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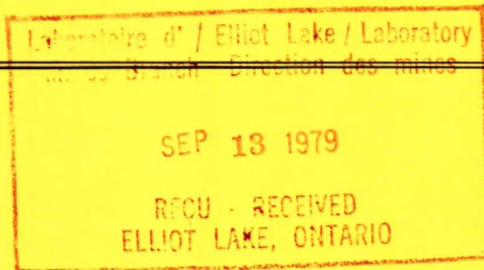
REPORT 79-3

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SOIL SAMPLES SO-1, SO-2, SO-3 AND SO-4 – CERTIFIED REFERENCE MATERIALS

W.S. BOWMAN, G.H. FAYE, R. SUTARNO, J.A. MCKEAGUE AND H. KODAMA



MINERALS RESEARCH PROGRAM
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SOIL SAMPLES SO-1, SO-2, SO-3 and SO-4 —

CERTIFIED REFERENCE MATERIALS

by

W.S. Bowman¹, G.H. Faye¹, R. Sutarno¹,
J.A. McKeague² and H. Kodama³

SYNOPSIS

Through the cooperation of the Canada Centre for Mineral and Energy Technology (CANMET) and the Land Resource Research Institute of Agriculture Canada, four soil samples have been prepared as compositional reference materials: a clayey soil, a sandy podzolic B horizon with a high organic content, a calcareous till, and a chernozemic A horizon. All have a wide range of compositions. Bulk samples of 180 to 280 kg of each were dried, ground to minus 74 µm, blended, tested for homogeneity and bottled in 200-g units.

Thirty-six laboratories participated in the certification program by providing analytical results for 1 to 25 constituents for each of two bottles of each sample. Based on statistical analyses of the data, the four reference samples were certified for Al, Fe, Mn, K, Zn, Cu, Cr and Pb, and one or more were certified for Si, Na, Mg, Ca, P, Ti, Hg, Ni, Sr and V. Preliminary data were obtained for another 47 elements.

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ECHANTILLONS DE SOL SO-1, SO-2, SO-3 et SO-4 —

MATERIAUX DE REFERENCE CERTIFIES

par

W.S. Bowman¹, G.H. Faye¹, R. Sutarno¹,
J.A. McKeague² and H. Kodama³

SOMMAIRE

Quatre échantillons de sol ont été préparés en tant que matériaux de référence certifiés — un sol argileux, un horizon B podsolique sablonneux ayant une haute teneur de matières organiques, un argile à blocs calcarifère et un horizon A chernozémique — en vertu de la coopération entre le Centre canadien de la technologie des minéraux et de l'énergie (CANMET) et l'Institut de recherche sur les terres d'Agriculture Canada. Les échantillons ont tous une grande variété de compositions. Les échantillons en vrac de 180 à 280 kg chacun ont été asséchés, broyés à -74 µm, mélangés, soumis à des essais d'homogénéité et embouteillés en contenants de 200 g.

Trente-six laboratoires ont participé au programme de certification en fournissant des résultats d'analyse pour 1 à 25 composantes de chacune des deux bouteilles d'échantillons. Selon les résultats du traitement statistique des données, les quatre échantillons de référence ont été certifiés pour Al, Fe, Mn, K, Zn, Cu, Cr et Pb. Un ou plus ont été certifiés pour Si, Na, Mg, Ca, P, Ti, Hg, Ni, Sr et V. Des données préliminaires ont été obtenues pour 47 autres éléments.

-
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INTRODUCTION

This report describes the preparation, characterization and certification of four soil samples — SO-1, SO-2, SO-3 and SO-4 — for use as certified reference materials. The work is another facet of the Canadian Certified Reference Materials Project (CCRMP) to certify materials that have potential value in conventional analytical and earth science laboratories. Because there is a demand for reference soils, a cooperative program was conducted by CANMET and Agriculture Canada to make such materials available to analysts involved in agriculture, forestry and environmental studies, particularly those associated with mining and metallurgical operations. Reference materials certified previously by CCRMP are described in a catalogue available from CANMET (1).

The recommended values for the certified elements are given in Table 1; methodological, statistical and other analytical information is presented in Tables 2 to 5.

ORIGIN AND PREPARATION OF SAMPLES

The four samples were selected to represent major kinds of soil materials and to include a wide range of properties. Bulk samples were taken by soil scientists in different areas of Canada and sent to CANMET in Ottawa for processing. Information on the samples follows.

- SO-1: Origin - 23 km northwest of Hull, Quebec at $45^{\circ} 30' 50''$ N, $75^{\circ} 58' 40''$ W. The sample is somewhat weathered Champlain Sea clay from a depth of 35 to 75 cm below surface in an upland position. In pedological terms, the sample is of the C horizon of Rideau clay, a Regosolic soil. It contains about 80% clay ($<2\text{ }\mu\text{m}$) of mixed mineralogy.
- SO-2: Origin - Montmorency Forest about $47^{\circ} 20'$ N, $71^{\circ} 9'$ W, 72 km north of Quebec City. The sample, supplied by C.R. DeKimpe, is of the B horizon of a Ferro-Humic Podzol developed in sandy till. The organic matter content is approximately 10%. Sampling depth was 10 to 30 cm.
- SO-3: Origin - Near Guelph, Ontario at $43^{\circ} 33'$ N, $80^{\circ} 19'$ W. The sample, supplied by R. Protz, is of the calcareous till parent material of the Guelph series, a Gray Brown Luvisol. The sample has an appreciable content of both calcite and dolomite.

SO-4: Origin - Northeast of Saskatoon, Saskatchewan at $53^{\circ} 2'$ N, $106^{\circ} 42'$ W. The sample, supplied by H.B. Stonehouse, is of the A horizon of a Black Chernozemic soil developed in silty glacial lacustrine deposits.

At the CANMET laboratories each soil sample was dried in 70-kg batches at 120°C for 17 h. Stones and gravel fragments were removed and each batch was ball milled until the soil passed a $74\text{ }\mu\text{m}$ sieve. The batches of each soil were combined and each sample was tumbled in one lot in a rotating conical mixer for 8 h. The four soil samples were then bottled in 200-g units with each bottle bearing a number that permitted random sampling of the lot. The number of 200-g units obtained for SO-1 was 792, SO-2, 1193, SO-3, 1097, and SO-4, 990. Particle size analyses for the four materials are given in Table 6.

Six bottles were selected, according to a random bottle-number scheme, from the stocks of each of the four soil samples to assess their homogeneity by an energy dispersive X-ray fluorescence technique. For each soil, counting data for silicon, potassium, calcium and titanium were subjected to an analysis of variance. Although some bottle-to-bottle differences were detected, they were considered to be minor in relation to the anticipated between-laboratory standard deviations in the interlaboratory certification program. This assumption was borne out by the analytical results which indicated no abnormality in homogeneity (Table 5).

INTERLABORATORY CERTIFICATION PROGRAM

The laboratories participating in the program are listed alphabetically in Appendix A. Each of these was arbitrarily assigned a code number so that analytical results could be recorded while preserving the anonymity of the laboratory. The code number bears no relation to the alphabetical order of the laboratory.

The participating laboratories received two randomly selected bottles of each of the four soil samples. They were requested to determine as many elements as possible by methods of their choice and to report the results on the basis of overnight drying at 105°C . Where the laboratory provided data for an element or elements by more than one method, each set of data was treated statistically as if it originated in a separate laboratory.

STATISTICAL TREATMENT OF ANALYTICAL RESULTS

Detection of outliers

Cochran's test was used to identify data sets with abnormally high coefficients of variation (2) (Table 5). These sets were then examined individually by Dixon's test to determine if the high variance was caused by one or more values that were remote from the mean of the set (2). Such values were excluded and the coefficients of variation were recalculated. Sets continuing to have abnormally high cv's were not used for further computations.

Data sets whose means differed by more than twice the overall standard deviation from the grand mean were also excluded from calculations of recommended values and other statistics. Because of the unusually high within- and between-laboratory variations in this program, the tests could not be applied rigidly, i.e., some subjectivity was required in identifying outliers. All outliers are identified in Tables 5(a) and (b).

Estimation of consensus values and 95% confidence limits

A one-way analysis of variance technique was used to calculate the consensus values (means) and their variance. The analytical data were assumed to fit the following model (3):

$$x_{ij} = \mu + y_i + e_{ij}$$

where:

x_{ij} = the j^{th} result reported in set i ;

μ = the true value that is estimated by the overall mean $\bar{x}_{..}$;

y_i = the discrepancy between the mean of the results from set i (\bar{x}_i) and μ ; and

e_{ij} = the discrepancy between x_{ij} and \bar{x}_i .

It is assumed in this analysis that both y_i and e_{ij} are normally distributed with means of zero and variances of ω^2 and σ^2 , respectively. The significance of ω^2 can be detected by comparing the ratio of "between-set" mean squares to "within-set" mean squares with the F statistic at the 95% confidence level and with the appropriate degrees of freedom. The magnitude of ω^2 and σ^2 can be estimated from the ANOVA table.

The consensus value in the above model can be estimated by the overall mean $\bar{x}_{..}$, thus:

$$\bar{x}_{..} = \frac{\sum_{i=1}^k \sum_{j=1}^{n_i} x_{ij}}{\sum_{i=1}^k n_i}$$

Analysis of variance and expected mean squares for the one-way classification

Source of variance	Sums of squares	Degrees of freedom	Mean squares	E [Mean squares]
Between-sets	$k \sum_{i=1}^k n_i (\bar{x}_{i..} - \bar{x}_{..})^2$	$k-1$	s_2^2	$\sigma^2 + \frac{1}{k-1} \left(\sum_{i=1}^k n_i - \frac{\sum_{i=1}^k n_i}{k} \right) \omega^2$
Within-sets	$\sum_{i=1}^k \sum_{j=1}^{n_i} (x_{ij} - \bar{x}_{i..})^2$	$\sum_{i=1}^k n_i - k$	s_1^2	σ^2
Total	$\sum_{i=1}^k \sum_{j=1}^{n_i} (x_{ij} - \bar{x}_{..})^2$	$\sum_{i=1}^k n_i - 1$		

with the variance of the overall mean being given by:

$$V[\bar{x}_{..}] = \frac{\sum_i n_i^2}{\left(\sum_i n_i\right)^2} \omega^2 + \frac{\sigma^2}{\sum_i n_i}$$

The 95% confidence limits for the overall mean are then given by:

$$\bar{x}_{..} \pm \left[t_{0.975, (k-1)} \cdot \sqrt{V[\bar{x}_{..}]} \right]$$

where:

n_i = the number of results reported in set i ;

k = the number of sets.

The above values and other statistics computed from the one-way ANOVA are presented in Table 1.

Certification factor

The certification factor is a measure for evaluating the quality of reference materials issued by the CCRMP (4). It is computed from the following expression:

$$CF = 200 \left[t_{0.975, (k-1)} \cdot \sqrt{V[\bar{x}_{..}]} \right] / \bar{x}_{..} / \bar{cv}$$

where \bar{cv} is the average of the within-set coefficients of variation and is given by:

$$\bar{cv} = \frac{1}{k} \sum_i cv_i / k$$

The critical value of CF is 4. If a selected constituent has a CF greater than 4, the reference material is considered to be of unacceptable quality with respect to that constituent.

The certification factors for the four reference soils are given in Table 1 with the consensus values which are boxed in for easy identification. The latter are accepted as recommended values if their certification factor is less than 4. An exception is calcium in soil sample SO-3 for which the spread is much higher than expected for its level of concentration. The assignment of a recommended value was considered to be unjustified. For completeness, Table 1 also gives information in italics for some elements that were not certified (i.e., $CF > 4$).

Discussion of analytical methods

A methodological classification of elements with relatively abundant analytical data is given in Table 3. Only the methods used by three or more laboratories, or by two laboratories that submitted at least 10 results are listed. Some results close to the overall mean for the corresponding element were obtained by all the analytical methods used. Those by emission spectroscopy (ES), however, generally yielded the highest spread, i.e., the 95% confidence interval expressed as a percentage of the mean. This is partly due to the small number of laboratories using this method. That the results by atomic absorption are in better agreement with the recommended means, especially for the elements at the $\mu\text{g/g}$ level, is a consequence of their being the most predominant.

From the data in Table 5 it is evident that the capability of the analyst is the most important factor in determining the reliability of results as both good and poor data were generated by all methods.

Moisture and loss on ignition (LOI)

Contributing analysts were requested to dry their subsamples overnight at 105°C prior to analysis. It was assumed, therefore, that the majority of the moisture results given in Tables 5(a) and (b) were obtained after a drying period of 16 to 18 h. Experiments performed at CANMET after completion of the interlaboratory program showed that, for all four soil samples, moisture values do not vary significantly with drying periods ranging from 16 to 20 h. Thus, the vague instruction to dry "overnight" did not introduce uncertainty in the certified values in Table 1.

Loss on ignition (LOI) results were volunteered by a number of contributors. Although, their experimental parameters were not usually defined, it is assumed that a temperature of approximately 1000°C was used. It is evident, however, that the results were obtained on samples that were dried overnight at 105°C . Again, experiments at CANMET showed that for all four soils, there was no significant difference in LOI values for samples whose heating times at 1000°C varied from one to three hours. Moreover, LOI values at 900°C were only marginally lower than those at 1000°C .

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Table 1

Recommended values and other statistical parameters for SO-1 to SO-4 (outliers excluded)

[based on samples dried at 105°C for 16 h (overnight)]

Element	N	n	\bar{x}	95% CL		Spread %	\bar{v}	CF	N	n	\bar{x}	95% CL		Spread %	\bar{v}	CF	
				low	high							low	high				
				SO-1				SO-2				SO-2				SO-4	
			(wt %)	(wt %)	(wt %)							(wt %)	(wt %)	(wt %)			
Al	21	161	9.38	9.21	9.55	4	1.9	2.0	21	161	8.07	7.89	8.25	5	3.0	1.5	
Ca	20	149	1.80	1.73	1.87	8	4.2	1.9	21	151	1.96	1.86	2.05	10	4.0	2.5	
Fe	29	229	6.00	5.87	6.13	4	2.7	1.5	30	235	5.56	5.40	5.71	6	2.6	2.2	
K	22	156	2.68	2.61	2.76	5	2.3	2.3	21	150	2.45	2.41	2.49	3	2.3	1.4	
Mg	22	164	2.31	2.21	2.42	9	3.1	2.8	22	161	0.54	0.51	0.57	13	4.8	2.6	
Mn	32	253	0.089	0.087	0.092	5	3.7	1.4	29	229	0.072	0.070	0.074	6	3.0	1.9	
Na	19	136	(1.90)	--	--	(13)	(2)	(5.9)	18	131	(1.74)	--	--	(14)	(2)	(5.5)	
P	9	69	0.062	0.053	0.072	31	9.1	3.4	9	81	(0.30)	--	--	(17)	(3)	(6.0)	
Si	13	94	25.72	25.50	25.93	2	0.7	2.5	12	93	24.99	24.77	25.22	2	0.7	2.8	
Ti	17	139	0.53	0.51	0.54	7	4.1	1.6	18	137	0.86	0.84	0.88	5	4.0	1.2	
			($\mu\text{g/g}$)	($\mu\text{g/g}$)	($\mu\text{g/g}$)						($\mu\text{g/g}$)	($\mu\text{g/g}$)	($\mu\text{g/g}$)				
Cr	22	178	160	145	175	18	5.5	3.4	25	207	16	14	18	27	13.5	2.0	
Cu	27	223	61	59	64	8	3.3	2.3	23	206	7	6	8	26	12.9	2.0	
Hg	10	82	0.022	0.019	0.025	29	9.3	3.1	12	94	0.082	0.073	0.091	23	6.9	3.3	
Ni	29	250	94	87	100	13	5.1	2.6	23	193	(12)	--	--	(66)	(14)	(4.7)	
Pb	24	194	21	17	24	36	13.8	2.6	24	193	21	17	24	34	13.0	2.6	
Sr	13	104	(300)	--	--	(34)	(6)	(5.6)	13	104	340	290	390	29	7.8	3.7	
V	13	96	139	131	147	12	8.6	1.4	11	86	64	54	75	33	10.5	3.2	
Zn	27	221	146	141	151	6	3.7	1.7	24	203	124	119	129	8	2.7	3.0	
			($\mu\text{g/g}$)	($\mu\text{g/g}$)	($\mu\text{g/g}$)						($\mu\text{g/g}$)	($\mu\text{g/g}$)	($\mu\text{g/g}$)				
			SO-3				SO-4				SO-4						
Al	21	164	(wt %)	(wt %)	(wt %)				21	159	(wt %)	(wt %)	(wt %)				
Ca	21	154	(14.8)	--	--	(8)	(3)	(2.5)	21	151	5.46	5.31	5.60	5	1.8	2.9	
Fe	27	214	1.51	1.45	1.56	7	4.2	1.7	26	203	2.37	2.30	2.43	6	2.2	2.5	
K	21	139	1.16	1.12	1.21	7	2.8	2.6	20	144	1.73	1.71	1.76	3	2.4	1.3	
Mg	19	135	(5.11)	--	--	(9)	(2)	(4.3)	22	164	0.56	0.52	0.60	14	5.8	2.4	
Mn	30	230	0.052	0.051	0.054	7	3.2	2.1	32	253	0.060	0.058	0.062	6	4.5	1.4	
Na	18	128	0.74	0.70	0.77	10	3.3	3.1	18	123	(0.97)	--	--	(15)	(2)	(9.0)	
P	8	67	(0.046)	--	--	(21)	(5)	(4.2)	9	72	0.090	0.084	0.097	15	7.8	1.9	
Si	12	87	15.86	15.67	16.05	2	0.7	3.4	11	83	(32.0)	--	--	(2)	(0.4)	(4.2)	
Ti	15	111	(0.19)	--	--	(14)	(3)	(4.9)	18	133	0.34	0.32	0.36	11	4.8	2.3	
			($\mu\text{g/g}$)	($\mu\text{g/g}$)	($\mu\text{g/g}$)						($\mu\text{g/g}$)	($\mu\text{g/g}$)	($\mu\text{g/g}$)				
Cr	23	196	26	23	29	24	12.7	1.9	25	214	61	55	66	19	9.4	2.1	
Cu	23	192	17	16	18	14	6.2	2.3	24	216	22	21	23	8	6.9	1.1	
Hg	10	83	0.017	0.011	0.024	71	24.0	3.0	12	100	(0.033)	--	--	(53)	(8)	(6.9)	
Ni	24	213	16	13	19	37	12.8	2.9	26	230	26	23	29	20	8.4	2.4	
Pb	21	162	14	11	17	47	14.2	3.3	24	193	16	13	19	34	14.5	2.3	
Sr	11	93	217	188	246	27	7.7	3.5	12	103	170	152	188	21	5.8	3.6	
V	12	88	(44)	--	--	(54)	(11)	(4.9)	11	82	90	79	101	24	7.0	3.5	
Zn	25	215	52	50	55	9	5.8	1.5	26	218	94	91	97	6	3.5	1.8	

N = number of sets; n = number of results; \bar{x} = overall mean (recommended value); CL = confidence limits;
 Spread = 95% confidence interval as percentage of mean; cv = average within-lab coefficient of variation;
 CF = certification factor (see page 3).

Note: Entries in italics are for elements which were not certified; they are given only to complete the record and are for information purposes only.

Table 2

Analytical results for carbon, nitrogen, LOI[†] and moisture*
(outliers excluded)

Constituent	N	n	\bar{x}	Spread	\overline{cv}	N	n	\bar{x}	Spread	\overline{cv}
			(wt %)	%	%			(wt %)	%	%
SO-1										
Carbon	5	36	0.25	18	4.6	6	38	4.8	6	0.8
Nitrogen	5	27	0.04	104	16.1	5	30	0.22	56	4.7
LOI	6	39	4.4	14	2.9	7	41	11.5	8	1.1
Moisture (105°)	4	16	4.1	65	2.4	4	24	3.3	42	5.0
SO-3										
Carbon	4	31	6.6	7	0.6	6	38	4.4	8	1.0
Nitrogen	3	22	0.02	172	23.1	5	30	0.4	45	2.3
LOI	8	42	25.3	1	0.4	7	40	10.4	4	1.3
Moisture (105°)	4	16	0.4	72	10.6	4	16	3.1	73	6.0
SO-4										

N = number of sets; n = number of results; \bar{x} = overall mean; Spread = 95% confidence interval as percentage of mean; \overline{cv} = average within-lab coefficient of variation; LOI = loss on ignition (some lab to lab variation in conditions of determination)

* The reference soils are not certified for these constituents.
 These statistics are presented for information only.

† Based on samples dried at 105°C for 16 h (overnight);
 a temperature of ~1000°C is assumed.

Table 3

Methodological classification for elements with relatively abundant analytical data (outliers excluded)

Method	SO-1				SO-2				SO-3				SO-4				
	N (n)	\bar{x}	Spread %	\bar{CV} %	N (n)	\bar{x}	Spread %	\bar{CV} %	N (n)	\bar{x}	Spread %	\bar{CV} %	N (n)	\bar{x}	Spread %	\bar{CV} %	
<u>Aluminum</u>		(wt %)															
AA	9 (78)	9.43	8	2.5	10 (86)	8.12	9	5.0	9 (84)	3.03	14	7.0	9 (82)	5.43	10	2.4	
XRF	6 (52)	9.36	4	1.4	5 (44)	8.04	7	1.2	6 (49)	3.02	12	4.6	6 (46)	5.42	10	1.6	
<u>Barium</u>																	
AA	2 (20)	0.08	--	3.1	3 (26)	0.09	32	8.0	3 (26)	0.03	151	22.5	2 (20)	0.07	--	3.0	
XRF	2 (12)	0.09	--	1.5	2 (12)	0.11	--	1.1	2 (12)	0.02	--	3.6	2 (12)	0.08	--	1.6	
ES	3 (22)	0.10	119	5.0	3 (22)	0.11	112	4.9	3 (22)	0.03	177	8.4	3 (22)	0.08	98	4.1	
NAA	3 (25)	0.09	39	5.5	2 (20)	0.10	--	5.2	2 (20)	0.03	--	5.6	2 (20)	0.08	--	2.6	
<u>Calcium</u>																	
AA	9 (70)	1.73	12	5.4	10 (81)	1.86	14	5.7	9 (75)	14.3	14	5.2	11 (89)	1.09	13	2.9	
XRF	6 (53)	1.81	14	2.2	6 (50)	2.01	13	2.5	5 (44)	15.3	19	0.8	6 (46)	1.13	24	2.0	
ES	3 (14)	1.97	60	2.5	3 (14)	2.13	48	2.2	3 (14)	14.8	22	3.7	3 (14)	1.15	37	3.1	
<u>Iron</u>																	
AA	11 (90)	5.95	8	4.5	12 (99)	5.50	10	3.6	12 (99)	1.46	12	5.1	10 (86)	2.29	9	2.5	
XRF	6 (53)	6.11	10	1.1	6 (46)	5.62	15	2.4	6 (46)	1.52	23	4.3	6 (46)	2.43	14	2.3	
ES	3 (14)	6.33	20	3.5	3 (13)	6.21	26	2.5	2 (12)	1.65	--	5.2	3 (14)	2.67	34	2.3	
COLOR	4 (32)	5.77	13	1.9	4 (32)	5.33	13	1.4	4 (32)	1.56	21	1.4	4 (32)	2.32	5	0.9	
NAA	3 (25)	5.89	9	1.5	2 (20)	5.32	--	2.6	2 (20)	1.55	--	4.0	2 (20)	2.40	--	3.0	
TITR	2 (15)	6.32	--	0.7	3 (25)	5.78	29	0.8	--	--	--	--	--	--	--	--	
<u>Magnesium</u>																	
AA	12 (93)	2.26	12	2.6	13 (99)	0.54	16	4.2	11 (84)	4.99	11	2.4	13 (98)	0.56	14	4.0	
XRF	5 (50)	2.35	24	5.4	4 (36)	0.58	36	5.8	4 (40)	5.33	30	1.5	4 (40)	0.62	41	8.1	
ES	3 (14)	2.50	41	2.5	3 (14)	0.54	39	4.1	--	--	--	--	3 (14)	0.55	39	10.6	
<u>Manganese</u>																	
AA	18 (152)	0.088	7	3.1	16 (138)	0.070	7	3.0	18 (145)	0.052	8	2.2	18 (152)	0.059	7	3.0	
XRF	5 (38)	0.094	15	2.8	5 (34)	0.076	19	3.5	5 (39)	0.054	33	5.5	5 (39)	0.062	26	7.4	
ES	3 (14)	0.098	47	4.7	3 (14)	0.076	34	4.3	--	--	--	--	3 (14)	0.060	63	8.2	
COLOR	2 (20)	0.088	--	5.9	2 (19)	0.075	--	1.2	2 (19)	0.052	--	5.8	2 (20)	0.066	--	4.1	
NAA	3 (24)	0.089	26	2.1	3 (24)	0.073	35	2.5	3 (23)	0.055	32	3.0	3 (24)	0.061	30	2.4	
<u>Phosphorus</u>																	
XRF	2 (20)	0.065	--	6.7	2 (20)	0.32	--	2.3	2 (20)	0.052	--	6.3	2 (20)	0.090	--	4.5	
COLOR	5 (37)	0.064	45	2.0	6 (51)	0.30	27	1.6	4 (32)	0.045	37	0.4	5 (37)	0.092	34	3.5	
<u>Potassium</u>																	
AA	11 (75)	2.63	4	2.7	10 (73)	2.42	4	2.2	11 (75)	1.17	12	2.8	9 (70)	1.73	6	1.4	
XRF	6 (54)	2.71	8	1.2	6 (49)	2.48	5	2.0	6 (46)	1.12	12	2.9	6 (46)	1.72	7	2.9	
ES	3 (13)	2.96	69	3.3	3 (14)	2.50	17	3.4	--	--	--	--	3 (14)	1.78	15	4.0	
<u>Silicon</u>																	
XRF	6 (53)	25.80	3	0.9	5 (44)	24.98	4	0.8	5 (38)	15.90	5	0.9	5 (44)	32.11	4	0.5	
GRAV	3 (17)	25.51	6	0.3	3 (17)	24.79	7	0.3	3 (17)	15.90	5	0.4	3 (17)	31.78	3	0.4	
<u>Sodium</u>																	
AA	13 (97)	1.88	18	1.5	13 (97)	1.75	16	2.2	12 (86)	0.73	16	2.6	13 (97)	0.96	20	1.5	
NAA	3 (25)	2.01	15	2.0	2 (20)	1.84	--	2.0	2 (20)	0.74	--	3.2	2 (20)	1.00	--	2.4	
<u>Titanium</u>																	
AA	4 (36)	0.55	17	7.1	4 (36)	0.86	13	6.2	3 (25)	0.19	34	3.2	4 (36)	0.32	40	9.6	
XRF	6 (54)	0.53	13	2.4	6 (50)	0.88	11	2.1	6 (47)	0.19	31	1.8	6 (46)	0.35	16	3.5	
ES	3 (14)	0.54	20	6.2	3 (14)	0.85	16	4.0	--	--	--	--	3 (14)	0.39	64	2.7	
COLOR	3 (25)	0.52	10	1.5	4 (27)	0.85	20	2.3	3 (25)	0.21	37	3.4	4 (27)	0.34	17	2.6	

(see legend next page)

(continued)

Table 3 (continued)

Methodological classification for elements with relatively abundant analytical data (outliers excluded)

Method	SO-1				SO-2				SO-3				SO-4			
	N (n)	\bar{x}	Spread	\overline{CV}	N (n)	\bar{x}	Spread	\overline{CV}	N (n)	\bar{x}	Spread	\overline{CV}	N (n)	\bar{x}	Spread	\overline{CV}
<u>Chromium</u>																
AA	13(114)	158	28	6.1	17(153)	16	28	11.6	16(145)	27	30	15.2	16(150)	57	24	8.9
XRF	3(17)	174	22	2.1	3(17)	22	182	19.5	--	--	--	--	3(17)	70	13	4.0
ES	3(22)	171	32	8.2	2(12)	11	--	15.8	2(19)	21	--	10.9	3(22)	75	146	8.7
NAA	2(20)	152	--	2.2	2(20)	11	--	9.5	2(20)	23	--	4.5	2(20)	64	--	4.9
<u>Cobalt</u>																
AA	13(125)	33	32	4.7	14(134)	14	76	7.3	14(134)	13	71	7.5	16(154)	16	54	6.8
NAA	3(25)	31	75	2.7	2(20)	8	--	2.9	2(20)	6	--	5.1	2(20)	11	--	4.0
<u>Copper</u>																
AA	20(174)	61	8	2.7	19(171)	7	25	10.9	19(165)	17	13	6.4	19(171)	21	9	5.3
XRF	3(22)	64	65	3.7	--	--	--	--	2(12)	20	--	1.9	--	--	--	--
ES	3(22)	66	55	5.3	2(20)	7	--	28.5	--	--	--	--	2(20)	23	--	9.2
<u>Lead</u>																
AA	19(162)	22	39	11.7	19(162)	21	41	11.9	16(131)	14	60	13.4	19(161)	17	37	12.8
XRF	3(17)	16	95	17.9	3(17)	21	35	16.4	3(17)	14	21	8.3	3(17)	13	67	18.1
<u>Mercury</u>																
AA	10(82)	0.022	29	9.3	12(94)	0.082	23	6.9	10(83)	0.017	71	24.0	11(90)	0.031	57	7.0
<u>Nickel</u>																
AA	21(197)	94	14	4.6	17(154)	13	73	10.0	18(167)	17	42	12.2	20(183)	27	24	7.4
XRF	4(27)	85	78	4.3	2(12)	10	--	7.8	3(21)	13	271	14.4	3(22)	24	157	4.6
ES	3(21)	107	106	6.1	3(22)	7	869	41.2	2(20)	9	--	16.3	2(20)	21	--	10.2
<u>Strontrium</u>																
AA	5(46)	240	74	11.2	5(46)	290	48	11.0	4(36)	210	50	5.9	5(46)	170	46	7.4
XRF	4(32)	310	46	0.9	4(32)	370	87	7.1	3(30)	190	12	13.0	2(20)	150	--	3.5
ES	3(21)	390	68	2.2	3(21)	400	58	3.5	3(22)	260	43	3.0	3(22)	190	54	2.4
<u>Vanadium</u>																
AA	4(38)	148	29	12.3	3(30)	72	103	17.8	3(30)	55	182	24.7	3(29)	99	113	8.7
XRF	3(14)	136	74	1.8	2(12)	74	--	3.3	3(14)	29	175	6.7	3(14)	94	79	2.7
ES	2(12)	125	--	16.1	2(12)	51	--	8.8	2(12)	61	--	5.2	2(12)	82	--	10.4
COLOR	2(17)	132	--	3.4	2(17)	57	--	4.8	2(17)	30	--	4.6	2(17)	80	--	3.7
<u>Zinc</u>																
AA	19(159)	145	8	3.5	17(146)	127	10	2.8	18(163)	53	10	5.3	18(156)	94	8	3.4
XRF	4(27)	140	28	2.1	4(27)	114	27	1.6	4(27)	48	14	5.2	4(27)	93	24	2.1
ES	2(20)	155	--	5.3	2(20)	115	--	4.9	--	--	--	--	2(20)	99	--	3.5

Legend: AA = atomic absorption; XRF = X-ray fluorescence; ES = emission spectroscopy; COLOR = colorimetry(absorptiometry); NAA = neutron activation analysis; TITR = titrimetry.

N (n) = number of sets (number of results); \bar{x} = overall mean of sets; Spread = 95% confidence interval as percentage of mean; \overline{CV} = average within-lab coefficient of variation.

Table 4

Mean and precision of sets of results for elements not certified (outliers excluded)^a

Element	SO-1				SO-2				SO-3				SO-4			
	N	n	\bar{x} ($\mu\text{g/g}$)	s	N	n	\bar{x} ($\mu\text{g/g}$)	s	N	n	\bar{x} ($\mu\text{g/g}$)	s	N	n	\bar{x} ($\mu\text{g/g}$)	s
As	5	33	1.9	0.3	5	33	1.2	0.2	5	35	2.6	0.1	6	42	7.1	0.7
B	4	35	20	4	3	25	2.7	0.3	5	44	22	7	4	39	43	10
Ba	11	84	900	100	11	85	1010	160	11	85	280	70	10	79	780	90
Be	2	14	0.6	--	2	15	1.2	--	1	5	0.4	--	2	15	1.7	--
Bi	1	5	0.5	--	1	5	0.1	--	1	5	0.1	--	1	5	0.1	--
Cd	6	32	0.15	0.09	6	29	0.18	0.14	6	31	0.14	0.08	6	34	0.42	0.12
Ce	4	29	103	7	3	25	112	17	3	25	34	3	3	24	54	5
Cl	1	3	150	--	1	4	84	--	1	5	210	--	1	5	30	--
Co	20	169	33	7	20	172	13	8	18	169	12	8	22	193	15	6
Cs	3	24	5.0	0.2	2	15	0.4	--	2	15	1.2	--	3	25	3.1	0.3
Dy	1	5	5	--	1	5	11	--	1	5	3	--	1	5	4	--
Er	1	5	2.4	--	1	5	4.8	--	1	5	1.8	--	1	5	2.2	--
Eu	4	30	1.7	0.2	3	25	3.7	0.6	3	25	0.8	0.2	3	25	1.0	0.1
F	2	15	700	--	2	15	500	--	2	15	300	--	2	15	300	--
Ga	4	24	28	5	4	22	26	4	4	25	10	4	4	24	13	4
Gd	1	5	6	--	1	5	11	--	1	5	3	--	1	5	4	--
Ge	1	5	1	--	1	5	1.5	--	1	5	1	--	1	5	1.5	--
Hf	4	30	2.6	0.4	3	25	19	3	3	25	4.7	0.5	3	25	8	2
Ho	1	5	1	--	1	5	2	--	1	5	0.5	--	1	5	1	--
I	1	3	12	--	1	5	17	--	1	5	1	--	1	5	3	--
In	1	5	0.1	--	1	5	0.3	--	1	5	0.1	--	1	5	0.1	--
La	5	40	56	2	4	35	48	2	3	25	17	1	4	34	31	3
Li	5	33	40	14	5	32	9	2	4	30	9	3	4	30	18	5
Lu	3	25	0.3	0.02	2	20	0.5	--	2	20	0.2	--	2	20	0.4	--
Mo	4	30	2	1	5	41	2	1	3	19	2	1	4	29	1	1
Nb	1	5	12	--	1	5	27	--	1	5	6	--	1	5	13	--
Nd	3	20	47	2	2	15	57	--	2	15	18	--	2	15	27	--
Pr	1	5	13	--	1	5	15	--	1	5	5	--	1	5	8	--
Rb	10	61	144	20	10	61	81	7	10	61	41	11	10	61	75	19

Legend - see next page

(continued)

Table 4 (continued)

Element	SO-1				SO-2				SO-3				SO-4			
	N	n	\bar{x} ($\mu\text{g/g}$)	s	N	n	\bar{x} ($\mu\text{g/g}$)	s	N	n	\bar{x} ($\mu\text{g/g}$)	s	N	n	\bar{x} ($\mu\text{g/g}$)	s
S	3	17	100	23	3	17	340	100	3	17	150	34	3	17	440	200
Sb	2	15	0.2	--	1	5	0.1	--	2	15	0.3	--	2	15	0.7	--
Sc	5	31	19	2	3	21	11	1	3	25	6	2	4	26	10	2
Se	1	10	0.1	--	2	20	0.3	--	1	10	0.05	--	2	20	0.4	--
Sm	4	30	8.2	0.3	3	25	12	2	3	25	3.5	0.3	3	25	4.9	0.2
Sn	2	15	3	--	1	5	3	--	1	5	1	--	2	15	3	--
Ta	2	10	0.6	--	1	5	1	--	1	5	0.5	--	1	5	0.5	--
Tb	3	20	0.9	0.1	2	15	1.8	--	2	15	0.5	--	2	15	0.6	--
Th	4	30	12	1	3	24	3.7	0.5	3	24	3.9	0.4	3	25	8.7	0.7
Tl	1	5	0.9	--	1	5	0.7	--	1	5	0.3	--	1	5	0.4	--
Tm	1	5	0.4	--	1	5	0.8	--	1	5	0.3	--	1	5	0.4	--
U	4	30	1.6	0.1	2	15	1.2	--	3	25	1.1	0.3	3	25	2.3	0.3
W	1	5	0.7	--	1	5	0.4	--	1	5	0.6	--	1	5	1	--
Y	5	37	24	2	6	38	40	5	5	27	17	2	6	38	23	3
Yb	3	20	2.4	0.2	2	15	4	--	2	15	1.6	--	2	15	2.3	--
Zr	6	44	81	13	7	53	790	70	7	53	150	30	7	54	310	60

N = number of sets; n = number of results; \bar{x} = overall mean; s = standard deviation of means of sets.

a Approximately 90% of the results were obtained by physical methods of analysis such as emission, X-ray fluorescence, and spark-source mass spectroscopy and neutron activation analysis; the remainder were by atomic absorption and colorimetric methods.

b Although the certification factors for barium in SO-2 and SO-3 are less than 4, the precision of their means is substantially less than expected at their levels of concentration, therefore, they are not assigned as recommended values.

Table 5(a)⁺
Analytical results for reference soil samples SO-1 and SO-2

REFERENCE SOIL SO-1												REFERENCE SOIL SO-2											
ALUMINUM (WT%)												ALUMINUM (WT%)											
LAB- 6 (AA)	9.67	9.44	9.45	9.44	9.46	9.45	9.43	9.44	9.43	9.46	9.46	LAB- 6 (AA)	8.43	8.42	8.41	8.42	8.42	8.41	8.41	8.39	8.43		
LAB-21 (AA)	8.80	8.62	8.88	9.25	9.20	9.00	8.73	8.80	9.50	9.38	9.40	LAB-21 (AA)	7.60	7.23	7.71	7.75	8.00	7.50	7.60	7.70	7.65	8.00	
LAB-21 (AA)	9.41	9.50	9.25	9.53	9.33	9.50	9.25	9.50	9.25	9.40	9.40	LAB-21 (AA)	8.50	8.25	8.30	8.30	8.30	8.50	8.40	8.25	8.30	8.25	
LAB-27 (AA)	9.76	9.29	9.44	10.24								LAB-27 (AA)	9.32	6.69	8.82	7.70							
LAB-27 (AA)	9.24	9.24	9.24	9.30	9.33	9.26	9.22	9.28	9.33	9.30	9.30	LAB-27 (AA)	7.93	7.95	7.95	8.01	7.89	7.95	7.94	7.89	7.94	7.94	
LAB-28 (AA)	9.42	9.52	9.47	9.21	9.21	9.15	8.89	8.83	8.83	8.99	8.99	* LAB-28 (AA)	8.36	7.61	8.57	8.41	8.68	8.31	8.46	8.68	8.89	8.68	
LAB-40 (AA)	10.50	9.90	10.20	10.60	10.40	10.20	9.80	9.80	9.60	10.00	10.00	LAB-40 (AA)	8.50	8.10	8.30	9.00	8.80	8.80	8.30	9.00	8.90	8.60	
LAB-40 (AA)	10.00	10.80	10.40	11.00								LAB-40 (AA)	9.10	9.00	8.80	8.50							
* LAB-43 (AA)	10.85	9.45	8.92	8.50	9.55	7.00	5.45	4.39	4.90	3.12	3.12	LAB-43 (AA)	9.98	8.08	7.90	7.50	7.44	8.67	5.07	6.56	6.82	5.14	
LAB-46 (AA)	9.21	9.00	9.21	9.21	9.21	9.10	9.16	8.89	8.79	8.94	8.94	* LAB-46 (AA)	7.78	7.78	7.99	7.67	7.83	7.73	7.46	7.78	7.78	7.73	
LAB- 8 (XRF)	9.59	9.45	9.58	9.62	9.58	9.75	9.52	9.88	9.73	9.45	9.45	LAB- 8 (XRF)	8.19	8.41	8.23	8.32	7.88	8.27	8.05	8.44	8.36	8.63	
LAB- 9 (XRF)	9.54	9.56	9.52	9.41	9.73	9.54	9.45	9.48	9.50	9.49	9.49	LAB- 9 (XRF)	8.28	8.23	8.23	8.18	8.21	8.17	8.27	8.36	8.24	8.15	
LAB-14 (XRF)	9.24	9.11	9.13	9.38								LAB-14 (XRF)	7.95	8.01	7.99	8.00							
LAB-15 (XRF)	9.00	9.34	9.28	9.16	9.18	9.24	9.43	9.33	9.14	9.37	9.37	LAB-15 (XRF)	7.92	8.06	7.98	7.69	7.83	7.59	8.14	7.83	7.86	7.94	
LAB-28 (XRF)	9.57	9.15	9.10	9.05	8.73	9.31	8.99	9.31				LAB-29 (XRF)	7.86	7.79	7.80	7.75	7.77	7.85	7.84	7.78	7.80	7.84	
LAB-29 (XRF)	9.25	9.34	9.35	9.21	9.27	9.34	9.34	9.20	9.28	9.26	9.26	LAB-22 (ES)	7.66	7.51									
LAB-22 (ES)	8.63	8.62										LAB-24 (ES)	8.36	8.47									
LAB-24 (ES)	9.43	9.71										LAB- 9 (COLOR)	8.26	8.24	8.21	8.15	8.17	8.28	8.18	8.15	8.12	8.21	
LAB- 9 (COLOR)	9.48	9.46	9.41	9.46	9.31	9.46	9.49	9.48	9.46	9.32	9.32	LAB-55 (NAA)	7.66	7.73	8.00	7.69	7.65	8.05	7.81	7.71	8.19	7.81	
LAB-55 (NAA)	9.38	9.50	9.47	9.19	9.38	8.72	8.78	9.08	8.77	8.77	8.77	LAB-50 (TITR)	7.95	7.92	7.96	7.88	7.79						
LAB-50 (TITR)	9.28	9.28	9.28	9.34	9.37							LAB-29 (GRAV)	8.01	8.01									
LAB-29 (GRAV)	10.09	9.87																					
ARSENIC (UG/G)												ARSENIC (UG/G)											
LAB-20 (AA)	2.3	1.7	2.0	2.0								LAB-20 (AA)	1.4	1.0	1.1	1.3							
* LAB- 9 (XRF)	5.0	5.0	3.0	6.0	3.0	6.0	6.0	3.0	4.0	5.0	5.0	* LAB- 9 (XRF)	3.0	2.0	2.0	2.0	3.0	3.0	3.0	2.0	1.0	1.0	
LAB-11 (COLOR)	1.8	1.4	1.6	1.7								LAB-11 (COLOR)	1.2	1.0	.6	.7							
LAB-35 (COLOR)	1.9	2.1	2.1	2.1	2.1	2.0	2.1	2.1	2.2	2.1	2.1	LAB-35 (COLOR)	1.1	1.1	1.2	1.1	1.2	1.1	1.0	1.2	1.2	1.0	
LAB-49 (COLOR)	1.9	2.1	2.1	2.1	2.0	2.1	2.2	2.3	2.6	2.4	2.4	LAB-49 (COLOR)	1.2	1.3	1.4	1.1	1.3	1.1	1.3	1.1	1.2	1.2	
LAB-41 (SSMS)	2.0	2.8	2.6	1.9	1.9							LAB-41 (SSMS)	1.8	1.3	1.0	1.4	1.4						
BARIUM (UG/G)												BARIUM (UG/G)											
* LAB-43 (AA)	598	538	655	366	642	250						LAB-43 (AA)	1059	988	827	775	776	630					
LAB-44 (AA)	789	848	844	848	815	771	788	790	814	818	818	LAB-44 (AA)	877	881	883	917	896	918	878	879	878	888	
LAB-50 (AA)	805	800	825	875	850	805	830	825	840	850	850	LAB-50 (AA)	990	960	1000	950	920	905	940	990	950	1000	
LAB- B (XRF)	843	829	842	838	809	879	807	806	813	856	856	LAB- 8 (XRF)	1009	1023	1038	1035	1033	998	1034	1074	1058	1028	
LAB-28 (XRF)	1000	1000										LAB-28 (XRF)	1250	1250									
LAB-22 (ES)	929	912	903	B71	936	871	888	877	891	899	899	LAB-22 (ES)	1013	1014	993	994	978	953	941	994	985	936	
LAB-24 (ES)	796	786										LAB-24 (ES)	901	897									
LAB-45 (ES)	1104	1187	963	1146	1210	1462	1357	1314	1230	1151	1151	LAB-45 (ES)	1292	1044	1132	1423	1418	1249	1235	1441	1317	1528	
LAB- 4 (NAA)	839	836	822	801	830	793	786	776	772	853	853	LAB- 4 (NAA)	892	868	875	875	822	853	832	807	811	903	
LAB-33 (NAA)	810	820	880	820	950							LAB-55 (NAA)	1011	1035	1180	1144	1196	1162	1076	1126	1036	1030	
LAB-55 (NAA)	921	928	813	895	917	918	912	978	1001	994	994	LAB-41 (SSMS)	1100	930	1100	1100	1200						
LAB-41 (SSMS)	990	1100	820	860	960																		
BORON (UG/G)												BORON (UG/G)											
LAB-45 (ES)	22	16	18	21	28	30	29	30	28	24	24	LAB-19 (COLOR)	3.0	3.0	3.0	4.0	3.0	3.0	3.0	4.0	3.0	3.0	
LAB-19 (COLOR)	14	13	14	16	16	14	13	14	15	17	17	LAB-49 (COLOR)	2.5	2.3	2.2	2.5	2.8	2.8	2.2	2.0	2.0	2.0	
LAB-49 (COLOR)	18	20	20	20	19	20	21	20	20	20	20	LAB-41 (SSMS)	2.2	3.3	1.0	2.6	3.8						
LAB-41 (SSMS)	23	17	23	15	20																		
CADMIUM (UG/G)												CADMIUM (UG/G)											
LAB- 6 (AA)	.190	.120	.120	.170	.230	.210	.120	.240	.160	.170	.170	LAB- 6 (AA)	.160	.160	.190	.150	.150	.190	.190	.190	.180	.160	
LAB-11 (AA)	.028	.043	.028	.028								LAB-11 (AA)	.011	.016									
LAB-11 (AA)	.269	.302	.294	.252	.259	.280	.271					LAB-11 (AA)	.173	.182	.185	.165	.168	.185					
LAB-21 (AA)	.080	.075										LAB-21 (AA)	.035	.040									
LAB-30 (AA)	.120	.140	.130	.120								LAB-30 (AA)	.090	.080	.090	.080							
* LAB-46 (AA)	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	* LAB-46 (AA)	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	3.000	
LAB-41 (SSMS)	.100	.090	.090	.090	.060							LAB-41 (SSMS)	.400	.400	.200	.500	.500						

[†] See legend and note at end of Table 5(b) on p. 30.

REFERENCE SOIL SO-1

CALCIUM (WT%)											
LAB- 6 (AA)	1.78	1.79	1.79	1.79	1.83	1.79	1.78	1.79	1.79	1.80	
LAB- 9 (AA)	1.59	1.59	1.59	1.61	1.63	1.59	1.54	1.62	1.59	1.56	
LAB-20 (AA)	1.69	1.69									
LAB-21 (AA)	1.57	1.46	1.58	1.63	1.63	1.59	1.55	1.58	1.50	1.63	
LAB-27 (AA)	1.72	1.69	1.69	1.71	1.72	1.72	1.69	1.71	1.72		
LAB-28 (AA)	2.21	2.36	1.79	2.21	1.93	1.86	1.72	1.64	1.72	1.86	
LAB-40 (AA)	2.15	1.80	1.91	1.96	1.90	1.96	1.60	1.40	1.48	1.50	
LAB-40 (AA)	2.04	1.60	2.05	1.60							
* LAB-43 (AA)	1.70	1.55	1.52	1.65	1.64	1.07	.69	.38	.71	.17	
* LAB-46 (AA)	.10	.10	.10	.10	.10	.10	.10	.10	.10		
* LAB-50 (AA)	1.77	1.78	1.76	1.84	1.78						
* LAB-27 (FLAME)	2.40	2.40	2.14	2.34							
LAB- 8 (XRF)	1.85	1.85	1.87	1.85	1.87	1.86	1.88	1.86	1.86	1.85	
LAB- 9 (XRF)	1.98	1.97	1.96	1.96	1.99	1.98	1.94	1.97	1.96	1.92	
LAB-14 (XRF)	1.69	1.70	1.72	1.69							
LAB-15 (XRF)	1.63	1.66	1.62	1.66	1.72	1.74	1.65	1.63	1.65	1.67	
LAB-28 (XRF)	2.07	2.07	1.79	1.79	1.79	2.00	1.79	1.72	1.72	1.86	
* LAB-29 (XRF)	1.67	1.75	1.75	1.73	1.73	1.75	1.76	1.73	1.75	1.72	
LAB-22 (ES)	1.77	1.76									
LAB-24 (ES)	1.77	1.76									
LAB-45 (ES)	1.89	2.06	1.91	2.12	1.86	2.19	2.17	2.25	2.09	1.98	
LAB- 4 (NAA)	1.96	1.96	1.85	2.30	1.79	1.78	1.80	1.66	2.03	1.58	
LAB-29 (GRAV)	1.97	2.10									

REFERENCE SOIL SO-2

CALCIUM (WT%)											
LAB- 6 (AA)	2.02	2.06	2.04	2.06	2.04	2.01	2.01	2.04	2.01	2.05	
LAB- 9 (AA)	1.80	1.83	1.84	1.85	1.83	1.85	1.83	1.84	1.84	1.80	1.83
LAB-20 (AA)	1.88	1.86									
LAB-21 (AA)	1.73	1.74	1.65	1.50	1.50	1.79	1.79	1.84	1.38	1.38	
LAB-27 (AA)	1.90	1.88	1.90	1.90	1.88	1.88	1.88	1.89	1.90	1.90	
LAB-28 (AA)	1.93	1.72	1.86	1.93	1.93	1.93	2.14	2.14	2.14	2.07	
LAB-40 (AA)	2.28	1.75	1.72	1.65	2.12	2.19	1.65	1.68	1.68	1.62	
LAB-40 (AA)	2.31	2.14	2.27	2.18							
LAB-43 (AA)	1.88	1.78	1.74	1.88	1.82	1.71	1.24	1.48	1.69	.98	
* LAB-46 (AA)	.08	.08	.08	.08	.08	.08	.08	.08	.08	.09	.08
LAB-50 (AA)	1.99	1.99	1.99	2.00	2.01						
LAB-27 (FLAME)	2.25	2.44	2.34	2.46							
LAB- 8 (XRF)	2.04	2.00	2.02	2.09	2.07	2.06	2.07	2.03	2.01	2.01	
LAB- 9 (XRF)	2.21	2.17	2.16	2.16	2.19	2.18	2.20	2.21	2.16	2.14	
LAB-14 (XRF)	1.90	1.89	1.89	1.90							
LAB-15 (XRF)	1.82	2.02	1.80	1.84	1.92	1.80	1.82	1.79	1.84	1.84	
LAB-28 (XRF)	1.93	2.29	1.93	2.21	2.00	1.93					
LAB-29 (XRF)	2.00	1.99	1.98	1.99	1.99	1.98	1.97	1.99	1.97	1.97	
LAB-22 (ES)	1.94	2.01									
LAB-24 (ES)	1.94	1.94									
LAB-45 (ES)	2.05	2.14	2.15	2.21	2.30	2.16	2.17	2.36	2.20	2.28	
* LAB- 4 (NAA)	2.57	2.62	2.61	2.95	2.67	2.28	3.06	2.62	3.05	2.58	
LAB-29 (GRAV)	2.35	2.35									

CARBON (WT%)

CARBON (WT%)											
* LAB-27 (TITR)	.330	.320									
LAB-21 (COMB)	.290	.260	.280	.270	.280	.260	.290	.260	.220	.250	
LAB-29 (COMB)	.260	.260	.240	.250	.250	.250	.250	.260	.240	.260	
LAB-40 (COMB)	.250	.230	.220	.200	.220	.220					
LAB-50 (COMB)	.260	.260	.270	.260	.270						
LAB-19 (GC)	.237	.228	.235	.238	.244						

CARBON (WT%)

CARBON (WT%)											
LAB-27 (TITR)	4.73	4.75									
LAB-21 (COMB)	4.92	4.82	4.83	4.64	4.64	4.89	4.80	4.62	4.83	4.64	
LAB-29 (COMB)	4.65	4.68	4.67	4.67	4.71	4.73	4.73	4.72	4.72		
LAB-40 (COMB)	4.70	4.77	4.74	4.70	4.63	4.62					
LAB-50 (COMB)	4.94	4.96	4.96	4.95	4.97						
LAB-19 (GC)	4.95	4.96	4.95	4.97	4.96						

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CERIUM (UG/G)

CERIUM (UG/G)											
LAB- 4 (NAA)	103	105	109	104	108	105	105	107	104	101	
LAB-33 (NAA)	95	98	98	99	96	96					
LAB-55 (NAA)	97	82	91	96	97	101	100	97	101	98	
LAB-41 (SSMS)	120	120	100	110	110						

CERIUM (UG/G)

CERIUM (UG/G)											
* LAB- 5 (AA)	58.0	58.2	56.7	56.1	57.9	55.6	56.1	55.7	56.4	56.0	
LAB-11 (AA)	13.6	12.8	13.2	13.0	14.4	13.2	12.4				
LAB-19 (AA)	14.0	13.0	14.0	13.0	9.0	13.0	13.0	12.0	14.0		
LAB-21 (AA)	10.0	10.5	12.0	15.0	15.0	12.5	11.5	13.0	15.0	15.0	
LAB-27 (AA)	18.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
LAB-29 (AA)	19.7	14.8	24.8	19.9							
LAB-29 (AA)	17.9	19.5	17.4	10.3	7.7	10.2	7.2	7.7	14.3	16.4	
LAB-38 (AA)	18.5	19.1	19.7	21.0	19.6	18.4	17.7	17.0	18.3	17.7	
LAB-40 (AA)	15.0	20.0	23.0	21.0	15.0	15.0	15.0	15.0	15.0	15.0	
LAB-40 (AA)	15.0	20.0	23.0	21.0	15.0	18.0	20.0	20.0	20.0	20.0	
LAB-42 (AA)	8.7	9.9	9.3	9.8	10.0	9.9	9.5	8.3	9.8		
* LAB-43 (AA)	9.5	10.5	7.1	18.5	18.9	13.7	13.0	10.3	33.5	14.0	
LAB-44 (AA)	21.0	23.0	17.0	20.0	20.0	20.0	17.0	20.0	21.0	18.0	
LAB-44 (AA)	15.0	15.0	17.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	
LAB-46 (AA)	15.0	14.0	14.0	14.0	15.0	15.0	15.0	15.0	15.0	13.0	
LAB-47 (AA)	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	24.0	
LAB-47 (AA)	13.0	13.0	12.0	12.0	13.0	15.0	16.0	15.0	15.0	16.0	
LAB-50 (AA)	15.0	17.0	14.0	14.0	15.0	15.0	14.0	15.0	15.0	15.0	
LAB-52 (AA)	15.0	17.0	14.0	14.0	15.0	15.0	15.0	15.0	15.0	15.0	
LAB- 8 (XRF)	177	169	185	172	176	171	178	164	172	170	
LAB-14 (XRF)	187	185									
LAB-19 (XRF)	170	173	163	168	171	172	180	184	175		
LAB-22 (ES)	178	179	181	192	177	171	172	180	184	175	
LAB-24 (ES)	178	163									
* LAB-47 (AA)	332	332	332	332	332	332	332	332	332		
LAB-50 (AA)	160	156	158	156	155	154	158	156			
LAB-52 (AA)	208	210	214	212	211	214	212	214	213		
LAB- 8 (XRF)	177	169	185	172	176	171	178	164	172	170	
LAB-14 (XRF)	187	185									
LAB-19 (XRF)	170	173	163	168	171	172	180	184	175		
LAB-22 (ES)	178	179	181	192	177	171	172	180	184	175	
LAB-24 (ES)	178	163									
LAB-45 (ES)	177	151	118	158	164	182	199	184	137	153	
LAB- 4 (NAA)	187	189	191	186	192	189	190	189	187	185	
LAB-55 (NAA)	114	120	10								

REFERENCE SOIL S0-1

COBALT (UG/G)															
LAB- 6 (AA)	28.0	28.0	28.0	28.0	31.0	28.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0		
* LAB-19 (AA)	54.0	54.0	73.0	72.0	71.0	62.0	63.0	77.0	69.0	68.0	9.4	9.4	9.4	9.4	
LAB-21 (AA)	40.5	41.0	42.3	44.0	44.0	40.5	41.8	42.5	43.0	44.0	* LAB-19 (AA)	36.0	39.0	40.0	42.0
* LAB-27 (AA)	140.0	144.0	140.0	139.0							LAB-21 (AA)	20.3	20.3	25.0	25.0
LAB-29 (AA)	42.9	45.5	44.4	42.0	49.7	37.9	40.0	37.4	39.0	40.8	* LAB-27 (AA)	123.0	138.0	139.0	129.0
LAB-30 (AA)	27.2	27.0	28.2	28.0							LAB-29 (AA)	24.1	24.1	24.6	20.5
* LAB-35 (AA)	62.3	59.2	59.1	59.5	57.2	55.9	62.9	61.9	60.0	58.7	LAB-30 (AA)	4.0	4.1	4.0	4.0
LAB-38 (AA)	38.6	39.1	39.0	38.4	38.6	38.5	38.8	38.3	38.8	38.7	LAB-35 (AA)	30.4	31.3	27.4	31.8
	39.8	38.7									LAB-38 (AA)	10.1	9.6	9.3	9.5
LAB-39 (AA)	29.0	30.0	29.0	29.0	29.0	28.0	30.0	30.0	30.0	29.0		9.6	10.1		
* LAB-40 (AA)	57.0	55.0	55.0	53.0	56.0	65.0	50.0	52.0	50.0	58.0	LAB-39 (AA)	7.0	7.0	7.0	8.0
LAB-41 (AA)	21.0	26.0	29.0	31.0	29.0	21.0	28.0	29.0	31.0	29.0	* LAB-40 (AA)	35.0	31.0	35.0	32.0
* LAB-42 (AA)	78.0	99.0	100.0	88.0	87.0	95.0	98.0	84.0	88.0	87.0	LAB-41 (AA)	7.0	7.0	9.0	7.0
* LAB-43 (AA)	26.5	24.5	24.0	22.5	23.2	9.8	26.7	30.0	25.0	24.0	* LAB-42 (AA)	52.0	60.0	56.0	59.0
LAB-44 (AA)	28.0	28.0	28.0	26.0	26.0	24.0	27.0	25.0	24.0	27.0	LAB-43 (AA)	6.0	8.0	7.1	7.0
LAB-45 (AA)	27.0	28.0	28.0	30.0	27.0	28.0	27.0	30.0	29.0	27.0	LAB-44 (AA)	16.0	18.0	16.0	14.0
LAB-46 (AA)	52.0	52.0	53.0	52.0	52.0	51.0	50.0	50.0	51.0	51.0	LAB-45 (AA)	6.0	7.0	6.0	8.0
LAB-47 (AA)	27.0	27.0	27.0	26.0	27.0	27.0	26.0	26.0	27.0	27.0	LAB-46 (AA)	30.0	30.0	31.0	32.0
LAB-52 (AA)	26.0	27.0	27.0	26.0	26.0	27.0	27.0	26.0	26.0	26.0	LAB-47 (AA)	7.0	7.0	7.0	7.0
LAB-14 (XRF)	31.0	33.0									LAB-52 (AA)	8.0	8.0	8.0	B.0
LAB-28 (XRF)	40.0	40.0									LAB-14 (XRF)	6.0	7.0		
* LAB-24 (ES)	44.0	80.0									LAB-28 (XRF)	20.0	25.0		
LAB-45 (ES)	41.0	34.0	23.0	38.0	42.0	46.0	45.0	44.0	35.0	38.0	* LAB-24 (ES)	51.0	48.0		
LAB- 4 (NAA)	27.6	27.7	28.8	27.6	28.7	28.2	28.7	28.3	27.4	27.0	LAB-45 (ES)	11.0	7.0	7.0	
LAB-33 (NAA)	27.1	26.9	28.0	27.6	29.1						LAB- 4 (NAA)	7.2	7.2	7.4	
LAB-55 (NAA)	35.4	36.5	34.0	35.6	33.9	36.3	35.0	34.9	36.3	34.7	LAB-55 (NAA)	8.1	8.8	9.4	
LAB-41 (SSMS)	29.0	34.0	35.0	37.0	29.0						* LAB-41 (SSMS)	13.0	13.0	13.0	18.0

REFERENCE SOIL S0-2

COBALT (UG/G)															
LAB- 6 (AA)	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	9.4	* LAB-19 (AA)	36.0	39.0	40.0	42.0
* LAB-21 (AA)	20.3	20.3	25.0	25.0	24.0	24.0	23.5	23.5	19.0	21.5	LAB-21 (AA)	20.3	20.3	25.0	24.0
* LAB-27 (AA)	123.0	138.0	139.0	129.0							LAB-29 (AA)	24.1	24.1	24.6	20.5
LAB-30 (AA)	4.0	4.1	4.0	4.0							LAB-30 (AA)	4.0	4.1	4.0	4.0
LAB-38 (AA)	10.1	9.6	9.3	9.5	9.5	9.5	9.5	9.5	9.5	9.5	LAB-35 (AA)	30.4	31.3	27.4	28.5
	9.6	10.1									LAB-38 (AA)	10.2	10.1	10.1	10.1
LAB-39 (AA)	7.0	7.0	7.0	8.0	8.0	8.0	7.0	8.0	7.0	8.0		7.0	8.0	8.0	
* LAB-40 (AA)	35.0	31.0	35.0	32.0	30.0	40.0	28.0	31.0	30.0	38.0	LAB-41 (AA)	7.0	9.0	7.0	8.0
LAB-41 (AA)	7.0	7.0	9.0	7.0	6.0	8.0	8.0	7.0	6.0	7.0	LAB-42 (AA)	52.0	60.0	56.0	59.0
* LAB-42 (AA)	52.0	60.0	56.0	59.0	59.0	70.0	50.0	67.0	50.0	49.0	LAB-43 (AA)	6.0	8.0	7.1	7.0
LAB-43 (AA)	6.0	8.0	7.1	7.0	6.9	5.6	9.3	7.5	8.4		LAB-44 (AA)	16.0	18.0	16.0	14.0
LAB-44 (AA)	16.0	18.0	16.0	14.0	14.0	12.0	14.0	14.0	12.0	14.0	LAB-45 (AA)	6.0	7.0	6.0	6.0
LAB-45 (AA)	6.0	7.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	LAB-46 (AA)	30.0	30.0	31.0	32.0
LAB-46 (AA)	30.0	30.0	31.0	32.0	30.0	33.0	31.0	32.0	30.0	32.0	LAB-47 (AA)	7.0	7.0	7.0	7.0
LAB-47 (AA)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	LAB-52 (AA)	8.0	8.0	8.0	8.0
LAB-52 (AA)	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	LAB-14 (XRF)	6.0	7.0	7.0	7.0
LAB-14 (XRF)	6.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	LAB-28 (XRF)	20.0	25.0		
* LAB-24 (ES)	51.0	48.0									* LAB-24 (ES)	51.0	48.0		
LAB-45 (ES)	11.0	7.0	7.0	8.0	8.0	8.0	9.0	9.0	9.0	9.0	LAB-45 (ES)	11.0	7.0	7.0	7.0
LAB- 4 (NAA)	7.2	7.2	7.4	7.1	7.0	7.2	7.2	7.1	7.0	7.1	LAB- 4 (NAA)	7.2	7.2	7.3	7.3
LAB-55 (NAA)	8.1	8.8	9.4	9.1	8.4	8.7	8.7	8.5	8.5	8.5	LAB-55 (NAA)	8.1	8.8	8.8	8.7
* LAB-41 (SSMS)	13.0	13.0	13.0	18.0	12.0						* LAB-41 (SSMS)	13.0	13.0	18.0	12.0

COPPER (UG/G)															
LAB- 5 (AA)	10.1	9.6	9.8	10.1	9.9	10.7	9.9	10.1	9.8	10.1	* LAB-27 (AA)	64.0	69.0	78.1	104.0
LAB- 6 (AA)	10.0	10.0	9.1	9.1	9.1	8.4	10.0	13.0	9.1	9.1	LAB-28 (AA)	50.0	70.0	70.0	60.0
LAB-11 (AA)	4.1	4.8	4.6	4.6	5.0	4.9	5.0	6.0	6.0	6.0	LAB-19 (AA)	6.0	6.0	6.0	6.0
LAB-19 (AA)	6.0	6.0	6.0	6.0	6.0	7.0	6.0	6.0	6.0	6.0	LAB-20 (AA)	4.0	4.0	4.0	4.0
LAB-20 (AA)	4.0	4.0	4.0	4.0	5.5	5.5	5.5	5.5	5.5	5.5	LAB-21 (AA)	5.5	7.0	6.5	7.5
LAB-21 (AA)	5.5	7.0	6.5	7.5	8.0	5.5	7.0	6.5	7.5	8.0	LAB-27 (AA)	64.0	69.0	78.1	104.0
* LAB-27 (AA)	64.0	69.0	78.1	104.0							LAB-28 (AA)	50.0	70.0	70.0	60.0
* LAB-28 (AA)	50.0	70.0	70.0	60.0	50.0	50.0	50.0	50.0	50.0	50.0	LAB-30 (AA)	4.4	4.2	4.4	4.4
LAB-30 (AA)	4.4	4.2	4.4	4.4							LAB-35 (AA)	6.3	6.5	6.4	6.6
LAB-35 (AA)	6.3	6.0	6.0	6.0	6.2	6.1	5.9	5.9	5.9	5.9	LAB-39 (AA)	4.0	5.0	5.0	5.0
LAB-39 (AA)	6.2	6.0	6.1	6.1	6.1	6.2	6.2	6.2	6.0	6.0	LAB-40 (AA)	10.0	6.3	8.0	8.0
* LAB-40 (AA)	10.0	6.3	8.0	8.0	8.0	9.0	9.0	9.0	9.0	9.0	LAB-41 (AA)	18.0	12.0	18.0	15.0
LAB-41 (AA)	7.0	6.0	5.0	5.0	5.0	6.0	6.0	6.0	6.0	6.0	LAB-41 (AA)	7.0	6.0	5.0	4.0
LAB-42 (AA)	6.0	5.9	5.6	5.7	5.9	5.8	5.4	5.6	5.6	5.6	LAB-42 (AA)	10.0	9.9	9.5	8.3
LAB-43 (AA)	5.6	5.6	5.2	5.4	5.5	5.7	5.2	5.3	5.5	5.5	LAB-43 (AA)	6.0	3.0	6.1	6.4
LAB-44 (AA)	6.6	6.6	6.2	6.3	6.4	6.5	6.3	6.4	6.4	6.4	LAB-44 (AA)	6.0	8.0	5.0	9.0
LAB-45 (AA)	6.2	6.1	6.3	6.3	6.1	6.2	6.3	6.0	6.1	6.1	LAB-45 (AA)	7.0	8.0	6.0	7.0
LAB-46 (AA)	5.9	5.7	5.8	5.8	5.6	5.7	5.6	5.8	5.6	5.6	LAB-46 (AA)	3.0	4.0	4.0	4.0
LAB-47 (AA)	6.7	6.6	6.7	6.7	6.7	6.8	6.7	6.6	6.6	6.6	LAB-47 (AA)	7.0	7.0	7.0	7.0
LAB-48 (AA)	5.6	5.8	6.1	6.2	6.2	5.4	6.2	6.1	6.1	6.1	LAB-50 (AA)	7.0	6.8	8.5	9.0
LAB-50 (AA)	5.6	5.8	6.1	6.2	6.2	5.4	5.4	6.2	6.1	6.1	LAB-52 (AA)	6.0	6.0	6.0	6.0
LAB-52 (AA)	6.0	6.4	6.2	6.3	6.2	6.3	6.4	6.4	6.4	6.4	LAB-52 (AA)	6.0	6.0	6.0	6.0
LAB-8 (XRF)	69	51	61	58	61	53	61	58	63	63	LAB-9 (XRF)	13.0	12.0	13.0	12.0
LAB-9 (XRF)	71	69	70	70	72	70	72	71	72	72	LAB-22 (ES)	10.0	5.0	7.0	4.0
LAB-14 (XRF)	58	59									LAB-45 (ES)	11.0	6.0	6.0	6.0
LAB-22 (ES)	68	71	68	70	67	67	73	71	72	69	LAB-41 (SSMS)	7.8	6.0	4.0	5.2
LAB-24 (ES)	50	54													
LAB-45 (ES)	74	66	63	71	59	62	67	65	59	63					
LAB-41 (SSMS)	54	60	58	51	50										

REFERENCE SOIL 50-1

IRON (WT%)												IRON (WT%)											
LAB- 6 (AA)	5.90	5.90	5.90	5.90	5.92	5.91	5.90	5.90	5.90	5.90	5.92	LAB- 6 (AA)	5.39	5.39	5.37	5.38	5.38	5.38	5.37	5.37	5.37	5.36	5.39
LAB-20 (AA)	6.08	6.09										LAB-20 (AA)	5.62	5.65									
LAB-21 (AA)	5.10	5.40	5.75	5.90	5.38	5.30	5.75	5.68	6.40	5.25		LAB-21 (AA)	4.80	5.15	5.40	5.60	5.28	4.80	5.20	5.43	5.43	5.25	
LAB-21 (AA)	6.00	6.20	6.20	6.20	6.13	6.20	6.15	6.15	6.20			LAB-21 (AA)	5.68	5.60	5.70	5.70	5.70	5.75	5.65	5.70	5.65	5.75	
LAB-27 (AA)	5.75	5.55	5.99	5.54								LAB-27 (AA)	4.71	5.16	5.41	5.07							
LAB-28 (AA)	6.50	6.01	6.15	6.15	6.22	6.36	6.36	6.43	6.22	6.43		LAB-28 (AA)	5.94	5.74	6.08	6.15	6.29	6.29	6.01	6.43	6.36	6.08	
LAB-35 (AA)	6.26	6.28	6.23	6.19	6.23	6.22	6.21	6.19	6.28	6.22		LAB-35 (AA)	5.82	5.89	5.86	5.89	5.91	5.90	5.89	5.85	5.78		
LAB-40 (AA)	7.08	5.85	5.50	5.57	6.10	7.65	5.74	5.93	5.80	5.75		LAB-40 (AA)	6.15	5.42	6.25	5.93	5.85	5.55	5.14	5.16	5.25	5.19	
LAB-40 (AA)	5.01	5.74	5.33	4.70								LAB-40 (AA)	5.88	5.74	4.98	5.20							
LAB-42 (AA)	5.58	5.53	5.52	5.47	5.32	5.62	5.61	5.40	5.45	5.23		LAB-42 (AA)	5.08	5.15	4.96	5.22	4.89	4.96	5.06	4.92	4.99	4.91	
LAB-43 (AA)	7.63	6.51	6.88	6.65	5.48	6.25	5.75	5.99	5.45	5.35		LAB-43 (AA)	6.48	5.93	6.63	6.10	5.21	6.10	5.79	5.61	5.39	5.49	
* LAB-46 (AA)	4.94	4.96	4.96	4.98	4.97	4.85	4.91	4.95	4.96	4.91		* LAB-46 (AA)	4.24	4.88	4.84	4.96	4.80	4.81	4.86	4.80	4.82		
LAB- 8 (XRF)	6.28	6.28	6.23	6.23	6.25	6.19	6.21	6.22	6.24	6.20		LAB- 8 (XRF)	5.63	5.55	5.59	5.80	5.74	5.75	5.81	5.64	5.63	5.62	
LAB- 9 (XRF)	6.14	6.12	6.12	6.10	6.20	6.14	6.08	6.16	6.09	6.08		LAB- 9 (XRF)	5.83	5.75	5.72	5.78	5.73	5.69	5.74	5.78	5.78	5.69	
LAB-14 (XRF)	5.97	6.11	6.10	6.07								LAB-14 (XRF)	5.62	5.50	5.65	5.63							
LAB-15 (XRF)	6.54	6.22	6.41	6.25	6.61	6.43	6.57	6.55	6.40	6.39		LAB-15 (XRF)	5.54	5.70	6.26	5.81	6.33	5.98	6.04	5.63	6.04	6.34	
* LAB-28 (XRF)	6.78	6.15	6.29	6.15	6.15	6.15	6.15	6.08	6.15			LAB-28 (XRF)	6.15	5.81									
LAB-29 (XRF)	5.64	5.69										LAB-29 (XRF)	4.96	5.01	5.06	5.10	5.11	4.99	4.91	4.94	5.15	4.96	
LAB-22 (ES)	6.11	6.15										LAB-22 (ES)	6.32	6.43									
LAB-24 (ES)	6.15	6.19										LAB-24 (ES)	5.76	5.74									
LAB-45 (ES)	6.78	6.78	6.78	6.60	6.26	5.51	6.34	5.18	6.97	6.83		* LAB-45 (ES)	5.96	6.66	6.57	6.10	5.96	6.35	5.87	6.10	6.93	3.92	
LAB- 9 (COLOR)	5.49	5.50	5.52	5.56	5.54	5.48	5.58	5.52	5.53	5.51		LAB- 9 (COLOR)	5.13	5.11	5.15	5.18	5.20	5.08	5.10	5.06	5.18	5.18	
LAB-27 (COLOR)	5.98	6.01	6.03	5.94	5.96	5.92	5.99	6.01	5.90	6.01		LAB-27 (COLOR)	5.51	5.49	5.62	5.58	5.49	5.51	5.53	5.51	5.53	5.56	
LAB-29 (COLOR)	5.89	5.50										LAB-29 (COLOR)	5.44	5.58									
LAB-45 (COLOR)	5.75	5.72	5.86	5.95	5.85	5.72	5.85	5.88	5.96	5.86		LAB-45 (COLOR)	5.14	5.26	5.44	5.27	5.31	5.13	5.24	5.46	5.27	5.41	
LAB- 4 (NAA)	5.96	6.03	6.03	5.91	6.15	5.97	5.99	5.99	5.93	5.90		LAB- 4 (NAA)	5.46	5.47	5.54	5.51	5.41	5.47	5.51	5.42	5.47	5.43	
LAB-33 (NAA)	5.87	5.85	5.83	5.89	5.89	5.90						LAB-33 (NAA)	4.70	5.03	5.37	5.32	5.31	5.46	5.03	5.36	5.09	5.08	
LAB-55 (NAA)	5.70	6.00	5.48	5.92	5.73	5.83	5.84	5.81	6.00	5.72		LAB-38 (TITR)	5.62	5.63	5.60	5.56	5.61	5.54	5.56	5.57	5.55	5.57	
LAB-46 (TITR)	6.51	6.56	6.46	6.51	6.51	6.51	6.46	6.51	6.47	6.51		LAB-46 (TITR)	6.13	6.08	6.19	6.13	6.08	6.08	6.13	6.03	6.08	6.08	
LAB-50 (TITR)	5.91	5.94	5.89	6.01	5.98							LAB-50 (TITR)	5.51	5.50	5.53	5.61	5.64						

LANTHANUM (UG/G)

LANTHANUM (UG/G)												LANTHANUM (UG/G)											
LAB-45 (ES)	46	58	51	63	49	64	67	49	50	55		LAB-45 (ES)	45	48	40	56	53	54	52	41	43	54	
LAB- 4 (NAA)	54	54	55	54	56	55	55	56	55	54		LAB- 4 (NAA)	46	46	47	46	45	46	46	47	46	46	
LAB-33 (NAA)	52	52	54	55	54							LAB-55 (NAA)	43	46	49	48	50	46	49	47	46	46	
LAB-55 (NAA)	57	59	54	58	57	59	59	58	59	58		LAB-41 (SSMS)	47	65	49	48	43						
LAB-41 (SSMS)	55	62	54	53	55																		

LEAD (UG/G)

LEAD (UG/G)												LEAD (UG/G)											
LAB- 6 (AA)	16.0	15.0	16.0	14.0	16.0	16.0	16.0	14.0	16.0	14.0		LAB- 6 (AA)	11.0	11.0	12.0	11.0	12.0	11.0	12.0	11.0	12.0	11.0	
LAB-19 (AA)	37.0	28.0	35.0	36.0	37.0	36.0	37.0	36.0	36.0	32.0		LAB-19 (AA)	30.0	30.0	29.0	29.0	29.0	29.0	30.0	29.0	28.0	22.0	
LAB-20 (AA)	18.0	22.0										LAB-20 (AA)	18.0	20.0									
LAB-21 (AA)	20.0	21.0	20.0	18.5	15.5	18.0	20.0	19.0	17.0	12.5		LAB-21 (AA)	18.5	21.0	20.0	16.0	13.5	18.5	19.0	22.0	19.0	15.5	
LAB-24 (AA)	27.0	25.0										LAB-24 (AA)	26.0	29.0									
* LAB-27 (AA)	80.0	69.7	94.8	64.5								* LAB-27 (AA)	64.1	88.7	54.6	84.6							
LAB-28 (AA)	22.0	26.0	24.0	19.0	24.0	24.0	24.0	19.0	27.0	21.0		LAB-28 (AA)	31.0	31.0	26.0	24.0	39.0	23.0	24.0	33.0	32.0	20.0	
LAB-29 (AA)	22.2	21.2	18.6	20.2	19.6	19.5	20.5	22.0	19.5	20.5		LAB-29 (AA)	20.5	19.5	20.0	22.0	22.6	22.5	21.5	21.5	17.9		
LAB-30 (AA)	11.4	11.0	11.2	11.0								LAB-30 (AA)	5.2	5.3	5.3	5.3							
LAB-35 (AA)	14.7	14.3	14.1	13.7	13.6	14.3	14.4	14.5	14.3	14.6		LAB-35 (AA)	14.5	14.0	15.8	16.6	15.8	15.4	16.2	16.0	14.4	15.0	
LAB-39 (AA)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0		LAB-39 (AA)	30.0	30.0	30.0	25.0	30.0	30.0	30.0	30.0	25.0	25.0	
LAB-40 (AA)	16.0	16.0	19.0	19.0	18.0	20.0	18.0	20.0	19.0	18.0		LAB-40 (AA)	18.0	16.0	16.0	18.0	17.0	15.0	17.0	16.0	16.0	16.0	
LAB-40 (AA)	28.0	22.0	26.0	27.0								LAB-42 (AA)	30.0	30.0	29.0	25.0	29.0	44.0	40.0	28.0	25.0	30.0	
LAB-42 (AA)	39.0	40.0	50.0	39.0	29.0	29.0	30.0	19.0	44.0	35.0		LAB-43 (AA)	22.0	14.5	10.2	10.0	11.4	9.8	10.5	7.2	9.8	7.4	
LAB-43 (AA)	16.0	11.0	11.2	14.0	9.9	8.8	B-5	6.3	11.0	9.6		LAB-44 (AA)	18.0	18.0	18.0	17.0	22.0	13.0	16.0	14.0	22.0	19.0	
LAB-44 (AA)	19.0	17.0	20.0	18.0	17.0	19.0	17.0	16.0	18.0	25.0		LAB-45 (AA)	19.0	19.0	19.0	20.0	19.0	19.0	19.0	20.0	19.0	19.0	
LAB-45 (AA)	20.0	19.0	21.0	22.0	22.0	19.0	20.0	22.0	22.0	22.0		LAB-46 (AA)	39.0	39.0	37.0	39.0	40.0	33.0	32.0	34.0	37.0	34.0	
LAB-46 (AA)	35.0	33.0	37.0	36.0	34.0	30.0	33.0	34.0	31.0	30.0		LAB-47 (AA)	9.0	9.0	9.0	9.0	9.0	9.0	13.0	5.0	5.0</		

REFERENCE SOIL S0-1

	LITHIUM (UG/G)									
	27	24	15	19	15	25	19	16	48	48
LAB-43 (AA)										
LAB-50 (AA)	48	48	49	49	48	46	47	49	48	48
LAB-45 (ES)	55	53	55	61	51	52	49	50	46	47
LAB-41 (SSMS)	24	36	36	13						

REFERENCE SOIL S0-2

	LITHIUM (UG/G)									
	6.1	4.6	6.0	6.8	6.8	5.6	7.2	6.0		
LAB-43 (AA)										
LAB-50 (AA)	10.2	9.8	11.0	11.6	10.7	11.0	10.2	11.0		
LAB-45 (ES)	9.9	10.9	10.5	10.3	10.8	10.5	10.5	10.5		
LAB-41 (SSMS)	8.5	5.9	5.8							

	MAGNESIUM (WT%)									
	2.41	2.41	2.36	2.34	2.36	2.36	2.36	2.36	2.36	2.36
LAB- 6 (AA)										
LAB- 9 (AA)	2.27	2.26	2.23	2.24	2.24	2.25	2.27	2.20	2.26	2.22
LAB-14 (AA)	2.54	2.54	2.54	2.54						
LAB-20 (AA)	2.38	2.38								
LAB-21 (AA)	2.12	2.30	2.27	2.13	2.30	2.20	2.37	2.27	2.23	2.25
LAB-21 (AA)	2.20	2.42	2.35	2.38	2.35	2.37	2.37	2.40	2.35	2.30
LAB-27 (AA)	2.21	2.11	2.25	1.95						
LAB-27 (AA)	2.38	2.36	2.39	2.35	2.40	2.37	2.37	2.36	2.33	2.40
LAB-28 (AA)	2.17	2.29	2.29	2.35	2.23	2.23	2.23	2.11	2.23	
* LAB-40 (AA)	1.90	1.49	2.01	1.96	1.85	1.78	1.85	2.06	1.90	1.98
LAB-40 (AA)	1.82	1.58	1.79	1.62						
* LAB-43 (AA)	2.47	2.22	2.27	2.25	2.37	1.24	.63	.29	.59	.20
LAB-46 (AA)	2.50	2.50	2.50	2.50	2.42	2.42	2.40	2.44	2.50	
LAB- 8 (XRF)	2.02	2.21	1.90	2.10	2.03	2.24	2.12	2.26	2.21	2.21
LAB- 9 (XRF)	2.69	2.97	2.90	2.85	2.92	2.79	2.56	2.48	2.55	2.45
LAB-15 (XRF)	2.36	2.29	2.42	2.32	2.33	2.34	2.41	2.35	2.32	2.35
LAB-28 (XRF)	2.29	2.47	2.41	2.17	2.11	2.05	2.11	1.99	1.93	2.23
LAB-29 (XRF)	2.29	2.52	2.31	2.40	2.48	2.32	2.48	2.22	2.36	2.54
LAB-22 (ES)	2.35	2.35								
LAB-24 (ES)	2.28	2.30								
LAB-45 (ES)	2.74	2.84	2.50	2.77	2.29	2.69	2.57	2.48	2.40	2.49
* LAB-55 (NAA)	1.18	1.07	1.09	1.06	1.11	.99	1.01	.95	.90	.92
LAB-29 (TITR)	2.20	2.24								
LAB-50 (TITR)	2.40	2.40	2.42	2.43	2.46					

	MAGNESIUM (WT%)									
	.56	.56	.55	.56	.55	.55	.55	.55	.55	.56
LAB- 6 (AA)										
LAB- 9 (AA)	.49	.50	.51	.51	.51	.51	.50	.51	.50	.51
LAB-14 (AA)	.54	.57	.55	.54						
LAB-20 (AA)	.53	.54								
LAB-21 (AA)	.44	.48	.48	.48	.50	.44	.48	.48	.48	.53
LAB-21 (AA)	.57	.60	.60	.57	.58	.62	.60	.60	.57	.57
LAB-27 (AA)	.64	.67	.60	.76						
LAB-27 (AA)	.55	.54	.55	.54	.54	.55	.54	.54	.54	.54
LAB-28 (AA)	.60	.66	.60	.66	.72	.60	.66	.66	.66	.66
LAB-40 (AA)	.43	.36	.52	.48	.41	.42	.35	.47	.48	.40
LAB-40 (AA)	.44	.48	.43	.44						
* LAB-43 (AA)	.55	.51	.54	.53	.54	.52	.34	.43	.43	.10
LAB-46 (AA)	.50	.52	.54	.54	.54	.54	.54	.54	.54	.52
LAB-50 (AA)	.55	.53	.55	.57	.57					
LAB- B (XRF)	.56	.57	.56	.56	.56	.57				
* LAB- 9 (XRF)	.91	.82	.83	.84	.72	.92	.89	.92	.97	.88
LAB-15 (XRF)	.48	.49	.52	.55	.48	.57	.52	.52	.49	.59
LAB-28 (XRF)	.66	.72	.66	.72	.72	.66				
LAB-29 (XRF)	.54	.65	.54	.62	.54	.62	.55	.59	.69	
LAB-22 (ES)	.58	.58								
LAB-24 (ES)	.60	.55								
LAB-45 (ES)	.53	.49	.52	.52	.53	.47	.51	.58	.57	.53
LAB-55 (NAA)	.42	.44	.44	.34	.35	.42	.41	.49	.34	.44
LAB-29 (TITR)	.57	.60								

	MANGANESE (WT%)									
	.0911	.0951	.0902	.0901	.0921	.0941	.0918	.0909	.0912	.0915
LAB- 5 (AA)										
LAB- 6 (AA)	.0920	.0921	.0921	.0921	.0922	.0922	.0920	.0921	.0920	.0922
LAB-19 (AA)	.0606	.0758	.0928	.0886	.0856	.0867	.0848	.0912	.0728	.0790
LAB-20 (AA)	.0970	.0970								
LAB-21 (AA)	.0850	.0810	.0875	.0900	.0950	.0850	.0830	.0860	.0850	.0900
* LAB-27 (AA)	.0700	.0700	.0700	.0700						
LAB-28 (AA)	.1000	.1000	.1000	.1000	.1000	.1000	.0900	.0700	.0800	
LAB-29 (AA)	.0850	.0850								
LAB-30 (AA)	.0760	.0756	.0760	.0756						
LAB-35 (AA)	.0925	.0928	.0926	.0932	.0918	.0925	.0927	.0934	.0921	
LAB-40 (AA)	.0840	.0795	.0860	.0875	.0860	.0880	.0819	.0835	.0865	.0860
LAB-41 (AA)	.0914	.0896	.0883	.0839	.0848	.0898	.0873	.0875	.0850	.0848
LAB-42 (AA)	.0850	.0850	.0880	.0870	.0880	.0880	.0860	.0880	.0870	
* LAB-43 (AA)	.0752	.0875	.0892	.0709	.0752	.0684	.0780	.0725	.0768	.0357
LAB-44 (AA)	.1000	.0978	.0993	.0978	.0974	.0982	.0977	.0951	.0963	.0948
LAB-44 (AA)	.0826	.0848	.0840	.0881	.0835	.0821	.0851	.0812	.0814	.0831
* LAB-46 (AA)	.0605	.0615	.0605	.0615	.0615	.0600	.0615	.0605	.0615	.0615
LAB-47 (AA)	.0890	.0900	.0890	.0890	.0890	.0900	.0890	.0890	.0890	.0890
LAB-50 (AA)	.0900	.0900	.0900	.0900	.0900					
LAB-52 (AA)	.0750	.0740	.0750	.0750	.0750	.0740	.0740	.0750	.0750	.0740
* LAB- 8 (XRF)	.0840	.0840	.0840	.0840	.0850	.0890	.0840	.0840	.0840	.0890
LAB- 9 (XRF)	.0800	.0700	.0700	.0700	.0700	.0700	.0700	.0700	.0700	.0800
LAB-14 (XRF)	.0700	.0700	.0700	.0700	.0700					
LAB-19 (XRF)	.0684	.0701	.0690	.0709	.0687					
LAB-28 (XRF)	.0800	.0800	.0800	.0800	.0800	.0800	.0800	.0800	.0800	
LAB-29 (XRF)	.0700	.0900	.0900	.0800	.0800	.0800	.0800	.0800	.0800	.0800
LAB-22 (ES)	.0700	.0700								
LAB-24 (ES)	.0770	.0850								
LAB-45 (ES)	.1026	.0861	.0910	.1069	.0982	.1097	.1109	.1019	.1025	.1017
LAB- 9 (COLOR)	.1000	.1000	.0900	.0800	.0900	.0900	.0800	.0900	.0900	
LAB-45 (COLOR)	.0828	.0824	.0872	.0878	.0878	.0815	.0847	.0894	.0942	.0885
LAB- 4 (NAA)	.0899	.0900	.0927	.0892	.0909	.0933	.0945	.0927	.0897	.0895
LAB-11 (NAA)	.0815	.0827	.0808	.0799						
LAB-55 (NAA)	.0900	.0920	.0930	.0890	.0920	.0860	.0880	.0920	.0880	.0860
LAB-41 (SSMS)	.0870	.0920	.1000	.0750	.0630					

	MANGANESE (WT%)									
	.0718	.0718	.0720	.0722	.0719	.0719	.0719	.0719	.0739	.0742
LAB- 6 (AA)										
LAB- 9 (AA)	.0703	.0702	.0724	.0713	.0725	.0702	.0701	.0706	.0711	.0712
LAB-19 (AA)	.0675	.0661	.0690	.0691	.0681	.0648	.0640	.0668	.0668	.0606
LAB-20 (AA)	.0720									
LAB-21 (AA)	.0650	.0665	.0710	.0700	.0750	.0700	.0665	.0705	.0750	
* LAB-27 (AA)	.0500	.0500	.0500	.05						

REFERENCE SOIL SO-1

MERCURY (UG/G)												
LAB- 6 (AA)	.022	.021	.020	.020	.022	.020	.021	.021	.020	.021	LAB- 6 (AA)	.080
LAB-11 (AA)	.027	.027	.033	.029	.044	.025	.022	.038	.032	.021	LAB-11 (AA)	.124
LAB-14 (AA)	.020	.020									.096	
LAB-21 (AA)	.009	.021	.014	.014	.018	.021	.018	.017	.018		LAB-14 (AA)	.070
LAB-23 (AA)	.020	.020	.019	.019	.019	.015	.020	.018	.017	.018	LAB-21 (AA)	.078
LAB-30 (AA)	.020	.020	.020	.020							LAB-23 (AA)	.081
LAB-38 (AA)	.027	.026	.022	.024	.027	.027	.028	.024	.027	.022	LAB-27 (AA)	.110
LAB-40 (AA)	.025	.024	.021	.020	.024	.019					LAB-30 (AA)	.070
* LAB-45 (AA)	.043	.041	.042	.044	.042	.042	.043	.043	.044	.044	LAB-3B (AA)	.088
LAB-46 (AA)	.022	.022	.024	.020	.022	.030	.030	.028	.026	.026	LAB-40 (AA)	.105
LAB-52 (AA)	.020	.020	.020	.020	.020	.020	.020	.020	.020	.020	* LAB-42 (AA)	.060

REFERENCE SOIL SO-2

MERCURY (UG/G)												
LAB- 6 (AA)	.070	.077	.076	.080	.081	.077	.079	.075	.081	.081	LAB-11 (AA)	.121
LAB-11 (AA)	.096										LAB-11 (AA)	.096
LAB-14 (AA)											LAB-14 (AA)	.070
LAB-21 (AA)											LAB-21 (AA)	.078
LAB-23 (AA)											LAB-23 (AA)	.081
LAB-30 (AA)											LAB-27 (AA)	.110
LAB-38 (AA)											LAB-30 (AA)	.070
LAB-40 (AA)											LAB-3B (AA)	.088
* LAB-45 (AA)											LAB-40 (AA)	.105
LAB-46 (AA)											* LAB-42 (AA)	.060
LAB-52 (AA)											* LAB-45 (AA)	.154

MOLYBDENUM (UG/G)												
LAB-40 (AA)	2.4	2.5	4.0	3.6	3.0	3.0	3.3	3.2	3.6	3.0	LAB-40 (AA)	5.6
LAB-43 (AA)	3.5	2.5	3.1	3.5	2.8						LAB-43 (AA)	2.5
LAB-46 (AA)	2.0	2.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	LAB-46 (AA)	1.0
LAB-41 (SSMS)	.9	1.1	1.0	.9	.8						LAB-45 (ES)	2.1

NICKEL (UG/G)												
LAB- 5 (AA)	105	105	107	106	106	104	106	106	106	106	LAB- 5 (AA)	27.6
LAB-11 (AA)	73	73	72	71	73	78	76	74			LAB-11 (AA)	4.1
LAB-19 (AA)	109	99	112	112	117	106	113	124	114	113	LAB-19 (AA)	27.0
LAB-21 (AA)	77	77	80	89	85	78	78	80	89	85	LAB-21 (AA)	5.0
* LAB-27 (AA)	210	219	230	209							* LAB-27 (AA)	118.0
LAB-28 (AA)	130	140	120	110	115	130	130	120	130		* LAB-28 (AA)	70.0
LAB-29 (AA)	89	90	89	88	88	89	87	88	89	90	LAB-29 (AA)	9.7
LAB-30 (AA)	99	99	102	101							LAB-30 (AA)	4.5
* LAB-35 (AA)	109	110	108	110	109	109	110	110	118	108	LAB-35 (AA)	19.9
LAB-38 (AA)	103	102	102	103	103	102	102	101	100	102	LAB-38 (AA)	7.4
	99	101										7.7
LAB-39 (AA)	107	105	105	104	104	105	104	105	104	103	LAB-39 (AA)	15.0
LAB-40 (AA)	80	63	67	71	70	80	62	65	73	65	LAB-40 (AA)	5.0
LAB-40 (AA)	112	87	117	87							* LAB-40 (AA)	13.0
LAB-41 (AA)	90	95	94	93	85	90	93	94	97	86	LAB-41 (AA)	12.0
LAB-42 (AA)	85	79	80	98	97	67	89	84	97	96	LAB-42 (AA)	30.0
LAB-43 (AA)	76	74	68	74	70	79	82	75	93	80	LAB-44 (AA)	17.0
LAB-44 (AA)	100	93	99	115	94	102	107	95	99	93	LAB-45 (AA)	4.0
LAB-45 (AA)	83	85	85	83	85	83	84	84	85		LAB-46 (AA)	22.0
LAB-46 (AA)	100	105	104	103	104	99	103	105	99	103	LAB-52 (AA)	3.0
LAB-47 (AA)	87	87	88	88	87	88	88	88	87	88	LAB- 9 (XRF)	10.0
LAB-50 (AA)	79	84	89	91	87	75	83	90	87	91	LAB-14 (XRF)	8.0
LAB-52 (AA)	86	86	86	85	85	86	85	84	86		LAB-22 (ES)	6.0
LAB- 8 (XRF)	68	63	68	58	65	64	71	69	65	62	LAB-24 (ES)	36.0
LAB- 9 (XRF)	99	96	101	95	97	103	98	100	98	99	LAB-45 (ES)	9.0
LAB-14 (XRF)	93	88									LAB-41 (SSMS)	7.4
LAB-19 (XRF)	99	89	96	102	93							6.4
* LAB-28 (XRF)	140	140										
LAB-22 (ES)	90	92	89	90	94	91	92	92	93	90		
LAB-24 (ES)	102	112										
* LAB-45 (ES)	122	111	74	115	132	135	145	132	113	112		
LAB-41 (SSMS)	64	87	73	70	58							

NITROGEN (WT%)												
LA8-43 (AA)	.029	.029	.029	.039	.034	.026	.035				LAB-43 (AA)	.189
LAB-27 (TITR)	.031	.031									LAB-27 (TITR)	.243
LAB-21 (COMB)	.053	.053	.061	.048	.048	.045	.040	.064	.048	.040	LAB-21 (COMB)	.256
LAB-40 (COMB)	.010	.010	.020								LAB-40 (COMB)	.210
LAB-19 (GC)	.053	.052	.045	.053	.053						LAB-19 (GC)	.280

REFERENCE SOIL 50-1

PHOSPHORUS (WT%)											
LAB-43 (AA)	.033	.036	.030	.035	.049	.017	.060				
LAB- 8 (XRF)	.063	.063	.063	.071	.067	.067	.071	.071	.067	.063	
LAB- 9 (XRF)	.070	.070	.060	.060	.060	.060	.060	.070	.060	.070	
LAB- 9 (COLOR)	.070	.070	.060	.060	.060	.070	.070	.070	.070	.070	
LAB-14 (COLOR)	.060	.060									
* LAB-27 (COLOR)	.120	.100	.140	.110							
* LAB-29 (COLOR)	.022	.026									
LAB-38 (COLOR)	.067	.067	.068	.067	.067	.068	.068	.067	.067	.068	
LAB-42 (COLOR)	.051	.052	.051	.050	.050	.050	.051	.053	.052	.053	
LAB-50 (COLOR)	.080	.080	.080	.080	.080						
LAB-41 (SSMS)	.061	.062	.092	.079	.055						

REFERENCE SOIL 50-2

PHOSPHORUS (WT%)											
LAB-43 (AA)	.291	.249	.256	.285	.305	.309	.219	.238	.283	.283	.285
LAB- 8 (XRF)	.310	.300	.300	.310	.300	.300	.310	.300	.300	.300	.290
LAB- 9 (XRF)	.340	.320	.340	.340	.330	.330	.330	.330	.340	.340	.350
LAB- 9 (COLOR)	.260	.260	.260	.260	.260	.260	.270	.260	.270	.270	.270
LAB-14 (COLOR)	.290	.290									
LAB-27 (COLOR)	.370	.350	.390	.370							
* LAB-29 (COLOR)	.950	1.050									
* LAB-29 (COLOR)	.026	.022									
LAB-38 (COLOR)	.322	.322	.325	.327	.327	.327	.320	.322	.323	.327	
LAB-42 (COLOR)	.305	.299	.308	.302	.307	.300	.304	.306	.303	.303	.303
LAB-50 (COLOR)	.285	.306	.284	.293	.293	.297	.292	.306	.294	.307	
LAB-50 (COLOR)	.310	.310	.310	.310	.310	.310					

POTASSIUM (WT%)

LAB- 6 (AA)	2.66	2.67	2.67	2.74	2.67	2.71	2.66	2.71	2.67		
LAB- 9 (AA)	2.53	2.51	2.51	2.51	2.56	2.58	2.56	2.51	2.57	2.53	
LAB-20 (AA)	2.59	2.59									
LAB-21 (AA)	2.60	2.60	2.55	2.65	2.60	2.60	2.55	2.60	2.60		
LAB-27 (AA)	2.67	2.69	2.65	2.64	2.65	2.70	2.69	2.64	2.65		
LAB-28 (AA)	2.70	2.70	2.60	2.50	2.60	2.60	2.30	2.60			
LAB-29 (AA)	2.88	2.85									
LAB-40 (AA)	2.65	2.80	2.65	2.71	2.70	2.56	2.60	2.73	2.68	2.60	
LAB-40 (AA)	2.82	2.56	2.94	2.54							
LAB-43 (AA)	2.60	2.96									
LAB-50 (AA)	2.59	2.57	2.58	2.53	2.55						
LAB-27 (FLAME)	2.38	2.42	2.40	2.37							
LAB- 8 (XRF)	2.85	2.88	2.91	2.89	2.84	2.85	2.87	2.86	2.86		
LAB- 9 (XRF)	2.57	2.57	2.65	2.63	2.64	2.60	2.60	2.58	2.50	2.63	
LAB-14 (XRF)	2.54	2.65	2.60	2.62							
LAB-15 (XRF)	2.69	2.60	2.76	2.74	2.74	2.65	2.64	2.72	2.62	2.71	
LAB-28 (XRF)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70		
LAB-29 (XRF)	2.70	2.71	2.74	2.71	2.71	2.70	2.73	2.73	2.75	2.71	
LAB-22 (ES)	2.60	2.52									
LAB-24 (ES)	2.65	2.70									
* LAB-45 (ES)	3.18	3.30	3.27	3.84	3.15	3.31	2.93	3.21	2.89	2.76	
LAB- 4 (NAA)	2.61	2.77	2.75	2.63	2.80	2.64	2.79	2.72	2.65	2.84	

POTASSIUM (WT%)

LAB- 6 (AA)	2.36	2.36	2.48	2.36	2.42	2.48	2.48	2.48	2.42	2.42	
LAB- 9 (AA)	2.28	2.44	2.47	2.45	2.46	2.43	2.45	2.43	2.45	2.45	
LAB-20 (AA)	2.40	2.40									
LAB-21 (AA)	2.40	2.40	2.40	2.30	2.35	2.40	2.40	2.40	2.30	2.35	2.40
LAB-27 (AA)	2.44	2.50	2.52	2.49	2.48	2.46	2.50	2.50	2.48	2.48	
LAB-28 (AA)	2.30	2.20	2.50	2.40	2.70	2.40	2.20	2.30	2.30	2.40	
LAB-29 (AA)	2.70	2.70									
LAB-40 (AA)	2.40	2.40	2.38	2.40	2.54	2.40	2.30	2.48	2.45	2.36	
LAB-40 (AA)	2.65	2.38	2.53	2.47							
* LAB-43 (AA)	3.03	2.30									
LAB-50 (AA)	2.39	2.38	2.40	2.32	2.35						
LAB-27 (FLAME)	2.20	2.26	2.18	2.17							
LAB- 8 (XRF)	2.56	2.51	2.57	2.61	2.61	2.59	2.56	2.56	2.53	2.51	
LAB- 9 (XRF)	2.37	2.42	2.41	2.41	2.43	2.42	2.46	2.45	2.39		
LAB-14 (XRF)	2.45	2.40	2.42	2.42	2.42						
LAB-15 (XRF)	2.54	2.39	2.45	2.41	2.48	2.43	2.37	2.52	2.46	2.54	
LAB-28 (XRF)	2.70	2.50	2.30	2.50	2.50	2.50	2.50				
LAB-29 (XRF)	2.45	2.47	2.48	2.49	2.51	2.46	2.47	2.47	2.47	2.45	
LAB-22 (ES)	2.41	2.37									
LAB-24 (ES)	2.47	2.51									
LAB-45 (ES)	2.31	2.74	2.57	2.40	2.40	2.61	2.38	2.22	2.67	2.84	2.50
LAB- 4 (NAA)	2.46	2.51	2.40	2.44	2.47	2.54	2.49	2.49	2.62	2.88	
LAB-41 (SSMS)	2.46	2.51	2.40	2.44	2.47	2.54	2.49	2.49	2.62	2.88	

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RUBIDIUM (UG/G)

LAB- 8 (XRF)	138	137	114	130	134	127	127	126	122	133	
LAB- 9 (XRF)	133	134	131	133	131	133	137	135	136	136	
LAB-14 (XRF)	127	124									
LAB-28 (XRF)	115	115									
LAB-22 (ES)	156	157	154	158	159	157	155	156	156	156	
LAB-45 (ES)	161	150	167	180	156	163	138	151	140	148	
LAB- 4 (NAA)	153	150	148	146	146	150	144	149	156	154	
LAB-41 (SSMS)	170	210	160	140	140						

RUBIDIUM (UG/G)

LAB- 8 (XRF)	75	82	76	72	76	78	85	80	87	73	
LAB- 9 (XRF)	74	71	74	71	72	75	72	72	72	72	
LAB-14 (XRF)	70	68									
LAB-28 (XRF)	85	85									
LAB-22 (ES)	93	91	92	90	89	91	88	89	89	90	
LAB-45 (ES)	71	83	74	73	75	72	73	76	84	77	
LAB- 4 (NAA)	85	84	87	81	87	85	86	88	85	88	
LAB-41 (SSMS)	100	88	77	86	84						

SCANDIUM (UG/G)

LAB- 4 (NAA)	17.4	18.5	17.7	17.3	18.0	17.5	17.5	17.5	17.4	17.3	
LAB-33 (NAA)	16.9	17.0	16.8	17.1	16.9						
LAB-55 (NAA)	18.8	19.7	18.1	19.3	19.0	19.6	19.3	19.0	19.9	19.4	
LAB-41 (SSMS)	21.0	26.0	20.0	19.0	19.0						

LAB- 4 (NAA)	11.1	11.3	11.2	11.2	11.0	11.2	11.3	11.2	11.2	11.1	
LAB-55 (NAA)	10.8	11.6	12.3	12.3	12.2	12.5	11.4	12.1	11.6	11.7	
* LAB-41 (SSMS)	33.0	22.0	33.0	22.0	16.0						

REFERENCE SOIL SO-1

SILICON (WT%)

LAB-27 (AA)	26.03	25.84	26.25	26.03	25.76	26.05	25.89	26.13	26.16	25.91
LAB-28 (AA)	25.92	26.16								
LAB- 8 (XRF)	25.77	25.66	25.89	25.75	25.88	25.60	25.57	25.38	25.46	25.86
LAB- 9 (XRF)	26.12	26.13	25.72	25.90	26.03	25.94	25.63	25.91	25.83	25.51
LAB-14 (XRF)	25.27	25.27	25.07	25.49						
LAB-15 (XRF)	25.37	25.29	25.46	25.11	25.57	25.28	25.96	25.46	25.25	26.12
LAB-28 (XRF)	26.34	26.34	26.30	26.25	26.25	25.41	25.36	26.11	25.97	
LAB-29 (XRF)	26.04	26.19	26.31	26.27	25.98	26.14	26.11	26.12	26.29	26.07
LAB-24 (ES)	25.77	25.46								
LAB- 9 (COLOR)	25.40	25.28	25.24	25.29	25.10	25.53	25.36	25.24	25.23	25.31
LAB-29 *GRAV)	25.49	25.66								
LAB-46 (GRAV)	25.37	25.34	25.32	25.37	25.37	25.22	25.34	25.38	25.33	25.42
LAB-50 (GRAV)	25.80	25.77	25.83	25.86	25.81					

REFERENCE SOIL SO-2

SILICON (WT%)

LAB-27 (AA)	25.48	25.48	25.29	25.43	25.27	25.27	25.59	25.37	25.29	25.43
LAB-28 (AA)	24.48	24.28	24.62	24.28	24.34	25.46	25.18	25.50	25.50	25.50
LAB- 8 (XRF)	24.77	24.72	24.78	24.43	24.85	24.64	24.78	24.61	24.73	24.52
LAB- 9 (XRF)	25.65	25.23	25.22	25.24	25.51	25.26	25.45	25.50	25.28	25.13
LAB-14 (XRF)	24.53	24.31	24.76	24.38						
LAB-15 (XRF)	24.88	25.02	24.89	23.68	24.75	24.38	25.00	24.51	24.86	25.05
LAB-29 (XRF)	25.41	25.35	25.56	25.46	25.53	25.39	25.30	25.29	25.38	25.33
LAB-24 (ES)	24.93	24.95								
LAB- 9 (COLOR)	25.02	25.08	25.07	25.16	25.11	24.95	25.12	25.12	25.03	25.09
LAB-29 (GRAV)	24.98	24.88								
LAB-46 (GRAV)	24.49	24.59	24.64	24.65	24.67	24.68	24.59	24.49	24.62	24.61
LAB-50 (GRAV)	25.09	25.12	25.05	25.17	25.16					

SODIUM (WT%)

LAB- 6 (AA)	2.06	2.07	2.05	2.07	2.07	2.05	2.05	2.10	2.09	
LAB- 8 (AA)	2.16	2.13	2.06	2.13	2.03	2.16	2.11	2.16	2.10	
LAB- 9 (AA)	1.94	1.96	1.93	1.95	1.93	1.96	1.99	1.94	1.96	
LAB-14 (AA)	2.10	2.10	2.10	2.10						
LAB-20 (AA)	2.04	2.04								
LAB-21 (AA)	2.00	2.00	2.00	2.00	2.01	1.98	2.00	2.00	2.00	
LAB-27 (AA)	2.08	2.04	2.04	2.01	2.05	2.07	2.02	2.02	2.04	
LAB-28 (AA)	1.90	1.80	1.80	1.80	1.80	1.90	1.80	1.70	1.80	
LAB-29 (AA)	2.30	2.27								
LAB-40 (AA)	1.55	1.43	1.48	1.52	1.48	1.44	1.40	1.46	1.47	1.50
LAB-40 (AA)	1.58	1.53	1.69	1.53						
* LAB-43 (AA)	2.32	2.54	2.58							
LAB-46 (AA)	1.46	1.48	1.48	1.48	1.48	1.56	1.46	1.46	1.46	
LAB-50 (AA)	1.98	1.99	1.99	1.99	2.00					
LAB-29 (XRF)	1.68	1.80	1.95	1.82	1.66	1.44	1.45	1.81	1.51	1.62
LAB-22 (ES)	2.11	2.04								
LAB-24 (ES)	2.02	2.11								
LAB- 4 (NAA)	2.03	2.02	2.09	2.03	2.05	2.07	2.09	2.10	2.04	2.06
LAB-33 (NAA)	2.03	1.96	2.04	2.02	2.02					
LAB-55 (NAA)	1.98	2.00	2.01	1.98	2.03	1.89	1.92	1.97	1.87	1.87

SODIUM (WT%)

LAB- 6 (AA)	1.88	1.86	1.90	1.90	1.92	1.86	1.86	1.92	1.92	1.92
LAB- 8 (AA)	1.95	1.94	1.95	1.95	1.95	1.85	1.94	1.86	1.86	1.88
LAB- 9 (AA)	1.73	1.80	1.79	1.79	1.79	1.79	1.78	1.77	1.76	1.96
LAB-14 (AA)	1.93	1.93	1.93	1.93	1.89					
LAB-20 (AA)	1.88	1.89								
LAB-21 (AA)	1.80	1.80	1.79	1.80	1.80	1.80	1.80	1.79	1.78	1.80
LAB-27 (AA)	1.91	1.94	1.94	1.95	1.92	1.91	1.94	1.89	1.92	1.92
LAB-28 (AA)	1.90	1.60	1.90	1.80	2.00	1.90	1.60	1.70	1.70	1.80
LAB-29 (AA)	2.12	2.13								
LAB-40 (AA)	1.43	1.40	1.41	1.44	1.40	1.40	1.40	1.25	1.47	1.36
LAB-40 (AA)	1.43	1.45	1.49	1.42						
* LAB-43 (AA)	2.14	2.26								
LAB-46 (AA)	1.38	1.38	1.38	1.38	1.38	1.38	1.44	1.50	1.46	1.40
LAB-50 (AA)	1.84	1.83	1.85	1.83	1.81					
LAB-29 (XRF)	1.16	1.38	1.48	1.28	1.60	1.45	1.22	1.46	1.31	1.36
LAB-22 (ES)	1.92	1.85								
LAB-24 (ES)	1.91	1.90								
LAB- 4 (NAA)	1.88	1.84	1.89	1.89	1.92	1.91	1.90	1.89	1.91	1.91
LAB-55 (NAA)	1.77	1.77	1.84	1.74	1.75	1.81	1.79	1.75	1.90	1.80

STRONTIUM (UG/G)

LAB- 6 (AA)	245	246	246	246	246	245	245	246		
LAB-21 (AA)	340	340	335	400	336	345	340	390	340	
LAB-28 (AA)	150	230	200	215	190	200	185	180		
LAB-43 (AA)	181	228	157	92	112	227				
LAB-50 (AA)	230	225	225	223	218	238	225	220	218	213
LAB- 8 (XRF)	273	270	264	264	271	278	278	275	264	
LAB- 8 (XRF)	358	351	350	349	357	357	361	355	359	
LAB-28 (XRF)	340	340								
LAB-29 (XRF)	300	300	300	300	300	300	300	300		
LAB-22 (ES)	377	378	376	378	382	373	370	373	375	
LAB-24 (ES)	305	298								
* LAB-45 (ES)	339	425	415	404	419	445	401	443	415	
LAB-41 (SSMS)	350	420	310	320						

STRONTIUM (UG/G)

LAB- 6 (AA)	328	328	327	327	328	327	327	327	326	328
LAB-21 (AA)	355	355	360	390	365	360	355	355	390	370
LAB-28 (AA)	330	350	350	320	360	360	180	180	190	210
LAB-43 (AA)	208	283	249	244	158	239				
LAB-50 (AA)	260	260	250	243	250	258	253	247	243	248
LAB- 8 (XRF)	295	283	289	288	278	283	274	280	296	272
LAB- 8 (XRF)	350	359	354	351	352	358	362	354	351	357
LAB-28 (XRF)	340	380								
LAB-29 (XRF)	500	600	400	600	400	500	500	400	400	500
LAB-22 (ES)	407	408	407	406	408	411	401	405	407	
LAB-24 (ES)	305	303								
LAB-45 (ES)	366	406	439	383	420	383	383	477	450	472
LAB-41 (SSMS)	360	350	300	340	310					

SULPHUR (WT%)

LAB-14 (XRF)	.010	.010								
LAB-41 (SSMS)	.013	.012	.013	.012	.012					
LAB-50 (COMB)	.010	.010	.010	.010	.010					

SULPHUR (WT%)

LAB-14 (XRF)	.050	.050								
LAB-41 (SSMS)	.045	.037	.029	.037	.027					

THORIUM (UG/G)

LAB- 4 (NAA)	13.9	14.4	14.1	13.8	14.4	13.9	13.9	13.9	13.7	13.8

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REFERENCE SOIL SO-1

TITANIUM (WT%)																					
LAB-21 (AA)	.61	.59	.62	.50	.51	.62	.61	.59	.64	.52	LAB-21 (AA)	.92	.92	.85	.75	.71	.95	.91	.92	.78	.73
LAB-21 (AA)	.55	.50	.60	.52	.51	.55	.60	.51	.52	.55	LAB-21 (AA)	.86	.90	.90	.82	.80	.88	.89	.90	.83	.80
LAB-28 (AA)	.51	.58	.54	.54	.48	.54	.54	.48	.48	.48	LAB-28 (AA)	.90	.84	.84	.84	.84	.78	.78	.84	.84	.84
LAB-43 (AA)	.52	.60	.52	.55	.51	.55					LAB-43 (AA)	.89	.95	.89	.98	.87	.95				
LAB-8 (XRF)	.59	.59	.57	.58	.57	.55	.57	.59	.58	.58	LAB-8 (XRF)	.95	.95	.95	.97	.99	.96	.96	.95	.93	.95
LAB-9 (XRF)	.51	.51	.50	.51	.52	.51	.50	.49	.51	.51	LAB-14 (XRF)	.83	.83	.82	.82						
LAB-14 (XRF)	.47	.50	.49	.50							LAB-15 (XRF)	.83	.87	.86	.86	.93	.88	.89	.77	.87	.91
LAB-15 (XRF)	.53	.51	.52	.52	.52	.50	.52	.52	.53	.52	LAB-28 (XRF)	.90	.90	.84	.84	.90	.90				
LAB-28 (XRF)	.54	.62	.54	.54	.48	.54	.54	.54	.54	.54	LAB-29 (XRF)	.86	.87	.87	.89	.88	.87	.87	.87	.87	.87
LAB-29 (XRF)	.50	.50	.50	.50	.50	.50	.50	.50	.50	.50	LAB-22 (ES)	.85	.83								
LAB-22 (ES)	.53	.51									LAB-24 (ES)	.89	.92								
LAB-24 (ES)	.50	.55									LAB-45 (ES)	.82	.75	.81	.81	.85	.90	.96	.83	.93	.78
LAB-45 (ES)	.57	.55	.44	.61	.55	.57	.61	.57	.50	.54	LAB-9 (COLOR)	.81	.82	.80	.82	.82	.80	.80	.82	.80	.81
LAB-9 (COLOR)	.51	.51	.53	.52	.53	.51	.52	.51	.52	.51	LAB-27 (COLOR)	.85	.83	.85	.87	.84	.85	.84	.85	.87	.89
LAB-27 (COLOR)	.52	.52	.51	.52	.50	.51	.52	.51	.51	.52	LAB-29 (COLOR)	.98	.92								
* LAB-29 (COLOR)	.70	.80									LAB-50 (COLOR)	.86	.88	.87	.89	.89					
LAB-50 (COLOR)	.53	.53	.53	.55	.54						LAB-55 (NAA)	.67	.73	.81	.70	.72	.97	.92	.92	.97	.80
LAB-55 (NAA)	.48	.49	.46	.47	.47	.45	.44	.48	.44	.43											

REFERENCE SOIL SO-2

TITANIUM (WT%)																				
LAB-21 (AA)	.92	.92	.85	.75	.71	.95	.91													
LAB-21 (AA)	.86	.90	.90	.82	.80	.88	.89													
LAB-28 (AA)	.90	.84	.84	.84	.84	.78	.78													
LAB-43 (AA)	.89	.95	.89	.98	.87	.95														
LAB-8 (XRF)	.95	.95	.95	.97	.99	.96	.96													
LAB-14 (XRF)	.83	.83	.82	.82																
LAB-15 (XRF)	.83	.87	.86	.86	.93	.88	.89													
LAB-28 (XRF)	.90	.90	.84	.84	.90	.90														
LAB-29 (XRF)	.86	.87	.87	.89	.88	.87	.87													
LAB-22 (ES)	.85	.83																		
LAB-24 (ES)	.89	.92																		
LAB-45 (ES)	.82	.75	.81	.81	.85	.90	.96													
LAB-9 (COLOR)	.81	.82	.80	.82	.82	.80	.80													
LAB-27 (COLOR)	.85	.83	.85	.87	.84	.85	.85													
LAB-29 (COLOR)	.98	.92																		
LAB-50 (COLOR)	.86	.88	.87	.89	.89															
LAB-55 (NAA)	.67	.73	.81	.70	.72	.97	.92													
LAB-55 (NAA)	.67	.73	.81	.70	.72	.97	.92													

URANIUM (UG/G)									
LAB-4 (NAA)	1.4	1.4	1.3	1.3	1.5	1.5	1.3	1.4	1.3
LAB-33 (NAA)	1.7	1.5	1.4	1.7	1.8				
LAB-55 (NAA)	2.1	2.0	1.6	2.0	2.1	1.8	1.5	1.7	.9
LAB-41 (SSMS)	1.3	2.2	1.6	1.8	1.8				

URANIUM (UG/G)									
LAB-4 (NAA)	1.0	1.0	1.0	1.0	.8	1.1	1.2	1.1	1.1
LAB-41 (SSMS)	1.0	1.2	1.2	1.2	1.7	1.2			

VANADIUM (UG/G)																					
LAB-29 (AA)	155	156	164	151	147	145	144	144	160	154	LAB-29 (AA)	72	67	67	57	57	54	51	51	61	61
LAB-42 (AA)	120	170	150	130	180	160	190	190	170		LAB-42 (AA)	110	130	110	58	68	96	69	100	59	88
* LAB-43 (AA)	230	155	163	113	140	74	123	129	129	138	LAB-43 (AA)	78	69	82	69	69	74	57	51	62	69
LAB-50 (AA)	140	133	148	138	175	170	148	138	148	150	LAB-8 (XRF)	84	80	82	82	73	85	84	82	77	84
LAB-8 (XRF)	114	132	131	138	132	133	127	137	129	125	LAB-14 (XRF)	34	35								
LAB-14 (XRF)	142	142									* LAB-28 (XRF)	160	160								
LAB-28 (XRF)	160	160									LAB-24 (ES)	80	75								
LAB-24 (ES)	148	132									LAB-45 (ES)	45	45	39	51	48	52	47	56	41	37
LAB-45 (ES)	103	104	78	127	107	155	155	169	100	121	LAB-38 (COLOR)	62	59	57	61	58	59	59	58	60	56
LAB-38 (COLOR)	137	138	140	135	137	135	134	132	135	133	LAB-50 (COLOR)	51	49	55	57	57	57				
LAB-50 (COLOR)	131	135									LAB-55 (NAA)	53	48	52	57	48	56	65	59	59	68
LAB-55 (NAA)	124	134	120	122	121						LAB-41 (SSMS)	81	57	60	76	60					
LAB-41 (SSMS)	130	160	150	130	120																

YTTRIUM (UG/G)									
LAB-9 (XRF)	24	22	23	22	26	22	25	22	22
LAB-14 (XRF)	22	22							
LAB-22 (ES)	24	26	25	25	28	26	26	27	26
LAB-45 (ES)	24	24	24	23	29	25	22	21	19
LAB-41 (SSMS)	22	30	23	24	24				
LAB-9 (XRF)	36	38	38	38	38	36	37	38	40
LAB-14 (XRF)	39	35							
LAB-22 (ES)	40	41	39	38	42	43	43	43	40
LAB-45 (ES)	33	36	35	33	37	33	40	32	43
LAB-41 (SSMS)	46	56	43	58	39				

See legend and note on p 30

REFERENCE SOIL SO-1

					Z INC (UG/G)					
LAB- 5 (AA)	106	108	106	105	107	100	100	102	99	1
LAB- 6 (AA)	134	130	135	135	135	135	132	134	134	1
* LAB-11 (AA)	144	120	137	141	142	147	141	137		
LAB-19 (AA)	152	148	163	157	159	165	154	171	162	1
LAB-20 (AA)	140	145								
LAB-21 (AA)	140	130	140	145	130	140	130	135	145	1
LAB-27 (AA)	163	165	174	160						
LAB-30 (AA)	124	124	124							
LAB-35 (AA)	145	147	143	146	145	147	145	147	149	1
LAB-39 (AA)	144	141	142	138	136	142	144	143	142	1
LAB-40 (AA)	126	155	158	163	160	138	176	150	156	1
LAB-40 (AA)	149	157	156	152						
* LAB-41 (AA)	194	213	159	194	196	205	213	173	208	1
LAB-42 (AA)	130	130	130	130	120	120	130	120	120	1
* LAB-43 (AA)	136	131	145	141	130	65	124	131	138	1
LAB-44 (AA)	132	160	173	140	153	157	147	187	152	1
LAB-45 (AA)	157	157	160	155	157	159	157	155	156	1
LAB-46 (AA)	149	142	142	143	142	133	140	140	141	1
LAB-47 (AA)	150	151	154	152	150	152	150	149	153	1
LAB-50 (AA)	143	136	148	138	149	138	128	132	140	1
LAB-52 (AA)	146	151	147	146	144	144	145	146	145	1
LAB- 8 (XRF)	126	140	130	125	123	132	130	125	131	1
LAB- 9 (XRF)	144	144	140	143	140	144	144	143	144	1
LAB-14 (XRF)	157	153								
LAB-19 (XRF)	151	153	146	149	151					
LAB-22 (ES)	155	156	156	155	154	150	157	152	153	1
LAB-45 (ES)	135	165	170	156	157	184	160	149	145	1
LAB- 4 (NAA)	171	170	167	168	165	161	164	155	160	1
LAB-41 (SSMS)	160	170	130	140	160					

						ZINC	(UG/G)					
99	*LAB- 5 (AA)	89	85	87	87	90	85	89	89	88	88	8
95	LAB- 6 (AA)	110	110	112	110	112	112	110	112	112	112	11
59	*LAB-11 (AA)	95	89	94	96	97	98					
59	LAB-19 (AA)	151	139	143	147	144	163	129	141	144	14	
60	LAB-20 (AA)	123	118									
60	*LAB-21 (AA)	125	120	125	130	130	125	120	125	130	130	15
66	LAB-27 (AA)	143	163	147	139							
66	*LAB-30 (AA)	63	61	61	63							
66	LAB-35 (AA)	120	121	118	121	124	123	124	123	125	125	12
67	LAB-39 (AA)	117	110	116	115	115	115	115	115	115	113	11
67	*LAB-40 (AA)	115	148	140	141	136	140	135	133	137	14	
67	LAB-40 (AA)	144	142	144	136							
67	LAB-42 (AA)	110	110	110	110	110	110	110	100	110	110	11
70	*LAB-43 (AA)	124	120	158	124	122	137	127	124	123	11	
75	LAB-44 (AA)	125	124	127	133	130	134	121	127	127	12	
81	LAB-45 (AA)	137	137	140	142	140	137	138	140	141	13	
87	LAB-46 (AA)	124	123	123	124	122	128	125	125	124	12	
87	LAB-47 (AA)	134	138	133	140	140	136	133	134	134	13	
90	LAB-50 (AA)	125	116	122	119	127	130	119	126	125	12	
94	LAB-52 (AA)	130	130	134	131	130	130	130	129	130	13	
94	LAB- 8 (XRF)	109	102	109	101	108	109	113	111	108	10	
99	LAB- 9 (XRF)	110	113	112	110	112	113	114	113	114	11	
93	LAB-14 (XRF)	119	121									
	LAB-19 (XRF)	127	127	127	127	127						
	LAB-22 (ES)	121	117	120	116	121	121	119	116	118	12	
93	LAB-45 (ES)	101	103	102	107	124	112	111	109	127	11	

ZIRCONIUM

		ZIRCONIUM (UG/G)									
LAB- 8 (XRF)	76	79	74	78	72	74	79	74	69	6	
LAB- 9 (XRF)	60	62	61	77	69	63	76	65	69	6	
LAB-22 (ES)	95	101	93	97	97	97	98	94	96	9	
LAB-36 (ES)	70	110	130	120	75	80	80	90			
LAB-45 (ES)	162	201	109	147	202	222	159	274	164	10	
* LAB-41 (SSMS)	77	97	84	82	71						

							ZIRCONIUM (UG/G)			
2	LAB-8 (XRF)	682	722	689	689	699	715	670	702	671
0	LAB-9 (XRF)	716	698	738	707	712	727	738	727	728
7	LAB-22 (ES)	864	850	843	823	868	843	827	841	849
	LAB-36 (ES)	900	700	700	900	750	620	1000		811
8	LAB-45 (ES)	698	840	966	702	1053	680	1028	864	612
	LAB-41 (SSMS)	730	600	1000	650	1100				114

LOI (WT%)

	LOI (WT%)									
LAB- 9	4.09	4.04								
* LAB-14	5.56	5.59								
LAB-15	4.20	4.83	4.45	4.34	4.62	4.38	4.89	4.53	4.20	4.5
* LAB-22	8.20	8.26								
LAB-24	4.41	4.14								
LAB-27	4.58	4.47	4.45	4.49	4.50	4.55	4.49	4.51	4.47	4.5
LAB-29	4.29	4.09	3.90	4.23	4.32	4.30	3.98	4.26	3.91	4.3
LAB-50	4.91	4.85	4.85	4.72	4.93					

		LOI (WT%)									
	LAB- 9	11.10	11.06								
	LAB-14	12.58	12.53								
	LAB-15	11.71	11.00	11.42	11.17	11.73	12.01	12.38	11.78	11.70	11.7
*	LAB-22	14.36	14.17								
	LAB-24	11.47	11.52								
5	LAB-27	11.26	11.18	11.18	11.20	11.25	11.47	11.35	11.30	11.45	11.4
6	LAB-29	11.29	11.06	10.98	10.83	10.94	11.34	11.37	11.34	10.70	11.4
	LAB-50	12.04	12.08	12.01	12.13	12.12					

MOISTURE (WT%)

Table 5(b)

Analytical results for reference soil samples S0-3 and S0-4

REFERENCE SOIL SO-3

						ALU
LAB- 6	(AA)	3.19	3.17	3.30	3.23	3.
LAB-21	(AA)	3.10	2.90	2.88	2.85	3.
LAB-21	(AA)	2.88	3.00	3.15	3.00	2.
* LAB-27	(AA)	4.32	3.98	4.07	4.60	
LAB-27	(AA)	3.15	3.12	3.11	3.14	3.
LAB-28	(AA)	3.39	3.39	3.28	3.17	3.
LAB-40	(AA)	3.60	3.00	3.40	3.60	3.
LAB-40	(AA)	3.40	3.80	3.30	3.60	
LAB-43	(AA)	3.33	2.98	2.88	2.75	3.
LAB-46	(AA)	2.76	2.92	2.92	2.76	2.
LAB- 8	(XRF)	3.01	3.01	3.16	2.95	3.
LAB- 9	(XRF)	3.23	3.23	3.25	3.29	3.
LAB-14	(XRF)	2.93	3.06	3.01	3.04	
LAB-15	(XRF)	2.98	3.19	3.24	3.12	3.
LAB-28	(XRF)	3.28	3.07	3.17	2.12	2.
LAB-29	(XRF)	2.87	2.90	2.79	2.86	2.
LAB-22	(ES)	3.36	3.32			
LAB-24	(ES)	3.12	3.15			
LAB- 9	(COLOR)	3.12	3.18	3.08	3.06	3.
LAB-55	(NAA)	2.98	3.02	2.99	3.13	3.
LAB-50	(TITR)	3.01	3.06	3.00	3.07	3.
LAB-29	(GRAV)	3.37	3.38			

REFERENCE SOIL SO-4

ARSENIC (UG/G)

LAB-20	(AA)	2.6	2.5	2.5		
*	LAB- 9 (XRF)	4.0	4.0	3.0	3.0	3
	LAB-11 (COLOR)	2.4	2.4	2.2	2.6	
	LAB-35 (COLOR)	2.7	2.6	2.6	2.6	2
	LAB-49 (COLOR)	2.7	2.7	2.7	2.9	
	LAB- 4 (NAA)	2.0	2.0	2.9	3.5	2
*	LAB-41 (SSMS)	6.0	5.0	3.9	3.9	

ARSENIC (UG/G)

BARIUM (UG/G)

LAB-43 (AA)	324	230	96	107	1
LAB-44 (AA)	256	299	304	295	3
LAB-50 (AA)	310	350	360	375	3
LAB- 8 (XRF)	203	223	229	199	2
LAB-28 (XRF)	160	160			
LAB-22 (ES)	221	217	196	215	1
LAB-24 (ES)	298	296			
LAB-45 (ES)	402	221	378	305	3
LAB- 4 (NAA)	290	258	273	239	2
LAB-55 (NAA)	317	321	333	346	3
LAB-41 (SSMS)	380	340	370	390	2

BARIUM (UG/G)

	* LAB-43 (AA)	781	627	512	479	432	391				
297	LAB-44 (AA)	670	635	684	692	696	698	704	692	667	700
350	LAB-50 (AA)	750	800	775	810	760	750	750	770	800	780
211	LAB- 8 (XRF)	742	741	764	766	768	759	752	738	749	757
	LAB-28 (XRF)	840	860								
216	LAB-22 (ES)	731	704	682	721	723	714	691	728	677	733
	LAB-24 (ES)	634	640								
314	LAB-45 (ES)	930	1027	942	977	993	848	822	899	789	850
226	LAB- 4 (NAA)	710	738	719	734	709	717	723	711	713	723
341	LAB-55 (NAA)	841	871	848	816	812	855	792	885	808	801
	LAB-41 (SSMS)	920	1000	1000	850	780					

BORON (UG/

LAB-36 (ES)	15	20	17	20
LAB-45 (ES)	13	14	14	12
LAB-19 (COLOR)	22	24	28	25
LAB-49 (COLOR)	26	26	27	26
LAR-41 (SSMS)	37	20	44	29

BORON (UG/G)

25	LAB-36 (ES)	55	40	40	40	40	50	40	30	50
26	LAB-45 (ES)	51	50	46	61	55	51	52	56	53
27	LAB-19 (COLOR)	34	27	32	30	26	31	26	33	33
	LAB-49 (COLOR)	44	45	46	44	46	44	45	45	46
	* LAB-41 (SSMS)	150	120	110	130	48				

CADMIUM (UG/G)

CADMIUM (UG.)

CADMIUM (UG/G)

CADMIUM (UG.)

REFERENCE SOIL SO-3

CALCIUM (WT%)														
LAB- 6 (AA)	16.17	16.44	16.52	16.52	16.46	16.40	16.51	16.34	16.50	16.15				
LAB- 9 (AA)	14.97	15.05	15.37	15.22	15.50	15.40	15.21	15.35	15.48	15.32				
LAB-20 (AA)	14.92	14.94												
LAB-21 (AA)	14.50	14.00	14.50	13.50	13.50	14.50	14.50	14.20	13.25	13.25				
LAB-27 (AA)	14.74	14.60	14.73	14.83	14.83	14.86	14.60	14.93	14.83	14.92				
* LAB-28 (AA)	10.58	11.22	10.86	11.29	11.29	11.01	11.14	11.22	11.01	11.01				
LAB-40 (AA)	12.10	11.20	12.50	13.70	14.30	13.50	12.60	12.60	12.00	12.40				
LAB-40 (AA)	16.40	12.80	15.50	13.20										
LAB-43 (AA)	14.95	14.75	14.27	13.78	16.30	10.82	8.69	11.78	10.41					
LAB-46 (AA)	13.90	13.80	13.80	13.80	13.60	13.90	13.90	13.70	13.70	13.40				
LAB-27 (FLAME)	15.50	15.00	15.10	14.20										
LAB- 8 (XRF)	15.66	15.68	15.77	15.90	15.74	15.94	15.84	15.96	15.67	15.80				
LAB- 9 (XRF)	16.52	16.84	16.94	16.73	16.52	16.74	16.89	16.97	16.74	16.91				
LAB-14 (XRF)	15.33	15.35	15.38	15.40										
LAB-15 (XRF)	14.45	13.74	14.37	14.28	14.35	14.02	13.89	13.92	13.79	13.86				
LAB-29 (XRF)	14.56	14.53	14.60	14.53	14.51	14.51	14.49	14.53	14.44	14.57				
LAB-22 (ES)	14.78	14.82												
LAB-24 (ES)	14.52	14.66												
LAB-45 (ES)	15.80	15.20	14.90	16.51	16.11	13.48	15.40	11.27	14.29	15.50				
LAB- 4 (NAA)	16.30	16.90	16.90	16.70	16.80	17.20	16.20	16.90	16.50	16.20				
LAB-50 (TITR)	15.06	15.11	15.11	15.11	15.11									
LAB-29 (GRAV)	15.57	15.29												

REFERENCE SOIL SO-4

CALCIUM (WT%)														
LAB- 6 (AA)	1.22	1.26	1.29	1.26	1.26	1.26	1.26	1.26	1.26	1.26				
LAB- 9 (AA)	1.10	1.09	1.15	1.08	1.12	1.09	1.09	1.08	1.07	1.07				
LAB-20 (AA)	1.10	1.10												
LAB-21 (AA)	1.14	1.10	1.08	1.13	1.13	1.08	1.08	1.08	1.08	1.13				
LAB-27 (AA)	1.10	1.12	1.10	1.10	1.10	1.10	1.10	1.12	1.10	1.10				
* LAB-28 (AA)	1.00	1.21	1.00	1.07	1.00	1.07	1.07	1.07	1.07	1.00				
LAB-40 (AA)	1.31	.99	1.15	1.03	1.05	1.29	1.02	.98	.98	1.00				
LAB-40 (AA)	1.21	1.26	1.21	1.24										
* LAB-43 (AA)	1.08	.98	1.06	1.13	1.08	.97	1.08	1.04	1.05	.69				
LAB-46 (AA)	.88	.90	.94	.92	.92	.92	.92	.92	.92	.90				
LAB-50 (AA)	1.18	1.17	1.18	1.18	1.16									
* LAB-27 (FLAME)	2.12	2.23	2.19	2.20										
LAB- 8 (XRF)	1.16	1.13	1.15	1.16	1.17	1.17	1.16	1.15	1.12	1.15				
LAB- 9 (XRF)	1.30	1.31	1.30	1.30	1.31	1.32	1.30	1.31	1.31	1.31				
LAB-14 (XRF)	1.09	1.09	1.09	1.09	1.09									
LAB-15 (XRF)	1.06	1.04	1.03	1.03	1.08	1.03	.98	.97	.99	.96				
LAB-28 (XRF)	.93	1.00												
LAB-29 (XRF)	1.11	1.10	1.10	1.09	1.08	1.11	1.10	1.09	1.09	1.08				
LAB-22 (ES)	1.21	1.14												
LAB-24 (ES)	1.04	1.03												
LAB-45 (ES)	1.17	1.18	1.11	1.28	1.17	1.15	1.10	1.20	1.15	1.14				
* LAB- 4 (NAA)	1.44	1.53	1.40	1.27	1.45	1.31	1.37	1.43	1.30	1.41				
LAB-29 (GRAV)	1.37	1.15												

CARBON (WT%)														
LAB-21 (COMB)	6.72	6.60	6.75	6.60	6.57	6.67	6.62	6.63	6.56	6.63				
LAB-29 (COMB)	6.49	6.48	6.50	6.51	6.51	6.48	6.48	6.46	6.48					
LAB-40 (COMB)	6.52	6.49	6.42	6.40	6.52	6.48								
LAB-50 (COMB)	6.85	6.82	6.83	6.81	6.80									
* LAB-19 (GC)	7.33	7.51	7.39	7.37	7.51									

CARBON (WT%)														
LAB-27 (TITR)	4.66	4.61												
LAB-21 (COMB)	4.38	4.22	4.30	4.30	4.32	4.40	4.33	4.28	4.15	4.14				
LAB-29 (COMB)	4.23	4.23	4.24	4.26	4.24	4.24	4.23	4.23	4.24	4.24				
LAB-40 (COMB)	4.37	4.28	4.37	4.36	4.36	4.27	4.38							
LAB-50 (COMB)	4.53	4.53	4.53	4.52	4.52	4.44								
LAB-19 (GC)	4.51	4.57	4.59	4.62	4.62									

CERIUM (UG/G)														
LAB- 4 (NAA)	33	33	33	34	33	33	33	32	33					
LAB-55 (NAA)	32	32	32	32	33	32	34	36	36					
LAB-41 (SSMS)	36	40	46	40	35									
LAB- 4 (NAA)	52	53	51	54	52	54	53	51	50	52	51			
LAB-55 (NAA)	58	58	53	52	52	53	51	54	54	52	53			
LAB-41 (SSMS)	60	65	68	110	52									

CHROMIUM (UG/G)														
LAB- 5 (AA)	56.0	57.9	56.6	55.9	56.2	58.5	58.4	58.7	59.1	57.6				
LAB-11 (AA)	58.4	55.0	62.4	62.4	69.5	55.3								
LAB-19 (AA)	54.0	52.0	53.0	57.0	56.0	53.0	53.0	51.0	54.0	54.0				
LAB-21 (AA)	34.0	34.0	34.0	40.5	40.5	40.0	34.5	33.5	35.0	35.0				
LAB-21 (AA)	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0	65.0				
LAB-27 (AA)	34.1	29.6	49.2	45.0										
LAB-29 (AA)	57.0	60.0	63.0	27.0	26.0	23.0	54.0	55.0	58.0	63.0				
LAB-38 (AA)	56.0	56.8	53.0	57.5	56.1	65.6	65.8	66.2	61.5					
LAB-40 (AA)	70.0	72.0	70.0	72.0	78.0	68.0	69.0	74.0	80.0	86.0				
* LAB-40 (AA)	104.0	96.0	96.0	92.0										
LAB-42 (AA)	44.0	37.0	40.0	45.0	40.0	40.0	39.0	39.0	44.0	39.0				
LAB-43 (AA)	63.5	55.0	51.5	52.5	53.0	55.0	42.0	46.9	77.0	45.0				
LAB-44 (AA)	73.0	75.0	71.0	72.0	71.0	74.0	76.0	78.0	75.0	75.0				
LAB-44 (AA)	79.0	77.0	96.0	75.0	72.0	76.0	65.0	85.0	76.0	79.0				
LAB-46 (AA)	51.0	53.0	53.0	53.0	53.0	50.0	50.0	51.0	50.0	49.0				
LAB-52 (AA)	60.0	59.0	58.0	58.0	58.0	59.0	60.0	59.0	59.0	58.0				
LAB-14 (XRF)	68.0	68.0												
LAB-19 (XRF)	72.3	69.0	70.7	63.2	72.5									
LAB-19 (XRF)	63.0	59.0	58.0	60.0	61.0	57.0	62.0	61.0	55.0	60.0				
LAB-22 (ES)	69.0	72.0												
LAB-24 (ES)	51.0	52.0												
LAB-45 (ES)	22.0	20.0	16.0	25.0	19.0	20.0	24.0	26.0	22.0					
LAB-4 (NAA)	26.7	26.8	28.1	28.4	27.4									

REFERENCE SOIL SO-3

COBALT (UG/G)											
LAB- 6 (AA)	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7
LAB-21 (AA)	21.0	21.0	21.5	20.5	20.0	21.0	21.0	21.5	21.5	20.0	
* LAB-27 (AA)	134.0	124.0	125.0	123.0							
LAB-29 (AA)	18.0	18.0	19.5	17.0	16.0	16.5	16.0	15.0	19.0	19.0	
LAB-30 (AA)	4.6	4.5	4.4	4.4							
LAB-35 (AA)	18.5	18.8	18.1	19.5	18.7	18.5	18.3	19.7	18.6	18.2	
LAB-38 (AA)	16.6	16.9	17.1	16.6	16.6	16.9	16.3	15.7	16.5	15.5	
	16.2	16.3									
LAB-39 (AA)	4.0	5.0	6.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
LAB-40 (AA)	30.0	22.0	28.0	21.0	24.0	28.0	21.0	22.0	25.0	22.0	
* LAB-42 (AA)	39.0	49.0	44.0	46.0	47.0	49.0	49.0	39.0	32.0	46.0	
* LAB-43 (AA)	4.5	4.6	3.5	4.4	5.8	4.9	8.5	4.7	3.9		
LAB-44 (AA)	8.0	12.0	8.0	14.0	14.0	12.0	12.0	14.0	12.0	16.0	
LAB-45 (AA)	5.0	4.0	6.0	5.0	6.0	5.0	5.0	6.0	6.0	6.0	
LAB-46 (AA)	22.0	22.0	22.0	23.0	24.0	23.0	23.0	22.0	21.0	21.0	
LAB-47 (AA)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	
LAB-52 (AA)	5.0	6.0	6.0	6.0	7.0	6.0	6.0	6.0	6.0	7.0	
* LAB-24 (ES)	34.0	36.0									
LAB-45 (ES)	9.0	9.0	7.0	7.0	8.0	8.0	7.0	8.0	9.0	8.0	
LAB- 4 (NAA)	4.9	5.0	4.9	5.1	5.0	5.0	4.9	5.0	4.9	4.9	
LAB-55 (NAA)	6.3	6.6	6.1	6.9	6.9	6.9	6.7	8.3	7.2	7.5	
LAB-41 (SSMS)	25.0	18.0	26.0	23.0	22.0						

REFERENCE SOIL SO-4

COBALT (UG/G)											
LAB- 6 (AA)	10.0	9.4	9.4	9.6	9.3	9.4	9.3	9.4	9.3	9.4	
LAB-19 (AA)	22.0	24.0	27.0	29.0	32.0	22.0	26.0	33.0	28.0	31.0	
LAB-21 (AA)	17.8	18.0	18.3	19.0	17.5	17.8	18.0	18.3	20.0	17.5	
* LAB-27 (AA)	122.0	128.0	128.0	140.0							
* LAB-29 (AA)	16.8	16.8	15.3	15.8	16.3	15.4	15.9	14.3	16.9	18.9	
LAB-30 (AA)	9.0	9.0	8.9	8.9							
LAB-35 (AA)	26.1	25.4	26.8	24.0	26.0	23.9	24.1	24.5	25.4	24.8	
LAB-38 (AA)	9.5	9.9	10.1	9.2	9.2	9.1	10.1	10.2	10.0	9.8	
	10.0	10.0									
LAB-39 (AA)	10.0	10.0	10.0	10.0	11.0	10.0	10.0	10.0	9.0	11.0	
LAB-40 (AA)	30.0	27.0	26.0	28.0	30.0	31.0	29.0	25.0	27.0	26.0	
LAB-41 (AA)	7.0	7.0	8.0	9.0	7.0	8.0	8.0	10.0	9.0		
* LAB-42 (AA)	44.0	56.0	50.0	53.0	50.0	50.0	48.0	49.0	44.0	49.0	
LAB-43 (AA)	8.0	8.0	9.2	8.5	8.7	14.0	11.8	12.0	8.7	9.3	
LAB-44 (AA)	26.0	24.0	26.0	24.0	28.0	24.0	26.0	26.0	24.0	28.0	
LAB-45 (AA)	8.0	8.0	8.0	8.0	9.0	8.0	10.0	9.0	8.0		
LAB-46 (AA)	22.0	23.0	22.0	23.0	21.0	22.0	22.0	23.0	22.0	23.0	
LAB-47 (AA)	9.0	9.0	8.0	9.0	9.0	9.0	9.0	9.0	9.0	8.0	
LAB-52 (AA)	10.0	10.0	10.0	10.0	9.0	10.0	9.0	10.0	9.0	10.0	
LAB-14 (XRF)	12.0	12.0									
LAB-28 (XRF)	13.0	12.0									
* LAB-24 (ES)	75.0	43.0									
LAB-45 (ES)	11.0	11.0	9.0	12.0	8.0	10.0	8.0	12.0	10.0	10.0	
LAB- 4 (NAA)	9.4	9.5	9.6	9.7	9.5	9.5	9.5	9.5	9.6	9.5	
LAB-55 (NAA)	15.1	14.7	12.7	12.5	12.8	12.6	12.4	13.7	13.2	13.1	
LAB-41 (SSMS)	13.0	14.0	18.0	10.0	11.0						

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COPPER (UG/G)											
LAB- 5 (AA)	17.9	18.1	17.3	17.5	17.9	16.8	17.1	17.5	17.6	17.4	
LAB- 6 (AA)	21.0	20.0	22.0	21.0	22.0	20.0	21.0	20.0	20.0		
LAB-11 (AA)	14.6	16.6	15.0	16.0	15.3	14.8	14.5	14.6			
LAB-19 (AA)	14.0	17.0	17.0	17.0	18.0	17.0	17.0	17.0			
LAB-20 (AA)	13.0	15.0									
LAB-21 (AA)	15.8	17.0	18.0	11.0	15.0	15.8	18.5	16.5	11.0	16.0	
* LAB-27 (AA)	198.0	219.0	200.0	199.0							
* LAB-28 (AA)	70.0	110.0	100.0	50.0	50.0	80.0	90.0	100.0	80.0		
LAB-30 (AA)	16.0	16.0	15.0	15.0							
LAB-35 (AA)	15.9	16.8	15.9	17.4	16.7	16.5	16.5	15.4	16.2	16.5	
LAB-39 (AA)	16.0	17.0	17.0	15.0	16.0	16.0	17.0	15.0	15.0		
LAB-40 (AA)	18.0	19.0	20.0	21.0	22.0	18.0	18.0	19.0	20.0		
* LAB-40 (AA)	30.0	24.0	25.0	24.0							
LAB-41 (AA)	14.0	15.0	13.0	13.0	15.0	14.0	15.0	13.0	14.0	15.0	
* LAB-42 (AA)	20.0	19.0	18.0	18.0	19.0	20.0	20.0	19.0	16.0	23.0	
* LAB-43 (AA)	14.0	33.5	15.0	13.0	14.0	19.2	16.0	10.7	12.6	16.0	
LAB-44 (AA)	18.0	19.0	17.0	17.0	19.0	19.0	20.0	19.0	16.0	18.0	
LAB-45 (AA)	16.0	18.0	17.0	17.0	18.0	18.0	16.0	16.0	18.0		
LAB-46 (AA)	15.0	13.0	15.0	14.0	13.0	13.0	14.0	13.0	13.0		
LAB-47 (AA)	17.0	17.0	18.0	18.0	17.0	17.0	17.0	18.0			
* LAB-50 (AA)	29.0	31.0	35.0	33.0	35.0	22.0	22.0	24.0	22.0	25.0	
LAB-52 (AA)	17.0	18.0	16.0	17.0	16.0	17.0	17.0	16.0	18.0	17.0	
LAB- 9 (XRF)	21.0	23.0	23.0	23.0	22.0	22.0	22.0	24.0	22.0	22.0	
LAB-14 (XRF)	9.0	9.0									
* LAB-22 (ES)	6.0	9.0	7.0	9.0	11.0	11.0	11.0	8.0	12.0	9.0	
LAB-45 (ES)	14.0	14.0	14.0	14.0	14.0	13.0	16.0	16.0	15.0		
LAB-41 (SSMS)	20.0	22.0	18.0	21.0	18.0						

COPPER (UG/G)											
LAB- 5 (AA)	19.2	18.7	19.2	18.9	18.9	19.2	19.5	19.1	18.9	18.9	
LAB- 6 (AA)	24.0	22.0	22.0	21.0	22.0						
LAB-11 (AA)	19.0	19.2	19.3	19.2	19.2	18.8	19.1				
LAB-19 (AA)	21.0	20.0	20.0	20.0	20.0	22.0	21.0	20.0	21.0	24.0	
LAB-20 (AA)	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	
LAB-21 (AA)	22.0	22.5	23.0	23.0	23.0	21.5	22.0	22.5	23.0	16.0	
* LAB-27 (AA)	93.1	99.0	108.0	90.5							
* LAB-28 (AA)	80.0	80.0	80.0	80.0	70.0	80.0	110.0	80.0	70.0	60.0	
LAB-30 (AA)	17.0	17.0	17.0	17.0							
LAB-35 (AA)	25.2	22.9	21.1	22.1	22.3	23.7	23.1	24.3	24.0	22.1	
LAB-39 (AA)	20.0	20.0	20.0	21.0	21.0	20.0	21.0	20.0	20.0	20.0	
LAB-40 (AA)	22.0	24.0	21.0	24.0	23.0	22.0	23.0	27.0	23.0	23.0	
* LAB-40 (AA)	36.0	33.0	30.0	27.0							
LAB-41 (AA)	21.0	20.0	21.0	19.0	22.0	22.0	19.0	20.0	20.0	20.0	
* LAB-42 (AA)	26.0	28.0	20.0	27.0	20.0	20.0	29.0	30.0	18.0	20.0	
* LAB-43 (AA)	20.0	17.5	20.0	19.5	17.4	20.4	15.6	18.0	21.0		
LAB-44 (AA)	23.0	25.0	25.0	23.0	24.0	22.0	23.0	24.0	24.0	25.0	
LAB-45 (AA)	24.0	23.0	23.0	24.0	23.0	24.0	23.0	22.0	23.0	24.0	
LAB-46 (AA)	19.0	19.0	18.0	19.0	19.0	21.0	19.0	19.0	19.0	19.0	
LAB-47 (AA)	24.0	24.0	24.0	24.0	24.0	22.0	23.0	22.0	23.0	23.0	
LAB-50 (AA)	20.0	21.0	23.0	22.0	24.0	20.0	20.0	23.0	22.0	25.0	
LAB-52 (AA)	22.0	22.0	22.0	21.0	22.0	22.0	22.0	21.0	22.0	22.0	
LAB- 8 (XRF)	20.0	23.0	18.0	36.0	25.0	15.0	30.0	28.0	20.0	20.0	
* LAB- 9 (XRF)	29.0	29.0	30.0	30.0	29.0	30.0	31.0	29.0	29.0	29.0	
* LAB-14 (XRF)	15.0	15.0									
LAB-22 (ES)	25.0	23.0	19.0	25.0	30.0	20.0	28.0	28.0	25.0	20.0	
LAB-45 (ES)	21.0	22.0	23.0	22.0	22.0	21.0	22.0	21.0	22.0	2	

REFERENCE SOIL S0-3

	IRON (WT%)											IRON (WT%)									
LAB- 6 (AA)	1.45	1.45	1.45	1.45	1.45	1.44	1.45	1.43	1.45	1.45	LAB- 6 (AA)	2.32	2.22	2.28	2.22	2.22	2.22	2.22	2.22	2.22	2.22
LAB-20 (AA)	1.55	1.54									LAB-20 (AA)	2.46	2.46								
LAB-21 (AA)	1.70	1.53	1.52	1.36	1.38	1.70	1.55	1.52	1.33	1.38	LAB-21 (AA)	2.50	2.28	2.25	2.10	2.20	2.50	2.28	2.35	2.18	2.20
LAB-21 (AA)	1.32	1.45	1.53	1.55	1.45	1.35	1.45	1.55	1.50	1.50	LAB-21 (AA)	2.20	2.20	2.36	2.28	2.30	2.13	2.20	2.38	2.25	2.30
LAB-27 (AA)	1.50	1.63	1.60	1.81							* LAB-27 (AA)	1.77	1.98	1.70	1.98						
LAB-28 (AA)	1.47	1.61	1.47	1.61	1.61	1.12	1.19	1.26	1.05	1.12	* LAB-28 (AA)	1.89	1.75	1.96	1.89	1.96	2.10	2.17	1.96	1.89	1.96
LAB-35 (AA)	1.64	1.64	1.64	1.64	1.64	1.64	1.64	1.63	1.63	1.64	LAB-35 (AA)	2.49	2.49	2.48	2.49	2.47	2.52	2.48	2.48	2.47	2.50
LAB-40 (AA)	1.50	1.56	1.50	1.47	1.53	1.44	1.55	1.47	1.50	1.50	LAB-40 (AA)	2.25	2.29	2.22	2.21	2.24	2.18	2.29	2.19	2.23	2.27
LAB-40 (AA)	1.56	1.53	1.49	1.43							LAB-40 (AA)	2.19	2.30	2.15	2.26						
LAB-42 (AA)	1.37	1.36	1.32	1.37	1.32	1.37	1.38	1.36	1.37		LAB-42 (AA)	2.10	2.06	2.11	2.14	2.09	2.20	2.13	2.17	2.13	2.17
LAB-43 (AA)	1.73	1.76	1.68	1.65	1.57	1.57	1.37	1.31	1.22	1.55	LAB-43 (AA)	2.78	2.38	2.65	2.70	2.37	2.43	2.46	2.42	2.49	2.31
LAB-46 (AA)	1.22	1.22	1.20	1.20	1.24	1.20	1.20	1.20	1.18	1.21	LAB-46 (AA)	2.22	2.22	2.22	2.23	2.22	2.19	2.21	2.22	2.21	
LAB- 8 (XRF)	1.25	1.25	1.35	1.33	1.26	1.30	1.25	1.28	1.24	1.23	LAB- 8 (XRF)	2.23	2.20	2.26	2.32	2.29	2.34	2.30	2.31	2.27	2.24
LAB- 9 (XRF)	1.61	1.61	1.64	1.63	1.60	1.64	1.66	1.67	1.63	1.66	LAB- 9 (XRF)	2.45	2.47	2.47	2.45	2.45	2.45	2.44	2.44	2.47	2.42
LAB-14 (XRF)	1.50	1.45	1.55	1.48							LAB-14 (XRF)	2.34	2.41	2.43	2.45						
LAB-15 (XRF)	1.53	1.45	1.96	1.80	1.62	1.68	1.57	1.64	1.66	1.72	LAB-15 (XRF)	2.29	2.97	2.69	2.73	2.66	2.57	2.62	2.37	2.77	2.54
LAB-28 (XRF)	1.40	1.26									LAB-28 (XRF)	2.10	2.10								
LAB-29 (XRF)	1.50	1.51	1.55	1.52	1.57	1.50	1.58	1.62	1.52	1.55	LAB-29 (XRF)	2.41	2.42	2.47	2.44	2.39	2.43	2.39	2.55	2.43	2.42
* LAB-22 (ES)	2.04	1.88									LAB-22 (ES)	2.62	2.50								
LAB-24 (ES)	1.61	1.59									LAB-24 (ES)	2.48	2.47								
LAB-45 (ES)	1.49	1.78	1.66	1.85	1.66	1.82	1.71	1.41	1.46	1.78	LAB-45 (ES)	2.69	2.71	2.88	2.74	2.64	2.82	2.79	2.72	2.76	2.57
LAB- 9 (COLOR)	1.66	1.70	1.66	1.68	1.68	1.71	1.69	1.65	1.65	1.65	LAB- 9 (COLOR)	2.30	2.29	2.31	2.30	2.30	2.28	2.29	2.31	2.28	2.26
LAB-27 (COLOR)	1.47	1.52	1.50	1.50	1.53	1.47	1.50	1.50	1.47		LAB-27 (COLOR)	2.36	2.34	2.31	2.31	2.36	2.34	2.39	2.34	2.36	2.31
LAB-29 (COLOR)	1.58	1.56									LAB-29 (COLOR)	2.40	2.38								
LAB-45 (COLOR)	1.50	1.43	1.53	1.53	1.53	1.51	1.54	1.53	1.54	1.53	LAB-45 (COLOR)	2.29	2.29	2.30	2.32	2.29	2.30	2.29	2.34	2.34	
LAB- 4 (NAA)	1.51	1.51	1.53	1.55	1.53	1.51	1.50	1.51	1.47	1.48	LAB- 4 (NAA)	2.30	2.37	2.38	2.38	2.35	2.34	2.36	2.37	2.34	2.38
LAB-55 (NAA)	1.47	1.53	1.48	1.46	1.63	1.65	1.54	1.68	1.72	1.71	LAB-55 (NAA)	2.69	2.64	2.38	2.38	2.38	2.33	2.36	2.47	2.42	2.40
* LAB-46 (TITR)	2.01	1.95	1.95	1.95	1.89	1.89	1.89	1.89	1.95	1.89	* LAB-46 (TITR)	2.81	2.81	2.76	2.81	2.81	2.76	2.76	2.70	2.70	2.76
LAB-50 (TITR)	1.52	1.53	1.52	1.55	1.55						LAB-50 (TITR)	2.36	2.35	2.36	2.43	2.36					

LANTHANUM (UG/G)

* LAB-45 (ES)	48	73	57	57	50	62	53	63	49	55	LAB-45 (ES)	49	42	29	36	37	34	28	31	32	36
LAB- 4 (NAA)	16	16	16	16	16	16	16	17	16	16	LAB- 4 (NAA)	27	28	27	28	28	28	27	27	27	27
LAB-55 (NAA)	18	18	17	17	19	19	18	19	20	19	LAB-55 (NAA)	33	33	31	31	30	30	29	31	30	30
LAB-41 (SSMS)	18	19	21	20	15						LAB-41 (SSMS)	26	39	44	72	24					24

LEAD (UG/G)

LAB- 6 (AA)	5.5	5.5	5.0	5.0	5.5	5.4	5.5	5.4	5.0	5.5	LAB- 6 (AA)	8.7	8.4	8.2	8.4	9.3	8.4	8.4	8.9	8.4	
LAB-19 (AA)	19.0	20.0	20.0	19.0	19.0	20.0	19.0	20.0	19.0	19.0	LAB-19 (AA)	12.0	19.0	20.0	19.0	19.0	19.0	18.0	21.0	20.0	
LAB-20 (AA)	21.0	17.0									LAB-20 (AA)	10.0	6.0								
LAB-21 (AA)	12.5	13.5	15.0	12.5	10.0	13.5	13.5	15.0	14.5	10.0	LAB-21 (AA)	17.5	17.5	16.0	14.5	10.0	17.5	17.5	16.0	14.5	16.0
LAB-24 (AA)	21.0	19.0									LAB-24 (AA)	22.0	26.0								
* LAB-27 (AA)	64.5	69.5	59.9	78.9							* LAB-27 (AA)	77.9	54.3	78.7	60.0						
LAB-28 (AA)	23.0	31.0	15.0	13.0	13.0	22.0	26.0	24.0	19.0	24.0	LAB-28 (AA)	24.0	24.0	19.0	27.0	21.0	25.0	24.0	21.0	20.0	
LAB-29 (AA)	14.5	15.0	15.5	15.5	15.0	16.5	17.0	17.0	12.0	13.5	LAB-29 (AA)	17.8	18.9	16.8	17.8	18.4	16.4	17.9	16.9	17.4	18.4
LAB-30 (AA)	8.6	8.6	8.5	8.5							LAB-30 (AA)	9.3	9.5	9.3	9.3						
LAB-35 (AA)	12.5	12.5	11.9	13.1	11.9	12.5	13.1	11.9	11.9	12.5	LAB-35 (AA)	15.4	14.2	13.7	14.1	14.2	13.3	13.3	13.9	14.2	12.7
* LAB-39 (AA)	40.0	40.0	45.0	40.0	45.0	40.0	40.0	45.0	40.0	40.0	LAB-39 (AA)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	
LAB-40 (AA)	15.0	15.0	17.0	15.0	16.0	12.0	13.0	13.0	17.0	16.0	LAB-40 (AA)	20.0	18.0	18.0	18.0	18.0	21.0	18.0	22.0	20.0	19.0
LAB-40 (AA)	19.0	22.0	20.0	19.0							LAB-40 (AA)	26.0	20.0	28.0	26.0						
* LAB-42 (AA)	29.0	49.0	44.0	46.0	28.0	39.0	30.0	19.0	40.0	54.0	LAB-42 (AA)	18.0	37.0	30.0	18.0	30.0	30.0	29.0	20.0	27.0	20.0
* LAB-43 (AA)	16.0	7.5	5.6	9.0	8.5	5.4	3.9	6.4	5.5	4.9	LAB-43 (AA)	14.0	8.0	7.1	9.5	9.6	8.7	4.3	6.2	9.7	7.2
LAB-44 (AA)	8.0	10.0	8.0	10.0	6.0	8.0	9.0	10.0	9.0	9.0	LAB-44 (AA)	13.0	13.0	13.0	10.0	13.0	10.0	12.0	15.0	10.0	
LAB-45 (AA)	11.0	11.0	13.0	13.0	10.0	10.0	9.0	14.0	13.0	10.0	LAB-45 (AA)	13.0	12.0	14.0	16.0	14.0	12.0	12.0	14.0	15.0	13.0
* LAB-46 (AA)	44.0	45.0	42.0	43.0	42.0	43.0	40.0	41.0	45.0	42.0	LAB-46 (AA)	24.0	25.0	23.0	25.0	25.0	26.0	25.0	25.0	28.0	26.0
LAB-47 (AA)	5.0	3.0	5.0	5.0	9.0	9.0	13.0	9.0	5.0	5.0	LAB-47 (AA)	9.0	9.0	9.0	9.0	9.0	9.0	9.0	5.0	5.0	5.0
LAB-52 (AA)	33.0	32.0	33.0	30.0	28.0	27.0	38.0	32.0	34.0	35.0	LAB-52 (AA)	19.0	20.0	22.0	17.0	20.0	20.0	22.0	23.0	24.0	
LAB- 9 (XRF)	13.0	16.0	15.0	16.0	16.0	14.0	16.0	16.0	12.0	13.0	LAB- 9 (XRF)	15.0	15.0	11.0	13.0	10.0	8.0	15.0	11.0	10.0	14.0
LAB-14 (XRF)	14.0	15.0									LAB-14 (XRF)	18.0	14.0								
LAB-19 (XRF)	13.5	15.5	11.9	14.2	13.8						LAB-19 (XRF)	13.7	11.1	10.3	15.1	11.7					
* LAB-45 (ES)	5.0	42.0	9.0	15.0	13.0	12.0	15.0	4.0	3.0	15.0	LAB-45 (ES)	5.0	8.0	7.0	9.0	9.0					

REFERENCE SOIL SO-3

LITHIUM (UG/G) LITHIUM (UG/G)
 LAB-43 (AA) 4.4 5.1 3.6 4.0 5.0 5.9 5.3 3.9 3.9 LAB-43 (AA) 9 10 7 9 14 13 16 14 13
 LAB-50 (AA) 10.9 10.7 12.2 13.0 12.5 10.9 10.7 12.2 12.0 12.9 LAB-50 (AA) 21 21 20 21 22 21 21 20 20
 LAB-45 (ES) 10.7 10.9 10.4 12.3 12.0 12.6 10.1 10.4 10.8 12.6 LAB-45 (ES) 19 20 21 20 20 19 21 20 20
 * LAB-41 (SSMS) 15.0 9.0 22.0 58.0 36.0 * LAB-41 (SSMS) 92 110 150 42

REFERENCE SOIL SO-4

25

MANGANESE (WT%)

LAB- 5 (AA)	.0527	.0532	.0521	.0520	.0525	.0541	.0536	.0530	.0538	.0541	LAB- 5 (AA)	.0583	.0579	.0585	.0578	.0577	.0590	.0592	.0598	.0600	.0591
LAB- 6 (AA)	.0558	.0556	.0558	.0558	.0558	.0554	.0558	.0552	.0557	.0557	LAB- 6 (AA)	.0671	.0620	.0624	.0625	.0626	.0627	.0625	.0626	.0626	.0627
LAB-19 (AA)	.0557	.0552	.0570	.0549	.0421	.0555	.0543	.0589	.0548	.0343	LAB-19 (AA)	.0588	.0598	.0596	.0600	.0575	.0562	.0580	.0589	.0594	.0571
LAB-20 (AA)	.0540										LAB-20 (AA)	.0640	.0640								
LAB-21 (AA)	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	.0500	LAB-21 (AA)	.0550	.0525	.0525	.0550	.0550	.0550	.0525	.0525	.0500	.0550
LAB-27 (AA)	.0500	.0500	.0500	.0500	.0500						* LAB-27 (AA)	.0400	.0500	.0400	.0400						
LAB-28 (AA)	.0800	.0900	.0800	.0800	.0800	.0900	.0900	.0800	.0800	.0800	LAB-28 (AA)	.0500	.0600	.0500	.0500	.0500	.0700	.0700	.0600	.0800	.0500
LAB-29 (AA)	.0540	.0540									LAB-29 (AA)	.0540	.0540								
LAB-30 (AA)	.0448	.0452	.0448	.0448							LAB-30 (AA)	.0524	.0520	.0516	.0516						
LAB-35 (AA)	.0557	.0557	.0555	.0551	.0551	.0558	.0550	.0551	.0557	.0546	LAB-35 (AA)	.0623	.0613	.0601	.0607	.0605	.0617	.0602	.0611	.0614	.0605
LAB-40 (AA)	.0540	.0496	.0515	.0540	.0530	.0528	.0492	.0518	.0530	.0522	LAB-40 (AA)	.0580	.0558	.0585	.0610	.0590	.0593	.0550	.0560	.0580	.0575
LAB-41 (AA)	.0564	.0521	.0508	.0509	.0541	.0556	.0528	.0505	.0539	.0539	LAB-41 (AA)	.0639	.0604	.0578	.0605	.0645	.0599	.0596	.0594	.0608	
LAB-42 (AA)	.0510	.0510	.0520	.0520	.0540	.0510	.0510	.0520			LAB-42 (AA)	.0540	.0540	.0550	.0580	.0570	.0570	.0560	.0580	.0590	.0570
LAB-43 (AA)	.0478	.0525	.0536	.0504	.0516	.0519	.0513	.0490	.0472	.0427	LAB-43 (AA)	.0514	.0550	.0586	.0519	.0523	.0519	.0581	.0562	.0574	.0450
LAB-44 (AA)	.0559	.0570	.0557	.0546	.0564	.0571	.0573	.0563	.0565	.0563	LAB-44 (AA)	.0564	.0553	.0541	.0543	.0557	.0568	.0553	.0570	.0546	.0555
* LAB-44 (AA)	.0591	.0679	.0679	.0669	.0651	.0677	.0645	.0678	.0660	.0643	LAB-44 (AA)	.0650	.0654	.0645	.0672	.0677	.0688	.0694	.0683	.0677	.0671
LAB-46 (AA)	.0415	.0405	.0400	.0400	.0410	.0400	.0410	.0415	.0415	.0400	* LAB-46 (AA)	.0425	.0435	.0435	.0445	.0440	.0430	.0440	.0440	.0440	.0440
LAB-47 (AA)	.0500	.0510	.0510	.0510	.0520	.0510	.0520	.0520	.0520	.0520	LAB-47 (AA)	.0600	.0610	.0600	.0610	.0600	.0590	.0590	.0600	.0600	.0600
LAB-50 (AA)	.0500	.0500	.0500	.0500	.0500						LAB-50 (AA)	.0600	.0600	.0600	.0600	.0600					
LAB-52 (AA)	.0560	.0550	.0550	.0540	.0540	.0540	.0530	.0540	.0540	.0550	LAB-52 (AA)	.0630	.0610	.0620	.0630	.0620	.0630	.0630	.0630	.0620	.0640
LAB- 8 (XRF)	.0570	.0520	.0520	.0570	.0570	.0570	.0520	.0520	.0570	.0570	LAB- 8 (XRF)	.0680	.0620	.0680	.0740	.0740	.0680	.0680	.0680	.0740	
LAB- 9 (XRF)	.0600	.0600	.0600	.0600	.0600	.0600	.0600	.0600	.0600	.0600	LAB- 9 (XRF)	.0600	.0600	.0600	.0600	.0600	.0600	.0700	.0700	.0600	.0600
LAB-14 (XRF)	.0400	.0500	.0400	.0500							LAB-14 (XRF)	.0500	.0600	.0600	.0500						
LAB-19 (XRF)	.0626	.0610	.0622	.0627	.0618						LAB-19 (XRF)	.0650	.0644	.0652	.0630	.0653					
LAB-29 (XRF)	.0500	.0500	.0500	.0400	.0500	.0500	.0500	.0500	.0500	.0400	LAB-29 (XRF)	.0500	.0600	.0500	.0600	.0700	.0500	.0600	.0600	.0500	.0500
LAB-22 (ES)	.0500	.0500									LAB-22 (ES)	.0700	.0540								
LAB-24 (ES)	.0540	.0620									LAB-22 (ES)	.0500	.0500								
* LAB-45 (ES)	.0428	.0192	.0387	.0305	.0399	.0342	.0414	.0370	.0427	.0312	LAB-45 (ES)	.0581	.0631	.0644	.0651	.0689	.0562	.0609	.0635	.0577	.0642
LAB- 9 (COLOR)	.0600	.0600	.0600	.0500	.0500	.0600	.0600	.0600	.0500	.0500	LAB- 9 (COLOR)	.0700	.0700	.0700	.0700	.0700	.0700	.0700	.0700	.0700	
* LAB-45 (COLOR)	.0521	.0460	.0461	.0478	.0454	.0485	.0476	.0461	.0466	.0457	LAB-45 (COLOR)	.0595	.0595	.0576	.0543	.0563	.0638	.0676	.0664	.0670	.0670
LAB- 4 (NAA)	.0549	.0545	.0539	.0556	.0545	.0540	.0541	.0553	.0535		LAB- 4 (NAA)	.0592	.0599	.0599	.0622	.0607	.0627	.0625	.0616	.0614	.0618
LAB-11 (NAA)	.0506	.0483	.0489	.0493							LAB-11 (NAA)	.0536	.0555	.0539	.0548						
LAB-55 (NAA)	.0520	.0540	.0540	.0580	.0540	.0580	.0620	.0610	.0570	.0580	LAB-55 (NAA)	.0650	.0640	.0610	.0640	.0650	.0630	.0600	.0610	.0610	.0590
* LAB-41 (SSMS)	.0930	.0860	.0740	.0680	.0530						* LAB-41 (SSMS)	.1200	.0550	.0490	.0390	.0450					

REFERENCE SOIL SO-3

MERCURY (UG/G)												
LAB- 6 (AA)	.013	.015	.014	.015	.015	.017	.015	.014	.017	.015		
LAB-11 (AA)	.014	.015	.022	.020	.013	.013	.014	.019	.029	.028		
					.032							
LAB-14 (AA)	.030	.030										
LAB-21 (AA)	.004	.009	.004	.000	.004	.000	.007	.000	.007	.007		
LAB-23 (AA)	.011	.009	.010	.010	.009	.009	.010	.010	.009	.010		
* LAB-27 (AA)	.060	.060	.060	.070								
LAB-30 (AA)	.010	.010	.020	.010								
LAB-38 (AA)	.035	.029	.022	.032	.022	.034	.030	.026	.034	.026		
LAB-40 (AA)	.018	.009	.012	.020	.010	.014						
LAB-45 (AA)	.024	.026	.022	.022	.022	.022	.020	.021	.022			
LAB-46 (AA)	.022	.024	.022	.020	.018	.028	.024	.026	.028	.026		

REFERENCE SOIL SO-4

MERCURY (UG/G)												
LAB- 6 (AA)	.020	.018	.020	.019	.019	.022	.021	.023	.021	.020		
LAB-11 (AA)	.040	.044	.045	.041	.048	.034	.032	.035	.035	.029		
					.050							
LAB-14 (AA)	.050											
LAB-21 (AA)	.025	.024	.024	.024	.024	.025	.025	.025	.023	.023	.024	
LAB-23 (AA)	.027	.022	.022	.024	.024	.026	.026	.024	.031	.027	.029	
* LAB-27 (AA)	.060	.080	.060	.070								
LAB-30 (AA)	.020	.020	.020	.020								
* LAB-38 (AA)	.024	.028	.028	.028	.037	.037	.026	.026	.023	.029	.022	
LAB-40 (AA)	.037	.030	.036	.030	.032							
LAB-45 (AA)	.060	.060	.058	.058	.059	.060	.062	.062	.058	.058	.056	
LAB-46 (AA)	.038	.036	.036	.034	.038	.030	.032	.030	.034	.030		
LAB-52 (AA)	.022	.022	.022	.022	.024	.024	.024	.024	.024	.022	.024	
LAB-55 (NAA)	.063	.063	.051	.057	.046	.044	.042	.049	.043	.043	.043	

MOLYBDENUM (UG/G)												
* LAB-40 (AA)	6.0	6.2	6.0	5.8	6.0	6.6	6.0	6.0	6.0	6.4		
LAB-43 (AA)	3.5	4.2	3.1	2.5								
LAB-46 (AA)	2.0	1.0	1.0	1.0	2.0	2.0	2.0	1.0	1.0			
LAB-41 (SSMS)	1.1	1.3	1.6	.8	1.4							

MOLYBDENUM (UG/G)												
* LAB-40 (AA)	5.0	4.5	4.6	5.0	4.9	3.9	3.8	4.0	4.0	3.9	4.0	
LAB-43 (AA)	2.5	3.0	2.5	2.5								
LAB-46 (AA)	1.0	1.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
LAB-45 (ES)	2.1	1.0	.0	1.0	2.1	1.0	1.0	1.0	1.0	2.1	.0	
LAB-41 (SSMS)	1.0	1.0	1.1	1.1	1.2							

NICKEL (UG/G)												
LAB- 5 (AA)	21.0	20.8	21.2	20.9	21.1	25.0	24.6	25.2	25.7	25.8		
LAB-11 (AA)	14.2	13.0	13.5	13.1	13.4	13.2	12.6	11.6				
LAB-19 (AA)	18.0	16.0	18.0	17.0	17.0	16.0	17.0	17.0	16.0	16.0		
LAB-21 (AA)	10.0	11.5	11.5	12.5	12.5	11.5	11.5	11.5	12.5	12.5		
* LAB-27 (AA)	139.0	129.0	120.0	133.0								
* LAB-28 (AA)	70.0	80.0	80.0	80.0	90.0	80.0	80.0	80.0	90.0			
LAB-29 (AA)	17.0	16.0	15.5	15.0	18.0	17.0	16.5	14.5	15.5	18.5		
LAB-30 (AA)	10.5	10.5	10.5	10.5								
LAB-35 (AA)	28.4	25.2	25.0	28.4	27.6	28.4	27.8	26.5	26.8	27.0		
LAB-38 (AA)	26.1	25.5	25.6	26.3	27.1	27.5	24.3	24.0	24.2	24.5		
	24.3	24.8										
LAB-39 (AA)	28.0	26.0	26.0	27.0	26.0	27.0	26.0	26.0	25.0			
LAB-40 (AA)	15.0	9.0	14.0	15.0	15.0	16.0	12.0	14.0	12.0	17.0		
LAB-40 (AA)	13.0	11.0	19.0	17.0								
LAB-42 (AA)	20.0	19.0	26.0	18.0	28.0	30.0	19.0	24.0	38.0			
LAB-43 (AA)	9.0	8.0	7.1	8.0	8.3	6.7	8.9	8.5	16.5	12.0		
LAB-44 (AA)	22.0	20.0	17.0	20.0	14.0	20.0	22.0	22.0	20.0			
LAB-45 (AA)	11.0	10.0	10.0	10.0	11.0	11.0	9.0	11.0	12.0			
* LAB-46 (AA)	34.0	36.0	31.0	34.0	36.0	32.0	32.0	31.0	30.0			
LAB-47 (AA)	5.0	3.0	5.0	3.0	7.0	7.0	7.0	7.0	7.0			
LAB-50 (AA)	16.0	16.0	12.0	13.0	13.0	19.0	16.0	14.0	13.0	14.0		
LAB-52 (AA)	10.0	10.0	9.0	9.0	8.0	10.0	10.0	9.0	10.0	10.0		
LAB- 8 (XRF)	5.6	12.6	5.8	6.0	6.6	10.4	7.3	9.6	5.7			
LAB- 9 (XRF)	18.0	19.0	17.0	19.0	18.0	16.0	19.0	18.0	19.0			
LAB-14 (XRF)	14.0	15.0										
LAB-22 (ES)	5.0	9.0	7.0	9.0	6.0	10.0	8.0	9.0	7.0	11.0		
* LAB-24 (ES)	34.0	36.0										
LAB-45 (ES)	10.0	10.0	10.0	9.0	10.0	9.0	9.0	8.0	11.0	11.0		
LAB-41 (SSMS)	18.0	22.0	17.0	19.0	16.0							

NICKEL (UG/G)												
LAB- 5 (AA)	24.6	24.5	24.7	24.5	25.1	25.1	24.8	25.6	25.7	24.9		
LAB-11 (AA)	26.2	25.2	26.2	23.4	26.8	24.8	25.2	24.8				
LAB-19 (AA)	23.0	32.0	33.0	35.0	36.0	29.0	33.0	34.0	33.0	34.0		
LAB-21 (AA)	21.5	20.0	21.5	24.0	25.0	20.0	21.5	21.5	25.0	23.0		
* LAB-27 (AA)	112.0	133.0	123.0	125.0								
* LAB-28 (AA)	60.0	90.0	70.0	80.0	90.0	80.0	100.0	90.0	70.0	70.0		
* LAB-29 (AA)	29.0	27.0	26.5	26.0	26.5	25.6	25.6	25.6	25.6	27.6	18.4	
LAB-30 (AA)	22.0	21.5	22.0	21.0	22.0	21.0	21.0	21.0				
LAB-35 (AA)	37.4	37.6	34.0	32.2	33.6	33.0	35.9	37.0	36.1	36.1		
LAB-38 (AA)	23.3	23.1	23.3	23.6	23.3	24.7	23.6	23.6	23.6	23.5		
	23.6	24.7										
LAB-39 (AA)	28.0	30.0	28.0	27.0	28.0	29.0	28.0	27.0	28.0	27.0		
LAB-40 (AA)	20.0	17.0	18.0	15.0	20.0	23.0	17.0	20.0	20.0	20.0	18.0	
LAB-40 (AA)	18.0	19.0	19.0	22.0								
LAB-41 (AA)	27.0	29.0	25.0	28.0	26.0	30.0	27.0	30.0	30.0	31.0		
LAB-42 (AA)	26.0	30.0	53.0	40.0	40.0	48.0	39.0	53.0	30.0			
* LAB-43 (AA)	20.0	15.5	16.3	20.0	18.4	22.6	24.0	15.6	37.0	23.0		
LAB-44 (AA)	36.0	40.0	49.0	49.0	36.0	35.0	37.0	49.0	40.0	36.0		
LAB-45 (AA)	23.0	23.0	22.0	23.0	22.0	23.0	22.0	23.0	22.0	24.0	24.0	
LAB-46 (AA)	33.0	32.0	32.0	33.0	34.0	33.0	32.0	33.0	33.0	33.0	33.0	
LAB-47 (AA)	23.0	23.0	21.0	21.0	23.0	21.0	21.0	23.0	21.0	21.0	21.0	
LAB-48 (AA)	18.0	22.0	22.0	23.0	22.0	23.0	22.0	23.0	22.0	22.0	22.0	
LAB-50 (AA)	18.0	22.0	22.0	23.0	22.0	23.0	22.0	23.0	22.0	22.0	22.0	
LAB-52 (AA)	22.0	23.0	22.0	23.0	23.0	22.0	22.0	23.0	22.0	22.0	22.0	
LAB-8 (XRF)	19.0	18.0	21.0	19.0	20.0	19.0	19.0	17.0	17.0	19.0		
LAB-9 (XRF)	29.0	28.0	32.0	29.0	30.0	32.0	29.0	29.0	29.0	29.0	30.0	
LAB-14 (XRF)	26.0	27.0										
* LAB-28 (XRF)	50.0	60.0										
LAB-22 (ES)	24.0	23.0	22.0	22.0	19.0	20.0	18.0	19.0	18.0	19.0	20.0	

REFERENCE SOIL S0-3

PHOSPHORUS (WT%)													
LAB-43 (AA)	.037	.038	.037	.035	.043	.050	.046	.041	.040	.039			
LAB- 8 (XRF)	.046	.049	.046	.049	.049	.049	.049	.046	.046	.049			
LAB- 9 (XRF)	.050	.050	.050	.050	.050	.060	.060	.060	.060	.060			
LAB- 9 (COLOR)	.050	.050	.050	.050	.050	.050	.050	.050	.050	.050			
LAB-14 (COLOR)	.040	.040											
* LAB-27 (COLOR)	.090	.070	.110	.110									
* LAB-27 (COLOR)	.070	.070											
* LAB-29 (COLOR)	.017	.022											
LAB-38 (COLOR)	.047	.047	.046	.046	.046	.047	.047	.047	.046	.046			
LAB-42 (COLOR)	.041	.040	.040	.040	.042	.041	.041	.041	.040	.040			
* LAB-50 (COLOR)	.070	.060	.060	.060	.060								
LAB-41 (SSMS)	.042	.047	.049	.047	.034								

REFERENCE SOIL S0-4

PHOSPHORUS (WT%)													
LAB-43 (AA)	.084	.087	.086	.094	.087	.087	.087	.087	.087	.087	.075	.098	
LAB- 8 (XRF)	.086	.086	.082	.086	.090	.090	.082	.090	.090	.090	.086	.086	
LAB- 9 (XRF)	.090	.090	.090	.090	.100	.100	.090	.100	.100	.100	.100	.090	
LAB- 9 (COLOR)	.100	.100	.100	.100	.090	.090	.090	.090	.090	.090	.100	.090	
LAB-14 (COLOR)	.070	.080											
* LAB-27 (COLOR)	.120	.120	.140	.110									
* LAB-29 (COLOR)	.031	.026											
LAB-38 (COLOR)	.094	.096	.095	.095	.093	.093	.094	.094	.094	.094	.095	.097	.096
LAB-42 (COLOR)	.079	.081	.080	.080	.080	.080	.082	.081	.081	.081	.079	.081	.081
LAB-50 (COLOR)	.110	.110	.110	.110	.110	.110							
LAB-41 (SSMS)	.140	.077	.088	.066	.061								

POTASSIUM (WT%)

LAB- 6 (AA)	1.03	1.05	1.00	1.05	1.05	1.02	1.05	1.05	1.05	1.06			
LAB- 9 (AA)	1.29	1.31	1.29	1.34	1.35	1.33	1.32	1.31	1.34	1.34			
LAB-20 (AA)	1.12	1.12											
LAB-21 (AA)	1.15	1.10	1.15	1.13	1.15	1.13	1.13	1.15	1.15	1.15			
LAB-27 (AA)	1.16	1.17	1.15	1.21	1.21	1.17	1.19	1.18	1.21	1.21			
LAB-28 (AA)	1.20	1.20	1.10	1.20	1.00	1.10	1.10	1.00	1.10	1.10			
LAB-29 (AA)	1.37	1.38											
LAB-40 (AA)	1.17	1.24	1.17	1.20	1.20	1.16	1.10	1.11	1.20	1.16			
LAB-40 (AA)	1.35	1.19	1.23	1.20									
LAB-43 (AA)	1.20	1.31											
LAB-50 (AA)	1.15	1.15	1.15	1.17	1.14								
LAB-27 (FLAME)	1.22	1.23	1.15	1.20									
LAB- 8 (XRF)	1.18	1.20	1.18	1.18	1.18	1.20	1.21	1.21	1.17	1.18			
LAB- 9 (XRF)	1.07	1.07	1.10	1.09	1.10	1.10	1.10	1.09	1.12	1.04			
LAB-14 (XRF)	1.11	1.10	1.10	1.09									
LAB-15 (XRF)	1.20	1.15	1.23	1.18	1.24	1.18	1.11	1.15	1.12	1.16			
LAB-28 (XRF)	1.10	1.00											
LAB-29 (XRF)	1.03	1.05	1.14	1.05	1.10	1.05	1.04	1.05	1.07	1.06			
LAB-22 (ES)	1.20	1.24											
LAB-24 (ES)	1.12	1.11											
* LAB-45 (ES)	1.21	.85	1.12	1.39	1.47	1.50	1.18	1.11	1.36	1.40			
LAB- 4 (NAA)	1.25	1.31	1.27	1.29	1.24	1.16	1.26	1.36	1.26	1.20			

POTASSIUM (WT%)

LAB- 6 (AA)	1.74	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	1.75	
* LAB- 9 (AA)	1.83	1.81	1.83	1.83	1.83	1.80	1.81	1.81	1.82	1.75	1.81		
LAB-20 (AA)	1.69	1.69											
LAB-21 (AA)	1.78	1.78	1.80	1.80	1.78	1.78	1.80	1.78	1.78	1.80	1.80	1.80	
LAB-27 (AA)	1.69	1.75	1.70	1.73	1.72	1.70	1.75	1.69	1.74	1.73			
LAB-28 (AA)	1.60	1.60	1.60	1.70	1.70	1.70	1.60	1.70	1.70	1.60	1.60	1.70	
* LAB-29 (AA)	1.94	1.93											
LAB-40 (AA)	1.75	1.68	1.70	1.70	1.73	1.70	1.74	1.74	1.74	1.66			
LAB-40 (AA)	1.87	1.74	1.80	1.72									
* LAB-43 (AA)	1.60	2.14											
LAB-50 (AA)	1.69	1.70	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.71			
LAB-27 (FLAME)	1.74	1.72	1.71	1.74									
LAB- 8 (XRF)	1.74	1.78	1.80	1.82	1.86	1.83	1.81	1.82	1.79	1.79	1.79		
LAB- 9 (XRF)	1.73	1.73	1.72	1.72	1.72	1.72	1.60	1.63	1.50	1.73	1.59		
LAB-14 (XRF)	1.69	1.69	1.69	1.70									
LAB-15 (XRF)	1.74	1.72	1.82	1.73	1.92	1.79	1.59	1.72	1.66	1.69	1.66		
LAB-28 (XRF)	1.60	1.70											
LAB-29 (XRF)	1.71	1.74	1.70	1.72	1.73	1.71	1.72	1.73	1.71	1.71	1.69		
LAB-22 (ES)	1.77	1.70											
LAB-24 (ES)	1.75	1.70											
LAB-45 (ES)	1.67	1.96	2.00	1.84	1.70	1.67	1.92	1.79	1.73	1.68	1.71	1.68	
LAB- 4 (NAA)	1.62	1.68	1.85	1.59	1.78	1.59	1.72	1.72	1.80	1.75	1.78		

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RUBIDIUM (UG/G)

LAB- 8 (XRF)	43	43	39	34	49	47	35	36	32	34			
LAB- 9 (XRF)	37	34	41	38	37	35	35	36	35	38			
LAB-14 (XRF)	35	37											
LAB-28 (XRF)	70	70											
LAB-22 (ES)	40	36	39	37	38	37	39	40	39	38			
LAB-45 (ES)	41	47	42	47	45	41	43	40	40	46			
LAB- 4 (NAA)	41	42	40	42	43	39	41	43	39	42			
LAB-41 (SSMS)	45	49	54	40	52								

LAB- 8 (XRF)	76	71	74	65	73	72	70	75	76	67			
LAB- 9 (XRF)	68	69	67	68	69	70	70	68	68	68			
LAB-14 (XRF)	62	67											
LAB-28 (XRF)	120	120											
LAB-22 (ES)	82	81	82	86	84	81	79	80	81	79			
LAB-45 (ES)	55	56	64	63	59	65	63	62	62	61			
LAB- 4 (NAA)	78	79	80	75	75	78	80	80	75	78			
LAB-41 (SSMS)	130	78	97	79	72								

SCANDIUM (UG/G)

LAB- 4 (NAA)	4.9	5.0	5.0	5.1	5.0	4.9	4.9	5.0	4.8	4.9			
LAB-55 (NAA)	5.5	5.6	5.5	5.5	5.9	6.0	5.6	6.1	6.2	6.2			
LAB-41 (SSMS)	7.6	6.0	8.4	13.0	8.0								

LAB- 4 (NAA)	8.0	8.1	8.2	8.2	8.2	8.1	8.1	8.1	8.1	8.1			
LAB-55 (NAA)	10.2	10.2	9.3	9.2	9.3	9.1	9.2</td						

REFERENCE SOIL S0-3

SILICON (WT%)													
LAB-27 (AA)	16.07	16.33	16.36	16.40	16.35	15.97	16.27	16.07	16.01	16.13			
LAB-28 (AA)	15.74	15.65	15.65	15.51	15.79	15.60	15.60	15.79	15.46	15.69			
LAB- 8 (XRF)	15.97	15.92	15.69	15.77	16.00	16.01	15.92	15.91	16.18	16.03			
* LAB- 9 (XRF)	16.84	17.02	17.00	16.91	16.96	16.84	16.99	16.88	16.80	16.94			
LAB-14 (XRF)	15.71	15.49	15.90	15.70									
LAB-15 (XRF)	15.81	15.67	15.67	15.67	15.74	15.39	15.62	15.56	15.51	15.54			
LAB-28 (XRF)	15.55	15.93	15.83	15.51									
LAB-29 (XRF)	16.38	16.26	16.29	16.31	16.22	16.29	16.36	16.29	16.40	16.30			
LAB-24 (ES)	15.47	15.65											
LAB- 9 (COLOR)	15.59	15.53	15.48	15.54	15.49	15.64	15.58	15.62	15.57	15.62			
LAB-29 (GRAV)	15.66	15.71											
LAB-46 (GRAV)	15.96	15.96	15.94	15.90	15.88	16.00	15.96	16.07	16.02	15.99			
LAB-50 (GRAV)	15.93	15.93	15.74	15.79	15.78								

REFERENCE SOIL S0-4

SILICON (WT%)													
LAB-27 (AA)	32.16	32.14	32.14	32.34	32.52	32.36	32.37	32.28	32.37	32.37			
* LAB-28 (AA)	30.22	30.27	30.08	30.45	30.41	29.89	30.54	30.31	28.73	31.06			
LAB- 8 (XRF)	31.99	32.24	32.27	32.02	32.11	32.07	32.05	32.03	32.05	31.95			
LAB- 9 (XRF)	32.56	32.59	32.35	32.35	32.51	32.60	32.83	32.53	32.70	32.77			
LAB-14 (XRF)	31.82	31.82	31.75	31.81									
LAB-15 (XRF)	32.07	31.69	31.84	31.72	31.62	31.56	31.23	31.13	31.11	31.04			
LAB-29 (XRF)	32.45	32.39	32.46	32.44	32.38	32.31	32.47	32.21					
LAB-24 (ES)	32.15	32.26											
LAB- 9 (COLOR)	31.92	31.81	31.90	31.89	31.84	31.73	31.84	31.81	31.76	31.93			
LAB-29 (GRAV)	32.07	31.76											
LAB-46 (GRAV)	31.63	31.89	31.65	31.68	31.65	31.64	31.59	31.63	31.72	31.79			
LAB-50 (GRAV)	31.82	31.89	31.94	31.95	32.00								

SODIUM (WT%)													
LAB- 6 (AA)	.723	.737	.723	.734	.732	.730	.735	.732	.734	.734			
LAB- 8 (AA)	.880	.880	.880	.880	.880	.900	.880	.870	.860				
LAB- 9 (AA)	.700	.710	.730	.740	.750	.730	.720	.700	.740	.770			
LAB-14 (AA)	.780	.780	.780	.780									
LAB-20 (AA)	.730	.720											
LAB-21 (AA)	.750	.750	.750	.750	.750	.760	.770	.750	.750	.750			
* LAB-27 (AA)	.750	.750	.720	.750	.740	.780	.750	.750	.740				
LAB-28 (AA)	.800	.700	.700	.700	.700	.700	.800	.800					
LAB-29 (AA)	.830	.830											
* LAB-40 (AA)	.550	.500	.520	.540	.560	.520	.480	.510	.500	.500			
LAB-40 (AA)	.680	.580	.540	.560									
* LAB-43 (AA)	.900	.900	.934										
LAB-46 (AA)	.580	.580	.580	.580	.560	.580	.580	.660	.620	.600			
LAB-50 (AA)	.720	.710	.700	.700									
LAB-28 (XRF)	.800	.800	.700	.700	.700	.700	.700	.700					
LAB-29 (XRF)	.720	.780	.670	.860	.630	.750	.760	.830	.650				
LAB-22 (ES)	.800	.830											
LAB-24 (ES)	.780	.790											
LAB- 4 (NAA)	.742	.739	.750	.747	.756	.754	.744	.744	.741	.727			
LAB-55 (NAA)	.670	.690	.700	.710	.720	.760	.800	.760	.740	.720			

STRONTIUM (UG/G)													
LAB- 6 (AA)	214	213	214	214	212	214	212	214	214	214			
LAB-21 (AA)	250	250	255	250	255	250	250	250	250	245			
LAB-43 (AA)	203	221	143	134	148	196							
LAB-50 (AA)	190	188	190	188	188	190	193	188	193	190			
LAB- 8 (XRF)	183	179	179	180	177	181	166	172	172	183			
LAB- 9 (XRF)	239	241	238	239	238	239	242	239	237				
LAB-29 (XRF)	200	200	100	100	200	200	100	100	100				
LAB-22 (ES)	246	247	251	247	251	248	247	250	250	249			
LAB-24 (ES)	227	223											
LAB-45 (ES)	276	237	281	281	282	284	303	258	256	259			
LAB-41 (SSMS)	210	260	300	260	240								

STRONTIUM (UG/G)													
LAB- 6 (AA)	181	187	187	187	187	187	187	187	187	187			
LAB-21 (AA)	180	180	175	175	175	180	185	185	175	175			
LAB-28 (AA)	190	160	180	200	210	200	230	215	230	230			
LAB-43 (AA)	128	118	113	124	73	142							
LAB-50 (AA)	150	143	149	153	155	150	149	153	155	155			
LAB- 8 (XRF)	125	119	124	129	113	137	132	130	121	131			
LAB- 9 (XRF)	174	173	172	173	176	180	176	176	173	177			
* LAB-28 (XRF)	260	250											
* LAB-29 (XRF)	300	300	300	300	200	200	300	300	300	300			
LAB-22 (ES)	193	195	193	194	192	188	186	193	190	187			
LAB-24 (ES)	142	144											
LAB-45 (ES)	176	189	187	196	186	191	198	193	182	196			
LAB- 4 (NAA)	158	153	162	155	152	158	162	155	167	158			
LAB-41 (SSMS)	240	170	200	160	190								

THORIUM (UG/G)													
LAB- 4 (NAA)	4.0	4.3	4.2	4.2	4.2	4.0	4.1	4.1	4.0	3.9			
LAB-55 (NAA)	3.4	3.5	3.3	3.4	3.7	3.6	3.4	3.7	3.6	3.7			
LAB-41 (SSMS)	2.8	4.7	4.5	4.1	4.4								

REFERENCE SOIL SO-3

TITANIUM (WT%)																			
* LAB-2I (AA)	.31	.31	.30	.25	.26	.31	.30	.30	.25	.25	LAB-21 (AA)	.37	.38	.34	.32	.38	.34	.32	.33
LAB-21 (AA)	.20	.20	.22	.20	.20	.21	.20	.21	.20	.20	LAB-21 (AA)	.33	.33	.35	.35	.33	.35	.32	.33
* LAB-28 (AA)	.18	.18	.18	.18	.18	.18	.18	.18	.24	.18	LAB-28 (AA)	.30	.24	.30	.30	.24	.30	.24	.30
LAB-43 (AA)	.20	.19	.19	.20	.20	.17					LAB-43 (AA)	.37	.28	.26	.29	.27	.24		
LAB-B (XRF)	.15	.15	.15	.15	.15	.15	.15	.14	.14	.15	LAB-8 (XRF)	.38	.37	.36	.38	.38	.38	.38	.37
LAB-9 (XRF)	.21	.21	.22	.21	.21	.21	.21	.21	.21	.21	LAB-9 (XRF)	.34	.34	.34	.35	.34	.34	.34	.34
LAB-14 (XRF)	.18	.18	.18	.19							LAB-14 (XRF)	.32	.33	.33	.33				
LAB-15 (XRF)	.20	.21	.21	.20	.22	.20	.20	.20	.20	.21	LAB-15 (XRF)	.35	.35	.35	.35	.35	.35	.34	.35
* LAB-28 (XRF)	.18	.18	.12	.18							LAB-28 (XRF)	.30	.24						
LAB-29 (XRF)	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18	LAB-29 (XRF)	.34	.34	.34	.34	.34	.34	.34	.34
LAB-22 (ES)	.19	.18									LAB-22 (ES)	.35	.34						
LAB-24 (ES)	.24	.24									LAB-24 (ES)	.35	.35						
* LAB-45 (ES)	.31	.33	.29	.41	.31	.36	.32	.35	.31	.31	LAB-45 (ES)	.43	.39	.38	.41	.43	.42	.40	.41
LAB-9 (COLOR)	.23	.23	.23	.23	.23	.23	.21	.22	.23	.23	LAB-9 (COLOR)	.32	.32	.32	.33	.33	.33	.32	.33
LAB-27 (COLOR)	.20	.21	.22	.21	.22	.19	.21	.21	.21	.20	LAB-27 (COLOR)	.35	.35	.33	.33	.35	.34	.35	.34
* LAB-29 (COLOR)	.31	.37									LAB-29 (COLOR)	.39	.37						
LAB-50 (COLOR)	.20	.20	.20	.19	.19						LAB-50 (COLOR)	.33	.34	.33	.35	.34			
LAB-55 (NAA)	.16	.20	.18	.19	.17	.18	.20	.19	.17	.16	LAB-55 (NAA)	.37	.30	.31	.30	.34	.31	.30	.29

REFERENCE SOIL SO-4

TITANIUM (WT%)																			
LAB-21 (AA)	.37	.38	.38	.34	.32	.38	.34	.34	.38	.34	LAB-21 (AA)	.33	.33	.35	.35	.33	.35	.32	.33
LAB-28 (AA)	.30	.24	.30	.30	.30	.30	.30	.30	.30	.30	LAB-28 (AA)	.30	.24	.30	.30	.24	.30	.24	.30
LAB-43 (AA)	.37	.28	.26	.29	.27	.27	.27	.27	.27	.27	LAB-43 (AA)	.38	.37	.36	.38	.38	.38	.38	.37
LAB-8 (XRF)	.38	.37	.36	.38	.38	.38	.38	.38	.38	.38	LAB-8 (XRF)	.34	.34	.34	.34	.34	.34	.34	.34
LAB-9 (XRF)	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	LAB-9 (XRF)	.34	.34	.34	.34	.34	.34	.34	.34
LAB-14 (XRF)	.32	.33	.33	.33	.33	.33	.33	.33	.33	.33	LAB-14 (XRF)	.35	.35	.33	.33	.35	.34	.35	.34
LAB-15 (XRF)	.35	.35	.35	.35	.35	.35	.35	.35	.35	.35	LAB-15 (XRF)	.35	.35	.35	.35	.35	.35	.35	.35
LAB-28 (XRF)	.30	.24									LAB-28 (XRF)	.30	.24						
LAB-29 (XRF)	.34	.34	.34	.34	.34	.34	.34	.34	.34	.34	LAB-29 (XRF)	.34	.34	.34	.34	.34	.34	.34	.34
LAB-22 (ES)	.35	.34									LAB-22 (ES)	.35	.34						
LAB-24 (ES)	.35	.35									LAB-24 (ES)	.35	.35						
LAB-45 (ES)	.43	.39	.38	.41	.43	.43	.41	.43	.42	.42	LAB-45 (ES)	.43	.39	.38	.41	.43	.42	.40	.41
LAB-9 (COLOR)	.32	.32	.32	.32	.32	.32	.32	.32	.32	.32	LAB-9 (COLOR)	.32	.32	.32	.32	.32	.32	.32	.32
LAB-27 (COLOR)	.35	.35	.33	.33	.33	.33	.33	.33	.33	.33	LAB-27 (COLOR)	.35	.35	.33	.33	.35	.34	.35	.33
LAB-50 (COLOR)	.33	.34	.33	.34	.33	.33	.33	.33	.33	.33	LAB-50 (COLOR)	.33	.34	.33	.33	.34	.34	.33	.34
LAB-55 (NAA)	.37	.30	.31	.30	.31	.30	.31	.30	.31	.30	LAB-55 (NAA)	.37	.30	.31	.30	.34	.31	.30	.29
LAB-41 (SSMS)	1.0	1.4	1.4	1.6	1.4	1.4	1.4	1.4	1.4	1.4	LAB-41 (SSMS)	2.6	1.9	2.3	3.2	3.0			

URANIUM (UG/G)																			
LAB-4 (NAA)	.7	.7	.8	.8	.7	.8	.8	.8	.8	.8	LAB-4 (NAA)	1.7	2.0	1.9	1.8	2.0	2.0	1.9	2.3
LAB-55 (NAA)	1.3	.9	1.1	1.5	1.1	1.1	1.5	1.2	1.1	1.4	LAB-55 (NAA)	2.9	2.8	2.1	2.2	2.9	2.4	2.5	2.6
LAB-41 (SSMS)	1.0	1.4	1.4	1.6	1.4	1.4	1.4				LAB-41 (SSMS)	2.6	1.9	2.3	3.2	3.0			

VANADIUM (UG/G)																			
LAB-29 (AA)	48	50	46	38	35	33	40	33	45	50	LAB-29 (AA)	82	85	82	72	74	78	82	77
LAB-42 (AA)	98	78	97	73	67	68	69	87	56	84	LAB-42 (AA)	120	110	150	120	130	130	110	130
LAB-43 (AA)	48	47	61	34	43	40	30	29	28	85	LAB-43 (AA)	106	95	107	84	100	93	84	88
LAB-8 (XRF)	28	26	23	32	25	20	30	23	20	27	LAB-8 (XRF)	85	103	97	90	80	92	95	94
LAB-14 (XRF)	32	34									LAB-14 (XRF)	80	81						
LAB-28 (XRF)	40	40									LAB-28 (XRF)	110	110						
LAB-24 (ES)	55	56									LAB-24 (ES)	82	90	90	82	80	90		
LAB-45 (ES)	67	58	59	66	68	49	61	66	64	63	LAB-45 (ES)	75	77	75	103	72	79	68	96
LAB-3B (COLOR)	28	30	29	27	27	28	32	31	32	30	LAB-3B (COLOR)	82	82	83	82	84	83	77	78
	31	31									LAB-3B (COLOR)	74	74						
LAB-50 (COLOR)	31	33	32	31	33						LAB-50 (COLOR)	82	80	81	85	82			
LAB-55 (NAA)	34	38	38	38	38	36	36	38	40	34	LAB-55 (NAA)	76	72	70	76	75	101	101	99
LAB-41 (SSMS)	44	40	43	49	32	32					LAB-41 (SSMS)	180	100	120	79	68	99	97	92

YTTRIUM (UG/G)																			
LAB-9 (XRF)	15	14	13	14	14	15	15	17	15	15	LAB-9 (XRF)	22	22	18	19	23	20	23	20
LAB-14 (XRF)	12	14									LAB-14 (XRF)	19	20						
LAB-22 (ES)	17	17	14	16	18	18	16	16	17	15	LAB-22 (ES)	22	24	23	22	25	27	22	24
* LAB-45 (ES)	48	30	41	36	50	55	31	51	53	29	LAB-45 (ES)	26	24	23	22	21	22	22	24
LAB-41 (SSMS)	19	16	21	20	21						LAB-41 (SSMS)	34	21	32	30	21			

See legend and note on p 30

REFERENCE SOIL SO-3

	ZINC (UG/G)									
LAB- 5 (AA)	45	44	47	48	48	54	46	54	48	51
LAB- 6 (AA)	52	52	52	52	52	52	54	54	54	52
LAB-11 (AA)	60	56	55	51	53	53	55	54	56	55
LAB-19 (AA)	55	58	60	55	54	56	56	59	67	55
LAB-20 (AA)	42	39								
LAB-21 (AA)	55	50	55	50	50	55	50	55	50	
* LAB-27 (AA)	70	73	80	72						
LAB-30 (AA)	49	48	49	49						
LAB-35 (AA)	52	51	52	51	52	50	50	51	48	51
LAB-39 (AA)	49	49	49	51	50	51	50	48	49	50
LAB-40 (AA)	58	71	64	67	71	50	72	64	70	
* LAB-40 (AA)	77	68	67	68						
LAB-42 (AA)	49	49	44	46	47	49	59	39	48	
LAB-43 (AA)	58	56	50	53	53	51	47	53	46	45
LAB-44 (AA)	52	53	50	46	50	49	48	47	49	47
LAB-45 (AA)	71	53	59	57	63	60	56	57	58	62
LAB-46 (AA)	48	48	48	48	42	50	46	45	46	47
LAB-47 (AA)	57	61	61	58	58	54	57	59	55	59
LAB-50 (AA)	58	57	61	60	62	56	53	60	54	53
LAB-52 (AA)	55	54	54	54	54	52	52	52	52	52
LAB- 8 (XRF)	54	51	40	45	46	48	50	44	45	49
LAB- 9 (XRF)	46	50	46	46	48	47	46	44	48	46
LAB-14 (XRF)	50	48								
LAB-19 (XRF)	55	48	52	49	53					
LAB-22 (ES)	42	43	45	45	44	44	45	43	44	40
* LAB-45 (ES)	70	43	51	82	45	45	56	36	34	14
LAB- 4 (NAA)	51	58	54	53	56	58	56	53	55	59
LAB-41 (SSMS)	53	77	59	52	46					

REFERENCE SOIL SO-4

	ZINC (UG/G)									
* LAB- 5 (AA)	70	65	68	68	69	69	65	65	68	67
LAB- 6 (AA)	96	84	84	84	84	84	82	82	84	84
LAB-11 (AA)	97	95	91	105	98	99	93	93	95	95
LAB-19 (AA)	105	96	99	100	99	104	112	112	100	99
LAB-20 (AA)	88	92								
LAB-21 (AA)	95	90	90	95	95	95	90	90	95	95
LAB-27 (AA)	107	105	106	109						
LAB-30 (AA)	84	83	82	82						
LAB-35 (AA)	93	94	95	93	92	95	95	97	97	94
LAB-39 (AA)	93	93	93	89	90	93	94	92	89	89
LAB-40 (AA)	92	114	98	110	112	90	111	107	114	110
* LAB-40 (AA)	114	110	112	116						
LAB-42 (AA)	79	94	80	80	80	80	87	79	80	79
* LAB-43 (AA)	91	90	94	89	91	93	88	84	111	84
LAB-44 (AA)	93	94	91	91	99	93	90	93	90	105
LAB-45 (AA)	102	99	103	104	100	99	99	99	103	102
LAB-46 (AA)	91	92	90	90	92	93	93	94	93	93
LAB-47 (AA)	101	104	100	104	100	97	97	104	102	102
LAB-50 (AA)	90	83	89	88	89	83	77	86	83	83
LAB-52 (AA)	98	98	98	97	96	97	97	98	97	97
LAB- 8 (XRF)	87	84	85	88	84	87	90	90	95	91
LAB- 9 (XRF)	91	90	90	91	92	93	92	93	91	92
LAB-14 (XRF)	94	97								
LAB-19 (XRF)	101	103	104	103	102					
LAB-22 (ES)	98	100	101	101	98	98	97	99	100	99
LAB-45 (ES)	96	93	96	96	96	98	113	95	97	100
LAB- 4 (NAA)	90	94	94	95	90	91	96	93	93	92
LAB-41 (SSMS)	78	85	100	78	85					

OC

ZIRCONIUM (UG/G)

	ZIRCONIUM (UG/G)									
LAB- 8 (XRF)	136	143	137	149	144	157	140	147	149	163
LAB- 9 (XRF)	148	139	146	142	161	145	143	148	152	160
LAB-22 (ES)	177	177	185	190	177	176	168	177	185	181
LAB-36 (ES)	160	160	145	130	130	100	120			
LAB-45 (ES)	156	100	72	115	78	76	93	159	115	86
LAB-41 (SSMS)	170	180	120	200	160					

ZIRCONIUM (UG/G)

	ZIRCONIUM (UG/G)									
LAB- 8 (XRF)	254	256	263	251	250	274	268	261	278	268
LAB- 9 (XRF)	274	288	272	273	267	268	278	276	262	281
LAB-22 (ES)	322	327	326	334	327	316	323	321	318	327
LAB-36 (ES)	270	200	250	280	300	250	170	250		
LAB-45 (ES)	333	446	336	346	326	412	356	378	592	317
LAB-41 (SSMS)	260	250	410	390	500					

LOI (WT%)

	LOI (WT%)									
LAB- 9	25.22	25.22								
LAB-14	25.47	25.50								
* LAB-15	26.28	25.64	25.31	25.11	25.45	25.34	25.55	25.37	25.20	25.44
LAB-22	25.56	25.64								
LAB-24	25.20	25.09								
LAB-27	25.08	25.10	25.00	25.08	25.37	25.10	25.31	25.30	25.23	25.25
LAB-29	25.38	25.26	25.06	25.48	25.30	25.31	25.35	25.25	25.21	25.27
LAB-50	25.62	25.64	25.62	25.34	25.37					

LOI (WT%)

	LOI (WT%)									
LAB- 9	10.19	10.18								
LAB-14	10.63	10.67								
LAB-15	10.91	10.74	10.21	10.43	10.65	10.57	10.39	10.33	10.36	
* LAB-22	13.18	13.09								
LAB-24	10.28	10.84								
LAB-27	10.39	10.47	10.45	10.47	10.56	10.35	10.40	10.35	10.38	10.40
LAB-29	10.28	9.98	10.18	10.27	10.18	10.25	10.14	10.25	10.06	10.52
LAB-50	10.86	10.78	10.81	10.77	10.67					

MOISTURE (WT%)

	MOISTURE (WT%)									
LAB-22	.28	.31								
LAB-24	.34	.33								
LAB-29	.37	.52	.38	.46	.36	.33	.53	.39	.46	.32
LAB-55	.26	.32								

	MOISTURE (WT%)									
LAB-22	2.41	2.41								
LAB-24	2.66	2.16								
LAB-29	3.58	3.51	3.26	3.38	3.24	3.08	3.57	3.32	3.52	3.01
LAB-55	2.82	2.95								

Legend: AA - atomic absorption; FLAME - flame emission; XRF - X-ray fluorescence; ES - emission spectroscopy;

COLOR - colorimetry (absorptiometry); NAA - neutron activation analysis; TITR - titrimetry;

GRAV - gravimetry; SSMS - spark source mass spectrometry; COMB - combustion; GC - gas chromatography.

* - Indicates set in which one or more values are gross outliers and were not used in computations.

NOTE: This table does not give the raw data for certain elements, such as most rare earths, for which there is insufficient data for certification or for useful comparisons to be made among methods. For such elements, however, overall means are given in Table 4.

Table 6
Particle size analysis (wet screen)

Size of fraction (μm)	SO-1	SO-2	SO-3	SO-4
	wt %			
+74	6.7	0.1	-	0.2
-74 +55	1.2	0.6	0.1	3.4
-55 +46	2.9	7.8	7.4	10.8
-46 +37	1.1	7.0	4.6	7.2
-37	88.1	84.5	87.9	78.4

APPENDIX A

Participating Laboratories

- Alberta Institute of Pedology, University of Alberta, Edmonton, Alberta.
- Alberta Research Council, Edmonton, Alberta.
- Bondar-Clegg and Company Limited, Ottawa, Ontario.
- Canada Centre for Mineral and Energy Technology, Mineral Sciences Laboratories, Department of Energy, Mines and Resources, Ottawa, Ontario (three independent analysts).
- Centre de Recherche Petrographiques et Geochimiques, Centre National de la Recherche Scientifique, Vandoeuvres-les-Nancy, France.
- Chemistry and Biology Research Institute, Agriculture Canada, Ottawa, Ontario.
- Commonwealth Scientific and Industrial Research Organization, Division of Mineral Chemistry, Port Melbourne, Victoria, Australia.
- Department of Mines, Australia, South Launceston, Tasmania, Australia.
- European Economic Community Research Laboratories, Ispra, Italy.
- Geological Survey of Czechoslovakia, Prague, Czechoslovakia.
- Geological Survey of Israel, Geochemistry Department, Jerusalem, Israel.
- Geological Survey of Japan, Kawasaki, Japan.
- Geological Survey of Norway, Chemistry Division, Trondheim, Norway.
- Imperial College of Science and Technology, Department of Geology, London, England.
- Inco Limited, Analytical Services, Process Technology, Copper Cliff, Ontario.
- Inco Limited, Geological Research, Field Exploration, Copper Cliff, Ontario.
- Institute for Geological Sciences, London, England.
- Kansas State University, Department of Geology, Manhattan, Kansas.
- Kyoto University, Faculty of Agriculture, Kyoto, Japan.
- Land Resource Research Institute, Agriculture Canada, Ottawa, Ontario.
- Macaulay Institute for Soil Research, Aberdeen Scotland.
- Manitoba Department of Mines, Resources and Environmental Management, Geological Surveys Branch, Winnipeg, Manitoba.
- Ministry of Natural Resources, Mineral Research Branch, Toronto, Ontario.
- National Institute of Agricultural Sciences, Department of Soils and Fertilizers, Tokyo, Japan.
- National Research Council, Physical and Chemical Science Laboratories, Ottawa, Ontario.
- Norges Landbrukskole, Ås, Norway.
- Ontario Ministry of Environment, Laboratories Branch, Rexdale, Ontario.
- Rijksuniversiteit, Laboratorium voor Analytische en Agrochemie, Gent, Belgium.
- Rijksuniversiteit, Laboratorium voor Fysische Aardrijkskunde en Bodemkunde, Gent, Belgium.
- Rothamsted Experimental Station, Pedology Department, Harpenden, Herts., England.
- Royal Tropical Institute, Tropical Soils Division, Department of Agricultural Research, Amsterdam, Netherlands.
- The Hebrew University of Jerusalem, The Levi Eshkol School of Agriculture, Rehovot, Israel.
- University of Oslo, Institute for Geology, Oslo, Norway.
- University of Wisconsin, Department of Soil Science, Madison, Wisconsin, U.S.A.
- University of Wisconsin, Nuclear Reactor Laboratory, Madison, Wisconsin, U.S.A.
- Water Quality Branch, Department of Fisheries and the Environment, Burlington, Ontario (two independent analysts).