2100	750	940	900	1800	2400	3400	540	600	2600	2400	2200	200	2800	690
Cu	61	70	48	47	63	62	76	82	53	41	65	70	82	9.9	85	41
Dy	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	20	< 22	< 22	< 22	< 22	< 22	< 22
Er	18	27	22	20	16	18	19	20	13	16	15	16	17	< 10	16	18
Eu	< 1.5	2.4	2.0	1.9	< 1.5	3.0	2.8	< 1.5	< 1.5	4.0	< 1.5	3.7	4.1	2.6	3.2	5.6
Ga	< 1.5	4.1	< 1.5	2.0	2.3	2.4	3.7	3.4	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.7	< 1.5
Gd	< 6.8	8.8	7.4	< 6.8	9.0	8.2	13	18	10	11	11	16	13	< 6.8	16	12
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 15	< 6.8	6.8	< 6.8	< 6.8	7.0	< 6.8	< 6.8	7.5
La	180	140	160	180	160	150	210	240	270	200	200	250	260	67	210	270
Mn	100	140	76	120	130	130	130	190	61	110	97	110	110	150	120	190
Mo	130	630	210	260	200	160	390	340	63	35	110	53	100	9.7	150	66
Nb	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 3.6	< 2.2	3.7	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	5.1	< 2.2
Nd	< 46	< 46	< 46	< 46	< 46	< 46	52	68	< 46	< 46	< 46	< 47	< 46	< 46	62	< 46
Ni	360	1100	430	420	420	380	790	770	180	140	380	330	330	33	550	160
Pb	< 6.8	8.4	< 6.8	< 6.8	< 6.8	< 6.8	8.1	7.9	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	7.1	< 6.8
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	74	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	6.8	9.6	6.4	7.6	9.7	9.1	12	14	5.4	7.3	8.2	8.9	10	6.8	11	9.6
Sn	4.5	8.1	< 1.5	5.9	5.3	< 1.5	5.3	5.8	< 1.5	< 1.5	5.5	< 1.5	3.5	< 1.5	4.4	< 1.5
Sr	2700	2100	2600	2200	1700	1500	1600	1500	3100	3300	2700	1800	1900	2300	1400	2900
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	24	< 3.2	< 25	26	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	6.8	15	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	4.7	< 4.6	< 4.6	4.7
U	<320	<320	<320	<320	<320	<320	540	<320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	<320
V	1200	>2200	1500	1400	1300	1200	1400	1300	790	600	790	460	670	170	750	700
Y	210	170	190	190	200	190	270	330	270	350	260	310	310	59	270	330
Yb	13	18	17	15	16	14	17	18	13	12	15	15	14	2.7	15	13
Zn	4100	12000	6500	3400	3200	2300	8600	5400	2100	1300	3200	1200	1600	230	3000	660
Zr	200	310	220	240	350	260	260	310	220	280	480	470	350	40	540	380

Table 1. Hot Springs analyses (cont.)

Bed no.	MP-225	MP-224	MP-223	MP-222	MP-221	MP-220	MP-219	MP-218	MP-217	MP-216	MP-215	MP-214	MP-213	MP-212	MP-211	MP-210
Thickness (m)	.15	.16	.24	.20	.22	.37	.23	.26	.10	.10	.13	.07	.28	.50	.50	.53
Cumulative thickness (m)	42.91	42.76	42.60	42.36	42.16	41.94	41.57	41.34	41.08	40.98	40.88	40.75	40.68	40.40	39.90	39.40
Sample no.	521-77	169-76	520-77	168-76	519-77	167-76	518-77	166-76	517-77	516-77	515-77	514-77	165-76	164-76	163-76	162-76
Lab no.	M-132475	M-132474	M-132473	M-132472	M-132471	M-132560	M-132470	M-132469	M-132468	M-132467	M-132466	M-132465	M-132464	M-132463	M-132462	M-132461
Rock type	QS	QS	QS	QS	QS	D	QS	P	P	P	P	P	QS	QS	QS	QS
									percent							
P_2O_5	8.7	10.2	8.0	7.3	5.4	2.2	11.3	15.5	16.6	14.8	17.2	16.1	12.0	5.9	9.7	9.3
OM	16.6	14.8	14.8	9.7	7.8	1.9	10.9	15.7	12.8	14.1	12.1	8.7	8.3	9.3	8.2	8.8
									ppm							
Ag	20	19	16	7.3	6.9	.8	17	13	14	15	12	7.1	13	15	12	12
B	160	130	180	120	61	12	160	150	74	110	100	19	60	140	140	120
Ba	310	270	360	300	280	130	280	3.0	270	250	280	74	220	340	300	290
Be	< 1.0	< 1.0	5.3	2.5	1.6	< 1.0	4.8	5.7	4.4	4.4	4.8	1.4	2.6	4.1	3.8	3.3
Cd	310	110	270	51	< 32	< 32	< 46	190	< 46	69	33	< 32	< 32	< 32	75	< 32
Ce	< 93	< 93	< 93	< 93	< 93	< 93	150	< 93	120	170	< 93	< 93	110	140	< 93	< 93
Co	5.4	4.1	4.1	4.9	5.9	2.8	5.5	4.9	3.2	4.5	3.6	1.3	2.4	8.3	6.5	5.4
Cr	1900	2000	1800	770	500	120	1400	2700	960	1800	2400	410	690	1300	1600	1500
Cu	100	83	91	60	40	13	61	73	48	58	74	36	49	62	59	62
Dy	< 22	< 22	< 22	< 22	< 22	< 22	29	19	30	29	26	23	33	< 22	< 22	25
Er	< 10	16	< 10	12	< 10	< 10	21	18	20	23	18	13	22	16	17	16
Eu	< 1.5	3.3	< 1.5	1.6	1.6	< 1.5	6.3	7.1	6.3	6.1	5.2	5.5	9.1	4.2	5.6	5.5
Ga	5.6	4.5	8.6	6.7	6.6	< 1.5	10	6.2	2.6	4.0	4.1	< 1.5	3.3	11	7.5	7.3
Gd	8.2	12	15	16	10	9.9	20	15	27	21	17	11	32	16	17	20
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	8.2	7.4	8.5	8.4	8.1	< 6.8	8.9	< 6.8	< 6.8	< 6.8
La	110	210	87	100	61	29	270	220	260	280	230	180	270	140	180	180
Mn	320	210	160	170	490	950	260	200	310	280	140	340	270	480	420	460
Mo	290	130	170	42	20	5.5	57	170	26	76	45	15	43	34	110	52
Nb	3.3	4.1	7.0	4.5	4.5	< 2.2	9.6	4.8	3.6	6.5	2.5	< 2.2	5.5	13	11	5.0
Nd	52	66	< 46	< 46	< 46	< 46	60	< 46	< 46	< 46	< 46	< 46	82	50	< 46	< 46
Ni	620	540	420	230	130	32	320	690	310	510	560	120	220	370	350	330
Pb	13	7.4	15	8.9	9.9	< 6.8	8.8	14	< 6.8	9.6	< 6.8	< 6.8	< 6.8	11	11	8.9
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	11	12	11	11	9.0	5.2	16	12	13	14	13	6.2	8.6	15	13	14
Sn	4.7	4.0	5.6	3.2	2.5	< 1.5	3.9	5.5	< 1.5	4.2	< 1.5	< 1.5	4.0	6.0	3.7	4.2
Sr	940	1100	720	600	480	300	1200	1600	1700	1600	2100	2900	1700	810	1200	1300
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	5.2	5.1	5.3	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320
V	1100	670	560	210	170	72	160	310	190	150	160	120	150	190	220	150
Y	130	260	110	130	67	15	300	310	390	380	340	240	330	160	240	220
Yb	12	14	9.9	8.2	6.9	1.5	15	14	15	16	14	9.7	16	11	12	12
Zn	4200	1800	3300	1100	350	86	1400	2900	930	1800	1700	420	600	1000	1700	940
Zr	240	400	350	270	230	170	340	460	430	430	340	140	320	390	450	360

Table 1. Hot Springs analyses (cont.)

Bed no.	MP-209	MP-208	MP-207	MP-206	MP-205	MP-204	MP-203	MP-202	MP-201	MP-200	MP-199	MP-198	MP-197	MP-196	MP-195	MP-194
Thickness (m)	.46	.41	.19	.13	.28	.65	.22	.22	.52	.52	.52	.52	.52	.09	.04	.01
Cumulative thickness (m)	38.87	38.41	38.00	37.81	37.68	37.40	36.75	36.53	36.31	35.79	35.27	34.75	34.23	33.71	33.62	33.58
Sample no.	161-76	160-76	513-77	512-77	159-76	158-76	157-76	511-77	156-76	155-76	154-76	153-76	152-76	151-76	150-76	149-76
Lab no.	M-132460	M-132459	M-132458	M-132457	M-132456	M-132455	M-132454	M-132453	M-132452	M-132451	M-132450	M-132449	M-132448	M-132447	M-132446	M-132445
Rock type	P	QS	QS	P	QS	QS	P	P	QS	QS	QS	QS	QS	QS	QS	QS
									percent							
P_2O_5	20.5	14.4	10.6	17.6	8.9	5.8	28.3	19.8	5.8	0.6	3.3	0.6	0.9	0.5	10.5	13.6
OM	8.8	5.1	5.7	5.8	5.6	6.1	4.7	10.8	7.7	8.9	6.6	12.6	8.3	18.4	14.2	12.5
									ppm							
Ag	6.0	1.7	5.3	6.7	4.4	4.7	6.1	7.0	10	3.9	15	4.6	7.9	24	16	13
B	73	31	69	100	70	120	25	84	160	42	140	69	130	240	190	220
Be	310	240	320	340	280	380	310	260	360	300	400	370	430	370	450	550
Be	3.5	1.6	2.3	3.9	2.5	3.9	2.9	3.7	5.5	1.4	3.9	1.8	3.8	6.1	6.6	9.8
Cd	< 32	< 32	< 32	< 46	< 32	< 32	< 46	59	44	< 32	< 46	< 32	< 32	89	72	60
Ce	200	270	110	160	120	130	240	150	< 93	< 93	130	110	120	110	220	260
Co	3.3	5.1	5.2	4.4	5.0	6.0	1.8	3.7	5.6	5.6	5.3	6.6	6.1	7.7	6.3	7.5
Cr	800	260	530	950	630	810	640	2000	1400	320	1400	360	980	3200	2600	2900
Cu	44	27	49	68	48	41	41	64	51	21	49	30	40	78	57	55
Dy	45	32	< 22	33	31	< 22	58	43	23	< 22	< 22	< 22	< 22	< 22	38	48
Er	39	24	18	31	19	17	43	34	18	< 10	13	< 10	< 10	< 10	37	36
Eu	14	7.0	3.5	8.8	5.6	4.8	19	9.4	6.1	< 1.5	3.8	2.4	2.8	2.6	10	12
Ga	3.3	3.2	5.7	6.7	6.8	10	2.0	4.9	9.9	4.5	8.2	6.3	10	16	14	18
Gd	56	27	21	37	17	23	68	28	18	< 15	16	< 15	< 15	< 15	43	47
Ho	15	7.6	< 15	11	7.6	< 6.8	19	15	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	12	12
La	360	250	180	340	170	160	570	280	150	37	100	50	73	47	300	340
Mn	310	460	360	230	380	490	130	200	380	630	380	580	400	390	390	330
Mo	30	15	26	65	29	19	11	62	65	9.9	67	16	37	160	130	66
Nb	6.4	5.3	7.0	7.9	9.3	15	< 2.2	6.9	9.7	6.9	13	10	10	9.2	8.7	13
Nd	260	81	66	120	< 46	65	510	100	64	< 46	49	< 46	< 46	< 46	150	240
Ni	120	110	150	320	170	170	220	400	380	77	380	87	280	800	610	610
Pb	9.0	< 6.8	11	< 6.8	7.8	9.6	< 6.8	7.9	12	< 6.8	11	8.1	10	12	9.6	7.5
Pr	<150	< 68	< 68	< 68	< 68	< 68	<150	<150	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	9.8	10	12	14	12	15	13	15	16	10	14	12	13	11	26	18
Sn	5.2	6.4	4.0	4.8	5.1	4.5	3.8	< 1.5	2.8	2.7	2.9	3.3	4.3	4.4	4.9	5.7
Sr	1800	1400	880	1600	850	610	4200	1900	730	290	510	240	280	190	870	1500
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	4.1	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	6.0	< 4.6	< 4.6	5.6	< 4.6	< 4.6	6.6	6.1	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	6.2	6.2
U	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320
V	120	90	110	130	120	120	130	180	230	180	250	160	200	410	270	250
Y	930	260	250	410	240	180	900	1000	210	38	150	56	93	46	690	730
Yb	12	13	13	17	14	10	12	22	13	4.2	9.4	5.0	6.8	5.4	29	17
Zn	340	290	400	980	450	470	590	1600	1100	110	820	130	630	1800	1700	1900
Zr	630	650	430	730	850	450	330	560	680	400	660	380	470	290	440	520

Table 1. Hot Springs analyses (cont.)

Bed no.	MP-193	MP-192	MP-191	MP-190	MP-189	MP-188	MP-187	MP-186	MP-185	MP-184	MP-183	MP-182	MP-181	MP-180	MP-179	MP-178
Thickness (m)	.22	.35	.57	.58	.09	.34	.35	.08	.08	.09	.35	.07	.07	.08	.21	.14
Cumulative thickness (m)	33.57	33.35	33.00	32.43	31.85	31.76	31.42	31.07	30.99	30.91	30.82	30.47	30.40	30.33	30.25	30.04
Sample no.	148-76	147-76	146-76	145-76	510-77	144-76	143-76	142-76	141-76	140-76	139-76	509-77	508-77	507-77	506-77	505-77
Lab no.	M-132444	M-132443	M-132442	M-132441	M-132440	M-132439	M-132438	M-132437	M-132436	M-132435	M-132434	M-132433	M-132432	M-132431	M-132430	M-132429
Rock type	P	D	D	D	QS	D	QS	P	P	P	QS	QS	P	P	QS	QS
									percent							
P_2O_5	34.6	0.3	0.3	0.3	2.5	0.4	0.5	24.5	32.5	29.6	0.5	5.5	20.3	28.5	7.4	13.3
OM	4.2	1.7	2.4	3.3	4.7	4.4	5.5	3.9	4.3	3.7	5.4	20.2	17.4	13.4	12.6	12.2
									ppm							
Ag	4.3	.6	.1	< .1	2.1	.2	.9	3.9	2.4	2.8	2.4	< 32	14	8.6	16	9.1
B	.6	14	10	11	53	17	46	30	7.8	19	74	300	94	42	170	120
Ba	270	130	97	130	370	170	300	270	220	170	360	450	330	260	290	300
Be	4.7	< 1.0	< 1.0	< 1.0	2.9	< 1.0	1.3	3.3	3.9	3.2	1.9	7.1	4.8	3.5	4.1	3.6
Cd	< 46	< 32	< 32	< 32	< 32	< 32	< 32	< 46	< 46	< 46	< 32	120	140	< 46	62	< 46
Ce	240	< 93	< 93	< 93	190	< 93	100	170	190	210	< 43	< 93	280	300	190	170
Co	1.7	2.7	3.5	4.1	5.3	4.5	5.9	1.8	1.3	2.1	7.4	6.8	3.5	2.3	5.2	4.9
Cr	380	120	75	88	200	160	180	310	260	450	500	4300	2900	2700	2400	2200
Cu	21	10	11	12	25	18	24	14	10	15	29	250	49	57	63	60
Dy	72	< 22	< 22	< 22	29	< 22	< 22	< 22	37	45	< 22	28	82	82	35	37
Er	43	< 10	< 10	< 10	23	< 10	< 10	< 10	17	30	< 10	23	63	66	19	26
Eu	20	< 10	< 10	< 1.5	10	< 1.5	2.0	5.8	12	15	< 1.5	8.4	22	22	6.9	9.2
Ga	2.0	1.5	1.6	2.2	6.4	4.5	6.1	1.7	< 1.5	< 1.5	8.4	16	3.6	1.5	9.0	6.9
Gd	79	< 15	< 15	< 15	33	< 15	15	23	25	53	< 15	31	98	100	27	36
Ho	19	< 6.8	< 6.8	< 6.8	7.2	< 6.8	< 6.8	< 6.8	9.4	14	< 6.8	8.5	24	23	6.8	10
La	540	32	28	28	260	24	41	220	320	390	25	310	780	860	270	350
Mn	48	790	810	740	290	710	450	130	75	120	430	350	94	28	360	310
Mo	12	25	4.3	2.5	7.9	5.3	4.9	9.3	5.1	15	30	160	100	37	130	59
Nb	< 2.2	3.8	< 2.2	4.2	7.7	2.4	11	2.5	< 2.2	< 2.2	12	6.2	5.1	< 2.2	5.5	5.5
Nd	550	< 46	< 46	< 46	140	< 46	< 46	< 46	170	220	< 46	130	560	540	94	130
Ni	150	32	35	37	92	51	65	90	53	80	92	1400	940	700	560	570
Pb	< 6.8	< 6.8	8.2	9.0	14	9.8	12	< 6.8	< 6.8	< 6.8	14	16	11	7.2	18	9.3
Pr	240	< 68	< 68	< 68	< 68	< 68	< 68	< 68	<150	<150	< 68	< 68	250	350	< 68	<150
Sc	11	6.1	5.9	6.5	9.2	8.8	9.0	7.8	8.0	11	11	19	21	15	16	20
Sn	< 1.5	2.2	2.2	2.3	< 1.5	2.7	3.6	< 1.5	3.7	2.6	3.8	5.1	< 1.5	< 1.5	4.2	2.7
Sr	2700	380	330	290	1200	270	170	2600	2500	2500	170	610	2800	2800	720	1400
Tb	<150	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	51	< 32	< 32	41	36	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	7.1	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	4.9	5.8	< 4.6	< 4.6	9.2	9.3	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	420	<460	<320	<320
V	110	85	53	76	76	100	110	100	57	80	140	300	160	130	180	130
Y	1000	17	18	19	260	18	31	180	360	650	18	330	1600	1200	310	620
Yb	23	2.5	2.1	2.7	13	2.3	4.0	8.4	12	15	3.4	14	13	15	12	16
Zn	500	73	72	68	200	110	68	230	360	330	110	3100	2900	1800	1800	1400
Zr	190	330	260	280	450	200	440	810	210	470	380	240	420	150	380	380

Table 1. Hot Springs analyses (cont.)

Bed no.	MP-177	MP-176	MP-175	MP-174	MP-173	MP-172	MP-171	MP-170	MP-169	MP-168	MP-167	MP-166	MP-165	MP-164	MP-163	MP-162
Thickness (m)	.10	.22	.18	.33	.22	.34	.30	.24	.33	.17	.04	.25	.28	.02	.02	.13
Cumulative thickness (m)	29.90	29.80	29.58	29.40	29.07	28.85	28.51	28.21	27.97	27.64	27.47	27.43	27.18	26.90	26.88	26.86
Sample no.	504-77	137-76	503-77	136-76	502-77	135-76	501-77	134-76	133-76	132-76	131-76	130-76	129-76	128-76	127-76	126-76
Lab no.	M-132428	M-132427	M-132426	M-132425	M-132424	M-132423	M-132422	M-132421	M-132420	M-132419	M-132418	M-132417	M-132416	M-132415	M-132414	M-132413
Rock type	QS	QS	QS	P	L	QS	QS	D	L	D	D	D	D	QS	CH	QS
									percent							
P_2O_5	5.5	1.4	1.1	16.4	3.7	6.9	5.4	2.0	0.4	0.6	0.8	1.6	0.6	1.3	0.8	4.8
OM	11.2	6.3	7.7	13.4	9.6	11.4	2.9	1.2	0.3	1.0	2.6	2.0	1.7	4.5	2.8	4.6
									ppm							
Ag	9.4	5.7	5.6	11	6.8	9.7	3.6	1.5	.2	.4	2.0	.9	.2	2.7	.7	5.6
B	150	93	67	140	100	170	120	9.0	< 4.6	< 4.6	18	16	4.7	69	30	140
Ba	270	360	350	290	190	310	270	71	75	57	130	120	83	250	140	390
Be	3.4	2.5	1.9	3.5	2.5	2.9	2.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	1.5	< 1.0	4.6
Cd	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Ce	170	91	100	200	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 43	130
Co	4.1	6.1	6.2	3.4	2.3	5.3	5.0	2.3	1.6	1.5	3.5	3.1	1.2	4.6	1.4	6.7
Cr	2100	770	410	2900	1100	2100	670	390	94	250	420	340	290	510	140	950
Cu	52	32	32	59	40	63	39	20	4.1	14	29	28	8.6	43	19	41
Dy	21	< 22	< 22	37	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	30
Er	13	< 10	< 10	27	< 10	13	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	14
Eu	4.6	1.6	< 1.5	11	3.6	5.0	2.8	1.6	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	5.0
Ga	6.5	7.8	6.1	3.7	3.4	9.2	6.0	1.5	< 1.5	< 1.5	4.4	2.4	< 1.5	5.9	2.0	13
Gd	23	< 15	< 15	44	< 15	22	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	21
Ho	< 6.8	< 6.8	< 6.8	10	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	210	68	67	400	160	170	120	51	< 10	42	65	68	30	62	41	150
Mn	150	420	430	110	130	340	290	510	300	430	410	440	430	310	110	170
Mo	59	38	22	38	44	35	11	6.7	3.8	6.3	6.3	5.0	3.4	6.4	2.7	21
Nb	3.8	11	10	< 2.2	< 2.2	5.2	4.2	< 2.2	< 2.2	< 2.2	2.2	2.9	< 2.2	7.0	< 2.2	9.4
Nd	55	< 46	47	160	< 46	65	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	110
Ni	360	240	130	380	270	350	130	63	18	39	91	72	36	140	56	310
Pb	< 6.8	10	11	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	7.3
Pr	< 68	< 68	< 68	<150	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	15	12	10	15	11	14	12	6.4	6.5	5.8	6.9	6.3	6.7	6.8	6.0	14
Sn	2.7	4.4	3.1	< 1.5	< 1.5	4.1	2.2	< 1.5	< 1.5	< 1.5	1.9	< 1.5	2.0	2.5	< 1.5	5.1
Sr	800	300	290	2000	1200	870	530	470	870	430	280	430	380	220	310	460
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320
V	130	140	130	130	130	160	90	84	25	52	56	60	120	130	56	170
Y	220	72	63	500	140	160	99	28	20	16	42	42	14	43	34	140
Yb	9.2	5.2	5.1	14	6.4	8.1	6.0	1.8	.8	.9	3.0	2.5	1.2	3.5	2.2	8.5
Zn	1100	380	260	1300	1100	1100	560	210	180	200	310	230	150	410	270	970
Zr	220	280	270	170	140	190	130	45	67	38	73	93	39	120	48	230

Table 1. Hot Springs analyses (cont.)

Bed no.	MP-161	MP-160	MP-159	MP-158	MP-157	MP-156	MP-155	MP-154	MP-153	MP-152	MP-151	MP-150	MP-149	MP-148	MP-147	MP-146
Thickness (m)	.27	.27	.18	.27	.31	.27	.16	.28	.27	.20	.13	.13	.11	.12	.08	.09
Cumulative thickness (m)	26.73	26.46	26.19	26.01	25.74	25.43	25.16	25.00	24.72	24.45	24.25	24.12	23.99	23.88	23.76	23.68
Sample no.	125-76	124-76	123-76	122-76	121-76	120-76	119-76	118-76	117-76	116-76	115-76	114-76	113-76	112-76	111-76	110-76
Lab no.	M-132412	M-132411	M-132410	M-132409	M-132408	M-132407	M-132406	M-132405	M-132404	M-132403	M-132402	M-132401	M-132400	M-132399	M-132498	M-132497
Rock type	QS	QS	QS	QS	QS	QS	QS	QS	QS	QS	QS	QS	QS	QS	QS	QS
									percent							
P_2O_5	2.4	0.4	7.0	3.5	0.8	3.9	0.4	0.6	4.0	0.3	1.8	10.5	6.1	6.8	2.7	7.4
OM	11.1	7.6	8.4	5.0	5.8	5.6	4.8	1.9	7.8	2.9	3.9	9.5	5.0	8.5	8.2	8.7
									ppm							
Ag	15	4.8	4.0	1.7	.4	4.3	1.4	.8	.5	.8	3.7	7.3	3.7	8.2	10	7.5
B	160	90	160	200	63	170	74	57	41	48	130	270	95	160	320	350
Ba	400	300	380	410	280	380	280	290	240	250	360	370	290	320	370	330
Be	4.8	1.7	4.0	4.5	1.3	3.8	1.4	1.1	1.1	< 1.0	2.3	5.1	2.0	2.2	4.3	3.5
Cd	80	< 32	32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Ce	110	77	< 93	< 93	100	< 93	< 93	< 93	< 93	85	< 93	< 93	< 93	< 93	< 93	< 93
Co	7.3	7.4	7.3	8.5	6.3	7.3	5.0	6.0	5.8	6.7	8.5	6.2	4.7	7.1	8.3	6.8
Cr	1400	430	1400	1200	300	1400	440	310	250	300	820	2700	960	1900	3500	2800
Cu	55	44	69	43	31	72	33	32	31	28	55	92	55	80	100	81
Dy	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	25	< 22	< 22	< 22	< 22
Er	14	< 10	< 10	12	< 10	14	< 10	< 10	< 10	< 10	< 10	16	< 10	12	< 10	< 10
Eu	4.7	< 1.5	4.2	1.8	2.3	3.3	1.9	< 1.5	< 1.5	< 1.5	2.0	9.1	1.9	5.5	4.1	4.8
Ga	13	7.7	11	13	6.1	15	5.1	5.3	3.4	5.3	14	16	5.6	14	19	13
Gd	18	12	18	17	16	13	14	14	12	11	12	21	8.4	15	13	21
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	7.8	< 6.8	< 6.8	< 6.8	< 6.8
La	120	38	120	140	55	110	69	44	36	38	79	280	63	160	130	140
Mn	380	470	360	460	500	400	430	370	550	500	410	290	380	370	380	340
Mo	100	13	22	31	6.7	64	14	8.9	14	7.8	25	49	13	37	49	38
Nb	9.5	8.4	7.2	15	11	9.9	9.8	14	9.8	9.2	11	9.3	8.2	4.4	7.3	9.5
Nd	85	< 46	59	53	< 46	67	< 46	< 46	< 46	< 46	51	140	48	100	93	83
Ni	590	96	300	180	84	300	100	65	54	56	210	560	140	360	420	390
Pb	12	15	11	11	10	10	8.0	14	11	13	15	< 6.8	< 6.8	9.3	13	7.5
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	17	9.8	12	22	11	14	10	9.6	9.9	8.8	14	17	11	15	18	15
Sn	3.9	3.4	5.3	5.4	< 1.5	7.4	3.1	2.6	4.5	2.4	2.3	6.3	3.7	5.0	< 1.5	5.3
Sr	370	190	900	640	360	620	600	380	380	240	460	1300	730	810	430	820
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320
V	360	240	190	190	100	150	83	71	91	110	130	160	81	140	190	180
Y	140	23	110	140	45	120	66	42	19	21	67	260	64	150	110	140
Yb	12	3.9	7.9	7.6	5.0	9.0	6.2	5.5	3.4	3.7	6.7	13	4.9	9.4	8.5	7.6
Zn	2000	140	660	370	88	940	200	100	75	63	580	1600	460	690	1100	1100
Zr	250	300	360	330	360	290	300	320	360	260	330	230	330	220	140	160

Table 1. Hot Springs analyses (cont.)

Bed no.	MP-145	MP-144	MP-143	MP-142	MP-141	MP-140	MP-139	MP-138	MP-137	MP-136	MP-135	MP-134	MP-133	MP-132	MP-131	MP-130
Thickneee (m)	.12	.09	.06	.24	.23	.16	.20	.23	.18	.12	.23	.07	.17	.26	.18	.06
Cumulative thicknese (m)	23.59	23.47	23.38	23.32	23.08	22.85	22.69	22.49	22.26	22.08	21.96	21.73	21.66	21.49	21.23	21.05
Sample no.	109-76	108-76	107-76	106-76	105-76	104-76	103-76	102-76	101-76	100-76	99-76	97-76	96-76	95-76	94-76	93-76
Lab no.	M-132396	M-132395	M-132394	M-132393	M-132392	M-132391	M-132390	M-132389	M-132388	M-132387	M-132386	M-132385	M-132384	M-132383	M-132382	M-132381
Rock type	QS	QS	QS	P	P	L	QS	QS	L	QS	P	P	L	QS	QS	QS
								percent								
P_2O_5	5.2	6.7	1.5	16.2	14.3	8.2	9.4	2.9	5.4	9.1	13.7	17.1	4.2	10.1	8.5	8.2
OM	7.2	7.7	5.1	8.8	9.2	9.1	8.9	11.1	11.6	11.8	11.9	12.8	11.7	13.9	11.4	10.9
								ppm								
Ag	6.3	6.5	4.4	2.1	4.7	5.4	3.8	7.5	9.7	9.6	6.7	4.2	7.9	11	8.6	6.0
B	220	200	48	80	120	87	84	180	170	140	120	120	99	140	170	100
Ba	350	340	170	280	310	180	270	250	210	300	410	230	230	280	350	350
Be	3.4	3.0	< 1.0	2.0	2.7	1.8	2.2	2.1	2.9	4.0	4.2	2.8	2.2	2.9	3.9	2.4
Cd	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	49	< 32	< 32	< 32	< 32	< 32
Ce	< 93	< 93	< 93	110	< 93	160	140	< 93	< 93	160	130	140	< 93	170	< 93	< 93
Co	7.4	6.8	4.4	3.6	3.6	3.1	2.8	4.9	4.9	4.9	4.9	3.4	4.0	5.1	6.1	7.2
Cr	1800	1500	590	680	1800	1500	990	2200	2600	1700	1800	2000	1900	2200	2100	1300
Cu	84	83	48	40	63	53	43	89	78	66	64	66	79	63	84	68
Dy	< 22	< 22	< 22	< 22	31	20	< 22	< 22	21	< 22	25	28	< 22	24	24	< 22
Er	11	14	< 10	15	17	13	11	< 10	15	15	17	15	< 10	12	11	< 10
Eu	3.9	3.1	< 1.5	< 1.5	7.2	5.0	5.5	3.9	5.5	5.8	6.6	5.5	< 1.5	4.2	6.4	3.2
Ga	13	14	6.0	4.3	5.8	5.0	3.6	10	7.8	8.5	5.2	6.0	7.4	7.5	10	7.9
Gd	16	16	7.8	23	27	14	18	15	12	19	26	23	11	12	18	11
Ho	< 6.8	< 6.8	< 6.8	< 6.8	7.5	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	180	120	65	220	280	240	260	100	220	230	260	250	200	190	170	96
Mn	360	380	440	150	140	190	130	280	280	290	160	100	270	220	300	330
Mo	46	50	26	21	49	50	25	25	92	78	83	34	71	89	31	29
Nb	18	9.1	< 2.2	5.0	4.9	2.4	3.3	3.9	3.2	5.0	7.3	3.8	3.5	2.5	4.6	5.2
Nd	89	< 46	< 46	69	96	< 46	< 46	< 46	< 46	64	63	68	< 46	< 46	74	< 46
Ni	400	350	120	170	350	310	250	320	560	370	370	320	400	640	550	300
Pb	10	10	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	8.1	7.8	8.0	< 6.8	< 6.8	< 6.8	8.0	< 6.8
Pr	< 68	< 68	< 68	69	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	18	16	9.9	12	13	11	12	11	13	14	14	13	12	13	13	12
Sn	4.7	1.6	< 1.5	< 1.5	4.0	3.4	< 1.5	2.1	< 1.5	< 1.5	3.5	< 1.5	< 1.5	4.0	3.8	3.0
Sr	750	850	1100	2100	2900	2800	2900	680	1300	1200	2000	1800	1300	1600	1200	1100
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320
V	180	140	79	120	130	110	100	130	200	180	170	140	180	130	190	130
Y	180	120	47	220	280	190	210	95	180	230	290	240	160	170	160	99
Yb	9.1	7.5	2.4	9.4	10	10	9.4	7.0	11	10	11	9.2	8.3	8.8	8.8	6.7
Zn	1000	1400	300	560	1100	800	1100	1100	1900	1200	1400	1400	1600	1800	1600	560
Zr	380	240	160	250	290	180	160	86	170	180	300	190	150	180	180	160

Table 1. Hot Springs analyses (cont.)

Bed. No.	MP-129	MP-128	MP-127	MP-126	MP-125	MP-124	MP-123	MP-122	MP-121	MP-120	MP-119	MP-118	MP-117	MP-116	MP-115	MP-114
Thickness (m)	.20	.26	.10	.01	.13	.13	.22	.21	.07	.12	.10	.11	.15	.19	.17	.13
Cummulative thickness (m)	20.99	20.79	20.53	20.43	20.42	20.29	20.16	19.94	19.73	19.66	19.54	19.44	19.33	19.18	18.99	18.82
Semple No.	92-76	91-76	90-76	89-76	88-76	87-76	86-76	85-76	84-76	83-76	82-76	81-76	80-76	79-76	78-76	77-76
Lab No.	M-132380	M-132379	M-132378	M-132377	M-132376	M-132375	M-132374	M-132373	M-132372	M-132371	M-132370	M-132369	M-132368	M-132367	M-132366	M-132365
Rock type	QS	QS	QS	QS	D	P	P	D	QS	QS	P	QS	P	P	P	P
								percent								
P_2O_5	9.8	8.3	5.1	0.4	3.1	12.2	13.9	10.2	9.6	8.4	17.7	14.7	23.6	17.3	19.0	14.9
OM	9.9	10.2	8.8	4.4	4.8	12.7	10.3	8.2	8.8	11.8	14.8	12.6	14.5	12.3	13.6	11.8
								ppm								
Ag	5.6	7.1	5.9	3.1	3.0	6.8	4.9	3.1	5.5	6.7	9.9	15	5.5	5.6	6.0	6.4
B	110	150	150	1300	19	150	66	34	71	98	130	190	44	48	57	48
Ba	300	350	240	210	140	300	260	180	270	330	300	270	180	150	200	190
Be	2.8	2.8	2.8	4.1	< 1.0	3.9	2.5	1.4	2.0	2.7	3.4	3.0	2.1	2.2	2.7	1.9
Cd	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Ce	120	<93	150	< 43	100	< 93	150	120	97	110	170	< 93	150	120	< 93	< 93
Co	6.6	6.7	5.3	1.6	3.5	5.2	3.6	3.6	4.9	5.6	4.3	5.4	2.2	2.7	2.4	2.4
Cr	1100	2100	1500	630	960	3000	910	840	880	1900	2900	3300	2200	2200	2400	2000
Cu	52	66	56	34	42	96	53	51	53	66	76	120	62	62	78	66
Dy	< 22	27	< 22	< 22	< 22	23	24	< 22	23	< 22	23	< 22	22	< 22	28	20
Er	< 10	13	13	< 10	< 10	16	15	< 10	13	14	17	14	18	13	22	14
Eu	< 1.5	4.7	3.4	< 1.5	2.0	7.2	5.5	4.0	4.6	4.1	8.4	4.9	8.6	5.2	8.3	4.2
Ga	6.5	10	11	2.4	2.7	6.7	2.7	3.2	4.7	4.5	4.1	6.2	< 1.5	< 1.5	< 1.5	< 1.5
Gd	11	17	16	8.3	< 6.8	21	23	13	18	17	23	16	24	12	31	16
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	7.2	< 6.8	< 6.8	< 6.8	7.9	< 6.8	8.1	< 6.8	8.6	6.9
La	100	160	130	11	86	250	300	180	210	210	320	250	400	240	430	270
Mn	370	340	400	600	630	140	120	360	320	200	120	220	69	84	90	90
Mo	29	22	18	6.0	5.9	44	39	11	18	36	51	44	35	71	42	56
Nb	6.9	6.3	3.9	< 2.2	2.5	4.6	7.2	5.8	4.6	3.4	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
Nd	< 46	58	72	< 46	52	65	54	57	54	67	73	63	61	< 46	99	46
Ni	310	470	300	65	130	710	350	180	300	370	690	650	380	390	410	390
Pb	< 6.8	< 6.8	12	37	< 6.8	< 6.8	6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
Pr	< 68	< 68	< 58	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	78	< 68	80	< 68
Sc	15	14	12	3.5	9.6	13	12	10	12	12	15	11	8.9	9.9	11	8.6
Sn	< 1.5	3.0	3.3	1.6	< 1.5	3.6	5.2	< 1.5	3.5	2.2	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.2
Sr	1400	1000	630	95	660	1500	2400	1400	1200	1600	2400	810	3000	2200	2600	2100
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	4.8	< 4.6
U	<320	<320	<320	<320	<320	<320	<320	< 320	<320	<320	<320	<320	<320	<320	< 320	<320
V	130	160	150	130	130	130	110	130	130	140	150	170	130	160	130	140
Y	100	140	110	2.6	68	250	270	140	180	190	300	200	350	250	390	270
Yb	7.3	9.3	8.2	1.0	3.9	9.9	10	6.8	8.0	8.6	12	11	13	11	14	9.7
Zn	540	970	660	190	250	3000	1400	370	560	1400	2400	2200	1300	1700	1700	1600
Zr	170	160	110	140	74	280	220	130	220	240	220	130	140	160	180	140

Table 1. Hot Springs analyses (cont.)

Bed No.	MP-113	MP-112	MP-111	MP-110	MP-109	MP-108	MP-107	M-106	MP-105	MP-104	MP-103	MP-102	MP-101	MP-100	MP-99	MP-98	MP-97
Thickness (m)	.10	.08	.11	.05	.15	.13	.16	.16	.09	.05	.05	.09	.06	.09	.12	.07	.09
Cummulative thickness (m)	18.69	18.59	18.51	18.40	18.35	18.20	18.07	17.91	17.75	17.66	17.61	17.56	17.47	17.41	17.32	17.20	17.13
Sample No.	76-76	75-76	74-76	73-76	72-76	71-76	70-76	69-76	68-76	67-76	66-76	65-76	64-76	63-76	62-76	61-76	60-76
Lab No.	M-132364	M-132363	M-132362	M-132361	M-132360	M-132359	M-132358	M-132357	M-132356	M-132355	M-132354	M-132353	M-132352	M-132351	M-132350	M-132349	M-132348
Rock type	P	P	P	P	QS	P	P	P	P	P	QS	P	QS	P	P	P	QS
								percent									
P_2O_5	20.4	14.7	13.8	21.5	12.6	24.7	27.6	18.9	19.0	18.9	0.8	22.6	10.0	18.0	27.2	21.6	12.3
OR	15.1	15.7	13.2	14.9	8.9	10.3	13.3	7.4	13.2	13.7	35.4	17.2	19.9	17.1	16.2	15.1	15.0
								ppm									
Ag	6.5	7.7	7.8	6.9	11	6.8	9.1	12	14	12	74	18	30	22	9.3	8.5	23
B	65	69	84	89	89	34	58	27	70	49	200	46	140	72	21	20	77
Ba	210	200	210	270	240	140	240	170	300	270	260	320	350	260	210	140	270
Be	2.8	3.1	3.0	3.9	2.8	2.2	4.4	< 1.0	5.6	< 1.0	< 1.0	< 1.0	1.9	1.9	1.4	< 1.0	1.8
Cd	< 32	< 32	< 32	< 32	< 32	< 32	< 46	71	110	110	490	340	680	400	130	190	190
Ce	< 93	< 93	< 93	170	< 93	120	240	140	200	180	75	190	220	170	240	120	120
Co	2.5	3.0	3.3	2.6	4.3	1.9	2.6	3.0	3.7	2.5	7.7	3.2	5.8	3.6	1.6	1.8	3.6
Cr	2700	3100	3000	3000	1500	730	2800	680	2300	960	7100	880	2900	2100	610	570	1400
Cu	78	88	97	89	73	45	74	37	73	60	990	82	310	85	44	48	74
Dy	31	29	27	40	22	30	68	37	53	56	< 22	41	51	38	54	38	27
Er	20	21	19	33	15	21	52	29	42	45	< 46	35	46	36	43	28	24
Eu	7.8	9.7	< 1.5	12	4.9	8.0	20	10	13	14	4.0	9.3	15	12	16	8.3	5.9
Ga	< 1.5	< 1.5	1.8	1.9	4.6	< 1.5	1.7	< 1.5	1.7	< 1.5	7.4	< 1.5	6.2	2.6	< 1.5	< 1.5	2.8
Gd	33	22	25	49	19	24	74	45	52	53	22	48	59	45	60	30	28
Ho	8.4	8.8	7.3	14	< 6.8	9.3	21	14	16	16	< 6.8	15	15	15	17	14	8.1
La	380	440	340	400	230	400	710	380	430	440	42	390	390	330	550	300	290
Mn	71	79	100	80	220	110	50	160	110	120	130	87	160	100	39	100	180
Mo	51	78	70	45	42	17	73	63	170	140	500	130	400	180	59	69	110
Nb	< 2.2	< 2.2	< 2.2	< 2.2	3.6	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 3.1	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
Nd	95	95	77	220	71	83	550	140	250	250	93	150	300	180	220	93	100
Ni	540	620	510	550	370	180	540	200	650	600	2800	700	1700	850	350	320	430
Pb	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	34	12	33	16	< 6.8	< 6.8	11
Pr	71	< 68	< 68	110	< 68	< 68	210	< 68	90	< 68	< 68	140	100	73	150	< 68	< 68
Sc	12	14	12	16	12	11	15	13	28	17	9.7	18	23	17	18	12	12
Sn	< 1.5	6.7	4.5	4.0	< 1.5	< 1.5	4.3	< 1.5	< 4.5	3.7	< 1.5	5.0	< 1.5	3.7	< 1.5	< 1.5	3.4
Sr	2700	2900	2000	2600	1200	2900	3700	2000	2300	2600	150	2700	870	1400	3600	1700	910
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	4.9	< 4.6	< 4.6	5.7	< 4.6	5.1	7.8	5.2	7.8	8.9	4.6	5.8	6.9	< 4.6	< 4.6	< 4.6	< 4.6
U	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 460	< 460	< 320	< 460	< 320	< 320
V	140	160	130	150	230	170	180	460	470	540	1400	1200	>2200	1300	840	850	1200
Y	390	390	330	880	250	400	980	440	960	1000	39	850	940	870	960	430	330
Yb	15	15	12	15	11	15	28	14	19	30	11	16	38	18	29	16	15
Zn	2100	2300	2100	2300	1300	520	2000	660	2100	2000	11000	4100	8300	4300	1700	2700	2700
Zr	180	200	250	260	220	210	300	280	460	570	220	680	440	320	380	330	330

Table 1. Hot Springs analyses (cont.)

Bed. No.	MP-96	MP-95	MP-94	MP-93	MP-92	MP-91	MP-90	MP-89	MP-88	MP-87	MP-86	MP-85	MP-84	MP-83	MP-82
Thickness (m)	.11	.04	.04	.02	.03	.03	.12	.30	.32	.16	.31	.40	.26	.06	.09
Cummulative thickness (m)	17.04	16.93	16.89	16.85	16.83	16.80	16.62	16.50	16.20	15.88	15.72	15.41	15.01	14.75	14.69
Sample No.	59-76	58-76	57-76	56-76	55-76	54-76	53-76	52-76	51-76	50-76	49-76	48-76	47-76	46-76	45-76
Lab No.	M-132347	M-132346	M-132345	M-132344	M-132343	M-132342	M-132341	M-132340	M-132339	M-132338	M-132337	M-132336	M-132335	M-132334	M-132333
Rock type	QS	QS	P	P	P	P	QS	L	D	D	QS	QS	QS	CH	CH
								percent							
P_2O_5	6.7	10.4	15.5	22.9	16.8	21.8	11.5	1.8	1.7	2.3	8.7	9.4	6.1	1.5	10.7
OM	14.3	16	14.4	19.5	14.8	12.9	6.1	3.3	2.4	2.2	4.0	5.2	6.4	2.7	5.0
								ppm							
Ag	24	23	22	12	18	10	10	2.8	1.3	1.0	4.0	4.6	2.5	.6	1.0
B	120	96	84	46	83	72	40	7.7	< 4.6	< 4.6	38	130	76	42	37
Ba	350	290	210	220	300	290	230	24	100	29	260	300	260	51	150
Be	3.2	2.4	2.2	1.6	2.4	1.9	1.8	< 1.0	< 1.0	< 1.0	1.6	3.0	2.0	< 1.0	< 1.0
Cd	370	240	310	250	330	240	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Ce	< 93	150	< 93	120	< 93	120	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93
Co	5.2	4.0	4.0	2.1	3.1	3.5	2.2	1.5	1.5	1.3	2.4	4.3	3.2	< 1.0	1.2
Cr	2000	2000	1700	660	2000	970	400	240	250	170	320	810	560	110	190
Cu	91	74	69	57	69	68	40	14	14	13	38	51	43	19	24
Dy	29	31	33	28	29	27	22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Er	24	29	27	25	26	20	17	< 10	< 10	< 10	< 10	11	12	< 10	< 10
Eu	9.3	11	9.8	< 1.5	8.6	5.4	6.2	< 1.5	< 1.5	< 1.5	3.3	3.5	2.1	< 1.5	< 1.5
Ga	5.7	3.5	3.7	1.5	3.5	4.6	2.6	< 1.5	< 1.5	< 1.5	3.6	6.7	4.9	< 1.5	< 1.5
Gd	31	39	25	22	31	18	22	< 6.8	< 6.8	< 6.8	12	14	18	10	12
Ho	8.4	10	10	8.8	9.2	8.1	7.0	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	250	370	340	360	310	220	210	99	83	70	150	160	130	27	48
Mn	200	140	130	84	110	120	130	290	380	340	180	250	160	60	110
Mo	210	110	140	81	130	210	34	16	8.6	6.8	19	18	19	4.4	7.2
Nb	2.6	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	3.8	< 2.2	< 2.2	< 2.2	< 2.2	5.2	4.1	< 2.2	2.4
Nd	140	160	120	68	100	< 46	62	< 46	< 46	< 46	55	53	< 46	< 46	< 46
Ni	790	700	690	340	540	550	140	68	56	44	140	140	180	46	83
Pb	19	14	15	< 6.8	15	7.7	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
Pr	< 68	78	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	12	13	12	13	14	13	10	7.3	6.9	4.5	8.7	10	9.4	1.7	3.3
Sn	3.1	2.3	3.3	4.3	3.7	< 1.5	2.2	< 1.5	5.0	< 1.5	3.5	2.1	3.6	1.5	< 1.5
Sr	580	750	1200	1600	1300	1600	800	600	560	520	630	740	560	180	290
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	5.1	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320	< 320
V	1400	1200	1200	950	1200	1100	350	170	110	68	120	140	130	38	73
Y	270	390	390	400	350	300	240	79	64	59	160	160	130	30	52
Yb	16	16	16	14	14	14	11	4.2	3.1	2.7	8.6	8.3	7.2	2.0	3.3
Zn	4500	3000	3600	2900	4100	3800	320	260	230	160	440	460	570	100	180
Zr	230	300	300	380	500	520	290	170	85	86	250	150	150	42	100

Table 1. Hot Springs analyses (cont.)

Bed. No.	MP-81	MP-80	MP-79	MP-78	MP-77	MP-76	MP-75	MP-74	MP-73	MP-72	MP-71	MP-70	MP-69	MP-68	MP-67	MP-66
Thickness (m)	.10	.13	.15	.12	.08	.52	.14	.14	.34	.37	.14	.09	.13	.11	.18	.21
Cummulative thickness (m)	14.60	14.50	14.37	14.22	14.10	14.02	13.50	13.36	13.22	12.88	12.42	12.51	12.28	12.15	12.04	11.86
Sample No.	44-76	43-76	42-76	41-76	40-76	39-76	38-76	37-76	36-76	35-76	34-76	33-76	32-76	31-76	30-76	29-76
Lab No.	M-132332	M-132331	M-132330	M-132329	M-132328	M-132327	M-132326	M-132325	M-132324	M-132323	M-132321	M-132322	M-132320	M-132319	M-132318	M-132317
Rock type	QS	QS	QS	QS	QS	QS	QS	D	D	D	D	QS	QS	D	D	D
								percent								
P_2O_5	3.8	6.6	4.4	2.5	6.5	13.2	3.4	.3	.8	.7	.9	5.0	6.2	7.4	1.1	4.3
OM	5.3	7.3	6.4	6.1	6.3	7.0	5.7	3.7	2.8	3.4	3.9	4.8	1.7	1.5	1.4	4.1
								ppm								
Ag	2.6	1.4	4.1	6.1	4.1	8.7	11	1.3	1.0	.3	.7	4.5	2.3	5.4	.8	1.1
B	84	42	110	120	120	97	160	< 4.6	< 4.6	6.5	15	67	57	22	< 4.6	< 4.6
Ba	240	150	300	340	340	300	360	73	38	120	160	240	190	140	44	53
Be	2.3	< 1.0	2.9	2.5	2.9	3.3	3.5	< 1.0	< 1.0	< 1.0	< 1.0	2.3	2.0	1.2	< 1.0	< 1.0
Cd	< 32	< 32	< 32	< 32	< 32	35	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Ce	< 93	< 93	87	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 110	< 93	< 93	< 93	< 93
Co	3.3	1.3	4.6	5.3	5.4	4.3	6.1	2.4	2.3	3.0	3.2	4.1	2.5	3.0	1.3	1.1
Cr	590	280	770	740	800	690	800	170	150	89	120	370	290	380	92	150
Cu	42	34	57	48	45	43	61	19	13	12	20	34	24	32	15	9.9
Dy	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Er	< 10	< 10	12	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Eu	3.0	< 1.5	3.2	3.0	3.0	2.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.9	< 1.5	< 1.5	< 1.5	< 1.5
Ga	4.2	2.0	5.9	7.9	7.9	6.7	9.1	< 1.5	< 1.5	< 1.5	2.3	6.6	2.5	2.7	< 1.5	< 1.5
Gd	13	9.9	15	17	18	13	15	< 6.8	< 6.8	11	9.3	14	15	< 6.8	< 6.8	< 6.8
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	140	54	180	110	150	150	95	37	29	47	34	170	110	120	40	63
Mn	280	150	330	330	340	180	380	390	400	380	3.0	310	200	300	380	390
Mo	18	9.0	20	23	23	30	31	7.6	9.2	5.1	3.3	11	8.0	14	4.0	7.5
Nb	6.8	< 2.2	5.1	4.0	4.0	3.1	4.3	< 2.2	< 2.2	< 2.2	< 2.2	2.7	2.5	< 2.2	< 2.2	< 2.2
Nd	56	< 46	53	50	50	< 46	< 46	< 46	< 46	< 46	< 46	67	< 46	< 46	< 46	< 46
Ni	140	91	160	250	200	160	230	57	50	46	47	120	79	110	34	41
Pb	< 6.8	< 6.8	6.9	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	11	4.8	12	10	12	13	14	5.7	5.2	6.2	6.0	11	7.1	5.3	4.0	3.8
Sn	< 1.5	< 1.9	< 1.5	1.8	< 1.5	2.4	2.8	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.3	2.2	3.7
Sr	550	330	730	310	490	700	340	260	280	310	240	480	380	530	380	590
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	< 320	< 320	< 320	< 320	< 320	< 320	<320	< 320	<320	< 320	< 320	< 320	< 320	< 320
V	140	100	150	170	170	150	160	94	89	82	92	110	84	110	47	79
Y	160	65	170	110	160	160	110	15	18	35	24	150	110	93	28	45
Yb	7.6	3.9	9.3	6.6	9.2	8.1	6.3	1.4	1.6	2.4	2.0	7.3	5.1	5.3	1.2	1.9
Zn	430	300	380	670	550	950	570	180	170	93	110	600	180	6.0	160	180
Zr	270	75	200	140	170	210	200	81	58	160	110	160	130	82	34	29

Table 1. Hot Springs analyses (cont.)

Bed. No.	MP-65	MP-64	MP-63	MP-62	MP-61	MP-60	MP-59	MP-58	MP-57	MP-56	MP-55	MP-54	MP-53	MP-52	MP-51	MP-50
Thickness (m)	.20	.16	.15	.23	.35	.20	.22	.13	.08	.08	.11	.12	.12	.18	.21	.18
Cummulative thickness (m)	11.65	11.45	11.29	11.14	10.91	10.56	10.36	10.14	10.01	9.93	9.85	9.74	9.62	9.50	9.32	9.11
Sample No.	28-76	27-76	26-76	25-76	24-76	23-76	22-76	21-76	20-76	19-76	18-76	17-76	16-76	5-76	14-76	13-76
Lab No.	M-132316	M-132315	M-132314	M-132313	M-132312	M-132311	M-132310	M-132309	M-132308	M-132307	M-132306	M-132305	M-132304	M-132303	M-132302	M-132301
Rock type	D	QS	QS	QS	P	P	P	P	QS	P	QS	P	P	P	P	P
								percent								
P_2O_5	2.4	13.8	11.9	8.8	27.5	27.4	25.8	19.4	12.5	20.6	10.4	20.2	24.3	20.6	21.3	21.0
OM	4.15	5.5	6.4	6.3	9.9	10.85	14.6	15.8	13.4	10.5	9.9	13.7	13.9	12.2	8.1	8.3
								ppm								
Ag	.8	10	12	12	4.1	6.5	7.5	10	12	7.2	11	6.9	4.3	6.0	5.8	4.5
B	< 4.6	92	73	69	33	35	37	63	100	46	80	47	43	62	64	55
Ba	68	230	200	230	230	210	160	240	280	190	260	240	270	210	220	200
Be	< 1.0	2.5	< 1.0	2.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cd	<32	< 32	< 32	< 32	170	220	230	310	250	87	100	230	190	180	160	210
Ce	<93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	97	< 93	< 93	< 93	< 93	< 93	< 93
Co	< 1.0	4.2	2.3	2.5	1.7	1.6	1.8	3.2	3.6	2.1	3.5	2.7	2.3	3.1	2.3	3.6
Cr	160	710	530	560	410	420	410	460	650	400	370	410	360	440	440	350
Cu	14	55	56	46	39	50	37	63	54	31	43	47	37	40	41	38
Dy	<22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Er	<10	13	< 10	< 10	14	15	19	22	19	12	< 10	19	17	15	15	12
Eu	< 1.5	3.7	< 1.5	< 1.5	2.5	< 1.5	< 1.5	1.8	< 1.5	< 1.5	1.5	2.1	2.4	1.5	< 1.5	< 1.5
Ga	< 1.5	6.0	2.6	2.7	< 1.5	< 1.5	< 1.5	2.3	3.1	< 1.5	3.5	2.9	< 1.5	1.7	1.6	3.8
Gd	< 6.8	12	11	15	< 6.8	8.2	9.4	15	20	11	14	10	7.9	9.7	7.9	9.2
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	42	160	110	96	150	170	160	160	130	100	63	140	130	93	98	120
Mn	410	190	140	140	66	53	67	70	130	110	150	120	79	100	100	120
Mo	7.1	21	15	14	91	89	98	340	93	59	66	190	120	74	54	110
Nb	< 2.2	< 2.2	2.9	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	3.3	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2
Nd	<46	< 46	< 46	<46	< 46	< 46	< 53	71	76	< 46	< 46	< 46	< 46	< 46	< 46	< 46
Ni	38	160	120	130	230	240	390	730	400	200	190	440	360	330	240	380
Pb	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	7.6	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
Pr	<68	< 68	< 68	<68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	3.8	9.6	7.6	7.3	6.0	5.7	6.5	7.5	9.8	6.8	7.3	8.8	6.1	6.6	6.6	6.7
Sn	< 1.5	2.0	2.1	< 1.5	< 1.5	3.3	1.7	< 1.5	2.7	2.1	< 1.5	< 1.5	4.4	< 1.5	< 1.5	2.8
Sr	390	640	500	490	1700	1700	1400	1100	660	950	550	1300	1700	1100	1000	910
Tb	<32	< 32	< 32	<32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	14	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	15	25	< 3.2	< 3.2	< 3.2	18
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	< 320	<320	< 320	< 320	< 320	320	< 320	< 320	< 320	< 320	< 460	< 320	< 320	< 320
V	70	140	200	230	1000	980	1300	1400	1200	800	1000	1300	1100	1000	820	870
Y	35	180	130	110	150	140	150	170	140	110	72	150	130	110	110	120
Yb	1.3	10	6.9	6.5	11	12	15	17	13	9.4	10	13	13	11	9.2	8.3
Zn	160	690	390	460	3900	4400	4500	11000	3000	1300	1600	6200	4500	3100	2200	6100
Zr	38	170	140	110	300	200	300	340	330	280	180	300	400	190	260	220

Table 1. Hot Springs analyses (cont.)

Bed no.	MP-49	MP-48	MP-47	MP-46	MP-45	MP-44	MP-43	MP-42	MP-41	MP-40	MP-39	MP-38	MP-37	MP-36	MP-35	MP-34
Thickness (m)	.38	.09	.24	.16	.04	.19	.13	.20	.27	.15	.14	.07	.09	.19	.14	.13
Cumulative thickness (m)	8.93	8.55	8.46	8.22	8.06	8.02	7.83	7.70	7.50	7.23	7.08	6.94	6.87	6.78	6.59	6.45
Sample no.	12-76	11-76	10-76	9-76	251-74	250-74	249-74	248-74	247-74	246-74	245-74	244-74	243-74	242-74	241-74	240-74
Lab no.	M-132300	M-132299	M-132298	M-132297	M-132296	M-132295	M-132294	M-132293	M-132292	M-132291	M-132290	M-132289	M-132288	M-132287	M-132286	M-132285
Rock type	L	QS	L	L	P	P	P	P	P	QS	P	L	P	P	P	P
									percent							
P_2O_5	2.0	13.6	1.2	0.8	22.6	26.5	22.6	19.1	19.1	11.4	28.1	9.3	22.0	25.9	20.8	20.1
OM	3.3	7.8	2.1	2.15	8.8	9.5	10.1	9.7	9.3	7.8	9.7	3.6	7.4	9.7	8.2	8.1
									ppm							
Ag	1.4	6.5	.6	1.9	5.3	3.9	4.5	9.8	8.5	10	5.0	4.1	13	9.6	11	11
B	7.6	150	11	13	44	33	36	72	60	73	28	9.0	82	74	68	76
Ba	61	300	89	100	140	150	160	210	160	190	63	100	140	180	200	180
Be	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cd	< 32	160	< 32	< 32	150	180	130	240	97	95	110	< 46	110	200	87	76
Ce	< 93	< 93	< 93	170	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	< 93	130	< 93
Co	1.8	5.4	2.9	3.0	1.9	1.8	2.0	3.5	2.2	2.6	1.3	1.2	3.8	3.4	3.1	2.3
Cr	130	670	110	110	410	360	340	600	690	890	340	350	1200	620	840	620
Cu	15	53	14	9.3	38	39	< 1.5	51	54	48	34	20	54	35	43	38
Dy	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Er	< 10	< 10	< 10	< 10	11	13	12	13	11	11	< 10	< 10	14	13	13	11
Eu	< 1.5	2.4	< 1.5	< 1.5	< 1.5	1.7	< 1.5	< 1.5	< 1.5	3.0	3.0	< 1.5	3.2	2.5	< 1.5	< 1.5
Ga	< 1.5	7.5	< 1.5	1.7	< 1.5	< 1.5	< 1.5	3.5	1.5	2.8	< 1.5	< 1.5	3.0	2.2	2.0	1.6
Gd	< 6.8	14	< 6.8	< 6.8	6.9	7.9	7.1	12	11	10	< 6.8	< 6.8	9.2	9.7	< 6.8	11
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	53	130	44	34	120	100	100	140	140	120	140	54	180	170	220	140
Mn	400	140	440	400	79	68	79	110	93	140	69	350	180	98	140	120
Mo	9.7	86	6.7	6.7	62	120	99	130	72	84	52	35	110	140	82	55
Nb	< 2.2	5.4	2.6	< 2.2	< 2.2	< 2.2	< 2.2	3.3	< 2.2	2.6	< 2.2	< 2.2	3.0	< 2.2	5.3	< 2.2
Nd	< 46	60	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46
Ni	66	340	43	45	240	320	260	380	290	210	310	130	500	590	290	240
Pb	< 6.8	10	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	9.4	< 6.8	7.4	< 6.8
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	6.5	11	6.2	6.7	5.6	4.6	4.0	9.0	4.7	8.1	5.1	4.6	8.2	8.5	7.8	6.8
Sn	< 1.5	3.1	2.9	4.7	1.9	3.3	3.9	2.8	1.6	2.0	< 1.5	< 1.5	< 1.5	3.9	< 1.5	3.9
Sr	430	650	320	380	850	1300	1400	830	670	680	1300	850	970	1300	1100	800
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	370	<320	<320	<320	<320	<320	<320	<460	<320	<320
V	220	790	130	200	750	820	790	800	480	810	540	450	640	940	960	610
Y	45	140	35	29	130	120	99	170	< 4.6	150	140	64	190	190	170	160
Yb	3.3	9.4	2.9	2.9	9.0	9.6	8.6	11	9.0	8.5	7.3	5.1	10	13	9.1	9.7
Zn	320	2500	140	170	2600	3900	3100	4100	1700	2200	1600	860	2500	4000	880	910
Zr	220	300	210	170	140	130	160	300	240	220	130	57	240	210	280	240

Table 1. Hot Springs analysis (cont.)

Bed no.	MP-33	MP-32	MP-31	MP-30	MP-29	MP-28	MP-27	MP-26	MP-25	MP-24	MP-23	MP-22	MP-21	MP-20	MP-19	MP-18
Thickness (m)	.16	.17	.18	.09	.09	.26	.07	.06	.06	.08	.09	.19	.34	.07	.26	.14
Cumulative thickness (m)	6.32	6.16	5.99	5.81	5.72	5.63	5.37	5.30	5.24	5.18	5.10	5.01	4.82	4.48	4.41	4.15
Sample no.	239-74	238-74	237-74	236-74	235-74	234-74	233-74	232-74	231-74	230-74	229-74	228-74	227-74	226-74	225-74	224-74
Lab no.	M-132284	M-132283	M-132282	M-132281	M-132280	M-132279	M-132278	M-132277	M-132276	M-132275	M-132274	M-132273	M-132272	M-132271	M-132270	M-132269
Rock type	P	L	P	QS	QS	D	P	P	P	D	D	L	D	P	P	P
								percent								
P_2O_5	22.2	4.0	23.1	10.5	3.7	5.4	18.8	21.2	18.9	2.3	0.5	7.0	1.7	21.2	23.1	13.8
OM	9.8	1.0	8.6	7.5	10.7	2.7	6.3	6.85	7.1	1.0	1.2	1.6	0.8	5.95	5.4	3.7
								ppm								
Ag	7.6	2.7	6.8	12	16	4.5	5.4	7.8	10	4.2	3.9	4.1	1.2	5.3	6.0	9.2
B	50	8.2	51	150	140	9.7	59	76	120	9.3	68	21	< 4.6	40	45	69
Be	110	80	140	290	230	91	140	180	240	33	40	39	19	120	130	120
Be	< 1.0	< 1.0	< 1.0	3.8	< 1.0	< 1.0	2.8	2.9	3.6	< 1.0	< 1.0	< 1.0	< 1.0	2.2	2.3	2.0
Cd	100	< 46	110	160	220	< 32	56	85	78	40	< 32	< 32	< 32	77	< 46	< 32
Ce	< 93	< 93	< 93	120	130	< 93	100	140	150	< 93	< 93	< 93	< 93	< 93	< 93	< 93
Co	2.0	1.4	2.9	6.2	6.3	2.2	1.8	3.2	4.3	1.6	1.1	1.7	1.1	1.5	2.0	2.5
Cr	690	380	710	1100	1200	320	730	930	1000	420	120	320	130	450	430	670
Cu	48	17	44	58	68	19	38	45	58	30	14	17	6.1	47	45	36
Dy	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Er	9.3	< 10	10	< 10	< 10	< 10	10	< 10	18	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Eu	2.5	< 1.5	< 1.5	4.4	4.9	< 1.5	3.2	4.5	5.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	2.8	< 1.5
Ga	< 1.5	< 1.5	2.1	11	15	< 1.5	2.4	3.5	5.7	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	1.7	2.4
Gd	7.7	< 6.8	< 6.8	14	11	< 6.8	7.1	9.4	15	< 6.8	< 6.8	< 6.8	< 6.8	8.9	12	9.2
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	160	76	130	190	160	63	180	210	270	81	< 10	120	< 22	140	200	130
Mn	93	300	120	270	230	590	91	120	150	440	390	370	310	58	81	140
Mo	60	29	84	170	160	11	47	110	69	9.0	9.9	15	9.5	47	33	18
Nb	< 2.2	< 2.2	< 2.2	3.5	< 2.2	< 2.2	< 2.2	3.5	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	2.9
Nd	< 46	< 46	< 46	54	< 46	< 46	< 46	< 46	59	< 46	< 46	< 46	< 46	< 46	< 46	< 46
Ni	330	120	360	620	650	96	320	360	540	77	51	100	21	230	160	160
Pb	< 6.8	< 6.8	< 6.8	17	22	< 6.8	< 6.8	< 6.8	8.0	< 6.8	6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	5.8	7.2	6.4	12	11	5.4	7.1	8.6	13	4.5	2.9	7.6	5.1	5.2	7.4	7.5
Sn	3.5	< 1.5	< 1.5	3.6	< 1.5	3.1	< 1.5	6.1	< 1.5	1.9	< 1.5	< 1.5	3.1	< 1.5	< 1.5	< 1.5
Sr	840	830	1200	650	590	410	800	970	910	330	180	700	700	790	930	470
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2	4.0	< 3.2
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320
V	610	300	630	760	760	210	170	280	210	190	110	79	37	160	150	140
Y	180	68	140	190	170	52	190	190	320	68	4.8	92	15	160	200	140
Yb	7.3	3.6	7.7	11	13	3.0	8.8	8.3	13	3.3	0.5	4.4	0.5	6.2	8.2	6.7
Zn	1700	510	2200	3400	4500	210	1100	1900	1800	410	250	270	190	1500	1600	500
Zr	180	50	190	290	150	92	150	220	250	42	18	120	20	120	150	110

Table 1. Hot Springs analysis (cont.)

Bed no.	MP-17	MP-16	MP-15	MP-14	MP-13	MP-12	MP-11	MP-10	MP-9	MP-8	MP-7	MP-6	MP-5	MP-4	MP-3	MP-2	MP-1
Thickness (m)	.17	.50	.26	.62	.71	.22	.07	.09	.09	.15	.21	.23	.16	.16	.21	.08	.08
Cumulative thickness (m)	4.01	3.84	3.34	3.08	2.46	1.75	1.53	1.46	1.37	1.28	1.13	.92	.69	.53	.37	.16	.08
Sample no.	223-74	222-74	221-74	220-74	219-74	218-74	217-74	216-74	215-74	214-74	213-74	212-74	211-74	210-74	209-74	208-74	207-74
Lab no.	M-132268	M-132267	M-132266	M-132265	M-132264	M-132263	M-132262	M-132261	M-132260	M-132259	M-132258	M-132257	M-132256	M-132255	M-132254	M-132253	M-132252
Rock type	P	D	D	P	P	P	QS	QS	QS	QS	D	D	QS	QS	D	QS	P
									percent								
P_2O_5	14.3	5.3	4.5	32.8	33.4	31.6	6.6	0.5	1.7	2.1	0.5	1.0	1.1	4.2	0.5	0.5	33.8
OM	4.1	0.5	0.8	7.1	6.85	5.6	10.4	11.9	8.6	2.7	1.5	2.4	6.7	5.3	1.5	3.9	0.8
									ppm								
Ag	9.7	1.1	1.3	2.8	3.0	1.7	7.1	9.1	7.1	3.8	0.3	0.3	5.5	3.7	0.5	2.1	3.4
B	65	8.1	5.3	14	10	17	100	130	150	170	50	59	200	190	70	170	46
Ba	130	58	27	46	60	89	260	340	310	270	130	110	350	310	100	230	100
Be	2.1	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2.7
Cd	< 32	< 32	< 32	150	140	< 46	260	250	210	160	< 32	< 32	220	180	< 32	76	58
Ce	< 93	< 93	< 93	< 93	< 93	< 93	110	78	77	< 93	< 93	< 93	100	110	< 93	< 93	240
Co	2.2	1.1	1.3	1.1	1.0	1.1	5.1	7.6	8.0	6.8	2.5	2.5	8.9	7.2	3.1	4.7	3.7
Cr	620	130	120	380	450	220	920	1000	690	440	64	49	600	500	100	150	760
Cu	37	5.8	7.3	34	42	22	72	76	78	52	9.7	9.5	65	51	15	30	24
Dy	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	46
Er	< 10	< 10	< 10	10	15	9.7	19	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	32
Eu	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	4.7	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	1.7	3.3	< 1.5	< 1.5	16
Ga	2.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	5.8	12	11	12	< 1.5	2.3	20	12	2.1	5.9	2.3
Gd	11	< 6.8	< 6.8	< 6.8	7.2	9.0	17	11	11	11	< 6.8	11	10	14	< 6.8	10	47
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	15
La	160	86	40	160	170	180	130	41	53	42	24	17	53	84	27	37	450
Mn	160	190	260	18	10	43	250	280	250	280	340	280	270	260	320	290	63
Mo	12	12	13	30	17	21	520	850	440	200	15	6.9	210	120	6.7	18	27
Nb	2.3	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	2.6	5.5	6.4	5.4	< 2.2	< 2.2	8.4	9.6	< 2.2	5.3	< 2.2
Nd	< 46	< 46	< 46	< 46	< 46	< 46	110	< 46	54	< 46	< 46	71	79	< 46	< 46	< 46	240
Ni	130	43	40	180	93	140	940	1100	700	300	39	40	530	270	43	83	110
Pb	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	15	14	17	15	< 6.8	< 6.8	18	12	< 6.8	9.3	9.7
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	<150
Sc	8.3	6.0	4.6	4.1	3.9	4.3	11	8.5	12	7.8	3.8	3.1	12	12	3.9	7.9	9.5
Sn	< 1.5	5.2	< 1.5	< 1.5	< 1.5	< 1.5	4.7	4.8	5.1	5.1	< 1.5	< 1.5	< 1.5	4.4	< 1.5	2.5	3.3
Sr	480	700	220	1200	1400	1300	310	130	150	140	130	90	120	180	100	110	1600
Tb	< 32	< 32	< 32	34	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Tl	< 3.2	< 3.2	< 3.2	5.0	13	4.9	54	62	44	27	< 3.2	< 3.2	36	20	5.6	15	24
Tm	4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
U	<320	<320	<320	<320	<460	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320	<320
V	140	82	150	610	950	480	1300	1800	1300	740	140	130	1000	740	120	390	170
Y	150	63	31	160	180	190	160	33	53	36	13	10	54	110	10	21	630
Yb	6.5	2.7	1.7	7.8	12	9.1	15	10	9.5	5.3	2.0	1.7	8.8	8.2	1.6	4.1	15
Zn	450	220	200	2200	1400	990	9200	6700	4800	2300	150	80	4100	2100	89	380	460
Zr	130	110	49	160	210	290	320	330	300	380	250	150	320	560	170	300	220

Table 2. Analytical data of the Meade Peak Member at Trail Canyon trench.

[Bed and sample members are those used by McKelvey, Armstrong, and others (1953). Reference also includes stratigraphic section and other analyses. Organic C, carbonate C, total N, total S, Tl, and Zn were analysed by M. Schnepfe, A. Vlisidis, E. Campbell, and J. Kane. Semiquantitative sepctrographic analyses of the other elements were made by N. Rait, and L. Mei.]

Table 2. Analytical data of the Meade Peak Member at Trail Canyon trench.

Bed no.	P-205	P-200	P-199	P-196	P-192	P-191	P-187	P-180	P-177
Sample no.	VEM 269	RAG 5	RAG 4	RAG 1	VEM 262	VEM 259	VEM 254	VEM 246	VEM 243
				PERCENT					
organic C	12	.94	5.6	3.2	2.6	1.6	3.1	4.6	4.3
carbonate C	.10	.55	.43	.39	.12	.27	.72	.95	.25
total N	.35	.40	.69	.28	.35	.09	.39	.58	.36
total S (as SO_3)	1.42	.60	1.86	1.38	1.02	.98	1.14	2.14	1.60
				ppm					
Ag	2.8	1.5	11	11	17	8.1	9.4	14	14
B	490	360	100	100	370	47	160	180	130
Ba	330	250	220	150	370	180	160	340	190
Be	4.6	2.4	2.1	5.3	7	4.2	< .68	5.3	3.7
Cd	< 32	< 32	39	130	120	91	170	330	310
Ce	130	< 93	< 93	140	130	140	68	95	< 93
Co	9.1	6.7	5.5	3.7	5.9	3.4	5.3	4.7	5.2
Cr	690	470	930	1300	2800	460	1000	980	1200
Cu	53	34	120	68	210	31	110	140	97
Dy	< 32	< 32	< 32	< 32	< 32	< 42	< 32	< 32	< 32
Er	13	< 10	12	27	< 10	22	16	< 10	< 10
Eu	2.9	4.6	4.1	5.3	3.2	4.3	2.1	2.2	2.3
Ga	19	9.5	4.6	5.0	13	< 2.9	6.0	12	7.4
Gd	22	11	18	30	16	25	7.6	18	13
Ho	< 6.8	< 6.8	< 6.8	< 10	< 6.8	< 8.8	< 6.8	< 6.8	< 6.8
La	120	91	210	380	96	340	110	82	110
Lu	< 22	< 22	< 22	< 22	< 22	< 29	< 22	< 22	< 22
Mn	310	280	130	230	120	39	79	190	200
Mo	16	13	49	28	110	14	52	200	54
Nb	19	11	4.2	4.4	12	< 4.2	< 3.2	14	6.0
Nd	91	83	140	230	110	200	78	95	55
Ni	220	130	230	140	290	61	120	290	200
Pb	19	12	12	12	28	< 13	13	27	14
Pr	< 68	< 68	< 68	< 68	< 68	< 88	< 68	< 68	< 68
Sc	18	11	10	11	14	11	7.2	16	13
Sm	< 46	< 46	< 46	< 46	< 46	< 60	< 46	< 46	< 46
Sn	9.3	< 6.8	< 6.8	60	33	23	< 46	22	25
Sr	200	200	460	1100	130	1700	460	470	850
Tb	< 32	< 32	< 32	< 32	< 32	43	< 32	< 32	< 32
Ti	4700	2500	1100	600	3900	570	830	3400	1800
Tl	1.8	2.1	.7	3.5	16	1.6	12	8.8	4.6
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 6	< 4.6	< 4.6	< 4.6
V	170	130	150	480	>1000	350	740	>1000	>1000
Y	150	81	150	280	120	360	120	120	160
Yb	11	10	8.8	21	16	17	8.9	20	21
Zn	990	290	680	1200	3200	770	1500	5300	2700
Zr	410	280	160	200	360	570	170	420	260

Table 2. Trail Canyon analyses (cont.)

Bed no.	P-162	P-155	P-149	P-138	P-136	P-129	P-127	P-116	P-115
Sample no.	LES 343	LES 336	LES 330	VEM 227	VEM 225	VEM 218	VEM 216	VEM 205	VEM 204
				PERCENT					
organic C	7.7	7.6	1.3	1.4	.98	1.4	2.9	1.4	1.4
carbonate C	.77	.33	7.8	.04	.21	.28	.15	8.3	.73
total N	.34	.56	.40	.54	.44	.35	.37	.29	.68
total S (as SO_3)	2.44	.54	.64	1.44	.42	.50	1.16	.26	.48
				ppm					
Ag	18	18	2.7	2.3	3.4	1.8	5.2	.15	.9
B	120	140	< 3.2	78	48	57	83	5.5	65
Ba	180	230	45	270	260	200	200	47	260
Be	6.1	6.8	< .68	1.6	1.8	2.0	3.1	< .68	1.6
Cd	250	86	< 32	< 32	< 42	< 32	< 32	< 32	< 32
Ce	66	88	60	110	110	99	110	< 93	78
Co	6.1	9.7	4.2	6.3	7.0	6.1	2.9	4.1	6.4
Cr	1300	1500	210	580	270	300	640	74	240
Cu	120	130	17	85	74	54	80	12	28
Dy	< 32	< 32	< 32	< 32	< 42	< 32	< 32	< 32	< 32
Er	27	30	< 10	< 10	< 13	< 10	14	< 10	< 10
Eu	4.5	5.4	< 1.5	2.9	< 2.0	2.6	4.0	< 1.5	1.6
Ga	5	6.2	< 2.2	7.4	5.5	4.6	5	< 2.2	6.5
Gd	21	34	< 6.8	7.8	12	8.3	20	7.4	< 6.8
Ho	< 6.8	8	< 6.8	< 6.8	< 8.8	< 6.8	< 6.8	< 6.8	< 6.8
La	220	290	32	62	59	62	170	10	37
Lu	< 22	< 22	< 22	< 22	< 29	< 22	< 22	< 22	< 22
Mn	180	300	750	170	490	1800	42	470	210
Mo	220	140	60	18	34	18	12	5.1	6.8
Nb	7.9	7.6	5.1	5.5	14	17	4.2	< 3.2	9.8
Nd	130	130	140	59	< 60	< 46	87	< 46	< 46
Ni	410	440	90	160	270	270	69	33	84
Pb	17	15	< 10	11	< 13	12	< 10	< 10	14
Pr	< 68	< 68	< 68	< 68	< 88	< 68	< 68	< 68	< 68
Sc	13	15	7.4	9.8	13	9.7	9.9	5.2	9.1
Sm	< 46	< 46	< 46	< 46	< 60	< 46	< 46	< 46	< 46
Sn	39	89	< 6.8	< 6.8	13	< 6.8	< 10	< 6.8	< 6.8
Sr	1100	1000	330	220	360	130	600	160	190
Tb	< 32	< 32	< 32	< 32	< 42	< 32	< 32	< 32	< 32
Ti	1300	1300	1300	3300	3100	4200	910	820	3000
Tl	4.2	2.4	.3	.5	1.3	1	.55	.2	.85
Tm	< 10	5.6	< 4.6	< 4.6	< 6	< 4.6	< 4.6	< 4.6	< 4.6
V	>1000	460	220	120	180	170	110	56	110
Y	210	270	22	52	64	64	180	10	19
Yb	20	23	2.3	7.1	5.3	6.1	9.7	.8	4.3
Zn	3700	2700	330	370	1100	550	180	48	180
Zr	260	390	150	250	810	370	220	96	250

Table 2. Trail Canyon analyses (cont.)

Bed no.	P-109	P-99	P-86	P-75	P-74	P-69	P-67	P-65	P-64
Sample no.	VEM 198	VEM 188	LES 324	LES 313	LES 312	LES 307	LES 305	LES 303	LES 291
					PERCENT				
organic C	.64	1.2	.78	4.7	5.8	2.2	1.6	2.8	2.9
carbonate C	.2	.14	.02	2.5	3.3	.1	11.1	1.9	.57
total N	.24	.27	.60	.71	.67	.65	.18	.65	.74
total S (as SO_3)	.86	1.02	.41	1.50	1.68	.82	.28	1.20	1
					ppm				
Ag	1.3	2.9	3.1	16	15	5.7	< .1	9.2	8.0
B	9.4	48	81	84	130	110	< 3.2	100	170
Ba	170	260	285	240	230	300	22	290	220
Be	2.1	3.1	1.8	2.1	2.6	3.3	< .68	2.7	2.2
Cd	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Ce	150	120	86	< 93	< 93	130	< 93	110	< 93
Co	2.8	4.4	7.8	6	3.4	6.4	2.2	5	4.8
Cr	76	400	400	1100	1400	790	170	920	1300
Cu	17	81	35	110	150	110	7.7	58	150
Dy	< 32	32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Er	13	22	< 10	< 10	< 10	10	< 10	< 10	< 10
Eu	4.3	6	< 1.5	< 1.5	4.8	3.4	< 1.5	< 1.5	3.7
Ga	< 2.2	3.8	7.6	5.9	5.1	7.9	< 2.2	12	13
Gd	19	37	7	22	25	16	< 6.8	18	16
Ho	< 6.8	8.9	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	180	330	42	210	240	140	40	96	85
Lu	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Mn	42	56	260	180	120	280	430	150	100
Mo	4.4	5.7	13	47	41	20	4.3	24	24
Nb	< 3.2	< 3.2	9.3	5.4	3.9	9.7	< 3.2	7.6	5.5
Nd	170	200	55	210	230	120	< 46	92	83
Ni	40	28	135	310	330	220	40	210	200
Pb	< 10	< 10	11	14	< 10	14	< 10	12	13
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	9	11	12	12	11	12	7.4	13	11
Sm	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46
Sn	< 6.8	6.8	12	< 6.8	55	8.3	< 6.8	< 6.8	22
Sr	860	820	66	610	820	410	350	350	430
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Ti	480	520	4900	1400	940	2600	440	2000	1400
Tl	.4	.6	.8	.7	.6	.95	.1	.7	.3
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	4.8
V	30	54	83	140	140	170	71	210	99
Y	150	260	28	170	190	180	12	89	77
Yb	6.1	11	5	8.9	8.6	11	.7	7.7	6.2
Zn	90	60	345	660	630	560	72	490	480
Zr	140	140	265	170	120	300	40	220	150

Table 2. Trail Canyon analyses (cont.)

Bed no.	P-45	P-44	P-41	P-40	P-38	P-36	P-33	P-26	P-23
Sample no.	LES 281	LES 280	LES 267	LES 264	LES 262	LES 260	LES 277	LES 270	LES 247
				PERCENT					
organic C	4.3	1.5	3.1	3.8	5.3	5.1	2.4	1.6	2.1
carbonate C	2.5	9.2	.29	.76	1.2	.91	8.4	8.6	.29
total N	.60	.24	.46	.68	.61	.37	.20	.14	.14
total S (as SO_3)	1.40	.34	1.14	1.26	2.12	2.36	.66	.80	1.46
				ppm					
Ag	6.9	1.2	6.6	6.9	11	11	4.7	3.4	7.6
B	79	< 3.2	160	130	150	86	< 3.2	< 3.2	39
Ba	200	55	320	210	200	120	< 15	15	100
Be	1.5	< .68	3.4	2.4	3.3	2.9	.85	< .68	3.0
Cd	< 32	< 32	< 32	< 32	< 32	42	34	< 32	86
Ce	< 93	< 93	96	< 93	190	180	< 93	< 93	130
Co	5.5	4.5	5.2	5.1	4.1	4.7	6.2	3.5	2.5
Cr	1000	170	1200	980	1400	1400	560	220	450
Cu	110	16	100	110	150	180	51	29	47
Dy	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Er	< 10	< 10	11	< 10	< 10	23	< 10	< 10	17
Eu	2.7	< 1.5	3.0	2.3	4.2	6.7	3.8	< 1.5	3.7
Ga	8.6	< 2.2	11	7.0	7.8	4.1	< 2.2	2.3	2.3
Gd	10	< 6.8	19	13	21	35	17	9.4	16
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 10	< 6.8	< 6.8	< 6.8
La	100	< 10	160	91	160	410	180	65	210
Lu	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Mn	260	420	97	140	96	57	360	270	26
Mo	49	18	29	25	31	42	56	17	13
Nb	< 3.2	< 3.2	14	3.3	< 3.2	< 3.2	< 3.2	< 3.2	< 3.2
Nd	77	51	100	76	140	180	190	46	74
Ni	240	71	260	240	300	290	200	110	99
Pb	< 10	< 10	12	11	< 10	< 10	< 10	< 10	< 10
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	8.7	6	17	8.4	11	11	8.5	7.1	7.9
Sm	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46	< 46
Sn	< 6.8	< 6.8	34	< 6.8	43	49	< 6.8	8.6	< 6.8
Sr	370	180	600	530	620	850	380	180	790
Tb	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	44
Ti	1200	770	2400	970	1100	670	560	1100	550
Tl	.4	.2	1.6	.6	.95	1.6	.8	.5	1.6
Tm	5	4.8	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	4.7	< 4.6
V	120	81	150	110	160	180	220	160	570
Y	100	13	150	76	130	320	160	47	210
Yb	6.6	.9	8.4	4.9	8.1	14	8.4	2.1	12
Zn	530	180	1400	710	1100	670	350	220	310
Zr	150	120	200	120	120	140	49	160	190

Table 2. Trail Canyon analyses (cont.)

Bed no.	P-20	P-18	P-13	P-12	P-11	P-10	P-9	P-6	P-3
Sample no.	LES 244	VEM 179	RAH 189	WOM3182	WOM3181	RAH 186	RAH 195	RAH 182	RAH 179
				PERCENT					
organic C	1.3	2.2	1.7	1.2	1.8	2.1	1.8	1.6	.76
carbonate C	.07	.29	.26	.22	.44	.43	.49	1.2	.92
Total N	.40	< .1	.39	.08	.10	.11	.20	.19	.44
total S (as SO_3)	.48	1.30	1.90	1.72	2.80	2.98	2.42	1.82	1.44
				ppm					
Ag	9.6	14	13	8.5	5.4	6.1	6.2	6.6	3.1
B	140	72	91	33	37	14	26	240	240
Ba	350	170	150	85	82	40	31	340	860
Be	4.9	4	4.4	2.6	3.3	< .68	4.4	3.7	5.5
Cd	100	130	110	93	130	160	200	140	480
Ce	170	160	110	140	130	110	120	110	130
Co	9.8	3.5	8.1	5.4	2.5	2.4	3.9	8	110
Cr	400	920	860	320	620	470	560	510	440
Cu	100	95	68	74	74	72	90	110	53
Dy	< 42	< 42	< 32	< 32	< 32	< 32	< 42	< 32	< 32
Er	< 13	21	19	< 10	12	20	22	< 10	< 10
Eu	3.9	4.3	5.2	3.4	3.3	1.8	< 2	2.7	1.5
Ga	8.3	3.6	3.5	< 2.2	< 2.2	< 2.2	< 2.9	10	12
Gd	26	23	20	18	24	19	11	17	< 6.8
Ho	< 8.8	< 8.8	7.2	< 6.8	< 6.8	< 6.8	< 8.8	< 6.8	< 6.8
La	140	290	380	250	230	240	290	84	100
Lu	< 29	< 29	< 22	< 22	< 22	< 22	< 29	< 22	< 22
Mn	740	42	270	480	38	10	25	310	19000
Mo	39	33	26	19	9.6	5.1	6.9	95	130
Nb	16	< 4.2	4.6	3.9	< 3.2	< 3.2	< 4.2	17	15
Nd	120	180	110	110	< 46	88	< 60	100	89
Ni	440	160	210	260	66	62	85	290	3500
Pb	21	< 13	13	< 10	< 10	< 10	< 13	21	21
Pr	< 88	< 88	< 68	< 68	< 68	< 68	< 88	< 68	< 68
Sc	17	13	11	8.8	7.5	5.9	9.2	15	14
Sm	< 60	< 60	< 46	< 46	< 46	< 46	< 60	< 46	< 46
Sn	17	14	15	< 6.8	< 6.8	< 6.8	25	21	29
Sr	310	940	880	650	1500	1500	2100	160	310
Tb	< 42	< 42	< 32	35	35	36	62	< 32	< 32
Ti	3600	860	940	650	190	150	200	4200	3800
Tl	7.8	2.7	4.5	24	3.2	4	1.7	12	130
Tm	< 6	< 6	< 10	< 4.6	< 4.6	< 4.6	< 6.0	< 4.6	< 4.6
V	820	770	280	290	390	>1000	>1000	>1000	1100
Y	140	290	260	220	230	240	230	100	110
Yb	12	14	17	8.5	9.8	17	18	15	13
Zn	1900	910	1100	540	310	370	820	1700	12000
Zr	420	300	240	160	190	170	200	620	450

Table 3. Analytical data of the Meade Peak Member at Conda underground mine. [Bed and sample numbers are those used by McKelvey, Davidson, and others (1953). Reference also includes stratigraphic section and other analyses. Organic C, carbonate C, total N. total S, Tl, and Zn were analysed by M. Schnepfe, A. Vlisidis, E. Campbell, and J. Kane. Semiquantitative spectrographic analyses of the other elements were made by N. Rait and L. Mei.]

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Table 3. Analytical data of the Meade Peak Member at Conda underground mine.

Bed no.	P-138	P-137	P-134	P-131	P-127	P-125	P-122	P-117	P-113
Sample no.	FCA 144	FCA 143	FCA 135	FCA 132	FCA 128	FCA 126	FCA 123	FCA 118	FCA 114
				PERCENT					
organic C	2.2	2.0	8.0	8.4	2.4	3.6	7.4	11.8	11.9
carbonate C	2.4	6.3	1.2	.63	.90	.82	1.2	2.8	1.9
Total N	.40	.27	.62	.46	.14	.30	.53	.89	1.0
Total S (as SO_3)	6.0	1.5	7.8	4.7	1.9	2.5	5.9	8.5	9.6
				ppm					
Ag	1.0	.8	26	13	3.0	4.2	15	16	14
B	310	150	330	91	21	36	140	230	210
Ba	350	120	380	160	95	180	170	220	320
Be	3.3	1.2	8.0	5.2	3.0	3.8	3.9	< .68	4.5
Cd	< 42	< 32	370	340	63	130	360	370	290
Ce	140	100	110	220	120	140	100	60	< 93
Co	9.1	4.3	8.2	6.1	3.0	5.1	5.1	7.4	6.6
Cr	270	230	1300	1300	340	510	1000	1100	1000
Cu	38	26	140	130	21	31	160	160	140
Dy	< 42	< 32	< 32	< 42	< 32	< 42	< 32	< 32	< 32
Er	< 13	< 10	24	34	17	< 13	17	< 10	< 10
Eu	4.8	3.2	4.1	7.4	3.6	4.9	3.9	< 1.5	2.8
Ga	8.6	2.4	12	4.7	< 2.2	< 2.9	4.5	8.3	8.2
Gd	18	13	24	< 42	18	18	18	< 6.8	17
Ho	< 8.8	< 6.8	< 6.8	< 13	< 10	< 8.8	< 6.8	< 6.8	< 6.8
La	95	86	150	570	310	330	200	52	68
Lu	< 29	< 22	< 22	< 29	< 22	< 29	< 22	< 22	< 22
Mn	350	520	270	64	53	73	120	340	270
Mo	11	13	220	140	26	36	170	320	150
Nb	14	< 3.2	15	< 4.2	< 3.2	< 4.2	5.0	10.0	7.2
Nd	90	86	100	310	130	230	78	< 46	81
Ni	110	79	430	350	91	95	360	420	320
Pb	17	< 10	30	< 13	< 10	< 13	14	21	14
Pr	< 88	< 68	< 68	< 88	< 68	< 88	< 68	< 68	< 68
Sc	17	7.4	17	14	8.4	11	10	11	12
Sm	< 60	< 46	< 46	< 60	< 46	< 60	< 46	< 46	< 46
Sn	13	6.8	40	42	6.8	22	7.4	14	8.2
Sr	210	280	270	1700	2200	2300	840	340	390
Tb	< 42	< 32	< 32	< 42	46	< 42	< 32	< 32	< 32
Ti	3500	1000	3600	780	160	550	900	2200	2000
Tl	.9	1.7	9.2	2.3	1.2	2.2	4.2	9.1	2.4
Tm	< 6.0	< 4.6	< 4.6	6.2	< 4.6	< 6.0	< 4.6	< 4.6	< 4.6
Y	96	89	220	640	310	330	260	74	87
Yb	7.0	5.0	21	23	12	16	16	19	14
Zn	320	360	5900	4600	1000	1500	4700	7200	4400
Zr	600	210	620	350	130	290	320	320	210

Table 3. Conda analyses (cont.)

Bed no.	P-112	P-110	P-105	P-101	P-99	P-94	P-92	P-81	P-78
Sample no.	FCA 111	RAH 146	RAH 141	LES 241	LES 239	FCA 105	FCA 103	LES 235	LES 232
				PERCENT					
organic C	9.5	5.4	4.9	5.6	5.6	2.0	8.9	2.1	3.5
carbonate C	2.9	5.3	5.7	.71	2.2	9.4	1.0	7.1	.60
total N	.63	.26	.57	.62	.62	.21	.54	.35	.40
total S (as SO_3)	6.2	5.9	5.1	1.9	2.3	5.8	5.8	3.7	7.6
				ppm					
Ag	14	1.7	4.6	2.1	1.6	.5	10	.4	1
B	190	< 3.2	7.6	85	45	< 3.2	99	16	66
Ba	240	< 15	94	270	190	28	250	92	310
Be	4.4	< .68	.9	1.9	1.3	1.1	3.3	.9	1.4
Cd	260	56	< 32	< 32	< 32	< 32	< 42	< 32	< 42
Ce	150	< 93	72	87	96	< 93	130	51	120
Co	6.5	2.6	5.1	6.4	6	4.4	6.5	5.1	9.9
Cr	1200	220	290	600	290	180	990	140	250
Cu	130	15	32	81	56	15	140	18	40
Dy	< 32	< 32	< 32	< 32	< 32	< 32	< 42	< 32	< 42
Er	< 10	9.2	< 10	< 10	< 10	< 10	< 13	< 10	< 13
Eu	3.3	1.5	2.5	2.1	1.5	< 1.5	4.6	2.2	2.0
Ga	6.2	< 2.2	< 2.2	7.4	4.4	< 2.2	7.2	2.4	7.4
Gd	22	12	10	9.3	8.6	12	29	< 6.8	< 8.8
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 8.8	< 6.8	< 8.8
La	180	120	49	58	35	49	160	27	56
Lu	< 22	< 22	< 22	< 22	< 22	< 22	< 29	< 22	< 29
Mn	360	170	540	310	410	910	140	470	290
Mo	210	18	15	11	10	8.2	49	6.7	8.2
Nb	7.9	< 3.2	< 3.2	13	11	< 3.2	5.6	6.3	11
Nd	250	110	66	< 46	< 46	< 46	120	< 46	< 60
Ni	390	61	66	150	100	41	290	40	78
Pb	16	< 10	< 10	< 10	< 10	< 10	< 13	< 10	17
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 88	< 68	< 88
Sc	14	7.2	7.6	9.7	8.1	7.6	13	7.6	13
Sm	< 46	< 46	< 46	< 46	< 46	< 46	< 60	< 46	< 60
Sn	46	8.5	< 6.8	< 6.8	< 6.8	< 6.8	16	< 6.8	< 8.8
Sr	1100	2300	260	340	260	790	790	220	130
Tb	33	47	< 32	< 32	< 32	< 32	< 42	< 32	< 42
Ti	1600	76	1100	2600	2100	720	1600	1200	3800
Tl	4.1	0.3	0.4	0.3	0.5	0.2	0.7	0.4	0.9
Tm	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 6.0	< 4.6	< 6
Y	230	140	55	67	33	40	200	17	39
Yb	23	8.9	3.7	7.1	4.3	2.4	9.5	1.6	4.9
Zn	5200	70	330	700	450	150	1300	150	190
Zr	370	94	180	370	390	130	380	180	330

Table 3. Conda analyses (cont.)

Bed no.	P-72	P-69	P-65	P-59	P-57	P-54	P-53	P-51	P-49
Sample no.	LES 226	LES 223	LES 219	FCA 93	FCA 91	FCA 88	FCA 87	FCA 85	LES 215
					PERCENT				
Organic C	6.7	7.0	4.1	4.9	13.3	7.4	1.9	7.8	8.7
carbonate C	0.77	0.32	0.57	6.3	4.0	3.0	9.5	0.90	1.0
total N	0.49	0.54	0.61	0.50	0.84	0.61	0.38	0.92	0.84
total S (as SO_3)	9.1	7.6	7.8	4.5	6.8	6.8	1.4	8.2	7.7
					ppm				
Ag	5.7	6.4	0.6	6.1	16	9.1	1.5	10	6.1
B	120	140	87	35	110	95	< 3.2	120	130
Ba	400	320	320	130	100	350	32	320	270
Be	5.1	4.1	2	1.1	2.4	3.1	0.8	2.7	3.1
Cd	< 42	< 32	< 32	< 32	60	< 42	< 32	< 32	< 32
Ce	140	160	92	66	68	170	53	< 93	84
Co	6.9	6.6	8	5.3	5.8	8.3	5.8	8.6	6.6
Cr	720	850	230	460	1400	1200	350	940	1000
Cu	140	100	33	.54	140	110	28	82	80
Dy	< 42	< 32	< 32	< 32	< 32	< 42	< 32	< 32	< 32
Er	29	20	< 10	< 10	17	< 13	< 10	< 10	14
Eu	4.6	8.2	2.3	2.4	4.5	4.2	< 1.5	3.4	3.5
Ga	12	11	8.5	3.4	3.6	9.2	< 2.2	11	8.4
Gd	< 42	36	8.9	10	18	29	7.2	14	16
Ho	< 8.8	12	< 6.8	< 6.8	< 6.8	< 8.8	< 6.8	< 6.8	< 6.8
La	360	350	49	88	220	180	50	79	87
Lu	< 29	< 22	22	< 22	< 22	< 29	< 22	< 22	< 22
Mn	230	280	410	270	140	160	250	300	290
Mo	35	33	5.9	33	100	30	6.6	36	24
Nb	10	6.4	20	3.5	< 3.2	6.2	< 3.2	9.2	12
Nd	310	180	< 46	< 46	110	180	< 46	66	54
Ni	220	210	81	110	450	330	190	250	230
Pb	< 13	< 10	15	< 10	11	< 13	< 10	14	< 10
Pr	< 88	< 68	< 68	< 68	< 68	< 88	< 68	< 68	< 68
Sc	18	13	12	9.1	12	20	6.9	14	14
Sm	< 60	52	< 46	< 46	< 46	< 60	< 46	< 46	< 46
Sn	9.6	< 6.8	8.3	< 6.8	< 46	23	< 6.8	< 6.8	< 6.8
Sr	1000	900	110	550	930	1200	170	260	490
Tb	< 42	< 32	< 32	< 32	< 32	< 42	< 32	< 32	< 32
Ti	1600	1900	4100	1100	880	1700	670	2400	1900
Tl	0.4	1.1	0.8	0.4	0.2	0.7	0.2	0.7	0.3
Tm	< 6.0	5.6	< 4.6	< 4.6	5.2	< 6.0	< 4.6	< 4.6	< 4.6
Y	380	310	43	67	220	160	29	76	87
Yb	17	19	6.3	4.0	11	9.4	1.3	8.1	5.9
Zn	800	710	170	530	1300	1500	690	980	180
Zr	510	280	340	210	110	270	71	250	270

Table 3. Conda analyses (cont.)

Bed no.	P-46	P-45	P-42	P-41	P-35	P-31	P-30	P-25	P-23
Sample no.	LES 212	LES 211	LES 208	LES 207	LES 185	LES 181	LES 180	FCA 79	FCA 77
					PERCENT				
organic C	12.8	2.0	10.3	11.4	9.4	12.8	10.8	3.5	6.3
carbonate C	1.3	9.8	.23	.36	.34	1.6	.80	9.7	.49
total N	.96	.21	.78	.95	.78	.67	.68	.23	.29
total S (as SO_3)	8.0	2.4	6.9	10.1	8.0	6.9	7.1	2.1	7.3
					ppm				
Ag	9.0	0.9	7.7	7.7	6.0	11	9.9	2.4	6.0
B	120	< 3.2	200	110	98	130	120	< 3.2	43
Ba	350	< 15	310	270	230	230	170	31	100
Be	3.5	< .68	3.4	2.8	2.1	3.7	3.1	< .68	< .68
Cd	< 42	< 32	< 42	< 32	< 32	< 32	< 32	< 32	160
Ce	210	41	140	150	96	210	170	< 93	120
Co	7.5	4.4	6.2	5.0	4.7	5.9	5.4	2.8	3.5
Cr	1200	170	1100	940	770	1200	1200	130	530
Cu	110	15	100	110	110	170	220	19	46
Dy	< 42	< 32	< 42	< 32	< 32	< 32	30	< 32	< 32
Er	20	< 10	< 13	< 10	< 10	22	19	< 10	19
Eu	5.6	< 1.5	4.7	4.1	3.5	6.7	7.0	< 1.5	4.0
Ga	7.3	< 2.2	6.0	5.6	5.6	3.0	3.4	< 2.2	< 2.2
Gd	39	< 6.8	31	16	13	40	37	< 6.8	12
Ho	< 8.8	< 6.8	< 8.8	< 6.8	< 6.8	13	7.5	< 6.8	< 6.8
La	270	27	200	150	90	410	380	42	250
Lu	< 29	< 22	< 29	< 22	< 22	< 22	< 22	< 22	< 22
Mn	160	450	92	110	150	110	79	170	56
Mo	74	13	33	26	27	56	49	12	39
Nb	8.4	< 3.2	9.1	3.8	5.4	< 3.2	< 3.2	< 3.2	< 3.2
Nd	200	< 46	170	61	62	250	250	< 46	160
Ni	400	39	260	260	190	410	390	43	150
Pb	< 13	< 10	< 13	< 10	< 10	< 10	< 10	< 10	< 10
Pr	< 88	< 68	< 88	< 68	< 68	< 68	< 68	< 68	< 68
Sc	17	7.3	17	11	11	13	9.5	4.3	8.5
Sm	< 60	< 46	< 60	< 46	< 46	< 46	< 46	< 46	< 46
Sn	29	< 6.8	25	< 6.8	< 6.8	< 46	8	< 6.8	< 6.8
Sr	920	300	1100	1000	520	1000	820	190	920
Tb	< 42	< 32	< 42	< 32	< 32	< 32	< 32	< 32	< 32
Ti	1600	980	1400	830	1200	650	630	370	560
Tl	0.6	0.2	0.8	0.2	0.3	0.3	1.0	0.3	1.7
Tm	< 6	< 4.6	< 6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6	< 4.6
Y	250	16	170	110	79	360	300	30	210
Yb	12	1.3	8.2	5.8	5.7	16	17	1.3	13
Zn	1600	130	880	1000	810	1800	2200	570	1200
Zr	260	140	260	160	120	190	130	83	190

Table 3. Conda analyses (cont.)

Bed no.	P-22	P-20	P-17	P-16	P-15	P-13	P-10	P-6	P-4
Sample No.	FCA 76	FCA 74	FCA 71	FCA 70	LES 205	LES 203	LES 200	LES 196	LES 194
				PERCENT					
organic C	5.0	7.0	5.0	2.3	4.6	4.6	5.2	8.2	3.8
carbonate C	2.7	.80	2.9	8.5	1.2	.83	.62	.70	.26
total N	.27	.31	.16	.07	.16	.17	.26	.44	.19
total S (as SO_3)	4.4	4.6	2.5	1.7	3.4	3.1	3.6	2.4	2.9
				ppm					
Ag	5.9	10	7.3	3.7	3.2	4.6	6.3	5.9	5.9
B	46	69	38	< 3.2	28	25	24	170	300
Ba	150	100	87	28	55	26	46	270	350
Be	< .68	3.3	1.9	.7	< .68	< .68	5.7	< .68	4.2
Cd	84	250	59	< 32	78	120	200	250	99
Ce	83	< 93	60	30	37	< 93	99	77	96
Co	4.7	5	2.8	2.7	2.6	2.7	3.5	6.3	4.0
Cr	400	650	500	190	490	730	450	510	580
Cu	52	69	53	15	50	63	89	85	80
Dy	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32	< 32
Er	< 10	19	< 10	< 10	13	19	30	17	14
Eu	< 1.5	< 1.5	2.1	2.2	2.9	3.9	< 1.5	2.7	< 1.5
Ga	< 2.2	3.6	< 2.2	< 2.2	< 2.2	< 2.2	< 2.2	6.5	16
Gd	6.9	17	14	9	12	< 6.8	8.8	8.5	8.1
Ho	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8	< 6.8
La	93	210	220	130	180	200	230	54	54
Lu	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22	< 22
Mn	140	73	66	140	59	49	43	120	120
Mo	33	110	17	10	19	18	18	130	94
Nb	< 3.2	< 3.2	< 3.2	< 22	< 3.2	< 3.2	< 3.2	< 3.2	19
Nd	72	75	93	< 46	74	190	97	87	80
Ni	130	270	120	54	80	130	230	310	280
Pb	< 10	11	< 10	< 10	< 10	< 10	12	16	25
Pr	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68	< 68
Sc	6.1	8.4	7.8	6.9	6.6	6.8	6.1	8.6	15
Sm	< 46	< 46	< 46	< 46	< 46	< 46	55	< 46	< 46
Sn	< 6.8	15	< 6.8	< 6.8	< 6.8	< 6.8	7.7	< 6.8	8.7
Sr	390	1100	690	440	1100	1800	2300	240	86
Tb	< 32	40	< 32	< 32	< 32	< 32	44	< 32	< 32
Ti	690	600	390	370	190	230	270	1500	4700
Tl	2.0	3.4	1.2	1	1.7	2.2	9.1	33	9.7
Tm	< 4.6	4.7	< 4.6	< 4.6	< 4.6	< 4.6	4.8	< 4.6	< 4.6
Y	81	200	160	97	150	140	190	52	60
Yb	5.2	16	7.5	4	7.2	11	22	12	13
Zn	1000	3700	770	260	660	780	3900	4200	2300
Zr	170	290	110	74	110	130	190	190	450

References cited

Claypool, G. E., Love, A. H., and Maughan, E. K., 1978, Organic geochemistry, incipient metamorphism, and oil generation in black shale members of Phosphoria Formation, western interior United States: American Association of Petroleum Geologists Bulletin, v. 62, no. 1, p. 98-120.

Desborough, G. A., 1977, Preliminary report on certain metals of potential economic interest in thin vanadium-rich zones in the Meade Peak Member of the Phosphoria Formation in western Wyoming and eastern Idaho: U. S. Geological Survey, Open-File Report 77-341, 27 p.

Gulbrandsen, R. A., 1975, Analytical data on the Phosphoria Formation, western United States: U.S. Geological Survey, Open-File Report 75-554, 45 p.

Maughan, E. K., 1975, Organic carbon in shale beds of the Permain Phosphoria Formation of eastern Idaho and adjacent states -- a summary report: Twenty-seventh Annual Field Conference -- 1975 Wyoming Geological Association Guidebook, p. 107-115.

Maughan, E. K., 1976, Organic carbon and selected element distribution in the phosphate shale members of the Permain Phosphoria Formation, eastern Idaho and parts of adjacent states: U.S. Geological Survey, Open-File Report 76-577, 92 p.

McKelvey, V. E., Armstrong, F. C., Gulbrandsen, R. A., and Campbell, R. M., 1953, Stratigraphic sections of the Phosphoria Formation in Idaho, 1947-48, pt. 2: U.S. Geological Survey, Circular 301, 58 p.

McKelvey, V. E., Davidson, D. F., O'Malley, F. W., and Smith, L. E., 1953, Stratigraphic sections of the Phosphoria Formaiton in Idaho, 1947-48, pt. 1: U.S. Geological Survey, Circular 208, 49 p.

Powell, T. G., Cook , P. J., and McKirdy, D. M., 1975, Organic geochemistry of phosphorites: relevance to petroleum genesis: American Association of Petroleum Geologists Bulletin, v. 59, no. 4, p. 618-632.