Appendix 4: Analytical Methods and Reporting Limits

Table 1-1a. Analytical methods and reporting limits for water analyses.

[mg/L, milligrams per Liter; µg/L, micrograms per Liter; *na*, not analyzed]

Activation Laboratories HR ICP–MS (2007-2009)			Activation Laboratories HR ICP–MS (2010)		
Element	Reporting Limit	Units	Element	Reporting Limit	Units
Ag	0.002	µg/L	Ag	0.001	µg/L
Al	*na*	*na*	Al	2	µg/L
As	0.04	µg/L	As	0.01	µg/L
Au	0.007	µg/L	Au	*na*	*na*
B	2.0	µg/L	B	0.3	µg/L
Ba	0.004	µg/L	Ba	0.04	µg/L
Be	0.001	µg/L	Be	0.002	µg/L
Bi	0.0003	µg/L	Bi	0.001	µg/L
Ca	0.005	µg/L	Ca	14	µg/L
Cd	0.0003	µg/L	Cd	0.001	µg/L
Ce	0.002	µg/L	Ce	0.002	µg/L
Co	0.001	µg/L	Co	0.002	µg/L
Cr	0.006	µg/L	Cr	0.01	µg/L
Cs	0.001	µg/L	Cs	0.001	µg/L
Cu	0.01	µg/L	Cu	0.01	µg/L
Dy	0.00003	µg/L	Dy	0.0005	µg/L
Er	0.00002	µg/L	Er	0.0003	µg/L
Eu	0.00003	µg/L	Eu	0.0004	µg/L
Fe	0.1	µg/L	Fe	0.3	µg/L
Ga	0.001	µg/L	Ga	0.001	µg/L
Gd	0.00003	µg/L	Gd	0.0003	µg/L
Ge	0.001	µg/L	Ge	0.002	µg/L
Hf	0.00001	µg/L	Hf	0.0002	µg/L
Hg	0.04	µg/L	Hg	0.001	µg/L
Ho	0.00001	µg/L	Ho	0.0003	µg/L
In	0.0001	µg/L	In	0.001	µg/L
K	1.0	µg/L	K	1	µg/L
La	0.002	µg/L	La	0.003	µg/L
Li	0.03	µg/L	Li	0.04	µg/L
Lu	0.00001	µg/L	Lu	0.0005	µg/L
Mg	0.2	µg/L	Mg	1	µg/L
Mn	0.1	µg/L	Mn	0.03	µg/L
Mo	0.004	µg/L	Mo	0.02	µg/L
Na	20	µg/L	Na	2	µg/L
Nb	0.0001	µg/L	Nb	0.0003	µg/L
Nd	0.0001	µg/L	Nd	0.001	µg/L
Ni	0.05	µg/L	Ni	0.2	µg/L
P	*na*	*na*	P	*na*	*na*
Pb	0.003	µg/L	Pb	0.01	µg/L
Pr	0.00003	µg/L	Pr	0.0005	µg/L
Rb	0.04	µg/L	Rb	0.003	µg/L
Re	0.0001	µg/L	Re	0.001	µg/L
Sb	0.001	µg/L	Sb	0.02	µg/L
Sc	0.01	µg/L	Sc	0.04	µg/L
Se	3.0	µg/L	Se	1	µg/L
SiO2	*na*	*na*	SiO2	*na*	*na*
Sm	0.0003	µg/L	Sm	0.0002	µg/L
Sn	0.006	µg/L	Sn	0.05	µg/L
SO4	*na*	*na*	SO4	*na*	*na*
Sr	0.01	µg/L	Sr	0.03	µg/L
Ta	0.0005	µg/L	Ta	0.0002	µg/L
Tb	0.00002	µg/L	Tb	0.0005	µg/L

Table 1-1a. Analytical methods and reporting limits for water analyses—Continued.

Activation Laboratories HR ICP–MS (2007-2009)			Activation Laboratories HR ICP–MS (2010)		
Element	Reporting Limit	Units	Element	Reporting Limit	Units
Te	0.001	µg/L	Te	0.001	µg/L
Th	0.00002	µg/L	Th	0.00005	µg/L
Ti	0.01	µg/L	Ti	0.1	µg/L
Tl	0.0001	µg/L	Tl	0.001	µg/L
Tm	0.0001	µg/L	Tm	0.0002	µg/L
U	0.0001	µg/L	U	0.0005	µg/L
V	0.0004	µg/L	V	0.0005	µg/L
W	0.001	µg/L	W	0.001	µg/L
Y	0.0003	µg/L	Y	0.001	µg/L
Yb	0.00005	µg/L	Yb	0.001	µg/L
Zn	0.4	µg/L	Zn	1	µg/L
Zr	0.001	µg/L	Zr	0.001	µg/L

Table 1-1b. Analytical methods and reporting limits for water analyses.

[mg/L, milligrams per Liter; µg/L, micrograms per Liter; *na,* not analyzed]

USGS ICP–MS			USGS ICP–AES		
Element	Reporting Limit	Units	Element	Reporting Limit	Units
Ag	2	µg/L	Ag	5	µg/L
Al	2	µg/L	Al	20	µg/L
As	1	µg/L	As	50	µg/L
Au	*na*	*na*	Au	*na*	*na*
B	*na*	*na*	B	5	µg/L
Ba	0.2	µg/L	Ba	1	µg/L
Be	0.05	µg/L	Be	10	µg/L
Bi	0.2	µg/L	Bi	*na*	*na*
Ca	0.2	mg/L	Ca	0.1	mg/L
Cd	0.02	µg/L	Cd	5	µg/L
Ce	0.01	µg/L	Ce	*na*	*na*
Co	0.02	µg/L	Co	10	µg/L
Cr	1	µg/L	Cr	10	µg/L
Cs	0.02	µg/L	Cs	*na*	*na*
Cu	0.5	µg/L	Cu	10	µg/L
Dy	0.005	µg/L	Dy	*na*	*na*
Er	0.005	µg/L	Er	*na*	*na*
Eu	0.005	µg/L	Eu	*na*	*na*
Fe	50	µg/L	Fe	20	µg/L
Ga	0.05	µg/L	Ga	*na*	*na*
Gd	0.005	µg/L	Gd	*na*	*na*
Ge	0.05	µg/L	Ge	*na*	*na*
Hf	*na*	*na*	Hf	*na*	*na*
Hg	*na*	*na*	Hg	*na*	*na*
Ho	0.005	µg/L	Ho	*na*	*na*
In	*na*	*na*	In	*na*	*na*
K	0.03	mg/L	K	0.1	mg/L
La	0.01	µg/L	La	*na*	*na*
Li	0.9	µg/L	Li	5	µg/L
Lu	0.1	µg/L	Lu	*na*	*na*
Mg	0.01	mg/L	Mg	0.1	mg/L
Mn	0.2	µg/L	Mn	10	µg/L
Mo	2	µg/L	Mo	20	µg/L
Na	0.5	mg/L	Na	0.1	mg/L
Nb	0.2	µg/L	Nb	*na*	*na*

Table 1-1b. Analytical methods and reporting limits for water analyses—Continued.

Element	USGS ICP–MS Reporting Limit	Units	Element	USGS ICP–AES Reporting Limit	Units
Nd	0.01	µg/L	Nd	*na*	*na*
Ni	0.4	µg/L	Ni	10	µg/L
P	0.01	mg/L	P	0.5	mg/L
Pb	0.05	µg/L	Pb	50	µg/L
Pr	0.01	µg/L	Pr	*na*	*na*
Rb	0.01	µg/L	Rb	*na*	*na*
Re	*na*	*na*	Re	*na*	*na*
Sb	0.3	µg/L	Sb	50	µg/L
Sc	0.6	µg/L	Sc	*na*	*na*
Se	1	µg/L	Se	200	µg/L
SiO2	0.2	mg/L	SiO2	0.1	mg/L
Sm	0.01	µg/L	Sm	*na*	*na*
Sn	*na*	*na*	Sn	*na*	*na*
SO4	2	mg/L	SO4	1	mg/L
Sr	0.5	µg/L	Sr	1	µg/L
Ta	0.02	µg/L	Ta	*na*	*na*
Tb	0.005	µg/L	Tb	*na*	*na*
Te	*na*	*na*	Te	*na*	*na*
Th	0.2	µg/L	Th	*na*	*na*
Ti	0.5	µg/L	Ti	50	µg/L
Tl	0.1	µg/L	Tl	*na*	*na*
Tm	0.005	µg/L	Tm	*na*	*na*
U	0.1	µg/L	U	*na*	*na*
V	0.5	µg/L	V	10	µg/L
W	0.5	µg/L	W	*na*	*na*
Y	0.01	µg/L	Y	*na*	*na*
Yb	0.005	µg/L	Yb	*na*	*na*
Zn	0.5	µg/L	Zn	20	µg/L
Zr	0.2	µg/L	Zr	*na*	*na*

Table 1-2. U.S. Geological Survey reporting limits for anions, alkalinity, dissolved organic carbon, and ferrous iron and mercury analyses of water.

[mg/L, milligrams per Liter; µg/L, micrograms per Liter; *na,* not analyzed]

Analyte	USGS Laboratories Reporting Limit	Units
Cl^-	0.08	mg/L
Fl^-	0.08	mg/L
NO_3^-	0.08	mg/L
SO_4^{-2}	0.08	mg/L
Alkalinity	3	mg/L
DOC	0.1	mg/L
Ferrous iron	5	µg/L
Hg(CVAAS)	0.02	µg/L
Hg(CVAFS)	0.005	µg/L

Table 1-3a. Analytical methods and reporting limits for soil analyses.

[ppm, parts per million; ppb, parts per billion; *na*, not analyzed]

USGS De-Ionized Water Leach			Activation Laboratories Bioleach			Skyline Labs Enzyme Leach		
Element	Reporting Limit	Units	Element	Reporting Limit	Units	Element	Reporting Limit	Units
Ag	20	ppb	Ag	0.2	ppb	Ag	0.1	ppb
Al	0.1	ppm	Al	*na*	*na*	Al	0.5	ppm
As	20	ppb	As	0.5	ppb	As	0.1	ppb
Au	*na*	*na*	Au	0.05	ppb	Au	0.005	ppb
B	*na*	*na*	B	*na*	*na*	B	*na*	*na*
Ba	8	ppb	Ba	1	ppb	Ba	0.5	ppb
Be	1	ppb	Be	0.1	ppb	Be	0.1	ppb
Bi	4	ppb	Bi	0.1	ppb	Bi	0.5	ppb
Br	*na*	*na*	Br	5	ppb	Br	1	ppb
Ca	4	ppm	Ca	*na*	*na*	Ca	0.5	ppm
Cd	0.4	ppb	Cd	0.05	ppb	Cd	0.1	ppb
Ce	0.2	ppb	Ce	0.02	ppb	Ce	0.01	ppb
Cl	*na*	*na*	Cl	*na*	*na*	Cl	1000	ppb
Co	0.4	ppb	Co	0.1	ppb	Co	0.2	ppb
Cr	20	ppb	Cr	2	ppb	Cr	3	ppb
Cs	0.4	ppb	Cs	0.01	ppb	Cs	0.01	ppb
Cu	10	ppb	Cu	0.5	ppb	Cu	1	ppb
Dy	0.1	ppb	Dy	0.01	ppb	Dy	0.01	ppb
Er	0.1	ppb	Er	0.01	ppb	Er	0.01	ppb
Eu	0.1	ppb	Eu	0.01	ppb	Eu	0.01	ppb
Fe	1	ppm	Fe	*na*	*na*	Fe	1	ppm
Ga	1	ppb	Ga	0.1	ppb	Ga	0.3	ppb
Gd	0.1	ppb	Gd	0.03	ppb	Gd	0.01	ppb
Ge	1	ppb	Ge	0.05	ppb	Ge	0.05	ppb
Hf	*na*	*na*	Hf	0.04	ppb	Hf	0.01	ppb
Hg	*na*	*na*	Hg	0.05	ppb	Hg	0.1	ppb
Ho	0.1	ppb	Ho	0.01	ppb	Ho	0.01	ppb
I	*na*	*na*	I	1	ppb	I	0.5	ppb
In	*na*	*na*	In	0.1	ppb	In	0.01	ppb
K	0.6	ppm	K	*na*	*na*	K	5	ppm
La	0.2	ppb	La	0.01	ppb	La	0.01	ppb
Li	2	ppb	Li	0.2	ppb	Li	0.5	ppb
Lu	2	ppb	Lu	0.01	ppb	Lu	0.01	ppb
Mg	0.2	ppm	Mg	*na*	*na*	Mg	2	ppm
Mn	4	ppb	Mn	0.1	ppb	Mn	0.4	ppb
Mo	40	ppb	Mo	2	ppb	Mo	0.1	ppb
Na	0.1	ppm	Na	*na*	*na*	Na	5	ppm
Nb	4	ppb	Nb	0.2	ppb	Nb	0.1	ppb
Nd	0.2	ppb	Nd	0.03	ppb	Nd	0.01	ppb
Ni	8	ppb	Ni	0.2	ppb	Ni	1	ppb
Os	*na*	*na*	Os	1	ppb	Os	0.5	ppb
P	0.2	ppm	P	*na*	*na*	P	*na*	*na*
Pb	1	ppb	Pb	0.1	ppb	Pb	0.1	ppb
Pd	*na*	*na*	Pd	0.5	ppb	Pd	0.5	ppb
Pr	0.2	ppb	Pr	0.01	ppb	Pr	0.01	ppb
Pt	*na*	*na*	Pt	0.5	ppb	Pt	0.5	ppb
Rb	0.2	ppb	Rb	0.1	ppb	Rb	0.1	ppb
Re	*na*	*na*	Re	0.01	ppb	Re	0.005	ppb
Rh	*na*	*na*	Rh	*na*	*na*	Rh	*na*	*na*
Ru	*na*	*na*	Ru	0.05	ppb	Ru	0.5	ppb
SO4	40	ppm	S	*na*	*na*	S	10	ppm
Sb	6	ppb	Sb	0.2	ppb	Sb	0.01	ppb
Sc	12	ppb	Sc	0.2	ppb	Sc	10	ppb
Se	20	ppb	Se	1	ppb	Se	1	ppb

Table 1-3a. Analytical methods and reporting limits for soil analyses—Continued.

USGS De-Ionized Water Leach			Activation Laboratories Bioleach			Skyline Labs Enzyme Leach		
Element	Reporting Limit	Units	Element	Reporting Limit	Units	Element	Reporting Limit	Units
Sm	0.2	ppb	Sm	0.03	ppb	Sm	0.01	ppb
Sn	*na*	*na*	Sn	*na*	*na*	Sn	0.2	ppb
Sr	10	ppb	Sr	0.1	ppb	Sr	0.1	ppb
Ta	0.4	ppb	Ta	0.01	ppb	Ta	0.02	ppb
Tb	0.1	ppb	Tb	0.01	ppb	Tb	0.01	ppb
Te	*na*	*na*	Te	1	ppb	Te	0.5	ppb
Th	4	ppb	Th	0.02	ppb	Th	0.01	ppb
Ti	10	ppb	Ti	*na*	*na*	Ti	10	ppb
Tl	2	ppb	Tl	0.2	ppb	Tl	0.005	ppb
Tm	0.1	ppb	Tm	0.01	ppb	Tm	0.01	ppb
U	2	ppb	U	0.01	ppb	U	0.01	ppb
V	10	ppb	V	1	ppb	V	0.1	ppb
W	10	ppb	W	0.01	ppb	W	0.1	ppb
Y	0.2	ppb	Y	0.02	ppb	Y	0.05	ppb
Yb	0.1	ppb	Yb	0.02	ppb	Yb	0.01	ppb
Zn	10	ppb	Zn	2	ppb	Zn	5	ppb
Zr	4	ppb	Zr	0.5	ppb	Zr	0.1	ppb

Table 1-3b. Analytical methods and reporting limits for soil analyses.

[ppm, parts per million; ppb, parts per billion; *na*, not analyzed]

Skyline Labs TerraSol Leach			SGS Minerals MMI Leach			ALS Minerals Cold Hydroxylamine HCl		
Element	Reporting Limit	Units	Element	Reporting Limit	Units	Element	Reporting Limit	Units
Ag	20	ppb	Ag	1	ppb	Ag	0.002	ppm
Al	500	ppb	Al	1	ppm	Al	1.0	ppm
As	5	ppb	As	10	ppb	As	0.1	ppm
Au	0.1	ppb	Au	0.1	ppb	Au	0.05	ppm
B	*na*	*na*	B	*na*	*na*	B	2	ppm
Ba	10	ppb	Ba	10	ppb	Ba	0.05	ppm
Be	0.5	ppb	Be	*na*	*na*	Be	0.05	ppm
Bi	0.5	ppb	Bi	1	ppb	Bi	0.005	ppm
Br	*na*	*na*	Br	*na*	*na*	Br	2.0	ppm
Ca	0.5	ppm	Ca	10	ppm	Ca	10	ppm
Cd	0.5	ppb	Cd	1	ppb	Cd	0.01	ppm
Ce	0.5	ppb	Ce	5	ppb	Ce	0.005	ppm
Cl	20000	ppb	Cl	*na*	*na*	Cl	*na*	*na*
Co	0.5	ppb	Co	5	ppb	Co	0.05	ppm
Cr	40	ppb	Cr	100	ppb	Cr	0.05	ppm
Cs	0.1	ppb	Cs	*na*	*na*	Cs	0.005	ppm
Cu	5	ppb	Cu	10	ppb	Cu	0.05	ppm
Dy	0.1	ppb	Dy	1	ppb	Dy	0.005	ppm
Er	0.06	ppb	Er	0.5	ppb	Er	0.005	ppm
Eu	0.05	ppb	Eu	0.5	ppb	Eu	0.005	ppm
Fe	1	ppm	Fe	1	ppm	Fe	5.0	ppm
Ga	0.5	ppb	Ga	*na*	*na*	Ga	0.05	ppm
Gd	0.4	ppb	Gd	1	ppb	Gd	0.005	ppm
Ge	0.1	ppb	Ge	*na*	*na*	Ge	0.1	ppm
Hf	0.1	ppb	Hf	*na*	*na*	Hf	0.01	ppm
Hg	0.1	ppb	Hg	*na*	*na*	Hg	0.1	ppm
Ho	0.02	ppb	Ho	*na*	*na*	Ho	0.005	ppm
I	*na*	*na*	I	*na*	*na*	I	0.1	ppm
In	0.2	ppb	In	*na*	*na*	In	0.005	ppm

Table 1-3b. Analytical methods and reporting limits for soil analyses—Continued.

Skyline Labs TerraSol Leach			SGS Minerals MMI Leach			ALS Minerals Cold Hydroxylamine HCl		
Element	**Reporting Limit**	**Units**	**Element**	**Reporting Limit**	**Units**	**Element**	**Reporting Limit**	**Units**
K	5	ppm	K	*na*	*na*	K	5.0	ppm
La	1	ppb	La	1	ppb	La	0.005	ppm
Li	0.5	ppb	Li	5	ppb	Li	0.05	ppm
Lu	0.2	ppb	Lu	*na*	*na*	Lu	0.005	ppm
Mg	2	ppm	Mg	1	ppm	Mg	1.0	ppm
Mn	5	ppb	Mn	*na*	*na*	Mn	0.1	ppm
Mo	1	ppb	Mo	5	ppb	Mo	0.01	ppm
Na	5	ppm	Na	*na*	*na*	Na	10	ppm
Nb	0.4	ppb	Nb	0.5	ppb	Nb	0.01	ppm
Nd	0.2	ppb	Nd	1	ppb	Nd	0.005	ppm
Ni	10	ppb	Ni	5	ppb	Ni	0.05	ppm
Os	0.1	ppb	Os	*na*	*na*	Os	*na*	*na*
P	*na*	*na*	P	*na*	*na*	P	5.0	ppm
Pb	5	ppb	Pb	10	ppb	Pb	0.1	ppm
Pd	1	ppb	Pd	1	ppb	Pd	*na*	*na*
Pr	0.2	ppb	Pr	1	ppb	Pr	0.005	ppm
Pt	1	ppb	Pt	1	ppb	Pt	*na*	*na*
Rb	0.5	ppb	Rb	5	ppb	Rb	0.01	ppm
Re	0.05	ppb	Re	*na*	*na*	Re	0.001	ppm
Rh	5	ppb	Rh	*na*	*na*	Rh	*na*	*na*
Ru	0.2	ppb	Ru	*na*	*na*	Ru	*na*	*na*
S	10	ppm	S	*na*	*na*	S	*na*	*na*
Sb	1	ppb	Sb	1	ppb	Sb	0.005	ppm
Sc	50	ppb	Sc	5	ppb	Sc	*na*	*na*
Se	20	ppb	Se	*na*	*na*	Se	0.5	ppm
Sm	0.1	ppb	Sm	1	ppb	Sm	0.005	ppm
Sn	10	ppb	Sn	1	ppb	Sn	0.05	ppm
Sr	1	ppb	Sr	10	ppb	Sr	0.05	ppm
Ta	0.1	ppb	Ta	1	ppb	Ta	0.01	ppm
Tb	*na*	*na*	Tb	1	ppb	Tb	0.005	ppm
Te	10	ppb	Te	10	ppb	Te	0.05	ppm
Th	0.05	ppb	Th	0.5	ppb	Th	0.01	ppm
Ti	20	ppb	Ti	3	ppb	Ti	1.0	ppm
Tl	0.5	ppb	Tl	0.5	ppb	Tl	0.005	ppm
Tm	0.05	ppb	Tm	*na*	*na*	Tm	0.005	ppm
U	0.05	ppb	U	1	ppb	U	0.005	ppm
V	5	ppb	V	*na*	*na*	V	0.05	ppm
W	10	ppb	W	1	ppb	W	0.01	ppm
Y	0.2	ppb	Y	5	ppb	Y	0.005	ppm
Yb	0.1	ppb	Yb	1	ppb	Yb	0.005	ppm
Zn	20	ppb	Zn	20	ppb	Zn	0.2	ppm
Zr	0.4	ppb	Zr	5	ppb	Zr	*na*	*na*

Table 1-3c. Analytical methods and reporting limits for soil analyses.

[%, percent; ppm, parts per million; ppb, parts per billion; *na*, not analyzed]

ALS Minerals Ionic Leach			ALS Minerals Sodium Pyrophosphate Leach			ACME Labs Aqua Regia Leach (2007)		
Element	Reporting Limit	Units	Element	Reporting Limit	Units	Element	Reporting Limit	Units
Ag	0.1	ppb	Ag	0.002	ppm	Ag	0.1	ppm
Al	*na*	*na*	Al	1	ppm	Al	0.01	%
As	2	ppb	As	0.1	ppm	As	0.5	ppm
Au	0.02	ppb	Au	0.05	ppm	Au	0.0005	ppm
B	*na*	*na*	B	2	ppm	B	20	ppm
Ba	10	ppb	Ba	0.05	ppm	Ba	1	ppm
Be	0.2	ppb	Be	0.05	ppm	Be	*na*	*na*
Bi	3	ppb	Bi	0.005	ppm	Bi	0.1	ppm
Br	0.05	ppm	Br	2	ppm	Br	*na*	*na*
Ca	0.2	ppm	Ca	10	ppm	Ca	0.01	%
Cd	1	ppb	Cd	0.01	ppm	Cd	0.1	ppm
Ce	0.1	ppb	Ce	0.005	ppm	Ce	*na*	*na*
Cl	*na*	*na*	Cl	*na*	*na*	Cl	*na*	*na*
Co	0.3	ppb	Co	0.05	ppm	Co	0.1	ppm
Cr	1	ppb	Cr	0.05	ppm	Cr	1	ppm
Cs	0.1	ppb	Cs	0.005	ppm	Cs	*na*	*na*
Cu	1	ppb	Cu	0.05	ppm	Cu	0.1	ppm
Dy	0.1	ppb	Dy	0.005	ppm	Dy	*na*	*na*
Er	0.1	ppb	Er	0.005	ppm	Er	*na*	*na*
Eu	0.1	ppb	Eu	0.005	ppm	Eu	*na*	*na*
Fe	0.1	ppm	Fe	5	ppm	Fe	0.01	%
Ga	0.5	ppb	Ga	0.05	ppm	Ga	1	ppm
Gd	0.1	ppb	Gd	0.005	ppm	Gd	*na*	*na*
Ge	0.2	ppb	Ge	0.1	ppm	Ge	*na*	*na*
Hf	0.5	ppb	Hf	0.01	ppm	Hf	*na*	*na*
Hg	0.1	ppb	Hg	0.1	ppm	Hg	0.01	ppm
Ho	0.1	ppb	Ho	0.005	ppm	Ho	*na*	*na*
I	0.01	ppm	I	0.1	ppm	I	*na*	*na*
In	0.1	ppb	In	0.005	ppm	In	*na*	*na*
K	*na*	*na*	K	5	ppm	K	0.01	%
La	0.1	ppb	La	0.005	ppm	La	1	ppm
Li	0.2	ppb	Li	0.05	ppm	Li	*na*	*na*
Lu	0.1	ppb	Lu	0.005	ppm	Lu	*na*	*na*
Mg	0.01	ppm	Mg	1	ppm	Mg	0.01	%
Mn	0.01	ppm	Mn	0.1	ppm	Mn	1	ppm
Mo	0.5	ppb	Mo	0.01	ppm	Mo	0.1	ppm
Na	*na*	*na*	Na	10	ppm	Na	0.001	%
Nb	0.1	ppb	Nb	0.01	ppm	Nb	*na*	*na*
Nd	0.1	ppb	Nd	0.005	ppm	Nd	*na*	*na*
Ni	1	ppb	Ni	0.05	ppm	Ni	0.1	ppm
Os	*na*	*na*	Os	*na*	*na*	Os	*na*	*na*
P	*na*	*na*	P	5	ppm	P	0.001	%
Pb	1	ppb	Pb	0.1	ppm	Pb	0.1	ppm
Pd	*na*	*na*	Pd	*na*	*na*	Pd	*na*	*na*
Pr	0.1	ppb	Pr	0.005	ppm	Pr	*na*	*na*
Pt	*na*	*na*	Pt	*na*	*na*	Pt	*na*	*na*
Rb	0.1	ppb	Rb	0.01	ppm	Rb	*na*	*na*
Re	0.1	ppb	Re	0.001	ppm	Re	*na*	*na*
Rh	*na*	*na*	Rh	*na*	*na*	Rh	*na*	*na*
Ru	*na*	*na*	Ru	*na*	*na*	Ru	*na*	*na*
S	*na*	*na*	S	*na*	*na*	S	0.05	%
Sb	0.5	ppb	Sb	0.005	ppm	Sb	0.1	ppm
Sc	*na*	*na*	Sc	*na*	*na*	Sc	0.1	ppm
Se	2	ppb	Se	0.5	ppm	Se	0.5	ppm
Sm	0.1	ppb	Sm	0.005	ppm	Sm	*na*	*na*

Table 1-3c. Analytical methods and reporting limits for soil analyses—Continued.

ALS Minerals Ionic Leach			ALS Minerals Sodium Pyrophosphate Leach			ACME Labs Aqua Regia Leach (2007)		
Element	Reporting Limit	Units	Element	Reporting Limit	Units	Element	Reporting Limit	Units
Sn	0.2	ppb	Sn	0.05	ppm	Sn	*na*	*na*
Sr	1	ppb	Sr	0.05	ppm	Sr	1	ppm
Ta	1	ppb	Ta	0.01	ppm	Ta	*na*	*na*
Tb	0.1	ppb	Tb	0.005	ppm	Tb	*na*	*na*
Te	1	ppb	Te	0.05	ppm	Te	*na*	*na*
Th	0.02	ppb	Th	0.01	ppm	Th	0.1	ppm
Ti	5	ppb	Ti	1	ppm	Ti	0.001	%
Tl	0.5	ppb	Tl	0.005	ppm	Tl	0.1	ppm
Tm	0.1	ppb	Tm	0.005	ppm	Tm	*na*	*na*
U	0.1	ppb	U	0.005	ppm	U	0.1	ppm
V	*na*	*na*	V	0.05	ppm	V	2	ppm
W	1	ppb	W	0.01	ppm	W	0.1	ppm
Y	0.1	ppb	Y	0.005	ppm	Y	*na*	*na*
Yb	0.1	ppb	Yb	0.005	ppm	Yb	*na*	*na*
Zn	10	ppb	Zn	0.2	ppm	Zn	1	ppm
Zr	0.1	ppb	Zr	0.05	ppm	Zr	*na*	*na*

Table 1-3d. Analytical methods and reporting limits for soil analyses.

[%, percent; ppm, parts per million; ppb, parts per billion; *na*, not analyzed]

ACME Labs Aqua Regia Leach (2008-09)			SGS Minerals ICPAES-MS42 4-Acid Digestion			SGS Minerals ICPAES-MS55 Sinter Digestion		
Element	Reporting Limit	Units	Element	Reporting Limit	Units	Element	Reporting Limit	Units
Ag	2	ppb	Ag	1.0	ppm	Ag	1.0	ppm
Al	0.001	%	Al	0.01	%	Al	0.01	%
As	0.1	ppm	As	1.0	ppm	As	30	ppm
Au	0.2	ppb	Au	*na*	*na*	Au	*na*	*na*
B	1	ppm	B	*na*	*na*	B	*na*	*na*
Ba	0.5	ppm	Ba	5.0	ppm	Ba	0.5	ppm
Be	0.1	ppm	Be	0.1	ppm	Be	5.0	ppm
Bi	0.02	ppm	Bi	0.04	ppm	Bi	0.1	ppm
Br	*na*	*na*	Br	*na*	*na*	Br	*na*	*na*
Ca	0.001	%	Ca	0.01	%	Ca	0.01	%
Cd	0.01	ppm	Cd	0.1	ppm	Cd	0.2	ppm
Ce	0.01	ppm	Ce	0.05	ppm	Ce	0.1	ppm
Cl	*na*	*na*	Cl	*na*	*na*	Cl	*na*	*na*
Co	0.1	ppm	Co	0.1	ppm	Co	0.5	ppm
Cr	0.5	ppm	Cr	1.0	ppm	Cr	10	ppm
Cs	0.02	ppm	Cs	0.05	ppm	Cs	0.1	ppm
Cu	0.01	ppm	Cu	0.5	ppm	Cu	5.0	ppm
Dy	*na*	*na*	Dy	*na*	*na*	Dy	0.05	ppm
Er	*na*	*na*	Er	*na*	*na*	Er	0.05	ppm
Eu	*na*	*na*	Eu	*na*	*na*	Eu	0.05	ppm
Fe	0.001	%	Fe	0.01	%	Fe	0.01	%
Ga	0.1	ppm	Ga	0.05	ppm	Ga	1.0	ppm
Gd	*na*	*na*	Gd	*na*	*na*	Gd	0.05	ppm
Ge	0.1	ppm	Ge	*na*	*na*	Ge	1.0	ppm
Hf	0.02	ppm	Hf	*na*	*na*	Hf	1.0	ppm
Hg	5	ppb	Hg	*na*	*na*	Hg	*na*	*na*
Ho	*na*	*na*	Ho	*na*	*na*	Ho	0.05	ppm
I	*na*	*na*	I	*na*	*na*	I	*na*	*na*
In	0.02	ppm	In	0.02	ppm	In	0.2	ppm
K	0.001	%	K	0.01	%	K	0.01	%
La	0.5	ppm	La	0.5	ppm	La	0.1	ppm

Table 1-3d. Analytical methods and reporting limits for soil analyses—Continued.

ACME Labs Aqua Regia Leach (2008-09)			SGS Minerals ICPAES-MS42 4-Acid Digestion			SGS Minerals ICPAES-MS55 Sinter Digestion		
Element	Reporting Limit	Units	Element	Reporting Limit	Units	Element	Reporting Limit	Units
Li	0.1	ppm	Li	1.0	ppm	Li	10	ppm
Lu	*na*	*na*	Lu	*na*	*na*	Lu	0.05	ppm
Mg	0.01	%	Mg	0.01	%	Mg	0.01	%
Mn	1	ppm	Mn	5.0	ppm	Mn	10	ppm
Mo	0.01	ppm	Mo	0.05	ppm	Mo	2.0	ppm
Na	0.001	%	Na	0.01	%	Na	*na*	*na*
Nb	0.02	ppm	Nb	0.1	ppm	Nb	1.0	ppm
Nd	*na*	*na*	Nd	*na*	*na*	Nd	0.1	ppm
Ni	0.1	ppm	Ni	0.5	ppm	Ni	5.0	ppm
Os	*na*	*na*	Os	*na*	*na*	Os	*na*	*na*
P	0.001	%	P	50	ppm	P	0.01	%
Pb	0.01	ppm	Pb	0.5	ppm	Pb	5.0	ppm
Pd	10	ppb	Pd	*na*	*na*	Pd	*na*	*na*
Pr	*na*	*na*	Pr	*na*	*na*	Pr	0.05	ppm
Pt	2	ppb	Pt	*na*	*na*	Pt	*na*	*na*
Rb	0.1	ppm	Rb	*na*	*na*	Rb	0.2	ppm
Re	1	ppb	Re	*na*	*na*	Re	*na*	*na*
Rh	*na*	*na*	Rh	*na*	*na*	Rh	*na*	*na*
Ru	*na*	*na*	Ru	*na*	*na*	Ru	*na*	*na*
S	0.01	%	S	0.01	%	S	*na*	*na*
Sb	0.02	ppm	Sb	0.05	ppm	Sb	0.1	ppm
Sc	0.1	ppm	Sc	0.1	ppm	Sc	5.0	ppm
Se	0.1	ppm	Se	*na*	*na*	Se	*na*	*na*
Sm	*na*	*na*	Sm	*na*	*na*	Sm	0.1	ppm
Sn	0.02	ppm	Sn	0.1	ppm	Sn	1.0	ppm
Sr	0.5	ppm	Sr	0.5	ppm	Sr	0.1	ppm
Ta	0.05	ppm	Ta	*na*	*na*	Ta	0.5	ppm
Tb	*na*	*na*	Tb	*na*	*na*	Tb	0.1	ppm
Te	0.02	ppm	Te	0.1	ppm	Te	*na*	*na*
Th	0.1	ppm	Th	0.2	ppm	Th	0.1	ppm
Ti	0.001	%	Ti	0.01	%	Ti	0.01	%
Tl	0.02	ppm	Tl	0.1	ppm	Tl	0.5	ppm
Tm	*na*	*na*	Tm	*na*	*na*	Tm	0.05	ppm
U	0.01	ppm	U	0.1	ppm	U	0.05	ppm
V	2	ppm	V	1.0	ppm	V	5.0	ppm
W	0.01	ppm	W	0.1	ppm	W	1.0	ppm
Y	0.01	ppm	Y	0.1	ppm	Y	0.5	ppm
Yb	*na*	*na*	Yb	*na*	*na*	Yb	0.1	ppm
Zn	0.1	ppm	Zn	1.0	ppm	Zn	5.0	ppm
Zr	0.1	ppm	Zr	*na*	*na*	Zr	0.5	ppm

Table 1-4. Analytical methods and reporting limits for vegetation analyses.

[%, percent; ppm, parts per million; *na*, not analyzed]

ACME Labs			Activation Laboratories		
Element	Reporting Limit	Units	Element	Reporting Limit	Units
Ag	0.002	ppm	Ag	0.001	ppm
Al	0.01	%	Al	*na*	*na*
As	0.1	ppm	As	0.005	ppm
Au	0.0002	ppm	Au	0.0001	ppm
B	1	ppm	B	0.2	ppm
Ba	0.1	ppm	Ba	1	ppm
Be	0.1	ppm	Be	0.0001	ppm
Bi	0.01	%	Bi	0.0002	%
Ca	0.02	ppm	Ca	0.001	ppm

Table 1-4. Analytical methods and reporting limits for vegetation analyses—Continued.

ACME Labs			Activation Laboratories		
Element	Reporting Limit	Units	Element	Reporting Limit	Units
Cd	0.01	ppm	Cd	0.0001	ppm
Ce	0.01	ppm	Ce	0.0005	ppm
Co	0.01	ppm	Co	0.0005	ppm
Cr	0.1	ppm	Cr	0.01	ppm
Cs	0.005	ppm	Cs	0.0001	ppm
Cu	0.01	ppm	Cu	0.02	ppm
Dy	*na*	*na*	Dy	0.00005	ppm
Er	*na*	*na*	Er	0.00005	ppm
Eu	*na*	*na*	Eu	0.001	ppm
Fe	0.001	%	Fe	0.00005	%
Ga	0.1	ppm	Ga	0.00001	ppm
Gd	*na*	*na*	Gd	0.001	ppm
Ge	0.01	ppm	Ge	0.1	ppm
Hf	0.001	ppm	Hf	0.002	ppm
Hg	0.001	ppm	Hg	0.005	ppm
Ho	*na*	*na*	Ho	0.00001	ppm
In	0.02	ppm	In	0.001	ppm
K	0.01	%	K	0.001	%
La	0.01	ppm	La	0.0002	ppm
Li	0.01	ppm	Li	0.005	ppm
Lu	*na*	*na*	Lu	0.0002	ppm
Mg	0.001	%	Mg	0.00005	%
Mn	1	ppm	Mn	0.01	ppm
Mo	0.01	ppm	Mo	0.001	ppm
Na	0.001	%	Na	0.001	%
Nb	*na*	*na*	Nb	0.0005	ppm
Nb	0.01	ppm	Nd	0.0002	ppm
Ni	0.1	ppm	Ni	0.1	ppm
P	0.001	%	P	*na*	*na*
Pb	0.01	ppm	Pb	0.01	ppm
Pd	0.002	ppm	Pd	*na*	*na*
Pr	*na*	*na*	Pr	0.0005	ppm
Pt	0.001	ppm	Pt	*na*	*na*
Rb	0.1	ppm	Rb	0.01	ppm
Re	0.001	ppm	Re	0.001	ppm
S	0.01	%	S	*na*	*na*
Sb	0.02	ppm	Sb	0.0002	ppm
Sc	0.1	ppm	Sc	0.001	ppm
Se	0.1	ppm	Se	0.2	ppm
Sm	*na*	*na*	Sm	0.0001	ppm
Sn	0.02	ppm	Sn	0.04	ppm
Sr	0.5	ppm	Sr	0.02	ppm
Ta	0.001	ppm	Ta	0.0001	ppm
Tb	*na*	*na*	Tb	0.00002	ppm
Te	0.02	ppm	Te	0.001	ppm
Th	0.01	ppm	Th	0.005	ppm
Ti	1	ppm	Ti	0.02	ppm
Tl	0.02	ppm	Tl	0.0005	ppm
Tm	*na*	*na*	Tm	0.00005	ppm
U	0.01	ppm	U	0.001	ppm
V	2	ppm	V	0.01	ppm
W	0.1	ppm	W	0.005	ppm
Y	0.001	ppm	Y	0.0002	ppm
Yb	*na*	*na*	Yb	0.0004	ppm
Zn	0.1	ppm	Zn	0.2	ppm
Zr	0.01	ppm	Zr	0.05	ppm

Appendix 4: Quality Control Tables and Charts for U.S. Geological Survey De-Ionized Water Leach Data

Table 2-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a de-ionized water leach of soil samples at USGS (2007 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	20	5	<20	<20	<20	*na*	*na*
Al	ppm	0.1	5	1.57	8.90	4.77	0.146	3.06
As	ppb	20	5	<20	<20	<20	*na*	*na*
Ba	ppb	8	5	82.8	418	201	15.0	7.45
Be	ppb	1	5	<1	<1	<1	*na*	*na*
Bi	ppb	4	5	<4	<4	<4	*na*	*na*
Ca	ppm	4	5	4.00	11.0	6.52	0.657	10.1
Cd	ppb	0.4	5	<0.4	<0.4	<0.4	*na*	*na*
Ce	ppb	0.2	5	5.20	19.8	8.38	1.34	16.0
Co	ppb	0.4	5	1.00	5.60	3.06	0.141	4.62
Cr	ppb	20	5	<20	<20	<20	*na*	*na*
Cs	ppb	0.4	5	<0.4	2.00	0.972	0.0632	6.51
Cu	ppb	10	5	<10	74.0	23.8	8.41	35.3
Dy	ppb	0.1	5	0.400	3.60	1.22	0.341	27.9
Er	ppb	0.1	5	0.200	1.90	0.672	0.126	18.7
Eu	ppb	0.1	5	0.180	1.02	0.358	0.0944	26.4
Fe	ppm	1	5	<1	6.72	2.59	0.0447	1.72
Ga	ppb	1	5	<1	<1	<1	*na*	*na*
Gd	ppb	0.1	5	0.800	3.80	1.41	0.257	18.2
Ge	ppb	1	5	<1	<1	<1	*na*	*na*
Ho	ppb	0.1	5	0.100	0.600	0.230	0.0190	8.25
K	ppm	0.6	5	1.40	6.80	4.30	0.648	15.1
La	ppb	0.2	5	2.00	8.00	3.44	0.580	16.9
Li	ppb	2	5	<2	6.00	3.14	0.941	30.0
Lu	ppb	2	5	<2	<2	<2	*na*	*na*
Mg	ppm	0.2	5	1.20	3.00	2.10	0.141	6.73
Mn	ppb	4	5	72.0	270	160	5.37	3.35
Mo	ppb	40	5	<40	<40	<40	*na*	*na*
Na	ppm	0.1	5	7.60	13.6	10.4	0.400	3.86
Nb	ppb	4	5	<4	<4	<4	*na*	*na*
Nd	ppb	0.2	5	2.80	13.6	5.12	0.790	15.4
Ni	ppb	8	5	<8	8.00	<8	*na*	*na*
P	ppm	0.2	5	<0.2	0.400	0.269	0	0
Pb	ppb	1	5	<1	<1	<1	*na*	*na*
Pr	ppb	0.2	5	0.600	3.20	1.18	0.261	22.1
Rb	ppb	0.2	5	10.6	33.6	20.9	0.756	3.62
Sb	ppb	6	5	<6	<6	<6	*na*	*na*
Sc	ppb	12	5	<12	<12	<12	*na*	*na*
Se	ppb	20	5	<20	<20	<20	*na*	*na*
SiO_2	ppm	4	5	24.0	70.0	39.8	3.41	8.56
Sm	ppb	0.2	5	0.800	3.00	1.24	0.0894	7.21
SO4	ppm	40	5	<40	<40	<40	*na*	*na*
Sr	ppb	10	5	36.0	147	77.9	5.08	6.52
Ta	ppb	0.4	5	<0.4	1.20	0.513	0.273	53.2
Tb	ppb	0.1	5	<0.1	0.600	0.195	0.0639	32.8
Th	ppb	4	5	<4	<4	<4	*na*	*na*
Ti	ppb	10	5	<10	70.0	28.5	2.29	8.02
Tl	ppb	2	5	<2	<2	<2	*na*	*na*
Tm	ppb	0.1	5	<0.1	0.200	0.113	0	0
U	ppb	2	5	<2	<2	<2	*na*	*na*

Table 2-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a de-ionized water leach of soil samples at USGS (2007 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
V	ppb	10	5	<10	10.0	<10	*na*	*na*
W	ppb	10	5	<10	<10	<10	*na*	*na*
Y	ppb	0.2	5	2.80	16.0	5.76	0.514	8.92
Yb	ppb	0.1	5	0.200	2.00	0.600	0.268	44.7
Zn	ppb	10	5	<10	78.0	38.9	15.0	38.6
Zr	ppb	4	5	<4	10.0	5.48	0.903	16.5

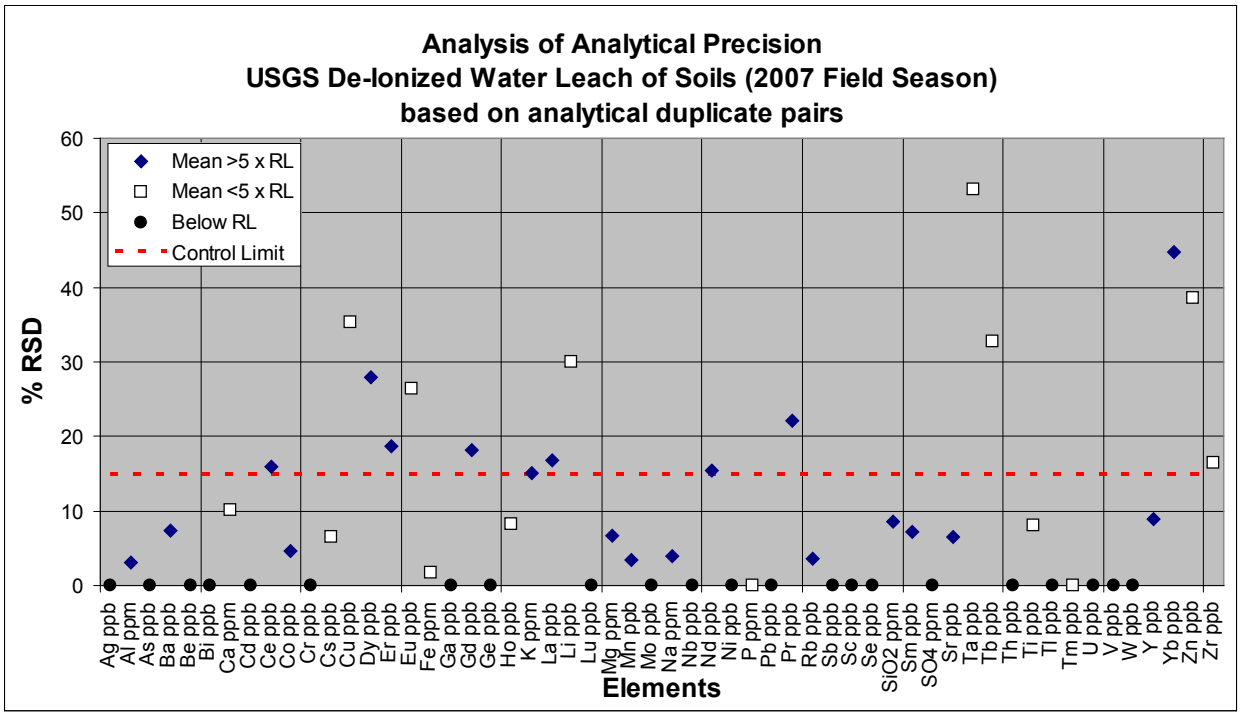

Figure 2-1. Precision plot for five analytical duplicate sample pairs by de-ionized water leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 2-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a de-ionized water leach of soil samples at the U.S. Geological Survey (2007 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	5	*na*	<20	*na*	*na*	*na*
Al	ppm	0.1	5	*na*	0.953	0.0910	9.55	*na*
As	ppb	20	5	*na*	44.0	8.94	20.3	*na*
Ba	ppb	8	5	*na*	581	38.4	6.60	*na*
Be	ppb	1	5	*na*	<1	*na*	*na*	*na*
Bi	ppb	4	5	*na*	<4	*na*	*na*	*na*
Ca	ppm	4	5	*na*	187	9.21	4.93	*na*
Cd	ppb	0.4	5	*na*	1.32	0.110	8.30	*na*
Ce	ppb	0.2	5	*na*	8.92	1.69	18.9	*na*
Co	ppb	0.4	5	*na*	0.720	0.110	15.2	*na*

Table 2-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a de-ionized water leach of soil samples at the U.S. Geological Survey (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Cr	ppb	20	5	*na*	<20	*na*	*na*	*na*
Cs	ppb	0.4	5	*na*	0.920	0.110	11.9	*na*
Cu	ppb	10	5	*na*	185	8.90	4.81	*na*
Dy	ppb	0.1	5	*na*	0.440	0.0894	20.3	*na*
Er	ppb	0.1	5	*na*	0.196	0.0089	4.56	*na*
Eu	ppb	0.1	5	*na*	0.124	0.0089	7.21	*na*
Fe	ppm	1	5	*na*	<1	*na*	*na*	*na*
Ga	ppb	1	5	*na*	2.40	0.894	37.3	*na*
Gd	ppb	0.1	5	*na*	0.480	0.110	22.8	*na*
Ge	ppb	1	5	*na*	<1	*na*	*na*	*na*
Ho	ppb	0.1	5	*na*	<0.1	*na*	*na*	*na*
K	ppm	0.6	5	*na*	76.2	2.32	3.04	*na*
La	ppb	0.2	5	*na*	4.52	0.867	19.2	*na*
Li	ppb	2	5	*na*	35.6	2.19	6.15	*na*
Lu	ppb	2	5	*na*	<2	*na*	*na*	*na*
Mg	ppm	0.2	5	*na*	29.2	1.41	4.84	*na*
Mn	ppb	4	5	*na*	182	32.3	17.7	*na*
Mo	ppb	40	5	*na*	543	34.0	6.26	*na*
Na	ppm	0.1	5	*na*	39.6	0.953	2.41	*na*
Nb	ppb	4	5	*na*	<4	*na*	*na*	*na*
Nd	ppb	0.2	5	*na*	3.76	0.740	19.7	*na*
Ni	ppb	8	5	*na*	<8	*na*	*na*	*na*
P	ppm	0.2	5	*na*	1.08	0.110	10.1	*na*
Pb	ppb	1	5	*na*	52.4	8.99	17.2	*na*
Pr	ppb	0.2	5	*na*	1.08	0.179	16.6	*na*
Rb	ppb	0.2	5	*na*	78.6	5.14	6.53	*na*
Sb	ppb	6	5	*na*	10.2	1.10	10.8	*na*
Sc	ppb	12	5	*na*	<12	*na*	*na*	*na*
Se	ppb	20	5	*na*	<20	*na*	*na*	*na*
SiO2	ppm	4	5	*na*	33.2	2.68	8.08	*na*
Sm	ppb	0.2	5	*na*	0.600	0	0	*na*
SO4	ppm	40	5	*na*	64.0	8.94	14.0	*na*
Sr	ppb	10	5	*na*	878	44.2	5.03	*na*
Ta	ppb	0.4	5	*na*	2.36	1.53	64.7	*na*
Tb	ppb	0.1	5	*na*	<0.1	*na*	*na*	*na*
Th	ppb	4	5	*na*	<4	*na*	*na*	*na*
Ti	ppb	10	5	*na*	<10	*na*	*na*	*na*
Tl	ppb	2	5	*na*	<2	*na*	*na*	*na*
Tm	ppb	0.1	5	*na*	<0.1	*na*	*na*	*na*
U	ppb	2	5	*na*	21.7	1.15	5.28	*na*
V	ppb	10	5	*na*	89.2	9.76	10.9	*na*
W	ppb	10	5	*na*	<10	*na*	*na*	*na*
Y	ppb	0.2	5	*na*	1.76	0.167	9.51	*na*
Yb	ppb	0.1	5	*na*	0.164	0.0358	21.8	*na*
Zn	ppb	10	5	*na*	24.8	4.15	16.7	*na*
Zr	ppb	4	5	*na*	5.33	3.62	68.0	*na*

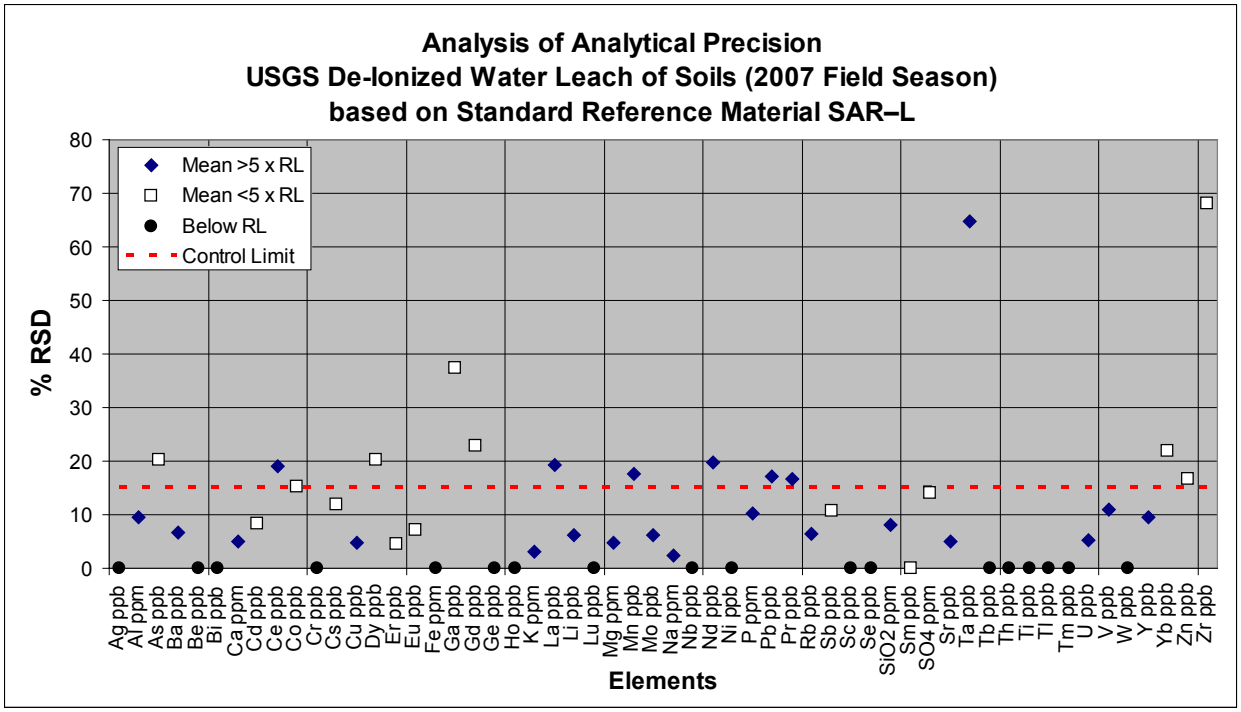

Figure 2-2. Precision plot for five analyses of standard reference material SAR–L by de-ionized water leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for Activation Laboratories, Ltd., Soil Gas Hydrocarbon Data

Table 3-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season).

[ppt, parts per trillion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Compound[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD[2]
001-C5&6A	ppt	1	12	47.0	100	69.5	9.91	14.3
002-C7A	ppt	1	12	20.0	160	96.4	35.1	36.4
003-C1B	ppt	1	12	12.0	23.0	17.3	2.90	16.7
004-C8A	ppt	1	12	2.10	16.0	8.95	2.00	22.4
005-C2B	ppt	1	12	15.0	48.0	28.5	4.47	15.7
006-C2B	ppt	1	12	25.0	86.0	46.2	8.09	17.5
007-C9A	ppt	1	12	10.0	34.0	17.4	1.70	9.76
008-C3B	ppt	1	12	12.0	30.0	18.0	1.65	9.16
009-C3B	ppt	1	12	<1	2.30	1.07	0.0696	6.52
010-C3B	ppt	1	12	1.30	5.20	2.31	0.292	12.7
011-C10A	ppt	1	12	1.10	3.70	1.87	0.184	9.84
012-C3B	ppt	1	12	<1	3.50	1.70	0.640	37.6
013-BA	ppt	1	12	<1	4.90	3.05	0.542	17.8
014-C4B	ppt	1	12	<1	1.40	<1	*na*	*na*
015 -	ppt	1	12	<1	<1	<1	*na*	*na*
016-C4B	ppt	1	12	6.00	21.0	10.5	0.934	8.89
017-C4B	ppt	1	12	7.10	26.0	12.9	1.19	9.27
018-C4B	ppt	1	12	7.10	26.0	12.9	1.15	8.92
019-C4B	ppt	1	12	<1	11.0	3.75	2.02	53.8
020-C11A	ppt	1	12	<1	4.70	1.97	0.298	15.1
021-C2N	ppt	1	12	<1	<1	<1	*na*	*na*
022-BA	ppt	1	12	<1	5.30	1.37	1.16	85.0
023 -	ppt	1	12	<1	<1	<1	*na*	*na*
024-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
025 -	ppt	1	12	<1	<1	<1	*na*	*na*
026-BA	ppt	1	12	<1	2.30	1.46	0.190	13.1
027-C4B	ppt	1	12	<1	<1	<1	*na*	*na*
028-ALK	ppt	1	12	<1	1.40	<1	*na*	*na*
029-C4B	ppt	1	12	<1	5.40	2.09	0.829	39.6
030-C5B	ppt	1	12	<1	1.40	<1	*na*	*na*
031-C4B	ppt	1	12	<1	1.10	<1	*na*	*na*
032-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
033-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
034-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
035 -	ppt	1	12	<1	<1	<1	*na*	*na*
036-BA	ppt	1	12	1.30	3.90	2.23	0.387	17.3
037-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
038-BA	ppt	1	12	1.20	3.90	2.32	0.557	24.0
039 -	ppt	1	12	<1	<1	<1	*na*	*na*
040-C2PB	ppt	1	12	<1	<1	<1	*na*	*na*
041-BA	ppt	1	12	<1	4.20	2.94	0.391	13.3
042-C2PB	ppt	1	12	<1	<1	<1	*na*	*na*
043-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
044-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
045-C12A	ppt	1	12	1.30	6.20	2.83	0.330	11.7
046-C3N	ppt	1	12	<1	<1	<1	*na*	*na*
047-BA	ppt	1	12	<1	2.10	1.44	0.141	9.79
048-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
049-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
050-BA	ppt	1	12	1.10	3.00	2.09	0.275	13.2
051-C2BP	ppt	1	12	<1	<1	<1	*na*	*na*

Table 3-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season)—Continued.

Compound[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD[2]
052-C3PB	ppt	1	12	<1	<1	<1	*na*	*na*
053-C2PB	ppt	1	12	<1	<1	<1	*na*	*na*
054-C5B	ppt	1	12	<1	<1	<1	*na*	*na*
055-C3PB	ppt	1	12	<1	<1	<1	*na*	*na*
056-C1BP	ppt	1	12	<1	<1	<1	*na*	*na*
057-ALK	ppt	1	12	<1	<1	<1	*na*	*na*
058-C2PB	ppt	1	12	<1	<1	<1	*na*	*na*
059-C2PB	ppt	1	12	<1	<1	<1	*na*	*na*
060-C1N	ppt	1	12	<1	1.20	<1	*na*	*na*
061-C2BP	ppt	1	12	<1	<1	<1	*na*	*na*
062-BA	ppt	1	12	1.10	3.50	2.21	0.395	17.9
063-C1N	ppt	1	12	<1	1.00	<1	*na*	*na*
064-BA	ppt	1	12	<1	4.20	2.45	0.486	19.9
065-C3PB	ppt	1	12	<1	<1	<1	*na*	*na*
066-BA	ppt	1	12	1.20	4.60	3.23	0.627	19.4
067-C2BP	ppt	1	12	<1	<1	<1	*na*	*na*
068-C3PB	ppt	1	12	<1	<1	<1	*na*	*na*
069-C13A	ppt	1	12	<1	8.80	4.81	1.20	24.9
070-C3PB	ppt	1	12	<1	<1	<1	*na*	*na*
071-C3PB	ppt	1	12	<1	1.20	<1	*na*	*na*
072-C3PB	ppt	1	12	<1	1.30	<1	*na*	*na*
073-BA	ppt	1	12	1.30	4.60	3.08	0.506	16.4
074-BA	ppt	1	12	1.60	6.80	4.48	0.857	19.1
075-C3PB	ppt	1	12	<1	1.30	<1	*na*	*na*
076-C1F	ppt	1	12	<1	<1	<1	*na*	*na*
077 -	ppt	1	12	<1	<1	<1	*na*	*na*
078-ALK	ppt	1	12	<1	1.80	1.21	0.148	12.2
079-C2BP	ppt	1	12	<1	<1	<1	*na*	*na*
080-C1F	ppt	1	12	<1	<1	<1	*na*	*na*
081 -	ppt	1	12	<1	1.30	<1	*na*	*na*
082-C1F	ppt	1	12	<1	<1	<1	*na*	*na*
083-BA	ppt	1	12	3.00	30.0	17.9	4.57	25.6
084-BA	ppt	1	12	<1	1.10	<1	*na*	*na*
085-C1F	ppt	1	12	2.60	27.0	13.7	3.11	22.7
086-BP	ppt	1	12	<1	<1	<1	*na*	*na*
087 -	ppt	1	12	<1	1.00	<1	*na*	*na*
088-BA	ppt	1	12	3.60	32.0	16.6	4.19	25.3
089-DBT	ppt	1	12	<1	<1	<1	*na*	*na*
090-C3PB	ppt	1	12	<1	<1	<1	*na*	*na*
091-C3BP	ppt	1	12	<1	<1	<1	*na*	*na*
092-C2N	ppt	1	12	1.10	1.60	1.38	0.132	9.62
093-C14A	ppt	1	12	4.90	27.0	15.7	3.52	22.5
094-C3BP	ppt	1	12	<1	<1	<1	*na*	*na*
095 -	ppt	1	12	<1	<1	<1	*na*	*na*
096-C2N	ppt	1	12	1.00	1.50	1.28	0.119	9.27
097-BA	ppt	1	12	4.00	23.0	12.4	2.94	23.7
098-T	ppt	1	12	<1	<1	<1	*na*	*na*
099-C2N	ppt	1	12	<1	<1	<1	*na*	*na*
100-C2N	ppt	1	12	<1	1.30	1.07	0.106	9.91
101 -	ppt	1	12	<1	<1	<1	*na*	*na*
102-C1BP	ppt	1	12	<1	1.20	1.01	0.114	11.3
103-C2N	ppt	1	12	<1	1.40	1.16	0.140	12.1
104 -	ppt	1	12	1.10	1.30	1.17	0.0577	4.95
105-ALK	ppt	1	12	1.60	3.20	2.47	0.379	15.3
106-C3BP	ppt	1	12	<1	2.30	1.02	0.0447	4.37
107-C3BP	ppt	1	12	<1	1.10	<1	*na*	*na*
108-C2N	ppt	1	12	1.80	2.50	2.08	0.134	6.44

Table 3-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season)—Continued.

Compound[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD[2]
109 -	ppt	1	12	2.10	2.90	2.39	0.150	6.28
110-BA	ppt	1	12	5.80	18.0	12.3	2.27	18.5
111 -	ppt	1	12	1.70	2.50	1.99	0.131	6.56
112-C1BP	ppt	1	12	2.00	3.10	2.39	0.249	10.4
113-BA	ppt	1	12	6.40	16.0	10.1	2.18	21.7
114-C1BP	ppt	1	12	2.20	3.40	2.73	0.241	8.83
115-C1BP	ppt	1	12	2.20	2.90	2.51	0.163	6.50
116 -	ppt	1	12	1.70	2.50	2.13	0.143	6.70
117-C15A	ppt	1	12	11.0	35.0	23.3	5.61	24.1
118-C3N	ppt	1	12	2.30	3.00	2.57	0.202	7.86
119-BA	ppt	1	12	6.90	20.0	14.3	2.41	16.8
120-DBT	ppt	1	12	<1	2.50	2.05	0.278	13.6
121-C3N	ppt	1	12	<1	2.80	2.03	0.761	37.5
122-P	ppt	1	12	2.40	3.20	2.78	0.162	5.83
123-C3N	ppt	1	12	2.40	3.20	2.82	0.157	5.57
124-C1BP	ppt	1	12	2.00	2.70	2.34	0.151	6.46
125 -	ppt	1	12	2.00	2.70	2.31	0.121	5.22
126-C3N	ppt	1	12	2.10	2.90	2.52	0.184	7.30
127-C3N	ppt	1	12	2.10	3.20	2.55	0.272	10.7
128-C1PY	ppt	1	12	1.60	2.10	1.85	0.138	7.47
129 -	ppt	1	12	2.30	3.20	2.64	0.210	7.97
130 -	ppt	1	12	2.30	3.30	2.73	0.266	9.77
131-C3N	ppt	1	12	2.10	3.10	2.61	0.219	8.39
132 -	ppt	1	12	7.60	14.0	11.1	1.43	12.9
133 -	ppt	1	12	4.60	6.40	5.44	0.465	8.54
134 -	ppt	1	12	6.70	9.80	8.18	0.561	6.87
135-C3N	ppt	1	12	4.90	6.40	5.69	0.471	8.27
136-C4N	ppt	1	12	5.20	6.90	6.12	0.389	6.36
137-C1BP	ppt	1	12	3.70	5.30	4.24	0.381	8.99
138-C1BP	ppt	1	12	3.90	5.70	4.66	0.331	7.10
139-C4N	ppt	1	12	4.80	5.90	5.32	0.275	5.17
140-C3N	ppt	1	12	<1	5.10	4.28	0.765	17.9
141-C2BP	ppt	1	12	5.50	7.70	6.32	0.411	6.51
142-C4N	ppt	1	12	5.10	6.50	5.63	0.393	6.97
143-C16A	ppt	1	12	9.10	58.0	32.7	7.04	21.6
144-C2BP	ppt	1	12	5.20	7.10	6.14	0.453	7.38
145-BA	ppt	1	12	23.0	50.0	36.8	9.41	25.6
146-C4N	ppt	1	12	2.00	3.00	2.53	0.153	6.05
147-C2BP	ppt	1	12	3.30	4.40	3.85	0.263	6.84
148-C4N	ppt	1	12	<1	5.00	4.01	0.993	24.8
149-C2BP	ppt	1	12	<1	6.70	5.00	2.01	40.2
150-C4N	ppt	1	12	<1	5.50	3.57	2.26	63.4
151-C2BP	ppt	1	12	<1	5.80	4.72	1.21	25.6
152-C4N	ppt	1	12	<1	7.60	5.70	1.68	29.4
153-C4N	ppt	1	12	1.40	13.0	9.28	4.17	44.9
154-C4N	ppt	1	12	1.20	14.0	9.72	4.09	42.1
155-C4N	ppt	1	12	11.0	14.0	13.0	0.612	4.71
156-C3BP	ppt	1	12	9.00	13.0	11.2	0.678	6.08
157 -	ppt	1	12	1.40	13.0	11.5	2.29	19.9
158-BA	ppt	1	12	38.0	91.0	52.9	11.1	21.0
159-C3N	ppt	1	12	1.80	16.0	10.5	6.12	58.3
160-C2BP	ppt	1	12	1.70	17.0	12.5	5.21	41.6
161-C17A	ppt	1	12	49.0	120	70.6	16.0	22.6
162-C4N	ppt	1	12	1.70	15.0	12.3	4.03	32.8

[1]The names of specific hydrocarbon compounds analyzed are proprietary and identified here by laboratory code.
[2]Actlabs does not consider %RSD to be an appropriate statistic for measuring variation in SGH data.

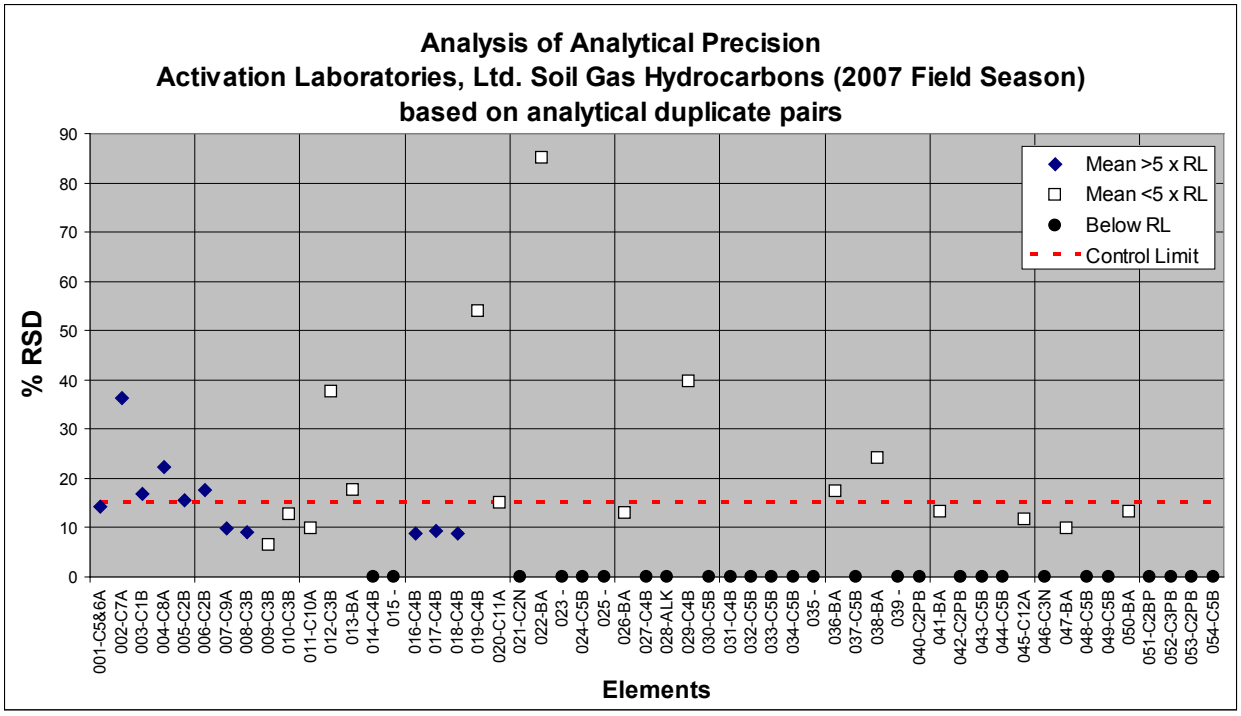

Figure 3-1a. Precision plot for twelve analytical duplicate sample pairs by soil gas hydrocarbons analysis (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

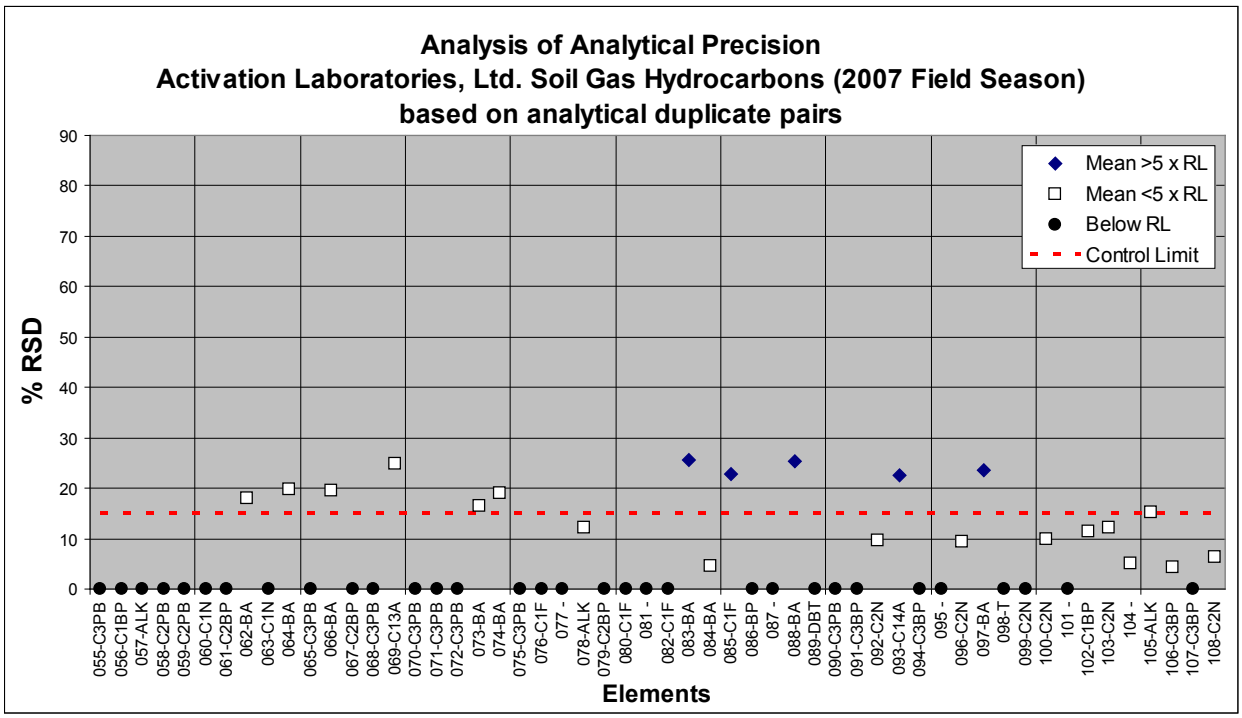

Figure 3-1b. Precision plot for twelve analytical duplicate sample pairs by soil gas hydrocarbons analysis (2007 field season)—Continued. %RSD is percent relative standard deviation; RL is reporting limit.

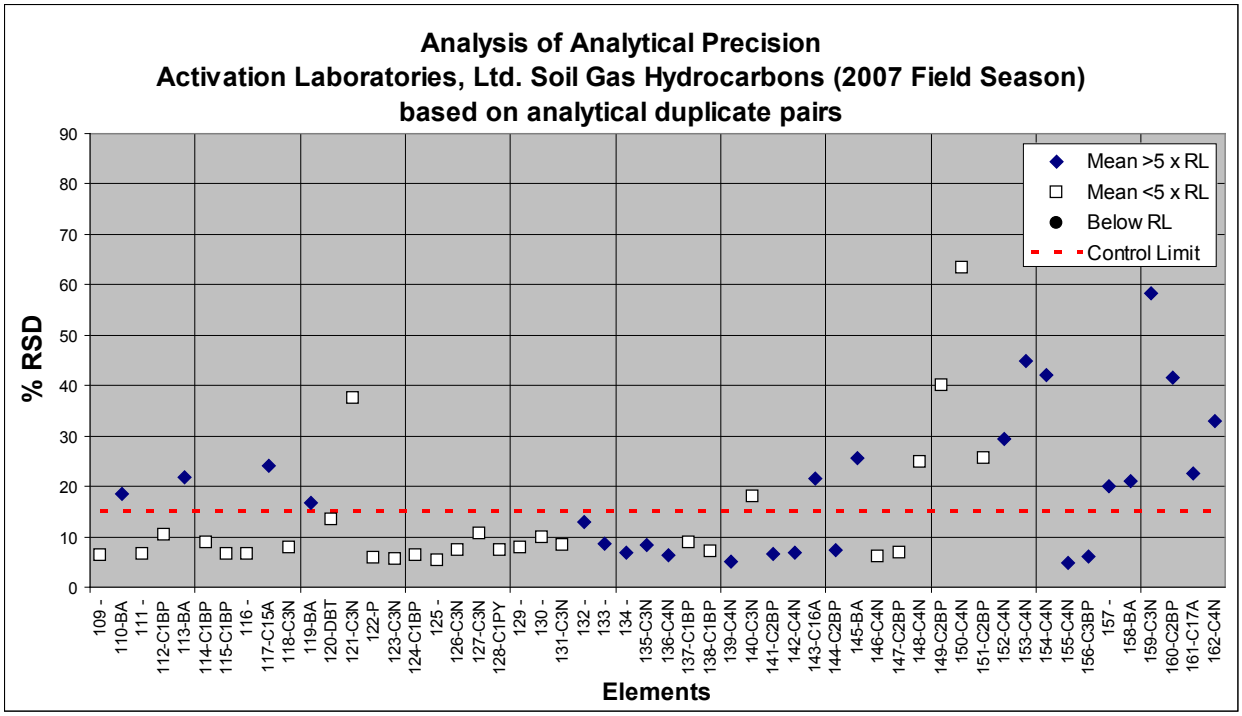

Figure 3-1c. Precision plot for twelve analytical duplicate sample pairs by soil gas hydrocarbons analysis (2007 field season)—Continued. %RSD is percent relative standard deviation; RL is reporting limit.

Table 3-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season).

[ppt, parts per trillion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Compound[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD[2]	%Recovery
001-C5&6A	ppt	1	5	*na*	46.6	35.4	75.9	*na*
002-C7A	ppt	1	5	*na*	118	18.7	15.9	*na*
003-C1B	ppt	1	5	*na*	49.8	13.1	26.3	*na*
004-C8A	ppt	1	5	*na*	14.2	7.21	50.6	*na*
005-C2B	ppt	1	5	*na*	80.8	10.1	12.5	*na*
006-C2B	ppt	1	5	*na*	138	27.2	19.7	*na*
007-C9A	ppt	1	5	*na*	85.4	10.6	12.5	*na*
008-C3B	ppt	1	5	*na*	89.2	8.87	9.95	*na*
009-C3B	ppt	1	5	*na*	4.02	0.239	5.94	*na*
010-C3B	ppt	1	5	*na*	11.4	1.14	10.0	*na*
011-C10A	ppt	1	5	*na*	12.0	0.707	5.89	*na*
012-C3B	ppt	1	5	*na*	4.08	0.286	7.02	*na*
013-BA	ppt	1	5	*na*	11.1	1.26	11.4	*na*
014-C4B	ppt	1	5	*na*	8.66	1.16	13.4	*na*
015 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
016-C4B	ppt	1	5	*na*	18.3	6.38	34.9	*na*
017-C4B	ppt	1	5	*na*	22.6	6.50	28.8	*na*
018-C4B	ppt	1	5	*na*	22.8	6.65	29.2	*na*
019-C4B	ppt	1	5	*na*	5.46	2.84	52.0	*na*
020-C11A	ppt	1	5	*na*	14.6	1.52	10.4	*na*
021-C2N	ppt	1	5	*na*	<1	*na*	*na*	*na*
022-BA	ppt	1	5	*na*	12.5	1.79	14.3	*na*
023 -	ppt	1	5	*na*	<1	*na*	*na*	*na*

Table 3-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season)—Continued.

Compound[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD[2]	%Recovery
024-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
025 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
026-BA	ppt	1	5	*na*	14.0	2.45	17.5	*na*
027-C4B	ppt	1	5	*na*	1.07	0.353	33.0	*na*
028-ALK	ppt	1	5	*na*	4.44	2.90	65.4	*na*
029-C4B	ppt	1	5	*na*	4.12	1.96	47.4	*na*
030-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
031-C4B	ppt	1	5	*na*	1.44	0.502	34.8	*na*
032-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
033-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
034-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
035 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
036-BA	ppt	1	5	*na*	21.2	2.39	11.3	*na*
037-C5B	ppt	1	5	*na*	1.02	0.125	12.2	*na*
038-BA	ppt	1	5	*na*	15.0	6.50	43.3	*na*
039 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
040-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
041-BA	ppt	1	5	*na*	14.0	1.58	11.3	*na*
042-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
043-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
044-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
045-C12A	ppt	1	5	*na*	16.2	1.30	8.05	*na*
046-C3N	ppt	1	5	*na*	<1	*na*	*na*	*na*
047-BA	ppt	1	5	*na*	9.64	0.918	9.52	*na*
048-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
049-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
050-BA	ppt	1	5	*na*	12.6	0.894	7.10	*na*
051-C2BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
052-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
053-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
054-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
055-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
056-C1BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
057-ALK	ppt	1	5	*na*	3.24	0.251	7.75	*na*
058-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
059-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
060-C1N	ppt	1	5	*na*	4.48	0.370	8.26	*na*
061-C2BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
062-BA	ppt	1	5	*na*	6.12	0.650	10.6	*na*
063-C1N	ppt	1	5	*na*	4.46	0.737	16.5	*na*
064-BA	ppt	1	5	*na*	7.12	1.46	20.4	*na*
065-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
066-BA	ppt	1	5	*na*	7.18	0.847	11.8	*na*
067-C2BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
068-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
069-C13A	ppt	1	5	*na*	1.17	0.523	44.8	*na*
070-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
071-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
072-C3PB	ppt	1	5	*na*	1.01	0.168	16.7	*na*
073-BA	ppt	1	5	*na*	6.40	0.819	12.8	*na*
074-BA	ppt	1	5	*na*	8.58	1.65	19.2	*na*
075-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
076-C1F	ppt	1	5	*na*	<1	*na*	*na*	*na*
077 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
078-ALK	ppt	1	5	*na*	1.48	0.630	42.6	*na*
079-C2BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
080-C1F	ppt	1	5	*na*	<1	*na*	*na*	*na*
081 -	ppt	1	5	*na*	1.18	0.130	11.1	*na*

Table 3-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season)—Continued.

Compound[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD[2]	%Recovery
082-C1F	ppt	1	5	*na*	<1	*na*	*na*	*na*
083-BA	ppt	1	5	*na*	7.06	3.17	44.8	*na*
084-BA	ppt	1	5	*na*	1.20	0.100	8.33	*na*
085-C1F	ppt	1	5	*na*	10.4	5.00	48.1	*na*
086-BP	ppt	1	5	*na*	1.16	0.0894	7.71	*na*
087 -	ppt	1	5	*na*	1.32	0.0447	3.39	*na*
088-BA	ppt	1	5	*na*	14.8	10.9	73.3	*na*
089-DBT	ppt	1	5	*na*	<1	*na*	*na*	*na*
090-C3PB	ppt	1	5	*na*	1.26	0.0894	7.10	*na*
091-C3BP	ppt	1	5	*na*	1.14	0.0548	4.80	*na*
092-C2N	ppt	1	5	*na*	8.96	0.874	9.75	*na*
093-C14A	ppt	1	5	*na*	31.4	4.83	15.4	*na*
094-C3BP	ppt	1	5	*na*	1.28	0.0447	3.49	*na*
095 -	ppt	1	5	*na*	1.30	0.0707	5.44	*na*
096-C2N	ppt	1	5	*na*	8.40	0.781	9.30	*na*
097-BA	ppt	1	5	*na*	19.6	3.44	17.5	*na*
098-T	ppt	1	5	*na*	<1	*na*	*na*	*na*
099-C2N	ppt	1	5	*na*	2.72	0.278	10.2	*na*
100-C2N	ppt	1	5	*na*	3.56	0.207	5.82	*na*
101 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
102-C1BP	ppt	1	5	*na*	1.58	0.110	6.93	*na*
103-C2N	ppt	1	5	*na*	1.98	0.0837	4.23	*na*
104 -	ppt	1	5	*na*	1.78	0.811	45.4	*na*
105-ALK	ppt	1	5	*na*	6.34	0.568	8.96	*na*
106-C3BP	ppt	1	5	*na*	1.08	0.0837	7.75	*na*
107-C3BP	ppt	1	5	*na*	1.10	0.118	10.7	*na*
108-C2N	ppt	1	5	*na*	2.56	0.182	7.10	*na*
109 -	ppt	1	5	*na*	3.92	0.370	9.44	*na*
110-BA	ppt	1	5	*na*	24.4	3.44	14.1	*na*
111 -	ppt	1	5	*na*	2.38	0.311	13.1	*na*
112-C1BP	ppt	1	5	*na*	5.36	0.992	18.5	*na*
113-BA	ppt	1	5	*na*	20.8	2.77	13.3	*na*
114-C1BP	ppt	1	5	*na*	12.2	0.837	6.86	*na*
115-C1BP	ppt	1	5	*na*	3.36	0.0548	1.63	*na*
116 -	ppt	1	5	*na*	2.56	0.152	5.92	*na*
117-C15A	ppt	1	5	*na*	45.2	4.38	9.69	*na*
118-C3N	ppt	1	5	*na*	6.64	0.537	8.08	*na*
119-BA	ppt	1	5	*na*	23.8	2.95	12.4	*na*
120-DBT	ppt	1	5	*na*	2.14	0.0894	4.18	*na*
121-C3N	ppt	1	5	*na*	3.68	0.884	24.0	*na*
122-P	ppt	1	5	*na*	3.76	0.134	3.57	*na*
123-C3N	ppt	1	5	*na*	7.26	0.747	10.3	*na*
124-C1BP	ppt	1	5	*na*	2.74	0.0548	2.00	*na*
125 -	ppt	1	5	*na*	3.62	0.249	6.88	*na*
126-C3N	ppt	1	5	*na*	6.64	0.826	12.5	*na*
127-C3N	ppt	1	5	*na*	5.72	0.476	8.33	*na*
128-C1PY	ppt	1	5	*na*	2.52	0.377	15.0	*na*
129 -	ppt	1	5	*na*	3.18	0.278	8.73	*na*
130 -	ppt	1	5	*na*	3.90	0.418	10.7	*na*
131-C3N	ppt	1	5	*na*	3.52	0.415	11.8	*na*
132 -	ppt	1	5	*na*	22.0	1.22	5.57	*na*
133 -	ppt	1	5	*na*	5.80	0.141	2.44	*na*
134 -	ppt	1	5	*na*	13.4	0.548	4.09	*na*
135-C3N	ppt	1	5	*na*	9.54	0.344	3.60	*na*
136-C4N	ppt	1	5	*na*	8.68	0.581	6.69	*na*
137-C1BP	ppt	1	5	*na*	5.80	0.515	8.88	*na*
138-C1BP	ppt	1	5	*na*	6.10	0.400	6.56	*na*
139-C4N	ppt	1	5	*na*	7.92	0.820	10.4	*na*

Table 3-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season)—Continued.

Compound[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD[2]	%Recovery
140-C3N	ppt	1	5	*na*	5.18	0.259	5.00	*na*
141-C2BP	ppt	1	5	*na*	16.0	1.00	6.25	*na*
142-C4N	ppt	1	5	*na*	8.42	0.709	8.41	*na*
143-C16A	ppt	1	5	*na*	62.0	5.92	9.54	*na*
144-C2BP	ppt	1	5	*na*	6.88	4.70	68.4	*na*
145-BA	ppt	1	5	*na*	56.0	12.5	22.3	*na*
146-C4N	ppt	1	5	*na*	3.42	0.0837	2.45	*na*
147-C2BP	ppt	1	5	*na*	5.12	0.342	6.68	*na*
148-C4N	ppt	1	5	*na*	3.88	2.17	55.9	*na*
149-C2BP	ppt	1	5	*na*	3.52	3.13	89.1	*na*
150-C4N	ppt	1	5	*na*	1.52	0.868	57.0	*na*
151-C2BP	ppt	1	5	*na*	5.86	0.270	4.61	*na*
152-C4N	ppt	1	5	*na*	8.68	0.444	5.11	*na*
153-C4N	ppt	1	5	*na*	15.8	0.837	5.30	*na*
154-C4N	ppt	1	5	*na*	9.4	7.22	76.9	*na*
155-C4N	ppt	1	5	*na*	15.6	0.548	3.51	*na*
156-C3BP	ppt	1	5	*na*	12.4	3.78	30.5	*na*
157 -	ppt	1	5	*na*	15.2	1.10	7.21	*na*
158-BA	ppt	1	5	*na*	78.6	7.83	9.96	*na*
159-C3N	ppt	1	5	*na*	16.0	0.707	4.42	*na*
160-C2BP	ppt	1	5	*na*	16.4	0.548	3.34	*na*
161-C17A	ppt	1	5	*na*	74.6	32.3	43.3	*na*
162-C4N	ppt	1	5	*na*	17.0	0.707	4.16	*na*

[1]The names of specific hydrocarbon compounds analyzed are proprietary and identified here by laboratory code.
[2]Actlabs does not consider %RSD to be an appropriate statistic for measuring variation in SGH data.

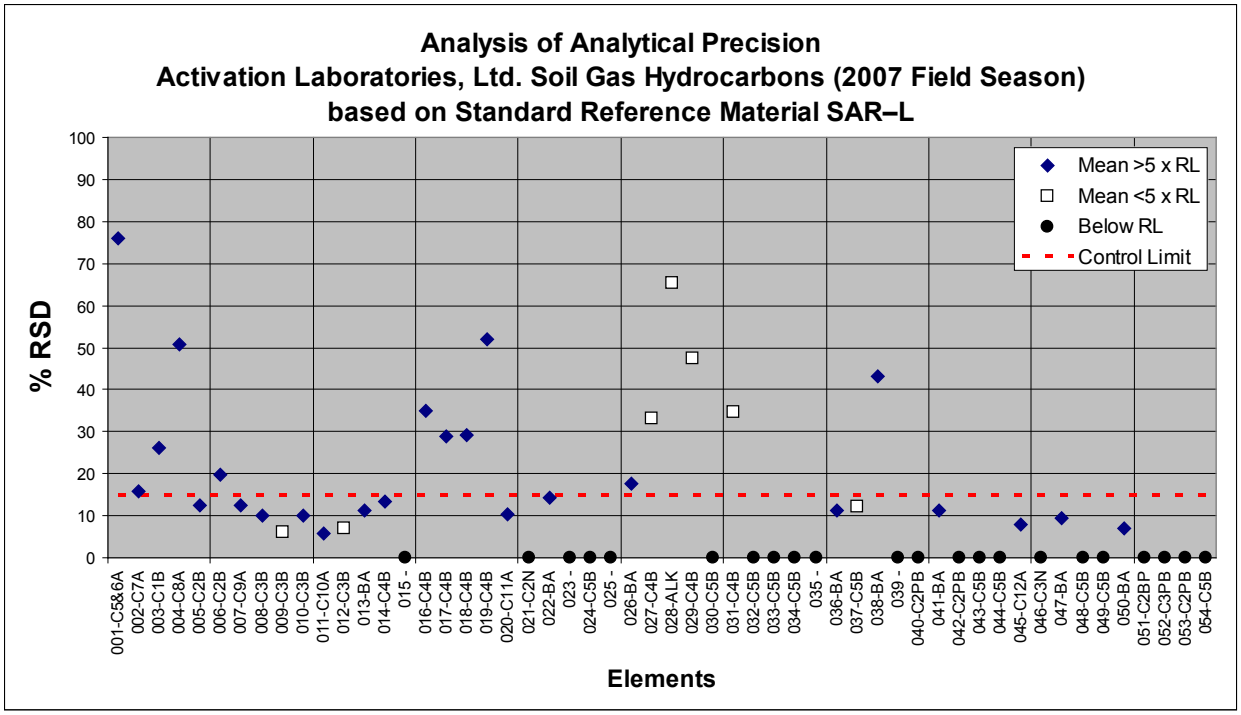

Figure 3-2a. Precision plot for five analyses of standard reference material SAR–L by soil gas hydrocarbons analysis (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

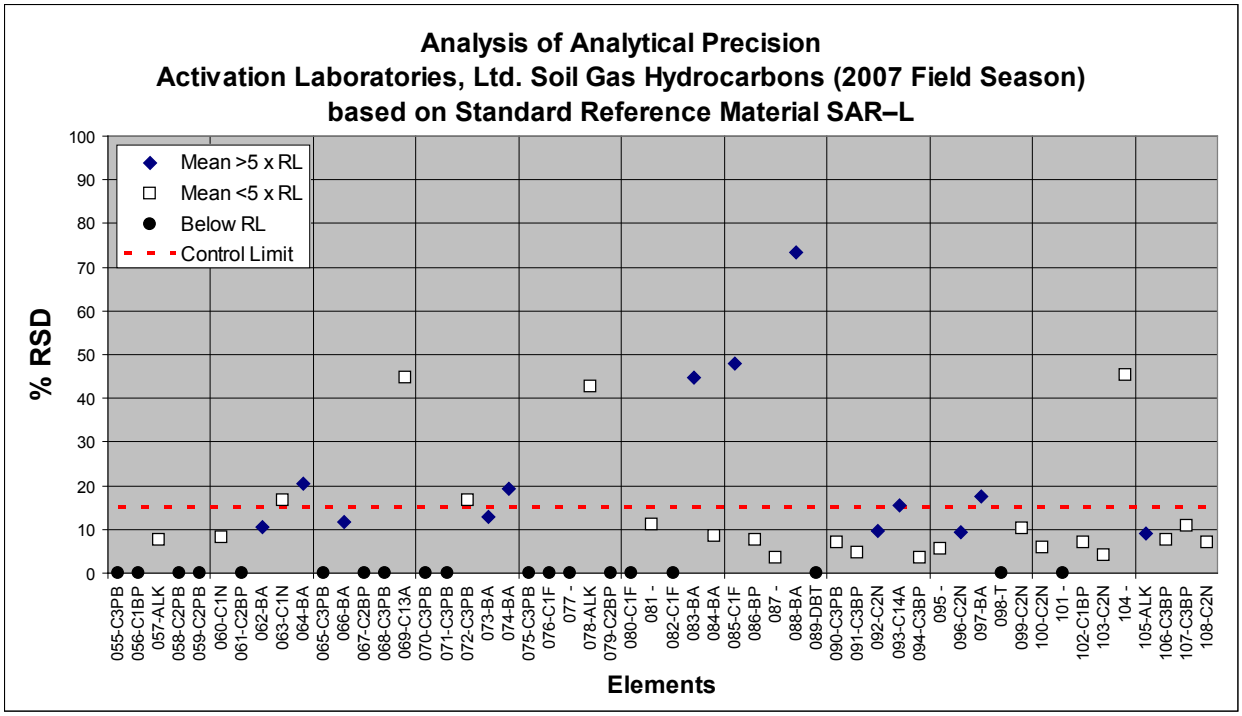

Figure 3-2b. Precision plot for five analyses of standard reference material SAR–L by soil gas hydrocarbons analysis (2007 field season)—Continued. %RSD is percent relative standard deviation; RL is reporting limit.

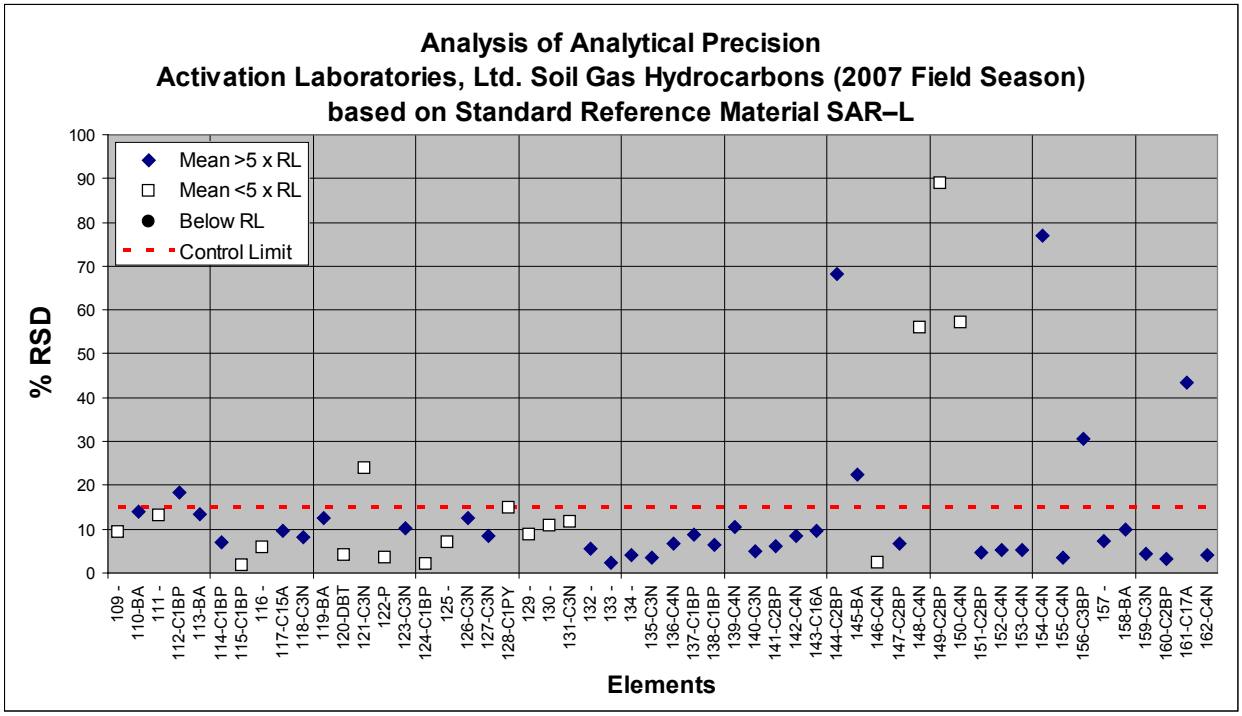

Figure 3-2c. Precision plot for five analyses of standard reference material SAR–L by soil gas hydrocarbons analysis (2007 field season)—Continued. %RSD is percent relative standard deviation; RL is reporting limit.

Table 3-3. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season).

[ppt, parts per trillion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Compound[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD[2]	%Recovery
001-C5&6A	ppt	1	5	*na*	63.0	9.82	15.6	*na*
002-C7A	ppt	1	5	*na*	74.2	35.6	48.0	*na*
003-C1B	ppt	1	5	*na*	17.0	2.24	13.2	*na*
004-C8A	ppt	1	5	*na*	6.40	1.00	22.1	*na*
005-C2B	ppt	1	5	*na*	28.0	3.94	14.1	*na*
006-C2B	ppt	1	5	*na*	46.8	10.1	21.6	*na*
007-C9A	ppt	1	5	*na*	16.8	2.68	16.0	*na*
008-C3B	ppt	1	5	*na*	16.0	2.35	14.7	*na*
009-C3B	ppt	1	5	*na*	0.949	0.0845	8.90	*na*
010-C3B	ppt	1	5	*na*	2.18	0.370	17.0	*na*
011-C10A	ppt	1	5	*na*	1.56	0.182	11.6	*na*
012-C3B	ppt	1	5	*na*	1.05	0.308	29.4	*na*
013-BA	ppt	1	5	*na*	3.54	0.456	12.9	*na*
014-C4B	ppt	1	5	*na*	1.85	2.10	113	*na*
015 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
016-C4B	ppt	1	5	*na*	10.9	1.95	17.9	*na*
017-C4B	ppt	1	5	*na*	13.4	2.19	16.4	*na*
018-C4B	ppt	1	5	*na*	13.4	2.19	16.4	*na*
019-C4B	ppt	1	5	*na*	2.72	1.13	41.7	*na*
020-C11A	ppt	1	5	*na*	1.94	0.358	18.4	*na*
021-C2N	ppt	1	5	*na*	<1	*na*	*na*	*na*
022-BA	ppt	1	5	*na*	<1	*na*	*na*	*na*
023 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
024-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
025 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
026-BA	ppt	1	5	*na*	1.32	0.273	20.7	*na*
027-C4B	ppt	1	5	*na*	<1	*na*	*na*	*na*
028-ALK	ppt	1	5	*na*	<1	*na*	*na*	*na*
029-C4B	ppt	1	5	*na*	2.36	1.09	46.2	*na*
030-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
031-C4B	ppt	1	5	*na*	<1	*na*	*na*	*na*
032-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
033-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
034-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
035 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
036-BA	ppt	1	5	*na*	2.48	0.268	10.8	*na*
037-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
038-BA	ppt	1	5	*na*	1.58	0.130	8.25	*na*
039 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
040-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
041-BA	ppt	1	5	*na*	2.20	0.361	16.4	*na*
042-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
043-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
044-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
045-C12A	ppt	1	5	*na*	2.50	0.412	16.5	*na*
046-C3N	ppt	1	5	*na*	<1	*na*	*na*	*na*
047-BA	ppt	1	5	*na*	1.40	0.235	16.8	*na*
048-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
049-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
050-BA	ppt	1	5	*na*	1.96	0.365	18.6	*na*
051-C2BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
052-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
053-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
054-C5B	ppt	1	5	*na*	<1	*na*	*na*	*na*
055-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*

Table 3-3. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season)—Continued.

Compound[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD[2]	%Recovery
056-C1BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
057-ALK	ppt	1	5	*na*	<1	*na*	*na*	*na*
058-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
059-C2PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
060-C1N	ppt	1	5	*na*	1.04	0.128	12.3	*na*
061-C2BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
062-BA	ppt	1	5	*na*	2.16	0.594	27.5	*na*
063-C1N	ppt	1	5	*na*	1.01	0.136	13.5	*na*
064-BA	ppt	1	5	*na*	2.22	0.327	14.7	*na*
065-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
066-BA	ppt	1	5	*na*	2.88	1.03	35.7	*na*
067-C2BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
068-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
069-C13A	ppt	1	5	*na*	5.08	1.15	22.6	*na*
070-C3PB	ppt	1	5	*na*	5.08	1.15	22.6	*na*
071-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
072-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
073-BA	ppt	1	5	*na*	2.40	0.552	23.0	*na*
074-BA	ppt	1	5	*na*	3.76	1.28	33.9	*na*
075-C3PB	ppt	1	5	*na*	<1	*na*	*na*	*na*
076-C1F	ppt	1	5	*na*	<1	*na*	*na*	*na*
077 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
078-ALK	ppt	1	5	*na*	1.10	0.230	20.8	*na*
079-C2BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
080-C1F	ppt	1	5	*na*	<1	*na*	*na*	*na*
081 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
082-C1F	ppt	1	5	*na*	<1	*na*	*na*	*na*
083-BA	ppt	1	5	*na*	14.5	6.14	42.5	*na*
084-BA	ppt	1	5	*na*	<1	*na*	*na*	*na*
085-C1F	ppt	1	5	*na*	10.1	4.97	49.2	*na*
086-BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
087 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
088-BA	ppt	1	5	*na*	13.7	5.72	41.6	*na*
089-DBT	ppt	1	5	*na*	<1	*na*	*na*	*na*
090-C3PB	ppt	1	5	*na*	0.947	0.0487	5.14	*na*
091-C3BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
092-C2N	ppt	1	5	*na*	1.64	0.152	9.25	*na*
093-C14A	ppt	1	5	*na*	13.8	4.35	31.5	*na*
094-C3BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
095 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
096-C2N	ppt	1	5	*na*	1.56	0.167	10.7	*na*
097-BA	ppt	1	5	*na*	10.5	3.45	32.8	*na*
098-T	ppt	1	5	*na*	<1	*na*	*na*	*na*
099-C2N	ppt	1	5	*na*	<1	*na*	*na*	*na*
100-C2N	ppt	1	5	*na*	1.16	0.114	9.83	*na*
101 -	ppt	1	5	*na*	<1	*na*	*na*	*na*
102-C1BP	ppt	1	5	*na*	1.04	0.0851	8.17	*na*
103-C2N	ppt	1	5	*na*	1.10	0.118	10.7	*na*
104 -	ppt	1	5	*na*	1.16	0.163	14.0	*na*
105-ALK	ppt	1	5	*na*	2.26	0.358	15.8	*na*
106-C3BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
107-C3BP	ppt	1	5	*na*	<1	*na*	*na*	*na*
108-C2N	ppt	1	5	*na*	2.14	0.182	8.49	*na*
109 -	ppt	1	5	*na*	2.46	0.207	8.43	*na*
110-BA	ppt	1	5	*na*	11.6	2.94	25.5	*na*
111 -	ppt	1	5	*na*	2.02	0.148	7.34	*na*
112-C1BP	ppt	1	5	*na*	2.46	0.230	9.36	*na*
113-BA	ppt	1	5	*na*	8.88	1.66	18.7	*na*

Table 3-3. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a soil gas hydrocarbons analysis of soil samples at Actlabs (2007 field season)—Continued.

Compound[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD[2]	%Recovery
114-C1BP	ppt	1	5	*na*	2.88	0.356	12.4	*na*
115-C1BP	ppt	1	5	*na*	2.40	0.212	8.84	*na*
116 -	ppt	1	5	*na*	2.10	0.123	5.83	*na*
117-C15A	ppt	1	5	*na*	20.4	1.52	7.43	*na*
118-C3N	ppt	1	5	*na*	2.62	0.0837	3.19	*na*
119-BA	ppt	1	5	*na*	13.4	1.95	14.6	*na*
120-DBT	ppt	1	5	*na*	2.08	0.110	5.27	*na*
121-C3N	ppt	1	5	*na*	1.84	0.770	41.8	*na*
122-P	ppt	1	5	*na*	2.68	0.278	10.4	*na*
123-C3N	ppt	1	5	*na*	2.90	0.187	6.45	*na*
124-C1BP	ppt	1	5	*na*	2.32	0.278	12.0	*na*
125 -	ppt	1	5	*na*	2.26	0.182	8.04	*na*
126-C3N	ppt	1	5	*na*	2.70	0.187	6.93	*na*
127-C3N	ppt	1	5	*na*	2.64	0.0894	3.39	*na*
128-C1PY	ppt	1	5	*na*	1.74	0.114	6.55	*na*
129 -	ppt	1	5	*na*	2.44	0.0548	2.24	*na*
130 -	ppt	1	5	*na*	2.64	0.167	6.34	*na*
131-C3N	ppt	1	5	*na*	2.62	0.0837	3.19	*na*
132 -	ppt	1	5	*na*	10.4	0.817	7.83	*na*
133 -	ppt	1	5	*na*	5.34	0.344	6.43	*na*
134 -	ppt	1	5	*na*	8.04	0.532	6.62	*na*
135-C3N	ppt	1	5	*na*	5.38	0.130	2.42	*na*
136-C4N	ppt	1	5	*na*	6.34	0.416	6.56	*na*
137-C1BP	ppt	1	5	*na*	4.08	0.444	10.9	*na*
138-C1BP	ppt	1	5	*na*	4.64	0.219	4.72	*na*
139-C4N	ppt	1	5	*na*	5.40	0.212	3.93	*na*
140-C3N	ppt	1	5	*na*	4.34	0.182	4.19	*na*
141-C2BP	ppt	1	5	*na*	6.54	0.456	6.97	*na*
142-C4N	ppt	1	5	*na*	4.72	2.13	45.2	*na*
143-C16A	ppt	1	5	*na*	30.0	3.00	10.0	*na*
144-C2BP	ppt	1	5	*na*	6.20	0.510	8.22	*na*
145-BA	ppt	1	5	*na*	34.6	12.6	36.4	*na*
146-C4N	ppt	1	5	*na*	2.70	0.158	5.86	*na*
147-C2BP	ppt	1	5	*na*	3.94	0.378	9.60	*na*
148-C4N	ppt	1	5	*na*	4.56	0.230	5.05	*na*
149-C2BP	ppt	1	5	*na*	5.94	0.472	7.95	*na*
150-C4N	ppt	1	5	*na*	4.92	1.18	23.9	*na*
151-C2BP	ppt	1	5	*na*	5.06	0.385	7.60	*na*
152-C4N	ppt	1	5	*na*	6.90	0.316	4.58	*na*
153-C4N	ppt	1	5	*na*	6.24	5.26	84.3	*na*
154-C4N	ppt	1	5	*na*	12.8	0.447	3.49	*na*
155-C4N	ppt	1	5	*na*	12.8	0.837	6.54	*na*
156-C3BP	ppt	1	5	*na*	9.22	4.56	49.5	*na*
157 -	ppt	1	5	*na*	11.8	0.837	7.09	*na*
158-BA	ppt	1	5	*na*	47.2	4.44	9.40	*na*
159-C3N	ppt	1	5	*na*	14.2	1.30	9.18	*na*
160-C2BP	ppt	1	5	*na*	11.8	4.88	41.2	*na*
161-C17A	ppt	1	5	*na*	57.6	10.2	17.7	*na*
162-C4N	ppt	1	5	*na*	12.8	3.43	26.9	*na*

[1]The names of specific hydrocarbon compounds analyzed are proprietary and identified here by laboratory code.
[2]Actlabs does not consider %RSD to be an appropriate statistic for measuring variation in SGH data.

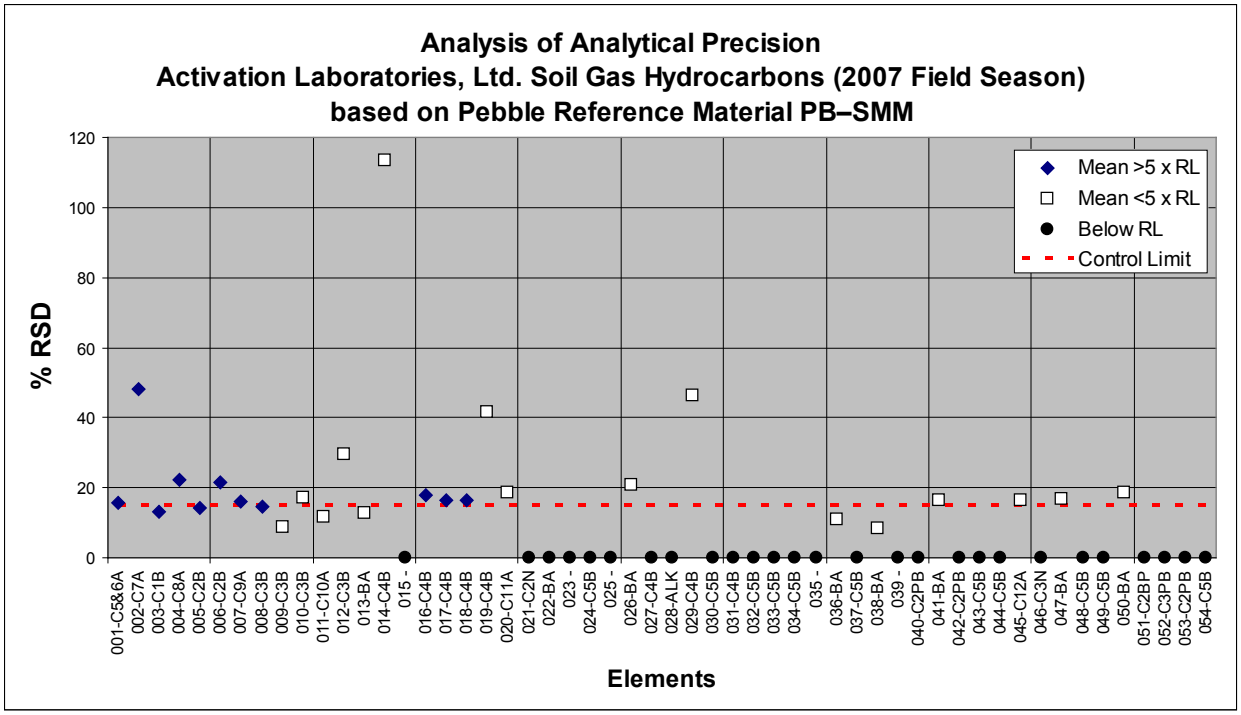

Figure 3-3a. Precision plot for five analyses of Pebble reference material PB–SMM by soil gas hydrocarbons analysis (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

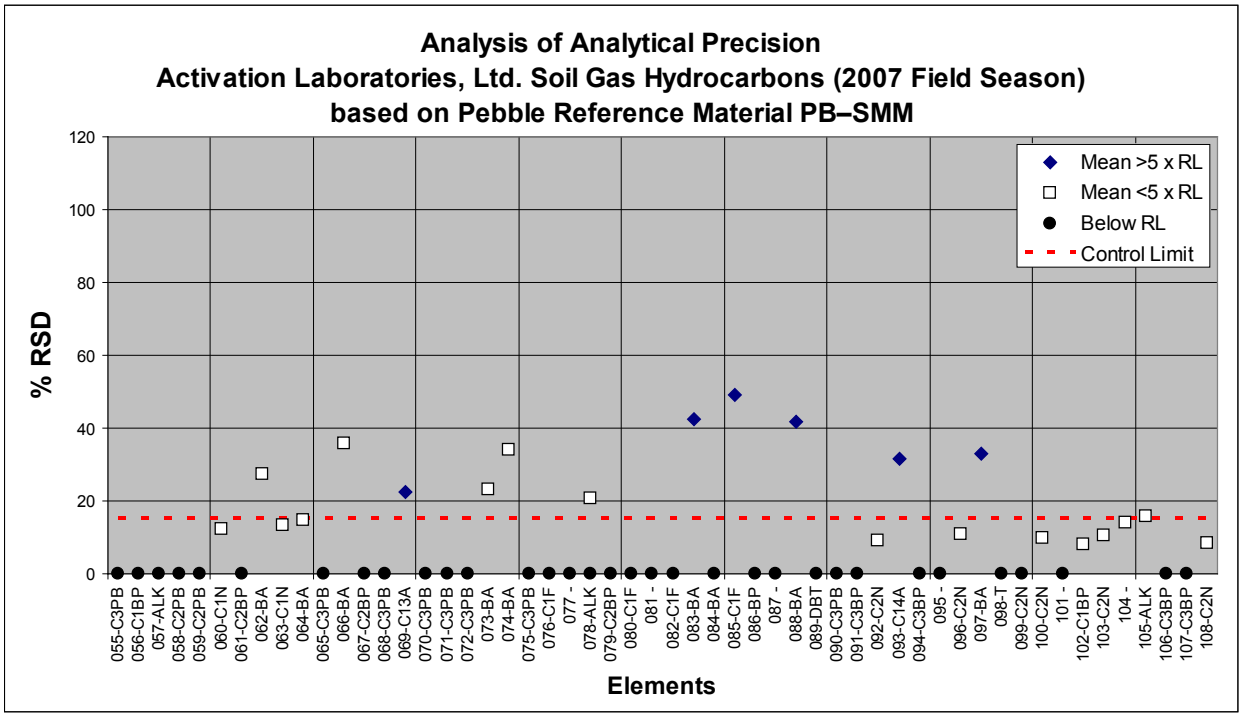

Figure 3-3b. Precision plot for five analyses of Pebble reference material PB–SMM by soil gas hydrocarbons analysis (2007 field season)—Continued. %RSD is percent relative standard deviation; RL is reporting limit.

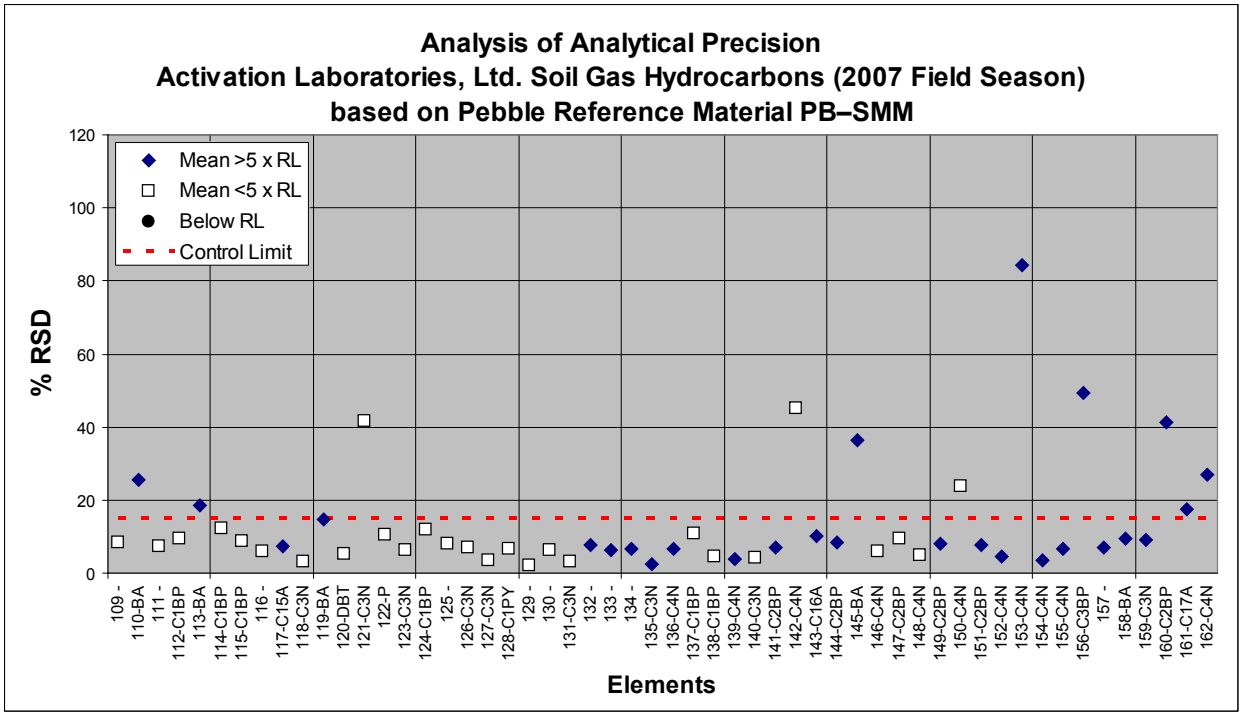

Figure 3-3c. Precision plot for five analyses of Pebble reference material PB–SMM by soil gas hydrocarbons analysis (2007 field season)—Continued. %RSD is percent relative standard deviation; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for Activation Laboratories, Ltd., Bioleach Data

Table 4-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a Bioleach of soil samples at Actlabs (2007 field season).

[ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	0.2	11	<0.2	<0.2	<0.2	*na*	*na*
As	ppb	0.5	11	50.4	486	160	5.98	3.74
Au	ppb	0.05	11	<0.05	1.64	0.268	0.0325	12.1
Ba	ppb	1	11	151	7,650	2,260	79.8	3.54
Be	ppb	0.07	11	4.69	157	44.2	2.56	5.79
Bi	ppb	0.1	11	0.100	1.50	0.509	0.0522	10.3
Br	ppb	5	11	84.0	4,440	1,960	102	5.19
Cd	ppb	0.05	11	<0.05	16.6	1.55	0.0213	1.38
Ce	ppb	0.02	11	149	2,320	732	23.7	3.24
Co	ppb	0.1	11	5.20	485	65.6	4.09	6.24
Cr	ppb	2	11	64.0	570	230	5.85	2.54
Cs	ppb	0.01	11	<0.01	6.43	2.68	0.133	4.97
Cu	ppb	0.5	11	122	4,100	1,350	33.0	2.44
Dy	ppb	0.01	11	18.1	393	125	2.37	1.89
Er	ppb	0.01	11	6.51	217	64.0	1.18	1.84
Eu	ppb	0.01	11	6.35	134	42.1	1.07	2.55
Ga	ppb	0.1	11	31.3	358	141	4.38	3.10
Gd	ppb	0.03	11	21.8	511	156	4.10	2.63
Ge	ppb	0.05	11	0.660	6.91	2.56	0.134	5.23
Hf	ppb	0.04	11	5.56	24.5	16.6	0.735	4.44
Hg	ppb	0.05	11	<0.05	<0.05	<0.05	*na*	*na*
Ho	ppb	0.01	11	2.79	75.4	22.9	0.323	1.41
I	ppb	1	11	40.0	3,170	1,250	22.5	1.81
In	ppb	0.1	11	0.300	3.10	1.20	0.0477	3.99
La	ppb	0.01	11	75.1	1,370	403	11.2	2.79
Li	ppb	0.2	11	<0.2	169	18.8	3.15	16.8
Lu	ppb	0.01	11	0.580	169	18.8	3.15	16.8
Mn	ppb	0.1	11	0.580	30.2	8.85	0.270	3.05
Mo	ppb	2	11	179	23,900	4,590	166	3.61
Nb	ppb	0.2	11	14.0	183	51.7	2.50	4.84
Nd	ppb	0.03	11	2.60	31.0	13.2	0.539	4.09
Ni	ppb	0.2	11	74.8	1,910	565	11.3	2.00
Os	ppb	1	11	<1	<1	<1	*na*	*na*
Pb	ppb	0.1	11	10.1	182	45.3	1.43	3.15
Pd	ppb	0.5	11	<0.5	<0.5	<0.5	*na*	*na*
Pr	ppb	0.01	11	18.2	422	127	2.73	2.15
Pt	ppb	0.5	11	<0.5	<0.5	<0.5	*na*	*na*
Rb	ppb	0.1	11	5.50	105	43.4	1.50	3.46
Re	ppb	0.01	11	<0.01	0.150	0.0316	0.0037	11.7
Ru	ppb	0.05	11	<0.05	0.060	<0.05	*na*	*na*
Sb	ppb	0.2	11	1.00	15.7	4.18	0.171	4.08
Sc	ppb	0.5	11	58.2	1,060	286	7.09	2.48
Se	ppb	1	11	43.0	132	77.4	4.59	5.93
Sm	ppb	0.03	11	21.8	508	156	3.76	2.41
Sr	ppb	0.1	11	15.9	6,550	1,510	42.7	2.83
Ta	ppb	0.01	11	0.100	1.90	0.809	0.0208	2.57
Tb	ppb	0.01	11	3.75	75.6	24.1	0.448	1.86
Te	ppb	1	11	<1	<1	<1	*na*	*na*
Th	ppb	0.02	11	10.8	73.9	40.6	1.60	3.95
Tl	ppb	0.2	11	0.200	2.40	1.36	0.0302	2.21
Tm	ppb	0.01	11	0.670	28.6	8.44	0.156	1.85
U	ppb	0.01	11	37.2	1,790	272	18.2	6.68

Table 4-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a Bioleach of soil samples at Actlabs (2007 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
V	ppb	1	11	93.0	8,280	1,210	23.0	1.89
W	ppb	0.01	11	2.38	12.0	4.45	0.383	8.6
Y	ppb	0.02	11	57.3	3,190	813	16.2	1.99
Yb	ppb	0.02	11	4.60	204	61.4	1.04	1.69
Zn	ppb	2	11	11.0	2,000	323	52.4	16.2
Zr	ppb	0.5	11	147	851	518	26.0	5.02

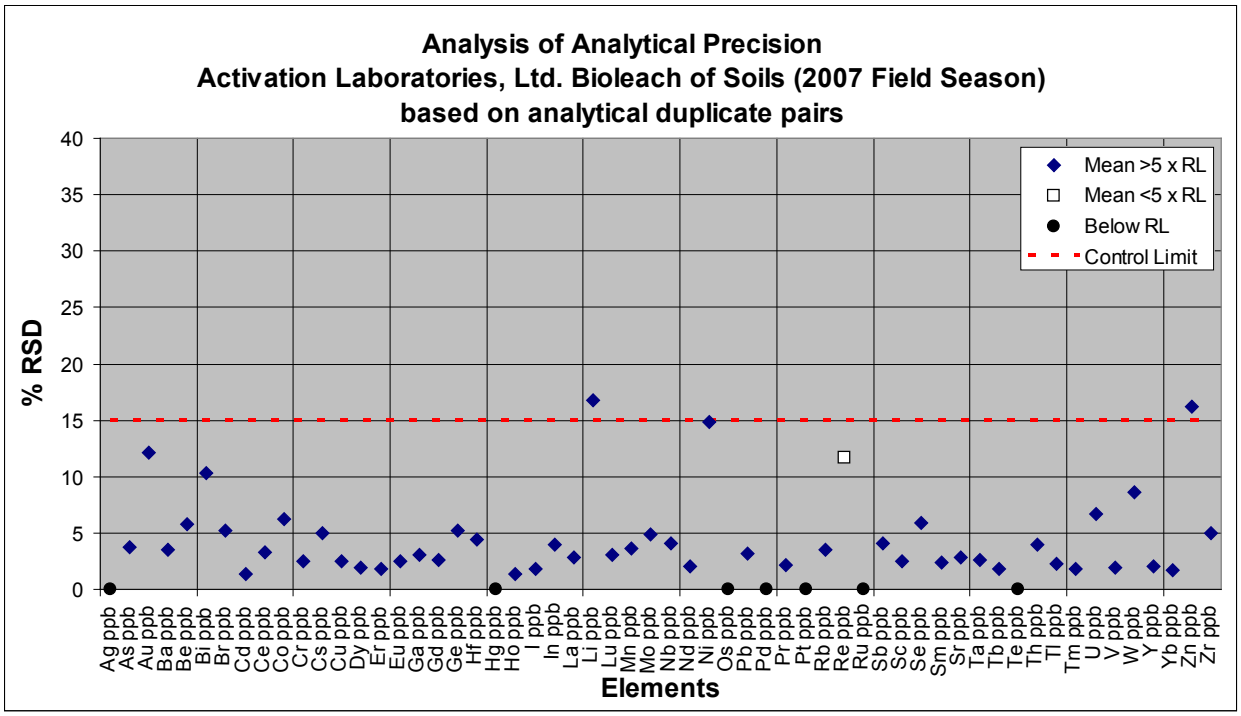

Figure 4-1. Precision plot for eleven analytical duplicate sample pairs by Bioleach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 4-2. Summary statistics for assessing analytical variation based on all five samples of the standard reference material SAR–L; determined by a Bioleach of soil samples at Actlabs (2007 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.2	5	*na*	3.98	2.21	55.7	*na*
As	ppb	0.5	5	*na*	242	32.7	13.5	*na*
Au	ppb	0.05	5	*na*	4.99	0.316	6.33	*na*
Ba	ppb	1	5	*na*	2,790	1,640	58.9	*na*
Be	ppb	0.07	5	*na*	42.0	1.89	4.50	*na*
Bi	ppb	0.1	5	*na*	2.26	1.09	48.1	*na*
Br	ppb	5	5	*na*	337	42.4	12.6	*na*
Cd	ppb	0.05	5	*na*	101	10.7	10.6	*na*
Ce	ppb	0.02	5	*na*	2,560	408	15.9	*na*

Table 4-2. Summary statistics for assessing analytical variation based on all five samples of the standard reference material SAR–L; determined by a Bioleach of soil samples at Actlabs (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Co	ppb	0.1	5	*na*	31.3	25.6	81.8	*na*
Cr	ppb	2	5	*na*	42.8	15.3	35.8	*na*
Cs	ppb	0.01	5	*na*	4.04	2.01	49.7	*na*
Cu	ppb	0.5	5	*na*	6,250	528	8.45	*na*
Dy	ppb	0.01	5	*na*	163	8.35	5.11	*na*
Er	ppb	0.01	5	*na*	87.5	2.96	3.38	*na*
Eu	ppb	0.01	5	*na*	25.5	1.82	7.12	*na*
Ga	ppb	0.1	5	*na*	101	51.4	51.0	*na*
Gd	ppb	0.03	5	*na*	248	20.1	8.11	*na*
Ge	ppb	0.05	5	*na*	3.86	0.484	12.6	*na*
Hf	ppb	0.04	5	*na*	4.09	0.294	7.20	*na*
Hg	ppb	0.05	5	*na*	<0.05	*na*	*na*	*na*
Ho	ppb	0.01	5	*na*	30.5	1.29	4.22	*na*
I	ppb	1	5	*na*	193	20.9	10.8	*na*
In	ppb	0.1	5	*na*	4.12	1.05	25.6	*na*
La	ppb	0.01	5	*na*	1,230	172	14.0	*na*
Li	ppb	0.2	5	*na*	20.4	12.6	61.6	*na*
Lu	ppb	0.01	5	*na*	12.2	0.415	3.40	*na*
Mn	ppb	0.1	5	*na*	21,200	12,300	58.0	*na*
Mo	ppb	2	5	*na*	2,920	187	6.41	*na*
Nb	ppb	0.2	5	*na*	13.1	3.82	29.2	*na*
Nd	ppb	0.03	5	*na*	1180	124	10.5	*na*
Ni	ppb	0.2	5	*na*	105	29.5	28.2	*na*
Os	ppb	1	5	*na*	<1	*na*	*na*	*na*
Pb	ppb	0.1	5	*na*	7,350	4,670	63.5	*na*
Pd	ppb	0.5	5	*na*	1.10	0.212	19.3	*na*
Pr	ppb	0.01	5	*na*	301	33.9	11.3	*na*
Pt	ppb	0.5	5	*na*	<0.5	*na*	*na*	*na*
Rb	ppb	0.1	5	*na*	111	22.7	20.4	*na*
Re	ppb	0.01	5	*na*	0.120	0.0100	8.33	*na*
Ru	ppb	0.05	5	*na*	<0.05	*na*	*na*	*na*
Sb	ppb	0.2	5	*na*	42.0	9.15	21.8	*na*
Sc	ppb	0.5	5	*na*	90.6	4.79	5.28	*na*
Se	ppb	1	5	*na*	86.6	4.28	4.94	*na*
Sm	ppb	0.03	5	*na*	257	21.8	8.49	*na*
Sr	ppb	0.1	5	*na*	2,260	32.7	1.45	*na*
Ta	ppb	0.01	5	*na*	0.510	0.0883	17.3	*na*
Tb	ppb	0.01	5	*na*	33.4	2.07	6.18	*na*
Te	ppb	1	5	*na*	5.00	4.53	90.6	*na*
Th	ppb	0.02	5	*na*	148	37.8	25.6	*na*
Tl	ppb	0.2	5	*na*	7.12	0.217	3.04	*na*
Tm	ppb	0.01	5	*na*	11.2	0.342	3.06	*na*
U	ppb	0.01	5	*na*	279	12.5	4.49	*na*
V	ppb	1	5	*na*	864	38.4	4.44	*na*
W	ppb	0.01	5	*na*	9.76	1.20	12.3	*na*
Y	ppb	0.02	5	*na*	1,110	29.7	2.68	*na*
Yb	ppb	0.02	5	*na*	82.9	3.36	4.05	*na*
Zn	ppb	2	5	*na*	11,000	1,100	9.99	*na*
Zr	ppb	0.5	5	*na*	92.8	8.02	8.64	*na*

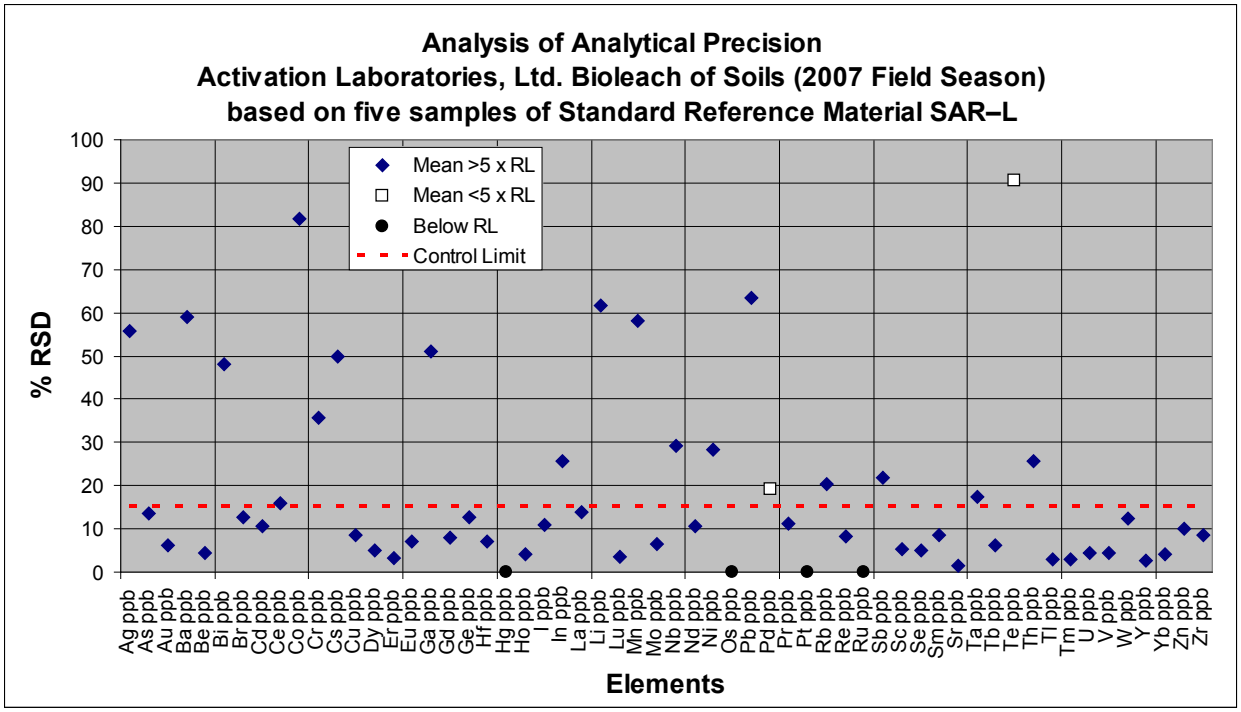

Figure 4-2. Precision plot for all five analyses of standard reference material SAR–L by Bioleach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 4-3. Summary statistics for assessing analytical variation based on only four samples of the standard reference material SAR–L; determined by a Bioleach of soil samples at Actlabs (2007 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.2	5	*na*	<0.2	*na*	*na*	*na*
As	ppb	0.5	5	*na*	129	15.2	11.8	*na*
Au	ppb	0.05	5	*na*	0.172	0.0130	7.58	*na*
Ba	ppb	1	5	*na*	2,640	62.7	2.37	*na*
Be	ppb	0.07	5	*na*	46.4	7.51	16.2	*na*
Bi	ppb	0.1	5	*na*	0.300	0	0	*na*
Br	ppb	5	5	*na*	1,620	179	11.1	*na*
Cd	ppb	0.05	5	*na*	<0.05	*na*	*na*	*na*
Ce	ppb	0.02	5	*na*	911	65.1	7.15	*na*
Co	ppb	0.1	5	*na*	38.2	7.66	20.0	*na*
Cr	ppb	2	5	*na*	148	13.8	9.31	*na*
Cs	ppb	0.01	5	*na*	5.03	1.00	20.0	*na*
Cu	ppb	0.5	5	*na*	3,150	404	12.8	*na*
Dy	ppb	0.01	5	*na*	190	26.1	13.8	*na*
Er	ppb	0.01	5	*na*	100	14.4	14.3	*na*
Eu	ppb	0.01	5	*na*	61.7	7.03	11.4	*na*
Ga	ppb	0.1	5	*na*	126	9.38	7.45	*na*
Gd	ppb	0.03	5	*na*	232	24.6	10.6	*na*
Ge	ppb	0.05	5	*na*	3.08	0.376	12.2	*na*
Hf	ppb	0.04	5	*na*	14.4	1.30	9.01	*na*
Hg	ppb	0.05	5	*na*	<0.05	*na*	*na*	*na*
Ho	ppb	0.01	5	*na*	35.3	4.85	13.7	*na*
I	ppb	1	5	*na*	1,090	30.3	2.79	*na*

Table 4-3. Summary statistics for assessing analytical variation based on only four samples of the standard reference material SAR–L; determined by a Bioleach of soil samples at Actlabs (2007 field season)—Continued.

[ppb, parts per billion; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
In	ppb	0.1	5	*na*	0.760	0.0894	11.8	*na*
La	ppb	0.01	5	*na*	489	23.4	4.78	*na*
Li	ppb	0.2	5	*na*	4.44	2.84	64.0	*na*
Lu	ppb	0.01	5	*na*	13.6	2.25	16.6	*na*
Mn	ppb	0.1	5	*na*	6,810	1,330	19.6	*na*
Mo	ppb	2	5	*na*	58.4	9.76	16.7	*na*
Nb	ppb	0.2	5	*na*	8.58	0.205	2.39	*na*
Nd	ppb	0.03	5	*na*	813	81.7	10.1	*na*
Ni	ppb	0.2	5	*na*	58.6	11.2	19.1	*na*
Os	ppb	1	5	*na*	<1	*na*	*na*	*na*
Pb	ppb	0.1	5	*na*	27.3	4.81	17.6	*na*
Pd	ppb	0.5	5	*na*	<0.5	*na*	*na*	*na*
Pr	ppb	0.01	5	*na*	181	16.3	9.01	*na*
Pt	ppb	0.5	5	*na*	<0.5	*na*	*na*	*na*
Rb	ppb	0.1	5	*na*	60.1	7.94	13.2	*na*
Re	ppb	0.01	5	*na*	0.0940	0.0089	9.52	*na*
Ru	ppb	0.05	5	*na*	<0.05	*na*	*na*	*na*
Sb	ppb	0.2	5	*na*	2.90	0.354	12.2	*na*
Sc	ppb	0.5	5	*na*	217	30.8	14.2	*na*
Se	ppb	1	5	*na*	79.2	11.3	14.3	*na*
Sm	ppb	0.03	5	*na*	230	26.7	11.6	*na*
Sr	ppb	0.1	5	*na*	1,120	33.5	2.99	*na*
Ta	ppb	0.01	5	*na*	0.514	0.0513	9.98	*na*
Tb	ppb	0.01	5	*na*	36.1	4.41	12.2	*na*
Te	ppb	1	5	*na*	<1	*na*	*na*	*na*
Th	ppb	0.02	5	*na*	37.0	2.20	5.96	*na*
Tl	ppb	0.2	5	*na*	1.64	0.313	19.1	*na*
Tm	ppb	0.01	5	*na*	13.1	2.03	15.5	*na*
U	ppb	0.01	5	*na*	93.8	16.0	17.1	*na*
V	ppb	1	5	*na*	511	70.8	13.9	*na*
W	ppb	0.01	5	*na*	3.93	0.287	7.29	*na*
Y	ppb	0.02	5	*na*	1,310	228	17.5	*na*
Yb	ppb	0.02	5	*na*	93.6	14.7	15.7	*na*
Zn	ppb	2	5	*na*	248	29.0	11.7	*na*
Zr	ppb	0.5	5	*na*	457	50.5	11.1	*na*

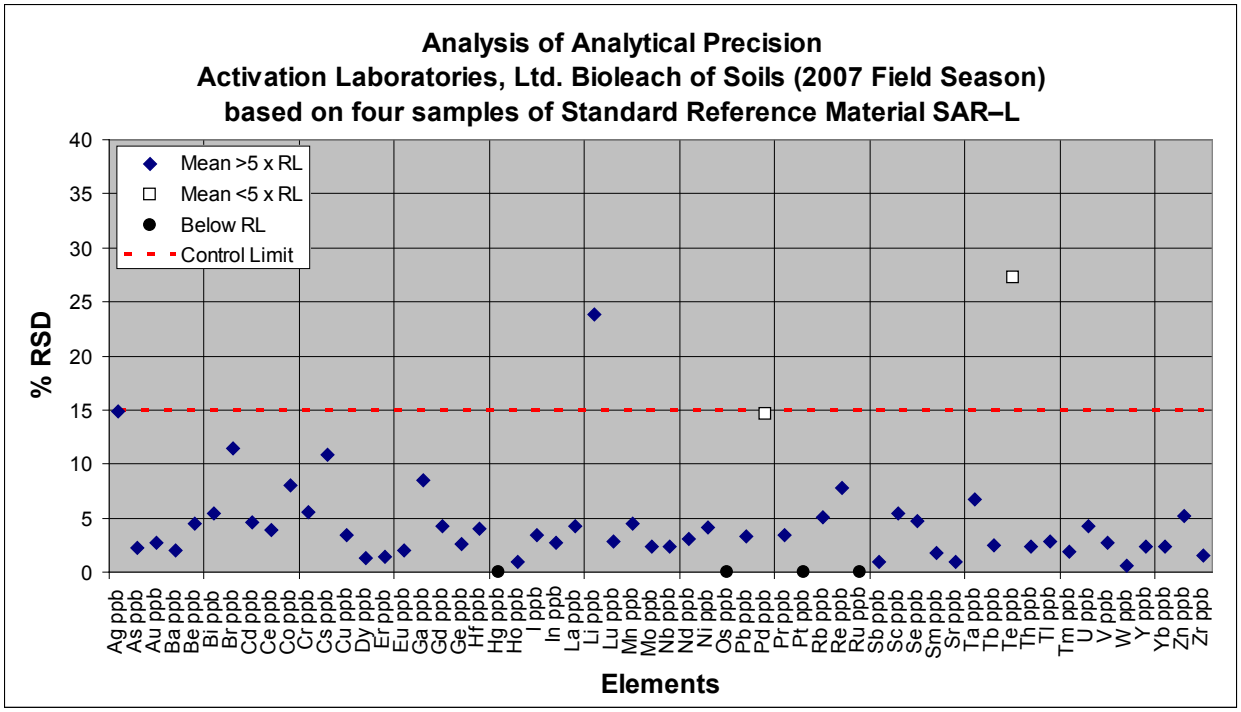

Figure 4-3. Precision plot for only four analyses of standard reference material SAR–L by Bioleach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 4-4. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a Bioleach of soil samples at Actlabs (2007 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.2	4	*na*	4.93	0.732	14.9	*na*
As	ppb	0.5	4	*na*	228	5.07	2.23	*na*
Au	ppb	0.05	4	*na*	5.13	0.137	2.68	*na*
Ba	ppb	1	4	*na*	2,060	42.0	2.05	*na*
Be	ppb	0.07	4	*na*	41.6	1.85	4.45	*na*
Bi	ppb	0.1	4	*na*	1.78	0.0957	5.39	*na*
Br	ppb	5	4	*na*	348	39.9	11.5	*na*
Cd	ppb	0.05	4	*na*	96.6	4.50	4.66	*na*
Ce	ppb	0.02	4	*na*	2,390	91.5	3.84	*na*
Co	ppb	0.1	4	*na*	19.9	1.60	8.04	*na*
Cr	ppb	2	4	*na*	36.0	2.00	5.56	*na*
Cs	ppb	0.01	4	*na*	3.15	0.341	10.8	*na*
Cu	ppb	0.5	4	*na*	6,030	209	3.47	*na*
Dy	ppb	0.01	4	*na*	160	2.06	1.29	*na*
Er	ppb	0.01	4	*na*	86.3	1.20	1.39	*na*
Eu	ppb	0.01	4	*na*	24.8	0.493	1.99	*na*
Ga	ppb	0.1	4	*na*	77.9	6.65	8.54	*na*
Gd	ppb	0.03	4	*na*	240	10.3	4.30	*na*
Ge	ppb	0.05	4	*na*	3.64	0.0925	2.54	*na*
Hf	ppb	0.04	4	*na*	3.97	0.161	4.05	*na*
Hg	ppb	0.05	4	*na*	<0.05	*na*	*na*	*na*
Ho	ppb	0.01	4	*na*	30.0	0.287	0.960	*na*
I	ppb	1	4	*na*	202	6.85	3.40	*na*

Table 4-4. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a Bioleach of soil samples at Actlabs (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
In	ppb	0.1	4	*na*	3.65	0.100	2.74	*na*
La	ppb	0.01	4	*na*	1,160	49.2	4.25	*na*
Li	ppb	0.2	4	*na*	15.0	3.56	23.8	*na*
Lu	ppb	0.01	4	*na*	12.1	0.342	2.83	*na*
Mn	ppb	0.1	4	*na*	15,700	704	4.48	*na*
Mo	ppb	2	4	*na*	3,000	70.5	2.35	*na*
Nb	ppb	0.2	4	*na*	11.4	0.263	2.31	*na*
Nd	ppb	0.03	4	*na*	1,130	34.6	3.07	*na*
Ni	ppb	0.2	4	*na*	91.5	3.79	4.14	*na*
Os	ppb	1	4	*na*	<1	*na*	*na*	*na*
Pb	ppb	0.1	4	*na*	5,260	173	3.29	*na*
Pd	ppb	0.5	4	*na*	1.03	0.150	14.6	*na*
Pr	ppb	0.01	4	*na*	287	9.68	3.38	*na*
Pt	ppb	0.5	4	*na*	<0.5	*na*	*na*	*na*
Rb	ppb	0.1	4	*na*	101	5.18	5.12	*na*
Re	ppb	0.01	4	*na*	0.123	0.0096	7.82	*na*
Ru	ppb	0.05	4	*na*	<0.05	*na*	*na*	*na*
Sb	ppb	0.2	4	*na*	38.0	0.342	0.900	*na*
Sc	ppb	0.5	4	*na*	89.6	4.90	5.46	*na*
Se	ppb	1	4	*na*	85.5	4.04	4.73	*na*
Sm	ppb	0.03	4	*na*	247	4.24	1.72	*na*
Sr	ppb	0.1	4	*na*	2,250	21.6	0.960	*na*
Ta	ppb	0.01	4	*na*	0.473	0.0320	6.78	*na*
Tb	ppb	0.01	4	*na*	32.6	0.806	2.48	*na*
Te	ppb	1	4	*na*	3.00	0.817	27.2	*na*
Th	ppb	0.02	4	*na*	131	3.10	2.37	*na*
Tl	ppb	0.2	4	*na*	7.18	0.206	2.87	*na*
Tm	ppb	0.01	4	*na*	11.1	0.208	1.88	*na*
U	ppb	0.01	4	*na*	282	12.0	4.24	*na*
V	ppb	1	4	*na*	849	23.3	2.75	*na*
W	ppb	0.01	4	*na*	9.22	0.0497	0.540	*na*
Y	ppb	0.02	4	*na*	1,100	26.3	2.40	*na*
Yb	ppb	0.02	4	*na*	81.6	1.88	2.30	*na*
Zn	ppb	2	4	*na*	10,600	544	5.14	*na*
Zr	ppb	0.5	4	*na*	89.3	1.38	1.55	*na*

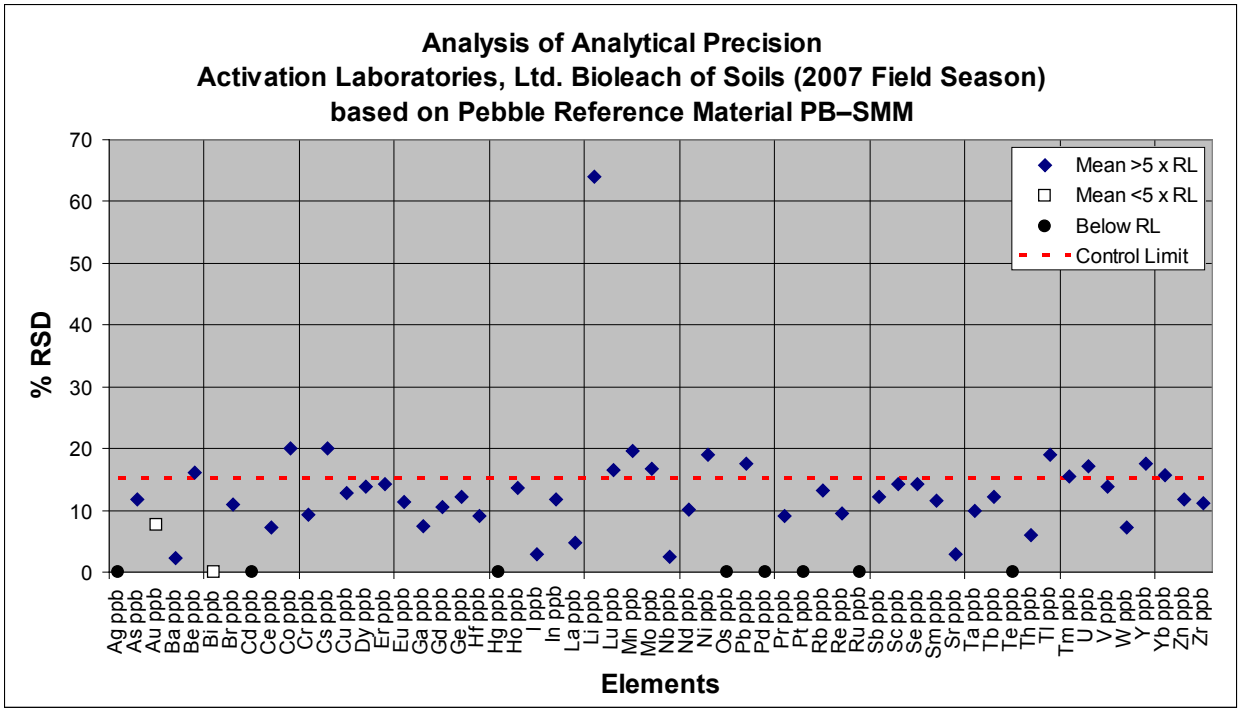

Figure 4-4. Precision plot for Pebble reference material PB–SMM by Bioleach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for Skyline Assayers and Laboratories Enzyme Leach Data

Table 5-1. Summary statistics for assessing analytical variation on duplicate samples; determined by an Enzyme Leach of soil samples at Skyline Labs (2007 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	0.1	10	<0.1	<0.1	<0.1	*na*	*na*
Al	ppm	0.5	10	3.97	154	79.2	3.38	4.27
As	ppb	0.1	10	<0.1	11.7	2.32	0.273	11.8
Au	ppb	0.005	10	<0.005	0.0510	0.00843	0.00887	105
Ba	ppb	0.5	10	377	3,280	1,640	92.3	5.64
Be	ppb	0.1	10	<0.1	6.48	3.08	0.367	11.9
Bi	ppb	0.5	10	<0.5	<0.5	<0.5	*na*	*na*
Br	ppb	1	10	9.41	163	60.6	5.31	8.76
Ca	ppm	0.5	10	<0.5	529	104	5.37	5.17
Cd	ppb	0.1	10	<0.1	30.4	3.74	0.357	9.54
Ce	ppb	0.01	10	1.30	25.6	8.61	1.45	16.8
Cl	ppb	1,000	10	<1,000	25,200	6,690	1,470	21.9
Co	ppb	0.2	10	4.82	133	52.8	5.64	10.6
Cr	ppb	3	10	<3	3.05	<3	*na*	*na*
Cs	ppb	0.01	10	0.224	3.34	0.784	0.0460	5.87
Cu	ppb	1	10	6.83	506	68.2	9.28	13.6
Dy	ppb	0.01	10	0.170	4.40	1.22	0.244	19.9
Er	ppb	0.01	10	0.0640	2.69	0.635	0.118	18.6
Eu	ppb	0.01	10	0.0480	1.08	0.331	0.0717	21.6
Fe	ppm	1	10	3.78	34.2	12.1	1.34	11.0
Ga	ppb	0.3	10	<0.3	8.79	1.29	0.381	29.4
Gd	ppb	0.01	10	0.352	4.78	1.40	0.252	17.9
Ge	ppb	0.05	10	<0.05	0.357	0.083	0.0324	38.8
Hf	ppb	0.01	10	0.0330	0.517	0.203	0.0249	12.2
Hg	ppb	0.1	10	<0.1	<0.1	<0.1	*na*	*na*
Ho	ppb	0.01	10	0.0210	0.901	0.235	0.0582	24.8
I	ppb	0.5	10	1.10	77.6	23.0	3.82	16.6
In	ppb	0.01	10	<0.01	0.0260	0.0121	0.00334	27.5
K	ppm	5	10	<5	41.9	8.68	0.579	6.62
La	ppb	0.01	10	0.586	14.3	5.11	0.908	17.7
Li	ppb	0.5	10	1.46	28.3	7.03	0.338	4.81
Lu	ppb	0.01	10	<0.01	0.327	0.0732	0.0154	21.0
Mg	ppm	2	10	<2	117	22.0	1.07	4.85
Mn	ppb	0.4	10	183	22,900	5,900	309	5.23
Mo	ppb	0.1	10	<0.1	21.8	3.42	0.482	14.0
Na	ppm	5	10	<5	22.3	9.19	0.944	10.2
Nb	ppb	0.1	10	0.125	1.50	0.338	0.0342	10.1
Nd	ppb	0.01	10	0.679	19.3	5.79	0.930	16.0
Ni	ppb	1	10	4.13	70.1	24.4	10.9	44.7
Os	ppb	0.5	10	<0.5	<0.5	<0.5	*na*	*na*
Pb	ppb	0.1	10	<0.1	9.12	1.22	1.15	94.6
Pd	ppb	0.5	10	<0.5	<0.5	<0.5	*na*	*na*
Pr	ppb	0.01	10	0.0910	4.09	1.25	0.241	19.2
Pt	ppb	0.5	10	<0.5	<0.5	<0.5	*na*	*na*
Rb	ppb	0.1	10	22.1	68.1	37.4	1.31	3.49
Re	ppb	0.005	10	<0.005	<0.005	<0.005	*na*	*na*
Ru	ppb	0.5	10	<0.5	<0.5	<0.5	*na*	*na*
S2	ppm	10	9	<10	<10	<10	*na*	*na*
Sb	ppb	0.01	10	<0.01	1.08	0.288	0.0552	19.2
Sc	ppb	10	10	<10	1.08	<10	*na*	*na*

Table 5-1. Summary statistics for assessing analytical variation on duplicate samples; determined by an Enzyme Leach of soil samples at Skyline Labs (2007 field season)—Continued.

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Se	ppb	1	10	<1	4.03	1.07	0.697	65.4
Sm	ppb	0.01	10	0.0960	4.43	1.27	0.173	13.6
Sn	ppb	0.2	10	<0.2	0.722	0.263	0.0514	19.6
Sr	ppb	0.1	10	68.9	2,550	1,080	39.7	3.69
Ta	ppb	0.02	10	<0.02	0.0810	0.0242	0.00894	3.70
Tb	ppb	0.01	10	0.0150	0.700	0.196	0.0394	20.1
Te	ppb	0.5	10	<0.5	<0.5	<0.5	*na*	*na*
Th	ppb	0.01	10	0.115	0.673	0.257	0.0159	6.19
Ti	ppb	10	10	105	2,160	460	22.8	4.97
Tl	ppb	0.005	10	0.141	1.89	0.554	0.0382	6.91
Tm	ppb	0.01	10	<0.01	0.358	0.0767	0.0222	28.9
U	ppb	0.01	10	0.0360	0.780	0.239	0.0318	13.3
V	ppb	0.1	10	1.05	127	34.7	3.02	8.71
W	ppb	0.1	10	<0.1	0.394	0.145	0.0678	46.8
Y	ppb	0.05	10	1.04	29.2	7.29	1.30	17.9
Yb	ppb	0.01	10	0.0870	2.16	0.518	0.117	22.6
Zn	ppb	5	10	5.19	752	117	8.99	7.66
Zr	ppb	0.1	10	2.41	21.1	7.84	0.579	7.39

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.
[2]One duplicate pair with very poor correspondence of values was removed from the statistics for S. The calculated %RSD for all 10 duplicate pairs was 211%.

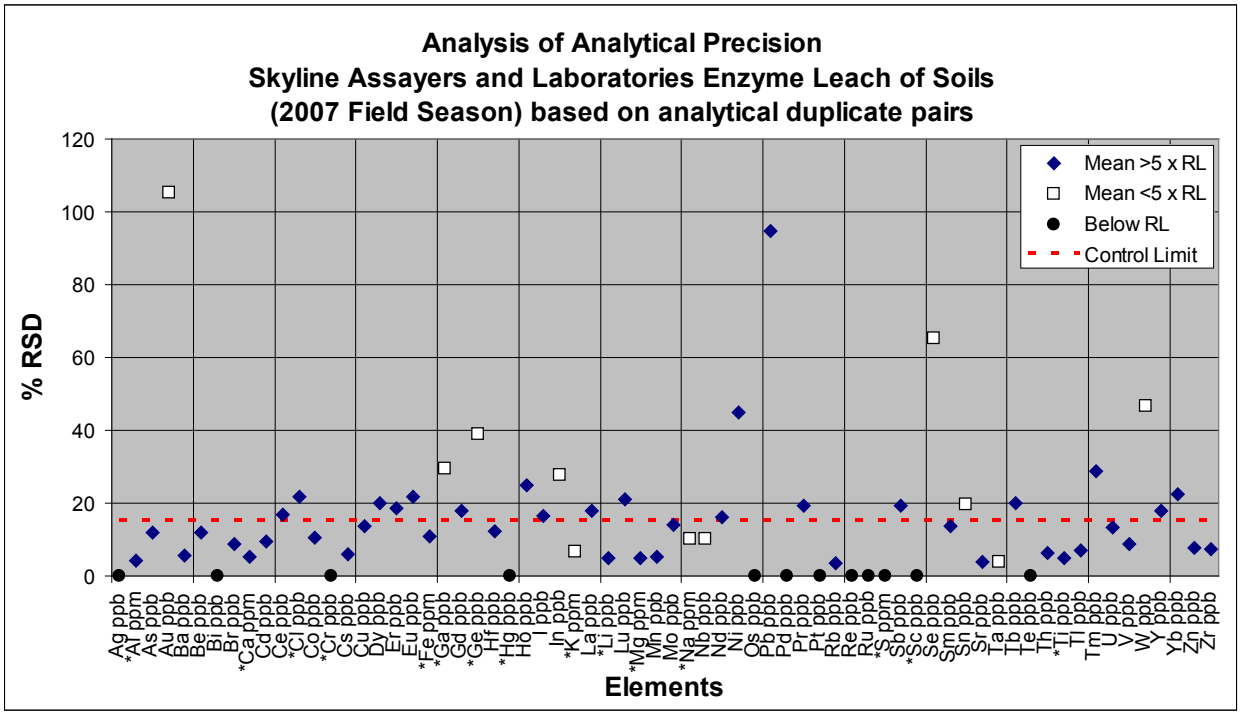

Figure 5-1. Precision plot for ten analytical duplicate sample pairs by Enzyme Leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-2. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by an Enzyme Leach of soil samples at Skyline Labs (2007 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value[2]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	3	2.80	3.03	0.211	6.98	108
Al	ppm	0.5	3	74.0	78.6	1.84	2.35	106
As	ppb	0.1	3	373	402	11.1	2.77	108
Au	ppb	0.005	3	0.366	0.424	0.0612	14.4	116
Ba	ppb	0.5	3	14,800	12,200	493	4.05	82.2
Be	ppb	0.1	3	8.50	7.75	0.762	9.82	91.2
Bi	ppb	0.5	3	2.20	1.77	0.126	7.10	80.6
Br	ppb	1	3	325	327	14.6	4.48	101
Ca	ppm	0.5	3	3,070	2,940	105	3.58	95.8
Cd	ppb	0.1	3	23.9	21.4	1.05	4.92	89.5
Ce	ppb	0.01	3	244	174	1.73	1.00	71.3
Cl	ppb	1,000	3	16,400	20,300	4,620	22.8	124
Co	ppb	0.2	3	605	573	13.2	2.30	94.8
Cr	ppb	3	3	198	193	8.19	4.24	97.5
Cs	ppb	0.01	3	0.330	0.302	0.0322	10.7	91.4
Cu	ppb	1	3	85.8	62.6	2.84	4.54	72.9
Dy	ppb	0.01	3	36.8	29.2	0.874	2.99	79.4
Er	ppb	0.01	3	19.8	16.0	0.666	4.17	80.6
Eu	ppb	0.01	3	8.80	6.91	0.343	4.96	78.5
Fe	ppm	1	3	230	216	9.64	4.46	93.9
Ga	ppb	0.3	3	23.5	22.1	0.862	3.91	94
Gd	ppb	0.01	3	44.1	33.7	1.08	3.21	76.4
Ge	ppb	0.05	3	14.9	14.0	0.404	2.89	93.7
Hf	ppb	0.01	3	12.9	12.0	0.416	3.48	92.8
Hg	ppb	0.1	3	1.00	0.306	0.199	65.0	30.6
Ho	ppb	0.01	3	7.12	5.66	0.262	4.63	79.5
I	ppb	0.5	3	250	227	4.04	1.78	90.7
In	ppb	0.01	3	0.0500	0.0467	0.0156	33.5	93.3
K	ppm	5	3	201	186	10.6	5.69	92.5
La	ppb	0.01	3	84.2	66.5	2.70	4.05	79.0
Li	ppb	0.5	3	515	546	15.9	2.92	106
Lu	ppb	0.01	3	2.64	2.28	0.0907	3.97	86.5
Mg	ppm	2	3	329	286	6.81	2.38	87.0
Mn	ppb	0.4	3	117,000	1,000,000	3,720	3.58	88.8
Mo	ppb	0.1	3	350	282	12.8	4.53	80.6
Na	ppm	5	3	125	124	5.03	4.07	98.9
Nb	ppb	0.1	3	28.7	23.7	0.651	2.75	82.5
Nd	ppb	0.01	3	149	113	2.52	2.23	75.6
Ni	ppb	1	3	456	442	22.0	4.98	97
Os	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
Pb	ppb	0.1	3	80.8	74.3	3.27	4.41	91.9
Pd	ppb	0.5	3	8.60	5.46	0.410	7.52	63.4
Pr	ppb	0.01	3	30.3	23.1	0.781	3.38	76.2
Pt	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
Rb	ppb	0.1	3	66.6	56.1	1.59	2.83	84.2
Re	ppb	0.005	3	0.193	0.178	0.0273	15.4	92.1
Ru	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
S	ppm	10	3	61.0	65.5	28.7	43.8	107
Sb	ppb	0.01	3	250	220	6.56	2.98	88.0
Sc	ppb	10	3	216	319	18.7	5.86	148
Se	ppb	1	3	27.0	26.5	4.20	15.8	98.3
Sm	ppb	0.01	3	40.7	30.0	1.23	4.10	73.7
Sn	ppb	0.2	3	5.50	5.31	0.271	5.10	96.5
Sr	ppb	0.1	3	20,800	18,700	929	4.98	89.7
Ta	ppb	0.02	3	3.81	3.66	0.161	4.40	96.1

Table 5-2. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by an Enzyme Leach of soil samples at Skyline Labs (2007 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value[2]	Mean	Standard Deviation	%RSD	%Recovery
Tb	ppb	0.01	3	6.67	5.15	0.185	3.60	77.2
Te	ppb	0.5	3	3.90	3.67	0.836	22.8	94.0
Th	ppb	0.01	3	53.8	50.5	2.46	4.87	93.9
Ti	ppb	10	3	5,780	4,640	112	2.42	80.3
Tl	ppb	0.005	3	0.685	0.619	0.0519	8.39	90.4
Tm	ppb	0.01	3	2.56	2.30	0.103	4.46	90.0
U	ppb	0.01	3	6.33	5.80	0.202	3.49	91.6
V	ppb	0.1	3	748	727	28.6	3.93	97.2
W	ppb	0.1	3	601	515	17.6	3.42	85.7
Y	ppb	0.05	3	184	142	2.65	1.86	77.2
Yb	ppb	0.01	3	16.5	14.2	0.656	4.62	86.1
Zn	ppb	5	3	478	457	23.5	5.15	95.6
Zr	ppb	0.1	3	602	517	17.0	3.29	85.9

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.
[2]Target Values as updated and reported in 2009 were used here rather than the original values from 2007.

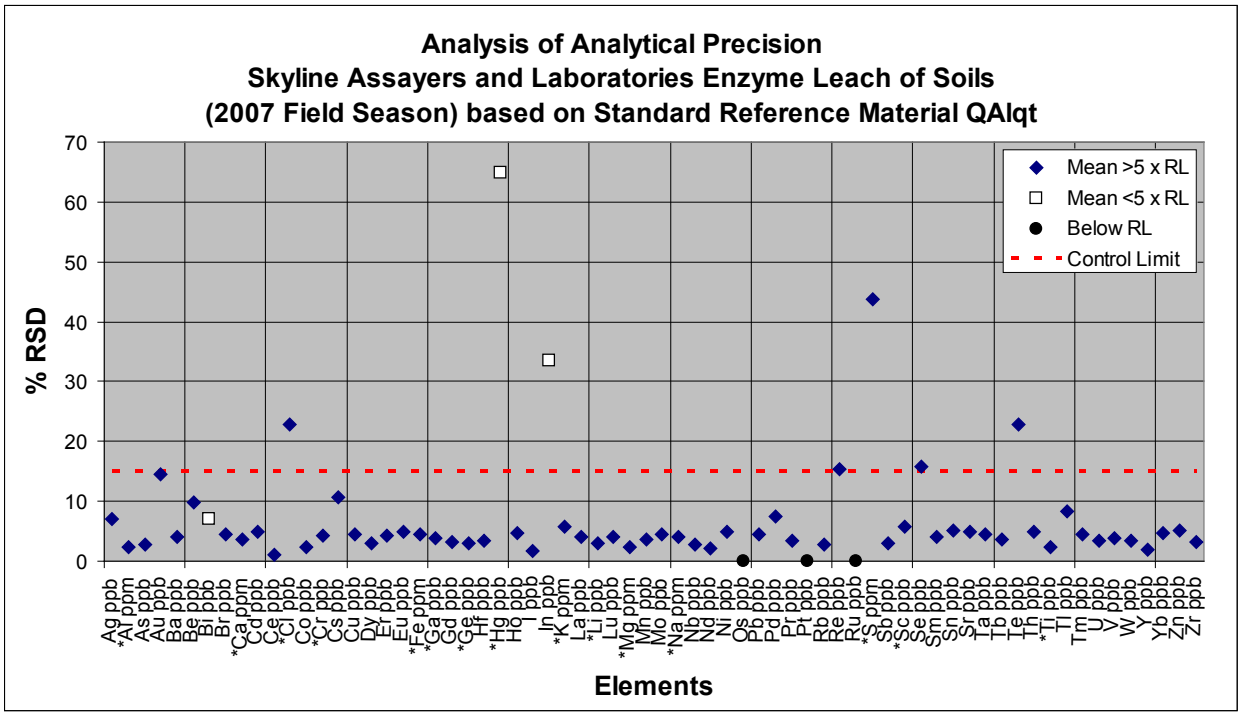

Figure 5-2. Precision plot for three analyses of standard reference material QAlqt by Enzyme Leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

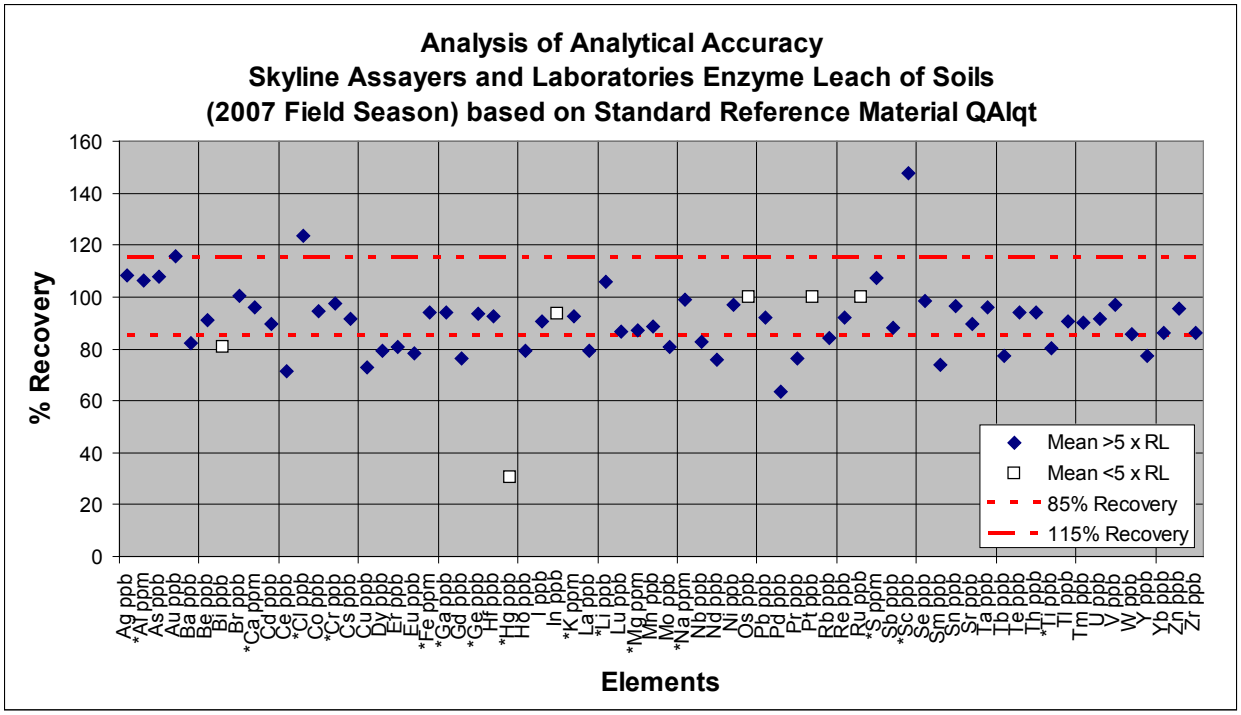

Figure 5-3. Accuracy plot for three analyses of standard reference material QAlqt by Enzyme Leach (2007 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-3. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by an Enzyme Leach of soil samples at Skyline Labs (2007 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value[2]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	3	0.600	0.711	0.108	15.2	119
Al	ppm	0.5	3	21.8	22.5	0.404	1.79	103
As	ppb	0.1	3	95.4	100	1.86	1.85	105
Au	ppb	0.005	3	4.15	5.05	0.305	6.04	122
Ba	ppb	0.5	3	3,800	3,650	45.8	1.26	96.1
Be	ppb	0.1	3	4.70	5.07	0.376	7.43	108
Bi	ppb	0.5	3	0.800	1.33	0.067	5.02	166
Br	ppb	1	3	667	679	13.3	1.96	102
Ca	ppm	0.5	3	1,110	1,040	25.2	2.41	94.0
Cd	ppb	0.1	3	5.80	5.76	0.409	7.10	99.3
Ce	ppb	0.01	3	58.1	53.6	0.700	1.31	92.3
Cl	ppb	1000	3	219,000	233,000	6,030	2.58	107
Co	ppb	0.2	3	148	153	1.53	1.00	103
Cr	ppb	3	3	84.0	65.2	5.06	7.76	77.6
Cs	ppb	0.01	3	0.450	0.430	0.0331	7.70	95.5
Cu	ppb	1	3	104	102	2.14	2.09	98.4
Dy	ppb	0.01	3	8.37	7.80	0.199	2.54	93.2
Er	ppb	0.01	3	4.44	4.14	0.112	2.71	93.3
Eu	ppb	0.01	3	2.21	2.03	0.0611	3.01	91.7
Fe	ppm	1	3	31.0	34.4	0.200	0.581	111
Ga	ppb	0.3	3	12.1	11.9	0.569	4.79	98.1
Gd	ppb	0.01	3	10.5	9.96	0.240	2.41	94.8

Table 5-3. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by an Enzyme Leach of soil samples at Skyline Labs (2007 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value[2]	Mean	Standard Deviation	%RSD	%Recovery
Ge	ppb	0.05	3	6.10	6.26	0.248	3.96	103
Hf	ppb	0.01	3	2.58	2.58	0.141	5.47	100
Hg	ppb	0.1	3	0.200	<0.1	*na*	*na*	45.6
Ho	ppb	0.01	3	1.63	1.52	0.0451	2.97	93.0
I	ppb	0.5	3	611	208	5.29	2.54	34.0
In	ppb	0.01	3	0.0200	0.0307	0.0140	45.7	153
K	ppm	5	3	99.0	88.6	2.39	2.70	89.5
La	ppb	0.01	3	25.3	23.6	0.252	1.06	93.4
Li	ppb	0.5	3	195	201	2.08	1.04	103
Lu	ppb	0.01	3	0.580	0.533	0.0316	5.94	91.8
Mg	ppm	2	3	94.0	94.8	2.11	2.22	101
Mn	ppb	0.4	3	21,100	20,600	351	1.71	97.5
Mo	ppb	0.1	3	139	173	3.00	1.73	124
Na	ppm	5	3	342	333	7.64	2.30	97.3
Nb	ppb	0.1	3	3.40	3.35	0.105	3.14	98.4
Nd	ppb	0.01	3	40.2	38.1	0.900	2.36	94.8
Ni	ppb	1	3	105	108	5.51	5.08	103
Os	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
Pb	ppb	0.1	3	36.4	33.7	0.404	1.20	92.5
Pd	ppb	0.5	3	1.80	1.08	0.129	12.0	59.9
Pr	ppb	0.01	3	8.55	8.02	0.155	1.93	93.8
Pt	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
Rb	ppb	0.1	3	42.9	43.3	0.751	1.73	101
Re	ppb	0.005	3	0.550	0.537	0.0237	4.41	97.7
Ru	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
S	ppm	10	3	134	80.6	2.10	2.61	60.1
Sb	ppb	0.01	3	20.4	20.2	0.351	1.74	99.2
Sc	ppb	10	3	57.0	76.2	5.23	6.86	134
Se	ppb	1	3	46.0	45.1	3.42	7.57	98.1
Sm	ppb	0.01	3	10.1	9.29	0.261	2.81	92.0
Sn	ppb	0.2	3	5.50	5.90	0.0850	1.44	107
Sr	ppb	0.1	3	6,280	6,050	97.1	1.61	96.3
Ta	ppb	0.02	3	0.490	0.467	0.0216	4.63	95.3
Tb	ppb	0.01	3	1.61	1.48	0.0458	3.10	91.9
Te	ppb	0.5	3	1.50	1.24	0.422	34.2	82.4
Th	ppb	0.01	3	4.46	4.40	0.0569	1.29	98.7
Ti	ppb	10	3	1,160	1,170	20.0	1.71	101
Tl	ppb	0.005	3	0.494	0.462	0.0189	4.08	93.6
Tm	ppb	0.01	3	0.590	0.552	0.0218	3.96	93.5
U	ppb	0.01	3	49.3	48.3	0.800	1.66	98.0
V	ppb	0.1	3	483	486	5.51	1.13	101
W	ppb	0.1	3	57.5	53.9	0.808	1.50	93.8
Y	ppb	0.05	3	43.5	43.4	0.557	1.28	99.8
Yb	ppb	0.01	3	3.62	3.44	0.125	3.63	95.1
Zn	ppb	5	3	219	214	4.00	1.87	97.7
Zr	ppb	0.1	3	92.5	93.8	1.10	1.17	101

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.
[2]Target Values as updated and reported in 2009 were used here rather than the original values from 2007.

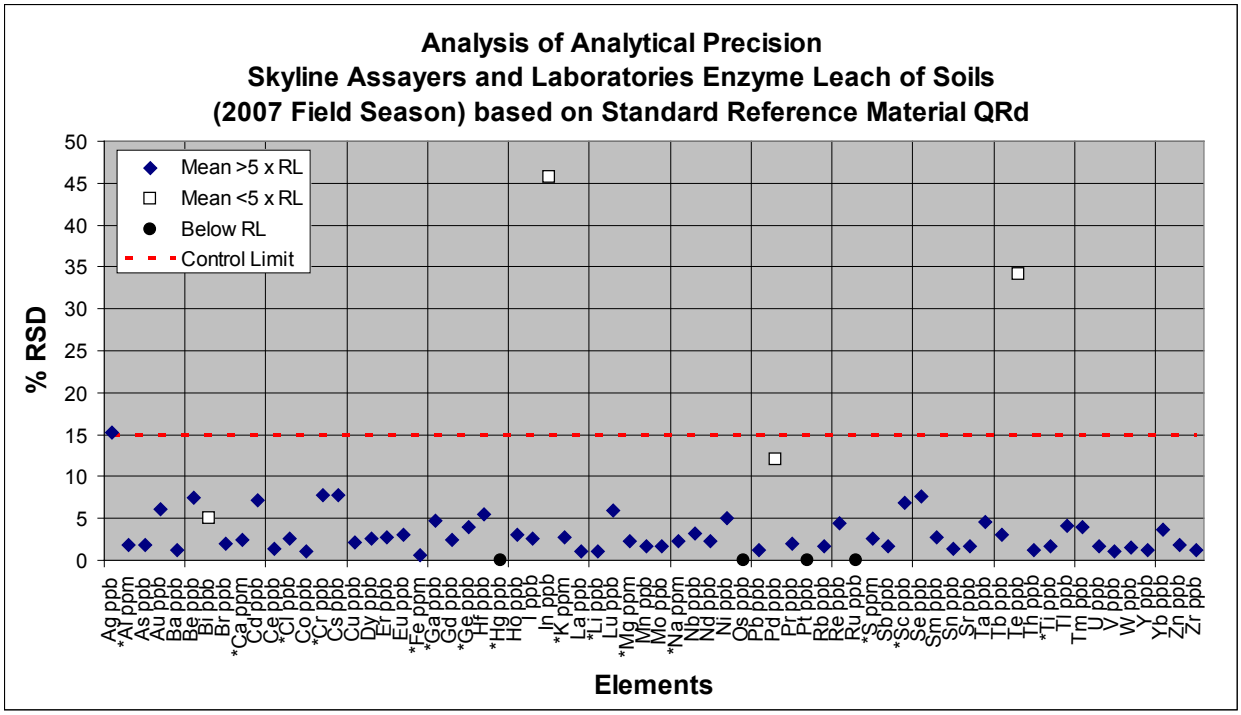

Figure 5-4. Precision plot for three analyses of standard reference material QRd by Enzyme Leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

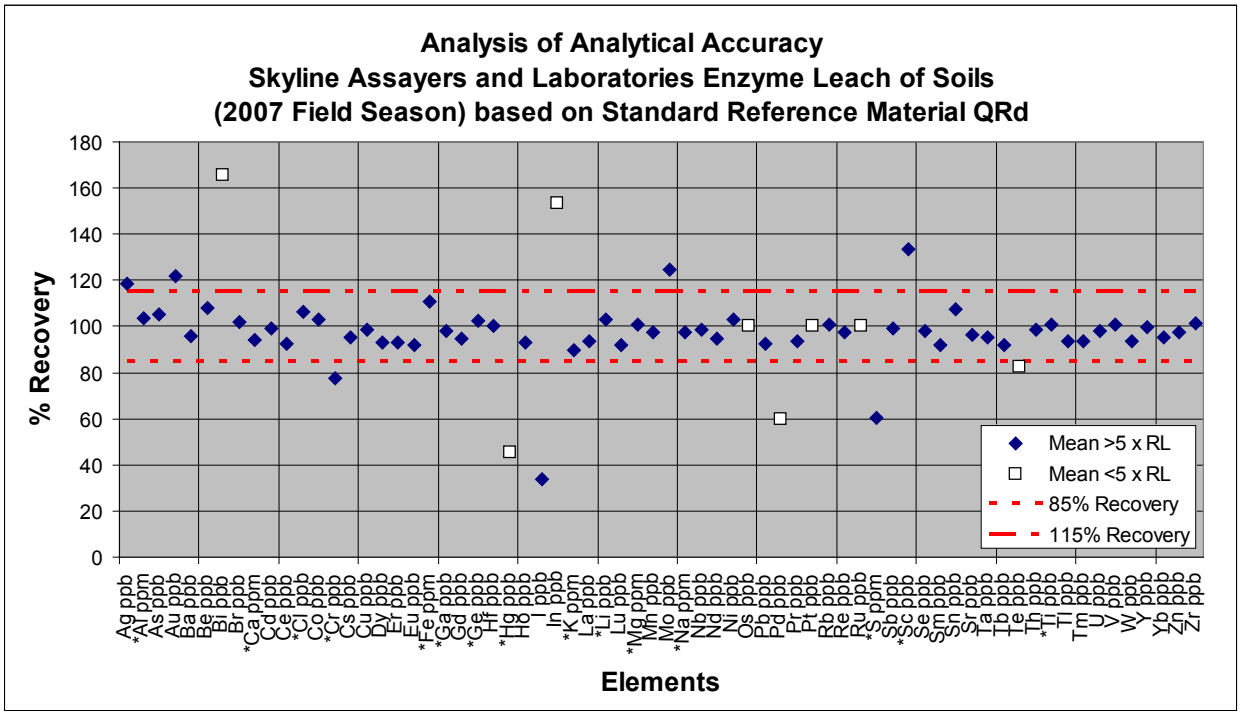

Figure 5-5. Accuracy plot for three analyses of standard reference material QRd by Enzyme Leach (2007 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-4. Summary statistics for assessing analytical variation on duplicate samples; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	0.1	14	<0.1	0.941	0.159	0.0232	14.5
Al	ppm	0.5	14	1.37	261	98.0	8.07	8.24
As	ppb	0.1	14	<0.1	104	11.8	4.02	34.1
Au	ppb	0.005	14	<0.005	0.122	0.0283	0.00548	19.3
Ba	ppb	0.5	14	398	4,410	1,580	99.7	6.31
Be	ppb	0.1	14	0.240	7.80	2.93	0.436	14.9
Bi	ppb	0.5	14	<0.5	<0.5	<0.5	*na*	*na*
Br	ppb	1.0	14	17.1	636	103	9.03	8.76
Ca	ppm	0.5	14	9.77	539	169	13.8	8.14
Cd	ppb	0.1	14	<0.1	4.75	1.27	0.205	16.1
Ce	ppb	0.01	14	0.194	68.6	13.3	2.53	18.9
Cl	ppb	1,000	14	<1,000	20,300	7,790	2,450	31.4
Co	ppb	0.2	14	1.71	138	34.4	3.35	9.74
Cr	ppb	3.0	14	<3	6.32	<3	*na*	*na*
Cs	ppb	0.01	14	0.184	1.84	0.543	0.0222	4.09
Cu	ppb	1.0	14	<1	262	47.1	10.8	22.9
Dy	ppb	0.01	14	0.0141	9.00	1.78	0.248	13.9
Er	ppb	0.01	14	<0.01	4.94	1.02	0.166	16.2
Eu	ppb	0.01	14	<0.01	2.85	0.535	0.0865	16.2
Fe	ppm	1.0	14	2.33	150	22.9	6.30	27.5
Ga	ppb	0.3	14	<0.3	4.98	1.30	0.284	21.9
Gd	ppb	0.01	14	<0.01	11.6	2.18	0.379	17.3
Ge	ppb	0.05	14	<0.05	0.995	0.309	0.0327	10.6
Hf	ppb	0.01	14	0.0118	1.91	0.427	0.0534	12.5
Hg	ppb	0.1	14	<0.1	0.586	0.239	0.0636	26.6
Ho	ppb	0.01	14	0.0190	1.68	0.351	0.0565	16.1
I	ppb	0.5	14	<0.5	167	22.0	2.95	13.4
In	ppb	0.01	14	<0.01	0.0514	0.0155	0.00432	27.9
K	ppm	5.0	14	<5	50.1	9.51	0.698	7.34
La	ppb	0.01	14	0.169	28.2	6.27	1.16	18.4
Li	ppb	0.5	14	1.47	21.3	7.78	0.581	7.47
Lu	ppb	0.01	14	<0.01	0.550	0.123	0.0212	17.3
Mg	ppm	2.0	14	<2	102	33.1	3.11	9.39
Mn	ppb	0.4	14	36.4	20,800	3,900	366	9.37
Mo	ppb	0.1	14	0.398	97.2	13.4	5.67	42.4
Na	ppm	5.0	14	<5	41.5	15.6	1.05	6.73
Nb	ppb	0.1	14	0.168	1.94	0.621	0.0760	12.2
Nd	ppb	0.01	14	0.278	44.6	8.66	1.47	17.0
Ni	ppb	1.0	14	1.45	83.2	28.1	4.15	14.8
Os	ppb	0.5	14	<0.5	<0.5	<0.5	*na*	*na*
Pb	ppb	0.1	14	<0.1	4.72	0.762	0.576	75.6
Pd	ppb	0.5	14	<0.5	0.553	<0.5	*na*	*na*
Pr	ppb	0.01	14	0.0340	10.0	1.99	0.331	16.6
Pt	ppb	0.5	14	<0.5	<0.5	<0.5	*na*	*na*
Rb	ppb	0.1	14	8.35	116	29.1	1.87	6.42
Re	ppb	0.005	14	<0.005	0.123	0.0133	0.00253	19.0
Ru	ppb	0.5	14	<0.5	<0.5	<0.5	*na*	*na*
S	ppm	10	14	<10	36.4	18.3	3.17	17.3
Sb	ppb	0.01	14	0.0860	4.23	1.01	0.152	15.1
Sc	ppb	10	14	<10	29.4	14.0	1.82	13.0
Se	ppb	1.0	14	<1	9.03	2.18	0.741	33.9
Sm	ppb	0.01	14	0.111	10.6	2.06	0.282	13.7
Sn	ppb	0.2	14	<0.2	0.454	0.206	0.0447	21.7
Sr	ppb	0.1	14	37.7	6,170	1,820	80.1	4.41

Table 5-4. Summary statistics for assessing analytical variation on duplicate samples; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ta	ppb	0.02	14	<0.02	1.00	0.289	0.179	62.0
Tb	ppb	0.01	14	0.0120	1.68	0.367	0.0536	14.6
Te	ppb	0.5	14	<0.5	<0.5	<0.5	*na*	*na*
Th	ppb	0.01	14	<0.01	1.57	0.401	0.0464	11.6
Ti	ppb	10	14	173	5,950	1,250	288	23.0
Tl	ppb	0.005	14	0.103	4.46	1.00	0.0478	4.76
Tm	ppb	0.01	14	0.0130	0.646	0.138	0.0215	15.5
U	ppb	0.01	14	0.0157	2.99	0.434	0.0247	5.70
V	ppb	0.1	14	4.98	1,530	233	50.2	21.5
W	ppb	0.1	14	<0.1	1.87	0.425	0.190	44.8
Y	ppb	0.05	14	0.290	45.4	9.89	1.70	17.2
Yb	ppb	0.01	14	0.0656	3.83	0.841	0.118	14.0
Zn	ppb	5.0	14	<5	843	136	32.7	24.1
Zr	ppb	0.1	14	0.823	56.2	15.0	1.32	8.80

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

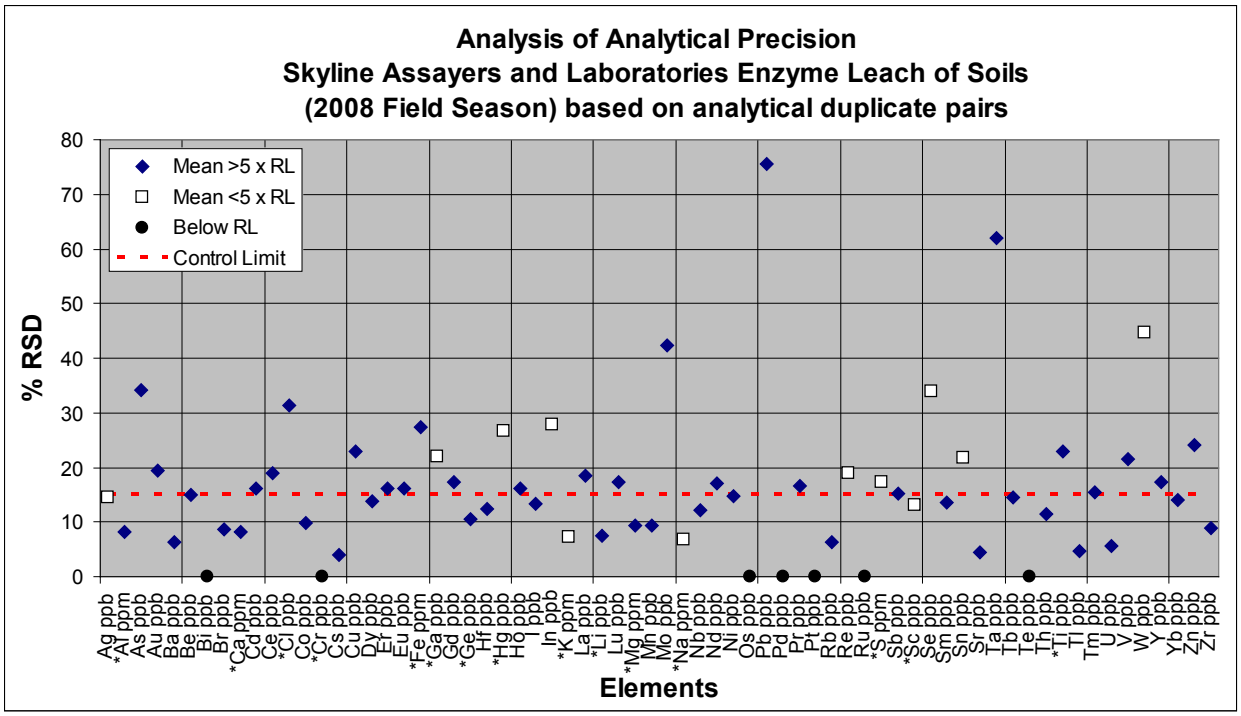

Figure 5-6. Precision plot for fourteen analytical duplicate sample pairs by Enzyme Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-5. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value[2]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	6	2.80	2.81	0.206	7.32	100
Al	ppm	0.5	6	74.0	73.8	4.32	5.85	99.7
As	ppb	0.1	6	373	359	32.2	8.96	96.3
Au	ppb	0.005	6	0.366	0.354	0.0287	8.10	96.8
Ba	ppb	0.5	6	14,800	16,000	1,060	6.66	108
Be	ppb	0.1	6	8.50	9.29	0.918	9.88	109
Bi	ppb	0.5	6	2.20	1.94	0.281	14.5	88.0
Br	ppb	1.0	6	325	340	8.24	2.43	105
Ca	ppm	0.5	6	3,070	3,140	311	9.89	102
Cd	ppb	0.1	6	23.9	25.6	0.709	2.77	107
Ce	ppb	0.01	6	244	283	3.66	1.29	116
Cl	ppb	1,000	6	16,400	18,100	2,410	13.4	110
Co	ppb	0.2	6	605	681	15.9	2.34	113
Cr	ppb	3.0	6	198	204	6.26	3.07	103
Cs	ppb	0.01	6	0.330	0.309	0.0140	4.51	93.8
Cu	ppb	1.0	6	85.8	118	2.51	2.12	138
Dy	ppb	0.01	6	36.8	42.3	1.01	2.39	115
Er	ppb	0.01	6	19.8	22.6	0.960	4.24	114
Eu	ppb	0.01	6	8.80	10.6	0.167	1.58	120
Fe	ppm	1.0	6	230	252	12.8	5.06	110
Ga	ppb	0.3	6	23.5	25.9	0.864	3.34	110
Gd	ppb	0.01	6	44.1	51.6	1.39	2.70	117
Ge	ppb	0.05	6	14.9	16.4	0.348	2.13	110
Hf	ppb	0.01	6	12.9	13.5	0.456	3.38	104
Hg	ppb	0.1	6	1.00	1.68	0.394	23.5	168
Ho	ppb	0.01	6	7.12	8.30	0.244	2.94	117
I	ppb	0.5	6	250	248	6.43	2.59	99.1
In	ppb	0.01	6	0.0500	0.0458	0.0106	23.2	91.6
K	ppm	5.0	6	201	187	28.6	15.3	92.9
La	ppb	0.01	6	84.2	98.2	3.45	3.52	117
Li	ppb	0.5	6	515	543	24.9	4.59	106
Lu	ppb	0.01	6	2.64	3.00	0.153	5.09	114
Mg	ppm	2.0	6	329	344	23.8	6.94	104
Mn	ppb	0.4	6	117,000	130,000	7,970	6.14	111
Mo	ppb	0.1	6	350	262	31.6	12.0	75.0
Na	ppm	5.0	6	125	119	6.09	5.11	95.3
Nb	ppb	0.1	6	28.7	29.1	0.435	1.49	101
Nd	ppb	0.01	6	149	179	6.38	3.55	120
Ni	ppb	1.0	6	456	486	12.4	2.56	107
Os	ppb	0.5	6	<0.5	<0.5	*na*	*na*	100
Pb	ppb	0.1	6	80.8	76.8	8.68	11.3	95.1
Pd	ppb	0.5	6	8.60	8.84	1.31	14.9	103
Pr	ppb	0.01	6	30.3	36.9	0.800	2.17	122
Pt	ppb	0.5	6	<0.5	<0.5	*na*	*na*	100
Rb	ppb	0.1	6	66.6	67.8	2.20	3.24	102
Re	ppb	0.005	6	0.193	0.197	0.0130	6.57	102
Ru	ppb	0.5	6	<0.5	<0.5	*na*	*na*	100
S	ppm	10	6	61.0	71.0	4.91	6.91	116
Sb	ppb	0.01	6	250	249	5.22	2.09	99.8
Sc	ppb	10	6	216	248	28.4	11.5	115
Se	ppb	1.0	6	27.0	28.0	3.18	11.4	104
Sm	ppb	0.01	6	40.7	47.7	1.05	2.20	117
Sn	ppb	0.2	6	5.50	5.66	1.13	20.0	103
Sr	ppb	0.1	6	20,800	22,000	1,230	5.58	106
Ta	ppb	0.02	6	3.81	4.08	0.320	7.85	107

Table 5-5. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value[2]	Mean	Standard Deviation	%RSD	%Recovery
Tb	ppb	0.01	6	6.67	7.70	0.180	2.34	115
Te	ppb	0.5	6	3.90	4.66	0.840	18.0	120
Th	ppb	0.01	6	53.8	57.4	0.782	1.36	107
Ti	ppb	10	6	5,780	5,960	150	2.52	103
Tl	ppb	0.005	6	0.685	0.706	0.0234	3.31	103
Tm	ppb	0.01	6	2.56	2.96	0.0668	2.25	116
U	ppb	0.01	6	6.33	6.92	0.196	2.84	109
V	ppb	0.1	6	748	798	18.1	2.27	107
W	ppb	0.1	6	601	563	12.5	2.22	93.6
Y	ppb	0.05	6	184	218	5.49	2.52	119
Yb	ppb	0.01	6	16.5	19.1	0.705	3.69	116
Zn	ppb	5.0	6	478	541	13.7	2.54	113
Zr	ppb	0.1	6	602	600	29.8	4.96	99.6

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.
[2]Target Values as updated and reported in 2009 were used here rather than the original values from 2008.

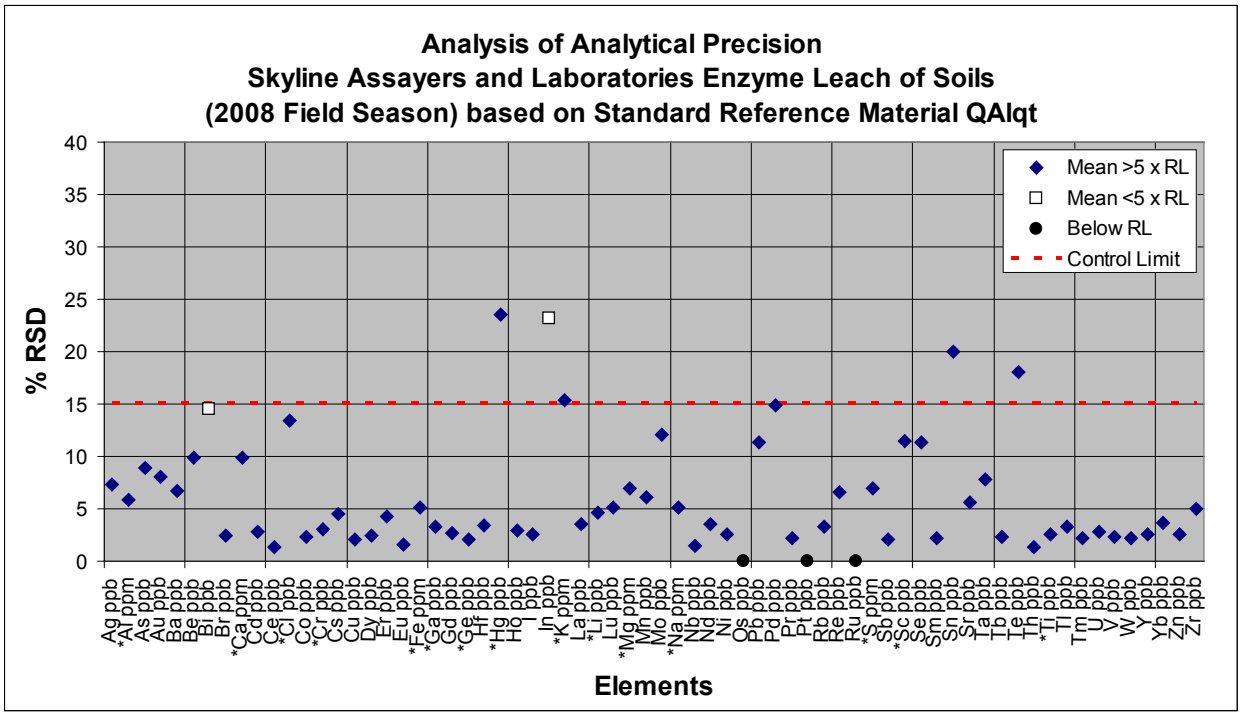

Figure 5-7. Precision plot for six analyses of standard reference material QAlqt by Enzyme Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

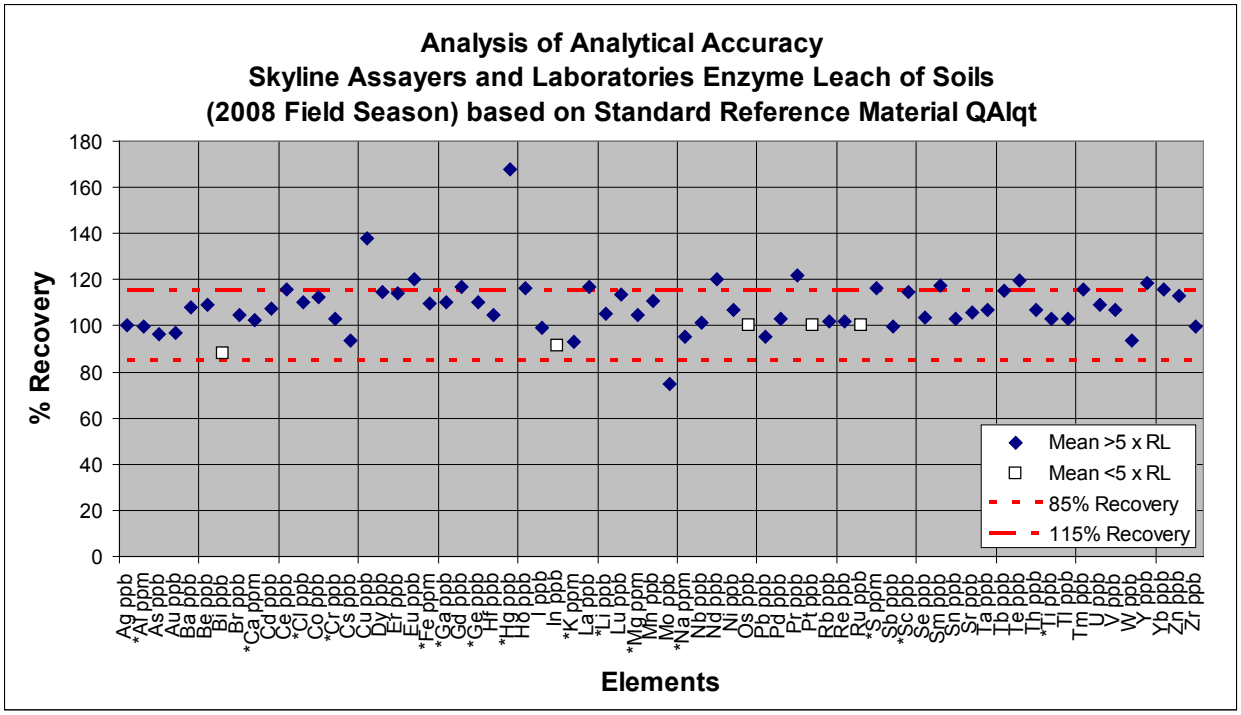

Figure 5-8. Accuracy plot for six analyses of standard reference material QAlqt by Enzyme Leach (2008 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-6. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value[2]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	6	0.600	0.460	0.0430	9.33	76.7
Al	ppm	0.5	6	21.8	19.3	0.695	3.59	88.7
As	ppb	0.1	6	95.4	93.5	9.27	9.92	98.0
Au	ppb	0.005	6	4.15	3.37	0.164	4.87	81.3
Ba	ppb	0.5	6	3,800	3,940	174	4.43	104
Be	ppb	0.1	6	4.70	5.29	0.395	7.46	113
Bi	ppb	0.5	6	0.800	0.877	0.105	11.9	110
Br	ppb	1.0	6	667	670	17.6	2.63	100
Ca	ppm	0.5	6	1,110	1,120	107	9.55	101
Cd	ppb	0.1	6	5.80	5.72	0.242	4.24	98.7
Ce	ppb	0.01	6	58.1	61.1	1.56	2.55	105
Cl	ppb	1,000	6	219,000	220,000	4,760	2.17	100
Co	ppb	0.2	6	148	150	3.17	2.11	101
Cr	ppb	3.0	6	84.0	72.4	4.23	5.84	86.2
Cs	ppb	0.01	6	0.450	0.444	0.0179	4.04	98.7
Cu	ppb	1.0	6	104	100	3.34	3.33	96.4
Dy	ppb	0.01	6	8.37	9.10	0.269	2.96	109
Er	ppb	0.01	6	4.44	4.75	0.127	2.66	107
Eu	ppb	0.01	6	2.21	2.42	0.101	4.19	109
Fe	ppm	1.0	6	31.0	30.4	1.14	3.76	98.1
Ga	ppb	0.3	6	12.1	12.0	0.616	5.14	99.1

Table 5-6. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value[2]	Mean	Standard Deviation	%RSD	%Recovery
Gd	ppb	0.01	6	10.5	11.6	0.410	3.54	110
Ge	ppb	0.05	6	6.10	6.06	0.181	2.99	99.4
Hf	ppb	0.01	6	2.58	2.66	0.109	4.10	103
Hg	ppb	0.1	6	0.200	0.440	0.152	34.5	220
Ho	ppb	0.01	6	1.63	1.73	0.0529	3.06	106
I	ppb	0.5	6	611	274	19.0	6.95	44.8
In	ppb	0.01	6	0.0200	0.0276	0.00713	25.8	138
K	ppm	5.0	6	99.0	87.6	13.1	14.9	88.5
La	ppb	0.01	6	25.3	26.3	0.778	2.96	104
Li	ppb	0.5	6	195	202	6.10	3.02	104
Lu	ppb	0.01	6	0.580	0.590	0.0217	3.67	102
Mg	ppm	2.0	6	94.0	94.0	3.51	3.74	100
Mn	ppb	0.4	6	21,100	21,500	729	3.39	102
Mo	ppb	0.1	6	139	160	14.2	8.91	115
Na	ppm	5.0	6	342	329	13.1	3.98	96.2
Nb	ppb	0.1	6	3.40	3.31	0.0897	2.71	97.3
Nd	ppb	0.01	6	40.2	43.0	1.04	2.43	107
Ni	ppb	1.0	6	105	104	3.31	3.20	98.6
Os	ppb	0.5	6	<0.5	<0.5	*na*	*na*	100
Pb	ppb	0.1	6	36.4	32.4	5.86	18.1	89.1
Pd	ppb	0.5	6	1.80	1.68	0.253	15.1	93.5
Pr	ppb	0.01	6	8.55	9.29	0.225	2.43	109
Pt	ppb	0.5	6	<0.5	<0.5	*na*	*na*	100
Rb	ppb	0.1	6	42.9	43.9	0.957	2.18	102
Re	ppb	0.005	6	0.550	0.552	0.0167	3.03	100
Ru	ppb	0.5	6	<0.5	<0.5	*na*	*na*	100
S	ppm	10	6	134	138	8.87	6.44	103
Sb	ppb	0.01	6	20.4	21.0	0.308	1.47	103
Sc	ppb	10	6	57.0	56.4	6.00	10.6	98.9
Se	ppb	1.0	6	46.0	48.5	6.46	13.3	105
Sm	ppb	0.01	6	10.1	10.8	0.268	2.47	107
Sn	ppb	0.2	6	5.50	5.05	0.736	14.6	91.7
Sr	ppb	0.1	6	6,280	6,420	339	5.28	102.0
Ta	ppb	0.02	6	0.490	0.466	0.0891	19.1	95.1
Tb	ppb	0.01	6	1.61	1.75	0.105	6.00	109
Te	ppb	0.5	6	1.50	1.40	0.363	25.9	93.6
Th	ppb	0.01	6	4.46	4.68	0.348	7.42	105
Ti	ppb	10	6	1,160	1,160	35.3	3.04	100
Tl	ppb	0.005	6	0.494	0.538	0.0210	3.90	109
Tm	ppb	0.01	6	0.590	0.621	0.0159	2.56	105
U	ppb	0.01	6	49.3	50.4	1.57	3.10	102.0
V	ppb	0.1	6	483	473	9.82	2.08	98.0
W	ppb	0.1	6	57.5	56.9	1.40	2.46	99.0
Y	ppb	0.05	6	43.5	45.8	1.01	2.19	105
Yb	ppb	0.01	6	3.62	3.83	0.125	3.26	106
Zn	ppb	5.0	6	219	217	15.2	7.03	99.0
Zr	ppb	0.1	6	92.5	89.8	4.45	4.96	97.1

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.
[2]Target Values as updated and reported in 2009 were used here rather than the original values from 2008.

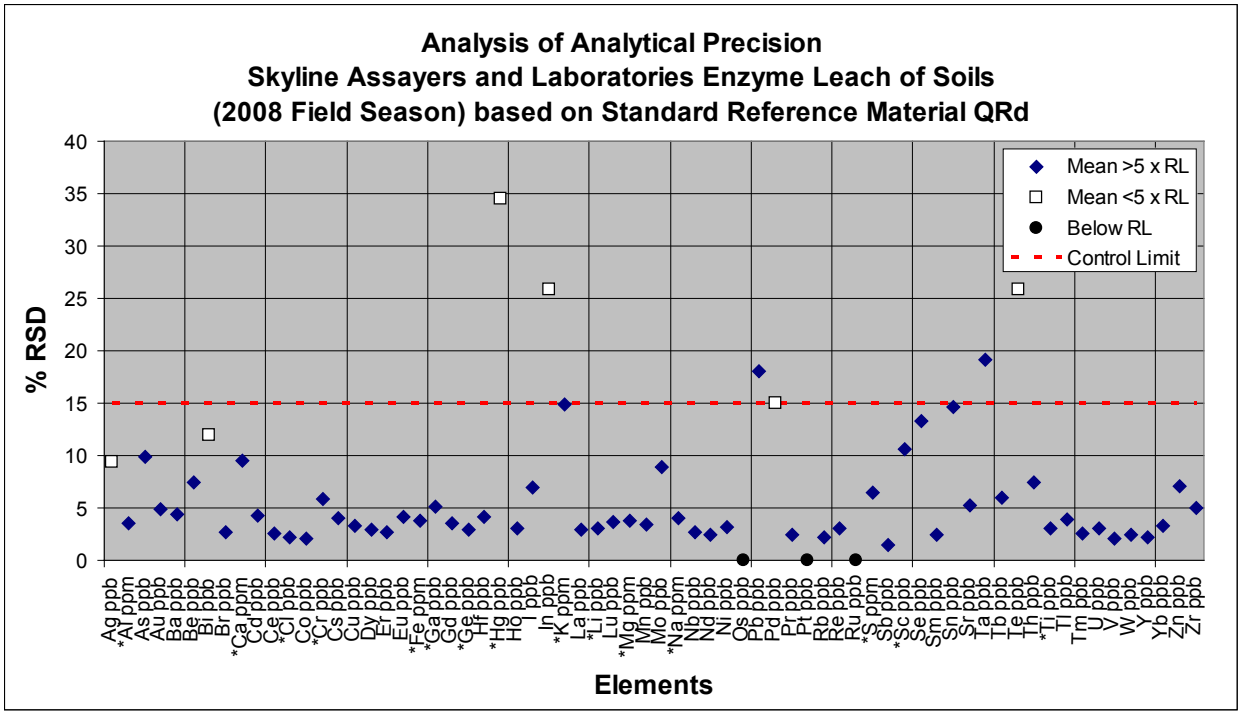

Figure 5-9. Precision plot for six analyses of standard reference material QRd by Enzyme Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

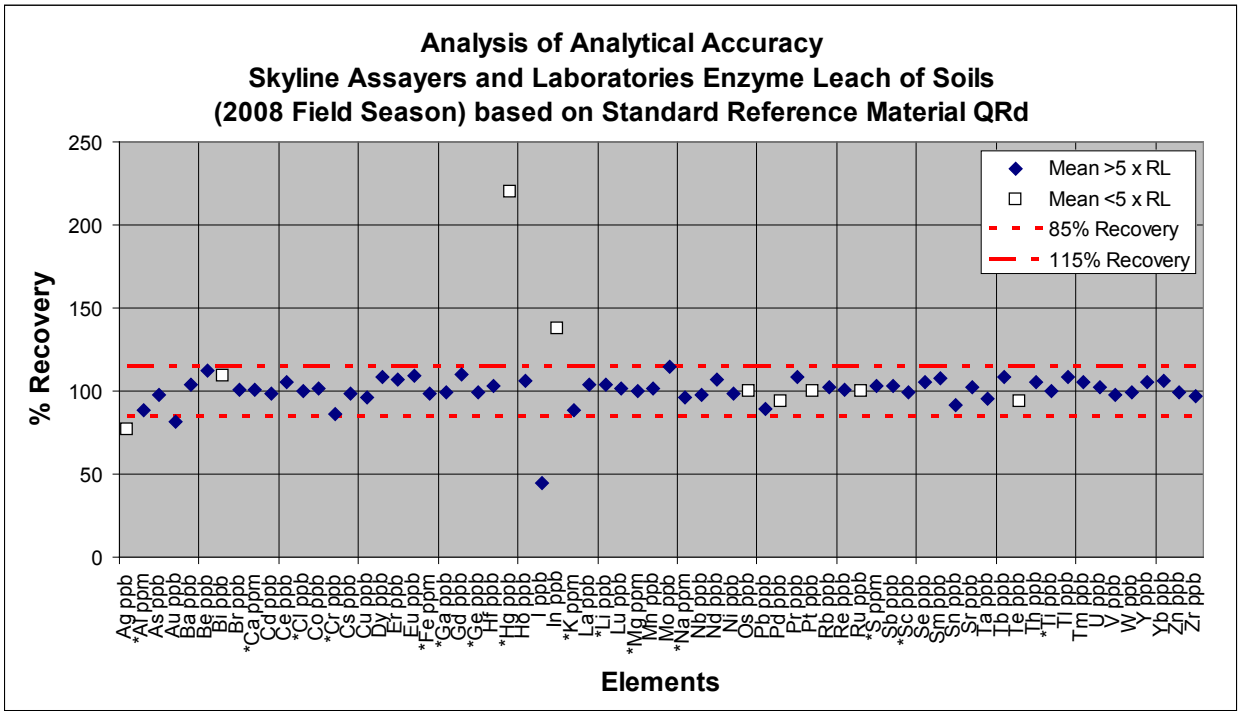

Figure 5-10. Accuracy plot for six analyses of standard reference material QRd by Enzyme Leach (2008 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-7. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	2	*na*	0.214	0.00071	0.331	*na*
Al	ppm	0.5	2	*na*	47.5	1.91	4.02	*na*
As	ppb	0.1	2	*na*	6.57	0.0566	0.861	*na*
Au	ppb	0.005	2	*na*	0.0260	0.00283	10.9	*na*
Ba	ppb	0.5	2	*na*	5,370	177	3.29	*na*
Be	ppb	0.1	2	*na*	3.59	0.0071	0.197	*na*
Bi	ppb	0.5	2	*na*	<0.5	*na*	*na*	*na*
Br	ppb	1	2	*na*	596	7.07	1.19	*na*
Ca	ppm	0.5	2	*na*	267	2.12	0.796	*na*
Cd	ppb	0.1	2	*na*	1.99	0.0071	0.356	*na*
Ce	ppb	0.01	2	*na*	35.9	2.05	5.72	*na*
Cl	ppb	1,000	2	*na*	8,780	3,000	34.1	*na*
Co	ppb	0.2	2	*na*	42.8	2.69	6.28	*na*
Cr	ppb	3	2	*na*	<3	*na*	*na*	*na*
Cs	ppb	0.01	2	*na*	1.55	0.0424	2.74	*na*
Cu	ppb	1	2	*na*	216	10.6	4.92	*na*
Dy	ppb	0.01	2	*na*	9.10	0.523	5.75	*na*
Er	ppb	0.01	2	*na*	5.84	0.445	7.63	*na*
Eu	ppb	0.01	2	*na*	2.34	0.191	8.18	*na*
Fe	ppm	1	2	*na*	9.80	0.707	7.22	*na*
Ga	ppb	0.3	2	*na*	0.788	0.296	37.5	*na*
Gd	ppb	0.01	2	*na*	10.4	0.495	4.78	*na*
Ge	ppb	0.05	2	*na*	0.334	0.0658	19.7	*na*
Hf	ppb	0.01	2	*na*	1.50	0.0919	6.15	*na*
Hg	ppb	0.1	2	*na*	0.135	0.0028	2.10	*na*
Ho	ppb	0.01	2	*na*	1.95	0.177	9.09	*na*
I	ppb	0.5	2	*na*	137	0.707	0.518	*na*
In	ppb	0.01	2	*na*	0.0116	0.0035	29.9	*na*
K	ppm	5	2	*na*	18.4	0.0707	0.385	*na*
La	ppb	0.01	2	*na*	20.2	1.34	6.67	*na*
Li	ppb	0.5	2	*na*	8.16	0.120	1.47	*na*
Lu	ppb	0.01	2	*na*	0.919	0.041	4.46	*na*
Mg	ppm	2	2	*na*	54.3	0.495	0.912	*na*
Mn	ppb	0.4	2	*na*	4,970	339	6.83	*na*
Mo	ppb	0.1	2	*na*	13.9	1.13	8.14	*na*
Na	ppm	5	2	*na*	28.1	0.778	2.77	*na*
Nb	ppb	0.1	2	*na*	1.13	0.0778	6.91	*na*
Nd	ppb	0.01	2	*na*	36.6	0.778	2.13	*na*
Ni	ppb	1	2	*na*	38.2	1.06	2.78	*na*
Os	ppb	0.5	2	*na*	<0.5	*na*	*na*	*na*
Pb	ppb	0.1	2	*na*	0.183	0.130	71.0	*na*
Pd	ppb	0.5	2	*na*	0.595	0.0544	9.16	*na*
Pr	ppb	0.01	2	*na*	7.65	0.354	4.62	*na*
Pt	ppb	0.5	2	*na*	<0.5	*na*	*na*	*na*
Rb	ppb	0.1	2	*na*	92.8	1.48	1.60	*na*
Re	ppb	0.005	2	*na*	0.170	0.00849	4.99	*na*
Ru	ppb	0.5	2	*na*	<0.5	*na*	*na*	*na*
S	ppm	10	2	*na*	51.7	1.34	2.60	*na*
Sb	ppb	0.01	2	*na*	2.04	0.113	5.55	*na*
Sc	ppb	10	2	*na*	57.8	0.707	1.22	*na*
Se	ppb	1	2	*na*	5.62	1.82	32.4	*na*
Sm	ppb	0.01	2	*na*	9.43	0.806	8.55	*na*
Sn	ppb	0.2	2	*na*	<0.2	*na*	*na*	*na*
Sr	ppb	0.1	2	*na*	3,150	163	5.17	*na*
Ta	ppb	0.02	2	*na*	0.0430	0.00566	13.2	*na*

Table 5-7. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tb	ppb	0.01	2	*na*	1.67	0.0707	4.23	*na*
Te	ppb	0.5	2	*na*	<0.5	*na*	*na*	*na*
Th	ppb	0.01	2	*na*	1.41	0.0849	6.02	*na*
Ti	ppb	10	2	*na*	1,260	56.6	4.49	*na*
Tl	ppb	0.005	2	*na*	0.883	0	0	*na*
Tm	ppb	0.01	2	*na*	0.835	0.0198	2.37	*na*
U	ppb	0.01	2	*na*	1.32	0.0141	1.07	*na*
V	ppb	0.1	2	*na*	271	9.90	3.65	*na*
W	ppb	0.1	2	*na*	1.14	1.26	110	*na*
Y	ppb	0.05	2	*na*	55.4	2.40	4.34	*na*
Yb	ppb	0.01	2	*na*	5.81	0.262	4.51	*na*
Zn	ppb	5	2	*na*	174	153	88.0	*na*
Zr	ppb	0.1	2	*na*	57.5	3.96	6.89	*na*

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

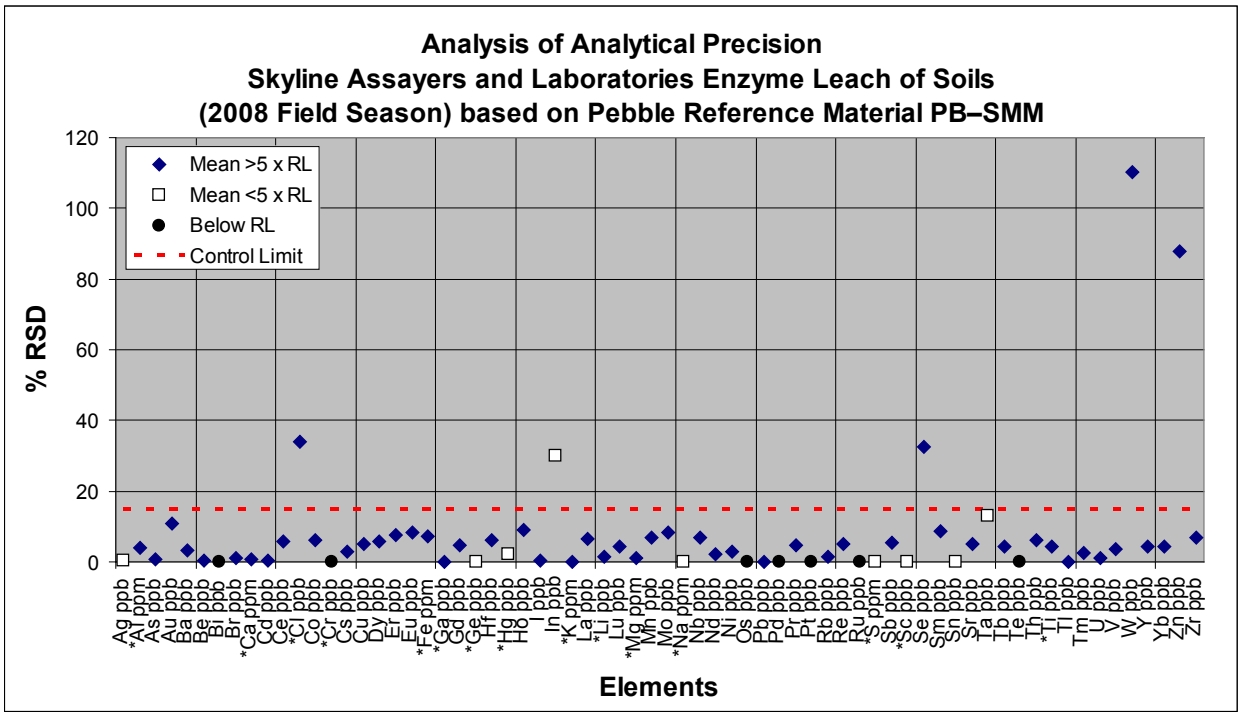

Figure 5-11. Precision plot for two analyses of Pebble reference material PB–SMM by Enzyme Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-8. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	2	0	0.117	0.0360	30.9	*na*
Al	ppm	0.5	2	0	101	13.5	13.3	*na*
As	ppb	0.1	2	0	9.03	0.0849	0.940	*na*
Au	ppb	0.005	2	0	0.0340	0.0240	70.7	*na*
Ba	ppb	0.5	2	0	2,510	255	10.1	*na*
Be	ppb	0.1	2	0	4.52	0.0778	1.72	*na*
Bi	ppb	0.5	2	0	<0.5	*na*	*na*	*na*
Br	ppb	1	2	0	638	2.12	0.333	*na*
Ca	ppm	0.5	2	0	153	13.4	8.81	*na*
Cd	ppb	0.1	2	0	4.63	0.177	3.82	*na*
Ce	ppb	0.01	2	0	22.0	2.55	11.6	*na*
Cl	ppb	1,000	2	0	15,600	283	1.81	*na*
Co	ppb	0.2	2	0	132	8.49	6.43	*na*
Cr	ppb	3	2	0	<3	*na*	*na*	*na*
Cs	ppb	0.01	2	0	1.79	0.0707	3.95	*na*
Cu	ppb	1	2	0	239	5.66	2.37	*na*
Dy	ppb	0.01	2	0	3.11	0.361	11.6	*na*
Er	ppb	0.01	2	0	1.69	0.134	7.97	*na*
Eu	ppb	0.01	2	0	0.806	0.111	13.8	*na*
Fe	ppm	1	2	0	18.6	2.33	12.6	*na*
Ga	ppb	0.3	2	0	4.28	0.997	23.3	*na*
Gd	ppb	0.01	2	0	3.50	0.226	6.46	*na*
Ge	ppb	0.05	2	0	0.224	0.0339	15.2	*na*
Hf	ppb	0.01	2	0	1.13	0.0919	8.17	*na*
Hg	ppb	0.1	2	0	0.408	0.209	51.3	*na*
Ho	ppb	0.01	2	0	0.606	0.0460	7.59	*na*
I	ppb	0.5	2	0	166	1.41	0.852	*na*
In	ppb	0.01	2	0	0.0265	0.00071	2.67	*na*
K	ppm	5	2	0	48.6	2.12	4.36	*na*
La	ppb	0.01	2	0	10.1	0.728	7.22	*na*
Li	ppb	0.5	2	0	14.7	0.212	1.45	*na*
Lu	ppb	0.01	2	0	0.232	0.00778	3.36	*na*
Mg	ppm	2	2	0	43.4	4.10	9.45	*na*
Mn	ppb	0.4	2	0	7,010	141	2.02	*na*
Mo	ppb	0.1	2	0	8.68	0.481	5.54	*na*
Na	ppm	5	2	0	24.7	2.05	8.32	*na*
Nb	ppb	0.1	2	0	1.56	0.177	11.4	*na*
Nd	ppb	0.01	2	0	14.2	1.34	9.49	*na*
Ni	ppb	1	2	0	79.0	6.01	7.61	*na*
Os	ppb	0.5	2	0	<0.5	*na*	*na*	*na*
Pb	ppb	0.1	2	0	2.50	0.742	29.8	*na*
Pd	ppb	0.5	2	0	<0.5	*na*	*na*	*na*
Pr	ppb	0.01	2	0	3.20	0.410	12.8	*na*
Pt	ppb	0.5	2	0	<0.5	*na*	*na*	*na*
Rb	ppb	0.1	2	0	115	1.41	1.23	*na*
Re	ppb	0.005	2	0	0.122	0.00212	1.75	*na*
Ru	ppb	0.5	2	0	<0.5	*na*	*na*	*na*
S	ppm	10	2	0	21.3	1.98	9.30	*na*
Sb	ppb	0.01	2	0	1.61	0.0778	4.85	*na*
Sc	ppb	10	2	0	23.5	1.27	5.42	*na*
Se	ppb	1	2	0	8.03	1.42	17.7	*na*
Sm	ppb	0.01	2	0	3.33	0.247	7.44	*na*
Sn	ppb	0.2	2	0	0.261	0.0530	20.4	*na*
Sr	ppb	0.1	2	0	1,480	56.6	3.82	*na*
Ta	ppb	0.02	2	0	0.0680	0.0113	16.6	*na*

Table 5-8. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by an Enzyme Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tb	ppb	0.01	2	0	0.634	0.0757	11.9	*na*
Te	ppb	0.5	2	0	<0.5	*na*	*na*	*na*
Th	ppb	0.01	2	0	1.39	0.163	11.7	*na*
Ti	ppb	10	2	0	2,680	311	11.6	*na*
Tl	ppb	0.005	2	0	2.05	0.163	7.95	*na*
Tm	ppb	0.01	2	0	0.234	0.0396	16.9	*na*
U	ppb	0.01	2	0	0.711	0.0148	2.09	*na*
V	ppb	0.1	2	0	74.2	2.55	3.43	*na*
W	ppb	0.1	2	0	3.23	2.88	89.2	*na*
Y	ppb	0.05	2	0	16.2	0.849	5.24	*na*
Yb	ppb	0.01	2	0	1.45	0.0354	2.45	*na*
Zn	ppb	5	2	0	342	17.7	5.18	*na*
Zr	ppb	0.1	2	0	39.2	3.32	8.49	*na*

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

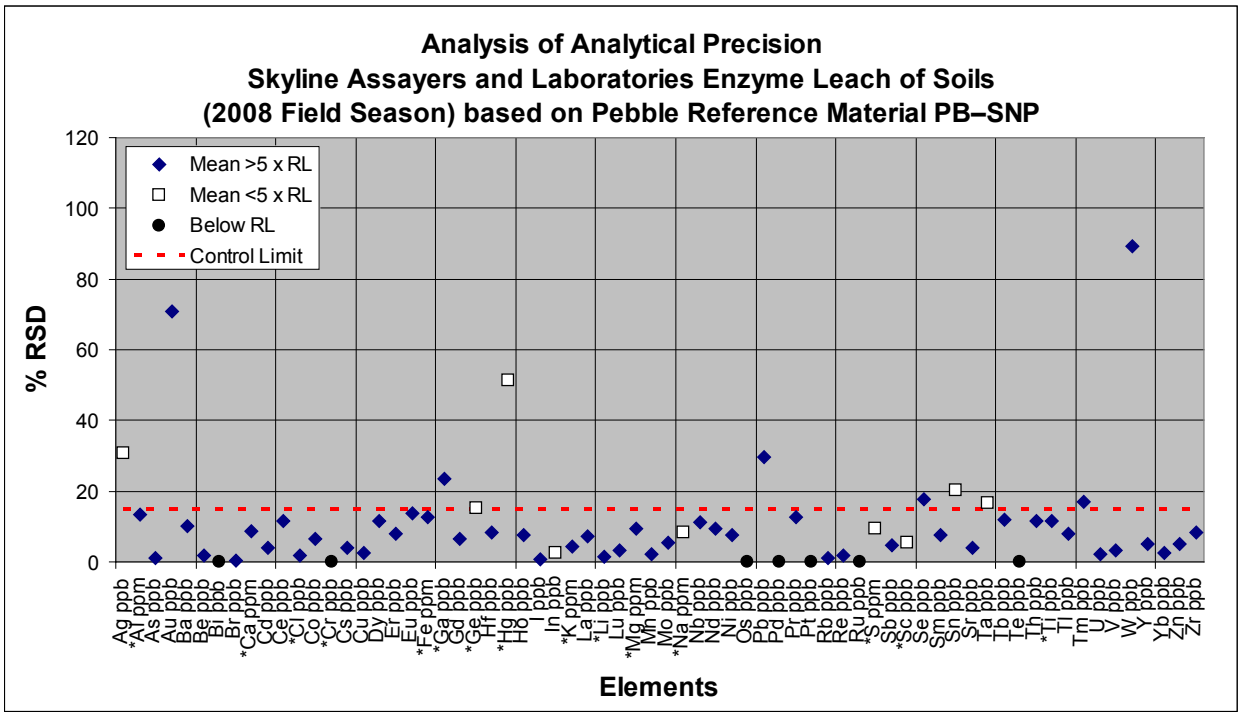

Figure 5-12. Precision plot for two analyses of Pebble reference material PB–SNP by Enzyme Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-9. Summary statistics for assessing analytical variation on duplicate samples; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	0.1	4	<0.1	0.289	0.152	0.0125	8.25
Al	ppm	0.5	4	158	209	184	7.54	4.09
As	ppb	0.1	4	1.93	2.76	2.44	0.0630	2.59
Au	ppb	0.005	4	<0.005	<0.005	<0.005	*na*	*na*
Ba	ppb	0.5	4	471	5,390	2,640	143	5.42
Be	ppb	0.1	4	3.08	13.9	7.02	0.417	5.94
Bi	ppb	0.5	4	<0.5	<0.5	<0.5	*na*	*na*
Br	ppb	1	4	44.7	71.8	57.0	4.51	7.91
Ca	ppm	0.5	4	8.22	16.6	12.5	1.20	9.67
Cd	ppb	0.1	4	0.535	1.60	1.13	0.122	10.7
Ce	ppb	0.01	4	6.21	57.9	22.0	0.961	4.37
Cl	ppb	1,000	4	93,600	104,000	98,850	1,751	1.77
Co	ppb	0.2	4	3.37	17.1	7.90	0.650	8.23
Cr	ppb	3	4	<3	6.47	3.46	0.537	15.5
Cs	ppb	0.01	4	0.317	0.447	0.393	0.00785	2.00
Cu	ppb	1	4	5.88	16.3	10.8	0.964	8.92
Dy	ppb	0.01	4	0.739	4.11	1.78	0.0938	5.27
Er	ppb	0.01	4	0.338	2.10	0.908	0.0481	5.30
Eu	ppb	0.01	4	0.179	1.16	0.489	0.0236	4.83
Fe	ppm	1	4	1.29	13.2	6.78	0.576	8.50
Ga	ppb	0.3	4	<0.3	2.07	0.714	0.441	61.7
Gd	ppb	0.01	4	0.821	5.89	2.42	0.0797	3.29
Ge	ppb	0.05	4	<0.05	0.110	0.0686	0.00632	9.23
Hf	ppb	0.01	4	0.206	0.359	0.262	0.0207	7.91
Hg	ppb	0.1	4	<0.1	<0.1	<0.1	*na*	*na*
Ho	ppb	0.01	4	0.147	0.814	0.346	0.0179	5.17
I	ppb	0.5	4	<0.5	18.5	6.81	2.33	34.2
In	ppb	0.01	4	<0.01	<0.01	<0.01	*na*	*na*
K	ppm	5	4	<5	6.50	5.37	0.117	2.18
La	ppb	0.01	4	3.09	38.4	13.3	0.413	3.09
Li	ppb	0.5	4	3.02	20.9	11.1	0.582	5.23
Lu	ppb	0.01	4	0.0440	0.168	0.0854	0.00434	5.09
Mg	ppm	2	4	<2	3.72	2.34	0.174	7.44
Mn	ppb	0.4	4	59.9	601	248	9.38	3.78
Mo	ppb	0.1	4	0.328	0.570	0.432	0.0614	14.2
Na	ppm	5	4	<5	10.8	7.74	0.127	1.65
Nb	ppb	0.1	4	0.262	0.590	0.451	0.0156	3.47
Nd	ppb	0.01	4	3.25	27.7	10.6	0.419	3.93
Ni	ppb	1	4	17.2	32.1	22.5	1.37	6.10
Os	ppb	0.5	4	<0.5	<0.5	<0.5	*na*	*na*
Pb	ppb	0.1	4	2.02	8.50	4.53	1.72	37.9
Pd	ppb	0.5	4	<0.5	<0.5	<0.5	*na*	*na*
Pr	ppb	0.01	4	0.791	6.95	2.61	0.130	4.99
Pt	ppb	0.5	4	<0.5	<0.5	<0.5	*na*	*na*
Rb	ppb	0.1	4	11.6	25.9	20.1	0.415	2.07
Re	ppb	0.005	4	<0.005	<0.005	<0.005	*na*	*na*
Ru	ppb	0.5	4	<0.5	<0.5	<0.5	*na*	*na*
S	ppm	10	4	<10	10.2	<10	*na*	*na*
Sb	ppb	0.01	4	0.664	1.14	0.851	0.0592	6.96
Sc	ppb	10	4	<10	<10	<10	*na*	*na*
Se	ppb	1	4	1.80	5.69	3.42	0.645	18.8
Sm	ppb	0.01	4	0.746	5.22	2.14	0.129	6.04
Sn	ppb	0.2	4	<0.2	0.332	<0.2	*na*	*na*
Sr	ppb	0.1	4	153	560	350	14.9	4.25

Table 5-9. Summary statistics for assessing analytical variation on duplicate samples; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ta	ppb	0.02	4	<0.02	0.0320	0.0237	0.00159	6.70
Tb	ppb	0.01	4	0.185	0.842	0.401	0.00677	1.69
Te	ppb	0.5	4	<0.5	<0.5	<0.5	*na*	*na*
Th	ppb	0.01	4	0.308	0.431	0.356	0.0211	5.93
Ti	ppb	10	4	476	780	675	37.3	5.52
Tl	ppb	0.005	4	0.171	0.427	0.259	0.00773	2.98
Tm	ppb	0.01	4	0.0520	0.235	0.109	0.00628	5.75
U	ppb	0.01	4	0.0980	0.227	0.166	0.00584	3.53
V	ppb	0.1	4	15.7	20.5	18.5	0.433	2.34
W	ppb	0.1	4	0.178	3.09	1.07	0.476	44.5
Y	ppb	0.05	4	3.74	24.9	10.1	0.468	4.61
Yb	ppb	0.01	4	0.351	1.46	0.705	0.0113	1.60
Zn	ppb	5	4	67.2	146	98.9	7.93	8.02
Zr	ppb	0.1	4	6.41	10.7	8.46	0.492	5.82

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

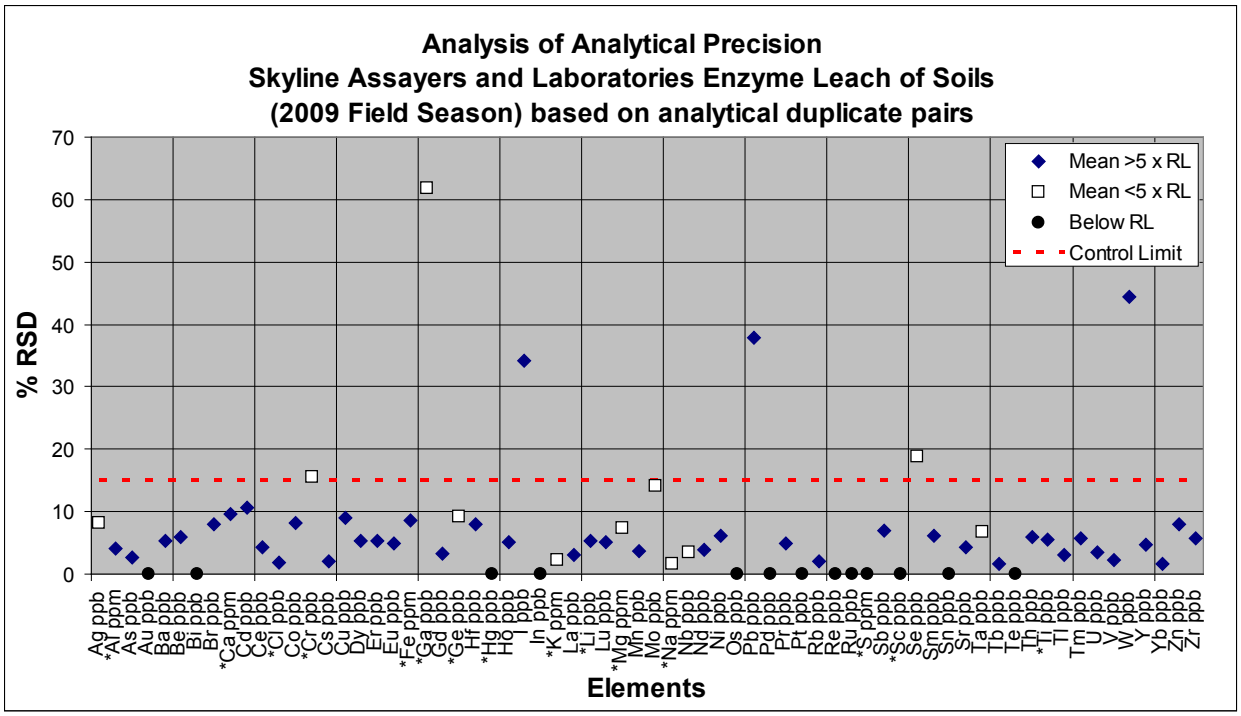

Figure 5-13. Precision plot for four analytical duplicate sample pairs by Enzyme Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-10. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	3	2.80	2.99	0.111	3.70	107
Al	ppm	0.5	3	74.0	73.8	2.28	3.09	99.8
As	ppb	0.1	3	373	384	9.50	2.47	103
Au	ppb	0.005	3	0.366	0.342	0.0194	5.67	93.5
Ba	ppb	0.5	3	14,800	16,233	153	0.941	110
Be	ppb	0.1	3	8.50	8.86	0.537	6.06	104
Bi	ppb	0.5	3	2.20	1.47	0.0265	1.80	66.8
Br	ppb	1	3	325	338	10.8	3.19	104
Ca	ppm	0.5	3	3,070	3,157	127	4.01	103
Cd	ppb	0.1	3	23.9	26.1	0.404	1.55	109
Ce	ppb	0.01	3	244	280	3.51	1.25	115
Cl	ppb	1,000	3	16,400	88,900	2,252	2.53	542
Co	ppb	0.2	3	605	659	15.6	2.36	109
Cr	ppb	3	3	198	207	5.29	2.56	105
Cs	ppb	0.01	3	0.330	0.346	0.0207	5.97	105
Cu	ppb	1	3	85.8	131	4.00	3.05	153
Dy	ppb	0.01	3	36.8	41.8	0.651	1.56	114
Er	ppb	0.01	3	19.8	23.1	0.361	1.56	117
Eu	ppb	0.01	3	8.80	10.2	0.100	0.980	116
Fe	ppm	1	3	230	248	4.58	1.85	108
Ga	ppb	0.3	3	23.5	25.0	0.300	1.20	106
Gd	ppb	0.01	3	44.1	50.5	0.874	1.73	114
Ge	ppb	0.05	3	14.9	16.3	0.153	0.935	110
Hf	ppb	0.01	3	12.9	13.5	0.252	1.87	104
Hg	ppb	0.1	3	1.00	1.48	0.363	24.6	148
Ho	ppb	0.01	3	7.12	8.33	0.121	1.46	117
I	ppb	0.5	3	250	275	5.03	1.83	110
In	ppb	0.01	3	0.050	0.0377	0.00850	22.6	75.3
K	ppm	5	3	201	191	5.00	2.62	95.0
La	ppb	0.01	3	84.2	95.9	1.31	1.37	114
Li	ppb	0.5	3	515	576	19.9	3.45	112
Lu	ppb	0.01	3	2.64	3.00	0.0436	1.45	114
Mg	ppm	2	3	329	353	15.9	4.51	107
Mn	ppb	0.4	3	117,000	127,333	2,517	1.98	109
Mo	ppb	0.1	3	350	226	2.65	1.17	64.6
Na	ppm	5	3	125	134	4.58	3.42	107
Nb	ppb	0.1	3	28.7	29.3	0.529	1.81	102
Nd	ppb	0.01	3	149	174	3.06	1.76	117
Ni	ppb	1	3	456	499	19.5	3.91	110
Os	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
Pb	ppb	0.1	3	80.8	89.8	1.40	1.56	111
Pd	ppb	0.5	3	8.60	7.69	0.307	3.99	89.5
Pr	ppb	0.01	3	30.3	35.6	0.503	1.42	117
Pt	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
Rb	ppb	0.1	3	66.6	66.8	1.53	2.29	100
Re	ppb	0.005	3	0.193	0.210	0.0115	5.47	109
Ru	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
S	ppm	10	3	61.0	69.4	4.35	6.27	114
Sb	ppb	0.01	3	250	260	2.00	0.769	104
Sc	ppb	10	3	216	189	10.6	5.60	87.7
Se	ppb	1	3	27.0	31.3	2.70	8.63	116
Sm	ppb	0.01	3	40.7	46.6	0.764	1.64	114
Sn	ppb	0.2	3	5.50	6.12	0.128	2.09	111
Sr	ppb	0.1	3	20,800	21,333	503	2.36	103
Ta	ppb	0.02	3	3.81	3.98	0.0751	1.88	105

Table 5-10. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tb	ppb	0.01	3	6.67	7.54	0.101	1.34	113
Te	ppb	0.5	3	3.90	3.82	0.213	5.57	97.9
Th	ppb	0.01	3	53.8	57.1	1.00	1.75	106
Ti	ppb	10	3	5,780	6,033	133	2.21	104
Tl	ppb	0.005	3	0.685	0.733	0.0245	3.35	107
Tm	ppb	0.01	3	2.56	2.95	0.0737	2.50	115
U	ppb	0.01	3	6.33	7.12	0.194	2.73	113
V	ppb	0.1	3	748	790	14.5	1.84	106
W	ppb	0.1	3	601	572	6.08	1.06	95.2
Y	ppb	0.05	3	184	210	6.03	2.87	114
Yb	ppb	0.01	3	16.5	19.4	0.252	1.30	117
Zn	ppb	5	3	478	551	15.0	2.73	115
Zr	ppb	0.1	3	602	640	7.21	1.13	106

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

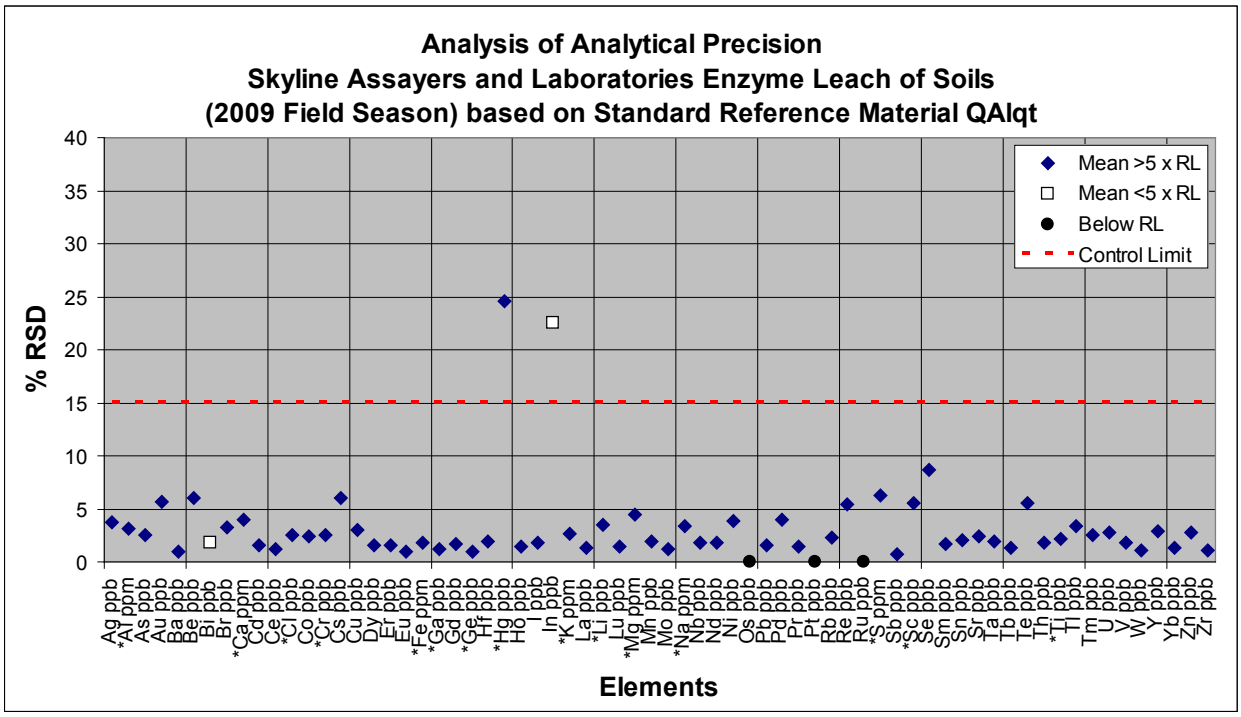

Figure 5-14. Precision plot for three analyses of standard reference material QAlqt by Enzyme Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

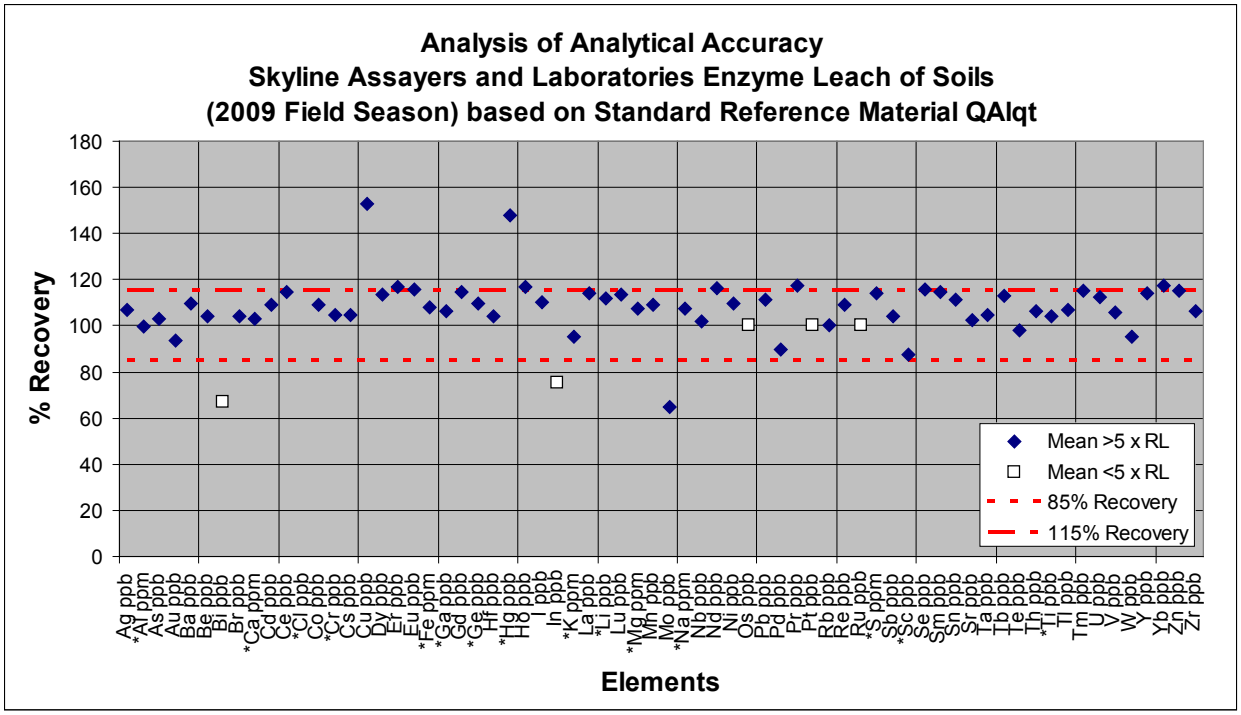

Figure 5-15. Accuracy plot for three analyses of standard reference material QAlqt by Enzyme Leach (2009 field season). %Recovery is percent recovery; RL is reporting limit. The percent Recovery for Cl (not shown above) is 542%. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-11. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	3	0.600	0.458	0.0311	6.79	76.4
Al	ppm	0.5	3	21.8	19.3	0.656	3.40	88.5
As	ppb	0.1	3	95.4	105	3.06	2.92	110
Au	ppb	0.005	3	4.15	3.20	0.110	3.42	77.2
Ba	ppb	0.5	3	3,800	4,040	45.8	1.13	106
Be	ppb	0.1	3	4.70	4.81	0.236	4.91	102
Bi	ppb	0.5	3	0.800	0.730	0.0259	3.55	91.2
Br	ppb	1	3	667	707	14.0	1.98	106
Ca	ppm	0.5	3	1,110	1,127	64.3	5.71	102
Cd	ppb	0.1	3	5.80	6.17	0.111	1.79	106
Ce	ppb	0.01	3	58.1	61.6	0.808	1.31	106
Cl	ppb	1,000	3	219,000	43,800	2,098	4.79	20.0
Co	ppb	0.2	3	148	151	5.13	3.41	102
Cr	ppb	3	3	84.0	85.1	3.01	3.53	101
Cs	ppb	0.01	3	0.450	0.467	0.0152	3.25	104
Cu	ppb	1	3	104	119	3.00	2.52	114
Dy	ppb	0.01	3	8.37	9.16	0.130	1.42	109
Er	ppb	0.01	3	4.44	4.87	0.107	2.20	110
Eu	ppb	0.01	3	2.21	2.37	0.0702	2.96	107
Fe	ppm	1	3	31.0	30.1	0.902	3.00	97.0
Ga	ppb	0.3	3	12.1	11.6	0.361	3.11	95.9
Gd	ppb	0.01	3	10.5	11.4	0.200	1.75	109

Table 5-11. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ge	ppb	0.05	3	6.10	6.26	0.230	3.68	103
Hf	ppb	0.01	3	2.58	2.66	0.0819	3.08	103
Hg	ppb	0.1	3	0.200	0.189	0.170	89.7	94.5
Ho	ppb	0.01	3	1.63	1.81	0.0351	1.94	111
I	ppb	0.5	3	611	698	17.7	2.53	114
In	ppb	0.01	3	0.0200	0.0130	0.0035	27.2	65.2
K	ppm	5	3	99.0	93.2	5.06	5.43	94.2
La	ppb	0.01	3	25.3	26.5	0.451	1.70	105
Li	ppb	0.5	3	195	218	6.24	2.86	112
Lu	ppb	0.01	3	0.580	0.603	0.0164	2.71	104
Mg	ppm	2	3	94.0	97.3	3.92	4.03	104
Mn	ppb	0.4	3	21,100	21,900	451	2.06	104
Mo	ppb	0.1	3	139	147	3.00	2.04	106
Na	ppm	5	3	342	374	15.3	4.08	109
Nb	ppb	0.1	3	3.40	3.53	0.0808	2.29	104
Nd	ppb	0.01	3	40.2	42.8	0.702	1.64	106
Ni	ppb	1	3	105	111	3.00	2.70	106
Os	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
Pb	ppb	0.1	3	36.4	41.5	0.500	1.20	114
Pd	ppb	0.5	3	1.80	1.43	0.0764	5.35	79.3
Pr	ppb	0.01	3	8.55	9.19	0.101	1.10	107
Pt	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
Rb	ppb	0.1	3	42.9	43.1	0.800	1.86	100
Re	ppb	0.005	3	0.550	0.591	0.0206	3.48	107
Ru	ppb	0.5	3	<0.5	<0.5	*na*	*na*	100
S	ppm	10	3	134	146	6.03	4.14	109
Sb	ppb	0.01	3	20.4	22.5	0.351	1.56	110
Sc	ppb	10	3	57.0	43.6	2.42	5.56	76.4
Se	ppb	1	3	46.0	49.2	1.50	3.06	107
Sm	ppb	0.01	3	10.1	10.7	0.208	1.95	106
Sn	ppb	0.2	3	5.50	5.81	0.151	2.60	106
Sr	ppb	0.1	3	6,280	6,320	141	2.23	101
Ta	ppb	0.02	3	0.490	0.510	0.0145	2.85	104
Tb	ppb	0.01	3	1.61	1.71	0.0200	1.17	106
Te	ppb	0.5	3	1.50	1.83	0.201	11.0	122
Th	ppb	0.01	3	4.46	5.05	0.0800	1.58	113
Ti	ppb	10	3	1,160	1,190	30.6	2.56	103
Tl	ppb	0.005	3	0.494	0.537	0.0111	2.06	109
Tm	ppb	0.01	3	0.590	0.611	0.0107	1.75	104
U	ppb	0.01	3	49.3	56.3	0.651	1.15	114
V	ppb	0.1	3	483	497	9.71	1.96	103
W	ppb	0.1	3	57.5	57.4	0.850	1.48	99.9
Y	ppb	0.05	3	43.5	45.2	1.29	2.86	104
Yb	ppb	0.01	3	3.62	3.82	0.120	3.14	106
Zn	ppb	5	3	219	233	5.57	2.39	106
Zr	ppb	0.1	3	92.5	96.7	0.808	0.836	105

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

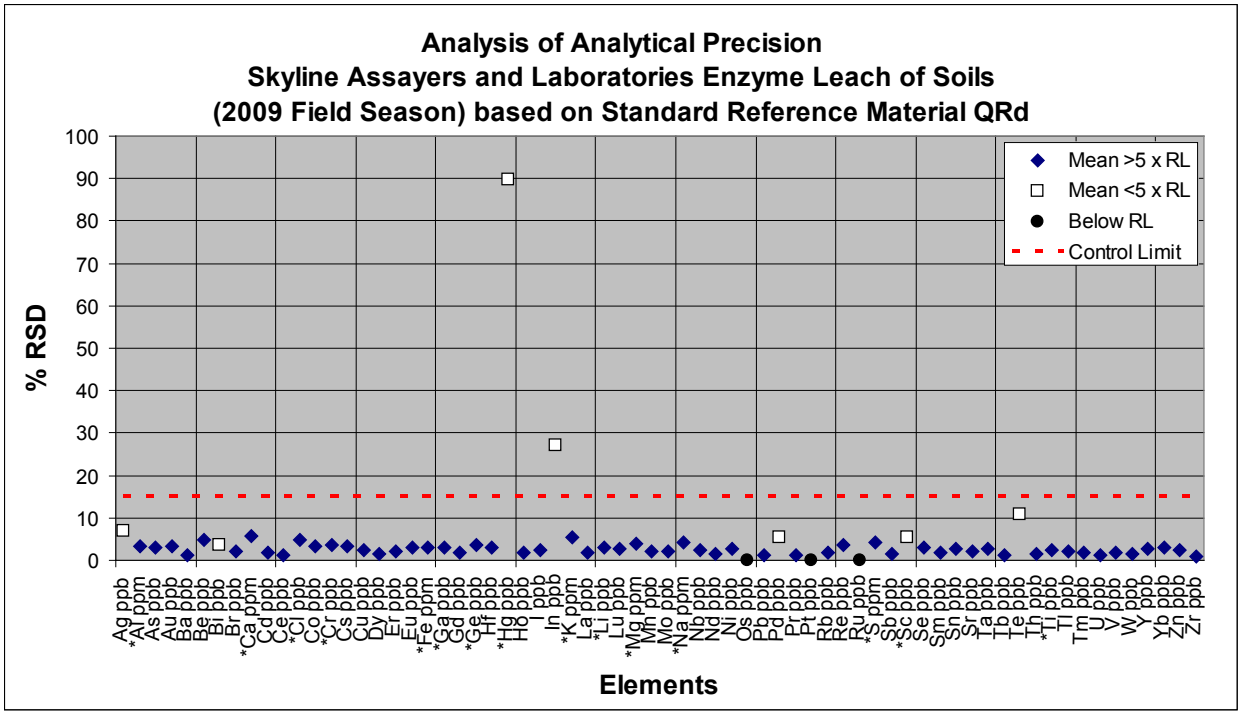

Figure 5-16. Precision plot for three analyses of standard reference material QRd by Enzyme Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

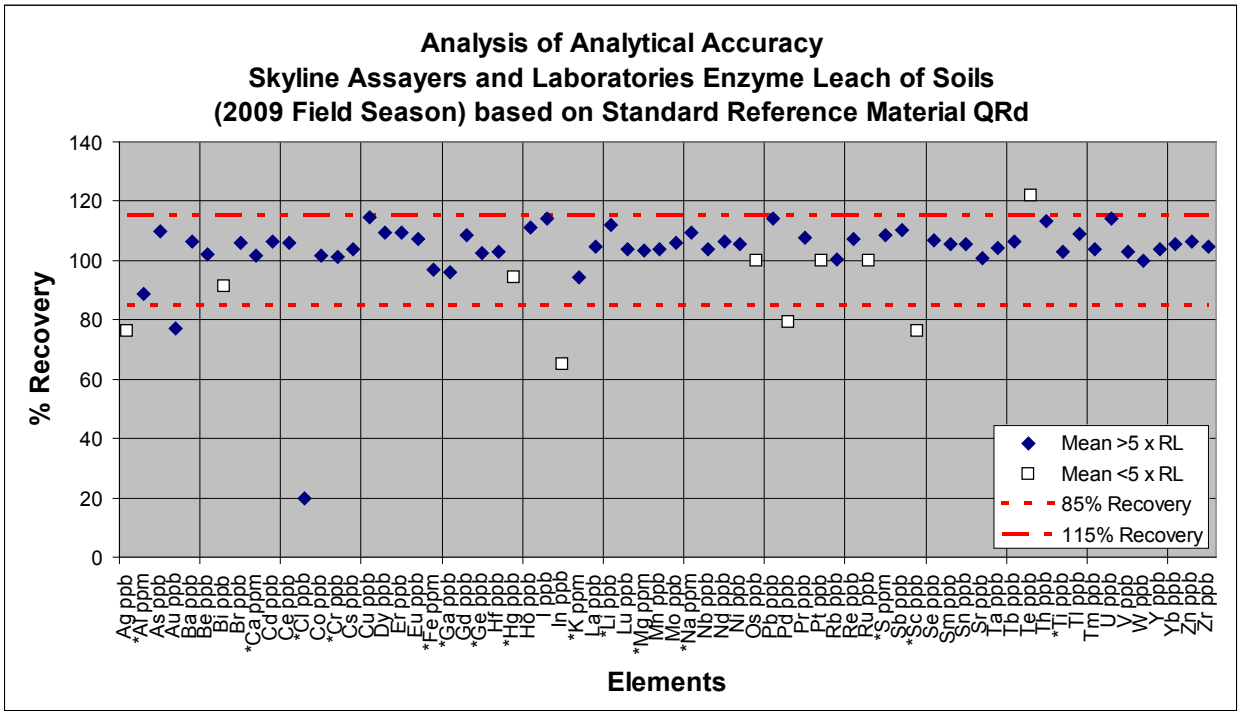

Figure 5-17. Accuracy plot for three analyses of standard reference material QRd by Enzyme Leach (2009 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-12. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	2	0.214	0.196	0.00071	0.362	91.4
Al	ppm	0.5	2	47.5	52.7	1.27	2.42	111
As	ppb	0.1	2	6.57	8.44	0.0707	0.838	128
Au	ppb	0.005	2	0.0260	0.0280	0.0255	90.9	108
Ba	ppb	0.5	2	5,370	5,900	70.7	1.20	110
Be	ppb	0.1	2	3.59	4.73	0.0636	1.35	132
Bi	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Br	ppb	1	2	596	808	13.4	1.66	135
Ca	ppm	0.5	2	267	281	3.54	1.26	105
Cd	ppb	0.1	2	1.99	2.77	0.205	7.42	139
Ce	ppb	0.01	2	35.9	42.6	0.636	1.50	119
Cl	ppb	1,000	2	8,780	101,000	0	0	1,150
Co	ppb	0.2	2	42.8	42.9	0.424	0.989	100
Cr	ppb	3	2	2.71	12.5	4.62	36.8	463
Cs	ppb	0.01	2	1.55	1.78	0.0283	1.59	115
Cu	ppb	1	2	216	303	5.66	1.87	140
Dy	ppb	0.01	2	9.10	11.4	0.0707	0.623	125
Er	ppb	0.01	2	5.84	7.20	0.0354	0.491	123
Eu	ppb	0.01	2	2.34	3.01	0.0566	1.88	129
Fe	ppm	1	2	9.80	11.8	0.141	1.20	120
Ga	ppb	0.3	2	0.788	1.03	0.385	37.4	130
Gd	ppb	0.01	2	10.4	12.4	0.212	1.72	119
Ge	ppb	0.05	2	0.334	0.337	0.00636	1.89	101
Hf	ppb	0.01	2	1.50	2.00	0.0283	1.41	133
Hg	ppb	0.1	2	0.135	<0.1	*na*	*na*	67.5
Ho	ppb	0.01	2	1.95	2.42	0.0424	1.75	124
I	ppb	0.5	2	137	145	3.54	2.45	105
In	ppb	0.01	2	0.0116	<0.01	*na*	*na*	78.5
K	ppm	5	2	18.4	17.7	0	0	96.2
La	ppb	0.01	2	20.2	23.1	0.212	0.920	114
Li	ppb	0.5	2	8.16	10.0	0.290	2.90	122
Lu	ppb	0.01	2	0.919	1.09	0.00707	0.652	118
Mg	ppm	2	2	54.3	61.4	1.41	2.30	113
Mn	ppb	0.4	2	4,970	6,120	77.8	1.27	123
Mo	ppb	0.1	2	13.9	11.4	0.424	3.72	82.0
Na	ppm	5	2	28.1	34.1	0.566	1.66	121
Nb	ppb	0.1	2	1.13	1.16	0.00707	0.612	102
Nd	ppb	0.01	2	36.6	43.7	0.0707	0.162	119
Ni	ppb	1	2	38.2	45.9	1.34	2.93	120
Os	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Pb	ppb	0.1	2	0.183	5.81	4.99	85.9	3,170
Pd	ppb	0.5	2	0.595	0.750	0.0856	11.4	126
Pr	ppb	0.01	2	7.65	9.10	0.0141	0.155	119
Pt	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Rb	ppb	0.1	2	92.8	98.1	0.919	0.938	106
Re	ppb	0.005	2	0.170	0.205	0.0170	8.28	121
Ru	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
S	ppm	10	2	51.7	52.1	1.41	2.71	101
Sb	ppb	0.01	2	2.04	1.93	0.0212	1.10	94.4
Sc	ppb	10	2	57.8	52.3	1.56	2.97	90.5
Se	ppb	1	2	5.62	8.24	1.10	13.3	147
Sm	ppb	0.01	2	9.43	11.0	0.141	1.29	117
Sn	ppb	0.2	2	0.181	0.234	0.0247	10.6	129
Sr	ppb	0.1	2	3,150	3,570	42.4	1.19	113
Ta	ppb	0.02	2	0.0430	0.0570	0.00566	9.92	133

Table 5-12. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tb	ppb	0.01	2	1.67	1.97	0.0141	0.718	118
Te	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Th	ppb	0.01	2	1.41	1.78	0.0636	3.59	126
Ti	ppb	10	2	1,260	1,320	21.2	1.61	104
Tl	ppb	0.005	2	0.883	1.08	0.0283	2.62	122
Tm	ppb	0.01	2	0.835	0.982	0.00071	0.0720	118
U	ppb	0.01	2	1.32	2.19	0.00707	0.324	166
V	ppb	0.1	2	271	209	3.54	1.70	76.9
W	ppb	0.1	2	1.14	0.495	0.00919	1.86	43.4
Y	ppb	0.05	2	55.4	61.2	0.636	1.04	110
Yb	ppb	0.01	2	5.81	6.85	0.120	1.76	118
Zn	ppb	5	2	174	113	13.4	11.9	64.7
Zr	ppb	0.1	2	57.5	70.2	0.778	1.11	122

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

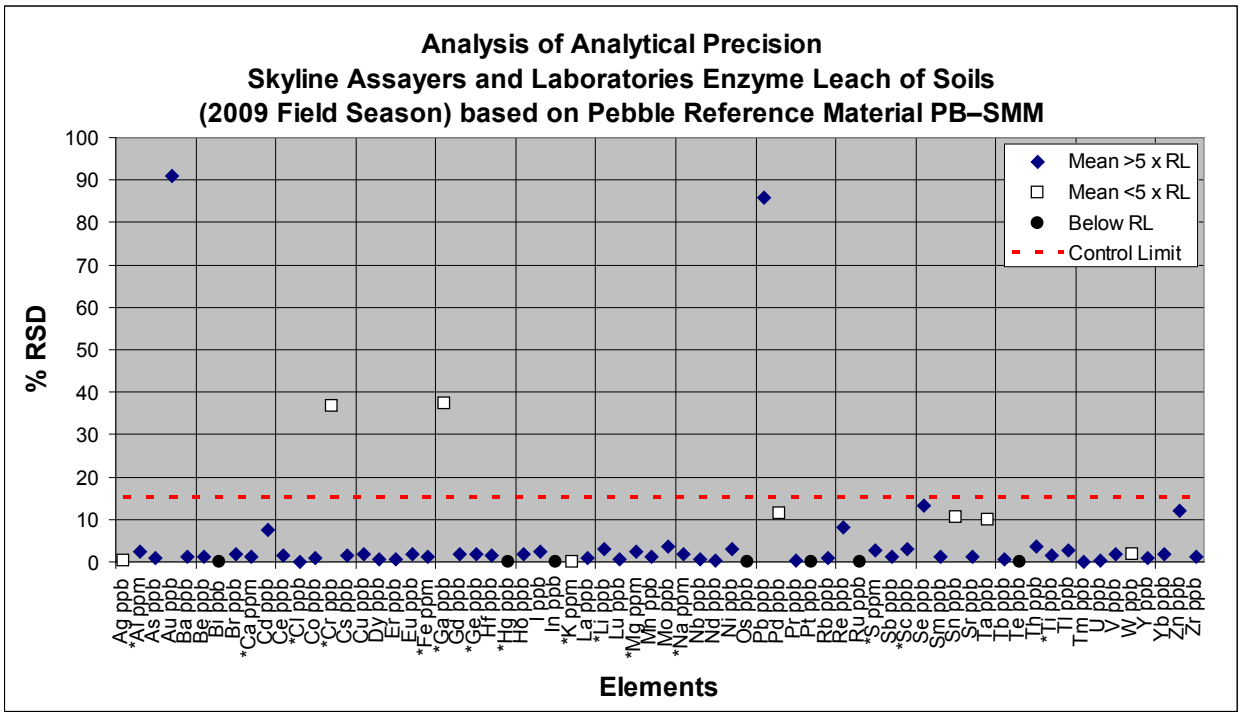

Figure 5-18. Precision plot for two analyses of Pebble reference material PB–SMM by Enzyme Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

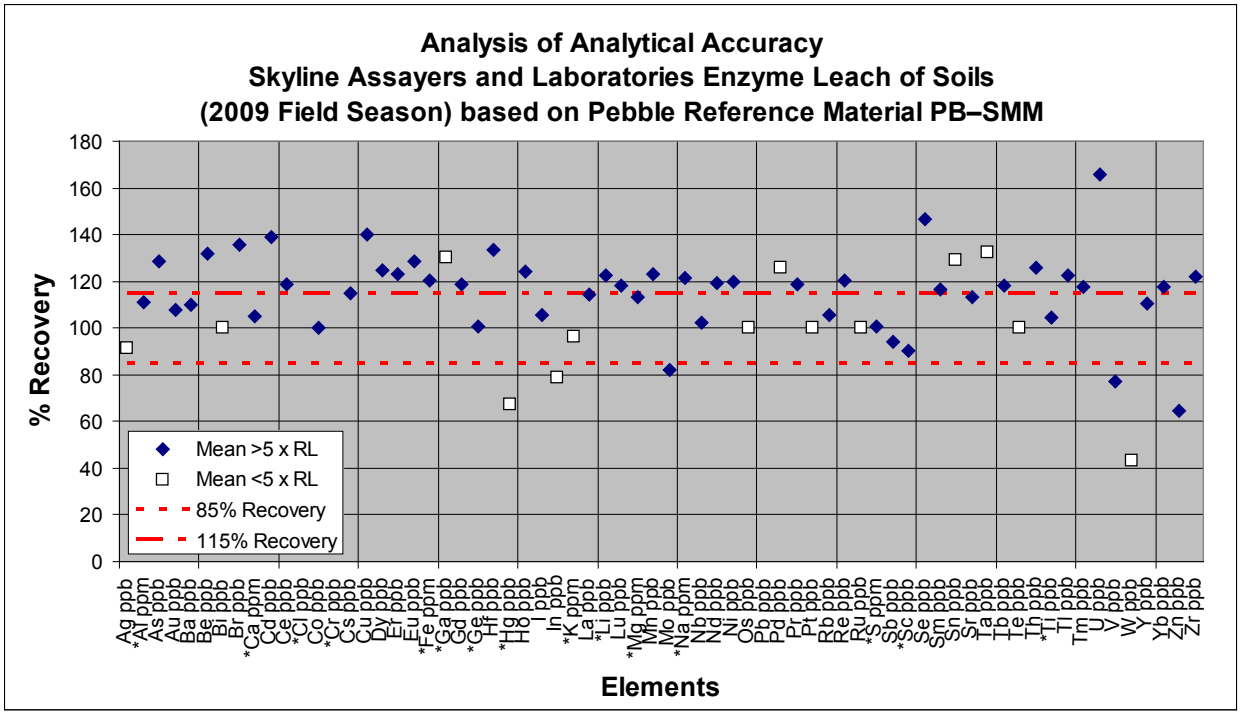

Figure 5-19. Accuracy plot for two analyses of Pebble reference material PB–SMM by Enzyme Leach (2009 field season). %Recovery is percent recovery; RL is reporting limit. The percent Recovery values for Cl, Cr, and Pb (not shown above) are 1,150%, 463%, and 3170%, respectively. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 5-13. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than;%RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	2	0.117	0.166	0.0163	9.83	141
Al	ppm	0.5	2	101	102	0.707	0.697	100
As	ppb	0.1	2	9.03	12.2	0.141	1.16	135
Au	ppb	0.005	2	0.0340	0.00950	0.00071	7.44	27.9
Ba	ppb	0.5	2	2,510	2,880	0	0	115
Be	ppb	0.1	2	4.52	5.20	0.445	8.58	115
Bi	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Br	ppb	1	2	638	808	50.9	6.30	127
Ca	ppm	0.5	2	153	143	2.12	1.49	93.1
Cd	ppb	0.1	2	4.63	5.73	0.0283	0.494	124
Ce	ppb	0.01	2	22.0	23.5	0.212	0.905	107
Cl	ppb	1,000	2	15,600	102,000	2,830	2.77	654
Co	ppb	0.2	2	132	140	0.707	0.507	106
Cr	ppb	3	2	2.71	11.9	0.990	8.32	439
Cs	ppb	0.01	2	1.79	1.73	0.0849	4.90	96.6
Cu	ppb	1	2	239	327	2.83	0.865	137
Dy	ppb	0.01	2	3.11	3.47	0.0212	0.612	111
Er	ppb	0.01	2	1.69	1.98	0.0778	3.94	117
Eu	ppb	0.01	2	0.806	0.899	0.0580	6.45	112
Fe	ppm	1	2	18.6	22.0	0.141	0.643	118
Ga	ppb	0.3	2	4.28	5.77	0.0283	0.490	135
Gd	ppb	0.01	2	3.50	3.96	0.127	3.21	113

Table 5-13. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by an Enzyme Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ge	ppb	0.05	2	0.224	0.213	0.00283	1.33	95.1
Hf	ppb	0.01	2	1.13	1.29	0.0778	6.05	114
Hg	ppb	0.1	2	0.408	<0.1	*na*	*na*	22.3
Ho	ppb	0.01	2	0.606	0.701	0.0120	1.72	116
I	ppb	0.5	2	166	163	8.49	5.21	98.2
In	ppb	0.01	2	0.0265	0.0245	0.00071	2.89	92.5
K	ppm	5	2	48.6	43.9	1.27	2.90	90.3
La	ppb	0.01	2	10.1	10.8	0.283	2.62	107
Li	ppb	0.5	2	14.7	14.5	0.707	4.88	98.6
Lu	ppb	0.01	2	0.232	0.249	0.0120	4.84	107
Mg	ppm	2	2	43.4	44.5	1.63	3.66	102
Mn	ppb	0.4	2	7,010	7,700	42.4	0.551	110
Mo	ppb	0.1	2	8.68	7.51	0.0990	1.32	86.5
Na	ppm	5	2	24.7	26.9	3.39	12.6	109
Nb	ppb	0.1	2	1.56	1.62	0.0141	0.873	104
Nd	ppb	0.01	2	14.2	15.0	0.283	1.89	106
Ni	ppb	1	2	79.0	87.7	0.0707	0.0807	111
Os	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Pb	ppb	0.1	2	2.50	10.5	0.141	1.35	420
Pd	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Pr	ppb	0.01	2	3.20	3.30	0.120	3.65	103
Pt	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Rb	ppb	0.1	2	115	108	7.07	6.55	93.9
Re	ppb	0.005	2	0.122	0.155	0.0106	6.87	127
Ru	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
S	ppm	10	2	21.3	20.7	4.24	20.5	97.2
Sb	ppb	0.01	2	1.61	1.69	0.00707	0.420	105
Sc	ppb	10	2	23.5	17.1	3.18	18.7	72.6
Se	ppb	1	2	8.03	9.70	0.573	5.91	121
Sm	ppb	0.01	2	3.33	3.61	0.127	3.53	108
Sn	ppb	0.2	2	0.261	0.477	0.00849	1.78	183
Sr	ppb	0.1	2	1,480	1,690	14.1	0.837	114
Ta	ppb	0.02	2	0.0680	0.0875	0.00071	0.808	129
Tb	ppb	0.01	2	0.634	0.668	0.0276	4.13	105
Te	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Th	ppb	0.01	2	1.39	1.79	0.0495	2.77	128
Ti	ppb	10	2	2,680	2,470	63.6	2.58	92.0
Tl	ppb	0.005	2	2.05	2.13	0.156	7.30	104
Tm	ppb	0.01	2	0.234	0.256	0.00141	0.552	109
U	ppb	0.01	2	0.711	1.10	0.0566	5.14	155
V	ppb	0.1	2	74.2	64.8	1.20	1.86	87.3
W	ppb	0.1	2	3.23	1.12	0.0849	7.58	34.7
Y	ppb	0.05	2	16.2	16.7	0.566	3.39	103
Yb	ppb	0.01	2	1.45	1.72	0.0849	4.93	119
Zn	ppb	5	2	342	435	0.707	0.163	127
Zr	ppb	0.1	2	39.2	44.7	0.141	0.316	114

[1]Skyline Labs considers enzyme leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

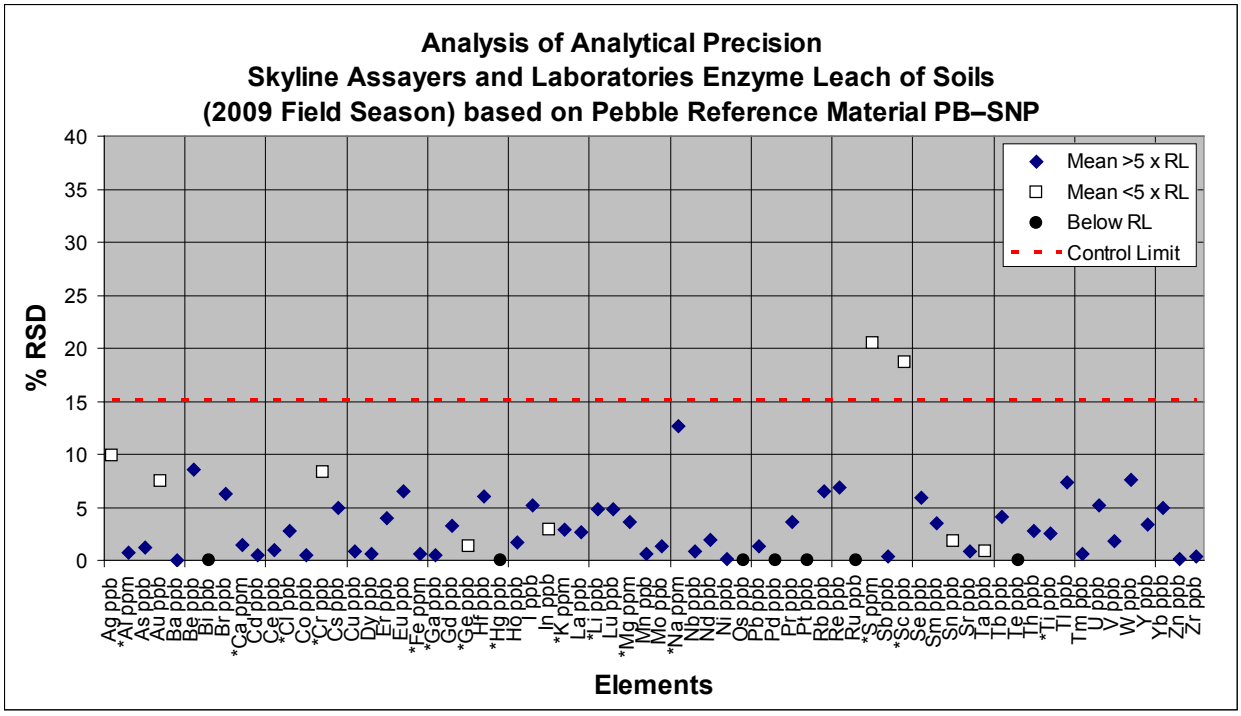

Figure 5-20. Precision plot for two analyses of Pebble reference material PB–SNP by Enzyme Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

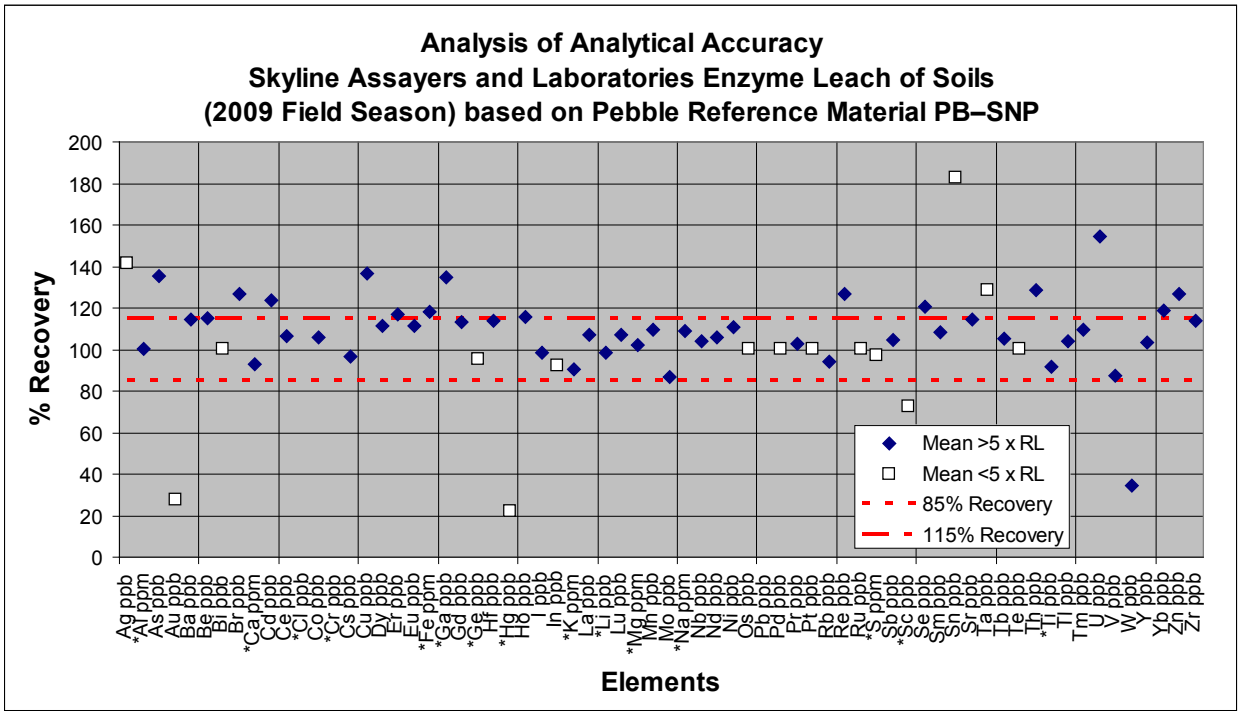

Figure 5-21. Accuracy plot for two analyses of Pebble reference material PB–SNP by Enzyme Leach (2009 field season). %Recovery is percent recovery; RL is reporting limit. The percent Recovery values for Cl, Cr, and Pb (not shown above) are 653%, 439%, and 420%, respectively. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Appendix 4: Quality Control Tables and Charts for Skyline Assayers and Laboratories TerraSol Leach Data

Table 6-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a TerraSol Leach of soil samples at Skyline Labs (2007 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	20	10	<20	70.7	28.9	1.98	6.84
Al	ppm	0.5	10	64.9	1,870	920	31.2	3.40
As	ppb	5	10	15.6	77.2	37.4	1.98	5.30
Au	ppb	0.1	10	<0.1	3.88	0.460	0.0447	9.72
Ba	ppb	10	10	562	34,400	9,630	267	2.77
Be	ppb	0.5	10	0.923	60.0	27.3	0.875	3.20
Bi	ppb	0.5	10	<0.5	3.37	0.822	0.0136	1.66
Ca	ppb	0.5	10	<0.5	1340	263	19.8	7.52
Cd	ppm	0.5	10	<0.5	60.7	8.96	0.414	4.62
Ce	ppb	0.5	10	138	3,390	928	19.0	2.04
Cl	ppb	20,000	10	<20,000	38,600	20,300	1,610	7.95
Co	ppb	0.5	10	8.46	788	187	5.84	3.12
Cr	ppb	40	10	<40	125	58.1	5.66	9.75
Cs	ppb	0.1	10	0.535	55.5	29.4	0.901	3.06
Cu	ppb	5	10	78.3	5,870	1,090	9.12	0.830
Dy	ppb	0.1	10	23.8	590	133	4.50	3.37
Er	ppb	0.06	10	12.1	323	69.9	2.27	3.25
Eu	ppb	0.05	10	5.78	175	38.3	0.847	2.21
Fe	ppb	1	10	65.8	849	299	3.06	1.02
Ga	ppm	0.5	10	5.77	169	33.9	0.601	1.77
Gd	ppb	0.7	10	23.0	764	158	6.64	4.20
Ge	ppb	1	10	<1	2.54	1.13	0.0877	7.75
Hf	ppb	0.1	10	1.27	13.9	8.46	0.230	2.71
Hg	ppb	0.1	10	<0.1	5.63	1.54	1.74	113
Ho	ppb	0.02	10	4.40	117	26.2	0.358	1.37
In	ppb	0.2	10	0.253	2.47	1.14	0.058	5.07
Ir	ppb	10	10	<10	<10	<10	*na*	*na*
K	ppb	5	10	<5	31.9	13.7	0.999	7.27
La	ppm	1	10	47.2	2,740	504	19.3	3.83
Li	ppb	2	10	2.12	48.8	13.3	0.807	6.04
Lu	ppb	0.1	10	0.456	34.8	7.08	0.268	3.79
Mg	ppb	2	10	<2	199	39.5	1.76	4.45
Mn	ppm	5	10	143	37,800	10,900	294	2.69
Mo	ppb	1	10	1.91	35.4	9.85	0.438	4.44
Na	ppb	5	10	5.00	36.3	13.4	0.403	3.00
Nb	ppm	0.4	10	1.37	20.5	6.11	0.315	5.16
Nd	ppb	0.2	10	74.1	3,140	636	19.5	3.06
Ni	ppb	10	10	29.2	155	97.3	5.49	5.64
Os	ppb	0.1	10	<0.1	<0.1	<0.1	*na*	*na*
Pb	ppb	5	10	17.7	82.2	43.9	1.86	4.23
Pd	ppb	1	10	<1	3.98	1.83	0.242	13.2
Pr	ppb	0.2	10	16.6	742	152	4.08	2.69
Pt	ppb	0.1	10	<0.1	0.144	<0.1	*na*	*na*
Rb	ppb	0.5	10	40.1	632	304	12.2	4.01
Re	ppb	0.05	10	<0.05	<0.05	<0.05	*na*	*na*
Rh	ppb	5	10	<5	<5	<5	*na*	*na*
Ru	ppb	0.2	10	<0.2	0.242	<0.2	*na*	*na*
S	ppm	10	10	<10	2,120	238	204	85.6
Sb	ppb	1	10	<1	2.52	1.19	0.0844	7.10
Sc	ppb	50	10	<50	580	184	8.78	4.76

Table 6-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a TerraSol Leach of soil samples at Skyline Labs (2007 field season)—Continued.

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Se	ppb	20	10	<20	37.4	22.3	3.66	16.4
Sm	ppb	0.1	10	22.3	680	145	6.40	4.41
Sn	ppb	10	10	<10	<10	<10	*na*	*na*
Sr	ppb	1	10	67.8	16,400	3,040	247	8.12
Ta	ppb	0.1	10	<0.1	1.12	0.367	0.0276	7.53
Te	ppb	10	10	<10	<10	<10	*na*	*na*
Th	ppb	0.05	10	3.48	53.2	28.7	0.522	1.82
Ti	ppb	20	10	656	11,400	2,640	44.4	1.68
Tl	ppb	0.5	10	<0.5	5.40	0.868	0.351	40.5
Tm	ppb	0.05	10	1.68	40.5	8.84	0.224	2.53
U	ppb	0.05	10	6.19	94.5	20.6	0.199	0.960
V	ppb	5	10	15.6	305	101	3.08	3.05
W	ppb	10	10	<10	<10	<10	*na*	*na*
Y	ppb	0.2	10	108	4,170	826	52.9	6.41
Yb	ppb	0.1	10	10.1	242	52.9	1.21	2.29
Zn	ppb	20	10	<20	2,060	340	14.9	4.37
Zr	ppb	0.4	10	63.7	493	264	6.20	2.35

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

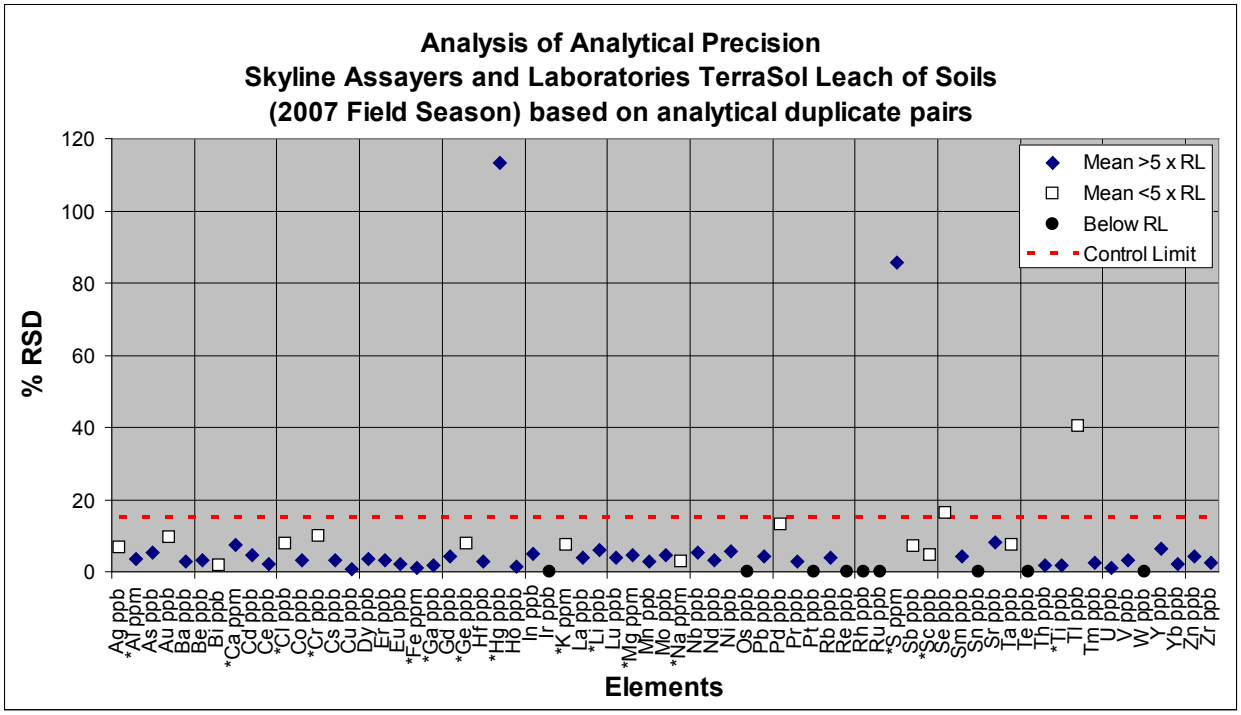

Figure 6-1. Precision plot for ten analytical duplicate sample pairs by TerraSol Leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-2. Summary statistics for assessing analytical variation on the standard reference material FA; determined by a TerraSol Leach of soil samples at Skyline Labs (2007 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	3	*na*	<20	*na*	*na*	*na*
Al	ppm	0.5	3	*na*	169	8.89	5.26	*na*
As	ppb	5	3	*na*	4,240	65.1	1.54	*na*
Au	ppb	0.1	3	*na*	0.247	0.203	82.3	*na*
Ba	ppb	10	3	*na*	101,000	4,250	4.22	*na*
Be	ppb	0.5	3	*na*	33.0	2.38	7.22	*na*
Bi	ppb	0.5	3	*na*	48.1	2.15	4.47	*na*
Ca	ppb	0.5	3	*na*	10,300	520	5.04	*na*
Cd	ppm	0.5	3	*na*	75.0	6.47	8.62	*na*
Ce	ppb	0.5	3	*na*	134	15.9	11.9	*na*
Cl	ppb	20,000	3	*na*	36,700	9,850	26.9	*na*
Co	ppb	0.5	3	*na*	213	6.56	3.08	*na*
Cr	ppb	40	3	*na*	3,790	55.1	1.45	*na*
Cs	ppb	0.1	3	*na*	56.7	3.12	5.50	*na*
Cu	ppb	5	3	*na*	2,490	85.0	3.41	*na*
Dy	ppb	0.1	3	*na*	25.1	1.88	7.47	*na*
Er	ppb	0.06	3	*na*	19.8	1.60	8.07	*na*
Eu	ppb	0.05	3	*na*	6.03	0.749	12.4	*na*
Fe	ppb	1	3	*na*	234	7.21	3.08	*na*
Ga	ppm	0.5	3	*na*	763	35.7	4.68	*na*
Gd	ppb	0.7	3	*na*	28.1	1.96	6.98	*na*
Ge	ppb	1	3	*na*	593	11.7	1.97	*na*
Hf	ppb	0.1	3	*na*	4.42	0.554	12.6	*na*
Hg	ppb	0.1	3	*na*	0.694	0.706	102	*na*
Ho	ppb	0.02	3	*na*	6.11	0.575	9.40	*na*
In	ppb	0.2	3	*na*	1.59	0.231	14.5	*na*
Ir	ppb	10	3	*na*	<10	*na*	*na*	*na*
K	ppb	5	3	*na*	24.4	2.15	8.82	*na*
La	ppm	1	3	*na*	63.7	8.70	13.7	*na*
Li	ppb	2	3	*na*	4,050	208	5.13	*na*
Lu	ppb	0.1	3	*na*	4.22	0.416	9.85	*na*
Mg	ppb	2	3	*na*	301	6.81	2.26	*na*
Mn	ppm	5	3	*na*	23,400	1,190	5.09	*na*
Mo	ppb	1	3	*na*	3,570	211	5.91	*na*
na	ppb	5	3	*na*	189	11.0	5.81	*na*
Nb	ppm	0.4	3	*na*	103	2.65	2.57	*na*
Nd	ppb	0.2	3	*na*	92.8	7.25	7.81	*na*
Ni	ppb	10	3	*na*	492	23.9	4.86	*na*
Os	ppb	0.1	3	*na*	<0.1	*na*	*na*	*na*
Pb	ppb	5	3	*na*	187	24.0	12.9	*na*
Pd	ppb	1	3	*na*	3.87	0.816	21.1	*na*
Pr	ppb	0.2	3	*na*	20.4	2.07	10.1	*na*
Pt	ppb	0.1	3	*na*	<0.1	*na*	*na*	*na*
Rb	ppb	0.5	3	*na*	164	8.08	4.92	*na*
Re	ppb	0.05	3	*na*	4.94	0.362	7.32	*na*
Rh	ppb	5	3	*na*	<5	*na*	*na*	*na*
Ru	ppb	0.2	3	*na*	<0.2	*na*	*na*	*na*
S	ppm	10	3	*na*	3,100	440	14.2	*na*
Sb	ppb	1	3	*na*	351	14.2	4.04	*na*
Sc	ppb	50	3	*na*	386	20.5	5.32	*na*
Se	ppb	20	3	*na*	159	26.8	16.9	*na*
Sm	ppb	0.1	3	*na*	22.9	2.30	10.1	*na*
Sn	ppb	10	3	*na*	103	4.10	3.96	*na*
Sr	ppb	1	3	*na*	145,000	4,730	3.27	*na*
Ta	ppb	0.1	3	*na*	2.40	0.131	5.45	*na*

Table 6-2. Summary statistics for assessing analytical variation on the standard reference material FA; determined by a TerraSol Leach of soil samples at Skyline Labs (2007 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Te	ppb	10	3	*na*	29.8	4.65	15.6	*na*
Th	ppb	0.05	3	*na*	37.6	3.11	8.27	*na*
Ti	ppb	20	3	*na*	5,990	492	8.22	*na*
Tl	ppb	0.5	3	*na*	<0.5	*na*	*na*	*na*
Tm	ppb	0.05	3	*na*	2.59	0.162	6.23	*na*
U	ppb	0.05	3	*na*	781	31.6	4.05	*na*
V	ppb	5	3	*na*	7,460	195	2.61	*na*
W	ppb	10	3	*na*	638	19.4	3.04	*na*
Y	ppb	0.2	3	*na*	199	13.0	6.55	*na*
Yb	ppb	0.1	3	*na*	18.2	0.586	3.23	*na*
Zn	ppb	20	3	*na*	740	50.3	6.80	*na*
Zr	ppb	0.4	3	*na*	169	12.1	7.17	*na*

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.
[2]Skyline Labs did not have sufficient data compiled for SRM FA by the TerraSol method to provide reliable Target Values.

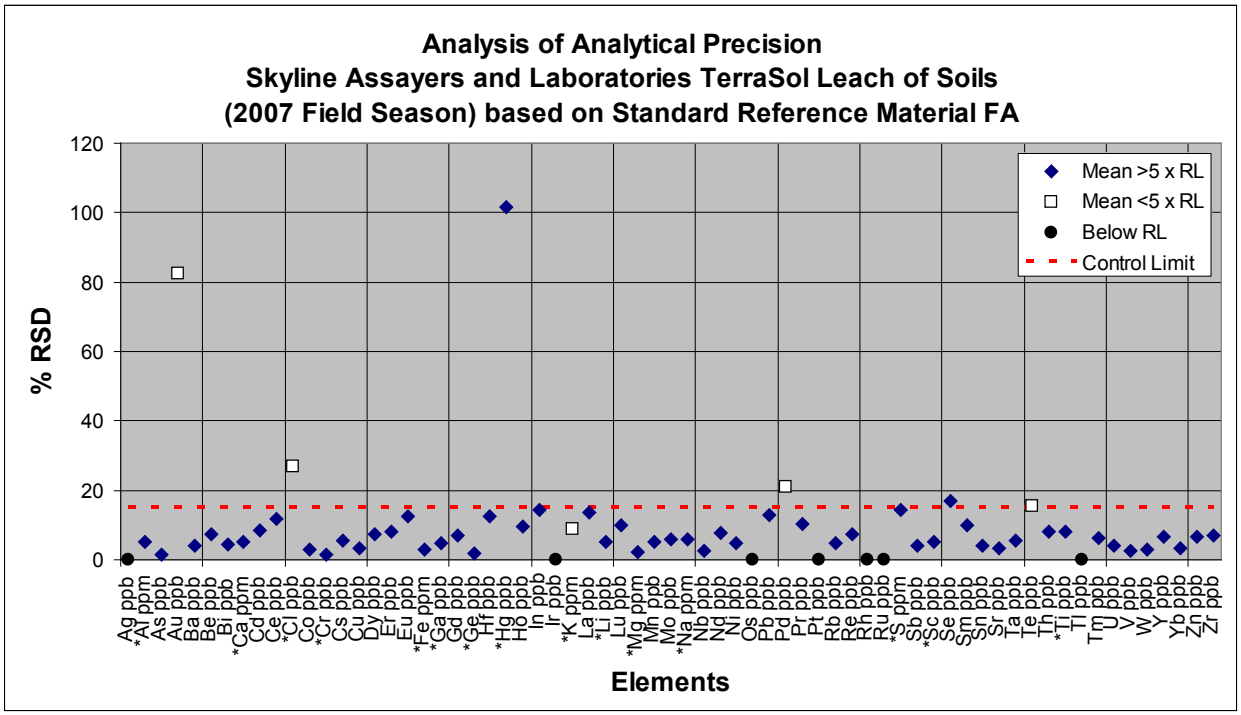

Figure 6-2. Precision plot for three analyses of standard reference material FA by TerraSol Leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-3. Summary statistics for assessing analytical variation on duplicate samples; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	20	14	<20	108	24.5	0.911	3.72
Al	ppm	0.5	14	82.5	2,220	809	63.3	7.82
As	ppb	5	14	<5	269	55.0	7.07	12.9
Au	ppb	0.1	14	<0.1	0.186	0.103	0.0103	9.98
Ba	ppb	10	14	217	24,500	4,940	526	10.7
Be	ppb	0.5	14	2.76	140	23.5	8.05	34.2
Bi	ppb	0.5	14	<0.5	5.19	0.933	0.151	16.1
Ca	ppb	0.5	14	3.29	1,260	334	28.2	8.44
Cd	ppm	0.5	14	<0.5	22.5	8.35	1.05	12.6
Ce	ppb	0.5	14	117	6,670	1,140	39.3	3.43
Cl	ppb	20,000	14	<20,000	25,400	<20,000	*na*	*na*
Co	ppb	0.5	14	3.57	464	97.5	11.0	11.3
Cr	ppb	40	14	<40	313	57.2	5.28	9.23
Cs	ppb	0.1	14	0.661	73.7	27.2	1.14	4.20
Cu	ppb	5	14	21.6	2,820	650	129	19.9
Dy	ppb	0.1	14	18.1	868	145	26.2	18.1
Er	ppb	0.06	14	10.6	478	75.8	13.6	17.9
Eu	ppb	0.05	14	4.30	281	44.0	5.67	12.9
Fe	ppb	1	14	25.8	3,840	740	166	22.4
Ga	ppm	0.5	14	6.01	106	47.3	3.53	7.46
Gd	ppb	0.7	14	18.6	1,090	172	22.0	12.8
Ge	ppb	1	14	<1	7.91	2.19	0.213	9.72
Hf	ppb	0.1	14	2.34	41.6	10.5	1.27	12.1
Hg	ppb	0.1	14	<0.1	12.0	1.10	0.780	70.7
Ho	ppb	0.02	14	3.73	169	27.7	4.94	17.8
In	ppb	0.2	14	<0.2	3.85	1.09	0.217	19.8
Ir	ppb	10	14	<10	<10	<10	*na*	*na*
K	ppb	5	14	<5	62.5	18.5	1.38	7.45
La	ppm	1	14	42.2	4,780	572	35.9	6.28
Li	ppb	2	14	<2	38.2	7.99	0.924	11.6
Lu	ppb	0.1	14	0.848	49.2	7.66	1.45	18.9
Mg	ppb	2	14	<2	166	57.7	4.76	8.24
Mn	ppm	5	14	84.8	50,800	11,200	3,760	33.5
Mo	ppb	1	14	1.19	214	31.1	3.29	10.6
Na	ppb	5	14	5.80	69.1	21.0	3.64	17.3
Nb	ppm	0.4	14	1.38	29.2	6.73	0.919	13.7
Nd	ppb	0.2	14	76.3	4,870	720	72.1	10.0
Ni	ppb	10	14	<10	317	102	7.51	7.33
Os	ppb	0.1	14	<0.1	<0.1	<0.1	*na*	*na*
Pb	ppb	5	14	5.21	124	52.1	5.23	10.0
Pd	ppb	1	14	<1	9.60	2.59	0.293	11.3
Pr	ppb	0.2	14	16.9	1,170	170	16.1	9.45
Pt	ppb	0.1	14	<0.1	0.427	0.125	0.00779	6.21
Rb	ppb	0.5	14	11.7	836	253	8.16	3.23
Re	ppb	0.05	14	<0.05	0.131	0.0508	0.00246	4.84
Rh	ppb	5	14	<5	<5	<5	*na*	*na*
Ru	ppb	0.2	14	<0.2	<0.2	<0.2	*na*	*na*
S	ppm	10	14	<10	67.7	16.6	4.92	29.7
Sb	ppb	1	14	<1	4.72	1.72	0.168	9.75
Sc	ppb	50	14	<50	678	167	16.2	9.69
Se	ppb	20	14	<20	70.3	26.1	1.98	7.61
Sm	ppb	0.1	14	17.8	1,050	165	22.8	13.8
Sn	ppb	10	14	<10	<10	<10	*na*	*na*
Sr	ppb	1	14	38.3	10,800	2,480	216	8.71

Table 6-3. Summary statistics for assessing analytical variation on duplicate samples; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ta	ppb	0.1	14	<0.1	1.54	0.374	0.0336	8.99
Te	ppb	10	14	<10	<10	<10	*na*	*na*
Th	ppb	0.05	14	4.55	102	27.4	4.03	14.7
Ti	ppb	20	14	430	15,100	3,740	363	9.71
Tl	ppb	0.5	14	<0.5	13.0	1.34	0.0378	2.82
Tm	ppb	0.05	14	1.64	59.4	9.65	1.85	19.2
U	ppb	0.05	14	3.70	225	37.5	13.3	35.3
V	ppb	5	14	6.26	12,300	1,230	654	53.2
W	ppb	10	14	<10	<10	<10	*na*	*na*
Y	ppb	0.2	14	113	6,880	906	169	18.6
Yb	ppb	0.1	14	10.0	350	57.7	10.5	18.2
Zn	ppb	20	14	<20	2,840	346	147	42.4
Zr	ppb	0.4	14	97.7	1,280	322	45.8	14.2

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

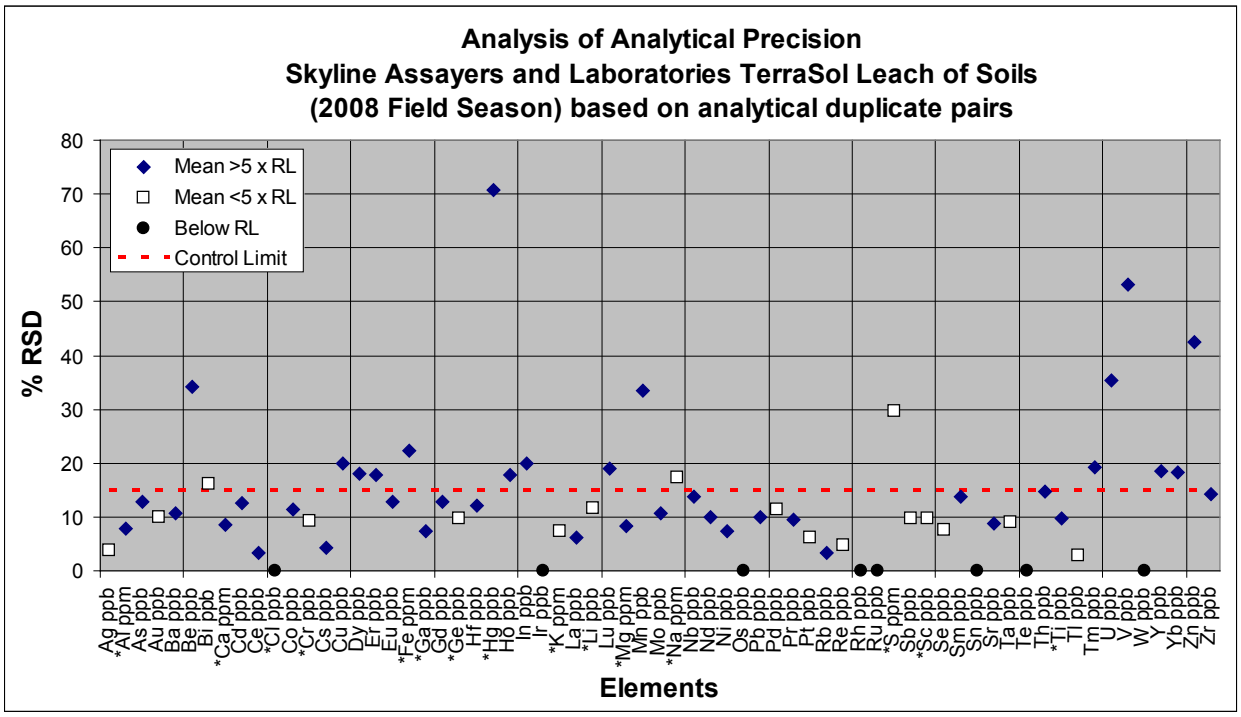

Figure 6-3. Precision plot for fourteen analytical duplicate sample pairs by TerraSol Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-4. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	6	37.0	39.8	4.17	10.5	108
Al	ppm	0.5	6	1,270	1,090	75.7	6.94	86.0
As	ppb	5	6	328	336	20.3	6.04	102
Au	ppb	0.1	6	2.90	3.20	0.137	4.27	110
Ba	ppb	10	6	18,200	18,800	1,130	6.04	103
Be	ppb	0.5	6	181	172	11.3	6.58	95.0
Bi	ppb	0.5	6	14.3	13.7	0.655	4.79	95.7
Ca	ppm	0.5	6	2,020	2,090	153	7.32	104
Cd	ppb	0.5	6	34.7	34.2	1.62	4.74	98.5
Ce	ppb	0.5	6	4,390	4,690	292	6.22	107
Cl	ppb	20,000	6	*na*	26,800	10,300	38.5	*na*
Co	ppb	0.5	6	1,680	1,620	92.9	5.75	96.2
Cr	ppb	40	6	976	948	60.8	6.42	97.1
Cs	ppb	0.1	6	18.4	18.2	0.965	5.29	99.1
Cu	ppb	5	6	1,430	1,340	68.6	5.11	93.9
Dy	ppb	0.1	6	482	470	20.7	4.39	97.6
Er	ppb	0.06	6	280	273	12.0	4.40	97.4
Eu	ppb	0.05	6	132	130	6.07	4.67	98.5
Fe	ppm	1	6	867	891	55.8	6.26	103
Ga	ppb	0.5	6	200	188	10.0	5.32	94.1
Gd	ppb	0.7	6	561	544	23.0	4.23	96.9
Ge	ppb	1	6	12.0	11.2	0.732	6.54	93.3
Hf	ppb	0.1	6	71.6	70.6	3.26	4.61	98.6
Hg	ppb	0.1	6	5.40	5.01	1.02	20.4	92.7
Ho	ppb	0.02	6	95.7	93.3	3.96	4.24	97.4
In	ppb	0.2	6	1.90	1.81	0.105	5.83	95.0
Ir	ppb	10	6	*na*	<10	*na*	*na*	*na*
K	ppm	5	6	162	176	15.7	8.91	109
La	ppb	1	6	1,480	1,450	66.8	4.62	97.7
Li	ppb	2	6	515	476	37.7	7.91	92.5
Lu	ppb	0.1	6	35.5	34.6	1.37	3.97	97.3
Mg	ppm	2	6	171	165	12.0	7.26	96.5
Mn	ppb	5	6	161,000	160,000	9,970	6.25	99.2
Mo	ppb	1	6	308	302	17.0	5.64	98.2
Na	ppm	5	6	28.0	27.1	2.20	8.14	96.7
Nb	ppb	0.4	6	54.9	54.6	2.75	5.05	99.5
Nd	ppb	0.2	6	2,540	2,500	117	4.68	98.4
Ni	ppb	10	6	706	680	41.0	6.03	96.4
Os	ppb	0.1	6	*na*	<0.1	*na*	*na*	*na*
Pb	ppb	5	6	490	469	20.8	4.42	95.8
Pd	ppb	1	6	26.0	23.9	2.62	11.0	91.9
Pr	ppb	0.2	6	592	581	26.9	4.63	98.2
Pt	ppb	0.1	6	1.20	1.13	0.119	10.5	94.6
Rb	ppb	0.5	6	328	317	17.3	5.46	96.6
Re	ppb	0.05	6	0.220	0.206	0.0199	9.68	93.6
Rh	ppb	5	6	*na*	<5	*na*	*na*	*na*
Ru	ppm	0.2	6	0.300	0.393	0.105	26.7	131
S	ppb	10	6	53.0	47.6	13.0	27.2	89.9
Sb	ppb	1	6	58.0	58.8	2.71	4.61	101
Sc	ppb	50	6	1,000	889	68.1	7.67	88.9
Se	ppb	20	6	96.0	89.1	7.02	7.88	92.8
Sm	ppb	0.1	6	576	566	24.5	4.32	98.2
Sn	ppb	10	6	*na*	<10	*na*	*na*	*na*
Sr	ppb	1	6	16,500	16,700	1,060	6.33	101
Ta	ppb	0.1	6	1.50	1.44	0.0999	6.97	95.7

Table 6-4. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Te	ppb	10	6	*na*	<10	*na*	*na*	*na*
Th	ppb	0.05	6	977	956	48.1	5.04	97.8
Ti	ppb	20	6	5,340	5,060	332	6.58	94.7
Tl	ppb	0.5	6	*na*	<0.5	*na*	*na*	*na*
Tm	ppb	0.05	6	38.9	38.2	1.59	4.16	98.2
U	ppb	0.05	6	231	226	11.0	4.87	98.0
V	ppb	5	6	1,510	1,460	98.9	6.78	96.6
W	ppb	10	6	658	659	31.2	4.74	100
Y	ppb	0.2	6	2,670	2,700	183	6.81	101
Yb	ppb	0.1	6	256	253	10.7	4.23	98.8
Zn	ppb	20	6	784	682	43.0	6.32	86.9
Zr	ppb	0.4	6	2,330	2,280	113	4.95	97.6

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

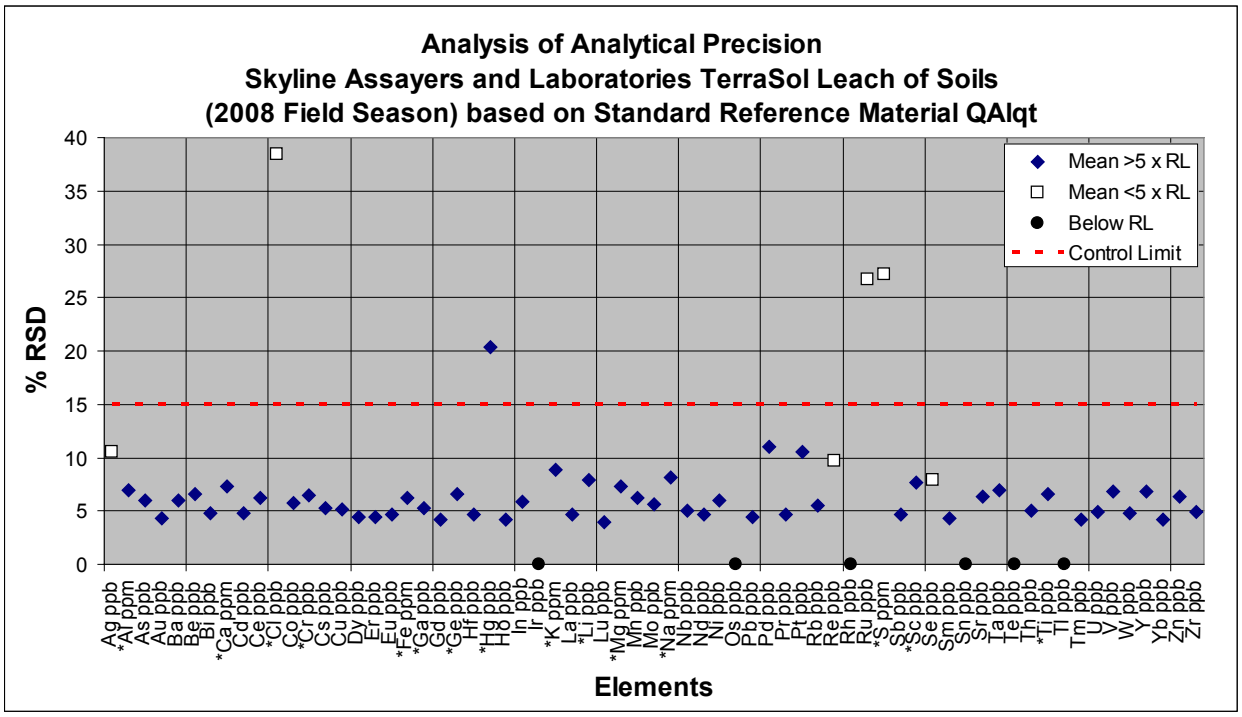

Figure 6-4. Precision plot for six analyses of standard reference material QAlqt by TerraSol Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

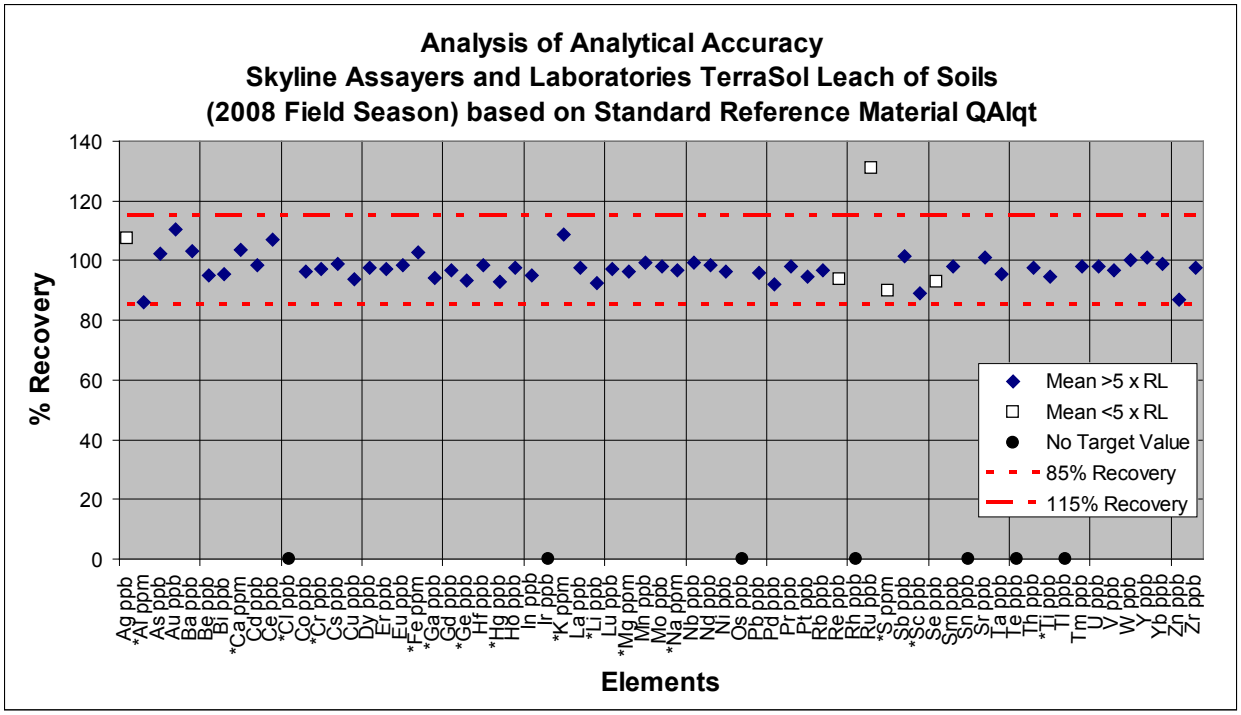

Figure 6-5. Accuracy plot for six analyses of standard reference material QAlqt by TerraSol Leach (2008 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-5. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	6	*na*	20.1	1.63	8.09	*na*
Al	ppm	0.5	6	68.0	57.5	3.09	5.38	84.5
As	ppb	5	6	72.0	70.3	2.10	2.99	97.6
Au	ppb	0.1	6	0.300	0.283	0.0384	13.6	94.3
Ba	ppb	10	6	7,060	7,500	240	3.20	106
Be	ppb	0.5	6	43.0	40.1	1.75	4.36	93.3
Bi	ppb	0.5	6	2.90	2.80	0.0565	2.02	96.4
Ca	ppb	0.5	6	814	838	61.8	7.37	103
Cd	ppm	0.5	6	15.7	15.4	0.471	3.06	98.0
Ce	ppb	0.5	6	2,980	3,310	119	3.60	111
Cl	ppb	20,000	6	*na*	<20,000	*na*	*na*	*na*
Co	ppb	0.5	6	711	671	20.0	2.97	94.4
Cr	ppb	40	6	56.0	54.8	6.99	12.8	97.8
Cs	ppb	0.1	6	9.20	9.25	0.173	1.87	101
Cu	ppb	5	6	345	324	6.65	2.05	93.9
Dy	ppb	0.1	6	363	361	3.08	0.853	99.4
Er	ppb	0.06	6	200	199	1.63	0.819	99.7
Eu	ppb	0.05	6	103	102	1.10	1.07	99.0
Fe	ppb	1	6	44.0	40.5	0.935	2.31	91.9
Ga	ppm	0.5	6	34.0	30.2	1.49	4.92	88.7
Gd	ppb	0.7	6	465	456	6.88	1.51	98.1
Ge	ppb	1	6	8.00	7.44	0.339	4.56	93.0

Table 6-5. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Hf	ppb	0.1	6	12.8	12.1	0.253	2.09	94.5
Hg	ppb	0.1	6	4.80	9.22	3.20	34.7	192
Ho	ppb	0.02	6	70.6	70.4	0.817	1.16	99.7
In	ppb	0.2	6	0.300	0.249	0.0197	7.91	83.1
Ir	ppb	10	6	*na*	<10	*na*	*na*	*na*
K	ppb	5	6	130	138	11.1	8.05	106
La	ppm	1	6	1,460	1,440	17.2	1.20	98.5
Li	ppb	2	6	96.0	87.1	3.80	4.36	90.7
Lu	ppb	0.1	6	22.3	21.9	0.327	1.49	98.1
Mg	ppb	2	6	142	139	5.73	4.12	97.9
Mn	ppm	5	6	52,700	52,200	1,530	2.93	99.0
Mo	ppb	1	6	84.0	82.0	1.64	1.99	97.6
Na	ppb	5	6	10.0	9.56	0.829	8.67	95.6
Nb	ppm	0.4	6	2.90	2.81	0.0983	3.49	97.0
Nd	ppb	0.2	6	2,180	2,150	14.7	0.685	98.5
Ni	ppb	10	6	351	329	13.5	4.09	93.7
Os	ppb	0.1	6	*na*	<0.1	*na*	*na*	*na*
Pb	ppb	5	6	148	147	1.05	0.716	99.0
Pd	ppb	1	6	4.00	3.10	0.387	12.5	77.4
Pr	ppb	0.2	6	512	503	6.92	1.37	98.3
Pt	ppb	0.1	6	*na*	<0.1	*na*	*na*	*na*
Rb	ppb	0.5	6	232	224	4.73	2.11	96.6
Re	ppb	0.05	6	*na*	0.0519	0.00947	18.2	*na*
Rh	ppb	5	6	*na*	<5	*na*	*na*	*na*
Ru	ppb	0.2	6	0.200	0.256	0.0825	32.3	128
S	ppm	10	6	*na*	<10	*na*	*na*	*na*
Sb	ppb	1	6	7.00	7.15	0.201	2.81	102
Sc	ppb	50	6	136	122	4.72	3.86	90.0
Se	ppb	20	6	52.0	41.3	4.99	12.1	79.4
Sm	ppb	0.1	6	467	463	4.90	1.06	99.1
Sn	ppb	10	6	*na*	<10	*na*	*na*	*na*
Sr	ppb	1	6	5,460	5,720	165	2.89	105
Ta	ppb	0.1	6	0.500	0.501	0.0301	6.01	100
Te	ppb	10	6	*na*	<10	*na*	*na*	*na*
Th	ppb	0.05	6	187	187	1.94	1.04	100
Ti	ppb	20	6	596	555	16.1	2.90	93.1
Tl	ppb	0.5	6	*na*	<0.5	*na*	*na*	*na*
Tm	ppb	0.05	6	26.2	26.1	0.183	0.703	99.6
U	ppb	0.05	6	70.2	70.5	0.842	1.19	100
V	ppb	5	6	203	188	6.84	3.64	92.6
W	ppb	10	6	121	124	3.72	3.00	103
Y	ppb	0.2	6	2,090	2,030	132	6.48	97.2
Yb	ppb	0.1	6	160	159	1.67	1.05	99.4
Zn	ppb	20	6	418	340	8.61	2.53	81.4
Zr	ppb	0.4	6	316	302	7.06	2.34	95.7

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

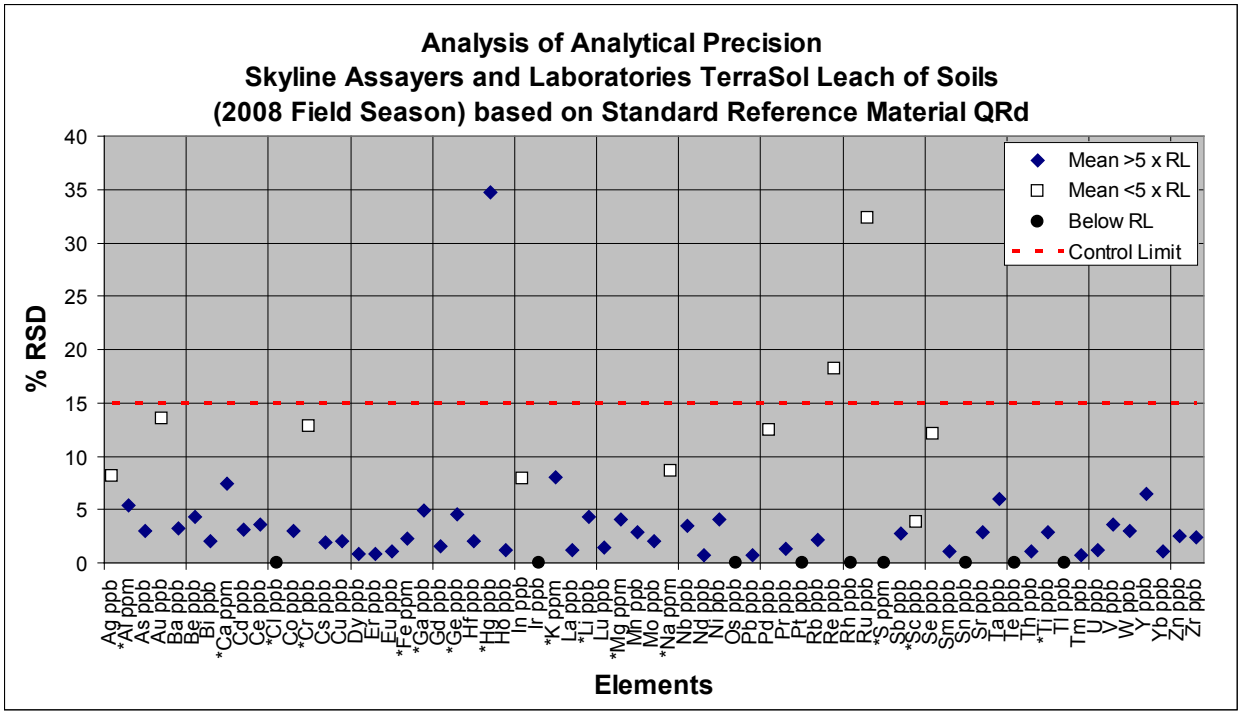

Figure 6-6. Precision plot for six analyses of standard reference material QRd by TerraSol Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

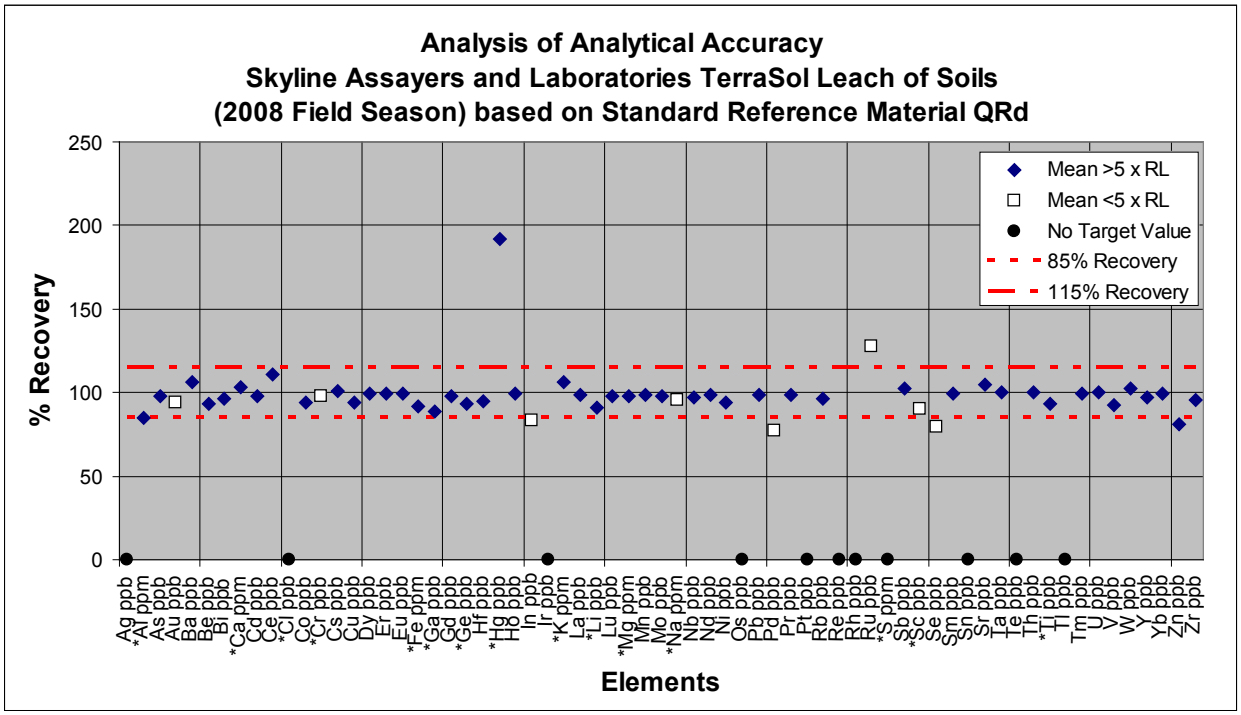

Figure 6-7. Accuracy plot for six analyses of standard reference material QRd by TerraSol Leach (2008 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-6. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	2	*na*	22.3	5.93	26.6	*na*
Al	ppm	0.5	2	*na*	828	9.19	1.11	*na*
As	ppb	5	2	*na*	44.5	1.06	2.39	*na*
Au	ppb	0.1	2	*na*	0.102	0.0148	14.5	*na*
Ba	ppb	10	2	*na*	10,300	212	2.07	*na*
Be	ppb	0.5	2	*na*	78.4	1.06	1.35	*na*
Bi	ppb	0.5	2	*na*	1.01	0.0163	1.61	*na*
Ca	ppm	0.5	2	*na*	559	46.7	8.35	*na*
Cd	ppb	0.5	2	*na*	20.9	1.06	5.09	*na*
Ce	ppb	0.5	2	*na*	3,550	184	5.18	*na*
Cl	ppb	20,000	2	*na*	<20,000	*na*	*na*	*na*
Co	ppb	0.5	2	*na*	105	0	0	*na*
Cr	ppb	40	2	*na*	65.1	1.63	2.50	*na*
Cs	ppb	0.1	2	*na*	49.9	0.636	1.28	*na*
Cu	ppb	5	2	*na*	8,820	77.8	0.882	*na*
Dy	ppb	0.1	2	*na*	532	7.07	1.33	*na*
Er	ppb	0.06	2	*na*	283	2.83	0.999	*na*
Eu	ppb	0.05	2	*na*	162	2.83	1.75	*na*
Fe	ppm	1	2	*na*	268	15.6	5.80	*na*
Ga	ppm	0.5	2	*na*	75.2	2.40	3.20	*na*
Gd	ppb	0.7	2	*na*	650	9.90	1.52	*na*
Ge	ppb	1	2	*na*	4.78	0.134	2.81	*na*
Hf	ppb	0.1	2	*na*	30.1	0.283	0.940	*na*
Hg	ppb	0.1	2	*na*	<0.1	*na*	*na*	*na*
Ho	ppb	0.02	2	*na*	104	0	0	*na*
In	ppb	0.2	2	*na*	1.70	0.0707	4.16	*na*
Ir	ppb	10	2	*na*	<10	*na*	*na*	*na*
K	ppm	5	2	*na*	29.4	0.495	1.69	*na*
La	ppb	1	2	*na*	1,800	113	6.29	*na*
Li	ppb	2	2	*na*	3.46	0.672	19.4	*na*
Lu	ppb	0.1	2	*na*	30.1	0.0707	0.235	*na*
Mg	ppm	2	2	*na*	110	5.66	5.14	*na*
Mn	ppb	5	2	*na*	14,500	141	0.975	*na*
Mo	ppb	1	2	*na*	35.1	1.20	3.43	*na*
Na	ppm	5	2	*na*	30.8	0.0707	0.230	*na*
Nb	ppb	0.4	2	*na*	6.95	0.163	2.34	*na*
Nd	ppb	0.2	2	*na*	2,590	99.0	3.82	*na*
Ni	ppb	10	2	*na*	171	4.24	2.48	*na*
Os	ppb	0.1	2	*na*	<0.1	*na*	*na*	*na*
Pb	ppb	5	2	*na*	89.2	6.58	7.38	*na*
Pd	ppb	1	2	*na*	7.68	0.177	2.30	*na*
Pr	ppb	0.2	2	*na*	605	22.6	3.74	*na*
Pt	ppb	0.1	2	*na*	0.234	0.0474	20.3	*na*
Rb	ppb	0.5	2	*na*	479	2.12	0.443	*na*
Re	ppb	0.05	2	*na*	0.100	0.00849	8.49	*na*
Rh	ppb	5	2	*na*	<5	*na*	*na*	*na*
Ru	ppb	0.2	2	*na*	<0.2	*na*	*na*	*na*
S	ppm	10	2	*na*	32.2	2.47	7.70	*na*
Sb	ppb	1	2	*na*	3.06	0.0141	0.462	*na*
Sc	ppb	50	2	*na*	587	9.90	1.69	*na*
Se	ppb	20	2	*na*	63.6	5.30	8.35	*na*
Sm	ppb	0.1	2	*na*	602	9.90	1.64	*na*
Sn	ppb	10	2	*na*	<10	*na*	*na*	*na*
Sr	ppb	1	2	*na*	4,820	49.5	1.03	*na*
Ta	ppb	0.1	2	*na*	0.747	0.0219	2.94	*na*

Table 6-6. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Te	ppb	10	2	*na*	<10	*na*	*na*	*na*
Th	ppb	0.05	2	*na*	85.7	1.84	2.15	*na*
Ti	ppb	20	2	*na*	2,080	21.2	1.02	*na*
Tl	ppb	0.5	2	*na*	<0.5	*na*	*na*	*na*
Tm	ppb	0.05	2	*na*	35.6	0.354	0.995	*na*
U	ppb	0.05	2	*na*	209	5.66	2.71	*na*
V	ppb	5	2	*na*	485	21.2	4.37	*na*
W	ppb	10	2	*na*	<10	*na*	*na*	*na*
Y	ppb	0.2	2	*na*	3,230	21.2	0.658	*na*
Yb	ppb	0.1	2	*na*	219	1.41	0.646	*na*
Zn	ppb	20	2	*na*	116	5.66	4.88	*na*
Zr	ppb	0.4	2	*na*	836	0	0	*na*

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

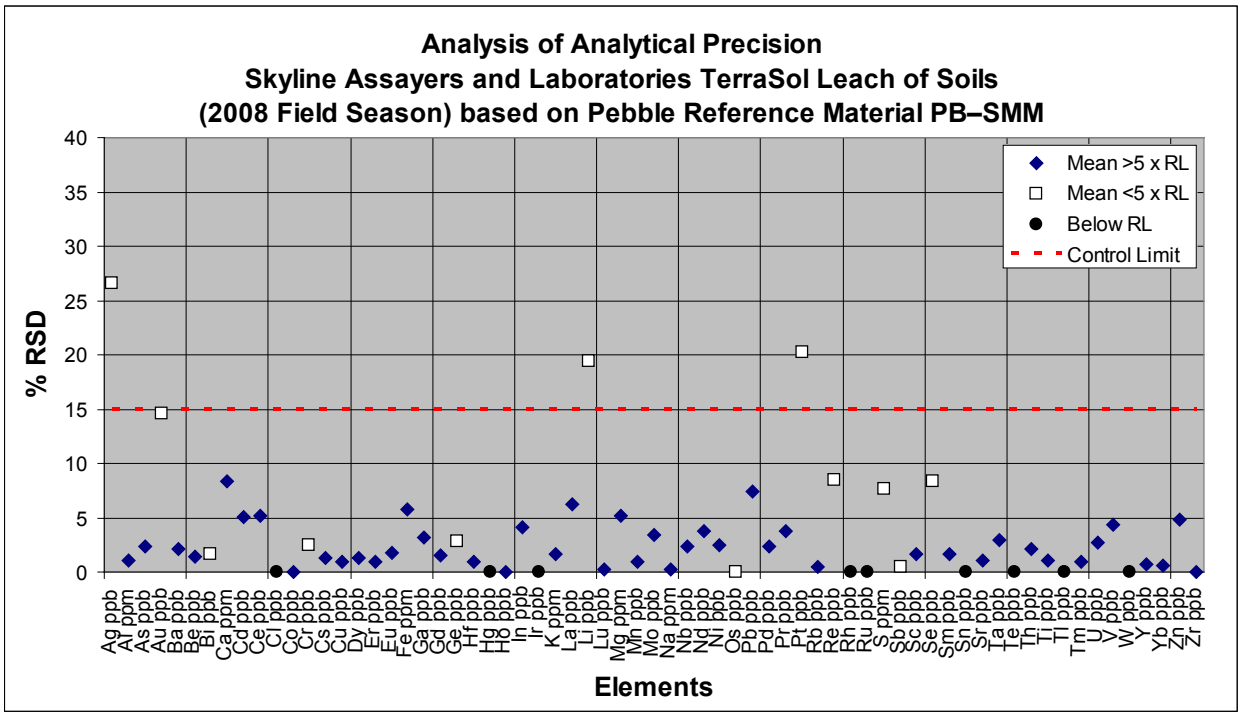

Figure 6-8. Precision plot for two analyses of Pebble reference material PB–SMM by TerraSol Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-7. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	3	*na*	<20	*na*	*na*	*na*
Al	ppm	0.5	3	*na*	1,200	37.9	3.16	*na*
As	ppb	5	3	*na*	46.8	6.06	12.9	*na*
Au	ppb	0.1	3	*na*	<0.1	*na*	*na*	*na*
Ba	ppb	10	3	*na*	2,230	5.77	0.259	*na*
Be	ppb	0.5	3	*na*	34.4	4.26	12.4	*na*
Bi	ppb	0.5	3	*na*	1.59	0.234	14.7	*na*
Ca	ppm	0.5	3	*na*	165	20.8	12.6	*na*
Cd	ppb	0.5	3	*na*	22.3	0.379	1.70	*na*
Ce	ppb	0.5	3	*na*	960	42.2	4.39	*na*
Cl	ppb	20,000	3	*na*	<20,000	*na*	*na*	*na*
Co	ppb	0.5	3	*na*	284	7.57	2.66	*na*
Cr	ppb	40	3	*na*	63.9	9.85	15.4	*na*
Cs	ppb	0.1	3	*na*	32.7	0.404	1.24	*na*
Cu	ppb	5	3	*na*	3,150	802	25.5	*na*
Dy	ppb	0.1	3	*na*	134	6.35	4.75	*na*
Er	ppb	0.06	3	*na*	67.1	4.55	6.78	*na*
Eu	ppb	0.05	3	*na*	35.2	0.945	2.68	*na*
Fe	ppm	1	3	*na*	547	66.1	12.1	*na*
Ga	ppm	0.5	3	*na*	107	5.51	5.16	*na*
Gd	ppb	0.7	3	*na*	147	2.31	1.57	*na*
Ge	ppb	1	3	*na*	1.82	0.0635	3.50	*na*
Hf	ppb	0.1	3	*na*	18.1	1.92	10.6	*na*
Hg	ppb	0.1	3	*na*	0.189	0.170	89.9	*na*
Ho	ppb	0.02	3	*na*	25.1	1.68	6.69	*na*
In	ppb	0.2	3	*na*	2.12	0.296	14.0	*na*
Ir	ppb	10	3	*na*	<10	*na*	*na*	*na*
K	ppm	5	3	*na*	58.0	5.64	9.71	*na*
La	ppb	1	3	*na*	393	25.9	6.58	*na*
Li	ppb	2	3	*na*	8.39	0.122	1.46	*na*
Lu	ppb	0.1	3	*na*	6.47	0.467	7.22	*na*
Mg	ppm	2	3	*na*	52.2	5.03	9.63	*na*
Mn	ppb	5	3	*na*	13,900	513	3.68	*na*
Mo	ppb	1	3	*na*	15.3	0.656	4.29	*na*
Na	ppm	5	3	*na*	24.3	1.10	4.51	*na*
Nb	ppb	0.4	3	*na*	11.8	1.49	12.7	*na*
Nd	ppb	0.2	3	*na*	563	11.7	2.08	*na*
Ni	ppb	10	3	*na*	196	17.6	8.97	*na*
Os	ppb	0.1	3	*na*	<0.1	*na*	*na*	*na*
Pb	ppb	5	3	*na*	123	2.08	1.69	*na*
Pd	ppb	1	3	*na*	4.74	0.920	19.4	*na*
Pr	ppb	0.2	3	*na*	131	1.53	1.17	*na*
Pt	ppb	0.1	3	*na*	0.174	0.0208	12.0	*na*
Rb	ppb	0.5	3	*na*	346	9.81	2.84	*na*
Re	ppb	0.05	3	*na*	0.126	0.00723	5.73	*na*
Rh	ppb	5	3	*na*	<5	*na*	*na*	*na*
Ru	ppb	0.2	3	*na*	<0.2	*na*	*na*	*na*
S	ppm	10	3	*na*	27.6	4.89	17.7	*na*
Sb	ppb	1	3	*na*	2.70	0.430	16.0	*na*
Sc	ppb	50	3	*na*	214	26.5	12.4	*na*
Se	ppb	20	3	*na*	39.4	9.85	25.0	*na*
Sm	ppb	0.1	3	*na*	137	0.577	0.422	*na*
Sn	ppb	10	3	*na*	<10	*na*	*na*	*na*
Sr	ppb	1	3	*na*	1,060	62.0	5.82	*na*
Ta	ppb	0.1	3	*na*	0.644	0.0902	14.0	*na*

Table 6-7. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by a TerraSol Leach of soil samples at Skyline Labs (2008 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Te	ppb	10	3	*na*	<10	*na*	*na*	*na*
Th	ppb	0.05	3	*na*	62.7	6.61	10.5	*na*
Ti	ppb	20	3	*na*	4,370	484	11.1	*na*
Tl	ppb	0.5	3	*na*	<0.5	*na*	*na*	*na*
Tm	ppb	0.05	3	*na*	8.49	0.600	7.08	*na*
U	ppb	0.05	3	*na*	70.7	6.39	9.04	*na*
V	ppb	5	3	*na*	161	15.8	9.85	*na*
W	ppb	10	3	*na*	<10	*na*	*na*	*na*
Y	ppb	0.2	3	*na*	651	34.6	5.32	*na*
Yb	ppb	0.1	3	*na*	50.5	3.85	7.62	*na*
Zn	ppb	20	3	*na*	581	71.5	12.3	*na*
Zr	ppb	0.4	3	*na*	543	58.7	10.8	*na*

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

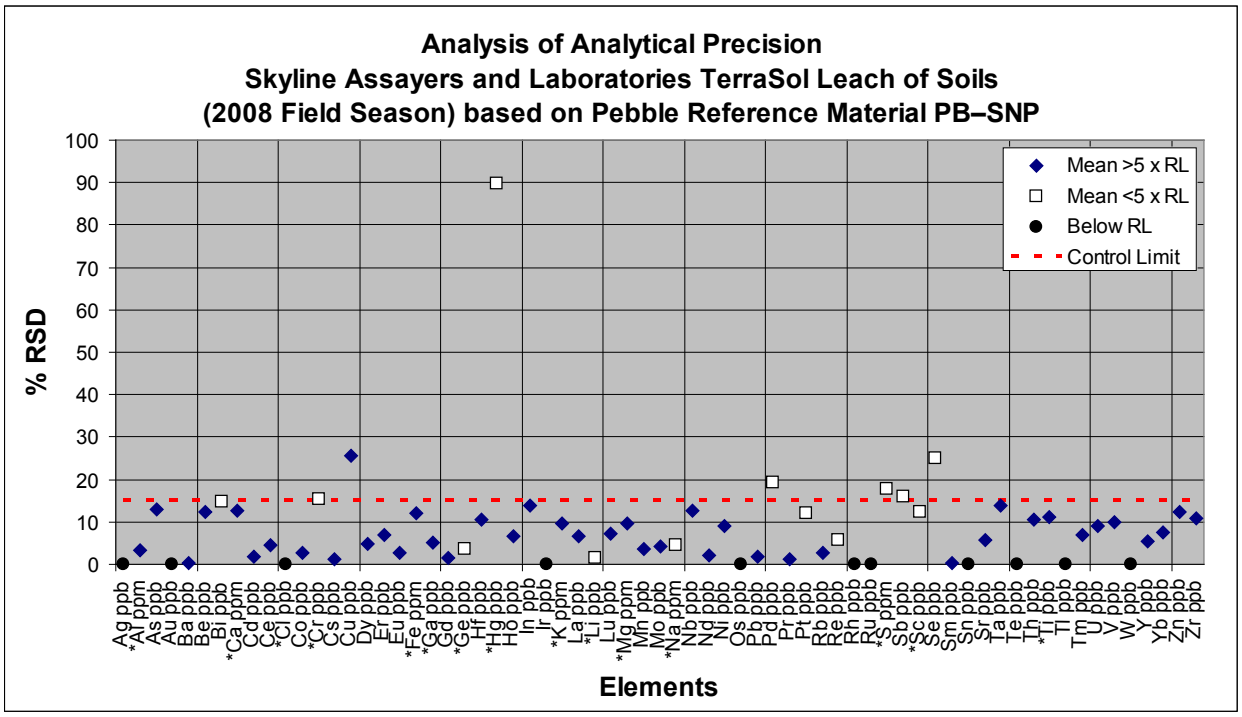

Figure 6-9. Precision plot for three analyses of Pebble reference material PB–SNP by TerraSol Leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-8. Summary statistics for assessing analytical variation on duplicate samples; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	20	4	<20	<20	<20	*na*	*na*
Al	ppm	0.5	4	766	1,700	1,160	63.4	5.45
As	ppb	5	4	13.4	19.8	16.5	0.885	5.37
Au	ppb	0.1	4	<0.1	<0.1	<0.1	*na*	*na*
Ba	ppb	10	4	335	13,700	6,000	111	1.84
Be	ppb	0.5	4	11.2	36.0	17.8	2.12	11.9
Bi	ppb	0.5	4	<0.5	<0.5	<0.5	*na*	*na*
Ca	ppb	0.5	4	6.55	25.0	16.2	1.48	9.10
Cd	ppm	0.5	4	2.18	3.88	2.99	0.350	11.7
Ce	ppb	0.5	4	204	2,510	976	68.2	6.98
Cl	ppb	20,000	4	<20,000	<20,000	<20,000	*na*	*na*
Co	ppb	0.5	4	4.40	17.2	9.26	0.288	3.11
Cr	ppb	40	4	<40	<40	<40	*na*	*na*
Cs	ppb	0.1	4	33.5	52.1	41.3	0.896	2.17
Cu	ppb	5	4	90.5	173	127	2.17	1.72
Dy	ppb	0.1	4	30.6	187	82.4	1.15	1.39
Er	ppb	0.06	4	15.0	75.8	34.9	0.477	1.37
Eu	ppb	0.05	4	8.66	58.2	25.5	0.728	2.86
Fe	ppb	1	4	13.9	201	95.6	7.79	8.15
Ga	ppm	0.5	4	11.0	37.4	24.0	0.813	3.39
Gd	ppb	0.7	4	30.9	268	109	3.57	3.28
Ge	ppb	1	4	<1	2.96	1.48	0.0875	5.90
Hf	ppb	0.1	4	3.95	7.40	5.45	0.520	9.54
Hg	ppb	0.1	4	<0.1	0.393	0.129	0.107	82.8
Ho	ppb	0.02	4	5.69	30.7	14.0	0.129	0.923
In	ppb	0.2	4	0.209	1.36	0.720	0.0485	6.74
Ir	ppb	10	4	<10	<10	<10	*na*	*na*
K	ppb	5	4	8.43	25.4	16.3	0.358	2.19
La	ppm	1	4	73.2	1,220	427	47.2	11.1
Li	ppb	2	4	<2	6.02	3.83	0.266	6.95
Lu	ppb	0.1	4	1.06	5.63	2.60	0.188	7.24
Mg	ppb	2	4	<2	3.70	2.28	0.0141	0.621
Mn	ppm	5	4	97.0	601	287	12.2	4.26
Mo	ppb	1	4	1.28	2.40	1.92	0.0692	3.61
Na	ppb	5	4	6.84	19.2	12.1	1.02	8.41
Nb	ppm	0.4	4	1.97	5.26	3.74	0.265	7.10
Nd	ppb	0.2	4	123	1,310	508	26.7	5.25
Ni	ppb	10	4	19.9	51.2	32.3	2.45	7.61
Os	ppb	0.1	4	<0.1	<0.1	<0.1	*na*	*na*
Pb	ppb	5	4	37.2	191	98.6	6.17	6.25
Pd	ppb	1	4	<1	1.58	1.21	0.110	9.10
Pr	ppb	0.2	4	28.3	327	125	8.21	6.58
Pt	ppb	0.1	4	<0.1	<0.1	<0.1	*na*	*na*
Rb	ppb	0.5	4	187	435	282	11.0	3.89
Re	ppb	0.05	4	<0.05	<0.05	<0.05	*na*	*na*
Rh	ppb	5	4	<5	<5	<5	*na*	*na*
Ru	ppb	0.2	4	<0.2	<0.2	<0.2	*na*	*na*
S	ppm	10	4	<10	<10	<10	*na*	*na*
Sb	ppb	1	4	1.12	2.56	1.63	0.0847	5.19
Sc	ppb	50	4	55.5	138	83.7	7.82	9.34
Se	ppb	20	4	<20	35.7	23.0	0.180	0.784
Sm	ppb	0.1	4	30.4	273	111	4.35	3.94
Sn	ppb	10	4	<10	<10	<10	*na*	*na*
Sr	ppb	1	4	61.0	749	352	9.06	2.58

Table 6-8. Summary statistics for assessing analytical variation on duplicate samples; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ta	ppb	0.1	4	0.184	0.342	0.258	0.0259	10.1
Te	ppb	10	4	<10	<10	<10	*na*	*na*
Th	ppb	0.05	4	12.9	28.5	17.8	1.74	9.74
Ti	ppb	20	4	1,060	2,220	1,730	81.4	4.70
Tl	ppb	0.5	4	<0.5	<0.5	<0.5	*na*	*na*
Tm	ppb	0.05	4	1.93	8.92	4.20	0.133	3.18
U	ppb	0.05	4	3.86	8.98	6.01	0.403	6.71
V	ppb	5	4	23.9	35.5	30.5	2.01	6.57
W	ppb	10	4	<10	<10	<10	*na*	*na*
Y	ppb	0.2	4	156	907	399	9.31	2.33
Yb	ppb	0.1	4	11.7	49.2	23.7	0.605	2.55
Zn	ppb	20	4	<20	66.3	40.5	1.82	4.50
Zr	ppb	0.4	4	120	196	154	11.8	7.64

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

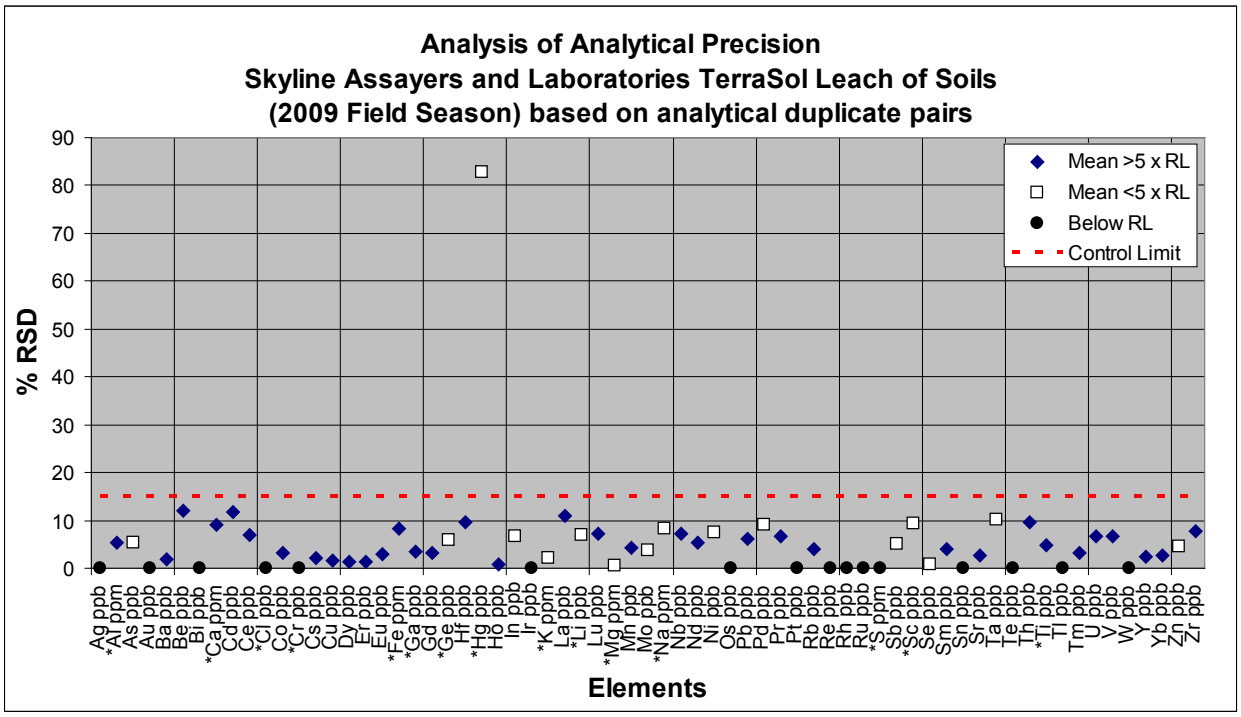

Figure 6-10. Precision plot for four analytical duplicate sample pairs by TerraSol Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-9. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	3	37.0	33.8	0.850	2.52	91.3
Al	ppm	0.5	3	1,270	1,250	36.1	2.88	98.4
As	ppb	5	3	328	346	4.58	1.32	105
Au	ppb	0.1	3	2.90	2.87	0.135	4.71	99.0
Ba	ppb	10	3	18,200	22,000	300	1.36	121
Be	ppb	0.5	3	181	149	7.02	4.72	82.1
Bi	ppb	0.5	3	14.3	11.5	0.153	1.33	80.2
Ca	ppb	0.5	3	2,020	3,370	36.1	1.07	167
Cd	ppm	0.5	3	34.7	31.7	0.808	2.55	91.5
Ce	ppb	0.5	3	4,390	4,510	131	2.89	103
Cl	ppb	20,000	3	*na*	<20,000	*na*	*na*	*na*
Co	ppb	0.5	3	1,680	1,520	20.0	1.32	90.5
Cr	ppb	40	3	976	917	24.3	2.65	94.0
Cs	ppb	0.1	3	18.4	17.7	0.289	1.63	96.4
Cu	ppb	5	3	1,430	1,240	15.3	1.24	86.5
Dy	ppb	0.1	3	482	426	2.08	0.488	88.5
Er	ppb	0.06	3	280	238	2.08	0.876	84.9
Eu	ppb	0.05	3	132	117	1.00	0.855	88.6
Fe	ppb	1	3	867	888	22.3	2.52	102
Ga	ppm	0.5	3	200	191	4.73	2.47	95.7
Gd	ppb	0.7	3	561	490	3.79	0.773	87.3
Ge	ppb	1	3	12.0	13.0	0.751	5.79	108
Hf	ppb	0.1	3	71.6	62.4	1.46	2.34	87.1
Hg	ppb	0.1	3	5.40	4.40	0.735	16.7	81.4
Ho	ppb	0.02	3	95.7	83.3	0.551	0.661	87.0
In	ppb	0.2	3	1.90	1.56	0.0306	1.95	82.3
Ir	ppb	10	3	*na*	<10	*na*	*na*	*na*
K	ppb	5	3	162	256	3.61	1.41	158
La	ppm	1	3	1,480	1,320	10.0	0.758	89.2
Li	ppb	2	3	515	476	19.1	4.01	92.4
Lu	ppb	0.1	3	35.5	31.0	0.252	0.813	87.2
Mg	ppb	2	3	171	196	11.6	5.90	115
Mn	ppm	5	3	161,000	171,000	4,580	2.68	106
Mo	ppb	1	3	308	310	3.00	0.968	101
Na	ppb	5	3	28.0	34.5	2.17	6.28	123
Nb	ppm	0.4	3	54.9	49.5	0.300	0.606	90.2
Nd	ppb	0.2	3	2,540	2,270	28.9	1.27	89.5
Ni	ppb	10	3	706	632	16.9	2.68	89.5
Os	ppb	0.1	3	*na*	<0.1	*na*	*na*	*na*
Pb	ppb	5	3	490	414	5.51	1.33	84.6
Pd	ppb	1	3	26.0	21.6	0.819	3.79	83.1
Pr	ppb	0.2	3	592	513	6.08	1.19	86.7
Pt	ppb	0.1	3	1.20	0.684	0.122	17.8	57.0
Rb	ppb	0.5	3	328	342	2.52	0.737	104
Re	ppb	0.05	3	0.220	0.230	0.0187	8.12	105
Rh	ppb	5	3	*na*	<5	*na*	*na*	*na*
Ru	ppb	0.2	3	0.300	0.401	0.134	33.3	134
S	ppm	10	3	53.0	50.7	8.08	15.9	95.6
Sb	ppb	1	3	58.0	61.5	0.624	1.02	106
Sc	ppb	50	3	1,000	805	37.4	4.64	80.5
Se	ppb	20	3	96.0	105	5.87	5.57	110
Sm	ppb	0.1	3	576	509	5.13	1.01	88.3
Sn	ppb	10	3	*na*	<10	*na*	*na*	*na*
Sr	ppb	1	3	16,500	19,900	436	2.19	121
Ta	ppb	0.1	3	1.50	1.30	0.0611	4.69	86.9

Table 6-9. Summary statistics for assessing analytical variation on the standard reference material QAlqt; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Te	ppb	10	3	*na*	<10	*na*	*na*	*na*
Th	ppb	0.05	3	977	868	7.57	0.873	88.8
Ti	ppb	20	3	5,340	4,690	85.0	1.81	87.8
Tl	ppb	0.5	3	*na*	<0.5	*na*	*na*	*na*
Tm	ppb	0.05	3	38.9	32.9	0.351	1.07	84.5
U	ppb	0.05	3	231	203	2.65	1.30	87.9
V	ppb	5	3	1,510	1,360	30.6	2.25	89.8
W	ppb	10	3	658	590	5.51	0.933	89.7
Y	ppb	0.2	3	2,670	2,380	25.2	1.06	89.0
Yb	ppb	0.1	3	256	222	2.52	1.13	86.8
Zn	ppb	20	3	784	711	15.2	2.13	90.7
Zr	ppb	0.4	3	2,330	2,130	15.3	0.716	91.6

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

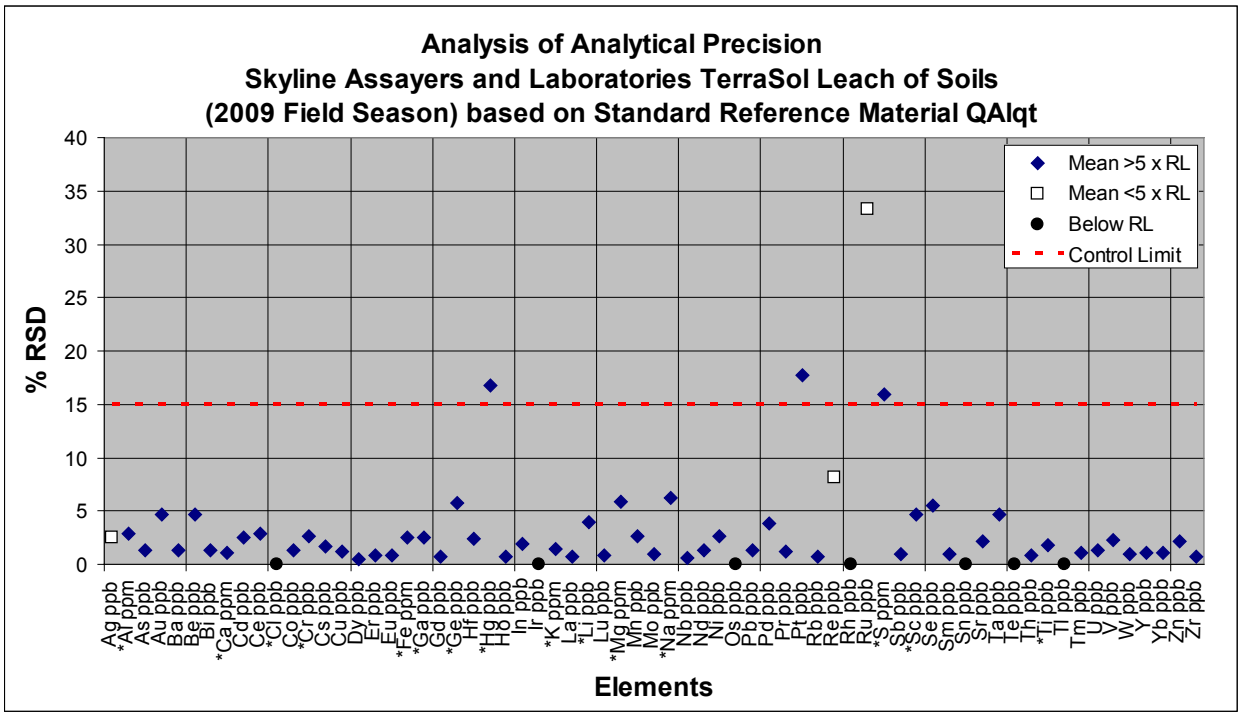

Figure 6-11. Precision plot for three analyses of standard reference material QAlqt by TerraSol Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

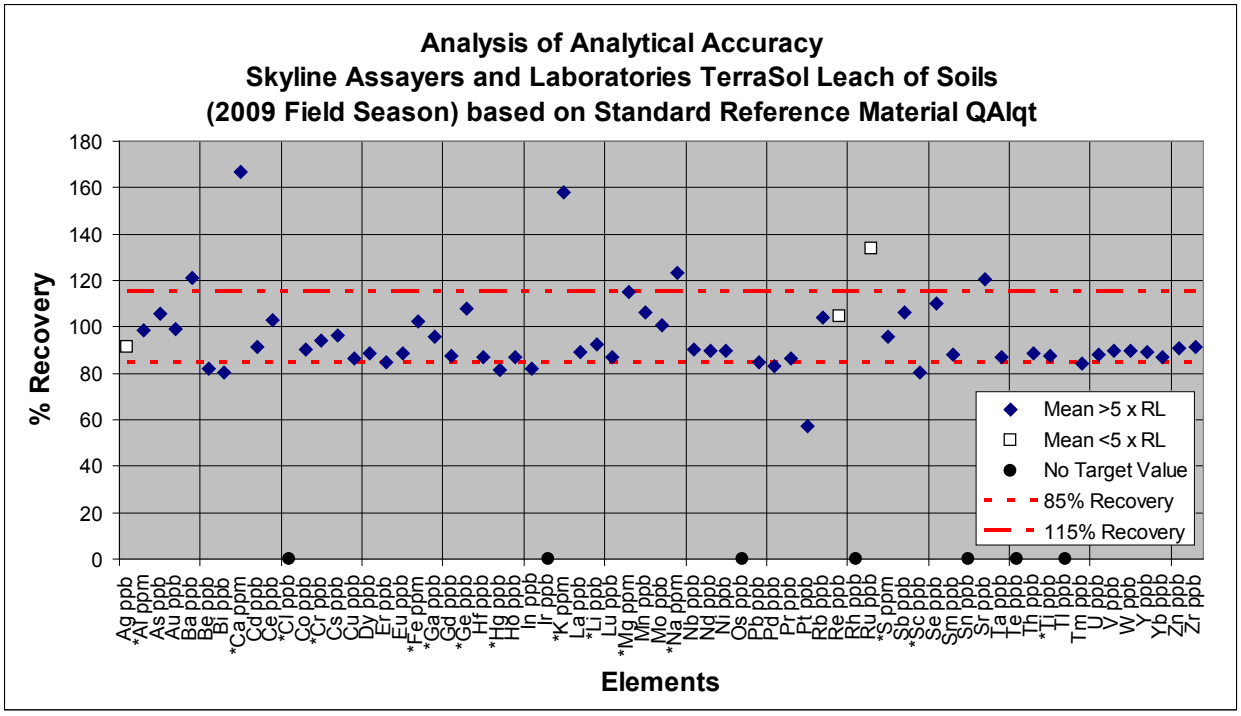

Figure 6-12. Accuracy plot for three analyses of standard reference material QAlqt by TerraSol Leach (2009 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-10. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	3	*na*	20.4	0.458	2.25	*na*
Al	ppm	0.5	3	68.0	78.4	1.87	2.38	115
As	ppb	5	3	72.0	75.2	2.93	3.89	104
Au	ppb	0.1	3	0.300	0.360	0.0273	7.58	120
Ba	ppb	10	3	7,060	8,690	70.2	0.809	123
Be	ppb	0.5	3	43.0	42.3	2.11	4.98	98.4
Bi	ppb	0.5	3	2.90	2.84	0.0404	1.42	98.0
Ca	ppb	0.5	3	814	929	71.4	7.69	114
Cd	ppm	0.5	3	15.7	16.0	0.513	3.20	102
Ce	ppb	0.5	3	2,980	3,820	95.0	2.49	128
Cl	ppb	20,000	3	*na*	<20,000	*na*	*na*	*na*
Co	ppb	0.5	3	711	727	19.9	2.73	102
Cr	ppb	40	3	56.0	57.6	5.97	10.4	103
Cs	ppb	0.1	3	9.20	9.54	0.181	1.90	104
Cu	ppb	5	3	345	349	6.43	1.84	101
Dy	ppb	0.1	3	363	374	3.51	0.938	103
Er	ppb	0.06	3	200	202	1.53	0.757	101
Eu	ppb	0.05	3	103	106	1.53	1.45	103
Fe	ppb	1	3	44.0	46.3	1.74	3.76	105
Ga	ppm	0.5	3	34.0	38.4	2.31	6.01	113
Gd	ppb	0.7	3	465	472	4.16	0.881	102
Ge	ppb	1	3	8.00	9.14	0.437	4.77	114

Table 6-10. Summary statistics for assessing analytical variation on the standard reference material QRd; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Hf	ppb	0.1	3	12.8	12.4	0.529	4.27	96.9
Hg	ppb	0.1	3	4.80	25.7	0.961	3.74	535
Ho	ppb	0.02	3	70.6	72.1	0.643	0.892	102
In	ppb	0.2	3	0.300	0.251	0.0160	6.38	83.8
Ir	ppb	10	3	*na*	<10	*na*	*na*	*na*
K	ppb	5	3	130	177	5.03	2.85	136
La	ppm	1	3	1,460	1,570	20.8	1.33	107
Li	ppb	2	3	96.0	97.3	4.70	4.83	101
Lu	ppb	0.1	3	22.3	22.3	0.306	1.37	99.9
Mg	ppb	2	3	142	165	7.37	4.46	116
Mn	ppm	5	3	52,700	62,500	1,580	2.53	119
Mo	ppb	1	3	84.0	86.7	1.96	2.25	103
Na	ppb	5	3	10.0	9.66	0.435	4.50	96.6
Nb	ppm	0.4	3	2.9	2.95	0.0800	2.71	102
Nd	ppb	0.2	3	2,180	2,270	25.2	1.11	104
Ni	ppb	10	3	351	359	16.2	4.50	102
Os	ppb	0.1	3	*na*	<0.01	*na*	*na*	*na*
Pb	ppb	5	3	148	154	1.53	0.990	104
Pd	ppb	1	3	4.00	3.51	0.226	6.44	87.8
Pr	ppb	0.2	3	512	532	5.03	0.947	104
Pt	ppb	0.1	3	*na*	<0.01	*na*	*na*	*na*
Rb	ppb	0.5	3	232	238	3.00	1.26	103
Re	ppb	0.05	3	*na*	<0.05	*na*	*na*	*na*
Rh	ppb	5	3	*na*	<5	*na*	*na*	*na*
Ru	ppb	0.2	3	0.200	0.288	0.0699	24.3	144
S	ppm	10	3	*na*	<10	*na*	*na*	*na*
Sb	ppb	1	3	7.00	7.63	0.207	2.71	109
Sc	ppb	50	3	136	143	8.89	6.22	105
Se	ppb	20	3	52.0	58.6	5.61	9.57	113
Sm	ppb	0.1	3	467	479	4.04	0.843	103
Sn	ppb	10	3	*na*	<10	*na*	*na*	*na*
Sr	ppb	1	3	5,460	7,030	92.9	1.32	129
Ta	ppb	0.1	3	0.500	0.491	0.0343	6.97	98.3
Te	ppb	10	3	*na*	<10	*na*	*na*	*na*
Th	ppb	0.05	3	187	194	2.08	1.07	104
Ti	ppb	20	3	596	612	19.3	3.15	103
Tl	ppb	0.5	3	*na*	<0.5	*na*	*na*	*na*
Tm	ppb	0.05	3	26.2	26.0	0.100	0.385	99.2
U	ppb	0.05	3	70.2	70.1	1.27	1.81	99.8
V	ppb	5	3	203	210	4.73	2.25	104
W	ppb	10	3	121	128	1.53	1.19	106
Y	ppb	0.2	3	2,090	2,190	20.0	0.913	105
Yb	ppb	0.1	3	160	161	2.52	1.57	100
Zn	ppb	20	3	418	449	7.09	1.58	107
Zr	ppb	0.4	3	316	330	5.69	1.72	105

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

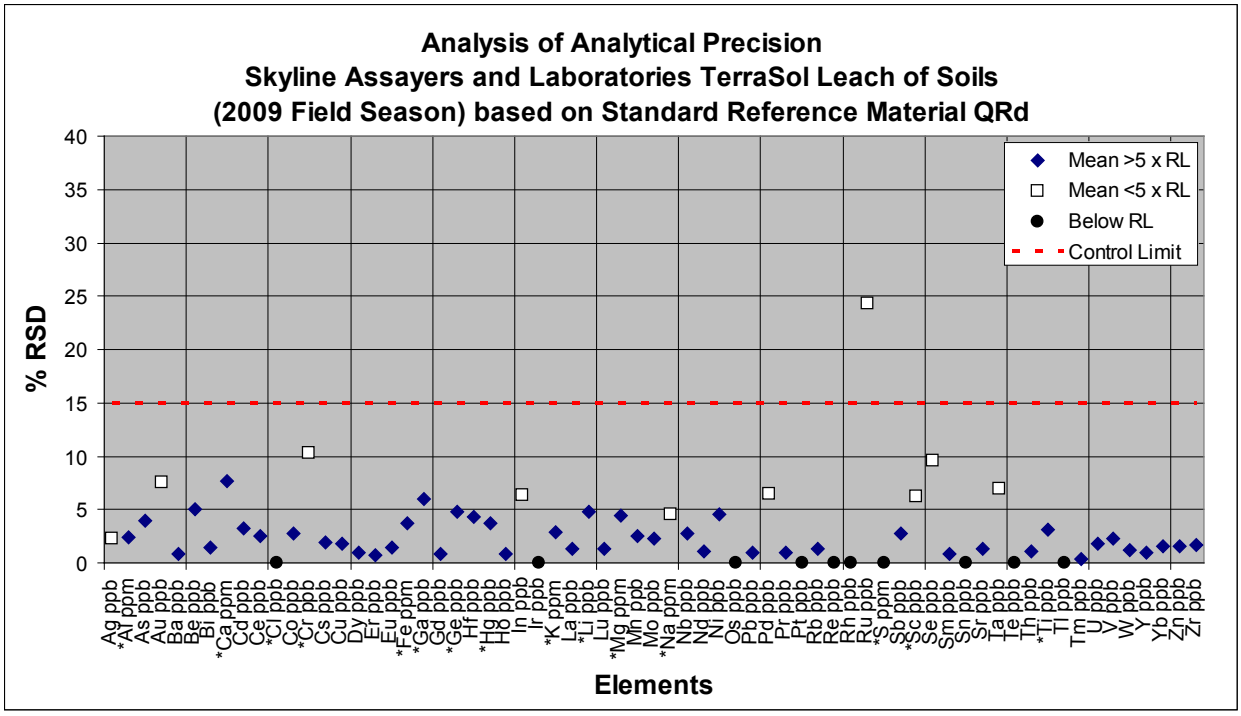

Figure 6-13. Precision plot for three analyses of standard reference material QRd by TerraSol Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

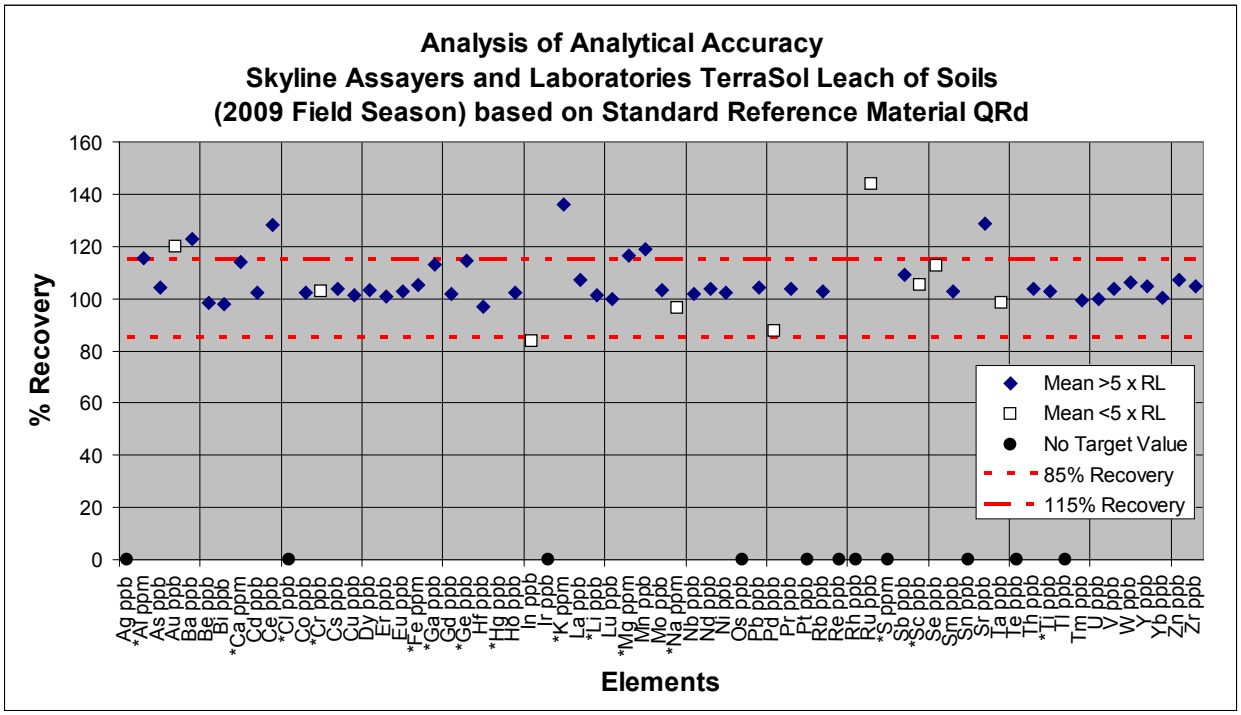

Figure 6-14. Accuracy plot for three analyses of standard reference material QRd by TerraSol Leach (2009 field season). %Recovery is percent recovery; RL is reporting limit. The percent Recovery for Hg (not shown above) is 535%. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-11. Summary statistics for assessing analytical variation on the standard reference material QMthd60; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	3	*na*	<20	*na*	*na*	*na*
Al	ppm	0.5	3	97.0	104	2.08	2.01	107
As	ppb	5	3	273	295	12.5	4.23	108
Au	ppb	0.1	3	0.100	0.148	0.0259	17.5	148
Ba	ppb	10	3	17,700	17,700	306	1.72	100
Be	ppb	0.5	3	2.70	2.59	0.420	16.2	95.8
Bi	ppb	0.5	3	*na*	<0.5	*na*	*na*	*na*
Ca	ppb	0.5	3	5,590	5,590	68.1	1.22	100
Cd	ppm	0.5	3	18.2	18.6	1.97	10.6	102
Ce	ppb	0.5	3	1,080	997	97.5	9.78	92.3
Cl	ppb	20,000	3	36,200	23,000	8,480	36.9	63.6
Co	ppb	0.5	3	106	109	1.53	1.41	103
Cr	ppb	40	3	*na*	<40	*na*	*na*	*na*
Cs	ppb	0.1	3	23.4	22.1	0.611	2.76	94.6
Cu	ppb	5	3	139	155	6.08	3.92	112
Dy	ppb	0.1	3	157	145	13.5	9.29	92.6
Er	ppb	0.06	3	93.5	83.5	7.67	9.19	89.3
Eu	ppb	0.05	3	41.3	37.6	3.80	10.1	91.1
Fe	ppb	1	3	68.0	68.0	3.75	5.52	100
Ga	ppm	0.5	3	25.0	23.1	1.89	8.16	92.5
Gd	ppb	0.7	3	205	183	17.5	9.57	89.3
Ge	ppb	1	3	2.00	2.26	0.136	6.01	113
Hf	ppb	0.1	3	6.60	6.86	0.476	6.94	104
Hg	ppb	0.1	3	0.800	0.914	0.544	59.5	114
Ho	ppb	0.02	3	32.1	29.5	2.65	8.99	91.9
In	ppb	0.2	3	*na*	<0.2	*na*	*na*	*na*
Ir	ppb	10	3	*na*	<10	*na*	*na*	*na*
K	ppb	5	3	571	663	19.0	2.87	116
La	ppm	1	3	584	550	47.1	8.57	94.2
Li	ppb	2	3	70.0	66.6	1.53	2.29	95.2
Lu	ppb	0.1	3	12.0	11.4	1.05	9.24	95.0
Mg	ppb	2	3	569	604	13.5	2.24	106
Mn	ppm	5	3	22,100	22,800	1,850	8.09	103
Mo	ppb	1	3	28.0	29.3	0.666	2.28	105
Na	ppb	5	3	192	191	7.37	3.87	99.3
Nb	ppm	0.4	3	2.7	2.84	0.111	3.92	105
Nd	ppb	0.2	3	866	813	70.0	8.62	93.8
Ni	ppb	10	3	270	255	12.6	4.94	94.3
Os	ppb	0.1	3	*na*	<0.1	*na*	*na*	*na*
Pb	ppb	5	3	*na*	<5	*na*	*na*	*na*
Pd	ppb	1	3	4.00	3.53	0.206	5.82	88.3
Pr	ppb	0.2	3	193	176	14.5	8.22	91.4
Pt	ppb	0.1	3	*na*	<0.1	*na*	*na*	*na*
Rb	ppb	0.5	3	717	682	9.85	1.44	95.1
Re	ppb	0.05	3	0.120	0.100	0.00900	9.00	83.3
Rh	ppb	5	3	*na*	<5	*na*	*na*	*na*
Ru	ppb	0.2	3	*na*	<0.2	*na*	*na*	*na*
S	ppm	10	3	73.0	51.9	4.50	8.67	71.1
Sb	ppb	1	3	59.0	58.7	2.45	4.17	99.5
Sc	ppb	50	3	74.0	70.0	3.30	4.72	94.5
Se	ppb	20	3	44.0	46.1	2.39	5.18	105
Sm	ppb	0.1	3	198	180	17.0	9.47	90.7
Sn	ppb	10	3	*na*	<10	*na*	*na*	*na*
Sr	ppb	1	3	20,200	20,100	153	0.761	99.3
Ta	ppb	0.1	3	0.300	0.259	0.0159	6.15	86.4

Table 6-11. Summary statistics for assessing analytical variation on the standard reference material QMthd60; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Te	ppb	10	3	*na*	<10	*na*	*na*	*na*
Th	ppb	0.05	3	83.7	86.9	1.76	2.03	104
Ti	ppb	20	3	180	170	13.9	8.17	94.4
Tl	ppb	0.5	3	*na*	<0.5	*na*	*na*	*na*
Tm	ppb	0.05	3	12.4	11.3	1.00	8.89	90.9
U	ppb	0.05	3	66.2	63.2	3.43	5.42	95.5
V	ppb	5	3	120	120	1.00	0.833	100
W	ppb	10	3	29.0	29.3	1.78	6.06	101
Y	ppb	0.2	3	992	911	80.5	8.84	91.8
Yb	ppb	0.1	3	79.2	72.1	6.46	8.96	91.1
Zn	ppb	20	3	43.0	42.9	12.1	28.3	99.8
Zr	ppb	0.4	3	308	290	24.0	8.28	94.2

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

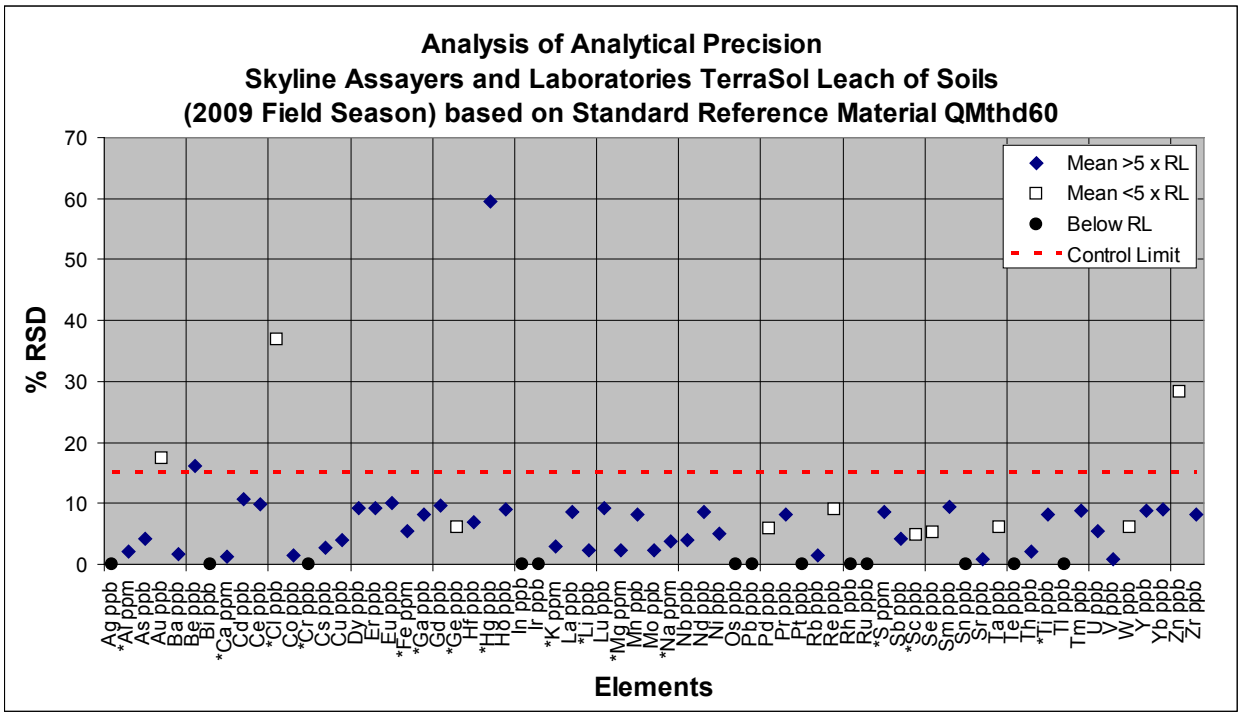

Figure 6-15. Precision plot for three analyses of standard reference material QMthd60 by TerraSol Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

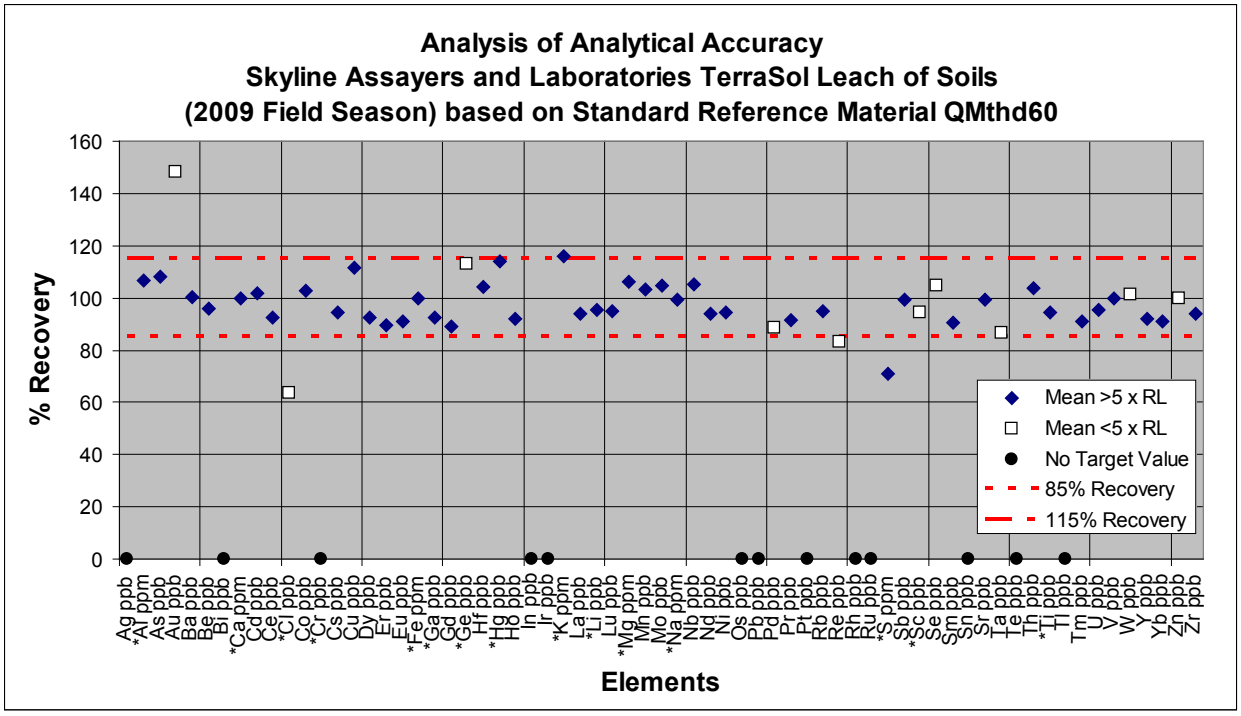

Figure 6-16. Accuracy plot for three analyses of standard reference material QMthd60 by TerraSol Leach (2009 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-12. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	2	22.3	57.2	0.495	0.866	256
Al	ppm	0.5	2	828	998	17.0	1.70	121
As	ppb	5	2	44.5	42.9	0.141	0.330	96.4
Au	ppb	0.1	2	0.102	0.123	0.0120	9.81	120
Ba	ppb	10	2	10,300	18,700	424	2.27	182
Be	ppb	0.5	2	78.4	72.8	0.636	0.875	92.8
Bi	ppb	0.5	2	1.01	0.999	0.0438	4.39	98.9
Ca	ppb	0.5	2	559	690	35.4	5.12	123
Cd	ppm	0.5	2	20.9	17.5	1.06	6.08	83.5
Ce	ppb	0.5	2	3,550	3,960	21.2	0.536	111
Cl	ppb	20,000	2	*na*	<20,000	*na*	*na*	*na*
Co	ppb	0.5	2	105	122	2.12	1.75	116
Cr	ppb	40	2	65.1	43.6	1.06	2.44	66.9
Cs	ppb	0.1	2	49.9	57.1	0.424	0.743	114
Cu	ppb	5	2	8,820	9,100	163	1.79	103
Dy	ppb	0.1	2	532	544	4.95	0.911	102
Er	ppb	0.06	2	283	287	0.707	0.247	101
Eu	ppb	0.05	2	162	162	0.707	0.438	99.7
Fe	ppb	1	2	268	252	1.41	0.561	94.0
Ga	ppm	0.5	2	75.2	77.1	2.12	2.75	103
Gd	ppb	0.7	2	650	646	0.707	0.110	99.3
Ge	ppb	1	2	4.78	5.47	0.0849	1.55	114

Table 6-12. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Hf	ppb	0.1	2	30.1	27.9	0.495	1.78	92.5
Hg	ppb	0.1	2	*na*	1.68	0.530	31.7	*na*
Ho	ppb	0.02	2	104	106	0.707	0.670	101
In	ppb	0.2	2	1.70	1.39	0.0636	4.59	81.5
Ir	ppb	10	2	*na*	<10	*na*	*na*	*na*
K	ppb	5	2	29.4	51.3	1.34	2.62	174
La	ppm	1	2	1,800	1,920	35.4	1.85	106
Li	ppb	2	2	3.46	6.33	0.0424	0.670	183
Lu	ppb	0.1	2	30.1	30.4	0.283	0.930	101
Mg	ppb	2	2	110	142	4.24	2.99	129
Mn	ppm	5	2	14,500	18,900	495	2.63	130
Mo	ppb	1	2	35.1	28.2	2.47	8.79	80.2
Na	ppb	5	2	30.8	40.0	0.212	0.531	130
Nb	ppm	0.4	2	6.95	6.07	0.205	3.38	87.3
Nd	ppb	0.2	2	2,590	2,640	35.4	1.34	102
Ni	ppb	10	2	171	176	2.12	1.21	103
Os	ppb	0.1	2	*na*	<0.1	*na*	*na*	*na*
Pb	ppb	5	2	89.2	82.2	8.27	10.1	92.1
Pd	ppb	1	2	7.68	6.93	0.0990	1.43	90.2
Pr	ppb	0.2	2	605	598	3.54	0.592	98.8
Pt	ppb	0.1	2	0.234	0.108	0.0233	21.6	46.0
Rb	ppb	0.5	2	479	574	7.07	1.23	120
Re	ppb	0.05	2	0.100	0.134	0.00283	2.11	134
Rh	ppb	5	2	*na*	<5	*na*	*na*	*na*
Ru	ppb	0.2	2	*na*	<0.2	*na*	*na*	*na*
S	ppm	10	2	32.2	36.9	10.2	27.6	115
Sb	ppb	1	2	3.06	2.77	0.0495	1.79	90.4
Sc	ppb	50	2	587	569	9.90	1.74	96.9
Se	ppb	20	2	63.6	66.9	10.7	16.1	105
Sm	ppb	0.1	2	602	599	4.95	0.827	99.4
Sn	ppb	10	2	*na*	<10	*na*	*na*	*na*
Sr	ppb	1	2	4,820	7,830	141	1.81	162
Ta	ppb	0.1	2	0.747	0.642	0.0502	7.83	85.9
Te	ppb	10	2	*na*	<10	*na*	*na*	*na*
Th	ppb	0.05	2	85.7	81.0	2.12	2.62	94.5
Ti	ppb	20	2	2,080	1,870	77.8	4.17	89.7
Tl	ppb	0.5	2	*na*	<0.5	*na*	*na*	*na*
Tm	ppb	0.05	2	35.6	35.7	0.354	0.992	100
U	ppb	0.05	2	209	215	4.95	2.31	103
V	ppb	5	2	485	464	27.6	5.95	95.6
W	ppb	10	2	*na*	<10	*na*	*na*	*na*
Y	ppb	0.2	2	3,230	3,310	14.1	0.427	102
Yb	ppb	0.1	2	219	220	0.707	0.322	100
Zn	ppb	20	2	116	291	9.90	3.40	251
Zr	ppb	0.4	2	836	815	26.9	3.30	97.5

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

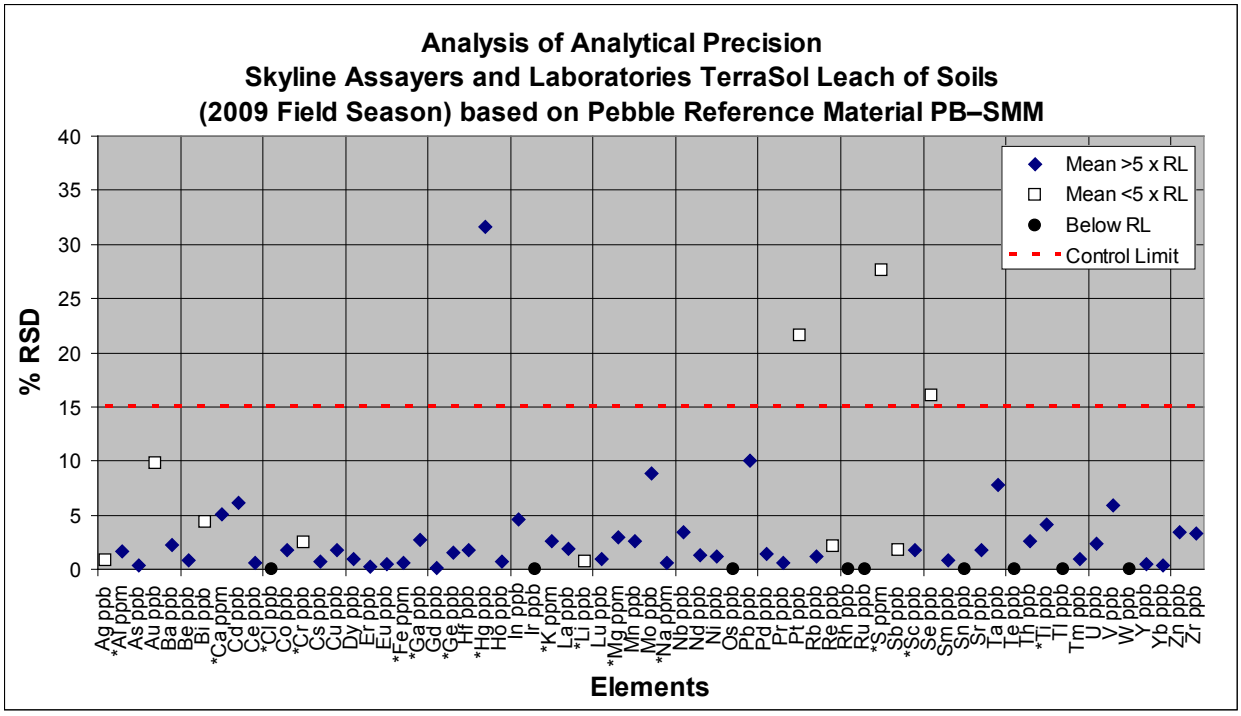

Figure 6-17. Precision plot for two analyses of Pebble reference material PB–SMM by TerraSol Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

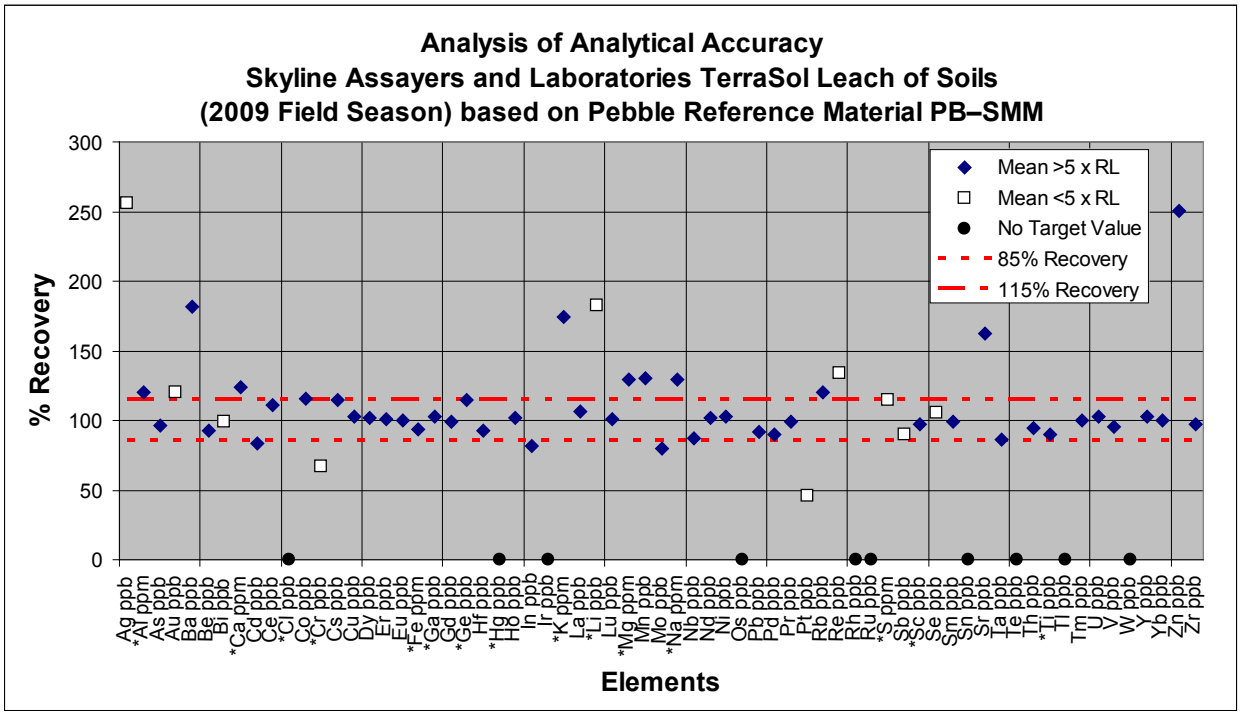

Figure 6-18. Accuracy plot for two analyses of Pebble reference material PB–SMM by TerraSol Leach (2009 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Table 6-13. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	20	2	*na*	<20	*na*	*na*	*na*
Al	ppm	0.5	2	1,200	1,420	21.2	1.50	118
As	ppb	5	2	46.8	41.1	0.424	1.03	87.8
Au	ppb	0.1	2	*na*	<0.1	*na*	*na*	*na*
Ba	ppb	10	2	2,230	2,800	141	5.05	126
Be	ppb	0.5	2	34.4	29.4	0.354	1.20	85.3
Bi	ppb	0.5	2	1.59	1.50	0.0283	1.89	94.3
Ca	ppb	0.5	2	165	165	4.24	2.57	100
Cd	ppm	0.5	2	22.3	18.6	0.707	3.80	83.4
Ce	ppb	0.5	2	960	792	54.4	6.88	82.4
Cl	ppb	20,000	2	*na*	<20,000	*na*	*na*	*na*
Co	ppb	0.5	2	284	315	2.12	0.675	111
Cr	ppb	40	2	63.9	41.3	7.28	17.6	64.6
Cs	ppb	0.1	2	32.7	32.3	0.283	0.876	98.8
Cu	ppb	5	2	3,150	4,370	269	6.15	139
Dy	ppb	0.1	2	134	127	4.95	3.91	94.4
Er	ppb	0.06	2	67.1	63.9	2.47	3.88	95.2
Eu	ppb	0.05	2	35.2	31.1	1.41	4.55	88.4
Fe	ppb	1	2	547	553	35.4	6.39	101
Ga	ppm	0.5	2	107	106	1.41	1.33	99.1
Gd	ppb	0.7	2	147	129	9.19	7.15	87.4
Ge	ppb	1	2	1.82	1.88	0.0919	4.90	103
Hf	ppb	0.1	2	18.1	16.4	0.212	1.30	90.3
Hg	ppb	0.1	2	0.189	0.162	0.100	61.9	85.7
Ho	ppb	0.02	2	25.1	24.1	0.849	3.52	96.0
In	ppb	0.2	2	2.12	1.88	0.0919	4.90	88.4
Ir	ppb	10	2	*na*	<10	*na*	*na*	*na*
K	ppb	5	2	58.0	91.0	1.27	1.40	157
La	ppm	1	2	393	318	24.7	7.79	80.8
Li	ppb	2	2	8.39	11.1	1.72	15.5	132
Lu	ppb	0.1	2	6.47	6.46	0.368	5.69	99.8
Mg	ppb	2	2	52.2	62.2	1.41	2.27	119
Mn	ppm	5	2	13,900	16,500	212	1.29	118
Mo	ppb	1	2	15.3	15.4	1.56	10.1	101
Na	ppb	5	2	24.3	32.6	1.27	3.90	134
Nb	ppm	0.4	2	11.8	10.3	0.141	1.37	87.3
Nd	ppb	0.2	2	563	488	23.3	4.79	86.6
Ni	ppb	10	2	196	224	7.07	3.16	114
Os	ppb	0.1	2	*na*	<0.1	*na*	*na*	*na*
Pb	ppb	5	2	123	93.8	13.0	13.9	76.3
Pd	ppb	1	2	4.74	4.36	0.0283	0.649	92.0
Pr	ppb	0.2	2	131	110	7.07	6.43	84.0
Pt	ppb	0.1	2	0.174	<0.1	*na*	*na*	52.4
Rb	ppb	0.5	2	346	373	9.19	2.47	108
Re	ppb	0.05	2	0.126	0.160	0.0156	9.72	127
Rh	ppb	5	2	*na*	<5	*na*	*na*	*na*
Ru	ppb	0.2	2	*na*	<0.2	*na*	*na*	*na*
S	ppm	10	2	27.6	25.1	0.849	3.38	90.9
Sb	ppb	1	2	2.70	2.60	0.00707	0.272	96.1
Sc	ppb	50	2	214	193	9.90	5.13	90.2
Se	ppb	20	2	39.4	33.2	4.38	13.2	84.3
Sm	ppb	0.1	2	137	121	7.78	6.45	88.0
Sn	ppb	10	2	*na*	<10	*na*	*na*	*na*
Sr	ppb	1	2	1,060	1,280	63.6	4.99	120
Ta	ppb	0.1	2	0.644	0.550	0.00141	0.257	85.4

Table 6-13. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by a TerraSol Leach of soil samples at Skyline Labs (2009 field season)—Continued.

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Te	ppb	10	2	*na*	<10	*na*	*na*	*na*
Th	ppb	0.05	2	62.7	56.5	1.77	3.13	90.0
Ti	ppb	20	2	4,370	4,020	141	3.52	92.0
Tl	ppb	0.5	2	*na*	<5	*na*	*na*	*na*
Tm	ppb	0.05	2	8.49	8.09	0.141	1.75	95.3
U	ppb	0.05	2	70.7	70.5	3.25	4.61	99.7
V	ppb	5	2	161	159	4.24	2.67	98.8
W	ppb	10	2	*na*	<10	*na*	*na*	*na*
Y	ppb	0.2	2	651	650	20.5	3.16	99.8
Yb	ppb	0.1	2	50.5	48.9	0.778	1.59	96.7
Zn	ppb	20	2	581	939	12.7	1.36	162
Zr	ppb	0.4	2	543	527	4.24	0.805	97.1

[1]Skyline Labs considers TerraSol leach analyses of Al, Ca, Cl, Cr, Fe, Ga, Ge, Hg, K, Li, Mg, Na, S, Sc, and Ti to be semi-quantitative.

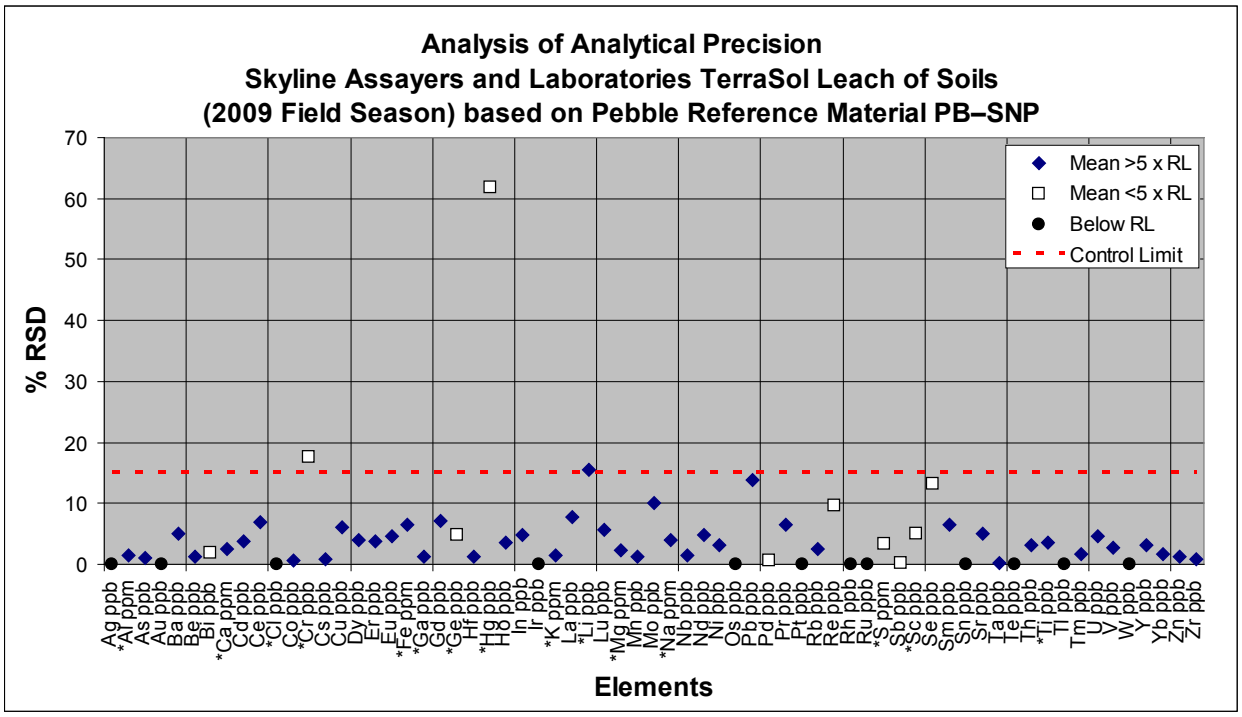

Figure 6-19. Precision plot for two analyses of Pebble reference material PB–SNP by TerraSol Leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

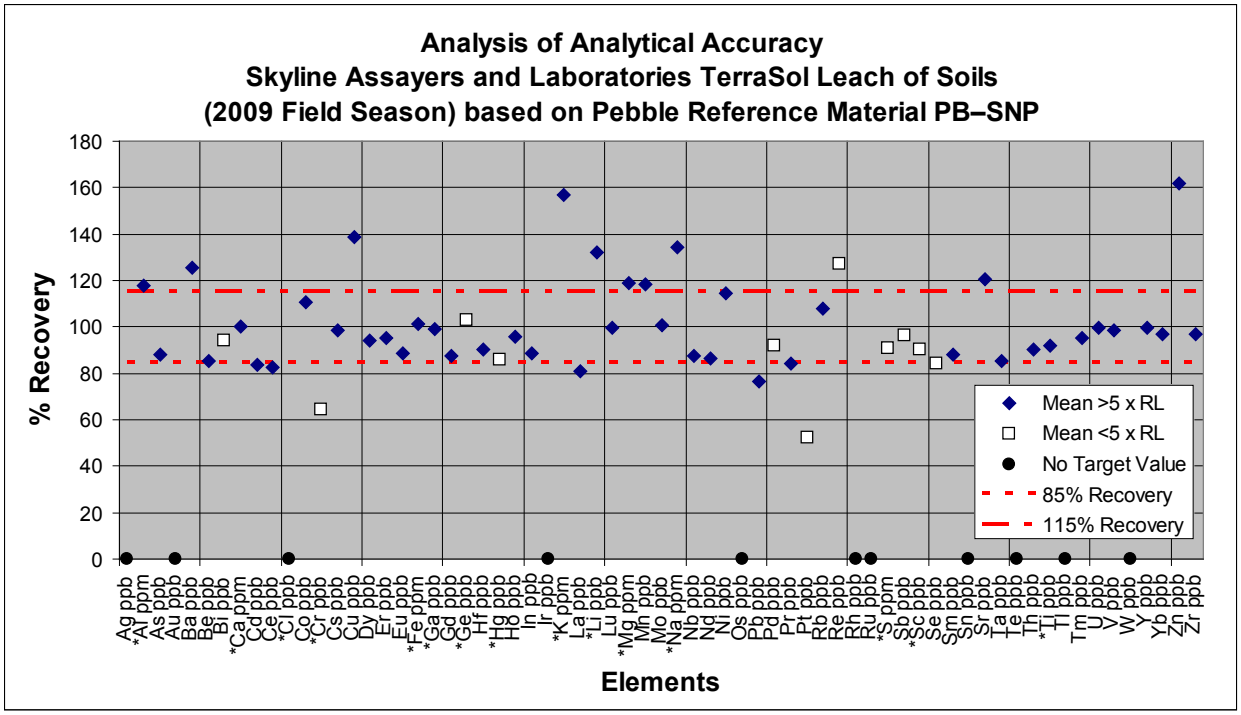

Figure 6-20. Accuracy plot for two analyses of Pebble reference material PB–SNP by TerraSol Leach (2009 field season). %Recovery is percent recovery; RL is reporting limit. Values for elements designated with an asterisk (*) are considered semi-quantitative.

Appendix 4: Quality Control Tables and Charts for SGS Mineral Services Metal Mobile Ion (MMI) Data

Table 7-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a metal mobile ion (MMI) leach of soil samples at SGS Minerals (2007 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	1	7	1.00	247	59.2	1.04	1.75
Al	ppm	1	7	36.0	246	148	5.93	4.00
As	ppb	10	7	<10	<10	<10	*na*	*na*
Au	ppb	0.1	7	<0.1	57.7	12.9	0.553	4.30
Ba	ppb	10	7	180	5,230	2,850	116	4.07
Bi	ppb	1	7	<1	<1	<1	*na*	*na*
Ca	ppm	10	7	<10	550	283	11.3	4.01
Cd	ppb	1	7	2.00	14.0	5.29	0.378	7.15
Ce	ppb	5	7	8.00	665	201	35.3	17.6
Co	ppb	5	7	<5	338	59.2	4.38	7.40
Cr	ppb	100	7	<100	100	<100	*na*	*na*
Cu	ppb	10	7	100	33,300	6,530	183	2.81
Dy	ppb	1	7	10.0	144	71.4	5.32	7.45
Er	ppb	0.5	7	11.2	154	54.7	3.80	6.95
Eu	ppb	0.5	7	0.900	33.0	11.9	1.45	12.2
Fe	ppm	1	7	2.00	49.0	19.4	4.53	23.4
Gd	ppb	1	7	5.00	141	55.9	6.23	11.2
La	ppb	1	7	3.00	276	77.4	20.4	26.4
Li	ppb	5	7	<5	34.0	8.30	1.60	19.3
Mg	ppm	1	7	<1	55.0	20.1	4.25	21.2
Mo	ppb	5	7	<5	28.0	9.29	0.378	4.07
Nb	ppb	0.5	7	<0.5	1.60	0.533	0.307	57.6
Nd	ppb	1	7	8.00	525	158	24.8	15.7
Ni	ppb	5	7	10.0	445	124	1.77	1.43
Pb	ppb	10	7	<10	120	64.9	5.98	9.21
Pd	ppb	1	7	<1	<1	<1	*na*	*na*
Pr	ppb	1	7	1.00	121	34.0	6.08	17.9
Pt	ppb	1	7	<1	<1	<1	*na*	*na*
Rb	ppb	5	7	26.0	155	73.9	4.25	5.75
Sb	ppb	1	7	<1	<1	<1	*na*	*na*
Sc	ppb	5	7	15.0	69.0	40.4	7.59	18.8
Sm	ppb	1	7	3.00	114	39.6	5.33	13.5
Sn	ppb	1	7	<1	<1	<1	*na*	*na*
Sr	ppb	10	7	20.0	6,330	2,780	59.3	2.13
Ta	ppb	1	7	<1	<1	<1	*na*	*na*
Tb	ppb	1	7	1.00	25.0	10.8	1.10	10.2
Te	ppb	10	7	<10	<10	<10	*na*	*na*
Th	ppb	0.5	7	<0.5	12.8	3.93	0.549	14.0
Ti	ppb	3	7	<3	127	51.5	8.29	16.1
Tl	ppb	0.5	7	<0.5	2.00	1.27	0.129	10.2
U	ppb	1	7	2.00	46.0	10.1	2.20	21.7
W	ppb	1	7	<1	1.00	<1	*na*	*na*
Y	ppb	5	7	77.0	977	467	37.4	8.00
Yb	ppb	1	7	10.0	142	48.4	3.60	7.44
Zn	ppb	20	7	20.0	520	216	12.2	5.66
Zr	ppb	5	7	<5	48.0	19.3	2.77	14.4

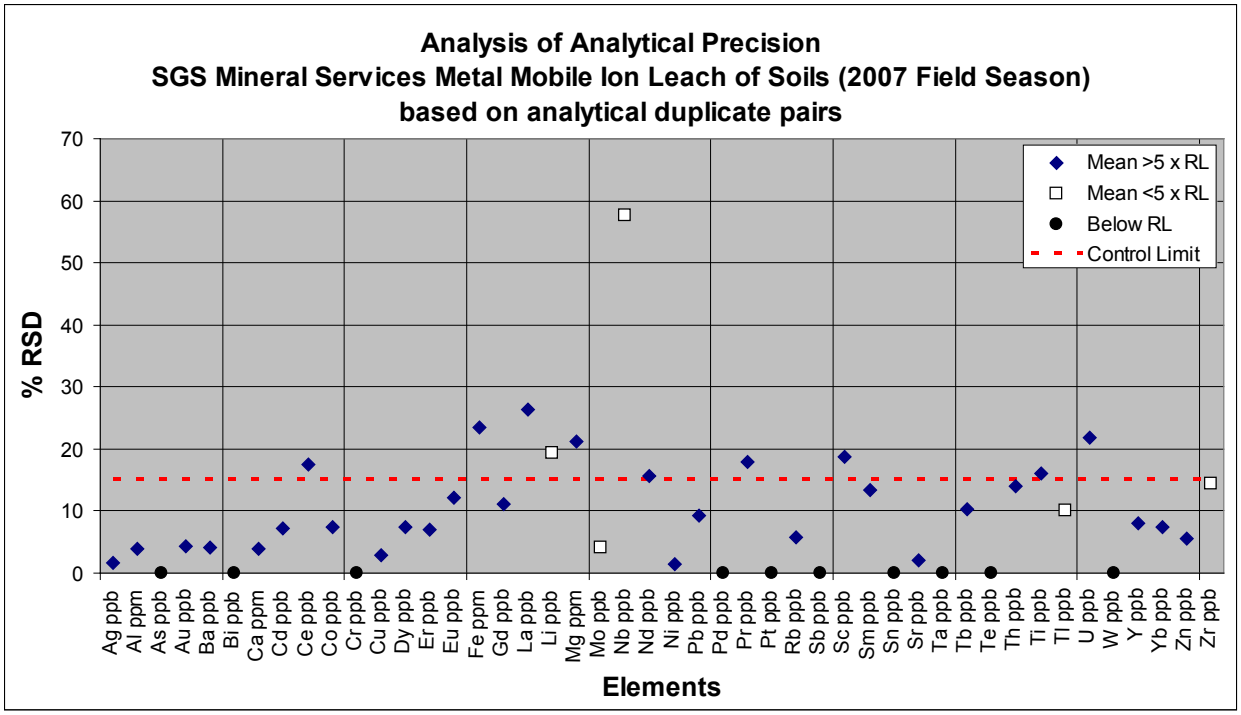

Figure 7-1. Precision plot for seven analytical duplicate sample pairs by metal mobile ion (MMI) leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 7-2. Summary statistics for assessing analytical variation on the standard reference material MMISRM14; determined by a metal mobile ion (MMI) leach of soil samples at SGS Minerals (2007 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	1	2	19.0	16.5	0.707	4.29	86.8
Al	ppm	1	2	36.0	36.0	4.24	11.8	100
As	ppb	10	2	13.0	10.0	0	0	76.9
Au	ppb	0.1	2	44.1	41.1	0.495	1.21	93.1
Ba	ppb	10	2	90.0	105	7.07	6.73	117
Bi	ppb	1	2	<1	<1	*na*	*na*	100
Ca	ppm	10	2	273	240	14.1	5.89	87.9
Cd	ppb	1	2	8.00	8.00	0	0	100
Ce	ppb	5	2	13.0	14.0	0	0	108
Co	ppb	5	2	45.0	48.0	2.83	5.89	107
Cr	ppb	100	2	<100	<100	*na*	*na*	100
Cu	ppb	10	2	765	755	63.6	8.43	98.7
Dy	ppb	1	2	2.00	3.00	1.41	47.1	150
Er	ppb	0.5	2	0.800	1.20	0.566	47.1	150
Eu	ppb	0.5	2	0.900	1.25	0.212	17.0	139
Fe	ppm	1	2	1.70	2.50	0.707	28.3	147
Gd	ppb	1	2	6.00	5.00	1.41	28.3	83.3
La	ppb	1	2	3.00	4.00	0	0	133
Li	ppb	5	2	<5	<5	*na*	*na*	100
Mg	ppm	1	2	36.0	32.0	1.41	4.42	88.9
Mo	ppb	5	2	37.0	35.5	0.707	1.99	96.0
Nb	ppb	0.5	2	<0.5	<0.5	*na*	*na*	100
Nd	ppb	1	2	10.0	16.5	0.707	4.29	165

Table 7-2. Summary statistics for assessing analytical variation on the standard reference material MMISRM14; determined by a metal mobile ion (MMI) leach of soil samples at SGS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ni	ppb	5	2	289	287	19.1	6.66	99.1
Pb	ppb	10	2	120	180	70.7	39.3	150
Pd	ppb	1	2	46.0	48.0	1.41	2.95	104
Pr	ppb	1	2	2.00	3.00	0	0	150
Pt	ppb	1	2	<1	<1	*na*	*na*	100
Rb	ppb	5	2	283	273	2.12	0.780	96.3
Sb	ppb	1	2	<1	<1	*na*	*na*	100
Sc	ppb	5	2	6.00	8.50	0.707	8.32	142
Sm	ppb	1	2	3.00	4.50	0.707	15.7	150
Sn	ppb	1	2	<1	<1	*na*	*na*	100
Sr	ppb	10	2	518	605	49.5	8.18	117
Ta	ppb	1	2	<1	<1	*na*	*na*	100
Tb	ppb	1	2	<1	<1	*na*	*na*	100
Te	ppb	10	2	<10	<10	*na*	*na*	100
Th	ppb	0.5	2	16.2	19.8	0.283	1.43	122
Ti	ppb	3	2	<3	4.00	0	0	148
Tl	ppb	0.5	2	<0.5	0.576	0.176	30.6	128
U	ppb	1	2	40.0	40.0	0	0	100
W	ppb	1	2	<1	<1	*na*	*na*	100
Y	ppb	5	2	8.00	16.5	6.36	38.6	206
Yb	ppb	1	2	<1	<1	*na*	*na*	100
Zn	ppb	20	2	345	340	14.1	4.16	98.6
Zr	ppb	5	2	13.0	12.0	0	0	92.3

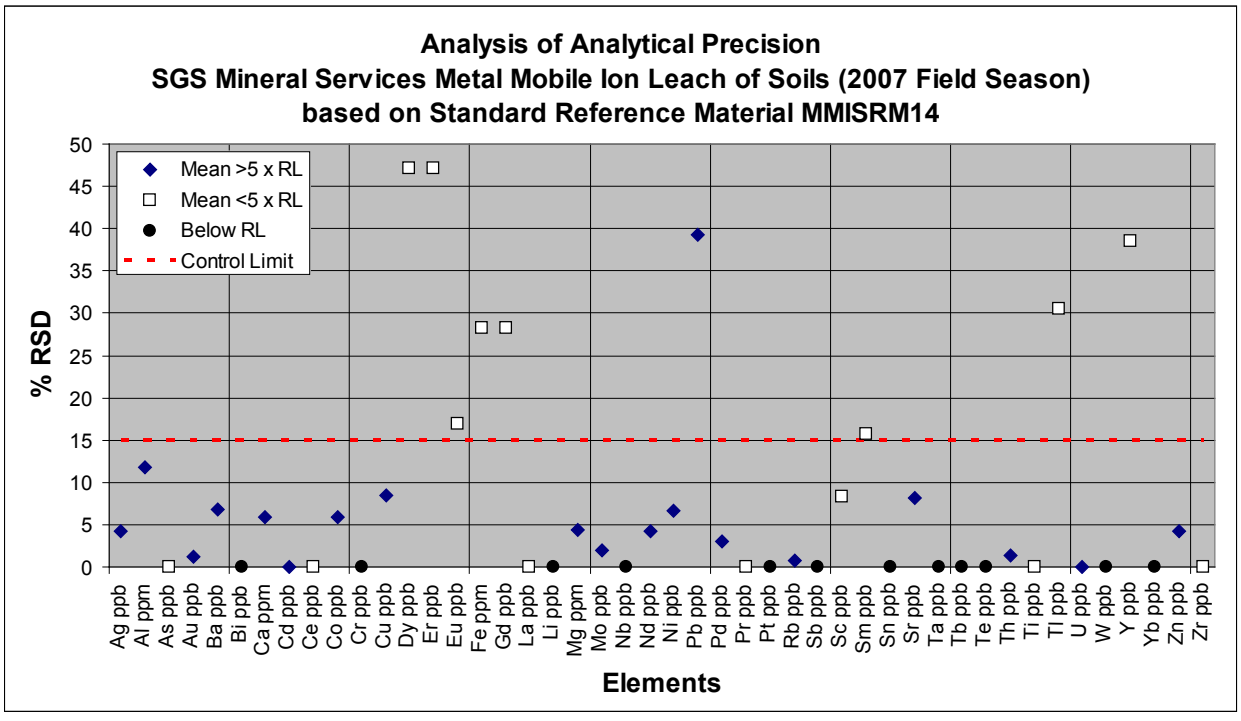

Figure 7-2. Precision plot for two analyses of standard reference material MMISRM14 by metal mobile ion (MMI) leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

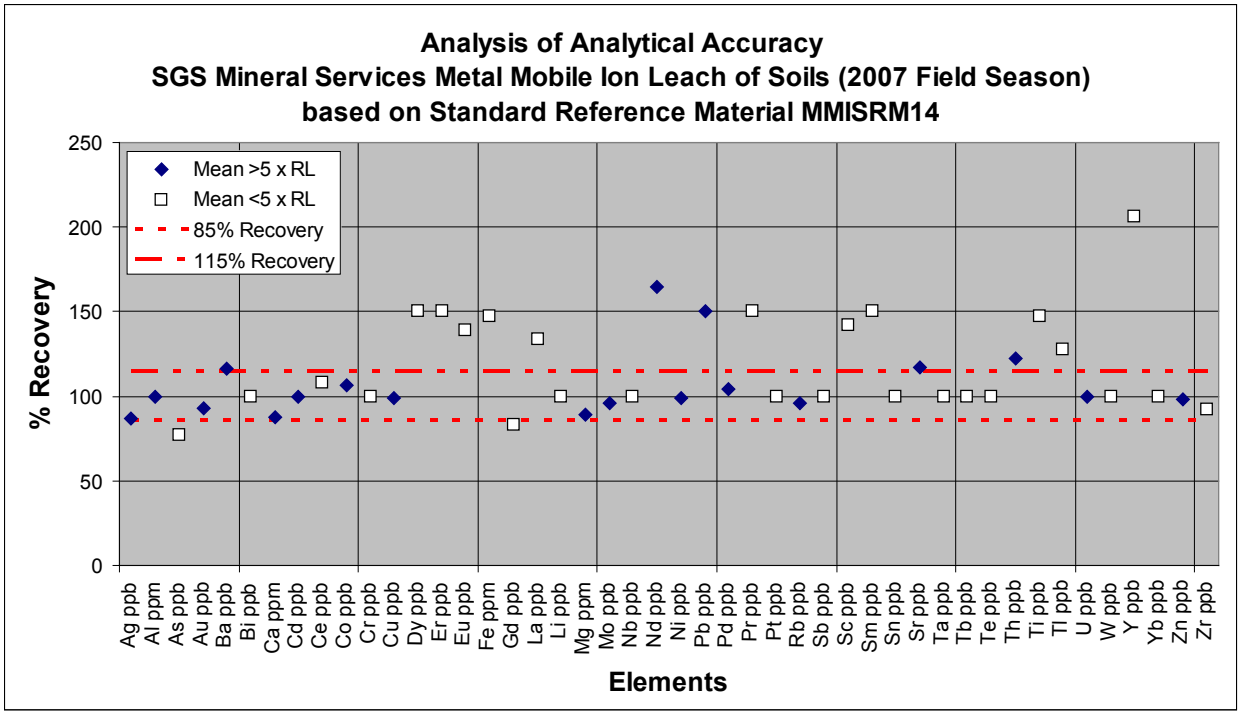

Figure 7-3. Accuracy plot for two analyses of standard reference material MMISRM14 by metal mobile ion (MMI) leach (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for ALS Minerals Cold Hydroxylamine Hydrochloride Leach Data

Table 8-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	0.002	10	0.008	0.152	0.0250	0.00415	16.7
Al	ppm	1	10	504	6,400	3,950	136	3.44
As	ppm	0.1	10	<0.1	1.30	0.219	0.00281	1.28
Au	ppm	0.05	10	<0.05	<0.05	<0.05	*na*	*na*
B	ppm	2	10	<2	<2	<2	*na*	*na*
Ba	ppm	0.05	10	6.94	103	40.3	3.33	8.26
Be	ppm	0.05	10	<0.05	0.230	0.120	0.0117	9.80
Bi	ppm	0.005	10	<0.005	0.0290	0.00691	0.000224	3.24
Br	ppm	2	10	<2	3.00	2.17	0.224	10.3
Ca	ppm	10	10	50.0	5,060	905	26.8	2.96
Cd	ppm	0.01	10	0.0100	2.04	0.221	0.00221	1.01
Ce	ppm	0.005	10	0.775	18.8	4.49	0.125	2.79
Co	ppm	0.05	10	0.0500	2.12	0.426	0.0331	7.78
Cr	ppm	0.05	10	0.200	0.600	0.305	0.0177	5.83
Cs	ppm	0.005	10	0.0340	0.0820	0.0539	0.00232	4.31
Cu	ppm	0.05	10	0.330	74.8	9.22	0.271	2.94
Dy	ppm	0.005	10	0.0690	0.930	0.334	0.0164	4.91
Er	ppm	0.005	10	0.0320	0.470	0.162	0.00737	4.55
Eu	ppm	0.005	10	0.0180	0.173	0.0808	0.00677	8.38
Fe	ppm	5	10	267	1,200	582	18.5	3.18
Ga	ppm	0.05	10	0.110	0.350	0.176	0.00775	4.40
Gd	ppm	0.005	10	0.0730	1.28	0.407	0.0288	7.08
Ge	ppm	0.1	10	<0.1	<0.1	<0.1	*na*	*na*
Hf	ppm	0.01	10	0.0100	0.0700	0.0315	0.00224	7.10
Hg	ppm	0.1	10	<0.1	<0.1	<0.1	*na*	*na*
Ho	ppm	0.005	10	0.0130	0.181	0.0650	0.00317	4.88
I	ppm	0.1	10	0.100	2.30	1.12	0.0548	4.89
In	ppm	0.005	10	<0.005	0.0550	0.0112	0.000317	2.82
K	ppm	5	10	15.0	293	51.7	0.949	1.83
La	ppm	0.005	10	0.424	6.95	1.91	0.121	6.34
Li	ppm	0.05	10	<0.05	0.420	0.0826	0.00568	6.88
Lu	ppm	0.005	10	<0.005	0.0530	0.0177	0.000765	4.32
Mg	ppm	1	10	5.00	268	56.9	1.63	2.86
Mn	ppm	0.1	10	1.20	1,450	164	6.46	3.93
Mo	ppm	0.01	10	<0.01	0.560	0.0628	0.00671	10.7
Na	ppm	10	10	20.0	80.0	32.0	5.48	17.1
Nb	ppm	0.01	10	0.0100	0.0500	0.0210	0.00316	15.1
Nd	ppm	0.005	10	0.292	5.92	1.73	0.0618	3.57
Ni	ppm	0.05	10	0.0800	1.59	0.336	0.0188	5.62
P	ppm	5	10	20.0	258	62.4	4.41	7.07
Pb	ppm	0.1	10	0.100	349	34.4	3.58	10.4
Pr	ppm	0.005	10	0.0800	1.60	0.459	0.0156	3.41
Rb	ppm	0.01	10	0.180	1.26	0.469	0.0102	2.19
Re	ppm	0.001	10	<0.001	0.0010	<0.001	*na*	*na*
Sb	ppm	0.005	10	<0.005	0.278	0.0310	0.00380	12.3
Se	ppm	0.5	10	<0.5	<0.5	<0.5	*na*	*na*
Sm	ppm	0.005	10	0.0570	1.07	0.321	0.0174	5.42
Sn	ppm	0.05	10	<0.05	0.0500	<0.05	*na*	*na*
Sr	ppm	0.05	10	0.400	15.3	5.62	0.132	2.35
Ta	ppm	0.01	10	<0.01	<0.01	<0.01	*na*	*na*
Tb	ppm	0.005	10	0.0120	0.178	0.0626	0.00322	5.15

Table 8-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Te	ppm	0.05	10	<0.05	0.150	0.0551	0.00224	4.06
Th	ppm	0.01	10	0.0100	0.0400	0.0265	0.00224	8.44
Ti	ppm	1	10	3.00	11.0	6.15	0.806	13.1
Tl	ppm	0.005	10	0.0080	0.0370	0.0141	0.000707	5.01
Tm	ppm	0.005	10	<0.005	0.0690	0.0233	0.00136	5.85
U	ppm	0.005	10	0.0180	0.499	0.0786	0.00179	2.28
V	ppm	0.05	10	0.200	4.23	0.901	0.0367	4.08
W	ppm	0.01	10	<0.01	0.0300	0.0102	0.00448	43.7
Y	ppm	0.005	10	0.339	4.92	1.78	0.0458	2.58
Yb	ppm	0.005	10	0.0190	0.350	0.117	0.00412	3.53
Zn	ppm	0.2	10	<0.2	167	17.2	0.796	4.64
Zr	ppm	0.05	10	0.0500	1.45	0.650	0.0195	3.00

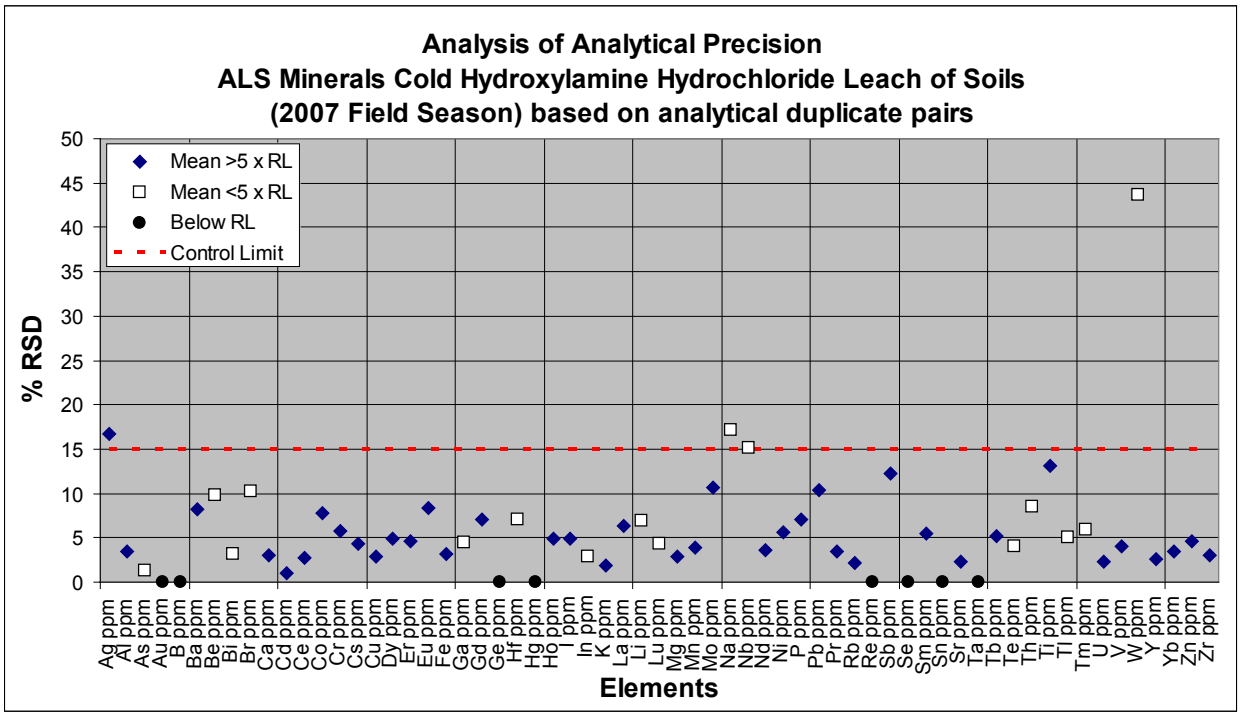

Figure 8-1. Precision plot for ten analytical duplicate sample pairs by cold hydroxylamine hydrochloride leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 8-2. Summary statistics for assessing analytical variation on the standard reference material LK3–ALG; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	2	0.0255	0.0275	0.000707	2.57	108
Al	ppm	1	2	712	682	8.49	1.24	95.8
As	ppm	0.1	2	4.00	4.30	0.141	3.29	108
Au	ppm	0.05	2	0.0730	<0.05	*na*	*na*	61.8
B	ppm	2	2	2.40	<2	*na*	*na*	75.5
Ba	ppm	0.05	2	75.0	75.5	6.08	8.05	101
Be	ppm	0.05	2	0.115	0.130	0.0141	10.9	113
Bi	ppm	0.005	2	0.0470	0.0550	0.00141	2.57	117
Br	ppm	2	2	2.90	<2	*na*	*na*	62.5
Ca	ppm	10	2	3,890	4,220	184	4.36	108
Cd	ppm	0.01	2	0.345	0.350	0	0	101
Ce	ppm	0.005	2	14.4	15.4	0.177	1.15	107
Co	ppm	0.05	2	2.85	2.98	0.00707	0.238	105
Cr	ppm	0.05	2	0.535	0.630	0.0424	6.73	118
Cs	ppm	0.005	2	0.0150	0.0200	0	0	133
Cu	ppm	0.05	2	5.10	4.96	0.0283	0.570	97.3
Dy	ppm	0.005	2	0.780	0.744	0.00212	0.285	95.3
Er	ppm	0.005	2	0.388	0.399	0.000707	0.177	103
Eu	ppm	0.005	2	0.179	0.192	0.00566	2.95	107
Fe	ppm	5	2	1,110	1,120	14.1	1.26	101
Ga	ppm	0.05	2	0.180	0.185	0.0212	11.5	103
Gd	ppm	0.005	2	1.07	1.14	0.00354	0.309	106
Ge	ppm	0.1	2	0.140	<0.1	*na*	*na*	65.1
Hf	ppm	0.01	2	0.0140	0.0200	0	0	143
Hg	ppm	0.1	2	0.140	<0.1	*na*	*na*	65.1
Ho	ppm	0.005	2	0.134	0.150	0	0	112
I	ppm	0.1	2	0.140	<0.1	*na*	*na*	71.4
In	ppm	0.005	2	0.00730	0.00600	0	0	82.2
K	ppm	5	2	189	195	11.3	5.80	103
La	ppm	0.005	2	9.54	9.72	0.757	7.79	102
Li	ppm	0.05	2	0.185	0.225	0.00707	3.14	122
Lu	ppm	0.005	2	0.0420	0.0500	0.00141	2.83	119
Mg	ppm	1	2	368	357	9.90	2.77	97.0
Mn	ppm	0.1	2	805	777	12.7	1.64	96.6
Mo	ppm	0.01	2	0.0140	0.0200	0	0	143
Na	ppm	10	2	55.0	65.0	7.07	10.9	118
Nb	ppm	0.01	2	0.0140	0.0200	0	0	143
Nd	ppm	0.005	2	6.52	6.86	0.0919	1.34	105
Ni	ppm	0.05	2	4.52	4.75	0.00707	0.149	105
P	ppm	5	2	161	177	5.66	3.20	110
Pb	ppm	0.1	2	4.00	4.20	0	0	105
Pr	ppm	0.005	2	1.85	2.03	0.0212	1.05	109
Rb	ppm	0.01	2	1.05	1.11	0.0212	1.92	106
Re	ppm	0.001	2	0.00140	<0.001	*na*	*na*	68.3
Sb	ppm	0.005	2	0.0560	0.0595	0.00212	3.57	106
Se	ppm	0.5	2	0.620	<0.5	*na*	*na*	72.8
Sm	ppm	0.005	2	1.02	1.00	0.00849	0.845	98.7
Sn	ppm	0.05	2	0.0720	<0.05	*na*	*na*	62.7
Sr	ppm	0.05	2	11.6	12.2	0.248	2.03	105
Ta	ppm	0.01	2	0.0140	<0.01	*na*	*na*	65.1
Tb	ppm	0.005	2	0.135	0.148	0.00141	0.956	110
Te	ppm	0.05	2	0.0720	<0.05	*na*	*na*	62.7
Th	ppm	0.01	2	0.0400	0.0550	0.00707	12.9	138
Ti	ppm	1	2	2.00	3.00	0	0	150
Tl	ppm	0.005	2	0.0410	0.0480	0.00283	5.89	117

Table 8-2. Summary statistics for assessing analytical variation on the standard reference material LK3–ALG; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Tm	ppm	0.005	2	0.0480	0.0575	0.000707	1.23	120
U	ppm	0.005	2	0.744	0.678	0.00707	1.04	91.1
V	ppm	0.05	2	3.14	3.43	0.0778	2.27	109
W	ppm	0.01	2	0.0140	0.0100	0	0	71.4
Y	ppm	0.005	2	4.73	4.66	0.0283	0.607	98.5
Yb	ppm	0.005	2	0.298	0.311	0.00424	1.36	104
Zn	ppm	0.2	2	18.7	18.7	0.141	0.756	100
Zr	ppm	0.05	2	0.300	0.370	0.0141	3.82	125

[1]ALS Minerals reports a target range for SRMs. The average of the upper and lower target range is used for a Target Value.

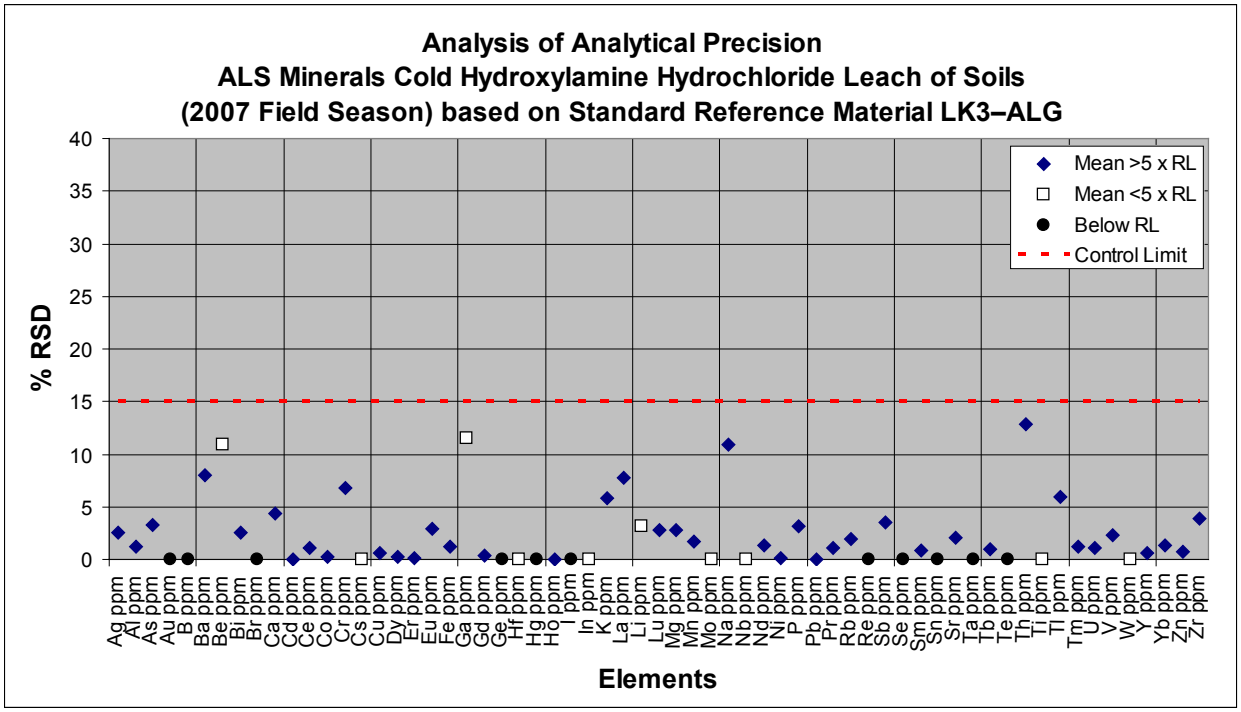

Figure 8-2. Precision plot for two analyses of standard reference material LK3–ALG by cold hydroxylamine hydrochloride leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

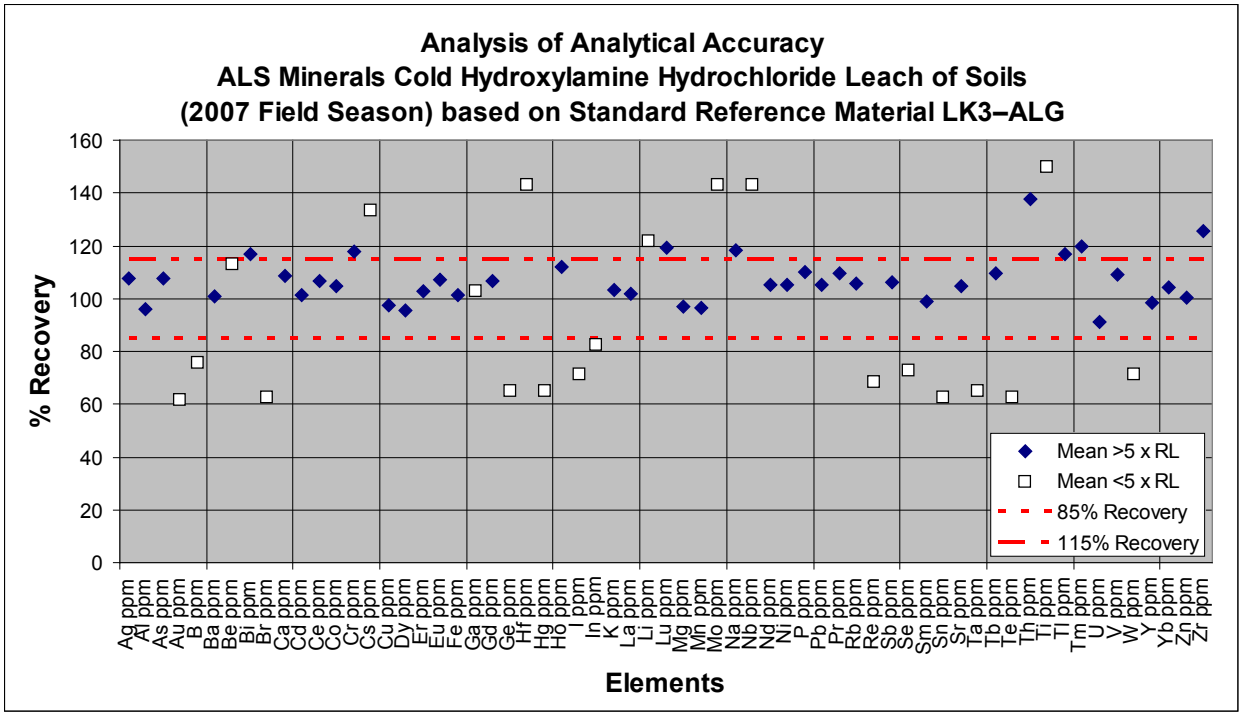

Figure 8-3. Accuracy plot for two analyses of standard reference material LK3–ALG by cold hydroxylamine hydrochloride leach (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 8-3. Summary statistics for assessing analytical variation on the standard reference material LK4–ALG; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	2	0.00300	0.00300	0.00141	47.1	100
Al	ppm	1	2	1,740	1,600	14.1	0.884	92.0
As	ppm	0.1	2	1.65	1.80	0	0	109
Au	ppm	0.05	2	0.072	<0.05	*na*	*na*	62.7
B	ppm	2	2	3.90	4.50	0.707	15.7	115
Ba	ppm	0.05	2	11.8	12.4	0.707	5.73	105
Be	ppm	0.05	2	0.115	0.150	0.0141	9.43	130
Bi	ppm	0.005	2	0.00720	<0.005	*na*	*na*	66.0
Br	ppm	2	2	3.40	2.00	0	0	58.8
Ca	ppm	10	2	6,880	7,070	84.9	1.20	103
Cd	ppm	0.01	2	1.07	1.15	0.0424	3.69	107
Ce	ppm	0.005	2	5.17	5.52	0.106	1.92	107
Co	ppm	0.05	2	2.27	2.40	0.0566	2.36	106
Cr	ppm	0.05	2	0.235	0.295	0.00707	2.40	126
Cs	ppm	0.005	2	0.0410	0.0480	0.00141	2.95	117
Cu	ppm	0.05	2	1.86	2.03	0.0495	2.44	109
Dy	ppm	0.005	2	0.308	0.347	0.000707	0.204	113
Er	ppm	0.005	2	0.192	0.205	0.00707	3.45	107
Eu	ppm	0.005	2	0.0770	0.0870	0.00141	1.63	113
Fe	ppm	5	2	869	841	19.1	2.27	96.7
Ga	ppm	0.05	2	0.200	0.260	0	0	130
Gd	ppm	0.005	2	0.402	0.437	0.00566	1.29	109
Ge	ppm	0.1	2	0.140	<0.1	*na*	*na*	65.1

Table 8-3. Summary statistics for assessing analytical variation on the standard reference material LK4–ALG; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Hf	ppm	0.01	2	0.0200	0.0100	0	0	50.0
Hg	ppm	0.1	2	0.140	<0.1	*na*	*na*	65.1
Ho	ppm	0.005	2	0.0650	0.0750	0.00141	1.89	115
I	ppm	0.1	2	0.140	0.150	0.0707	47.1	107
In	ppm	0.005	2	0.0160	0.0230	0	0	144
K	ppm	5	2	119	116	2.83	2.44	97.5
La	ppm	0.005	2	4.08	4.06	0.346	8.54	99.5
Li	ppm	0.05	2	0.0720	0.0850	0.00707	8.32	118
Lu	ppm	0.005	2	0.0190	0.0250	0	0	132
Mg	ppm	1	2	429	398	10.6	2.67	92.7
Mn	ppm	0.1	2	253	240	0.707	0.295	94.9
Mo	ppm	0.01	2	0.0140	0.0200	0	0	143
Na	ppm	10	2	35.0	45.0	7.07	15.7	129
Nb	ppm	0.01	2	0.0140	0.0200	0	0	143
Nd	ppm	0.005	2	2.12	2.25	0.0212	0.945	106
Ni	ppm	0.05	2	8.21	8.38	0.0141	0.169	102
P	ppm	5	2	142	154	2.12	1.38	108
Pb	ppm	0.1	2	20.6	20.7	0.566	2.73	101
Pr	ppm	0.005	2	0.621	0.666	0.00707	1.06	107
Rb	ppm	0.01	2	0.735	0.810	0	0	110
Re	ppm	0.001	2	0.00140	0.00150	0.000707	47.1	107
Sb	ppm	0.005	2	0.105	0.115	0.000707	0.618	110
Se	ppm	0.5	2	0.620	<0.5	*na*	*na*	72.8
Sm	ppm	0.005	2	0.326	0.330	0.0120	3.65	101
Sn	ppm	0.05	2	0.0720	<0.05	*na*	*na*	62.7
Sr	ppm	0.05	2	24.0	25.6	0	0	107
Ta	ppm	0.01	2	0.0140	<0.01	*na*	*na*	65.1
Tb	ppm	0.005	2	0.0550	0.0620	0.00283	4.56	113
Te	ppm	0.05	2	0.0720	<0.05	*na*	*na*	62.7
Th	ppm	0.01	2	0.0350	0.0400	0	0	114
Ti	ppm	1	2	2.00	3.00	0	0	150
Tl	ppm	0.005	2	0.156	0.174	0.00354	2.04	111
Tm	ppm	0.005	2	0.0240	0.0300	0.00141	4.71	125
U	ppm	0.005	2	2.38	2.45	0.0707	2.89	103
V	ppm	0.05	2	5.00	5.18	0.184	3.55	104
W	ppm	0.01	2	0.0140	<0.01	*na*	*na*	68.3
Y	ppm	0.005	2	2.89	3.00	0.0141	0.471	104
Yb	ppm	0.005	2	0.149	0.159	0.00495	3.12	106
Zn	ppm	0.2	2	68.5	71.8	0.919	1.28	105
Zr	ppm	0.05	2	0.102	0.160	0	0	157

[1]ALS Minerals reports a target range for SRMs. The average of the upper and lower target range is used for a Target Value.

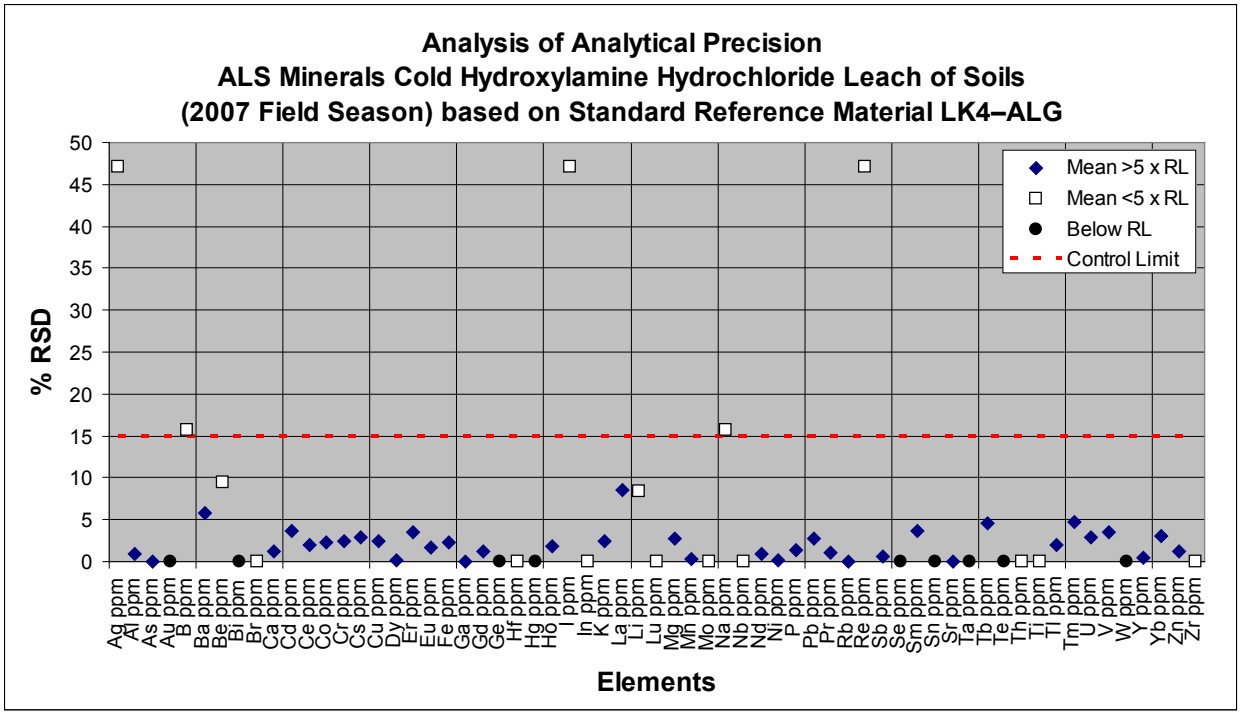

Figure 8-4. Precision plot for two analyses of standard reference material LK4–ALG by cold hydroxylamine hydrochloride leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

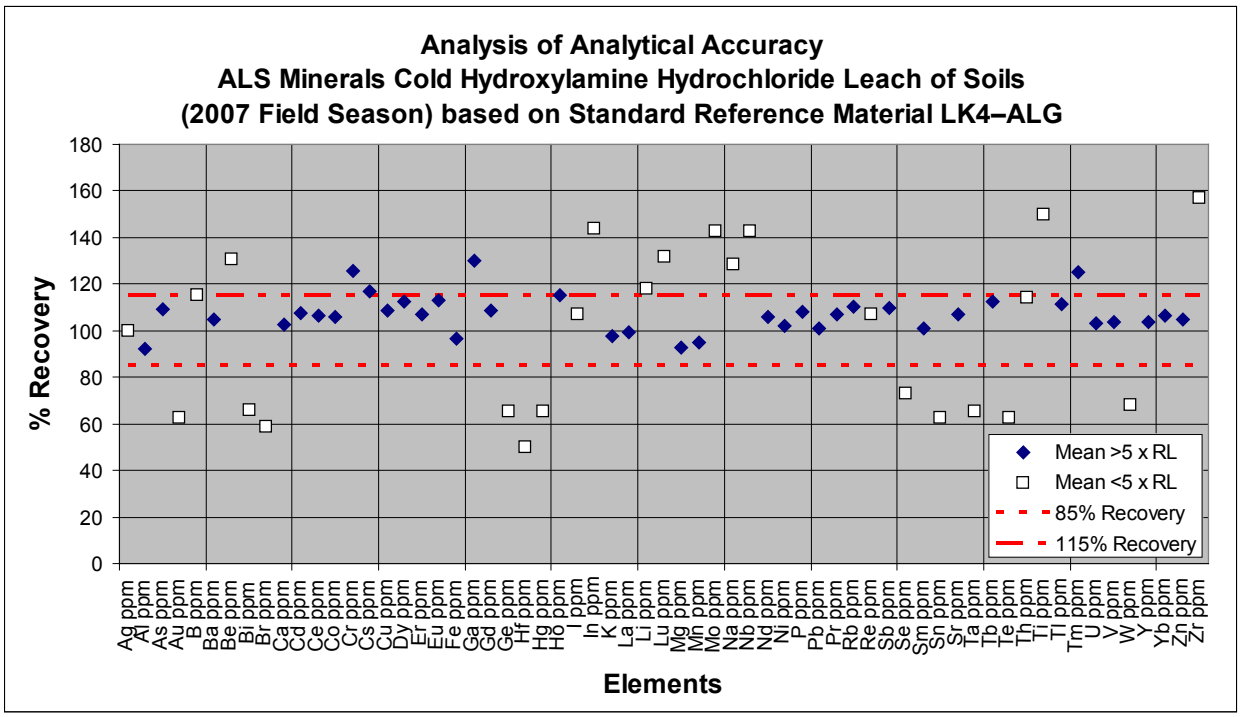

Figure 8-5. Accuracy plot for two analyses of standard reference material LK4–ALG by cold hydroxylamine hydrochloride leach (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 8-4. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	5	*na*	0.149	0.0110	7.34	*na*
Al	ppm	1	5	*na*	554	53.5	9.65	*na*
As	ppm	0.1	5	*na*	1.30	0.0707	5.44	*na*
Au	ppm	0.05	5	*na*	<0.05	*na*	*na*	*na*
B	ppm	2	5	*na*	<2	*na*	*na*	*na*
Ba	ppm	0.05	5	*na*	72.8	4.10	5.63	*na*
Be	ppm	0.05	5	*na*	0.226	0.0114	5.05	*na*
Bi	ppm	0.005	5	*na*	0.0294	0.000548	1.86	*na*
Br	ppm	2	5	*na*	<2	*na*	*na*	*na*
Ca	ppm	10	5	*na*	4,970	45.1	0.906	*na*
Cd	ppm	0.01	5	*na*	2.05	0.0477	2.33	*na*
Ce	ppm	0.005	5	*na*	19.0	0.256	1.35	*na*
Co	ppm	0.05	5	*na*	1.99	0.0487	2.44	*na*
Cr	ppm	0.05	5	*na*	0.734	0.210	28.6	*na*
Cs	ppm	0.005	5	*na*	0.0584	0.00114	1.95	*na*
Cu	ppm	0.05	5	*na*	74.1	1.18	1.60	*na*
Dy	ppm	0.005	5	*na*	0.907	0.0286	3.15	*na*
Er	ppm	0.005	5	*na*	0.455	0.00513	1.13	*na*
Eu	ppm	0.005	5	*na*	0.137	0.00297	2.17	*na*
Fe	ppm	5	5	*na*	840	8.76	1.04	*na*
Ga	ppm	0.05	5	*na*	0.232	0.0130	5.62	*na*
Gd	ppm	0.005	5	*na*	1.20	0.0114	0.953	*na*
Ge	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Hf	ppm	0.01	5	*na*	0.0100	0	0	*na*
Hg	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Ho	ppm	0.005	5	*na*	0.176	0.00402	2.29	*na*
I	ppm	0.1	5	*na*	0.100	0	0	*na*
In	ppm	0.005	5	*na*	0.0532	0.000837	1.57	*na*
K	ppm	5	5	*na*	292	6.91	2.36	*na*
La	ppm	0.005	5	*na*	6.33	0.426	6.73	*na*
Li	ppm	0.05	5	*na*	0.428	0.0327	7.64	*na*
Lu	ppm	0.005	5	*na*	0.0532	0.00130	2.45	*na*
Mg	ppm	1	5	*na*	272	6.99	2.57	*na*
Mn	ppm	0.1	5	*na*	1,420	21.0	1.48	*na*
Mo	ppm	0.01	5	*na*	0.538	0.0205	3.81	*na*
Na	ppm	10	5	*na*	80.0	0	0	*na*
Nb	ppm	0.01	5	*na*	0.0220	0.00447	20.3	*na*
Nd	ppm	0.005	5	*na*	5.82	0.127	2.18	*na*
Ni	ppm	0.05	5	*na*	1.52	0.0187	1.23	*na*
P	ppm	5	5	*na*	255	14.2	5.57	*na*
Pb	ppm	0.1	5	*na*	357	26.6	7.45	*na*
Pr	ppm	0.005	5	*na*	1.58	0.0196	1.24	*na*
Rb	ppm	0.01	5	*na*	1.35	0.0557	4.12	*na*
Re	ppm	0.001	5	*na*	<0.001	*na*	*na*	*na*
Sb	ppm	0.005	5	*na*	0.267	0.00942	3.53	*na*
Se	ppm	0.5	5	*na*	<0.5	*na*	*na*	*na*
Sm	ppm	0.005	5	*na*	1.04	0.0214	2.05	*na*
Sn	ppm	0.05	5	*na*	<0.05	*na*	*na*	*na*
Sr	ppm	0.05	5	*na*	14.3	0.386	2.69	*na*
Ta	ppm	0.01	5	*na*	<0.01	*na*	*na*	*na*
Tb	ppm	0.005	5	*na*	0.173	0.00483	2.80	*na*
Te	ppm	0.05	5	*na*	0.142	0.00447	3.15	*na*
Th	ppm	0.01	5	*na*	0.0280	0.0130	46.6	*na*
Ti	ppm	1	5	*na*	3.80	1.79	47.1	*na*
Tl	ppm	0.005	5	*na*	0.0380	0.00100	2.63	*na*

Table 8-4. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tm	ppm	0.005	5	*na*	0.0662	0.00130	1.97	*na*
U	ppm	0.005	5	*na*	0.508	0.00559	1.10	*na*
V	ppm	0.05	5	*na*	3.94	0.166	4.22	*na*
W	ppm	0.01	5	*na*	0.0180	0.0110	60.9	*na*
Y	ppm	0.005	5	*na*	4.98	0.157	3.15	*na*
Yb	ppm	0.005	5	*na*	0.347	0.00669	1.93	*na*
Zn	ppm	0.2	5	*na*	167	3.52	2.11	*na*
Zr	ppm	0.05	5	*na*	0.0760	0.0207	27.3	*na*

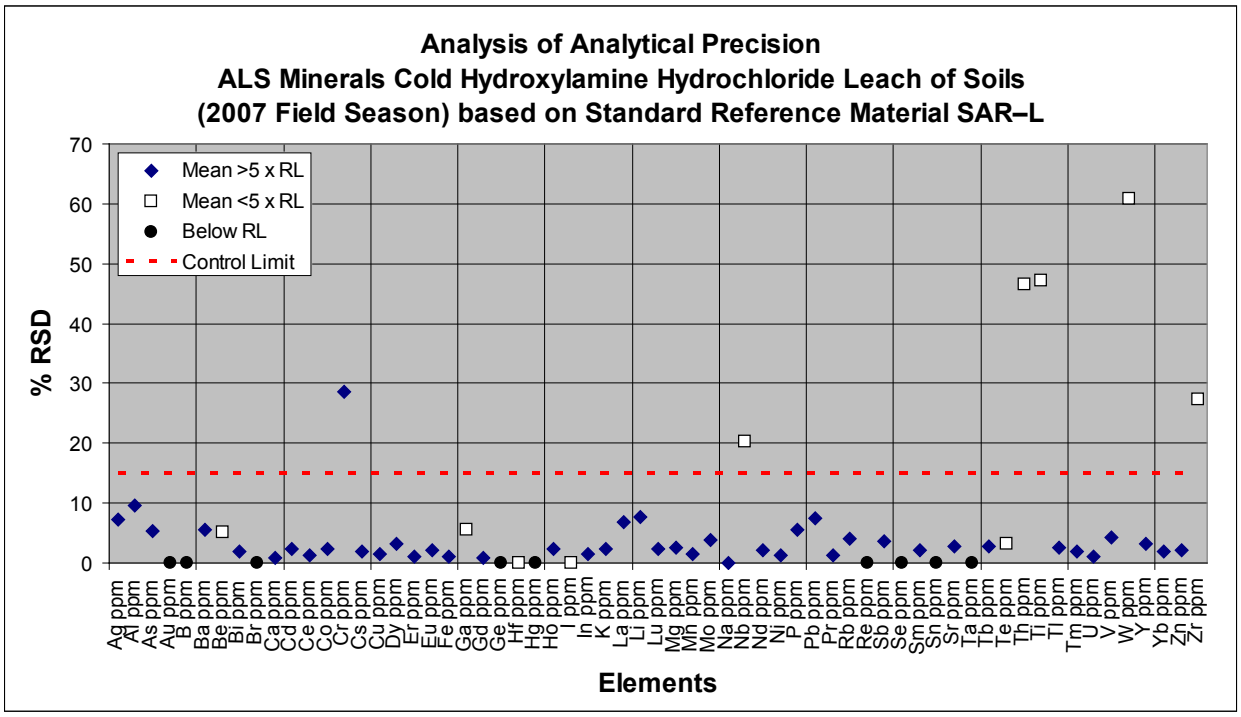

Figure 8-6. Precision plot for five analyses of standard reference material SAR–L by cold hydroxylamine hydrochloride leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 8-5. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	5	*na*	0.0156	0.000894	5.73	*na*
Al	ppm	1	5	*na*	3,010	72.6	2.41	*na*
As	ppm	0.1	5	*na*	0.100	0	0	*na*
Au	ppm	0.05	5	*na*	<0.05	*na*	*na*	*na*
B	ppm	2	5	*na*	<2	*na*	*na*	*na*
Ba	ppm	0.05	5	*na*	63.6	3.69	5.80	*na*
Be	ppm	0.05	5	*na*	0.162	0.0148	9.16	*na*
Bi	ppm	0.005	5	*na*	<0.005	*na*	*na*	*na*
Br	ppm	2	5	*na*	<2	*na*	*na*	*na*

Table 8-5. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ca	ppm	10	5	*na*	1,540	24.5	1.59	*na*
Cd	ppm	0.01	5	*na*	0.0240	0.00548	22.8	*na*
Ce	ppm	0.005	5	*na*	5.09	0.0654	1.28	*na*
Co	ppm	0.05	5	*na*	1.09	0.0644	5.91	*na*
Cr	ppm	0.05	5	*na*	0.220	0.0141	6.43	*na*
Cs	ppm	0.005	5	*na*	0.0536	0.00114	2.13	*na*
Cu	ppm	0.05	5	*na*	10.3	0.196	1.90	*na*
Dy	ppm	0.005	5	*na*	0.588	0.00957	1.63	*na*
Er	ppm	0.005	5	*na*	0.296	0.00698	2.36	*na*
Eu	ppm	0.005	5	*na*	0.153	0.00451	2.94	*na*
Fe	ppm	5	5	*na*	406	12.7	3.12	*na*
Ga	ppm	0.05	5	*na*	0.142	0.00447	3.15	*na*
Gd	ppm	0.005	5	*na*	0.684	0.00622	0.909	*na*
Ge	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Hf	ppm	0.01	5	*na*	0.0320	0.00447	14.0	*na*
Hg	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Ho	ppm	0.005	5	*na*	0.120	0.00130	1.09	*na*
I	ppm	0.1	5	*na*	1.06	0.0548	5.17	*na*
In	ppm	0.005	5	*na*	0.00520	0.000447	8.60	*na*
K	ppm	5	5	*na*	46.4	0.548	1.18	*na*
La	ppm	0.005	5	*na*	2.77	0.186	6.72	*na*
Li	ppm	0.05	5	*na*	0.0600	0.00707	11.8	*na*
Lu	ppm	0.005	5	*na*	0.0328	0.000837	2.55	*na*
Mg	ppm	1	5	*na*	148	3.05	2.05	*na*
Mn	ppm	0.1	5	*na*	72.7	4.76	6.55	*na*
Mo	ppm	0.01	5	*na*	0.0100	0	0	*na*
Na	ppm	10	5	*na*	28.0	4.47	16.0	*na*
Nb	ppm	0.01	5	*na*	0.0120	0.00447	37.3	*na*
Nd	ppm	0.005	5	*na*	2.78	0.0288	1.03	*na*
Ni	ppm	0.05	5	*na*	0.386	0.0134	3.48	*na*
P	ppm	5	5	*na*	57.8	1.64	2.84	*na*
Pb	ppm	0.1	5	*na*	0.500	0	0	*na*
Pr	ppm	0.005	5	*na*	0.705	0.00592	0.839	*na*
Rb	ppm	0.01	5	*na*	0.616	0.0182	2.95	*na*
Re	ppm	0.001	5	*na*	<0.001	*na*	*na*	*na*
Sb	ppm	0.005	5	*na*	<0.005	*na*	*na*	*na*
Se	ppm	0.5	5	*na*	<0.5	*na*	*na*	*na*
Sm	ppm	0.005	5	*na*	0.532	0.00795	1.49	*na*
Sn	ppm	0.05	5	*na*	<0.05	*na*	*na*	*na*
Sr	ppm	0.05	5	*na*	14.4	0.309	2.14	*na*
Ta	ppm	0.01	5	*na*	<0.01	*na*	*na*	*na*
Tb	ppm	0.005	5	*na*	0.107	0.00207	1.93	*na*
Te	ppm	0.05	5	*na*	<0.05	*na*	*na*	*na*
Th	ppm	0.01	5	*na*	0.0300	0	0	*na*
Ti	ppm	1	5	*na*	5.40	0.548	10.1	*na*
Tl	ppm	0.005	5	*na*	0.0156	0.00134	8.60	*na*
Tm	ppm	0.005	5	*na*	0.0424	0.000894	2.11	*na*
U	ppm	0.005	5	*na*	0.0890	0.00283	3.18	*na*
V	ppm	0.05	5	*na*	1.11	0.0534	4.81	*na*
W	ppm	0.01	5	*na*	<0.01	*na*	*na*	*na*
Y	ppm	0.005	5	*na*	3.62	0.0342	0.944	*na*
Yb	ppm	0.005	5	*na*	0.212	0.00295	1.39	*na*
Zn	ppm	0.2	5	*na*	0.720	0.0837	11.6	*na*
Zr	ppm	0.05	5	*na*	0.678	0.0259	3.82	*na*

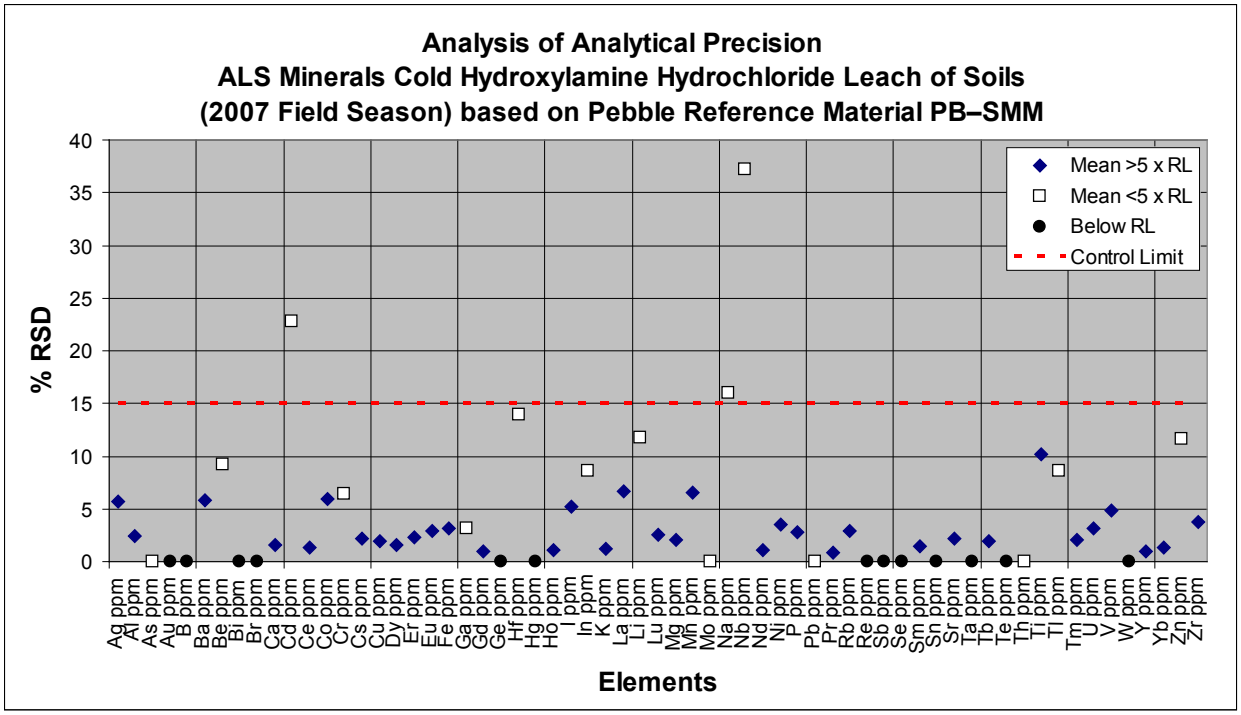

Figure 8-7. Precision plot for five analyses of Pebble reference material PB–SMM by cold hydroxylamine hydrochloride leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 8-6. Summary statistics for assessing analytical variation on duplicate samples; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2008 field season).

[ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	0.002	5	<0.002	0.0370	0.0126	0.000707	5.60
Al	ppm	1	5	376	4,670	2,050	245	11.9
As	ppm	0.1	5	<0.1	0.200	0.107	0.0320	29.8
Au	ppm	0.05	5	<0.05	<0.05	<0.05	*na*	*na*
B	ppm	2	5	<2	<2	<2	*na*	*na*
Ba	ppm	0.05	5	11.2	111	59.6	12.3	20.6
Be	ppm	0.05	5	<0.05	0.200	0.118	0.0203	17.3
Bi	ppm	0.005	5	<0.005	<0.005	<0.005	*na*	*na*
Br	ppm	2	5	<2	5.00	2.64	0.322	12.2
Ca	ppm	10	5	10.0	12,000	4,220	1,640	38.9
Cd	ppm	0.01	5	0.0100	0.0900	0.0300	0.00894	29.8
Ce	ppm	0.005	5	0.199	6.76	2.66	0.0875	3.28
Co	ppm	0.05	5	<0.05	0.880	0.358	0.122	34.2
Cr	ppm	0.05	5	0.0500	0.350	0.184	0.0161	8.76
Cs	ppm	0.005	5	<0.005	0.0820	0.0400	0.00187	4.68
Cu	ppm	0.05	5	<0.05	1.08	0.626	0.0249	3.99
Dy	ppm	0.005	5	0.0200	0.983	0.311	0.0169	5.43
Er	ppm	0.005	5	0.0120	0.495	0.158	0.00387	2.45
Eu	ppm	0.005	5	0.00800	0.272	0.0920	0.00322	3.51
Fe	ppm	5	5	216	818	436	111	25.4
Ga	ppm	0.05	5	0.0500	0.240	0.142	0.00775	5.45
Gd	ppm	0.005	5	0.0200	1.17	0.368	0.00766	2.08
Ge	ppm	0.1	5	<0.1	<0.1	<0.1	*na*	*na*

Table 8-6. Summary statistics for assessing analytical variation on duplicate samples; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2008 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Hf	ppm	0.01	5	<0.01	0.0500	0.0196	0.00447	22.8
Hg	ppm	0.1	5	<0.1	<0.1	<0.1	*na*	*na*
Ho	ppm	0.005	5	<0.005	0.181	0.0575	0.00247	4.31
I	ppm	0.1	5	<0.1	4.50	1.25	0.0548	4.39
In	ppm	0.005	5	<0.005	0.00600	<0.005	*na*	*na*
K	ppm	5	5	8.00	40.0	25.6	7.03	27.5
La	ppm	0.005	5	0.121	4.06	1.52	0.0478	3.14
Li	ppm	0.05	5	<0.05	0.110	0.0551	0.0126	23.0
Lu	ppm	0.005	5	<0.005	0.0530	0.0175	0.000316	1.81
Mg	ppm	1	5	16.0	880	287	119	41.5
Mn	ppm	0.1	5	2.50	53.4	25.1	7.36	29.3
Mo	ppm	0.01	5	<0.01	0.0200	0.0105	0.00316	30.2
Na	ppm	10	5	10.0	40.0	24.0	10.0	41.7
Nb	ppm	0.01	5	<0.01	0.0400	0.0166	0.00319	19.1
Nd	ppm	0.005	5	0.0710	4.62	1.48	0.0269	1.81
Ni	ppm	0.05	5	0.0700	1.45	0.383	0.139	36.3
P	ppm	5	5	<5	341	83.6	4.84	5.79
Pb	ppm	0.1	5	0.100	0.600	0.290	0.0548	18.9
Pr	ppm	0.005	5	0.0200	1.09	0.362	0.0138	3.82
Rb	ppm	0.01	5	0.0100	0.700	0.343	0.00949	2.77
Re	ppm	0.001	5	<0.001	0.00100	<0.001	*na*	*na*
Sb	ppm	0.005	5	<0.005	0.00700	<0.005	*na*	*na*
Se	ppm	0.5	5	<0.5	<0.5	<0.5	*na*	*na*
Sm	ppm	0.005	5	0.0110	1.05	0.326	0.00618	1.90
Sn	ppm	0.05	5	<0.05	<0.05	<0.05	*na*	*na*
Sr	ppm	0.05	5	0.300	88.8	32.4	16.6	51.2
Ta	ppm	0.01	5	<0.01	<0.01	<0.01	*na*	*na*
Tb	ppm	0.005	5	<0.005	0.178	0.0563	0.00195	3.46
Te	ppm	0.05	5	<0.05	<0.05	<0.05	*na*	*na*
Th	ppm	0.01	5	<0.01	0.0400	0.0195	0	0
Ti	ppm	1	5	2.00	20.0	7.50	1.05	14.0
Tl	ppm	0.005	5	<0.005	0.0150	0.00910	0.000894	9.83
Tm	ppm	0.005	5	<0.005	0.0700	0.0226	0.000961	4.26
U	ppm	0.005	5	<0.005	0.0680	0.0388	0.00570	14.7
V	ppm	0.05	5	0.150	5.00	1.75	0.593	33.9
W	ppm	0.01	5	<0.01	0.0100	<0.01	*na*	*na*
Y	ppm	0.005	5	0.164	5.66	1.76	0.104	5.89
Yb	ppm	0.005	5	0.0100	0.357	0.112	0.00634	5.68
Zn	ppm	0.2	5	0.300	1.00	0.540	0.141	26.2
Zr	ppm	0.05	5	<0.05	1.46	0.538	0.0350	6.50

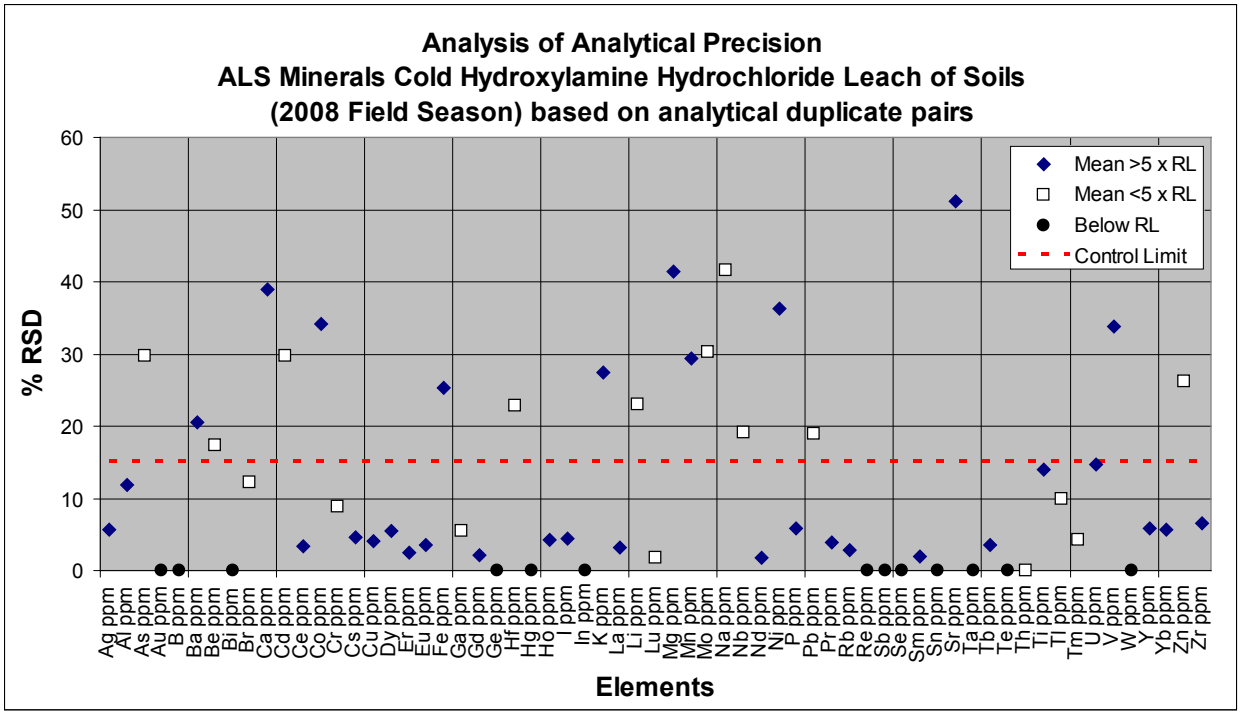

Figure 8-8. Precision plot for five analytical duplicate sample pairs by cold hydroxylamine hydrochloride leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 8-7. Summary statistics for assessing analytical variation on the standard reference material LK4–ALG; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2008 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	2	0.00300	0.00350	0.00212	60.6	117
Al	ppm	1.0	2	1,740	1,600	28.3	1.77	92.0
As	ppm	0.1	2	1.65	1.80	0	0	109
Au	ppm	0.05	2	0.0720	<0.05	*na*	*na*	62.7
B	ppm	2.0	2	3.90	3.00	0	0	76.9
Ba	ppm	0.05	2	11.8	13.3	0.601	4.53	113
Be	ppm	0.05	2	0.115	0.135	0.00707	5.24	117
Bi	ppm	0.005	2	0.00720	<0.005	*na*	*na*	66.0
Br	ppm	2.0	2	3.40	2.50	0.707	28.3	73.5
Ca	ppm	10	2	6,880	7,080	84.9	1.20	103
Cd	ppm	0.01	2	1.07	1.17	0.0141	1.21	109
Ce	ppm	0.005	2	5.17	5.53	0	0	107
Co	ppm	0.05	2	2.27	2.38	0.163	6.85	105
Cr	ppm	0.05	2	0.235	0.310	0.0141	4.56	132
Cs	ppm	0.005	2	0.0410	0.0500	0.00141	2.83	122
Cu	ppm	0.05	2	1.86	2.06	0.0283	1.37	111
Dy	ppm	0.005	2	0.308	0.347	0.00141	0.408	113
Er	ppm	0.005	2	0.192	0.209	0	0	109
Eu	ppm	0.005	2	0.0770	0.0875	0.000707	0.808	114
Fe	ppm	5.0	2	869	834	75.0	8.99	96.0
Ga	ppm	0.05	2	0.200	0.250	0.0141	5.66	125
Gd	ppm	0.005	2	0.402	0.434	0.00424	0.978	108
Ge	ppm	0.1	2	0.140	<0.1	*na*	*na*	65.1

Table 8-7. Summary statistics for assessing analytical variation on the standard reference material LK4–ALG; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2008 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Hf	ppm	0.01	2	0.0200	0.0100	0	0	50.0
Hg	ppm	0.1	2	0.140	<0.1	*na*	*na*	65.1
Ho	ppm	0.005	2	0.0650	0.0730	0.00141	1.94	112
I	ppm	0.1	2	0.140	0.200	0	0	143
In	ppm	0.005	2	0.0160	0.0225	0.000707	3.14	141
K	ppm	5.0	2	119	132	2.83	2.14	111
La	ppm	0.005	2	4.08	4.34	0.0141	0.326	107
Li	ppm	0.05	2	0.0720	0.0850	0.00707	8.32	118
Lu	ppm	0.005	2	0.0190	0.0255	0.000707	2.77	134
Mg	ppm	1.0	2	429	385	1.41	0.367	89.7
Mn	ppm	0.1	2	253	249	0	0	98.6
Mo	ppm	0.01	2	0.0140	0.0100	0	0	71.4
Na	ppm	10	2	35.0	30.0	0	0	85.7
Nb	ppm	0.01	2	0.0140	0.0200	0	0	143
Nd	ppm	0.005	2	2.12	2.26	0	0	106
Ni	ppm	0.05	2	8.21	8.53	0.346	4.06	104
P	ppm	5.0	2	142	156	14.1	9.07	110
Pb	ppm	0.1	2	20.6	22.2	0.141	0.637	108
Pr	ppm	0.005	2	0.621	0.661	0.00707	1.07	106
Rb	ppm	0.01	2	0.735	0.785	0.0212	2.70	107
Re	ppm	0.001	2	0.00140	0.00100	0	0	71.4
Sb	ppm	0.005	2	0.105	0.118	0.000707	0.602	112
Se	ppm	0.5	2	0.620	<0.5	*na*	*na*	72.8
Sm	ppm	0.005	2	0.326	0.348	0.00636	1.83	107
Sn	ppm	0.05	2	0.0720	<0.05	*na*	*na*	62.7
Sr	ppm	0.05	2	24.0	25.3	0.283	1.12	106
Ta	ppm	0.01	2	0.0140	<0.01	*na*	*na*	65.1
Tb	ppm	0.005	2	0.0550	0.0625	0.00212	3.39	114
Te	ppm	0.05	2	0.0720	<0.05	*na*	*na*	62.7
Th	ppm	0.01	2	0.0350	0.0350	0.00707	20.2	100
Ti	ppm	1.0	2	2.00	3.00	0	0	150
Tl	ppm	0.005	2	0.156	0.173	0.00424	2.45	111
Tm	ppm	0.005	2	0.0240	0.0295	0.00212	7.19	123
U	ppm	0.005	2	2.38	2.55	0.0778	3.06	107
V	ppm	0.05	2	5.00	5.14	0.269	5.23	103
W	ppm	0.01	2	0.0140	<0.01	*na*	*na*	65.1
Y	ppm	0.005	2	2.89	3.10	0.106	3.43	107
Yb	ppm	0.005	2	0.149	0.160	0.00424	2.65	107
Zn	ppm	0.2	2	68.5	69.4	3.11	4.48	101
Zr	ppm	0.05	2	0.102	0.155	0.0212	13.7	152

[1]ALS Minerals reports a target range for SRMs. The average of the upper and lower target range is used for a Target Value.

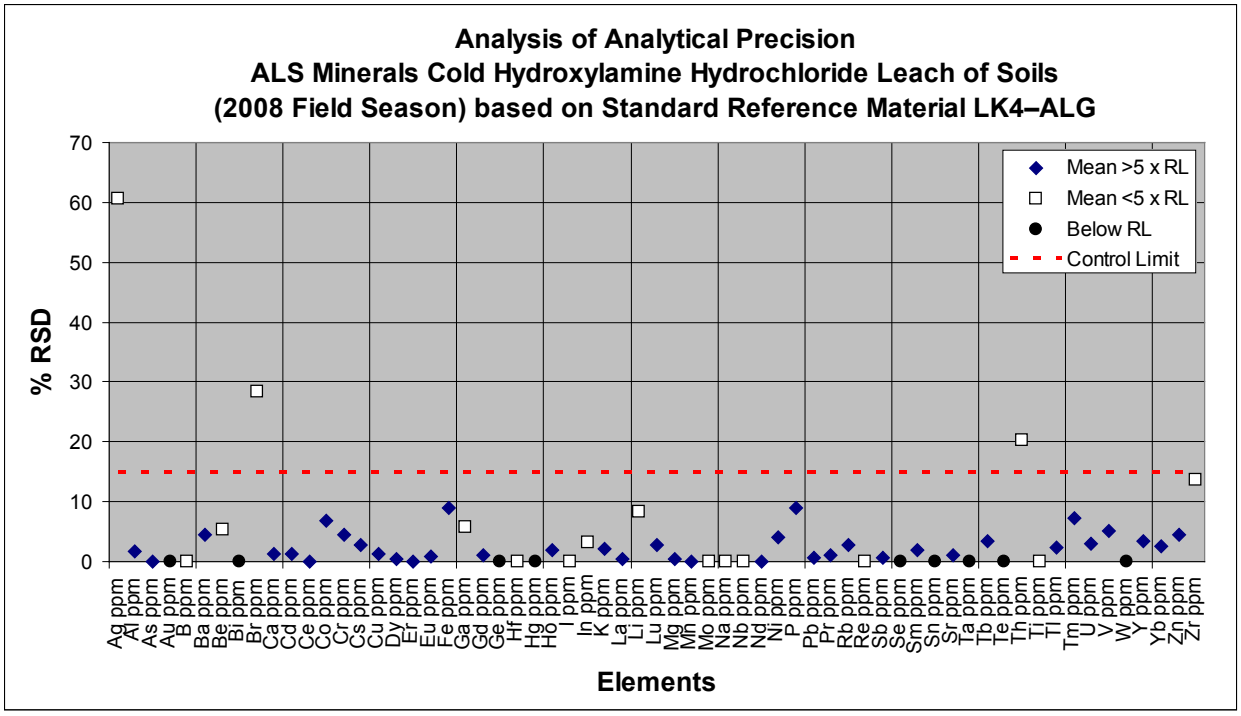

Figure 8-9. Precision plot for two analyses of standard reference material LK4–ALG by cold hydroxylamine hydrochloride leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

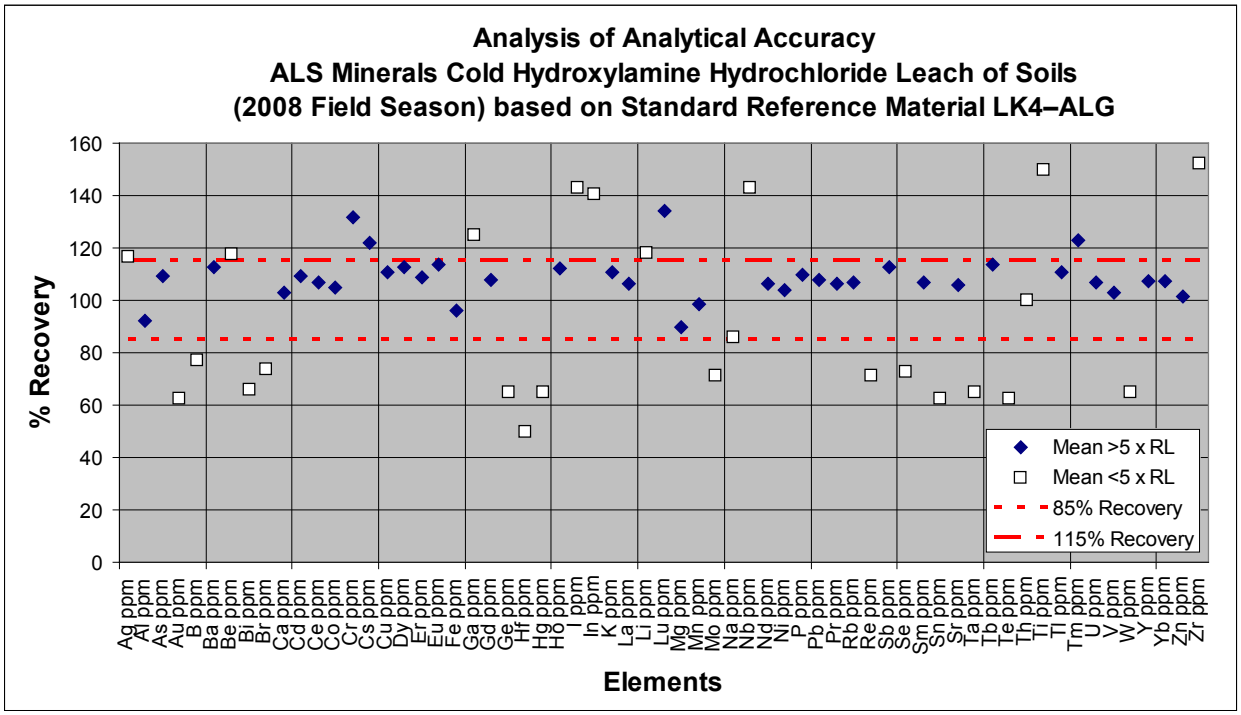

Figure 8-10. Accuracy plot for two analyses of standard reference material LK4–ALG by cold hydroxylamine hydrochloride leach (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 8-8. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2008 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	8	0.0156	0.0255	0.00160	6.29	163
Al	ppm	1.0	8	3,008	2,620	205	7.84	87.1
As	ppm	0.1	8	*na*	0.100	0	0	*na*
Au	ppm	0.05	8	*na*	<0.05	*na*	*na*	*na*
B	ppm	2.0	8	*na*	<2	*na*	*na*	*na*
Ba	ppm	0.05	8	63.6	61.1	2.61	4.28	96.1
Be	ppm	0.05	8	0.162	0.165	0.0298	18.0	102
Bi	ppm	0.005	8	*na*	<0.005	*na*	*na*	*na*
Br	ppm	2.0	8	*na*	3.10	1.15	37.2	*na*
Ca	ppm	10	8	1,540	1,490	34.8	2.34	96.7
Cd	ppm	0.01	8	0.0240	0.0225	0.00463	20.6	93.8
Ce	ppm	0.005	8	5.09	4.96	0.175	3.53	97.3
Co	ppm	0.05	8	1.09	0.921	0.0774	8.40	84.5
Cr	ppm	0.05	8	0.220	0.250	0.0288	11.5	114
Cs	ppm	0.005	8	0.0536	0.0683	0.00255	3.74	127
Cu	ppm	0.05	8	10.3	11.0	0.529	4.82	107
Dy	ppm	0.005	8	0.588	0.616	0.0145	2.35	105
Er	ppm	0.005	8	0.296	0.310	0.00489	1.58	105
Eu	ppm	0.005	8	0.153	0.170	0.00483	2.84	111
Fe	ppm	5.0	8	406	391	40.7	10.4	96.3
Ga	ppm	0.05	8	0.142	0.161	0.0181	11.2	114
Gd	ppm	0.005	8	0.684	0.725	0.0141	1.95	106
Ge	ppm	0.1	8	*na*	<0.1	*na*	*na*	*na*
Hf	ppm	0.01	8	0.0320	0.0288	0.00354	12.3	89.8
Hg	ppm	0.1	8	*na*	<0.1	*na*	*na*	*na*
Ho	ppm	0.005	8	0.120	0.117	0.00385	3.30	97.3
I	ppm	0.1	8	1.06	1.40	0.120	8.54	132
In	ppm	0.005	8	*na*	<0.005	*na*	*na*	*na*
K	ppm	5.0	8	46.4	53.4	2.56	4.80	115
La	ppm	0.005	8	2.77	2.81	0.0711	2.53	101
Li	ppm	0.05	8	0.0600	0.0513	0.00912	17.8	85.5
Lu	ppm	0.005	8	0.0328	0.0331	0.00189	5.69	101
Mg	ppm	1.0	8	148	143	7.77	5.43	96.4
Mn	ppm	0.1	8	72.7	66.3	6.06	9.14	91.3
Mo	ppm	0.01	8	*na*	0.0125	0.00463	37.0	125
Na	ppm	10	8	28.0	33.8	27.7	82.2	121
Nb	ppm	0.01	8	*na*	0.0163	0.00916	56.4	*na*
Nd	ppm	0.005	8	2.78	2.83	0.107	3.79	102
Ni	ppm	0.05	8	0.386	0.345	0.0207	6.00	89.4
P	ppm	5.0	8	57.8	56.8	9.10	16.0	98.2
Pb	ppm	0.1	8	0.500	0.538	0.0744	13.8	108
Pr	ppm	0.005	8	0.705	0.692	0.0330	4.77	98.2
Rb	ppm	0.01	8	0.616	0.719	0.0242	3.36	117
Re	ppm	0.001	8	*na*	<0.001	*na*	*na*	*na*
Sb	ppm	0.005	8	*na*	<0.005	*na*	*na*	*na*
Se	ppm	0.5	8	*na*	<0.5	*na*	*na*	*na*
Sm	ppm	0.005	8	0.532	0.585	0.0150	2.57	110
Sn	ppm	0.05	8	*na*	<0.05	*na*	*na*	*na*
Sr	ppm	0.05	8	14.4	13.5	0.252	1.87	93.4
Ta	ppm	0.01	8	*na*	<0.01	*na*	*na*	*na*
Tb	ppm	0.005	8	0.107	0.109	0.00238	2.18	101
Te	ppm	0.05	8	*na*	<0.05	*na*	*na*	*na*
Th	ppm	0.01	8	0.0300	0.0213	0.00835	39.3	70.8
Ti	ppm	1.0	8	5.40	6.13	1.36	22.1	113
Tl	ppm	0.005	8	0.0156	0.0160	0.000756	4.72	103

Table 8-8. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2008 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tm	ppm	0.005	8	0.0424	0.0428	0.00167	3.90	101
U	ppm	0.005	8	0.0890	0.106	0.00430	4.05	119
V	ppm	0.05	8	1.11	0.983	0.0392	3.99	88.5
W	ppm	0.01	8	*na*	<0.01	*na*	*na*	*na*
Y	ppm	0.005	8	3.62	3.63	0.0918	2.53	100
Yb	ppm	0.005	8	0.212	0.228	0.00450	1.98	107
Zn	ppm	0.2	8	0.720	0.700	0.0756	10.8	97.2
Zr	ppm	0.05	8	0.678	0.784	0.0891	11.4	116

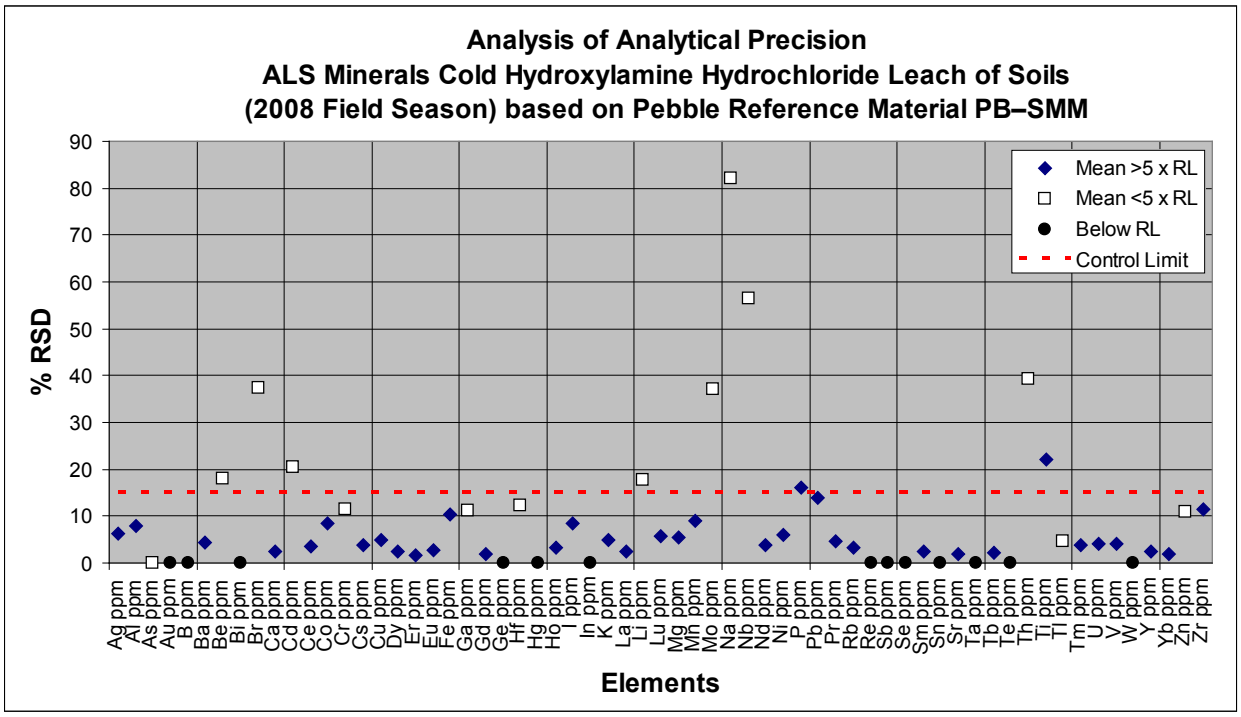

Figure 8-11. Precision plot for eight analyses of Pebble reference material PB–SMM by cold hydroxylamine hydrochloride leach (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

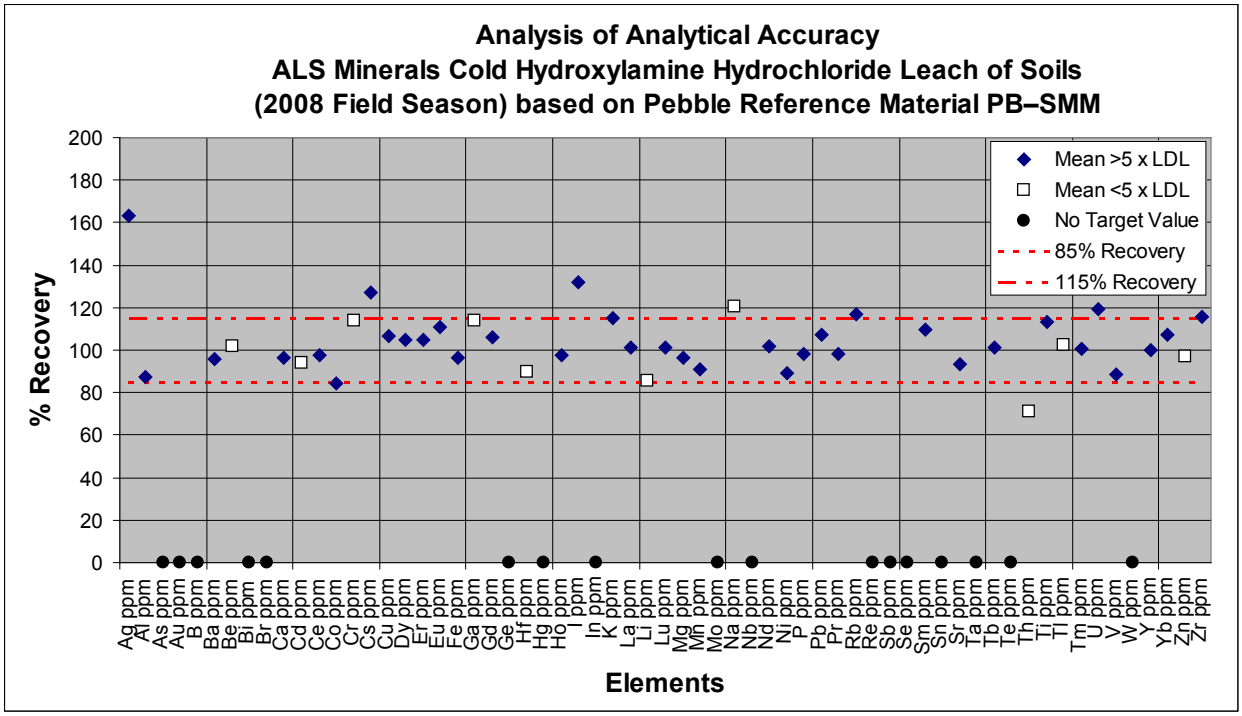

Figure 8-12. Accuracy plot for eight analyses of Pebble reference material PB–SMM by cold hydroxylamine hydrochloride leach (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 8-9. Summary statistics for assessing analytical variation on duplicate samples; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2009 field season).

[ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	0.002	1	<0.002	0.00200	<0.002	*na*	*na*
Al	ppm	1	1	2,020	2,400	2,210	269	12.2
As	ppm	0.1	1	<0.1	<0.1	<0.1	*na*	*na*
Au	ppm	0.05	1	<0.05	<0.05	<0.05	*na*	*na*
B	ppm	2	1	<2	<2	<2	*na*	*na*
Ba	ppm	0.05	1	5.64	6.16	5.90	0.368	6.23
Be	ppm	0.05	1	<0.05	<0.05	<0.05	*na*	*na*
Bi	ppm	0.005	1	<0.005	<0.005	<0.005	*na*	*na*
Br	ppm	2	1	<2	<2	<2	*na*	*na*
Ca	ppm	10	1	20.0	30.0	25.0	7.07	28.3
Cd	ppm	0.01	1	<0.01	<0.01	<0.01	*na*	*na*
Ce	ppm	0.005	1	0.223	0.243	0.233	0.0141	6.07
Co	ppm	0.05	1	<0.05	0.0500	<0.05	*na*	*na*
Cr	ppm	0.05	1	0.0800	0.0900	0.0850	0.00707	8.32
Cs	ppm	0.005	1	0.0220	0.0220	0.0220	0	0
Cu	ppm	0.05	1	<0.05	0.0600	0.0526	0.0105	20.0
Dy	ppm	0.005	1	0.0210	0.0220	0.0215	0.000707	3.29
Er	ppm	0.005	1	0.0110	0.0110	0.0110	0	0
Eu	ppm	0.005	1	0.00700	0.0100	0.00850	0.00212	25.0
Fe	ppm	5	1	301	338	320	26.2	8.19
Ga	ppm	0.05	1	<0.05	<0.05	<0.05	*na*	*na*
Gd	ppm	0.005	1	0.0220	0.0270	0.0245	0.00354	14.4
Ge	ppm	0.1	1	<0.1	<0.1	<0.1	*na*	*na*

Table 8-9. Summary statistics for assessing analytical variation on duplicate samples; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2009 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Hf	ppm	0.01	1	0.0100	0.0100	0.0100	0	0
Hg	ppm	0.1	1	<0.1	<0.1	<0.1	*na*	*na*
Ho	ppm	0.005	1	0.00500	0.00500	0.00500	0	0
I	ppm	0.1	1	0.900	0.900	0.900	0	0
In	ppm	0.005	1	<0.005	<0.005	<0.005	*na*	*na*
K	ppm	5	1	9.00	11.0	10.0	1.41	14.1
La	ppm	0.005	1	0.151	0.165	0.158	0.00990	6.27
Li	ppm	0.05	1	<0.05	<0.05	<0.05	*na*	*na*
Lu	ppm	0.005	1	<0.005	<0.005	<0.005	*na*	*na*
Mg	ppm	1	1	3.00	5.00	4.00	1.41	35.4
Mn	ppm	0.1	1	3.10	3.10	3.10	0	0
Mo	ppm	0.01	1	<0.01	<0.01	<0.01	*na*	*na*
Na	ppm	10	1	<10	30.0	19.6	14.8	75.5
Nb	ppm	0.01	1	0.0100	0.0100	0.0100	0	0
Nd	ppm	0.005	1	0.0910	0.100	0.0955	0.00636	6.66
Ni	ppm	0.05	1	<0.05	0.100	0.0726	0.0388	53.5
P	ppm	5	1	<5	8.00	6.26	2.47	39.4
Pb	ppm	0.1	1	<0.1	0.400	0.246	0.218	88.9
Pr	ppm	0.005	1	0.0230	0.0240	0.0235	0.000707	3.01
Rb	ppm	0.01	1	0.170	0.180	0.175	0.00707	4.04
Re	ppm	0.001	1	<0.001	0.00100	<0.001	*na*	*na*
Sb	ppm	0.005	1	<0.005	<0.005	<0.005	*na*	*na*
Se	ppm	0.5	1	<0.5	<0.5	<0.5	*na*	*na*
Sm	ppm	0.005	1	0.0160	0.0190	0.0175	0.00212	12.1
Sn	ppm	0.05	1	<0.05	<0.05	<0.05	*na*	*na*
Sr	ppm	0.05	1	0.500	0.510	0.505	0.00707	1.40
Ta	ppm	0.01	1	<0.01	<0.01	<0.01	*na*	*na*
Tb	ppm	0.005	1	<0.005	<0.005	<0.005	*na*	*na*
Te	ppm	0.05	1	<0.05	<0.05	<0.05	*na*	*na*
Th	ppm	0.01	1	0.0100	0.0100	0.0100	0	0
Ti	ppm	1	1	3.00	5.00	4.00	1.41	35.4
Tl	ppm	0.005	1	0.0100	0.0120	0.0110	0.00141	12.9
Tm	ppm	0.005	1	<0.005	<0.005	<0.005	*na*	*na*
U	ppm	0.005	1	<0.005	<0.005	<0.005	*na*	*na*
V	ppm	0.05	1	0.230	0.250	0.240	0.0141	5.89
W	ppm	0.01	1	<0.01	<0.01	<0.01	*na*	*na*
Y	ppm	0.005	1	0.141	0.146	0.144	0.00354	2.46
Yb	ppm	0.005	1	0.00900	0.0110	0.0100	0.00141	14.1
Zn	ppm	0.2	1	0.400	0.400	0.400	0	0
Zr	ppm	0.05	1	0.170	0.190	0.180	0.0141	7.86

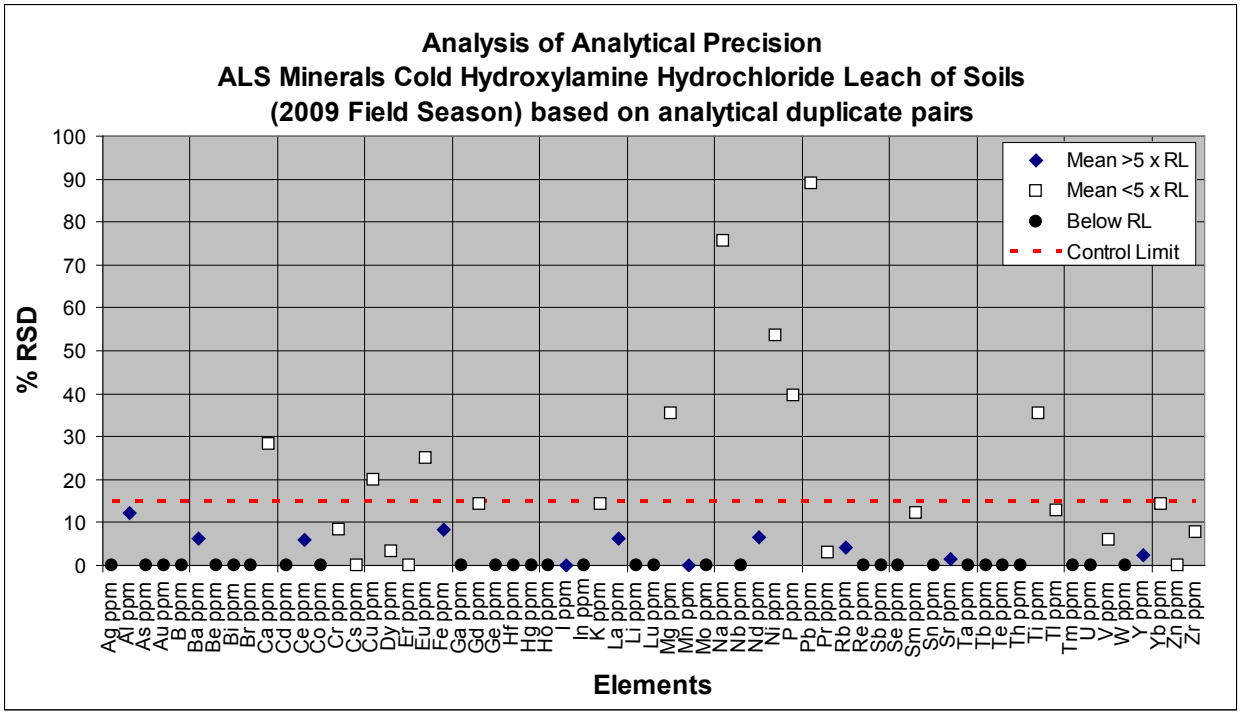

Figure 8-13. Precision plot for one analytical duplicate sample pair by cold hydroxylamine hydrochloride leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 8-10. Accuracy statistics for two standard reference materials determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2009 field season).

[ppm, parts per million; <, less than; %Recovery, percent recovery; *na*, not applicable]

Cold Hydroxylamine HCl Leach			Results for LK3–CWH			Results for LK4–CWH		
Element	Units	Reporting Limit	Target Value	Measured Value	%Recovery	Target Value	Measured Value	%Recovery
Ag	ppm	0.002	0.00441	0.00400	90.8	0.00291	<0.002	62.3
Al	ppm	1	312	340	109	927	947	102
As	ppm	0.1	1.65	1.80	109	0.950	1.10	116
Au	ppm	0.05	0.0726	<0.05	62.2	0.0726	<0.05	62.2
B	ppm	2	2.41	<2	75.3	3.91	4.00	102
Ba	ppm	0.05	63.8	59.5	93.3	9.60	9.89	103
Be	ppm	0.05	0.0926	0.0700	75.6	0.103	0.0800	78.0
Bi	ppm	0.005	0.00976	0.0130	133	0.00726	<0.005	62.2
Br	ppm	2	2.41	<2	75.3	3.41	2.00	58.7
Ca	ppm	10	3,280	3,500	107	5,855	6,260	107
Cd	ppm	0.01	0.335	0.320	95.5	0.790	0.770	97.5
Ce	ppm	0.005	1.24	1.34	108	0.750	0.684	91.2
Co	ppm	0.05	2.80	2.87	103	2.06	2.22	108
Cr	ppm	0.05	0.430	0.520	121	0.200	0.240	120
Cs	ppm	0.005	0.0103	0.0140	137	0.0230	0.0290	126
Cu	ppm	0.05	0.270	0.310	115	0.160	0.210	131
Dy	ppm	0.005	0.0540	0.0620	115	0.0430	0.0470	109
Er	ppm	0.005	0.0360	0.0450	125	0.0280	0.0310	111
Eu	ppm	0.005	0.0250	0.0280	112	0.0103	0.0150	146
Fe	ppm	5	1,042	1,040	99.8	817	819	100
Ga	ppm	0.05	0.0726	0.0800	110	0.0726	<0.05	62.2
Gd	ppm	0.005	0.0920	0.102	111	0.0600	0.0670	112
Ge	ppm	0.1	0.146	<0.1	62.6	0.146	<0.1	62.6

Table 8-10. Accuracy statistics for two standard reference materials determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2009 field season)—Continued.

Cold Hydroxylamine HCl Leach			Results for LK3–CWH			Results for LK4–CWH		
Element	Units	Reporting Limit	Target Value	Measured Value	%Recovery	Target Value	Measured Value	%Recovery
Hf	ppm	0.01	0.0146	0.0100	68.7	0.0146	<0.01	62.6
Hg	ppm	0.1	0.146	<0.1	62.6	0.146	<0.1	62.6
Ho	ppm	0.005	0.0103	0.0150	146	0.00926	0.0110	119
I	ppm	0.1	0.146	0.100	68.7	0.146	0.200	137
In	ppm	0.005	0.00726	<0.005	62.2	0.00726	<0.005	62.2
K	ppm	5	194	187	96.4	123	128	104
La	ppm	0.005	1.03	1.14	110	0.659	0.622	94.4
Li	ppm	0.05	0.170	0.230	135	0.0726	0.0900	124
Lu	ppm	0.005	0.00726	0.00700	96.5	0.00726	0.00500	68.9
Mg	ppm	1	414	420	101	403	412	102
Mn	ppm	0.1	713	734	103	222	241	109
Mo	ppm	0.01	0.0146	0.0100	68.7	0.0146	0.0100	68.7
Na	ppm	10	65.0	80.0	123	35.0	50.0	143
Nb	ppm	0.01	0.0146	0.0200	137	0.0146	0.0100	68.7
Nd	ppm	0.005	0.528	0.577	109	0.311	0.296	95.2
Ni	ppm	0.05	3.34	3.27	97.9	4.67	4.96	106
P	ppm	5	32.0	40.0	125	61.0	72.0	118
Pb	ppm	0.1	0.450	0.600	133	4.00	3.90	97.5
Pr	ppm	0.005	0.140	0.157	112	0.0840	0.0800	95.2
Rb	ppm	0.01	0.920	0.900	97.8	0.710	0.700	98.6
Re	ppm	0.001	0.00146	<0.001	62.6	0.00146	0.00100	68.7
Sb	ppm	0.005	0.0430	0.0480	112	0.116	0.115	99.6
Se	ppm	0.5	0.626	<0.5	170	0.626	<0.5	170
Sm	ppm	0.005	0.0805	0.0930	116	0.0510	0.0460	90.2
Sn	ppm	0.05	0.0726	<0.05	62.2	0.0726	<0.05	62.2
Sr	ppm	0.05	10.7	9.93	92.5	22.9	21.8	95.4
Ta	ppm	0.01	0.0146	<0.01	62.6	0.0146	<0.01	62.6
Tb	ppm	0.005	0.0103	0.0130	127	0.00726	0.00900	124
Te	ppm	0.05	0.0726	<0.05	62.2	0.0726	<0.05	62.2
Th	ppm	0.01	0.0196	0.0300	153	0.0196	0.0200	102
Ti	ppm	1	1.46	2.00	137	1.46	1.00	68.7
Tl	ppm	0.005	0.0350	0.0390	111	0.131	0.136	104
Tm	ppm	0.005	0.00726	0.00600	82.7	0.00726	<0.005	62.2
U	ppm	0.005	0.0740	0.0810	109	0.408	0.423	104
V	ppm	0.05	2.23	2.41	108	2.43	2.50	103
W	ppm	0.01	0.0146	<0.01	62.6	0.0146	<0.01	62.6
Y	ppm	0.005	0.552	0.591	107	0.446	0.439	98.4
Yb	ppm	0.005	0.0300	0.0370	123	0.0260	0.0290	112
Zn	ppm	0.2	18.0	16.6	92.2	63.9	63.3	99.1
Zr	ppm	0.05	0.180	0.260	144	0.0926	0.0900	97.2

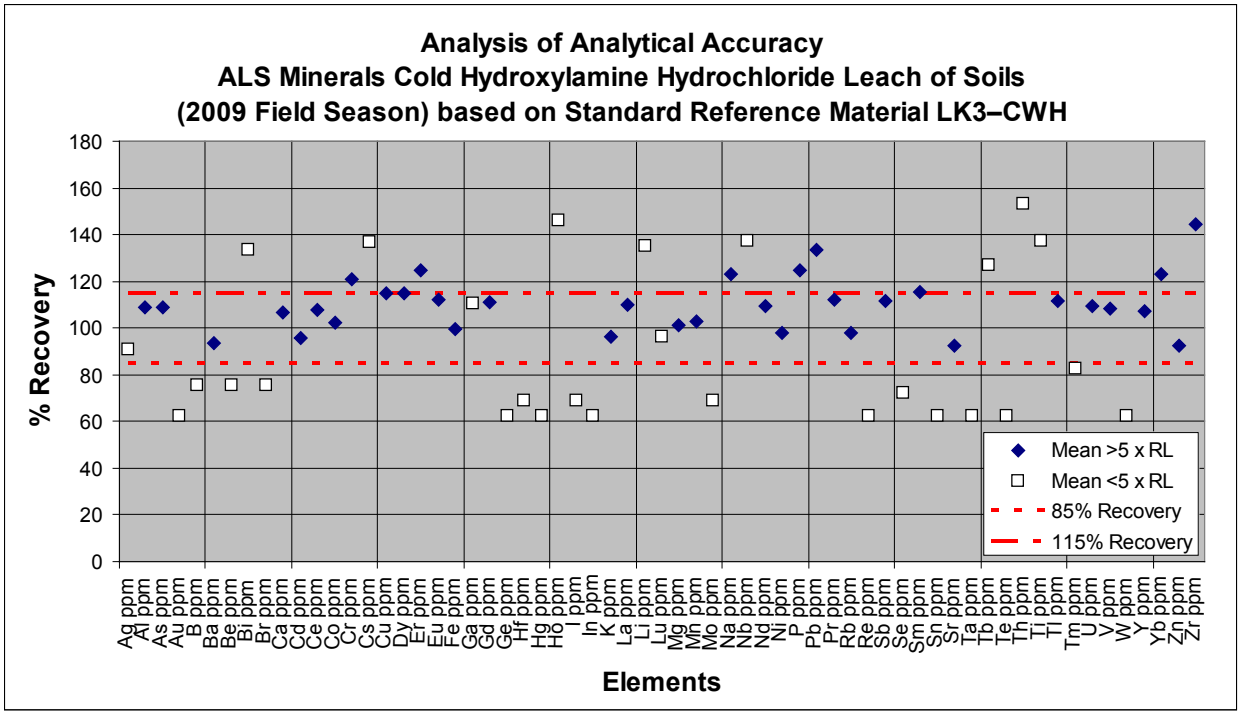

Figure 8-14. Accuracy plot for one analysis of standard reference material LK3–CWH by cold hydroxylamine hydrochloride leach (2009 field season). %Recovery is percent recovery; RL is reporting limit.

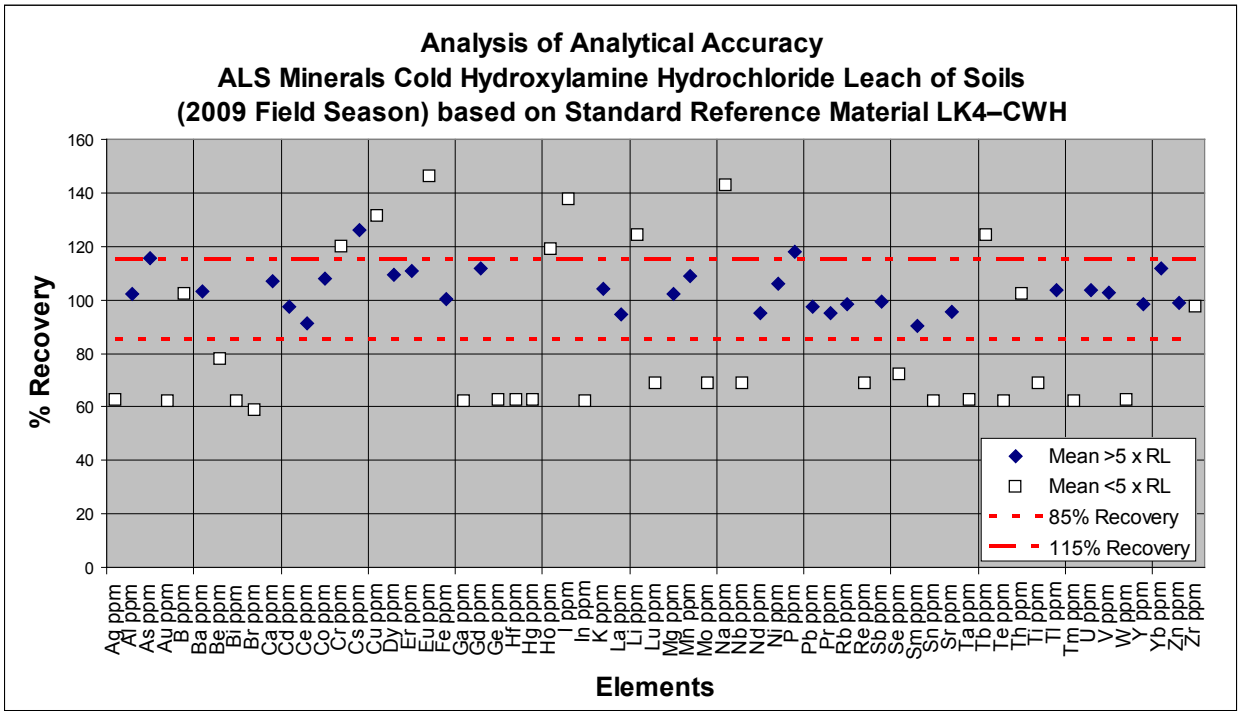

Figure 8-15. Accuracy plot for one analysis of standard reference material LK4–CWH by cold hydroxylamine hydrochloride leach (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 8-11. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2009 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	2	*na*	0.0110	0.00141	12.9	*na*
Al	ppm	1	2	*na*	1,375	35.4	2.57	*na*
As	ppm	0.1	2	*na*	<0.1	*na*	*na*	*na*
Au	ppm	0.05	2	*na*	<0.05	*na*	*na*	*na*
B	ppm	2	2	*na*	<2	*na*	*na*	*na*
Ba	ppm	0.05	2	*na*	61.5	2.33	3.80	*na*
Be	ppm	0.05	2	*na*	0.0850	0.00707	8.32	*na*
Bi	ppm	0.005	2	*na*	<0.005	*na*	*na*	*na*
Br	ppm	2	2	*na*	<2	*na*	*na*	*na*
Ca	ppm	10	2	*na*	1,410	28.3	2.01	*na*
Cd	ppm	0.01	2	*na*	0.0200	0	0	*na*
Ce	ppm	0.005	2	*na*	1.37	0.0141	1.03	*na*
Co	ppm	0.05	2	*na*	1.44	0.0212	1.48	*na*
Cr	ppm	0.05	2	*na*	0.145	0.00707	4.88	*na*
Cs	ppm	0.005	2	*na*	0.0490	0.00141	2.89	*na*
Cu	ppm	0.05	2	*na*	1.69	0.156	9.20	*na*
Dy	ppm	0.005	2	*na*	0.149	0.00778	5.24	*na*
Er	ppm	0.005	2	*na*	0.0895	0.000707	0.790	*na*
Eu	ppm	0.005	2	*na*	0.0465	0.000707	1.52	*na*
Fe	ppm	5	2	*na*	318	12.0	3.79	*na*
Ga	ppm	0.05	2	*na*	<0.05	*na*	*na*	*na*
Gd	ppm	0.005	2	*na*	0.186	0.00141	0.760	*na*
Ge	ppm	0.1	2	*na*	<0.1	*na*	*na*	*na*
Hf	ppm	0.01	2	*na*	0.0100	0	0	*na*
Hg	ppm	0.1	2	*na*	<0.1	*na*	*na*	*na*
Ho	ppm	0.005	2	*na*	0.0325	0.000707	2.18	*na*
I	ppm	0.1	2	*na*	0.700	0	0	*na*
In	ppm	0.005	2	*na*	<0.005	*na*	*na*	*na*
K	ppm	5	2	*na*	48.0	2.83	5.89	*na*
La	ppm	0.005	2	*na*	0.987	0.0191	1.94	*na*
Li	ppm	0.05	2	*na*	0.0500	0	0	*na*
Lu	ppm	0.005	2	*na*	0.00950	0.000707	7.44	*na*
Mg	ppm	1	2	*na*	141	4.24	3.01	*na*
Mn	ppm	0.1	2	*na*	99.8	0.354	0.354	*na*
Mo	ppm	0.01	2	*na*	<0.01	*na*	*na*	*na*
Na	ppm	10	2	*na*	25.0	7.07	28.3	*na*
Nb	ppm	0.01	2	*na*	<0.01	*na*	*na*	*na*
Nd	ppm	0.005	2	*na*	0.695	0.00919	1.32	*na*
Ni	ppm	0.05	2	*na*	0.310	0.0141	4.56	*na*
P	ppm	5	2	*na*	9.50	0.707	7.44	*na*
Pb	ppm	0.1	2	*na*	0.100	0	0	*na*
Pr	ppm	0.005	2	*na*	0.165	0.00141	0.857	*na*
Rb	ppm	0.01	2	*na*	0.660	0.0141	2.14	*na*
Re	ppm	0.001	2	*na*	<0.001	*na*	*na*	*na*
Sb	ppm	0.005	2	*na*	<0.005	*na*	*na*	*na*
Se	ppm	0.5	2	*na*	<0.5	*na*	*na*	*na*
Sm	ppm	0.005	2	*na*	0.127	0.00212	1.68	*na*
Sn	ppm	0.05	2	*na*	<0.05	*na*	*na*	*na*
Sr	ppm	0.05	2	*na*	12.6	0.424	3.37	*na*
Ta	ppm	0.01	2	*na*	<0.01	*na*	*na*	*na*
Tb	ppm	0.005	2	*na*	0.0280	0.00141	5.05	*na*
Te	ppm	0.05	2	*na*	<0.05	*na*	*na*	*na*
Th	ppm	0.01	2	*na*	0.0100	0	0	*na*
Ti	ppm	1	2	*na*	2.00	0	0	*na*
Tl	ppm	0.005	2	*na*	0.0150	0.00141	9.43	*na*

Table 8-11. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by a cold hydroxylamine hydrochloride leach of soil samples at ALS Minerals (2009 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tm	ppm	0.005	2	*na*	0.0125	0.000707	5.66	*na*
U	ppm	0.005	2	*na*	0.0125	0.000707	5.66	*na*
V	ppm	0.05	2	*na*	0.955	0.0354	3.70	*na*
W	ppm	0.01	2	*na*	<0.01	*na*	*na*	*na*
Y	ppm	0.005	2	*na*	1.20	0.0141	1.18	*na*
Yb	ppm	0.005	2	*na*	0.0650	0	0	*na*
Zn	ppm	0.2	2	*na*	0.650	0.0707	10.9	*na*
Zr	ppm	0.05	2	*na*	0.215	0.00707	3.29	*na*

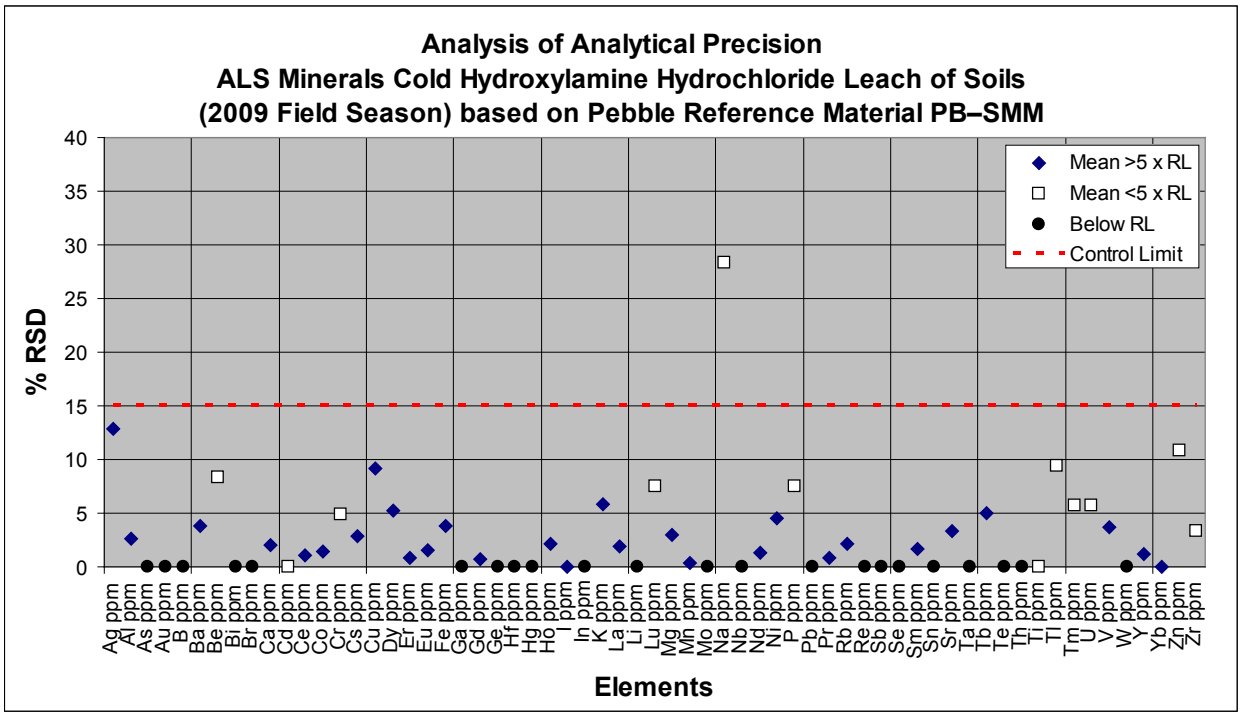

Figure 8-16. Precision plot for two analyses of Pebble reference material PB–SMM by cold hydroxylamine hydrochloride leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for ALS Minerals Ionic Leach Data

Table 9-1. Summary statistics for assessing analytical variation on the standard reference material ION–SRM18; determined by an ionic leach of soil samples at ALS Minerals (2007 and 2008 field seasons).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	3	17.6	18.9	0.569	3.01	108
As	ppb	2	3	8.00	6.33	1.15	18.2	79.2
Au	ppb	0.02	3	7.61	7.38	0.193	2.61	97.0
Ba	ppb	10	3	210	220	34.6	15.7	105
Be	ppb	0.2	3	0.300	0.260	0.121	46.6	86.8
Bi	ppb	3	3	3.00	<3	*na*	*na*	90.4
Br	ppm	0.05	3	1.42	1.53	0.0458	3.00	108
Ca	ppm	0.2	3	155	146	5.57	3.83	93.7
Cd	ppb	1	3	65.5	62.0	1.73	2.79	94.7
Ce	ppb	0.1	3	15.2	15.3	1.23	8.05	101
Co	ppb	0.3	3	61.0	62.1	3.76	6.04	102
Cr	ppb	1	3	5.50	4.67	0.577	12.4	84.8
Cs	ppb	0.1	3	7.40	7.73	0.416	5.38	105
Cu	ppb	1	3	771	748	16.4	2.20	97.0
Dy	ppb	0.1	3	1.10	1.23	0.0577	4.68	112
Er	ppb	0.1	3	0.700	0.667	0.0577	8.66	95.2
Eu	ppb	0.1	3	0.800	0.767	0.115	15.1	95.8
Fe	ppm	0.1	3	2.35	2.33	0.306	13.1	99.3
Ga	ppb	0.5	3	5.65	6.20	0.265	4.27	110
Gd	ppb	0.1	3	2.65	2.53	0.153	6.03	95.6
Ge	ppb	0.1	3	0.100	<0.1	*na*	*na*	94.1
Hf	ppb	0.5	3	0.600	<0.5	*na*	*na*	75.2
Hg	ppb	0.1	3	4.25	3.87	0.0577	1.49	91.0
Ho	ppb	0.1	3	0.100	0.167	0.0577	34.6	167
I	ppm	0.01	3	0.150	0.143	0.00577	4.03	95.6
In	ppb	0.1	3	0.150	<0.1	*na*	*na*	60.7
La	ppb	0.1	3	5.00	5.07	0.153	3.01	101
Li	ppb	0.2	3	0.400	0.367	0.0577	15.7	91.7
Lu	ppb	0.1	3	0.100	<0.1	*na*	*na*	97.0
Mg	ppm	0.01	3	73.8	74.0	0.929	1.26	100
Mn	ppm	0.01	3	0.470	0.470	0.0265	5.63	100
Mo	ppb	0.5	3	29.8	29.8	0.721	2.42	100
Nb	ppb	0.1	3	0.100	<0.1	*na*	*na*	91.1
Nd	ppb	0.1	3	12.8	11.8	0.100	0.847	92.2
Ni	ppb	1	3	551	570	31.1	5.46	103
Pb	ppb	1	3	87.0	84.0	6.56	7.81	96.6
Pd	ppb	0.1	3	11.9	12.1	0.100	0.826	102
Pr	ppb	0.1	3	2.00	1.97	0.0577	2.94	98.3
Rb	ppb	0.1	3	174	180	11.5	6.37	104
Re	ppb	0.1	3	0.100	<0.1	*na*	*na*	91.1
Sb	ppb	0.5	3	0.550	<0.5	*na*	*na*	82.0
Se	ppb	2	3	17.0	14.3	0.577	4.03	84.3
Sm	ppb	0.1	3	2.90	2.80	0.173	6.19	96.6
Sn	ppb	0.2	3	0.200	<0.2	*na*	*na*	90.6
Sr	ppb	1	3	1,123	1,130	75.7	6.68	101
Ta	ppb	1	3	1.50	<1	*na*	*na*	60.7
Tb	ppb	0.1	3	0.400	0.367	0.115	31.5	91.7
Te	ppb	1	3	1.00	<1	*na*	*na*	91.1
Th	ppb	0.02	3	3.48	3.61	*na*	*na*	104
Ti	ppb	5	3	39.0	30.7	0.577	1.88	78.6
Tl	ppb	0.5	3	0.550	<0.5	*na*	*na*	82.0
Tm	ppb	0.1	3	0.100	<0.1	*na*	*na*	97.0
U	ppb	0.1	3	9.75	9.30	0.458	4.93	95.4

Table 9-1. Summary statistics for assessing analytical variation on the standard reference material ION–SRM18; determined by an ionic leach of soil samples at ALS Minerals (2007 and 2008 field seasons)—Continued.

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
W	ppb	1	3	1.00	<1	*na*	*na*	91.1
Y	ppb	0.1	3	9.15	9.20	0.436	4.74	101
Yb	ppb	0.1	3	0.300	0.333	0.0577	17.3	111
Zn	ppb	10	3	600	547	5.77	1.06	91.1
Zr	ppb	0.1	3	4.70	5.00	0.300	6.00	106

[1]ALS Minerals reports a target range for SRMs. The average of the upper and lower target range is used for a Target Value.

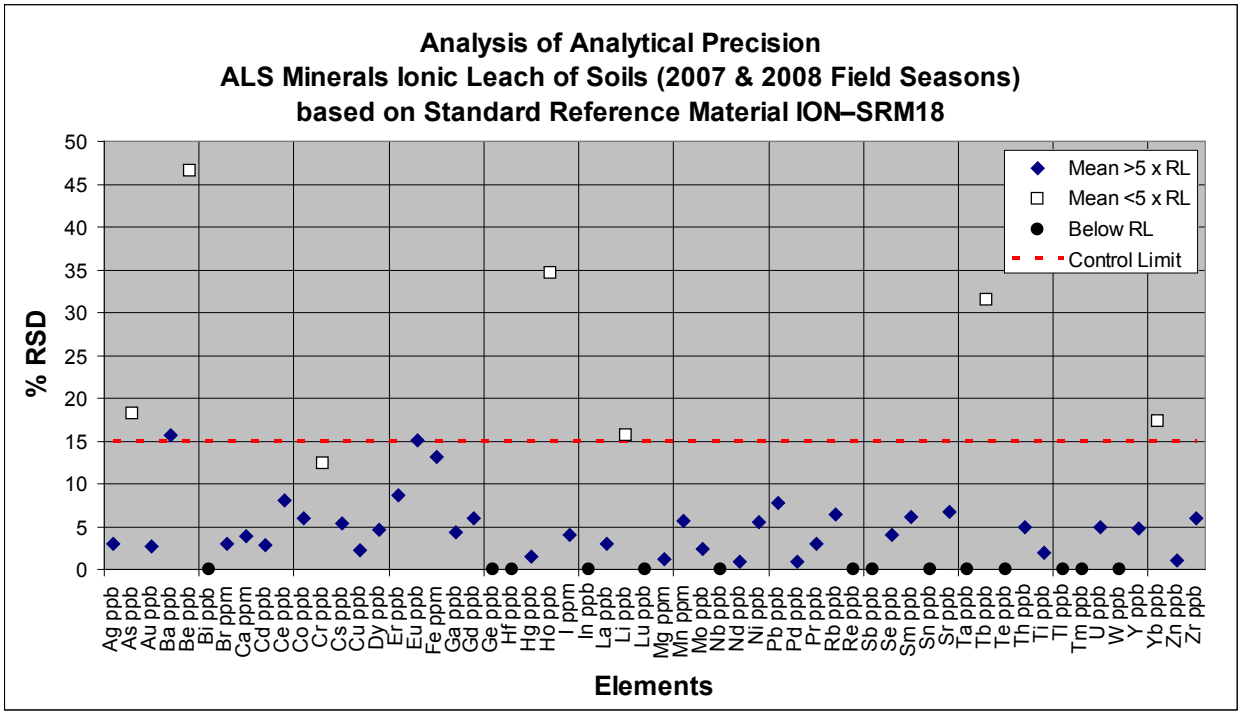

Figure 9-1. Precision plot for three analyses of standard reference material ION–SRM18 by ionic leach (2007 and 2008 field seasons). %RSD is percent relative standard deviation; RL is reporting limit.

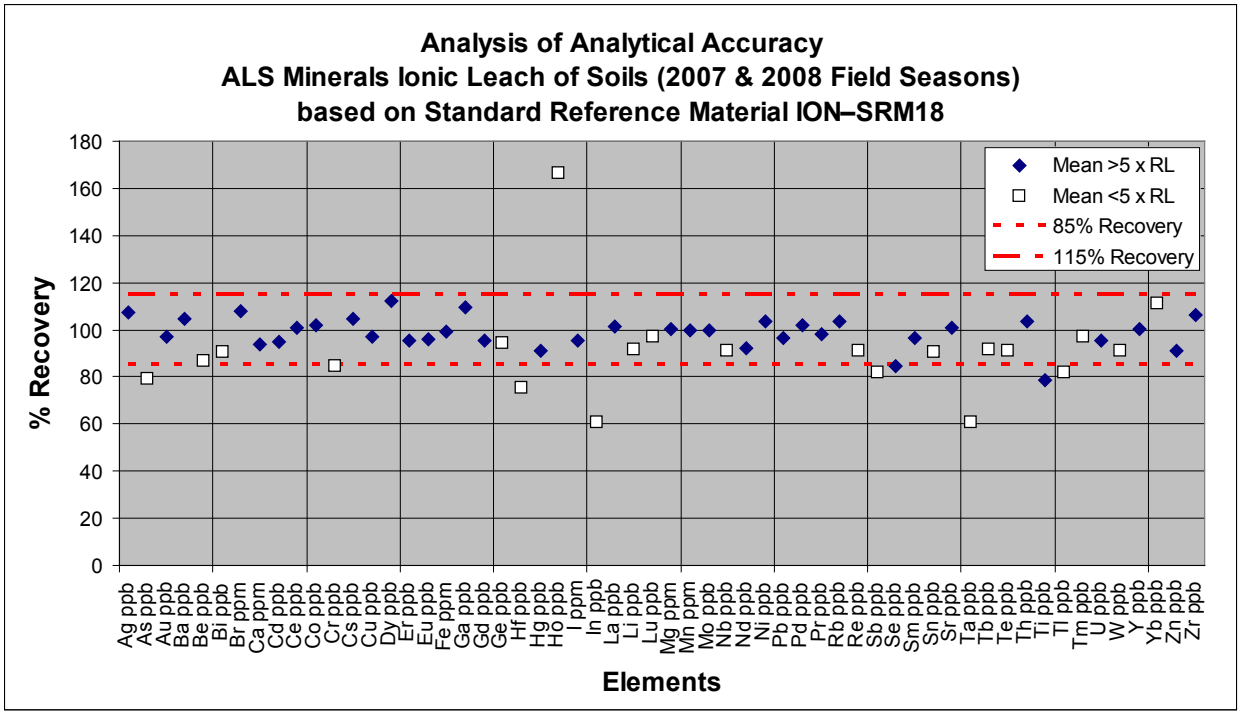

Figure 9-2. Accuracy plot for three analyses of standard reference material ION–SRM18 by ionic leach (2007 and 2008 field seasons). %Recovery is percent recovery; RL is reporting limit.

Table 9-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by an ionic leach of soil samples at ALS Minerals (2007 and 2008 field seasons).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	4	*na*	656	54.5	8.31	*na*
As	ppb	2.0	4	*na*	15.0	1.41	9.43	*na*
Au	ppb	0.02	4	*na*	47.4	10.1	21.2	*na*
Ba	ppb	10	4	*na*	1,650	319	19.3	*na*
Be	ppb	0.2	4	*na*	1.03	0.0957	9.34	*na*
Bi	ppb	3.0	4	*na*	<3	*na*	*na*	*na*
Br	ppm	0.05	4	*na*	0.220	0.0716	32.6	*na*
Ca	ppm	0.2	4	*na*	405	26.2	6.47	*na*
Cd	ppb	1.0	4	*na*	266	45.5	17.1	*na*
Ce	ppb	0.1	4	*na*	141	43.7	31.1	*na*
Co	ppb	0.3	4	*na*	79.1	9.48	12.0	*na*
Cr	ppb	1.0	4	*na*	9.00	3.16	35.1	*na*
Cs	ppb	0.1	4	*na*	36.3	3.60	9.91	*na*
Cu	ppb	1.0	4	*na*	22,800	1,500	6.57	*na*
Dy	ppb	0.1	4	*na*	22.5	8.39	37.3	*na*
Er	ppb	0.1	4	*na*	14.6	1.76	12.0	*na*
Eu	ppb	0.1	4	*na*	4.05	0.238	5.88	*na*
Fe	ppm	0.1	4	*na*	15.4	4.03	26.1	*na*
Ga	ppb	0.5	4	*na*	64.3	18.2	28.3	*na*
Gd	ppb	0.1	4	*na*	34.9	6.27	18.0	*na*
Ge	ppb	0.1	4	*na*	0.400	0	0	*na*
Hf	ppb	0.5	4	*na*	0.501	0.0702	14.0	*na*
Hg	ppb	0.1	4	*na*	4.25	0.686	16.1	*na*

Table 9-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by an ionic leach of soil samples at ALS Minerals (2007 and 2008 field seasons)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ho	ppb	0.1	4	*na*	4.98	1.19	23.9	*na*
I	ppm	0.01	4	*na*	0.108	0.0206	19.2	*na*
In	ppb	0.1	4	*na*	<0.1	*na*	*na*	*na*
La	ppb	0.1	4	*na*	81.8	2.75	3.36	*na*
Li	ppb	0.2	4	*na*	7.55	1.08	14.3	*na*
Lu	ppb	0.1	4	*na*	1.78	0.330	18.6	*na*
Mg	ppm	0.01	4	*na*	70.7	2.81	3.98	*na*
Mn	ppm	0.01	4	*na*	18.2	4.16	22.8	*na*
Mo	ppb	0.5	4	*na*	1,180	71.2	6.05	*na*
Nb	ppb	0.1	4	*na*	0.425	0.0957	22.5	*na*
Nd	ppb	0.1	4	*na*	125	11.5	9.19	*na*
Ni	ppb	1.0	4	*na*	281	14.0	4.97	*na*
Pb	ppb	1.0	4	*na*	6,490	420	6.47	*na*
Pd	ppb	0.1	4	*na*	1.13	0.907	80.6	*na*
Pr	ppb	0.1	4	*na*	24.9	4.51	18.1	*na*
Rb	ppb	0.1	4	*na*	401	26.5	6.61	*na*
Re	ppb	0.1	4	*na*	0.100	0	0	*na*
Sb	ppb	0.5	4	*na*	17.0	6.44	37.8	*na*
Se	ppb	2.0	4	*na*	24.5	1.91	7.82	*na*
Sm	ppb	0.1	4	*na*	29.8	4.81	16.1	*na*
Sn	ppb	0.2	4	*na*	0.225	0.0500	22.2	*na*
Sr	ppb	1.0	4	*na*	2,240	42.4	1.89	*na*
Ta	ppb	1.0	4	*na*	<1	*na*	*na*	*na*
Tb	ppb	0.1	4	*na*	5.23	0.562	10.8	*na*
Te	ppb	1.0	4	*na*	<1	*na*	*na*	*na*
Th	ppb	0.02	4	*na*	20.0	3.05	15.2	*na*
Ti	ppb	5.0	4	*na*	25.5	9.57	37.5	*na*
Tl	ppb	0.5	4	*na*	1.58	0.479	30.4	*na*
Tm	ppb	0.1	4	*na*	1.85	0.370	20.0	*na*
U	ppb	0.1	4	*na*	66.2	8.08	12.2	*na*
W	ppb	1.0	4	*na*	2.00	0	0	*na*
Y	ppb	0.1	4	*na*	128	6.98	5.44	*na*
Yb	ppb	0.1	4	*na*	10.6	1.58	14.9	*na*
Zn	ppb	10	4	*na*	5,130	319	6.22	*na*
Zr	ppb	0.1	4	*na*	7.38	2.51	34.1	*na*

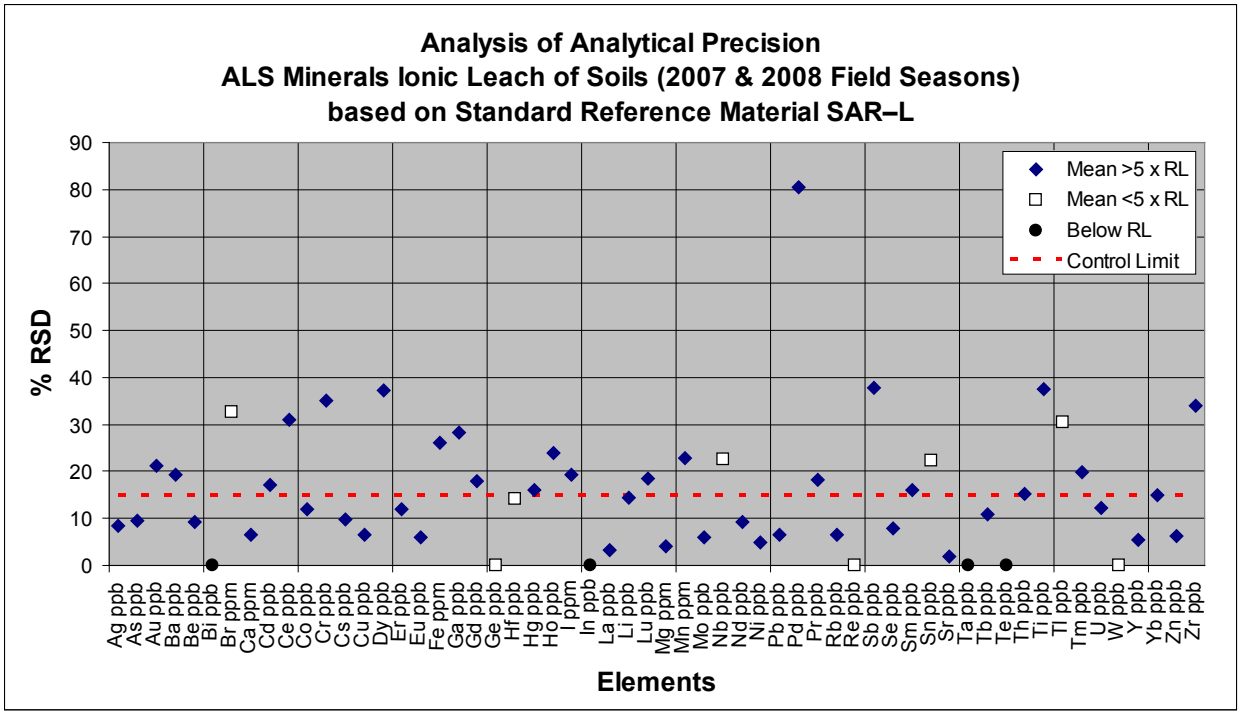

Figure 9-3. Precision plot for four analyses of standard reference material SAR–L by ionic leach (2007 and 2008 field seasons). %RSD is percent relative standard deviation; RL is reporting limit.

Table 9-3. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an ionic leach of soil samples at ALS Minerals (2007 and 2008 field seasons).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	14	*na*	5.96	2.45	41.2	*na*
As	ppb	2.0	14	*na*	7.21	2.46	34.0	*na*
Au	ppb	0.02	14	*na*	3.75	0.519	13.9	*na*
Ba	ppb	10	14	*na*	3,050	829	27.2	*na*
Be	ppb	0.2	14	*na*	7.77	0.997	12.8	*na*
Bi	ppb	3.0	14	*na*	<3	*na*	*na*	*na*
Br	ppm	0.05	14	*na*	0.356	0.0646	18.1	*na*
Ca	ppm	0.2	14	*na*	188	29.9	15.9	*na*
Cd	ppb	1.0	14	*na*	7.07	1.59	22.5	*na*
Ce	ppb	0.1	14	*na*	164	72.1	43.9	*na*
Co	ppb	0.3	14	*na*	54.3	8.98	16.5	*na*
Cr	ppb	1.0	14	*na*	7.79	3.83	49.1	*na*
Cs	ppb	0.1	14	*na*	18.3	2.00	10.9	*na*
Cu	ppb	1.0	14	*na*	2,730	323	11.8	*na*
Dy	ppb	0.1	14	*na*	118	19.3	16.3	*na*
Er	ppb	0.1	14	*na*	106	14.7	13.9	*na*
Eu	ppb	0.1	14	*na*	22.7	2.88	12.7	*na*
Fe	ppm	0.1	14	*na*	65.6	16.0	24.3	*na*
Ga	ppb	0.5	14	*na*	120	39.7	33.1	*na*
Gd	ppb	0.1	14	*na*	87.1	9.13	10.5	*na*
Ge	ppb	0.1	14	*na*	0.679	0.172	25.3	*na*
Hf	ppb	0.5	14	*na*	2.96	0.352	11.9	*na*
Hg	ppb	0.1	14	*na*	0.192	0.160	83.0	*na*

Table 9-3. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an ionic leach of soil samples at ALS Minerals (2007 and 2008 field seasons)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ho	ppb	0.1	14	*na*	32.4	4.64	14.3	*na*
I	ppb	0.01	14	*na*	0.186	0.0341	18.4	*na*
In	ppb	0.1	14	*na*	0.192	0.0837	43.5	*na*
La	ppb	0.1	14	*na*	88.7	23.5	26.5	*na*
Li	ppb	0.2	14	*na*	0.294	0.259	88.1	*na*
Lu	ppb	0.1	14	*na*	13.3	1.86	14.0	*na*
Mg	ppm	0.01	14	*na*	48.3	8.21	17.0	*na*
Mn	ppm	0.01	14	*na*	3.85	0.547	14.2	*na*
Mo	ppb	0.5	14	*na*	3.84	1.59	41.4	*na*
Nb	ppb	0.1	14	*na*	0.414	0.0949	22.9	*na*
Nd	ppb	0.1	14	*na*	220	44.6	20.3	*na*
Ni	ppb	1.0	14	*na*	63.7	10.3	16.2	*na*
Pb	ppb	1.0	14	*na*	111	36.7	33.0	*na*
Pd	ppb	0.1	14	*na*	6.24	2.04	32.7	*na*
Pr	ppb	0.1	14	*na*	40.3	7.12	17.7	*na*
Rb	ppb	0.1	14	*na*	193	15.3	7.93	*na*
Re	ppb	0.1	14	*na*	0.100	0	0	*na*
Sb	ppb	0.5	14	*na*	<0.5	*na*	*na*	*na*
Se	ppb	2.0	14	*na*	21.6	5.96	27.6	*na*
Sm	ppb	0.1	14	*na*	63.7	9.62	15.1	*na*
Sn	ppb	0.2	14	*na*	<0.2	*na*	*na*	*na*
Sr	ppb	1.0	14	*na*	2,390	473	19.8	*na*
Ta	ppb	1.0	14	*na*	<1	*na*	*na*	*na*
Tb	ppb	0.1	14	*na*	21.4	1.97	9.20	*na*
Te	ppb	1.0	14	*na*	<1	*na*	*na*	*na*
Th	ppb	0.02	14	*na*	10.3	2.14	20.7	*na*
Ti	ppb	5.0	14	*na*	139	40.9	29.4	*na*
Tl	ppb	0.5	14	*na*	1.97	0.310	15.7	*na*
Tm	ppb	0.1	14	*na*	14.5	1.80	12.4	*na*
U	ppb	0.1	14	*na*	41.4	10.9	26.3	*na*
W	ppb	1.0	14	*na*	<1	*na*	*na*	*na*
Y	ppb	0.1	14	*na*	706	114	16.1	*na*
Yb	ppb	0.1	14	*na*	85.6	11.9	13.9	*na*
Zn	ppb	10	14	*na*	142	18.5	13.0	*na*
Zr	ppb	0.1	14	*na*	62.7	17.7	28.2	*na*

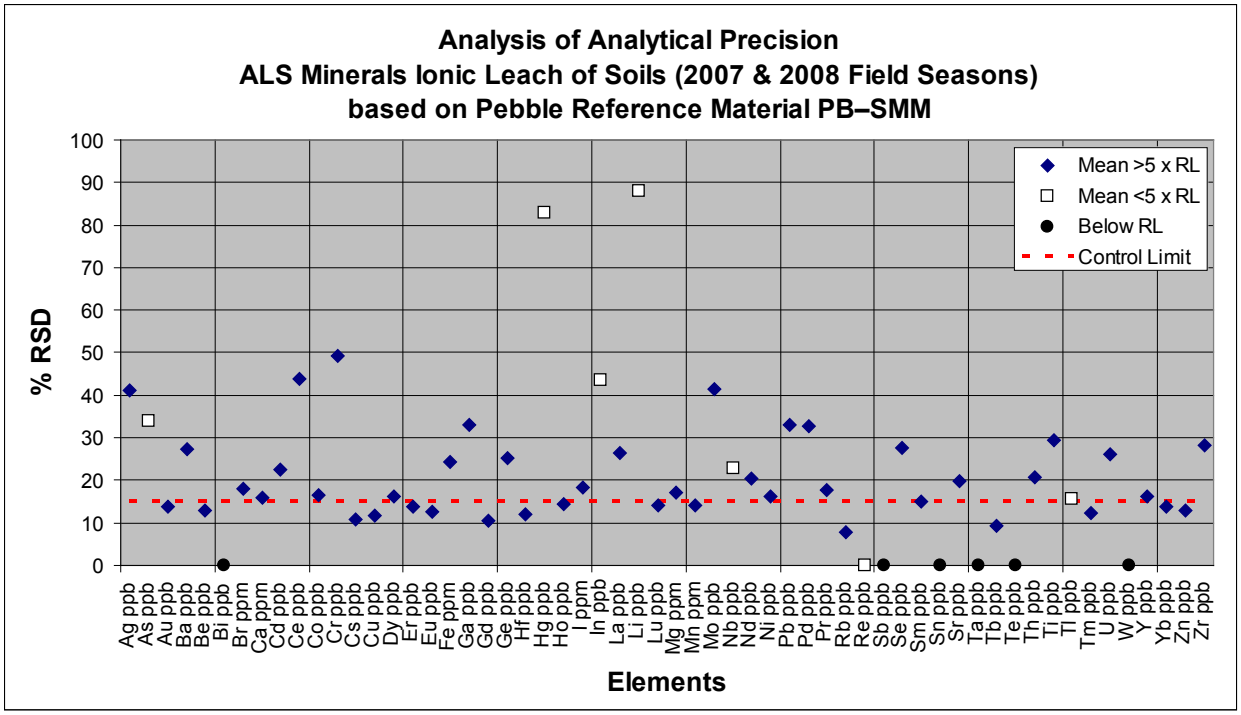

Figure 9-4. Precision plot for fourteen analyses of Pebble reference material PB–SMM by ionic leach (2007 and 2008 field seasons). %RSD is percent relative standard deviation; RL is reporting limit.

Table 9-4. Summary statistics for assessing analytical variation on duplicate samples; determined by an ionic leach of soil samples at ALS Minerals (2009 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	0.1	1	11.2	12.2	11.7	0.707	6.04
As	ppb	2	1	8.00	11.0	9.50	2.12	22.3
Au	ppb	0.02	1	0.330	0.360	0.345	0.0212	6.15
Ba	ppb	10	1	870	1,000	935	91.9	9.83
Be	ppb	0.2	1	6.80	6.90	6.85	0.0707	1.03
Bi	ppb	3	1	<3	<3	<3	*na*	*na*
Br	ppm	0.05	1	0.750	0.780	0.765	0.0212	2.77
Ca	ppm	0.2	1	3.60	3.90	3.75	0.212	5.66
Cd	ppb	1	1	1.00	2.00	1.50	0.707	47.1
Ce	ppb	0.1	1	341	376	359	24.7	6.90
Co	ppb	0.3	1	10.2	11.7	11.0	1.06	9.69
Cr	ppb	1	1	13.0	14.0	13.5	0.707	5.24
Cs	ppb	0.1	1	22.4	24.6	23.5	1.56	6.62
Cu	ppb	1	1	243	244	244	0.707	0.290
Dy	ppb	0.1	1	73.3	73.3	73.3	0	0
Er	ppb	0.1	1	37.1	38.7	37.9	1.13	2.99
Eu	ppb	0.1	1	16.0	17.7	16.9	1.20	7.13
Fe	ppm	0.1	1	25.0	26.5	25.8	1.06	4.12
Ga	ppb	0.5	1	36.7	41.6	39.2	3.46	8.85
Gd	ppb	0.1	1	71.1	77.6	74.4	4.60	6.18
Ge	ppb	0.1	1	1.00	1.10	1.05	0.0707	6.73
Hf	ppb	0.5	1	3.10	3.10	3.10	0	0

Table 9-4. Summary statistics for assessing analytical variation on duplicate samples; determined by an ionic leach of soil samples at ALS Minerals (2009 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Hg	ppb	0.1	1	0.500	0.500	0.500	0	0
Ho	ppb	0.1	1	14.3	14.8	14.6	0.354	2.43
I	ppm	0.01	1	0.430	0.440	0.435	0.00707	1.63
In	ppb	0.1	1	0.100	0.200	0.150	0.0707	47.1
La	ppb	0.1	1	122	158	140	25.5	18.2
Li	ppb	0.2	1	0.400	0.400	0.400	0	0
Lu	ppb	0.1	1	3.40	3.50	3.45	0.0707	2.05
Mg	ppm	0.01	1	0.380	0.480	0.430	0.0707	16.4
Mn	ppm	0.01	1	0.350	0.420	0.385	0.0495	12.9
Mo	ppb	0.5	1	1.20	1.80	1.50	0.424	28.3
Nb	ppb	0.1	1	1.40	1.80	1.60	0.283	17.7
Nd	ppb	0.1	1	260	303	282	30.4	10.8
Ni	ppb	1	1	15.0	15.0	15.0	0	0
Pb	ppb	1	1	249	284	267	24.7	9.29
Pd	ppb	0.1	1	3.20	3.50	3.35	0.212	6.33
Pr	ppb	0.1	1	49.8	59.7	54.8	7.00	12.8
Rb	ppb	0.1	1	130	143	136	9.55	7.01
Re	ppb	0.1	1	<0.1	<0.1	<0.1	*na*	*na*
Sb	ppb	0.5	1	0.500	0.600	0.550	0.0707	12.9
Se	ppb	2	1	21.0	25.0	23.0	2.83	12.3
Sm	ppb	0.1	1	61.4	70.0	65.7	6.08	9.26
Sn	ppb	0.2	1	<0.2	<0.2	<0.2	*na*	*na*
Sr	ppb	1	1	49.0	50.0	49.5	0.707	1.43
Ta	ppb	1	1	<1	<1	<1	*na*	*na*
Tb	ppb	0.1	1	12.0	12.7	12.4	0.495	4.01
Te	ppb	1	1	<1	<1	<1	*na*	*na*
Th	ppb	0.02	1	13.4	13.7	13.6	0.212	1.57
Ti	ppb	5	1	462	683	573	156	27.3
Tl	ppb	0.5	1	0.800	0.900	0.850	0.0707	8.32
Tm	ppb	0.1	1	4.50	4.70	4.60	0.141	3.07
U	ppb	0.1	1	16.9	18.1	17.5	0.849	4.85
W	ppb	1	1	<1	1.00	<1	*na*	*na*
Y	ppb	0.1	1	404	433	419	20.5	4.90
Yb	ppb	0.1	1	25.2	26.6	25.9	0.990	3.82
Zn	ppb	10	1	60.0	80.0	70.0	14.1	20.2
Zr	ppb	0.1	1	69.0	72.3	70.7	2.33	3.30

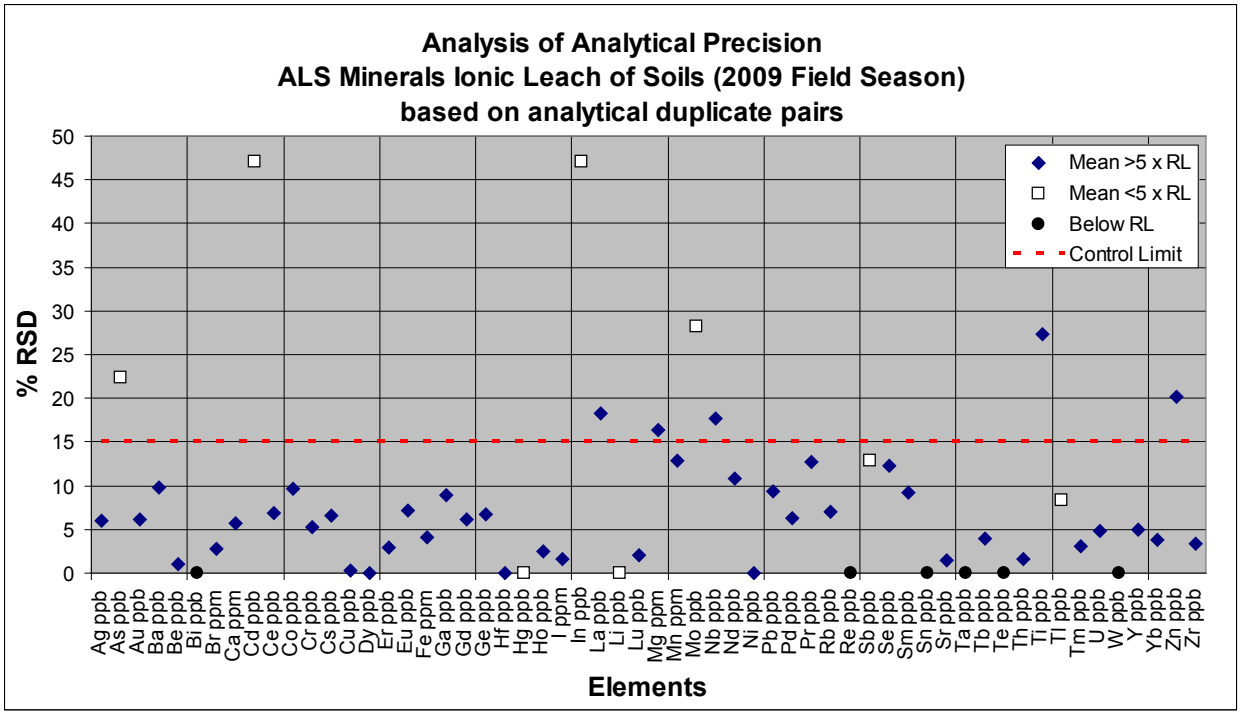

Figure 9-5. Precision plot for one analytical duplicate sample pair by ionic leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 9-5. Summary statistics for assessing analytical variation on the standard reference material ION–SRM18; determined by an ionic leach of soil samples at ALS Minerals (2009 field seasons).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	3	17.6	18.5	0.757	4.10	105
As	ppb	2	3	8.00	8.00	3.00	37.5	100
Au	ppb	0.02	3	7.61	8.08	0.200	2.48	106
Ba	ppb	10	3	210	187	11.5	6.19	88.9
Be	ppb	0.2	3	0.300	<0.2	*na*	*na*	64.6
Bi	ppb	3	3	3.00	<3	*na*	*na*	90.4
Br	ppm	0.05	3	1.42	1.50	0.121	8.08	105
Ca	ppm	0.2	3	155	156	7.00	4.49	100
Cd	ppb	1	3	65.5	66.3	0.577	0.870	101
Ce	ppb	0.1	3	15.2	15.4	2.19	14.2	102
Co	ppb	0.3	3	61.0	58.1	0.153	0.263	95.4
Cr	ppb	1	3	5.50	5.33	1.53	28.6	97.0
Cs	ppb	0.1	3	7.40	6.97	0.153	2.19	94.1
Cu	ppb	1	3	771	750	29.9	3.98	97.2
Dy	ppb	0.1	3	1.30	1.50	0.346	23.1	115
Er	ppb	0.1	3	0.700	0.700	0.200	28.6	100
Eu	ppb	0.1	3	0.800	0.700	0.100	14.3	87.5
Fe	ppm	0.1	3	2.35	2.83	0.666	23.5	121
Ga	ppb	0.5	3	5.65	5.73	0.231	4.03	101
Gd	ppb	0.1	3	2.90	2.90	0.436	15.0	100
Ge	ppb	0.1	3	0.100	0.264	0.291	110	264
Hf	ppb	0.5	3	0.600	<0.5	*na*	*na*	75.2

Table 9-5. Summary statistics for assessing analytical variation on the standard reference material ION–SRM18; determined by an ionic leach of soil samples at ALS Minerals (2009 field seasons)—Continued.

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Hg	ppb	0.1	3	4.25	3.67	0.231	6.30	86.3
Ho	ppb	0.1	3	0.100	0.267	0.0577	21.7	267
I	ppm	0.01	3	0.150	0.160	0.0100	6.25	107
In	ppb	0.1	3	0.150	<0.1	*na*	*na*	60.7
La	ppb	0.1	3	5.00	5.10	0.872	17.1	102
Li	ppb	0.2	3	0.400	0.567	0.379	66.8	142
Lu	ppb	0.1	3	0.100	<0.1	*na*	*na*	91.1
Mg	ppm	0.01	3	73.8	75.5	0.306	0.404	102
Mn	ppm	0.01	3	0.470	0.440	0.0265	6.01	93.6
Mo	ppb	0.5	3	29.8	30.1	1.05	3.49	101
Nb	ppb	0.1	3	0.100	0.130	0.0605	46.4	130
Nd	ppb	0.1	3	12.8	13.4	2.29	17.0	105
Ni	ppb	1	3	551	562	11.2	2.00	102
Pb	ppb	1	3	87.0	76.7	6.51	8.49	88.1
Pd	ppb	0.1	3	11.9	10.3	1.15	11.2	86.3
Pr	ppb	0.1	3	2.00	2.23	0.321	14.4	112
Rb	ppb	0.1	3	174	166	1.89	1.14	95.2
Re	ppb	0.1	3	0.100	<0.1	*na*	*na*	91.1
Sb	ppb	0.5	3	0.550	<0.5	*na*	*na*	82.0
Se	ppb	2	3	17.0	15.7	1.53	9.75	92.2
Sm	ppb	0.1	3	2.90	3.17	0.551	17.4	109
Sn	ppb	0.2	3	0.200	<0.2	*na*	*na*	90.6
Sr	ppb	1	3	1,123	1,090	40.4	3.70	97.3
Ta	ppb	1	3	1.50	<1	*na*	*na*	60.7
Tb	ppb	0.1	3	0.400	0.367	0.0577	15.7	91.7
Te	ppb	1	3	1.00	<1	*na*	*na*	91.1
Th	ppb	0.02	3	3.48	3.76	0.930	24.7	108
Ti	ppb	5	3	33.0	55.3	34.3	61.9	168
Tl	ppb	0.5	3	0.550	<0.5	*na*	*na*	82.0
Tm	ppb	0.1	3	0.100	<0.1	*na*	*na*	94.1
U	ppb	0.1	3	9.75	9.83	1.53	15.6	101
W	ppb	1	3	1.00	<1	*na*	*na*	91.1
Y	ppb	0.1	3	9.15	9.93	1.79	18.0	109
Yb	ppb	0.1	3	0.300	0.300	0.100	33.3	100
Zn	ppb	10	3	600	543	15.3	2.81	90.6
Zr	ppb	0.1	3	4.90	5.70	1.66	29.2	116

[1]ALS Minerals reports a target range for SRMs. The average of the upper and lower target range is used for a Target Value.

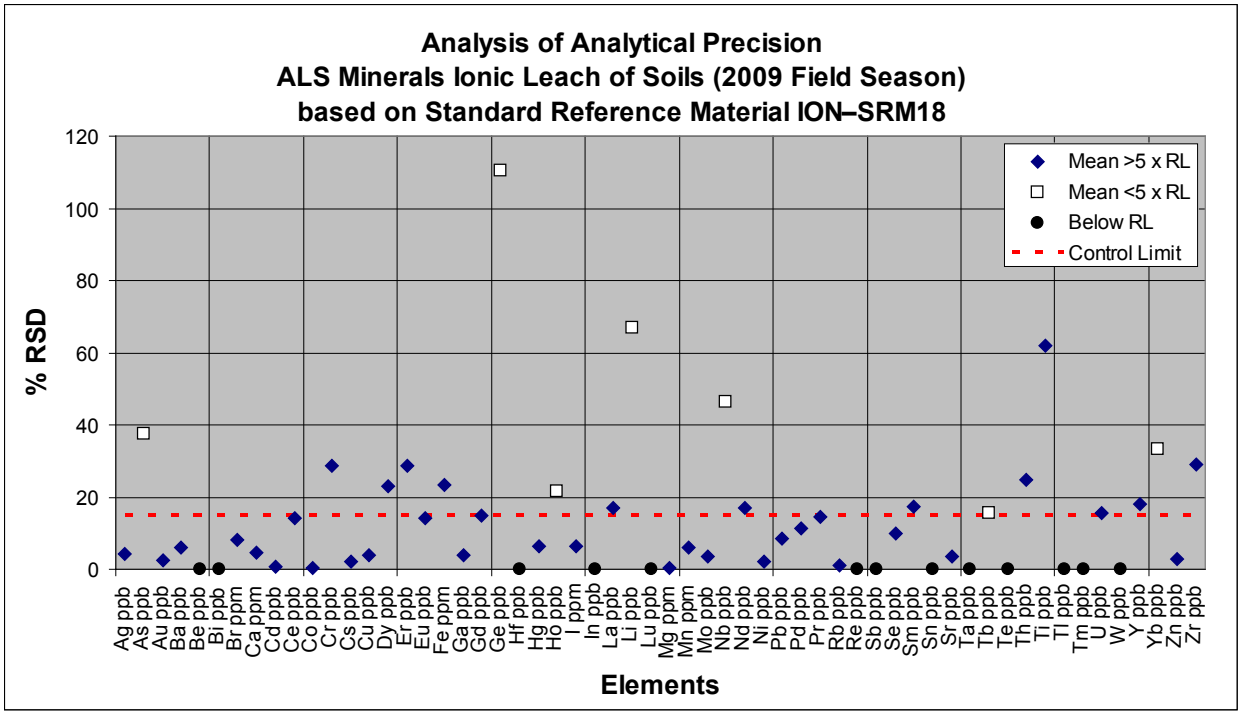

Figure 9-6. Precision plot for three analyses of standard reference material ION–SRM18 by ionic leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

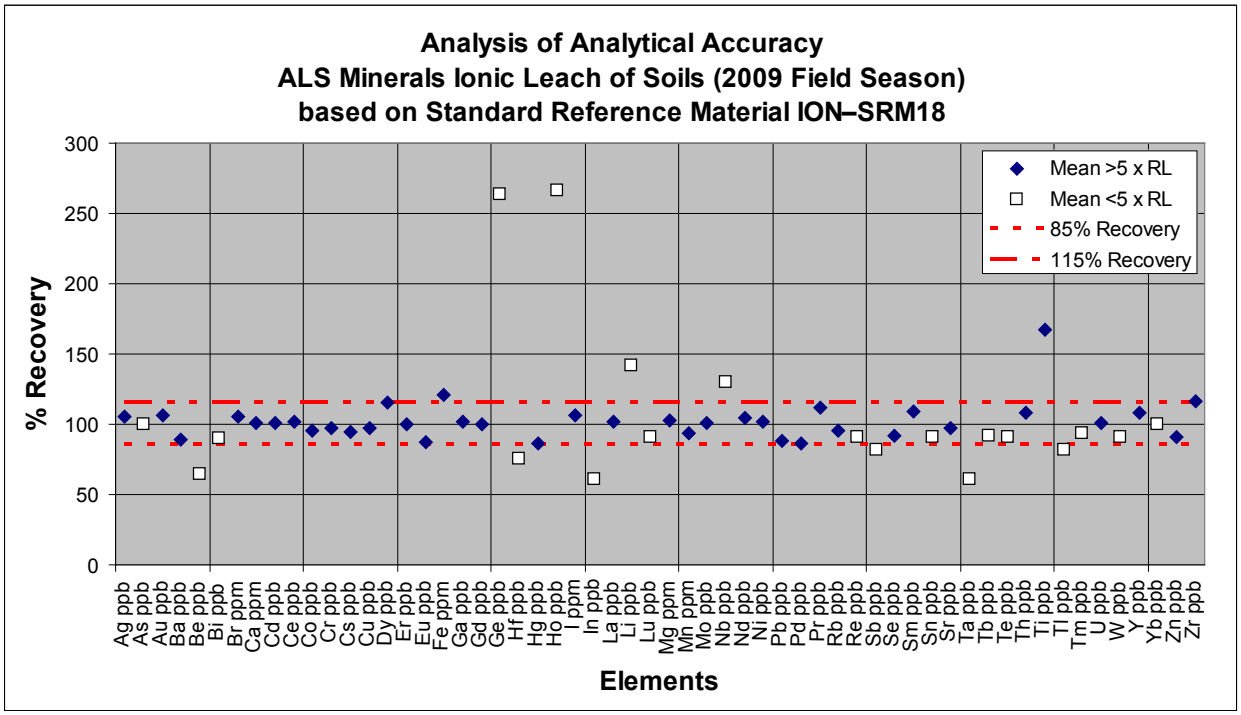

Figure 9-7. Accuracy plot for three analyses of standard reference material ION–SRM18 by ionic leach (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 9-6. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an ionic leach of soil samples at ALS Minerals (2009 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.1	2	*na*	10.6	1.13	10.7	*na*
As	ppb	2	2	*na*	6.50	0.707	10.9	*na*
Au	ppb	0.02	2	*na*	2.72	0.552	20.3	*na*
Ba	ppb	10	2	*na*	7,400	5,586	75.5	*na*
Be	ppb	0.2	2	*na*	10.0	0.990	9.90	*na*
Bi	ppb	3	2	*na*	<3	*na*	*na*	*na*
Br	ppm	0.05	2	*na*	0.425	0.0212	4.99	*na*
Ca	ppm	0.2	2	*na*	220	127	57.9	*na*
Cd	ppb	1	2	*na*	6.50	0.707	10.9	*na*
Ce	ppb	0.1	2	*na*	188	207	110	*na*
Co	ppb	0.3	2	*na*	50.8	10.3	20.2	*na*
Cr	ppb	1	2	*na*	9.00	7.07	78.6	*na*
Cs	ppb	0.1	2	*na*	14.6	1.13	7.75	*na*
Cu	ppb	1	2	*na*	2,635	332	12.6	*na*
Dy	ppb	0.1	2	*na*	152	19.1	12.6	*na*
Er	ppb	0.1	2	*na*	119	42.2	35.4	*na*
Eu	ppb	0.1	2	*na*	19.8	9.83	49.8	*na*
Fe	ppm	0.1	2	*na*	44.0	0.283	0.643	*na*
Ga	ppb	0.5	2	*na*	235	168	71.5	*na*
Gd	ppb	0.1	2	*na*	85.3	40.7	47.7	*na*
Ge	ppb	0.1	2	*na*	0.65	0.354	54.4	*na*
Hf	ppb	0.5	2	*na*	3.25	0.919	28.3	*na*
Hg	ppb	0.1	2	*na*	1.15	0.495	43.0	*na*
Ho	ppb	0.1	2	*na*	38.2	10.4	27.2	*na*
I	ppm	0.01	2	*na*	0.170	0.0424	25.0	*na*
In	ppb	0.1	2	*na*	0.250	0.0707	28.3	*na*
La	ppb	0.1	2	*na*	86.0	99.7	116	*na*
Li	ppb	0.2	2	*na*	0.700	0	0	*na*
Lu	ppb	0.1	2	*na*	14.9	6.01	40.5	*na*
Mg	ppm	0.01	2	*na*	51.3	29.6	57.8	*na*
Mn	ppm	0.01	2	*na*	3.765	0.389	10.3	*na*
Mo	ppb	0.5	2	*na*	2.95	2.76	93.5	*na*
Nb	ppb	0.1	2	*na*	0.700	0.566	80.8	*na*
Nd	ppb	0.1	2	*na*	217	199	91.8	*na*
Ni	ppb	1	2	*na*	70.5	4.95	7.02	*na*
Pb	ppb	1	2	*na*	116	42.4	36.6	*na*
Pd	ppb	0.1	2	*na*	5.55	0.354	6.37	*na*
Pr	ppb	0.1	2	*na*	37.5	38.3	102	*na*
Rb	ppb	0.1	2	*na*	171	27.6	16.1	*na*
Re	ppb	0.1	2	*na*	0.100	0	0	*na*
Sb	ppb	0.5	2	*na*	<0.5	*na*	*na*	*na*
Se	ppb	2	2	*na*	15.5	9.19	59.3	*na*
Sm	ppb	0.1	2	*na*	60.1	42.7	71.1	*na*
Sn	ppb	0.2	2	*na*	<0.2	*na*	*na*	*na*
Sr	ppb	1	2	*na*	3,078	1,983	64.4	*na*
Ta	ppb	1	2	*na*	<1	*na*	*na*	*na*
Tb	ppb	0.1	2	*na*	19.1	2.62	13.7	*na*
Te	ppb	1	2	*na*	<1	*na*	*na*	*na*
Th	ppb	0.02	2	*na*	13.1	4.07	31.0	*na*
Ti	ppb	5	2	*na*	255	171	67.1	*na*
Tl	ppb	0.5	2	*na*	1.60	0.424	26.5	*na*
Tm	ppb	0.1	2	*na*	16.6	6.58	39.7	*na*

Table 9-6. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an ionic leach of soil samples at ALS Minerals (2009 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
U	ppb	0.1	2	*na*	47.6	3.75	7.88	*na*
W	ppb	1	2	*na*	1.00	0	0	*na*
Y	ppb	0.1	2	*na*	923	180	19.5	*na*
Yb	ppb	0.1	2	*na*	99.0	39.7	40.1	*na*
Zn	ppb	10	2	*na*	115	7.07	6.15	*na*
Zr	ppb	0.1	2	*na*	62.1	28.1	45.3	*na*

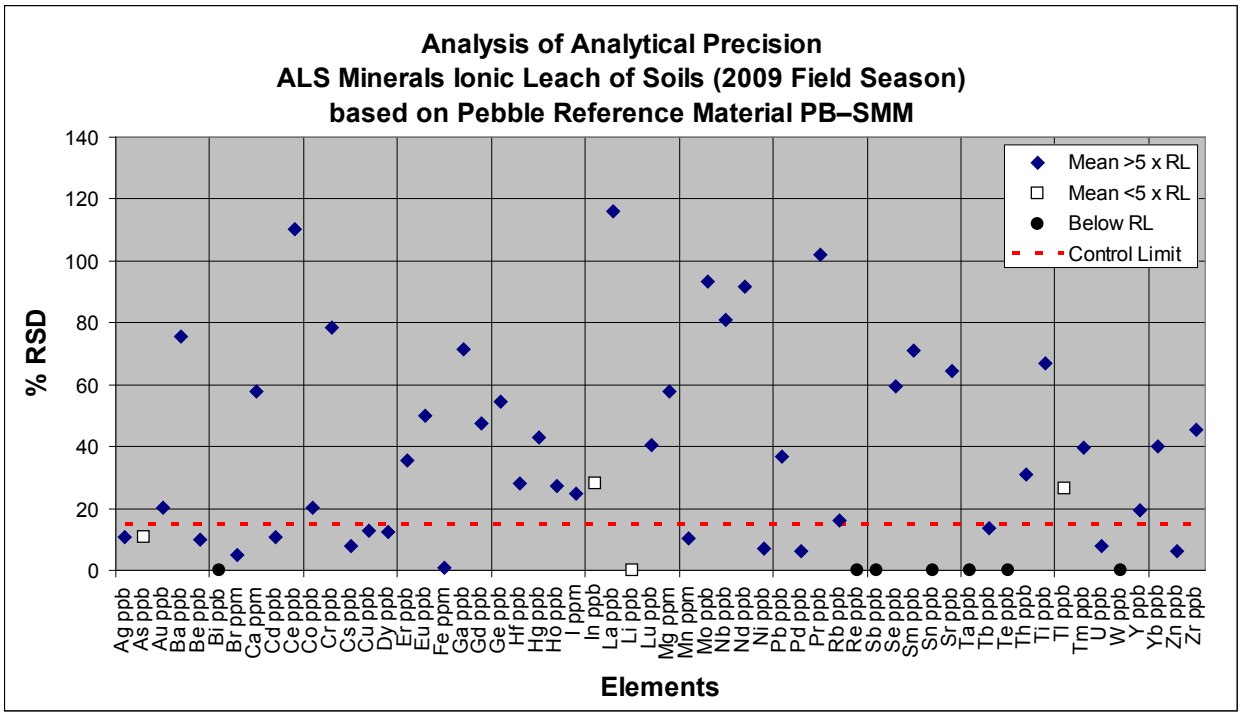

Figure 9-8. Precision plot for two analyses of Pebble reference material PB–SMM by ionic leach (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for ALS Minerals Sodium Pyrophosphate Leach Data

Table 10-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	0.002	10	0.00600	0.123	0.0245	0.0116	47.4
Al	ppm	1	10	799	12,800	8,270	378	4.56
As	ppm	0.1	10	0.900	3.70	2.36	0.134	5.68
Au	ppm	0.05	10	<0.05	<0.05	<0.05	*na*	*na*
B	ppm	2	10	<2	2.00	<2	*na*	*na*
Ba	ppm	0.05	10	8.85	36.5	22.3	0.400	1.80
Be	ppm	0.05	10	0.0700	0.170	0.126	0.0100	7.94
Bi	ppm	0.005	10	0.0190	0.400	0.113	0.0430	38.0
Br	ppm	2	10	<2	2.00	<2	*na*	*na*
Ca	ppm	10	10	50.0	2,090	447	44.0	9.85
Cd	ppm	0.01	10	0.0100	0.440	0.0750	0.00707	9.43
Ce	ppm	0.005	10	3.23	11.1	5.50	0.183	3.32
Co	ppm	0.05	10	0.310	1.12	0.667	0.0187	2.80
Cr	ppm	0.05	10	1.55	8.81	4.89	0.221	4.52
Cs	ppm	0.005	10	0.0210	0.419	0.229	0.00943	4.13
Cu	ppm	0.05	10	1.39	27.1	7.22	0.313	4.34
Dy	ppm	0.005	10	0.339	0.599	0.454	0.0224	4.92
Er	ppm	0.005	10	0.165	0.463	0.241	0.0256	10.6
Eu	ppm	0.005	10	0.129	0.267	0.177	0.0129	7.30
Fe	ppm	5	10	486	9,530	5,400	246	4.56
Ga	ppm	0.05	10	0.950	4.71	2.66	0.103	3.86
Gd	ppm	0.005	10	0.384	0.821	0.559	0.0196	3.51
Ge	ppm	0.1	10	<0.1	0.100	<0.1	*na*	*na*
Hf	ppm	0.01	10	0.220	1.85	1.12	0.0351	3.13
Hg	ppm	0.1	10	<0.1	0.100	<0.1	*na*	*na*
Ho	ppm	0.005	10	0.0690	0.124	0.0926	0.00226	2.44
I	ppm	0.1	10	0.300	16.9	10.4	0.703	6.76
In	ppm	0.005	10	0.0110	0.0280	0.0179	0.00207	11.6
K	ppm	5	10	167	716	311	38.0	12.2
La	ppm	0.005	10	1.31	4.53	2.31	0.112	4.85
Li	ppm	0.05	10	0.0500	1.08	0.633	0.0369	5.83
Lu	ppm	0.005	10	0.0180	0.0420	0.0275	0.00182	6.61
Mg	ppm	1	10	126	420	240	31.8	13.3
Mn	ppm	0.1	10	3.30	111	33.7	2.00	5.95
Mo	ppm	0.01	10	0.110	6.70	0.952	0.0256	2.69
Nb	ppm	0.01	10	0.160	1.39	0.776	0.0979	12.6
Nd	ppm	0.005	10	1.61	4.02	2.47	0.0985	3.99
Ni	ppm	0.05	10	0.590	1.49	1.00	0.0572	5.71
Pb	ppm	0.1	10	1.00	72.5	8.83	0.783	8.87
Pr	ppm	0.005	10	0.370	1.11	0.606	0.0300	4.95
Rb	ppm	0.01	10	0.240	3.77	1.57	0.110	7.01
Re	ppm	0.001	10	0.00100	0.00700	0.00195	0.00177	91.0
Sb	ppm	0.005	10	0.0400	0.234	0.0899	0.00474	5.27
Se	ppm	0.5	10	0.500	1.70	1.03	0.188	18.4
Sm	ppm	0.005	10	0.391	0.858	0.559	0.0319	5.70
Sn	ppm	0.05	10	0.130	0.310	0.219	0.0105	4.79
Sr	ppm	0.05	10	1.42	11.6	5.05	0.138	2.73
Ta	ppm	0.01	10	0.0200	0.0900	0.0585	0.00741	12.7
Tb	ppm	0.005	10	0.0710	0.132	0.0949	0.00236	2.48
Te	ppm	0.05	10	<0.05	<0.05	<0.05	*na*	*na*
Th	ppm	0.01	10	0.610	3.23	1.76	0.239	13.6
Ti	ppm	1	10	29.0	684	359	23.0	6.42

Table 10-1. Summary statistics for assessing analytical variation on duplicate samples; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Tl	ppm	0.005	10	0.0100	0.0680	0.0293	0.00145	4.95
Tm	ppm	0.005	10	0.0200	0.0430	0.0305	0.00145	4.75
U	ppm	0.005	10	0.135	0.607	0.344	0.00967	2.81
V	ppm	0.05	10	1.59	17.8	10.7	0.477	4.44
W	ppm	0.01	10	0.0300	0.150	0.0915	0.0116	12.7
Y	ppm	0.005	10	1.46	3.63	2.22	0.102	4.59
Yb	ppm	0.005	10	0.121	0.297	0.182	0.0140	7.71
Zn	ppm	0.2	10	2.90	34.3	8.01	0.417	5.21
Zr	ppm	0.05	10	1.98	19.0	11.2	0.535	4.77

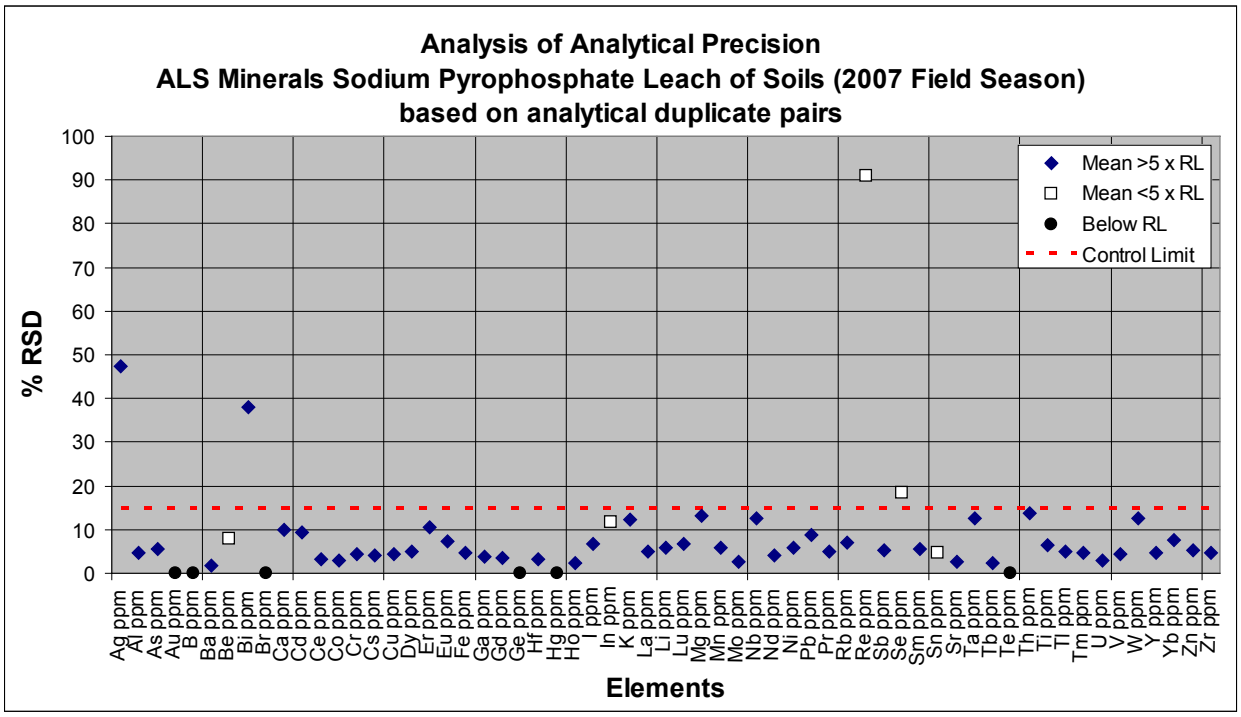

Figure 10-1. Precision plot for ten analytical duplicate sample pairs by sodium pyrophosphate leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 10-2. Summary statistics for assessing analytical variation on the standard reference material LK3–PYR; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	4	0.260	0.366	0.221	60.5	141
Al	ppm	1	4	2,820	2,790	197	7.06	98.9
As	ppm	0.1	4	8.65	8.43	0.457	5.43	97.4
Au	ppm	0.05	4	0.0720	<0.05	*na*	*na*	62.7
B	ppm	2	4	2.90	<2	*na*	*na*	65.7
Ba	ppm	0.05	4	34.4	37.8	1.01	2.67	110
Be	ppm	0.05	4	0.190	0.185	0.0208	11.3	97.4

Table 10-2. Summary statistics for assessing analytical variation on the standard reference material LK3–PYR; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Bi	ppm	0.005	4	0.629	0.933	0.0582	6.24	148
Br	ppm	2	4	2.90	10.7	10.2	95.9	367
Ca	ppm	10	4	2,990	2,670	102	3.83	89.3
Cd	ppm	0.01	4	0.260	0.253	0.0263	10.4	97.1
Ce	ppm	0.005	4	24.1	23.7	1.42	5.99	98.1
Co	ppm	0.05	4	3.24	3.02	0.296	9.80	93.1
Cr	ppm	0.05	4	6.54	6.09	0.555	9.10	93.2
Cs	ppm	0.005	4	0.206	0.193	0.0151	7.82	94.0
Cu	ppm	0.05	4	8.21	8.57	0.354	4.13	104
Dy	ppm	0.005	4	1.33	1.36	0.0706	5.19	102
Er	ppm	0.005	4	0.834	0.869	0.0379	4.36	104
Eu	ppm	0.005	4	0.383	0.411	0.0138	3.35	107
Fe	ppm	5	4	3,360	3,170	151	4.75	94.4
Ga	ppm	0.05	4	0.780	1.70	0.245	14.4	218
Gd	ppm	0.005	4	2.13	2.14	0.172	8.05	100
Ge	ppm	0.1	4	0.140	0.100	0	0	71.4
Hf	ppm	0.01	4	0.310	0.740	0.0632	8.55	239
Hg	ppm	0.1	4	0.140	<0.1	*na*	*na*	66.7
Ho	ppm	0.005	4	0.333	0.306	0.00678	2.22	91.9
I	ppm	0.1	4	1.00	0.875	0.0500	5.71	87.5
In	ppm	0.005	4	0.00720	0.008	0.000820	10.2	111
K	ppm	5	4	814	831	72.9	8.78	102
La	ppm	0.005	4	12.2	12.5	0.448	3.59	102
Li	ppm	0.05	4	1.96	1.99	0.433	21.8	102
Lu	ppm	0.005	4	0.117	0.126	0.00129	1.03	107
Mg	ppm	1	4	802	747	81.1	10.9	93.1
Mn	ppm	0.1	4	617	603	22.4	3.72	97.7
Mo	ppm	0.01	4	0.375	0.368	0.0435	11.8	98.0
Nb	ppm	0.01	4	0.645	0.628	0.0650	10.4	97.3
Nd	ppm	0.005	4	13.0	13.1	0.665	5.07	101
Ni	ppm	0.05	4	5.52	4.99	0.268	5.37	90.4
Pb	ppm	0.1	4	3.85	3.80	0.271	7.13	98.7
Pr	ppm	0.005	4	3.39	3.44	0.232	6.76	101
Rb	ppm	0.01	4	4.31	4.68	0.305	6.52	109
Re	ppm	0.001	4	0.00140	0.00100	0	0	71.4
Sb	ppm	0.005	4	0.244	0.225	0.0164	7.27	92.3
Se	ppm	0.5	4	0.720	0.588	0.103	17.5	81.6
Sm	ppm	0.005	4	2.35	2.37	0.125	5.28	101
Sn	ppm	0.05	4	0.200	0.218	0.0450	20.7	109
Sr	ppm	0.05	4	12.7	12.6	0.459	3.65	99.1
Ta	ppm	0.01	4	0.0450	0.0425	0.00500	11.8	94.4
Tb	ppm	0.005	4	0.284	0.298	0.0120	4.01	105
Te	ppm	0.05	4	0.0740	<0.05	*na*	*na*	61.0
Th	ppm	0.01	4	3.22	6.47	0.573	8.86	201
Ti	ppm	1	4	149	148	24.5	16.6	99.2
Tl	ppm	0.005	4	0.0770	0.0745	0.00100	1.34	96.8
Tm	ppm	0.005	4	0.114	0.123	0.00403	3.27	108
U	ppm	0.005	4	2.27	2.39	0.0403	1.68	105
V	ppm	0.05	4	9.13	9.01	0.576	6.40	98.6
W	ppm	0.01	4	0.185	0.108	0.00957	8.91	58.1
Y	ppm	0.005	4	8.54	9.06	0.209	2.30	106
Yb	ppm	0.005	4	0.756	0.781	0.0223	2.86	103
Zn	ppm	0.2	4	23.3	21.3	1.16	5.43	91.5
Zr	ppm	0.05	4	7.54	7.68	0.327	4.25	102

[1]ALS Minerals reports a target range for SRMs. The average of the upper and lower target range is used for a Target Value.

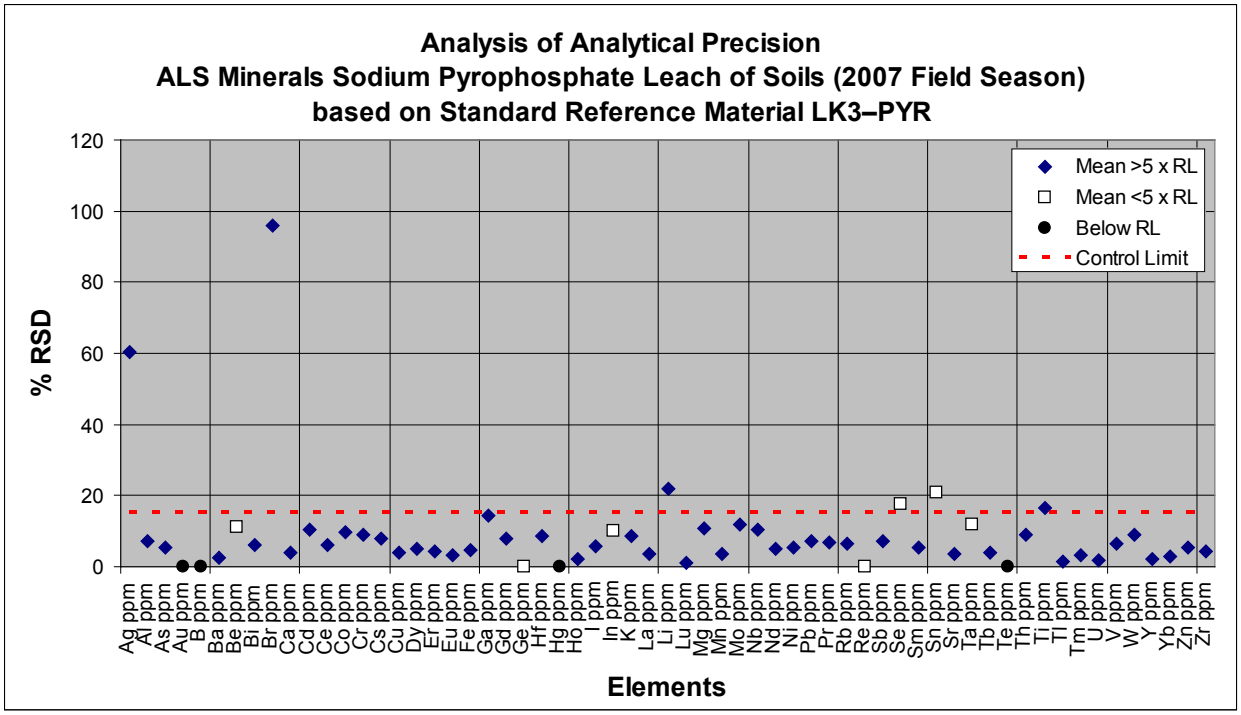

Figure 10-2. Precision plot for four analyses of standard reference material LK3–PYR by sodium pyrophosphate leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

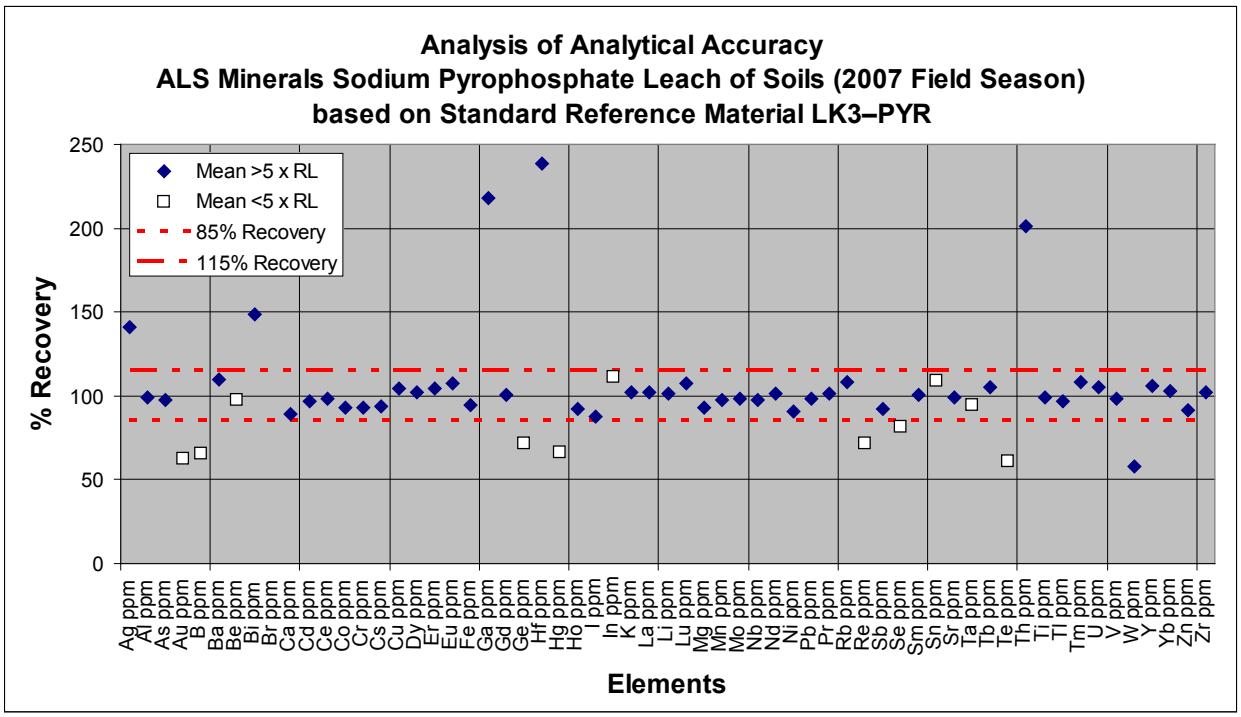

Figure 10-3. Accuracy plot for four analyses of standard reference material LK3–PYR by sodium pyrophosphate leach (2007 field season). The percent Recovery for Br (not shown above) is 410%. %Recovery is percent recovery; RL is reporting limit.

Table 10-3. Summary statistics for assessing analytical variation on the standard reference material LK4–PYR; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	4	0.0300	0.0260	0.000816	3.14	86.7
Al	ppm	1	4	2,810	2,900	18.3	0.630	103
As	ppm	0.1	4	4.90	5.43	0.222	4.09	111
Au	ppm	0.05	4	0.0720	<0.05	*na*	*na*	62.7
B	ppm	2	4	2.90	<2	*na*	*na*	64.1
Ba	ppm	0.05	4	10.3	12.1	1.40	11.6	117
Be	ppm	0.05	4	0.220	0.180	0.0141	7.86	81.8
Bi	ppm	0.005	4	0.106	0.202	0.0454	22.4	191
Br	ppm	2	4	5.50	12.5	11.7	93.6	227
Ca	ppm	10	4	5,650	4,820	599	12.4	85.4
Cd	ppm	0.01	4	0.555	0.625	0.0173	2.77	113
Ce	ppm	0.005	4	22.1	22.8	0.436	1.92	103
Co	ppm	0.05	4	1.80	2.07	0.0645	3.11	115
Cr	ppm	0.05	4	3.81	4.17	0.139	3.34	109
Cs	ppm	0.005	4	0.0560	0.0668	0.00250	3.75	119
Cu	ppm	0.05	4	6.76	7.65	0.263	3.43	113
Dy	ppm	0.005	4	1.63	1.74	0.0173	1.00	107
Er	ppm	0.005	4	0.983	1.07	0.0239	2.23	109
Eu	ppm	0.005	4	0.537	0.612	0.00947	1.55	114
Fe	ppm	5	4	2,830	3,000	40.8	1.36	106
Ga	ppm	0.05	4	0.445	0.810	0.0529	6.53	182
Gd	ppm	0.005	4	2.28	2.48	0.0718	2.89	109
Ge	ppm	0.1	4	0.140	0.175	0.0500	28.6	125
Hf	ppm	0.01	4	0.145	0.338	0.0171	5.06	233
Hg	ppm	0.1	4	0.140	<0.1	*na*	*na*	65.1
Ho	ppm	0.005	4	0.276	0.384	0.00591	1.54	139
I	ppm	0.1	4	2.80	2.38	0.0500	2.11	84.8
In	ppm	0.005	4	0.0270	0.0343	0.00171	4.99	127
K	ppm	5	4	149	182	8.66	4.75	122
La	ppm	0.005	4	11.3	12.2	0.260	2.13	109
Li	ppm	0.05	4	0.325	0.383	0.0789	20.6	118
Lu	ppm	0.005	4	0.141	0.154	0.00668	4.34	109
Mg	ppm	1	4	520	513	18.6	3.61	98.7
Mn	ppm	0.1	4	171	187	4.75	2.54	109
Mo	ppm	0.01	4	0.775	0.855	0.0574	6.72	110
Nb	ppm	0.01	4	0.245	0.285	0.0311	10.9	116
Nd	ppm	0.005	4	12.5	13.6	0.278	2.05	108
Ni	ppm	0.05	4	5.14	5.59	0.293	5.24	109
Pb	ppm	0.1	4	45.1	45.6	3.34	7.32	101
Pr	ppm	0.005	4	3.30	3.48	0.108	3.09	106
Rb	ppm	0.01	4	0.690	0.975	0.0619	6.35	141
Re	ppm	0.001	4	0.00200	0.00225	0.000500	22.2	113
Sb	ppm	0.005	4	0.323	0.331	0.0223	6.72	102
Se	ppm	0.5	4	0.720	1.05	0.100	9.52	146
Sm	ppm	0.005	4	2.51	2.60	0.0287	1.11	104
Sn	ppm	0.05	4	1.34	1.32	0.0975	7.41	98.5
Sr	ppm	0.05	4	21.5	22.3	0.976	4.38	104
Ta	ppm	0.01	4	0.0140	0.0175	0.00500	28.6	125
Tb	ppm	0.005	4	0.336	0.368	0.00550	1.49	110
Te	ppm	0.05	4	0.0740	<0.05	*na*	*na*	61.0
Th	ppm	0.01	4	1.98	4.73	0.669	14.2	239
Ti	ppm	1	4	77.5	91.0	6.38	7.01	117
Tl	ppm	0.005	4	0.161	0.171	0.00819	4.80	106
Tm	ppm	0.005	4	0.136	0.151	0.00171	1.13	111
U	ppm	0.005	4	22.4	22.4	0.842	3.76	100

Table 10-3. Summary statistics for assessing analytical variation on the standard reference material LK4–PYR; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
V	ppm	0.05	4	9.78	10.8	0.250	2.32	110
W	ppm	0.01	4	0.170	0.153	0.00500	3.28	89.7
Y	ppm	0.005	4	10.6	11.3	0.352	3.11	107
Yb	ppm	0.005	4	0.896	0.968	0.0157	1.62	108
Zn	ppm	0.2	4	63.1	61.5	1.90	3.09	97.4
Zr	ppm	0.05	4	2.76	2.93	0.0838	2.86	106

[1]ALS Minerals reports a target range for SRMs. The average of the upper and lower target range is used for a Target Value.

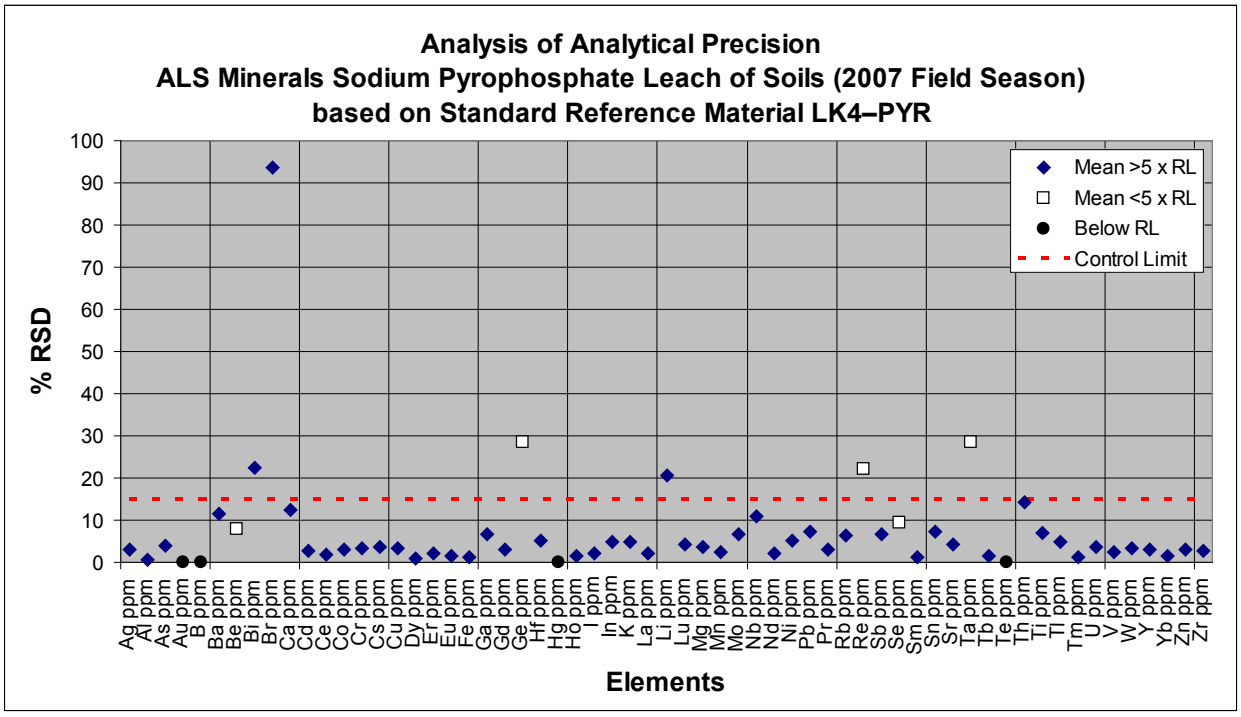

Figure 10-4. Precision plot for four analyses of standard reference material LK4–PYR by sodium pyrophosphate leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

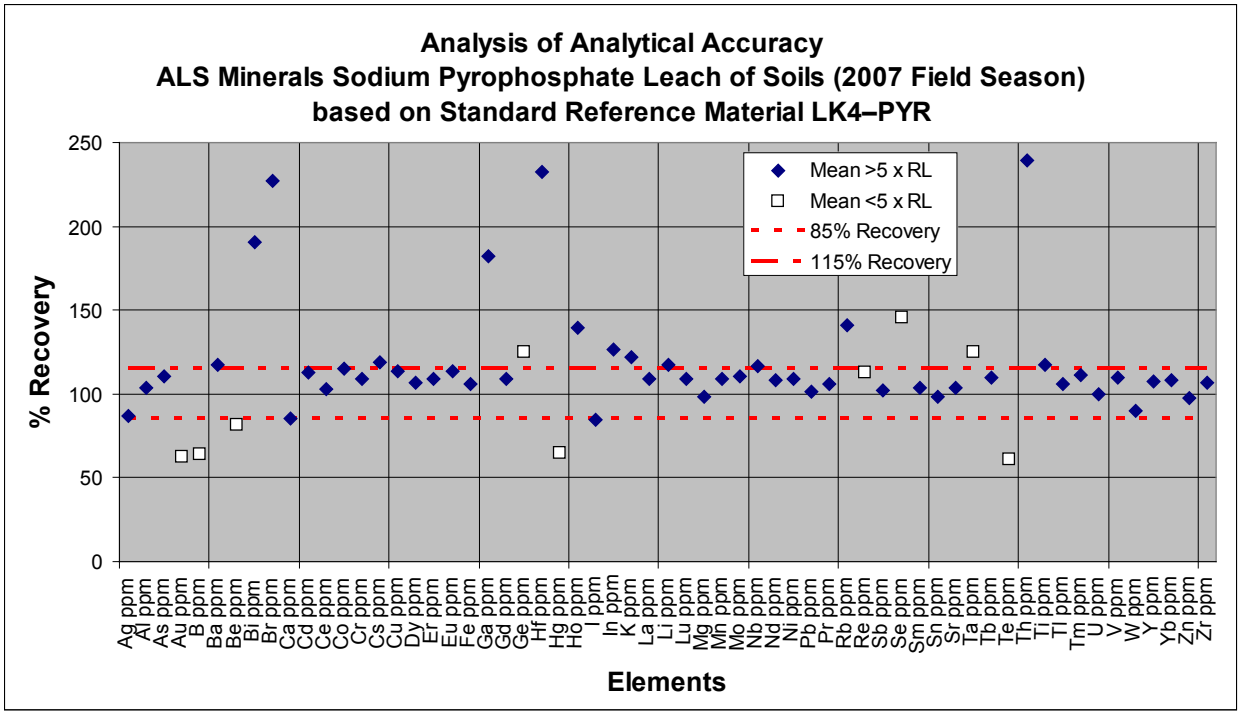

Figure 10-5. Accuracy plot for four analyses of standard reference material LK4–PYR by sodium pyrophosphate leach (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 10-4. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	5	*na*	0.312	0.423	136	*na*
Al	ppm	1	5	*na*	1,140	97.4	8.51	*na*
As	ppm	0.1	5	*na*	1.56	0.182	11.6	*na*
Au	ppm	0.05	5	*na*	<0.05	*na*	*na*	*na*
B	ppm	2	5	*na*	<2	*na*	*na*	*na*
Ba	ppm	0.05	5	*na*	29.9	1.43	4.79	*na*
Be	ppm	0.05	5	*na*	0.150	0.0158	10.5	*na*
Bi	ppm	0.005	5	*na*	0.130	0.0571	44.0	*na*
Br	ppm	2	5	*na*	<2	*na*	*na*	*na*
Ca	ppm	10	5	*na*	1,950	28.8	1.48	*na*
Cd	ppm	0.01	5	*na*	0.438	0.00837	1.91	*na*
Ce	ppm	0.005	5	*na*	11.8	0.655	5.56	*na*
Co	ppm	0.05	5	*na*	0.338	0.0259	7.66	*na*
Cr	ppm	0.05	5	*na*	1.74	0.158	9.07	*na*
Cs	ppm	0.005	5	*na*	0.237	0.0218	9.20	*na*
Cu	ppm	0.05	5	*na*	23.1	1.25	5.41	*na*
Dy	ppm	0.005	5	*na*	0.565	0.0344	6.09	*na*
Er	ppm	0.005	5	*na*	0.347	0.0655	18.9	*na*
Eu	ppm	0.005	5	*na*	0.113	0.00896	7.91	*na*
Fe	ppm	5	5	*na*	738	90.6	12.3	*na*
Ga	ppm	0.05	5	*na*	1.06	0.0623	5.90	*na*
Gd	ppm	0.005	5	*na*	0.763	0.0238	3.11	*na*
Ge	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*

Table 10-4. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Hf	ppm	0.01	5	*na*	0.266	0.0297	11.2	*na*
Hg	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Ho	ppm	0.005	5	*na*	0.119	0.0106	8.96	*na*
I	ppm	0.1	5	*na*	0.340	0.0548	16.1	*na*
In	ppm	0.005	5	*na*	0.0224	0.00219	9.78	*na*
K	ppm	5	5	*na*	775	49.9	6.44	*na*
La	ppm	0.005	5	*na*	4.88	0.320	6.56	*na*
Li	ppm	0.05	5	*na*	0.652	0.0319	4.90	*na*
Lu	ppm	0.005	5	*na*	0.0470	0.00361	7.67	*na*
Mg	ppm	1	5	*na*	313	6.99	2.23	*na*
Mn	ppm	0.1	5	*na*	109	4.15	3.82	*na*
Mo	ppm	0.01	5	*na*	6.35	0.236	3.72	*na*
Nb	ppm	0.01	5	*na*	0.522	0.0487	9.33	*na*
Nd	ppm	0.005	5	*na*	4.24	0.176	4.15	*na*
Ni	ppm	0.05	5	*na*	1.10	0.153	13.8	*na*
Pb	ppm	0.1	5	*na*	73.1	1.44	1.97	*na*
Pr	ppm	0.005	5	*na*	1.17	0.0674	5.74	*na*
Rb	ppm	0.01	5	*na*	4.19	0.465	11.1	*na*
Re	ppm	0.001	5	*na*	0.00258	0.00359	139	*na*
Sb	ppm	0.005	5	*na*	0.273	0.0397	14.6	*na*
Se	ppm	0.5	5	*na*	0.560	0.108	19.2	*na*
Sm	ppm	0.005	5	*na*	0.817	0.0551	6.74	*na*
Sn	ppm	0.05	5	*na*	0.170	0.0187	11.0	*na*
Sr	ppm	0.05	5	*na*	10.8	0.268	2.49	*na*
Ta	ppm	0.01	5	*na*	0.118	0.175	148	*na*
Tb	ppm	0.005	5	*na*	0.113	0.00642	5.67	*na*
Te	ppm	0.05	5	*na*	0.0540	0.00816	15.1	*na*
Th	ppm	0.01	5	*na*	2.97	1.73	58.2	*na*
Ti	ppm	1	5	*na*	37.8	4.27	11.3	*na*
Tl	ppm	0.005	5	*na*	0.0736	0.00643	8.73	*na*
Tm	ppm	0.005	5	*na*	0.0450	0.00543	12.1	*na*
U	ppm	0.005	5	*na*	0.643	0.0390	6.08	*na*
V	ppm	0.05	5	*na*	9.15	1.11	12.2	*na*
W	ppm	0.01	5	*na*	0.138	0.0217	15.7	*na*
Y	ppm	0.005	5	*na*	3.49	0.180	5.16	*na*
Yb	ppm	0.005	5	*na*	0.277	0.0228	8.25	*na*
Zn	ppm	0.2	5	*na*	35.6	1.52	4.27	*na*
Zr	ppm	0.05	5	*na*	2.22	0.647	29.1	*na*

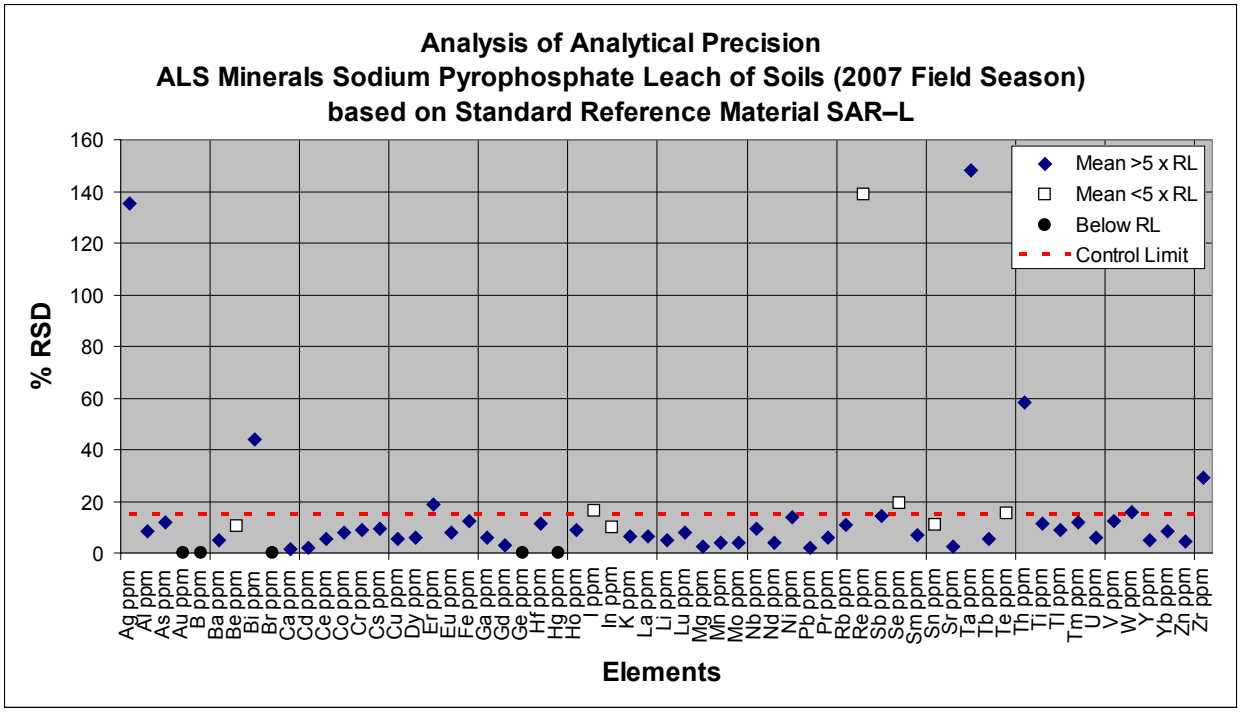

Figure 10-6. Precision plot for five analyses of standard reference material SAR–L by sodium pyrophosphate leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 10-5. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season).

[ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.002	5	*na*	0.0160	0.00158	9.88	*na*
Al	ppm	1	5	*na*	7,820	125	1.60	*na*
As	ppm	0.1	5	*na*	2.26	0.0548	2.42	*na*
Au	ppm	0.05	5	*na*	<0.05	*na*	*na*	*na*
B	ppm	2	5	*na*	<2	*na*	*na*	*na*
Ba	ppm	0.05	5	*na*	22.8	0.589	2.59	*na*
Be	ppm	0.05	5	*na*	0.146	0.0114	7.81	*na*
Bi	ppm	0.005	5	*na*	0.0916	0.0450	49.2	*na*
Br	ppm	2	5	*na*	2.00	0	0	*na*
Ca	ppm	10	5	*na*	600	18.7	3.12	*na*
Cd	ppm	0.01	5	*na*	0.0400	0	0	*na*
Ce	ppm	0.005	5	*na*	4.64	0.0820	1.77	*na*
Co	ppm	0.05	5	*na*	0.924	0.0207	2.24	*na*
Cr	ppm	0.05	5	*na*	3.94	0.0885	2.25	*na*
Cs	ppm	0.005	5	*na*	0.194	0.00791	4.08	*na*
Cu	ppm	0.05	5	*na*	11.3	0.288	2.54	*na*
Dy	ppm	0.005	5	*na*	0.459	0.0128	2.79	*na*
Er	ppm	0.005	5	*na*	0.237	0.00602	2.54	*na*
Eu	ppm	0.005	5	*na*	0.177	0.0106	6.03	*na*
Fe	ppm	5	5	*na*	4,880	111	2.27	*na*
Ga	ppm	0.05	5	*na*	2.33	0.0462	1.98	*na*
Gd	ppm	0.005	5	*na*	0.560	0.0111	1.98	*na*

Table 10-5. Summary statistics for assessing analytical variation on the Pebble reference material PB–SNP; determined by a sodium pyrophosphate leach of soil samples at ALS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ge	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Hf	ppm	0.01	5	*na*	0.960	0.0663	6.91	*na*
Hg	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Ho	ppm	0.005	5	*na*	0.0948	0.00249	2.63	*na*
I	ppm	0.1	5	*na*	9.26	0.251	2.71	*na*
In	ppm	0.005	5	*na*	0.0144	0.000548	3.80	*na*
K	ppm	5	5	*na*	250	5.48	2.19	*na*
La	ppm	0.005	5	*na*	2.01	0.0235	1.17	*na*
Li	ppm	0.05	5	*na*	0.506	0.0329	6.49	*na*
Lu	ppm	0.005	5	*na*	0.0270	0.00123	4.54	*na*
Mg	ppm	1	5	*na*	247	14.3	5.80	*na*
Mn	ppm	0.1	5	*na*	57.4	3.33	5.81	*na*
Mo	ppm	0.01	5	*na*	0.446	0.0385	8.63	*na*
Nb	ppm	0.01	5	*na*	0.562	0.0492	8.75	*na*
Nd	ppm	0.005	5	*na*	2.37	0.0192	0.812	*na*
Ni	ppm	0.05	5	*na*	0.936	0.0555	5.93	*na*
Pb	ppm	0.1	5	*na*	1.36	0.0894	6.58	*na*
Pr	ppm	0.005	5	*na*	0.568	0.0125	2.20	*na*
Rb	ppm	0.01	5	*na*	1.35	0.0363	2.70	*na*
Re	ppm	0.001	5	*na*	<0.001	*na*	*na*	*na*
Sb	ppm	0.005	5	*na*	0.0692	0.00438	6.33	*na*
Se	ppm	0.5	5	*na*	0.980	0.0837	8.54	*na*
Sm	ppm	0.005	5	*na*	0.556	0.0349	6.28	*na*
Sn	ppm	0.05	5	*na*	0.154	0.00894	5.81	*na*
Sr	ppm	0.05	5	*na*	6.86	0.112	1.63	*na*
Ta	ppm	0.01	5	*na*	0.0480	0.0110	22.8	*na*
Tb	ppm	0.005	5	*na*	0.0938	0.00377	4.02	*na*
Te	ppm	0.05	5	*na*	<0.05	*na*	*na*	*na*
Th	ppm	0.01	5	*na*	1.54	0.307	20.0	*na*
Ti	ppm	1	5	*na*	254	3.32	1.31	*na*
Tl	ppm	0.005	5	*na*	0.0286	0.00134	4.69	*na*
Tm	ppm	0.005	5	*na*	0.0298	0.000837	2.81	*na*
U	ppm	0.005	5	*na*	0.262	0.0173	6.59	*na*
V	ppm	0.05	5	*na*	8.20	0.369	4.50	*na*
W	ppm	0.01	5	*na*	0.0920	0.00447	4.86	*na*
Y	ppm	0.005	5	*na*	2.30	0.0230	1.00	*na*
Yb	ppm	0.005	5	*na*	0.180	0.00676	3.75	*na*
Zn	ppm	0.2	5	*na*	4.36	0.114	2.62	*na*
Zr	ppm	0.05	5	*na*	9.60	0.275	2.86	*na*

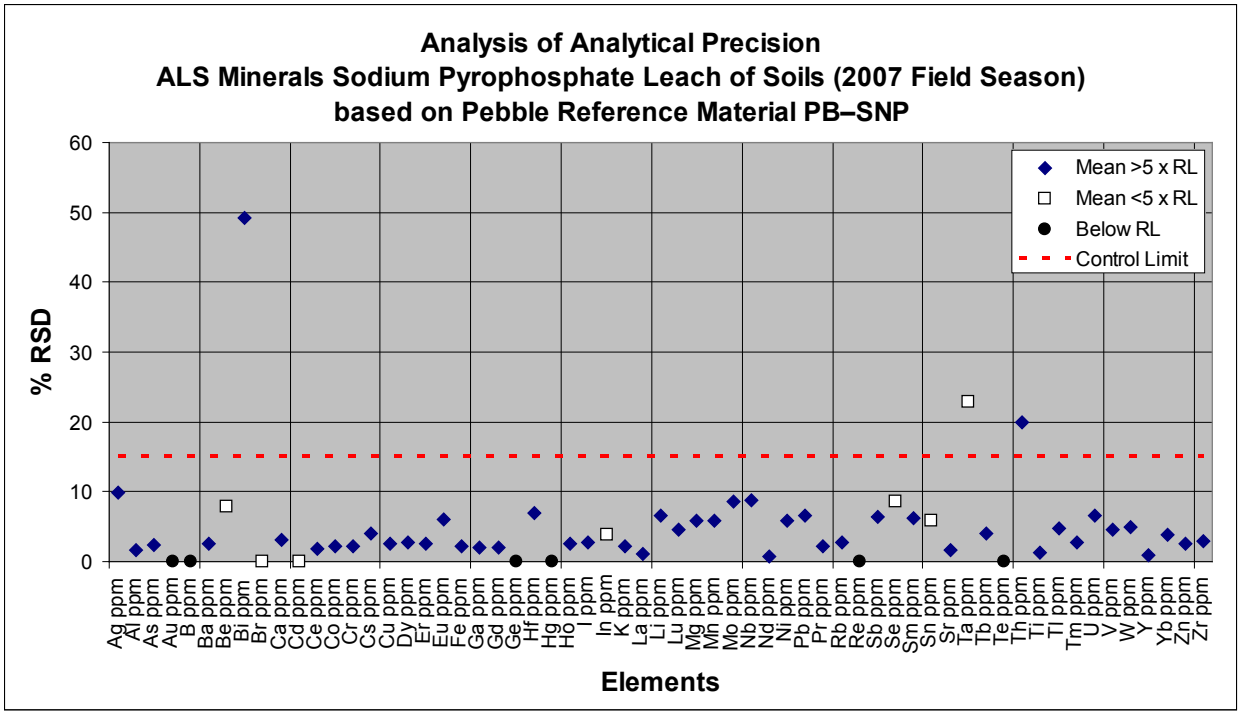

Figure 10-7. Precision plot for five analyses of Pebble reference material PB–SNP by sodium pyrophosphate leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for Acme A*nal*ytical Laboratories, Ltd. Aqua Regia Leach Data

Table 11-1. Summary statistics for assessing analytical variation on duplicate samples; determined by an aqua regia leach of soil samples at Acme A*nal*ytical Laboratories, Ltd. (2007 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	0.1	10	<0.1	0.800	0.163	0	0
Al	%	0.01	10	1.58	3.06	2.22	0.0924	4.15
As	ppm	0.5	10	3.20	71.3	13.4	1.02	7.57
Au	ppm	0.0005	10	<0.0005	0.196	0.0237	0.00659	27.9
B	ppm	20	10	<20	<20	<20	*na*	*na*
Ba	ppm	1	10	26.0	215	91.7	6.44	7.02
Bi	ppm	0.1	10	0.100	0.600	0.185	0.0387	20.9
Ca	%	0.01	10	0.0400	0.610	0.181	0.0191	10.6
Cd	ppm	0.1	10	<0.1	0.200	0.115	0.0331	28.9
Co	ppm	0.1	10	2.50	20.4	7.80	0.469	6.01
Cr	ppm	1	10	11.0	34.0	20.4	0.894	4.38
Cu	ppm	0.1	10	6.20	1,750	196	37.3	19.0
Fe	%	0.01	10	1.33	5.48	2.68	0.137	5.11
Ga	ppm	1	10	5.00	7.00	6.30	0.316	5.02
Hg[1]	ppm	0.01	9	0.0300	0.220	0.0856	0.0289	33.7
K	%	0.01	10	0.0100	0.150	0.0430	0.00316	7.35
La	ppm	1	10	3.00	18.0	9.00	0.447	4.97
Mg	%	0.01	10	0.130	0.680	0.336	0.00837	2.49
Mn	ppm	1	10	85.0	757	306	21.5	7.02
Mo	ppm	0.1	10	0.400	23.6	3.87	0.276	7.12
Na	%	0.001	10	0.00600	0.0240	0.0132	0.000922	7.01
Ni	ppm	0.1	10	3.90	20.3	10.9	0.517	4.74
P	%	0.001	10	0.0590	0.112	0.0815	0.00555	6.81
Pb	ppm	0.1	10	5.60	17.4	8.09	0.286	3.53
S	%	0.05	10	<0.05	0.160	0.0601	0.00742	12.3
Sb	ppm	0.1	10	0.100	1.70	0.375	0.0500	13.3
Sc	ppm	0.1	10	0.800	9.30	3.59	0.212	5.91
Se	ppm	0.5	10	<0.5	2.10	0.885	0.152	17.1
Sr	ppm	1	10	6.00	56.0	20.3	1.34	6.61
Th	ppm	0.1	10	<0.1	2.50	0.934	0.0388	4.16
Ti	%	0.001	10	0.0380	0.0820	0.0527	0.00266	5.04
Tl	ppm	0.1	10	<0.1	0.400	0.123	0.00199	1.61
U	ppm	0.1	10	0.400	4.10	0.940	0.0316	3.36
V	ppm	2	10	34.0	91.0	58.5	2.76	4.71
W	ppm	0.1	10	<0.1	0.100	<0.1	*na*	*na*
Zn	ppm	1	10	18.0	80.0	41.1	1.75	4.25

[1]One duplicate pair with very poor correspondence of values was removed from the statistics for Hg. The calculated %RSD for all 10 duplicate pairs was 291%.

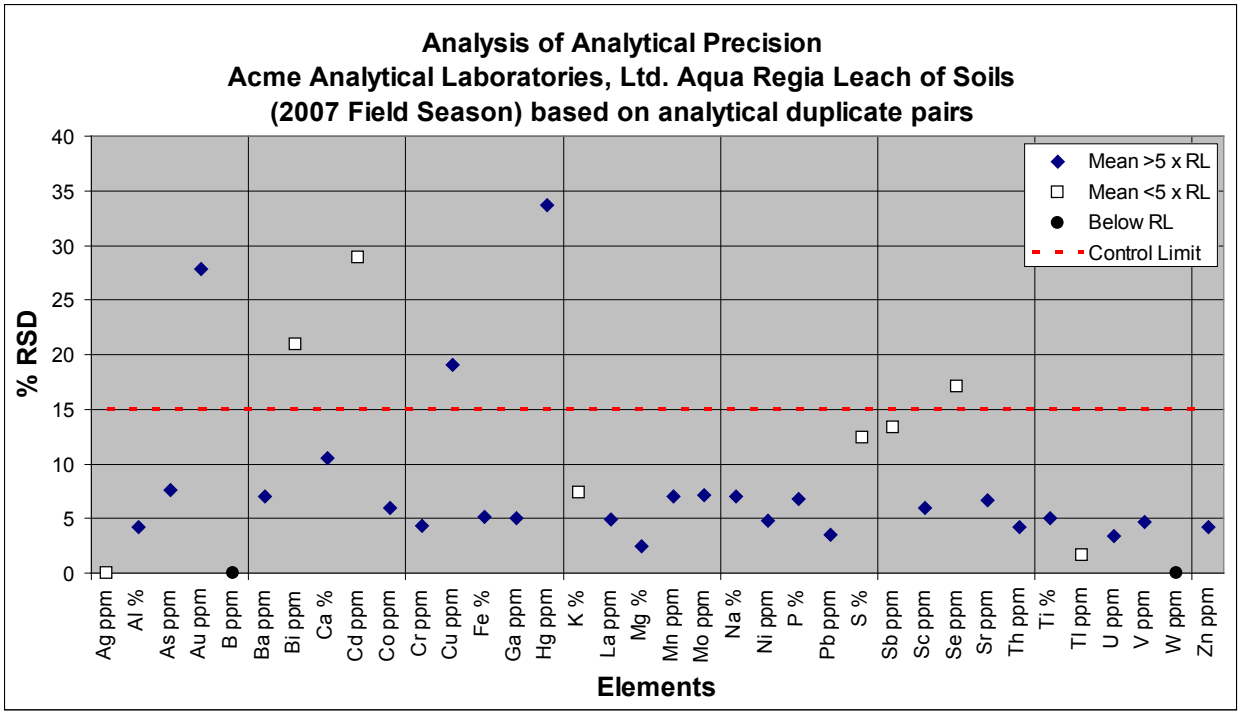

Figure 11-1. Precision plot for ten analytical duplicate sample pairs by aqua regia leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 11-2. Summary statistics for assessing analytical variation on the standard reference material DS7; determined by an aqua regia leach of soil samples at Acme Analytical Laboratories, Ltd. (2007 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.1	3	0.890	0.767	0.0577	7.53	86.1
Al	%	0.01	3	0.959	1.07	0.0907	8.45	112
As	ppm	0.5	3	48.2	49.9	3.25	6.51	104
Au	ppm	0.0005	3	0.0700	0.0609	0.00835	13.7	87.0
B	ppm	20	3	38.6	35.3	0.577	1.63	91.5
Ba	ppm	1	3	370	420	17.7	4.21	113
Bi	ppm	0.1	3	4.51	4.13	0.153	3.70	91.7
Ca	%	0.01	3	0.930	0.910	0.0819	8.99	97.9
Cd	ppm	0.1	3	6.38	5.93	0.681	11.5	93.0
Co	ppm	0.1	3	9.70	9.67	1.00	10.4	99.7
Cr	ppm	1	3	163	185	15.3	8.27	113
Cu	ppm	0.1	3	109	110	6.97	6.35	101
Fe	%	0.1	3	2.39	2.55	0.211	8.28	107
Ga	ppm	1	3	4.60	5.33	0.577	10.8	116
Hg	ppm	0.01	3	0.200	0.207	0.00577	2.79	103
K	%	0.01	3	0.440	0.553	0.0379	6.84	126
La	ppm	1	3	12.7	11.0	1.00	9.09	86.6
Mg	%	0.01	3	1.05	1.08	0.0557	5.16	103
Mn	ppm	1	3	627	674	53.4	7.92	108
Mo	ppm	0.1	3	20.9	19.5	2.11	10.8	93.1
Na	%	0.001	3	0.0730	0.0947	0.00503	5.32	130
Ni	ppm	0.1	3	56.0	54.7	3.50	6.41	97.7
P	%	0.001	3	0.0800	0.0760	0.00866	11.4	95.0

Table 11-2. Summary statistics for assessing analytical variation on the standard reference material DS7; determined by an aqua regia leach of soil samples at Acme Analytical Laboratories, Ltd. (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Pb	ppm	0.1	3	70.6	66.2	2.86	4.32	93.8
S	%	0.05	3	0.210	0.193	0.0231	12.0	92.1
Sb	ppm	0.1	3	5.86	5.23	0.252	4.81	89.3
Sc	ppm	0.1	3	2.50	2.37	0.322	13.6	94.7
Se	ppm	0.5	3	3.50	3.53	0.289	8.17	101
Sr	ppm	1	3	68.7	67.3	3.51	5.22	98.0
Th	ppm	0.1	3	4.40	3.73	0.473	12.7	84.9
Ti	%	0.001	3	0.124	0.120	0.00751	6.27	96.5
Tl	ppm	0.1	3	4.19	4.40	0.173	3.94	105
U	ppm	0.1	3	4.90	4.30	0.100	2.33	87.8
V	ppm	2	3	86.0	85.0	8.54	10.1	98.8
W	ppm	0.1	3	3.80	3.60	0.100	2.78	94.7
Zn	ppm	1	3	411	407	34.2	8.41	99.0

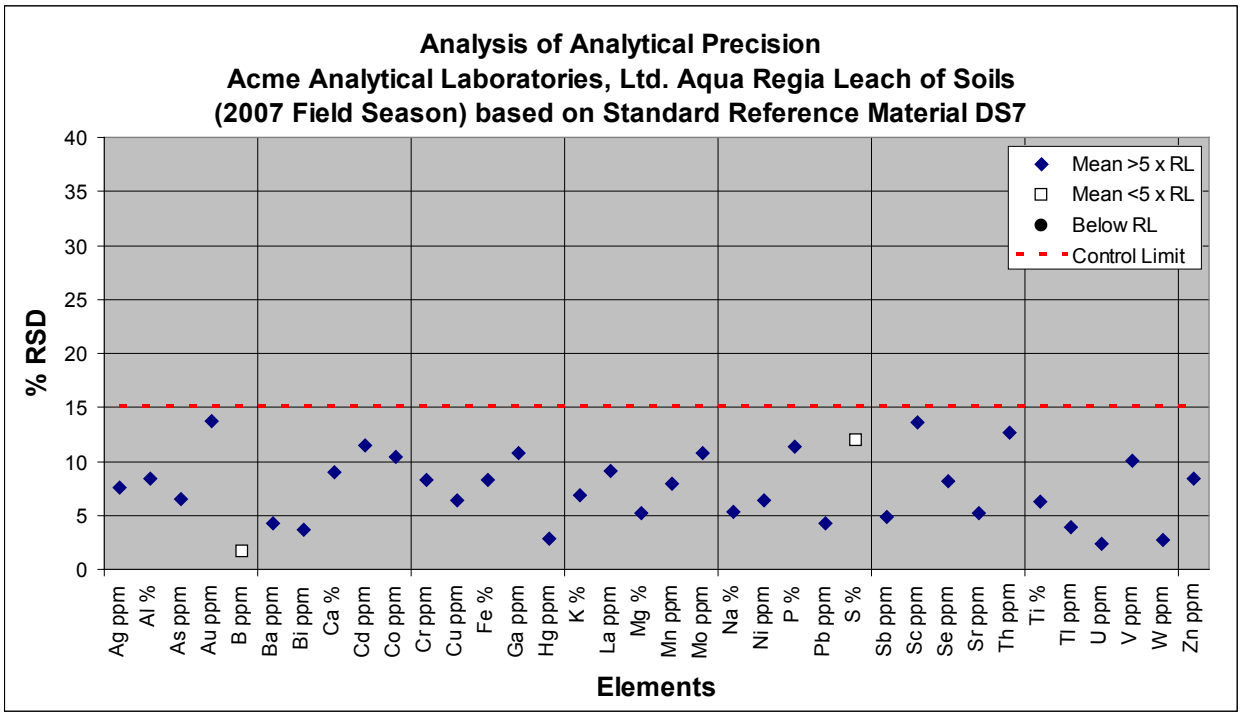

Figure 11-2. Precision plot for three analyses of standard reference material DS7 by aqua regia leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

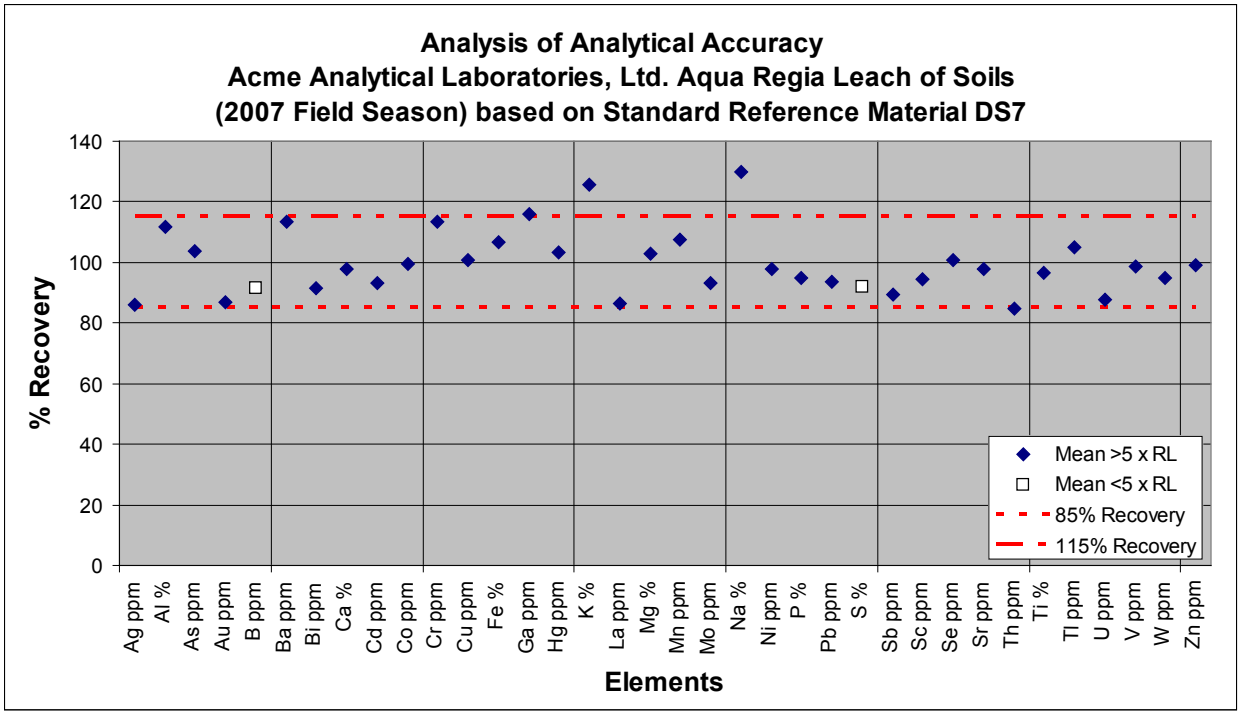

Figure 11-3. Accuracy plot for three analyses of standard reference material DS7 by aqua regia leach (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 11-3. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by an aqua regia leach of soil samples at Acme Analytical Laboratories, Ltd. (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.1	5	*na*	2.78	0.409	14.7	*na*
Al	%	0.01	5	*na*	0.726	0.0378	5.21	*na*
As	ppm	0.5	5	*na*	14.8	0.462	3.13	*na*
Au	ppm	0.0005	5	*na*	0.726	0.747	103	*na*
B	ppm	20	5	*na*	<20	*na*	*na*	*na*
Ba	ppm	1	5	*na*	244	6.02	2.47	*na*
Bi	ppm	0.1	5	*na*	1.04	0.0894	8.60	*na*
Ca	%	0.01	5	*na*	0.602	0.0286	4.76	*na*
Cd	ppm	0.1	5	*na*	2.94	0.114	3.88	*na*
Co	ppm	0.1	5	*na*	6.24	0.404	6.47	*na*
Cr	ppm	1	5	*na*	86.0	4.18	4.86	*na*
Cu	ppm	0.1	5	*na*	360	14.1	3.93	*na*
Fe	%	0.1	5	*na*	2.03	0.103	5.07	*na*
Ga	ppm	1	5	*na*	4.00	0	0	*na*
Hg	ppm	0.01	5	*na*	0.194	0.0385	19.8	*na*
K	%	0.01	5	*na*	0.242	0.0110	4.53	*na*
La	ppm	1	5	*na*	50.6	2.30	4.55	*na*
Mg	%	0.01	5	*na*	0.368	0.0110	2.98	*na*
Mn	ppm	1	5	*na*	1,930	59.6	3.09	*na*
Mo	ppm	0.1	5	*na*	11.9	1.17	9.83	*na*
Na	%	0.001	5	*na*	0.0192	0.00130	6.79	*na*
Ni	ppm	0.1	5	*na*	52.2	2.39	4.58	*na*
P	%	0.001	5	*na*	0.0688	0.00356	5.18	*na*

Table 11-3. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by an aqua regia leach of soil samples at Acme Analytical Laboratories, Ltd. (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Pb	ppm	0.1	5	*na*	557	39.8	7.13	*na*
S	%	0.05	5	*na*	0.0690	0.0143	20.7	*na*
Sb	ppm	0.1	5	*na*	2.62	0.179	6.83	*na*
Sc	ppm	0.1	5	*na*	2.50	0.187	7.48	*na*
Se	ppm	0.5	5	*na*	1.12	0.327	29.2	*na*
Sr	ppm	1	5	*na*	25.8	1.10	4.25	*na*
Th	ppm	0.1	5	*na*	11.3	1.06	9.41	*na*
Ti	%	0.001	5	*na*	0.0470	0.000707	1.50	*na*
Tl	ppm	0.1	5	*na*	0.300	0	0	*na*
U	ppm	0.1	5	*na*	2.16	0.195	9.02	*na*
V	ppm	2	5	*na*	61.6	4.34	7.04	*na*
W	ppm	0.1	5	*na*	0.700	0.100	14.3	*na*
Zn	ppm	1	5	*na*	433	20.4	4.71	*na*

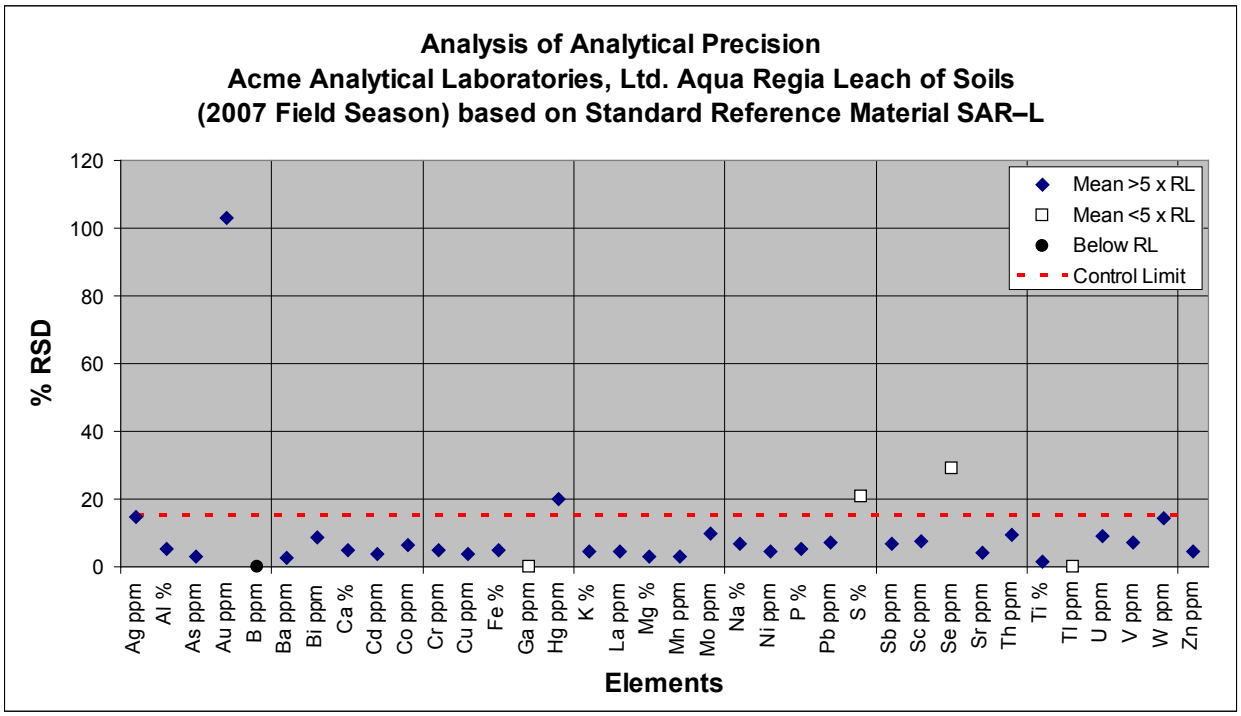

Figure 11-4. Precision plot for five analyses of standard reference material SAR–L by aqua regia leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 11-4. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an aqua regia leach of soil samples at Acme A*n*alytical Laboratories, Ltd. (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Al	%	0.01	5	*na*	2.45	0.179	7.29	*na*
As	ppm	0.5	5	*na*	11.3	0.543	4.81	*na*
Au	ppm	0.0005	5	*na*	0.0214	0.00758	35.4	*na*
B	ppm	20	5	*na*	<20	*na*	*na*	*na*
Ba	ppm	1	5	*na*	114	4.87	4.26	*na*
Bi	ppm	0.1	5	*na*	0.200	0	0	*na*
Ca	%	0.01	5	*na*	0.236	0.0182	7.70	*na*
Cd	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Co	ppm	0.1	5	*na*	10.2	0.691	6.76	*na*
Cr	ppm	1	5	*na*	23.0	1.41	6.15	*na*
Cu	ppm	0.1	5	*na*	128	6.31	4.92	*na*
Fe	%	0.1	5	*na*	3.23	0.219	6.79	*na*
Ga	ppm	1	5	*na*	6.40	0.548	8.56	*na*
Hg	ppm	0.01	5	*na*	0.0720	0.00837	11.6	*na*
K	%	0.01	5	*na*	0.0640	0.00548	8.56	*na*
La	ppm	1	5	*na*	10.4	0.548	5.27	*na*
Mg	%	0.01	5	*na*	0.408	0.0356	8.73	*na*
Mn	ppm	1	5	*na*	483	24.9	5.14	*na*
Mo	ppm	0.1	5	*na*	3.08	0.192	6.25	*na*
Na	%	0.001	5	*na*	0.0150	0.00158	10.5	*na*
Ni	ppm	0.1	5	*na*	13.6	0.590	4.35	*na*
P	%	0.001	5	*na*	0.0838	0.00743	8.87	*na*
Pb	ppm	0.1	5	*na*	8.52	0.687	8.06	*na*
S	%	0.05	5	*na*	<0.05	*na*	*na*	*na*
Sb	ppm	0.1	5	*na*	0.380	0.0447	11.8	*na*
Sc	ppm	0.1	5	*na*	4.48	0.342	7.64	*na*
Se	ppm	0.5	5	*na*	0.720	0.179	24.9	*na*
Sr	ppm	1	5	*na*	27.0	2.55	9.44	*na*
Th	ppm	0.1	5	*na*	0.960	0.0548	5.71	*na*
Ti	%	0.001	5	*na*	0.0528	0.00277	5.26	*na*
Tl	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
U	ppm	0.1	5	*na*	0.820	0.0837	10.2	*na*
V	ppm	2	5	*na*	65.4	5.32	8.13	*na*
W	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Zn	ppm	1	5	*na*	51.8	1.92	3.71	*na*

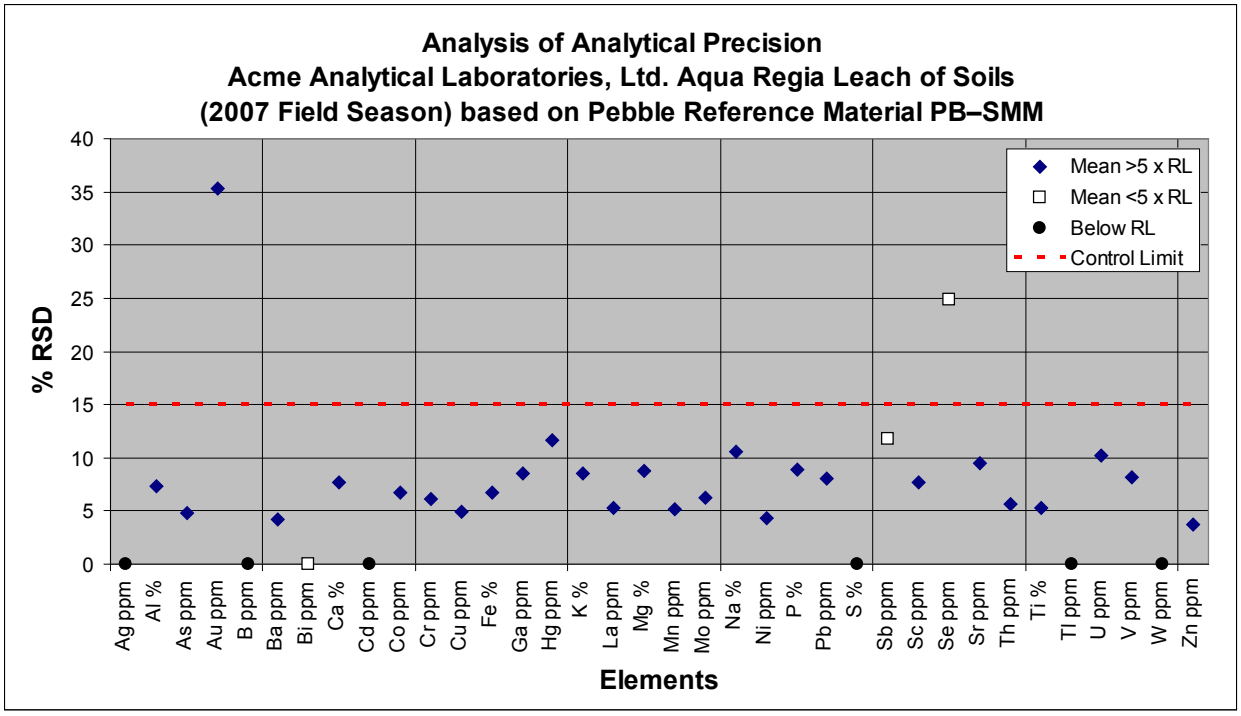

Figure 11-5. Precision plot for five analyses of Pebble reference material PB–SMM by aqua regia leach (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

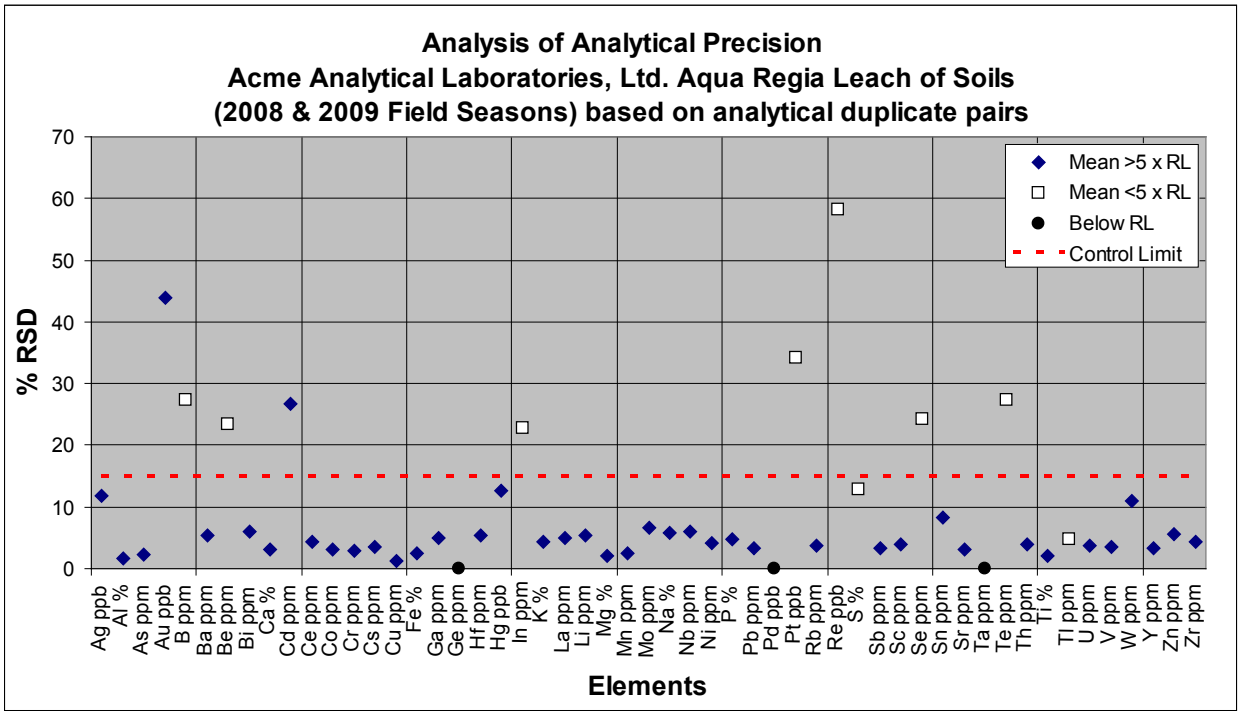

Figure 11-6. Precision plot for five analytical duplicate sample pairs by aqua regia leach (2008 and 2009 field seasons). %RSD is percent relative standard deviation; RL is reporting limit.

Table 11-5. Summary statistics for assessing analytical variation on duplicate samples; determined by an aqua regia leach of soil samples at Acme A*n*alytical Laboratories, Ltd. (2008 and 2009 field seasons).

[%, percent; ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	2	5	19.0	109	55.6	6.57	11.8
Al	%	0.001	5	1.61	3.01	2.32	0.0398	1.72
As	ppm	0.1	5	2.90	12.9	7.68	0.173	2.26
Au	ppb	0.2	5	1.20	37.8	8.49	3.73	44.0
B	ppm	1	5	<1	3.00	1.78	0.487	27.3
Ba	ppm	0.5	5	46.8	236	136	7.24	5.34
Be	ppm	0.1	5	0.200	0.600	0.450	0.105	23.3
Bi	ppm	0.02	5	0.100	0.240	0.150	0.00894	5.96
Ca	%	0.001	5	0.101	0.651	0.369	0.0111	3.01
Cd	ppm	0.01	5	0.0400	0.150	0.0960	0.0257	26.8
Ce	ppm	0.01	5	11.7	35.5	25.6	1.11	4.35
Co	ppm	0.1	5	4.70	13.3	9.07	0.288	3.18
Cr	ppm	0.5	5	13.9	35.6	25.9	0.753	2.91
Cs	ppm	0.02	5	1.01	1.99	1.39	0.0485	3.50
Cu	ppm	0.01	5	9.25	135	43.1	0.568	1.32
Fe	%	0.001	5	1.97	4.60	3.05	0.0763	2.50
Ga	ppm	0.1	5	4.90	8.10	6.48	0.329	5.07
Ge	ppm	0.1	5	<0.1	<0.1	<0.1	*na*	*na*
Hf	ppm	0.02	5	0.0300	0.360	0.118	0.00632	5.36
Hg	ppb	5	5	58.0	150	106	13.3	12.6
In	ppm	0.02	5	0.0200	0.0500	0.0310	0.00707	22.8
K	%	0.001	5	0.0270	0.0740	0.0525	0.00226	4.30
La	ppm	0.5	5	6.00	18.9	13.1	0.643	4.93
Li	ppm	0.1	5	7.40	11.2	9.57	0.521	5.44
Mg	%	0.01	5	0.220	0.710	0.468	0.0100	2.14
Mn	ppm	1	5	171	711	421	10.8	2.56
Mo	ppm	0.01	5	0.430	3.51	1.15	0.0768	6.68
Na	%	0.001	5	0.0110	0.0250	0.0186	0.00110	5.89
Nb	ppm	0.02	5	0.420	1.27	0.881	0.0526	5.97
Ni	ppm	0.1	5	6.40	20.6	12.9	0.543	4.23
P	%	0.001	5	0.0580	0.117	0.0810	0.00390	4.81
Pb	ppm	0.01	5	7.34	11.7	9.53	0.324	3.40
Pd	ppb	10	5	<10	13.0	<10	*na*	*na*
Pt	ppb	2	5	<2	4.00	2.03	0.692	34.1
Rb	ppm	0.1	5	3.90	6.40	4.99	0.187	3.75
Re	ppb	1	5	<1	3.00	1.14	0.662	58.2
S	%	0.01	5	<0.01	0.0500	0.0246	0.00316	12.8
Sb	ppm	0.02	5	0.240	0.550	0.415	0.0138	3.32
Sc	ppm	0.1	5	2.60	8.20	5.25	0.207	3.95
Se	ppm	0.1	5	0.200	0.900	0.470	0.114	24.3
Sn	ppm	0.02	5	0.570	1.24	0.827	0.0683	8.26
Sr	ppm	0.5	5	9.60	69.6	36.6	1.11	3.03
Ta	ppm	0.05	5	<0.05	<0.05	<0.05	*na*	*na*
Te	ppm	0.02	5	<0.02	0.130	0.0526	0.0143	27.3
Th	ppm	0.1	5	0.600	2.60	1.58	0.0632	4.00
Ti	%	0.001	5	0.0770	0.158	0.107	0.00212	1.98
Tl	ppm	0.02	5	0.0400	0.100	0.0670	0.00316	4.72
U	ppm	0.01	5	0.460	0.950	0.738	0.0268	3.64
V	ppm	2	5	54.0	84.0	69.7	2.43	3.48
W	ppm	0.01	5	0.0500	0.190	0.122	0.0134	11.0
Y	ppm	0.01	5	4.02	13.9	9.75	0.329	3.37
Zn	ppm	0.1	5	35.6	79.0	52.8	2.95	5.59
Zr	ppm	0.1	5	1.90	17.0	5.80	0.249	4.29

Table 11-6. Summary statistics for assessing analytical variation on the standard reference material DS7; determined by an aqua regia leach of soil samples at Acme A*n*alytical Laboratories, Ltd. (2008 and 2009 field seasons).

[%, percent; ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	2	5	890	820	39.0	4.75	92.2
Al	%	0.001	5	0.959	1.01	0.0731	7.27	105
As	ppm	0.1	5	48.2	49.8	1.16	2.32	103
Au	ppb	0.2	5	70.0	70.9	16.5	23.3	101
B	ppm	1	5	38.6	38.2	1.92	5.04	99.0
Ba	ppm	0.5	5	370	402	28.2	7.02	109
Be	ppm	0.1	5	*na*	1.56	0.152	9.72	*na*
Bi	ppm	0.02	5	4.51	4.71	0.172	3.64	104
Ca	%	0.001	5	0.930	0.929	0.0312	3.36	99.9
Cd	ppm	0.01	5	6.38	6.31	0.344	5.45	98.9
Ce	ppm	0.01	5	*na*	34.0	2.24	6.60	*na*
Co	ppm	0.1	5	9.70	9.20	0.480	5.21	94.8
Cr	ppm	0.5	5	163	202	14.7	7.32	124
Cs	ppm	0.02	5	*na*	5.92	0.250	4.22	*na*
Cu	ppm	0.01	5	109	107	4.46	4.16	98.3
Fe	%	0.001	5	2.39	2.40	0.106	4.43	100
Ga	ppm	0.1	5	4.60	4.70	0.480	10.2	102
Ge	ppm	0.1	5	*na*	<0.1	*na*	*na*	*na*
Hf	ppm	0.02	5	*na*	0.136	0.0261	19.2	*na*
Hg	ppb	5	5	200	195	14.0	7.16	97.7
In	ppm	0.02	5	*na*	1.57	0.0385	2.46	*na*
K	%	0.001	5	0.440	0.444	0.0336	7.58	101
La	ppm	0.5	5	12.7	13.1	1.11	8.47	103
Li	ppm	0.1	5	*na*	28.8	1.77	6.15	*na*
Mg	%	0.01	5	1.05	1.03	0.0483	4.70	97.7
Mn	ppm	1	5	627	612	24.2	3.96	97.6
Mo	ppm	0.01	5	20.9	20.2	0.627	3.11	96.4
Na	%	0.001	5	0.0730	0.0918	0.0117	12.7	126
Nb	ppm	0.02	5	*na*	0.624	0.124	19.9	*na*
Ni	ppm	0.1	5	56.0	55.3	2.78	5.03	98.8
P	%	0.001	5	0.0800	0.0742	0.00217	2.92	92.8
Pb	ppm	0.01	5	70.6	69.0	2.48	3.60	97.7
Pd	ppb	10	5	*na*	63.0	11.0	17.5	*na*
Pt	ppb	2	5	*na*	38.2	3.56	9.33	*na*
Rb	ppm	0.1	5	*na*	35.7	3.26	9.13	*na*
Re	ppb	1	5	*na*	4.20	1.92	45.8	*na*
S	%	0.01	5	0.210	0.192	0.0130	6.79	91.4
Sb	ppm	0.02	5	5.86	5.79	0.227	3.93	98.8
Sc	ppm	0.1	5	2.50	2.64	0.270	10.2	106
Se	ppm	0.1	5	3.50	3.32	0.277	8.36	94.9
Sn	ppm	0.02	5	*na*	5.22	0.443	8.48	*na*
Sr	ppm	0.5	5	68.7	71.1	6.47	9.10	103
Ta	ppm	0.05	5	*na*	<0.05	*na*	*na*	*na*
Te	ppm	0.02	5	*na*	1.11	0.0652	5.87	*na*
Th	ppm	0.1	5	4.40	4.50	0.255	5.67	102
Ti	%	0.001	5	0.124	0.124	0.00907	7.29	100
Tl	ppm	0.02	5	4.19	4.04	0.0760	1.88	96.5
U	ppm	0.01	5	4.90	4.92	0.177	3.60	100
V	ppm	2	5	86.0	79.4	2.79	3.52	92.3
W	ppm	0.01	5	3.80	3.76	0.0968	2.58	98.9
Y	ppm	0.01	5	*na*	5.50	0.780	14.2	*na*
Zn	ppm	0.1	5	411	387	12.2	3.15	94.2
Zr	ppm	0.1	5	*na*	5.48	0.432	7.89	*na*

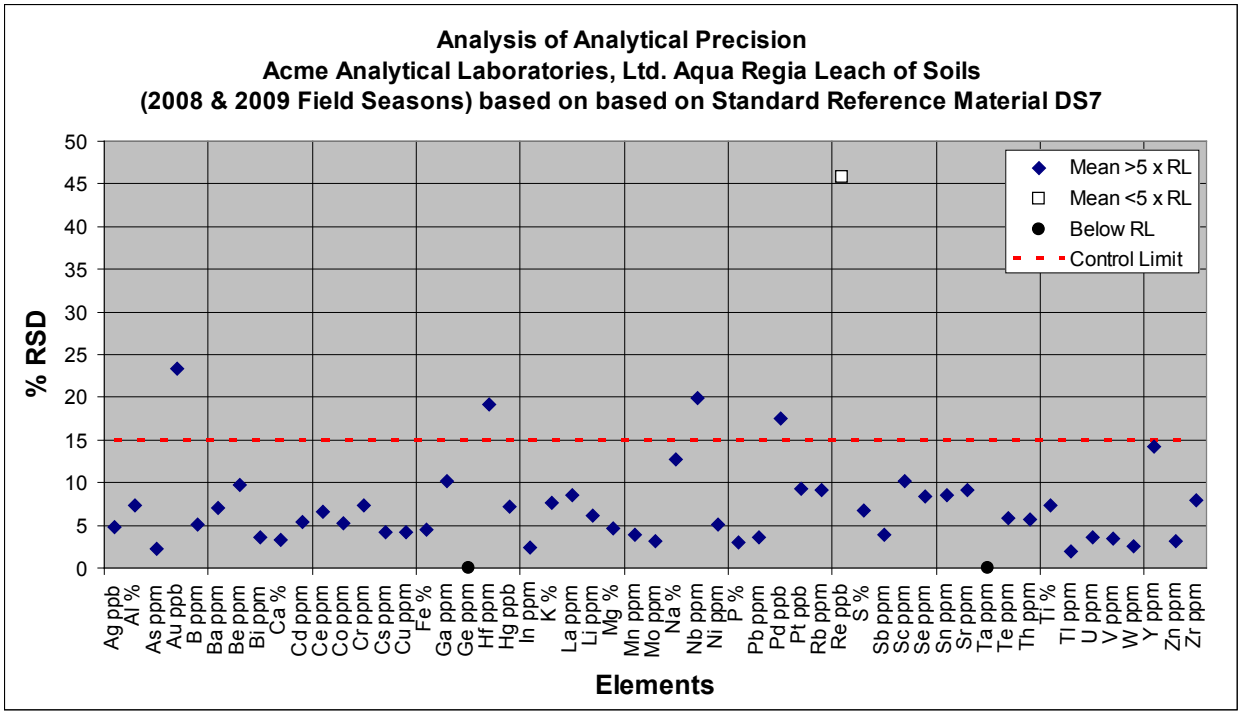

Figure 11-7. Precision plot for five analyses of standard reference material DS7 by aqua regia leach (2008 and 2009 field seasons). %RSD is percent relative standard deviation; RL is reporting limit.

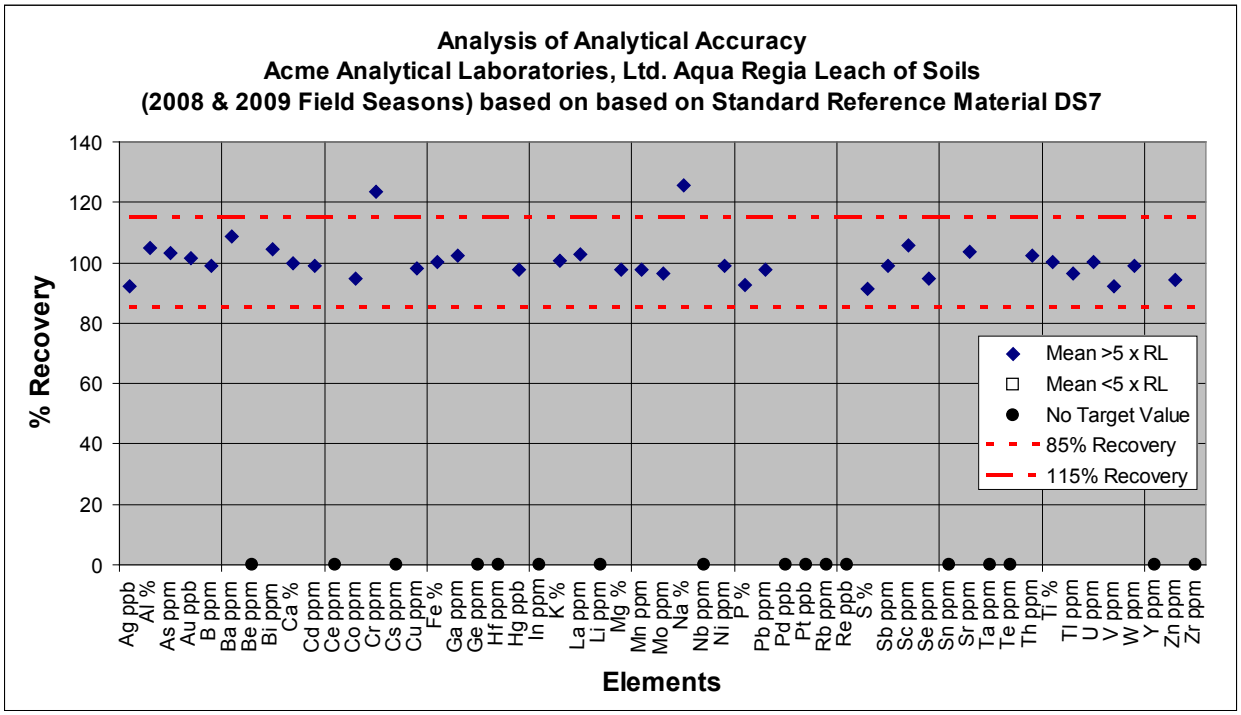

Figure 11-8. Accuracy plot for five analyses of standard reference material DS7 by aqua regia leach (2008 and 2009 field seasons). %Recovery is percent recovery; RL is reporting limit.

Table 11-7. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by an aqua regia leach of soil samples at Acme A*n*alytical Laboratories, Ltd. (2008 and 2009 field seasons).

[%, percent; ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na,* not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	2	6	98.0	109	9.61	8.82	111
Al	%	0.001	6	2.45	2.73	0.182	6.65	112
As	ppm	0.1	6	11.3	12.6	0.440	3.50	111
Au	ppb	0.2	6	21.4	31.5	5.35	17.0	147
B	ppm	1	6	*na*	1.17	0.408	35.0	*na*
Ba	ppm	0.5	6	114	135	4.31	3.18	119
Be	ppm	0.1	6	*na*	0.533	0.163	30.6	*na*
Bi	ppm	0.02	6	0.200	0.223	0.00816	3.66	112
Ca	%	0.001	6	0.236	0.258	0.00821	3.19	109
Cd	ppm	0.01	6	*na*	0.108	0.0214	19.7	*na*
Ce	ppm	0.01	6	*na*	25.9	0.808	3.12	*na*
Co	ppm	0.1	6	10.2	11.4	0.726	6.38	111
Cr	ppm	0.5	6	23.0	28.5	1.44	5.05	124
Cs	ppm	0.02	6	*na*	1.27	0.115	9.11	*na*
Cu	ppm	0.01	6	128	143	4.92	3.43	112
Fe	%	0.001	6	3.23	3.56	0.146	4.09	110
Ga	ppm	0.1	6	6.40	6.85	0.356	5.20	107
Ge	ppm	0.1	6	*na*	<0.1	*na*	*na*	*na*
Hf	ppm	0.02	6	*na*	0.0583	0.00408	7.00	*na*
Hg	ppb	5	6	72.0	83.8	18.0	21.4	116
In	ppm	0.02	6	*na*	0.0367	0.00816	22.3	*na*
K	%	0.001	6	0.0640	0.0720	0.00385	5.34	113
La	ppm	0.5	6	10.4	13.1	0.226	1.73	125
Li	ppm	0.1	6	*na*	8.87	0.509	5.74	*na*
Mg	%	0.01	6	0.408	0.460	0.0253	5.50	113
Mn	ppm	1	6	483	510	18.5	3.62	105
Mo	ppm	0.01	6	3.08	3.60	0.183	5.10	117
Na	%	0.001	6	0.0150	0.0177	0.00163	9.24	118
Nb	ppm	0.02	6	*na*	0.980	0.0245	2.50	*na*
Ni	ppm	0.1	6	13.6	14.4	0.731	5.07	106
P	%	0.001	6	0.0838	0.0883	0.00579	6.55	105
Pb	ppm	0.01	6	8.52	10.4	0.434	4.16	122
Pd	ppb	10	6	*na*	<10	*na*	*na*	*na*
Pt	ppb	2	6	*na*	2.18	0.894	41.1	*na*
Rb	ppm	0.1	6	*na*	6.90	0.486	7.04	*na*
Re	ppb	1	6	*na*	1.44	0.879	61.0	*na*
S	%	0.01	6	0.0500	0.0467	0.00516	11.1	93.3
Sb	ppm	0.02	6	0.380	0.518	0.0232	4.47	136
Sc	ppm	0.1	6	4.48	5.52	0.325	5.89	123
Se	ppm	0.1	6	0.720	0.850	0.138	16.2	118
Sn	ppm	0.02	6	*na*	0.713	0.0280	3.93	*na*
Sr	ppm	0.5	6	27.0	32.1	1.95	6.08	119
Ta	ppm	0.05	6	*na*	<0.05	*na*	*na*	*na*
Te	ppm	0.02	6	*na*	0.103	0.0151	14.6	*na*
Th	ppm	0.1	6	*na*	1.20	0.110	9.13	*na*
Ti	%	0.001	6	0.0528	0.0778	0.00564	7.24	147
Tl	ppm	0.02	6	*na*	0.110	0.00632	5.75	*na*
U	ppm	0.01	6	0.820	0.982	0.0293	2.98	120
V	ppm	2	6	65.4	73.5	2.81	3.82	112
W	ppm	0.01	6	*na*	0.0987	0.0318	32.2	*na*
Y	ppm	0.01	6	*na*	10.0	0.462	4.60	*na*
Zn	ppm	0.1	6	51.8	54.9	1.97	3.60	106
Zr	ppm	0.1	6	*na*	3.02	0.299	9.93	*na*

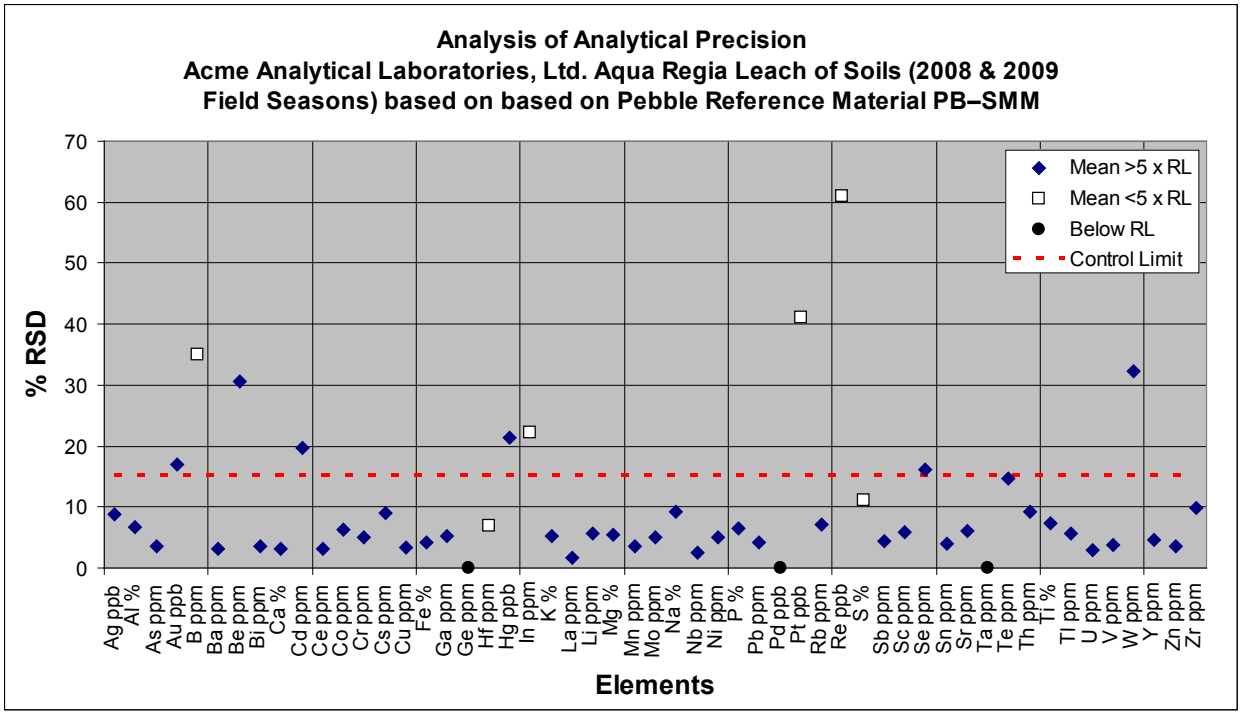

Figure 11-9. Precision plot for six analyses of Pebble reference material PB–SMM by aqua regia leach (2008 and 2009 field seasons). %RSD is percent relative standard deviation; RL is reporting limit.

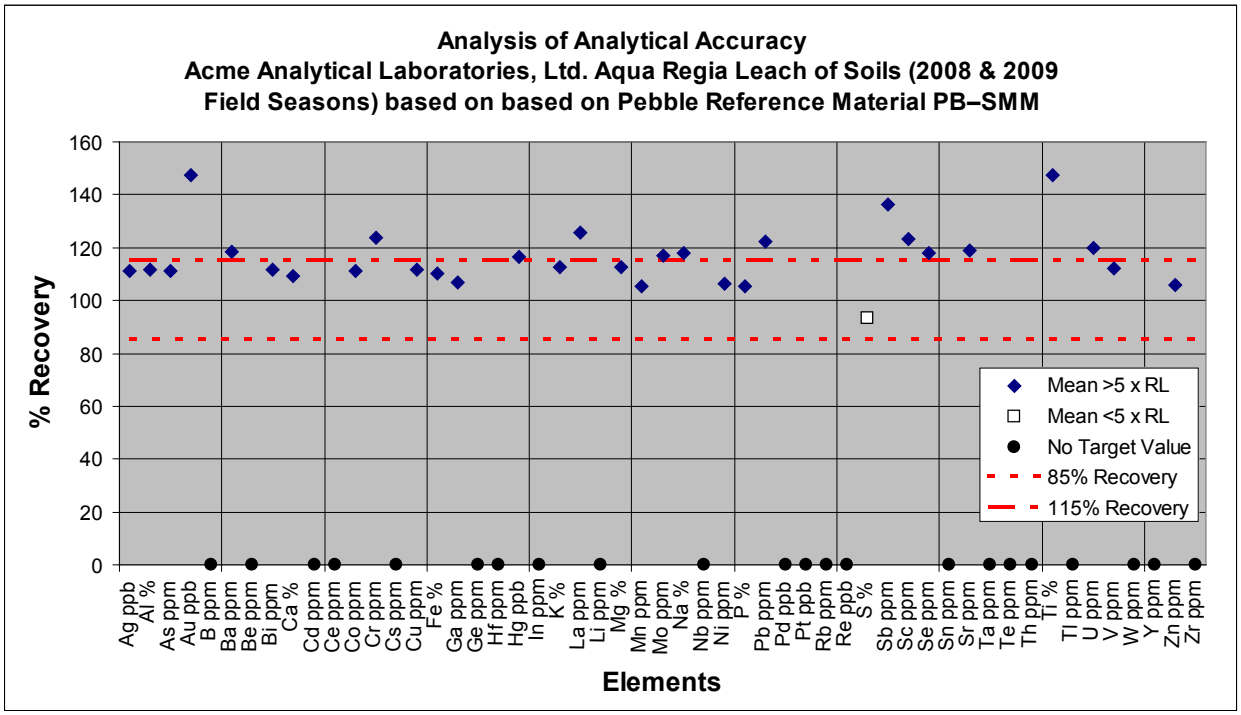

Figure 11-10. Accuracy plot for six analyses of Pebble reference material PB–SMM by aqua regia leach (2008 and 2009 field seasons). %Recovery is percent recovery; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for SGS Mineral Services (USGS contract) ICPAES–MS42 Multielement Package Data

Table 12-1. Summary statistics for assessing analytical variation on duplicate samples; determined after a four-acid total digestion of soil samples by the ICPAES–MS42 multielement package at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	1	4	<1	<1	<1	*na*	*na*
Al	%	0.01	4	5.32	8.24	6.95	0.247	3.56
As	ppm	1	4	7.00	17.0	10.0	1.50	15.0
Ba	ppm	5	4	416	793	583	38.8	6.66
Be	ppm	0.1	4	0.700	1.50	1.19	0.154	13.0
Bi	ppm	0.04	4	0.170	0.260	0.220	0.0240	10.9
Ca	%	0.01	4	0.980	1.59	1.31	0.0686	5.25
Cd	ppm	0.1	4	<0.1	0.200	0.109	0.0385	35.3
Ce	ppm	0.05	4	23.8	38.1	31.6	1.20	3.81
Co	ppm	0.1	4	5.40	14.0	9.13	0.265	2.90
Cr	ppm	1	4	25.0	64.0	41.3	3.91	9.47
Cs	ppm	5	4	<5	<5	<5	*na*	*na*
Cu	ppm	0.5	4	12.8	225	68.2	8.37	12.3
Fe	%	0.01	4	2.90	4.84	3.92	0.151	3.84
Ga	ppm	0.05	4	14.8	19.4	17.0	0.453	2.66
In	ppm	0.02	4	0.0600	0.0600	0.0600	0	0
K	%	0.01	4	0.750	1.36	1.09	0.0528	4.86
La	ppm	0.5	4	11.5	18.6	15.0	0.572	3.81
Li	ppm	1	4	11.0	21.0	16.1	1.37	8.49
Mg	%	0.01	4	0.530	0.980	0.783	0.0260	3.32
Mn	ppm	5	4	381	721	588	24.5	4.17
Mo	ppm	0.05	4	1.24	4.83	2.24	0.243	10.8
Na	%	0.01	4	1.24	1.86	1.53	0.0562	3.67
Nb	ppm	0.1	4	6.30	11.3	7.99	1.52	19.1
Ni	ppm	0.5	4	8.40	21.6	13.3	1.84	13.9
P	ppm	50	4	980	1,940	1,470	115	7.80
Pb	ppm	0.5	4	9.70	13.7	11.8	1.43	12.2
Rb	ppm	0.2	4	25.9	45.8	36.1	0.482	1.33
S	%	0.01	4	0.0500	0.120	0.0763	0.00791	10.4
Sb	ppm	0.05	4	0.520	1.02	0.800	0.0229	2.86
Sc	ppm	0.1	4	9.50	18.3	13.2	0.986	7.49
Sn	ppm	0.1	4	1.10	1.40	1.28	0.0500	3.92
Sr	ppm	0.5	4	151	228	198	6.09	3.08
Te	ppm	0.1	4	<0.1	<0.1	<0.1	*na*	*na*
Th	ppm	0.2	4	3.00	4.30	3.74	0.203	5.43
Ti	%	0.01	4	0.330	0.650	0.484	0.0267	5.52
Tl	ppm	0.1	4	0.200	0.400	0.300	0.0500	16.7
U	ppm	0.1	4	1.30	1.70	1.51	0.0935	6.18
V	ppm	1	4	79.0	144	115	6.53	5.68
W	ppm	0.1	4	0.500	1.20	0.800	0.0500	6.25
Y	ppm	0.1	4	9.60	17.1	13.5	0.367	2.72
Zn	ppm	1	4	38.0	79.0	58.5	3.77	6.45

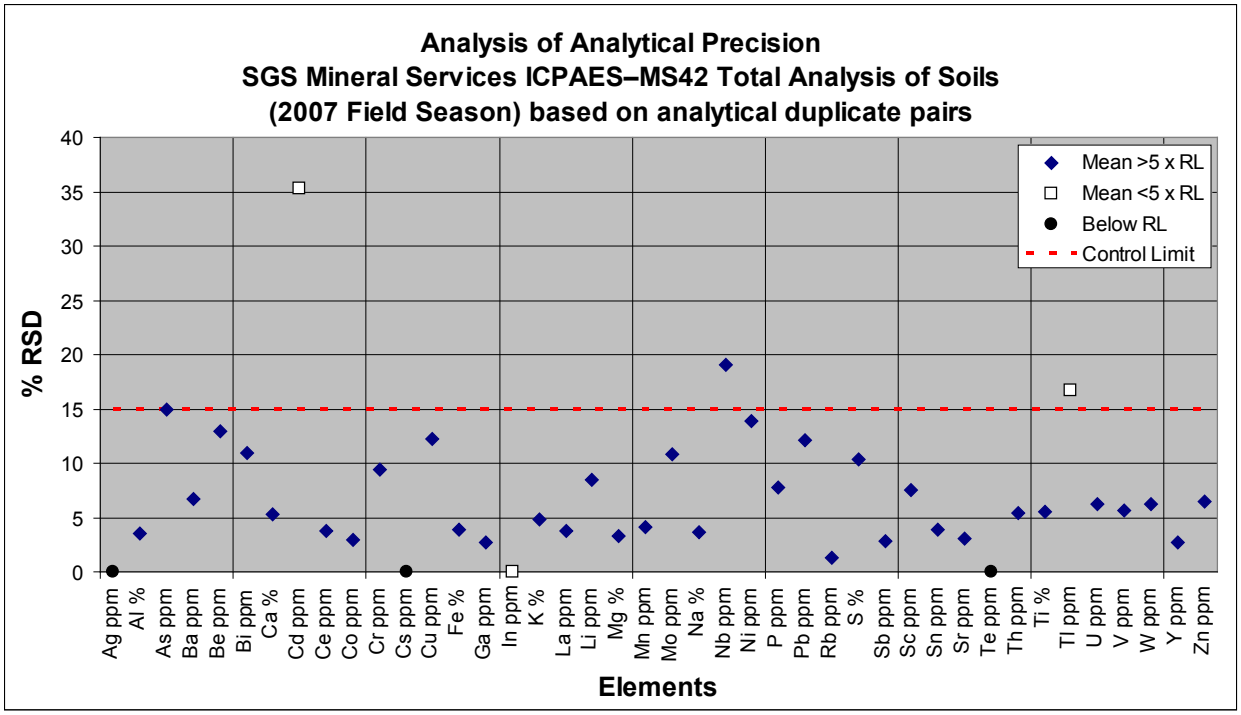

Figure 12-1. Precision plot for four analytical duplicate sample pairs by ICPAES–MS42 (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 12-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a four-acid total digestion of soil samples by the ICPAES–MS42 multielement package at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	3	2.56	3.00	0	0	117
Al	%	0.01	3	5.79	5.73	0.0700	1.22	99.0
As	ppm	1	3	16.5	16.7	0.577	3.46	101
Ba	ppm	5	3	879	881	8.33	0.945	100
Be	ppm	0.1	3	3.24	4.17	0.208	5.00	129
Bi	ppm	0.04	3	1.10	1.14	0.140	12.3	104
Ca	%	0.01	3	1.06	1.00	0.00575	0.575	94.7
Cd	ppm	0.1	3	2.50	2.97	0.0577	1.95	119
Ce	ppm	0.05	3	150	159	22.1	13.9	106
Co	ppm	0.1	3	7.50	7.60	0.100	1.32	101
Cr	ppm	1	3	110	108	2.08	1.93	97.9
Cs	ppm	5	3	<5	<5	*na*	*na*	100
Cu	ppm	0.5	3	370	387	3.51	0.907	105
Fe	%	0.01	3	2.67	2.70	0.0351	1.30	101
Ga	ppm	0.05	3	17.0	16.8	0.361	2.15	98.8
In	ppm	0.02	3	0.260	0.293	0.00577	1.97	113
K	%	0.01	3	2.98	2.87	0.0300	1.05	96.3
La	ppm	0.5	3	75.0	65.0	2.65	4.08	86.7
Li	ppm	1	3	28.0	29.0	0	0	104
Mg	%	0.01	3	0.550	0.550	0.0100	1.82	100
Mn	ppm	5	3	2,090	2,110	36.1	1.71	101
Mo	ppm	0.05	3	13.0	14.7	0.306	2.07	113

Table 12-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a four-acid total digestion of soil samples by the ICPAES–MS42 multielement package at SGS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Na	%	0.01	3	1.53	1.49	0.00577	0.388	97.2
Nb	ppm	0.1	3	35.0	33.1	1.17	3.54	94.7
Ni	ppm	0.5	3	52.0	52.8	1.28	2.42	102
P	ppm	50	3	900	687	15.3	2.22	76.3
Pb	ppm	0.5	3	578	575	13.1	2.27	99.4
Rb	ppm	0.2	3	140	135	2.00	1.48	96.4
S	%	0.01	3	0.0700	0.0933	0.00577	6.19	133
Sb	ppm	0.05	3	5.10	5.06	0.225	4.45	99.2
Sc	ppm	0.1	3	7.80	7.73	0.208	2.69	99.2
Sn	ppm	0.1	3	6.00	4.87	1.01	20.8	81.1
Sr	ppm	0.5	3	158	149	2.65	1.78	94.3
Te	ppm	0.1	3	0.600	0.667	0.0577	8.66	111
Th	ppm	0.2	3	19.0	18.2	0.954	5.24	95.8
Ti	%	0.01	3	0.250	0.253	0.00577	2.28	101
Tl	ppm	0.1	3	1.40	1.27	0.0577	4.56	90.5
U	ppm	0.1	3	5.20	4.03	0.0577	1.43	77.6
V	ppm	1	3	140	137	1.53	1.12	97.6
W	ppm	0.1	3	3.70	3.27	0.116	3.53	88.3
Y	ppm	0.1	3	44.0	36.9	0.902	2.45	83.8
Zn	ppm	1	3	420	458	6.35	1.39	109

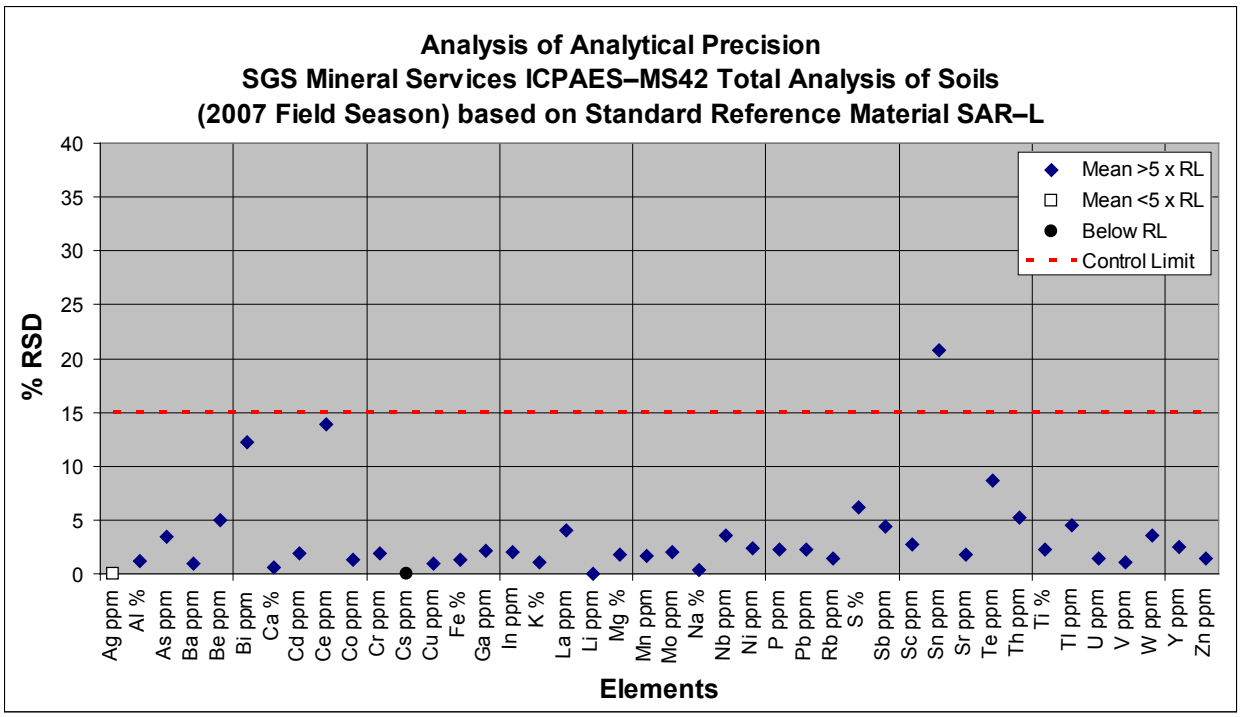

Figure 12-2. Precision plot for three analyses of standard reference material SAR–L by ICPAES–MS42 (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

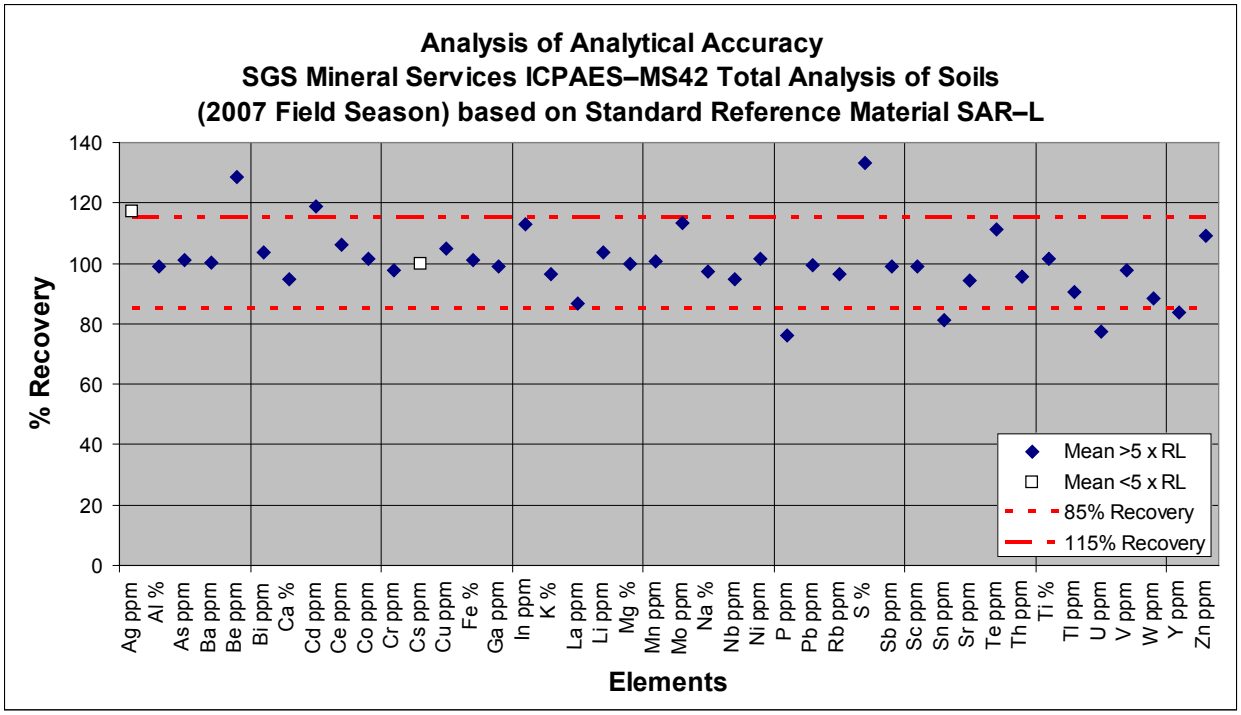

Figure 12-3. Accuracy plot for three analyses of standard reference material SAR–L by ICPAES–MS42 (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-3. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined after a four-acid total digestion of soil samples by the ICPAES–MS42 multielement package at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	4	3.10	3.25	0.500	15.4	105
Al	%	0.01	4	6.09	6.01	0.186	3.10	98.7
As	ppm	1	4	37.0	41.0	1.15	2.82	111
Ba	ppm	5	4	764	786	46.4	5.90	103
Be	ppm	0.1	4	2.40	3.28	0.695	21.2	136
Bi	ppm	0.04	4	1.33	1.85	0.315	17.1	139
Ca	%	0.01	4	0.580	0.590	0.0566	9.59	102
Cd	ppm	0.1	4	4.76	5.38	0.525	9.77	113
Ce	ppm	0.05	4	120	117	5.10	4.36	97.5
Co	ppm	0.1	4	11.0	11.3	0.866	7.68	103
Cr	ppm	1	4	101	91.3	6.13	6.72	90.4
Cs	ppm	5	4	<5	<5	*na*	*na*	102
Cu	ppm	0.5	4	320	330	25.8	7.84	103
Fe	%	0.01	4	3.22	3.22	0.0455	1.41	100
Ga	ppm	0.05	4	20.0	17.6	0.263	1.50	87.9
In	ppm	0.02	4	0.970	1.07	0.140	13.2	110
K	%	0.01	4	2.92	2.88	0.0741	2.57	98.7
La	ppm	0.5	4	61.0	56.0	2.71	4.83	91.8
Li	ppm	1	4	30.0	30.3	0.957	3.17	101
Mg	%	0.01	4	0.500	0.503	0.0126	2.50	101
Mn	ppm	5	4	5,200	5,140	260	5.06	98.9
Mo	ppm	0.05	4	12.0	14.9	0.956	6.41	124

Table 12-3. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined after a four-acid total digestion of soil samples by the ICPAES–MS42 multielement package at SGS Minerals (2007 field season)—Continued.

[%, percent; ppm, parts per million; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Na	%	0.01	4	1.19	1.19	0.0705	5.95	99.6
Nb	ppm	0.1	3	31.0	32.5	0.651	2.00	105
Ni	ppm	0.5	4	41.0	41.1	0.959	2.33	100
P	ppm	50	4	800	683	60.8	8.90	85.3
Pb	ppm	0.5	4	960	958	73.6	7.68	99.8
Rb	ppm	0.2	4	142	147	2.99	2.03	104
S	%	0.01	4	0.130	0.160	0	0	123
Sb	ppm	0.05	4	5.60	6.62	0.456	6.90	118
Sc	ppm	0.1	4	8.30	8.15	0.208	2.55	98.2
Sn	ppm	0.1	4	9.40	2.88	0.150	5.22	30.6
Sr	ppm	0.5	4	156	151	9.98	6.63	96.5
Te	ppm	0.1	4	0.680	0.900	0.0816	9.07	132
Th	ppm	0.2	4	18.0	17.8	0.810	4.57	98.6
Ti	%	0.01	4	0.350	0.285	0.0129	4.53	81.4
Tl	ppm	0.1	4	2.80	2.75	0.0577	2.10	98.2
U	ppm	0.1	4	5.10	3.43	0.126	3.67	67.2
V	ppm	1	4	66.0	67.0	4.08	6.09	102
W	ppm	0.1	4	14.0	11.0	1.59	14.6	78.2
Y	ppm	0.1	4	33.0	26.6	1.10	4.14	80.5
Zn	ppm	1	4	888	960	80.1	8.34	108

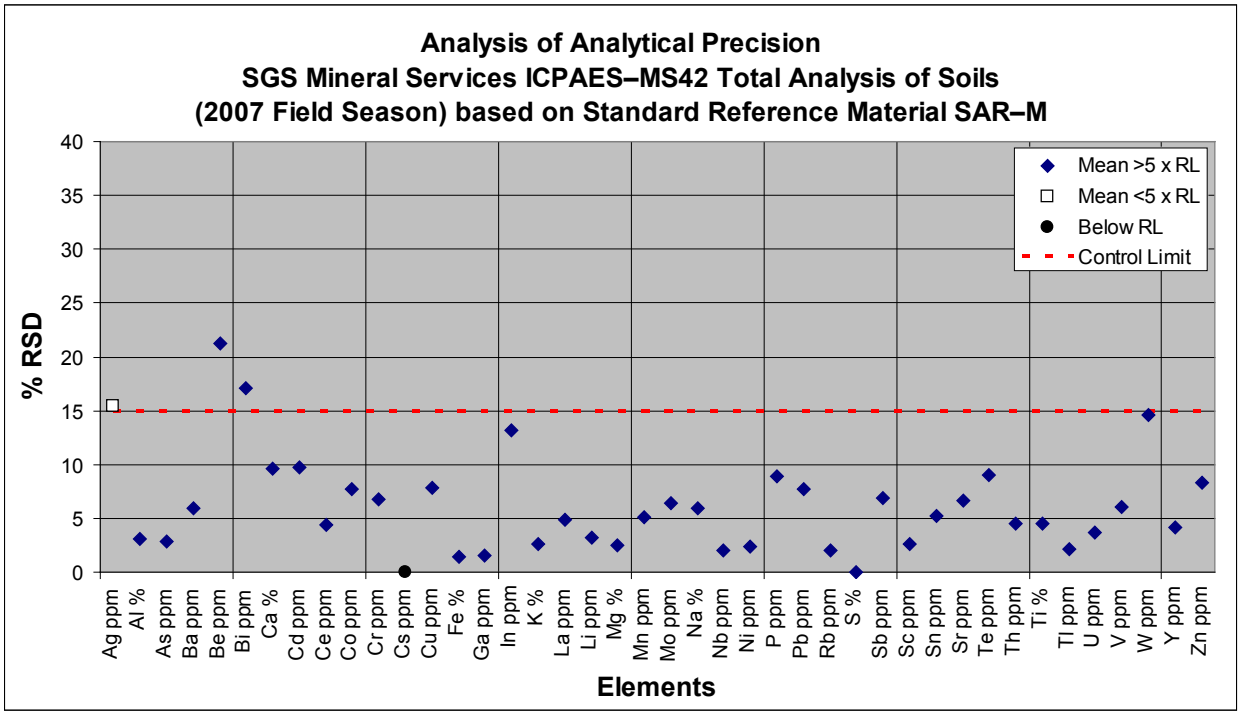

Figure 12-4. Precision plot for four analyses of standard reference material SAR–M by ICPAES–MS42 (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

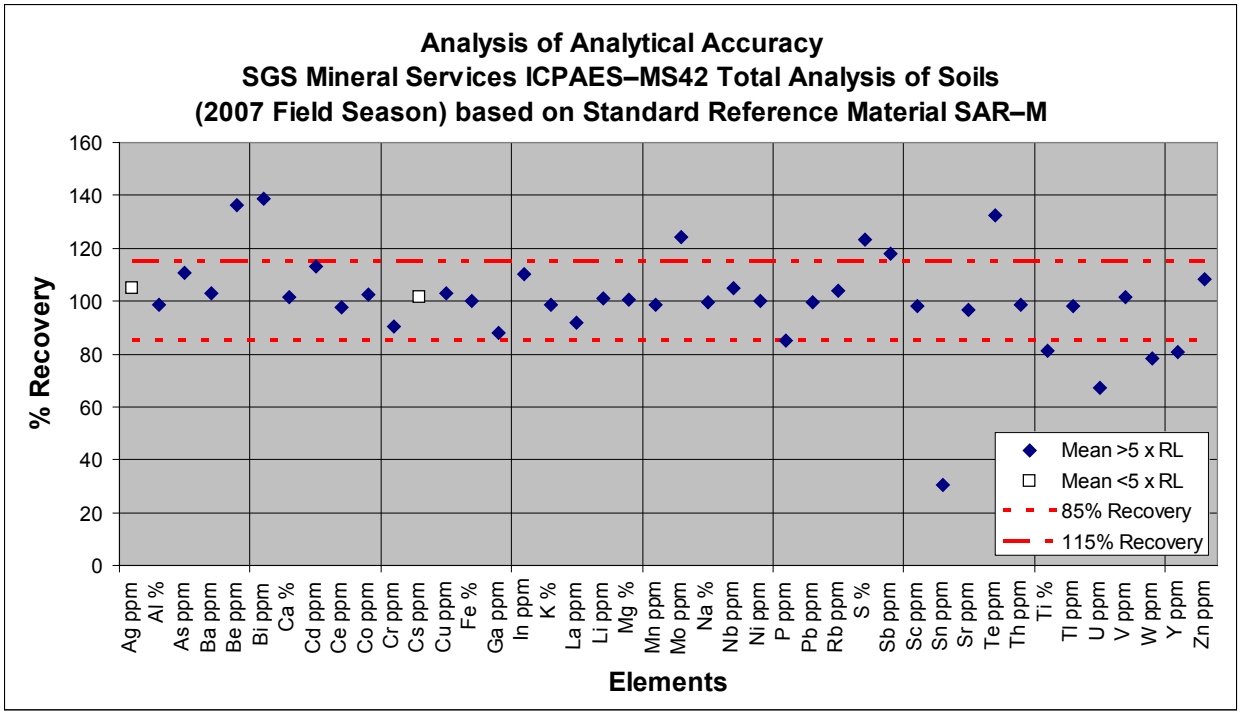

Figure 12-5. Accuracy plot for four analyses of standard reference material SAR–M by ICPAES–MS42 (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-4. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined after a four-acid total digestion of soil samples by the ICPAES–MS42 multielement package at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	5	*na*	<1	*na*	*na*	*na*
Al	%	0.01	5	*na*	7.69	0.153	1.99	*na*
As	ppm	1	5	*na*	15.8	0.447	2.83	*na*
Ba	ppm	5	5	*na*	761	14.9	1.96	*na*
Be	ppm	0.1	5	*na*	1.42	0.0837	5.89	*na*
Bi	ppm	0.04	5	*na*	0.214	0.00548	2.56	*na*
Ca	%	0.01	5	*na*	1.52	0.0308	2.03	*na*
Cd	ppm	0.1	5	*na*	0.240	0.0548	22.8	*na*
Ce	ppm	0.05	5	*na*	39.0	1.72	4.40	*na*
Co	ppm	0.1	5	*na*	14.0	0.370	2.65	*na*
Cr	ppm	1	5	*na*	50.8	3.63	7.15	*na*
Cs	ppm	5	5	*na*	<5	*na*	*na*	*na*
Cu	ppm	0.5	5	*na*	134	4.16	3.11	*na*
Fe	%	0.01	5	*na*	4.43	0.0653	1.47	*na*
Ga	ppm	0.05	5	*na*	18.1	0.195	1.07	*na*
In	ppm	0.02	5	*na*	0.0660	0.00548	8.30	*na*
K	%	0.01	5	*na*	1.33	0.0615	4.64	*na*
La	ppm	0.5	5	*na*	18.2	0.518	2.85	*na*
Li	ppm	1	5	*na*	19.2	0.447	2.33	*na*
Mg	%	0.01	5	*na*	0.882	0.0148	1.68	*na*
Mn	ppm	5	5	*na*	761	10.7	1.40	*na*
Mo	ppm	0.05	5	*na*	4.19	0.100	2.40	*na*

Table 12-4. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined after a four-acid total digestion of soil samples by the ICPAES–MS42 multielement package at SGS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Na	%	0.01	5	*na*	1.64	0.0421	2.56	*na*
Nb	ppm	0.1	5	*na*	10.0	0.187	1.87	*na*
Ni	ppm	0.5	5	*na*	16.3	0.560	3.42	*na*
P	ppm	50	5	*na*	1,200	21.9	1.82	*na*
Pb	ppm	0.5	5	*na*	17.8	1.28	7.22	*na*
Rb	ppm	0.2	5	*na*	45.8	0.971	2.12	*na*
S	%	0.01	5	*na*	0.0820	0.0130	15.9	*na*
Sb	ppm	0.05	5	*na*	1.27	0.0483	3.81	*na*
Sc	ppm	0.1	5	*na*	16.2	0.487	3.00	*na*
Sn	ppm	0.1	5	*na*	1.38	0.0837	6.06	*na*
Sr	ppm	0.5	5	*na*	237	6.99	2.94	*na*
Te	ppm	0.1	5	*na*	0.200	0	0	*na*
Th	ppm	0.2	5	*na*	4.22	0.0837	1.98	*na*
Ti	%	0.01	5	*na*	0.532	0.0130	2.45	*na*
Tl	ppm	0.1	5	*na*	0.400	0	0	*na*
U	ppm	0.1	5	*na*	1.94	0.0548	2.82	*na*
V	ppm	1	5	*na*	133	3.03	2.28	*na*
W	ppm	0.1	5	*na*	1.18	0.130	11.1	*na*
Y	ppm	0.1	5	*na*	17.3	0.200	1.16	*na*
Zn	ppm	1	5	*na*	89.0	12.2	13.7	*na*

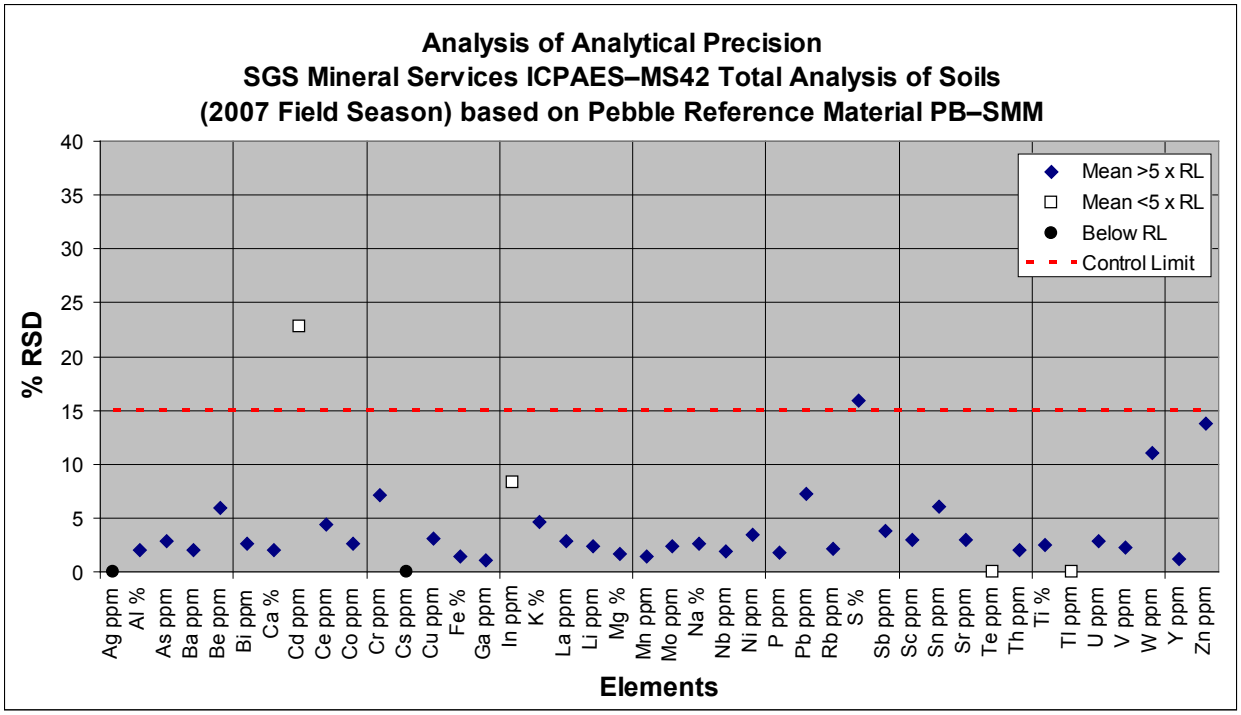

Figure 12-6. Precision plot for five analyses of Pebble reference material PB–SMM by ICPAES–MS42 (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 12-5. Summary statistics for assessing analytical variation on duplicate samples; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	1	11	<1	4.00	1.43	0.213	14.9
Al	%	0.01	11	5.50	8.63	7.14	0.342	4.79
As	ppm	1	11	6.00	39.0	14.3	1.07	7.45
Ba	ppm	5	11	573	811	695	22.6	3.26
Be	ppm	0.1	11	0.700	2.60	1.42	0.100	7.05
Bi	ppm	0.04	11	0.100	1.78	0.425	0.0502	11.8
Ca	%	0.01	11	0.490	2.69	1.49	0.0701	4.72
Cd	ppm	0.1	11	<0.1	5.40	0.999	0.107	10.7
Ce	ppm	0.05	11	28.8	113	52.8	1.34	2.55
Co	ppm	0.1	11	6.70	17.3	11.5	0.354	3.09
Cr	ppm	1	11	25.0	91.0	53.4	4.21	7.89
Cs	ppm	5	11	<5	5.00	<5	*na*	*na*
Cu	ppm	0.5	11	9.20	534	125	7.11	5.68
Fe	%	0.01	11	2.88	5.94	3.94	0.152	3.87
Ga	ppm	0.05	11	12.0	19.2	16.2	0.411	2.53
In	ppm	0.02	11	0.0400	1.13	0.234	0.0318	13.6
K	%	0.01	11	1.08	2.64	1.55	0.0830	5.36
La	ppm	0.5	11	13.8	54.7	25.6	0.942	3.69
Li	ppm	1	11	12.0	27.0	18.8	1.07	5.68
Mg	%	0.01	11	0.440	0.990	0.715	0.0306	4.28
Mn	ppm	5	11	398	5,210	1,450	124	8.55
Mo	ppm	0.05	11	0.710	13.9	3.67	0.390	10.6
Na	%	0.01	11	1.06	2.52	1.79	0.0807	4.52
Nb	ppm	0.1	11	7.60	33.1	13.5	1.62	12.0
Ni	ppm	0.5	11	8.00	38.2	17.5	0.650	3.72
P	ppm	50	11	580	1,230	845	39.7	4.70
Pb	ppm	0.5	11	8.90	929	170	4.50	2.65
Rb	ppm	0.2	11	37.3	151	61.9	3.77	6.10
S	%	0.01	11	0.0100	0.130	0.0568	0.00564	9.93
Sb	ppm	0.05	11	0.900	6.68	2.03	0.146	7.19
Sc	ppm	0.1	11	7.00	16.9	12.6	0.445	3.54
Sn	ppm	0.1	11	1.10	3.70	1.76	0.215	12.2
Sr	ppm	0.5	11	130	342	242	11.8	4.89
Te	ppm	0.1	11	<0.1	1.00	0.238	0.0302	12.7
Th	ppm	0.2	11	3.50	16.7	6.37	0.383	6.02
Ti	%	0.01	11	0.230	0.900	0.459	0.0328	7.13
Tl	ppm	0.1	11	0.300	2.60	0.745	0.0426	5.72
U	ppm	0.1	11	1.30	3.50	2.00	0.135	6.74
V	ppm	1	11	62.0	208	110	6.64	6.03
W	ppm	0.1	11	0.500	9.30	2.20	0.133	6.06
Y	ppm	0.1	11	13.3	26.2	19.3	0.418	2.17
Zn	ppm	1	11	49.0	957	211	17.2	8.16

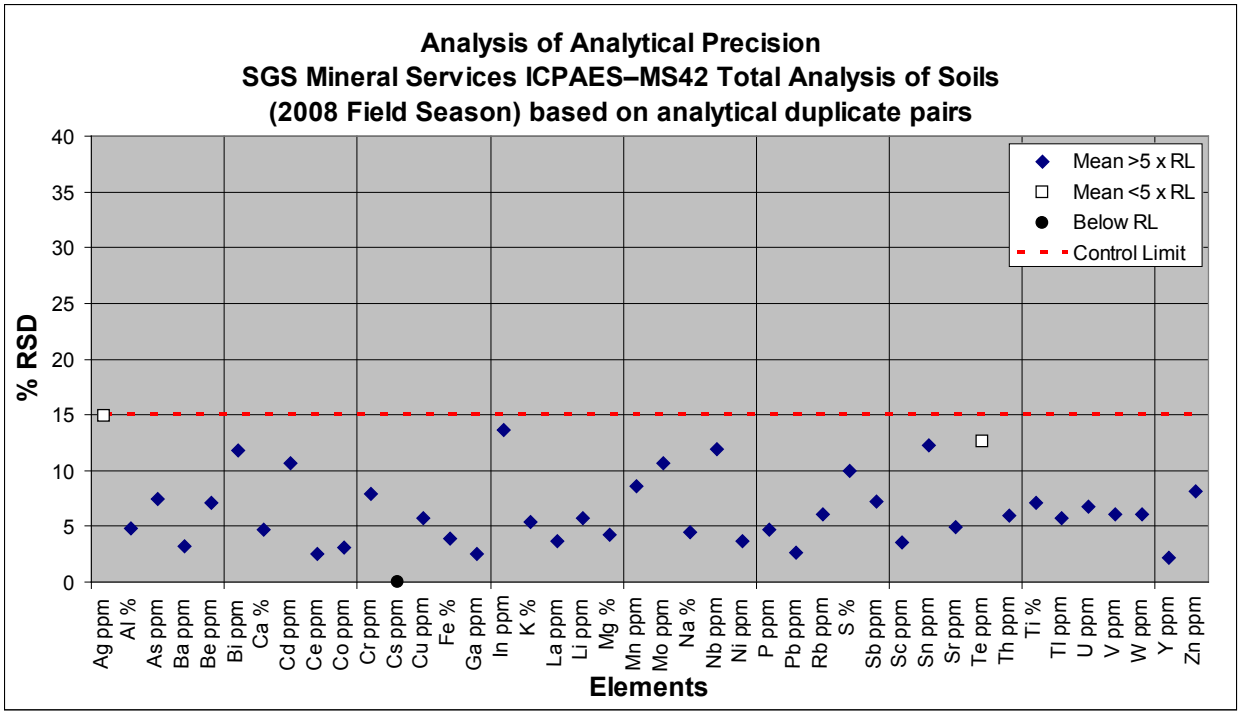

Figure 12-7. Precision plot for eleven analytical duplicate sample pairs by ICPAES–MS42 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 12-6. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1.0	7	2.56	3.57	0.787	22.0	140
Al	%	0.01	7	5.79	5.72	0.226	3.94	98.8
As	ppm	1.0	7	16.5	17.1	0.900	5.25	104
Ba	ppm	5.0	7	879	882	56.7	6.43	100
Be	ppm	0.1	7	3.24	3.86	0.940	24.4	119
Bi	ppm	0.04	7	1.10	1.16	0.101	8.71	105
Ca	%	0.01	7	1.06	1.03	0.0752	7.28	97.4
Cd	ppm	0.1	7	2.50	3.00	0.115	3.85	120
Ce	ppm	0.05	7	150	149	10.5	7.07	99.4
Co	ppm	0.1	7	7.50	7.69	0.530	6.90	102
Cr	ppm	1.0	7	110	93.9	6.01	6.41	85.3
Cs	ppm	5.0	7	<5	<5	*na*	*na*	100
Cu	ppm	0.5	7	370	351	20.5	5.84	95.0
Fe	%	0.01	7	2.67	2.66	0.100	3.77	99.5
Ga	ppm	0.05	7	17.0	16.2	2.00	12.4	95.5
In	ppm	0.02	7	0.260	0.290	0.0100	3.45	112
K	%	0.01	7	2.98	2.82	0.189	6.72	94.5
La	ppm	0.5	7	75.0	69.1	2.64	3.82	92.1
Li	ppm	1.0	7	28.0	26.4	0.976	3.69	94.4
Mg	%	0.01	7	0.550	0.511	0.0297	5.80	93.0
Mn	ppm	5.0	7	2,094	2,100	105	5.02	100
Mo	ppm	0.05	7	13.0	14.0	1.14	8.17	107

Table 12-6. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Na	%	0.01	7	1.53	1.48	0.0716	4.85	96.5
Nb	ppm	0.1	7	35.0	32.3	2.57	7.96	92.4
Ni	ppm	0.5	7	52.0	47.5	3.43	7.21	91.3
P	ppm	50	7	900	733	19.8	2.7	81.4
Pb	ppm	0.5	7	578	561	44.2	7.87	97.1
Rb	ppm	0.2	7	140	143	4.96	3.48	102
S	%	0.01	7	0.0700	0.0729	0.00756	10.4	104
Sb	ppm	0.05	7	5.10	5.32	0.197	3.70	104
Sc	ppm	0.1	7	7.80	7.64	0.580	7.59	98.0
Sn	ppm	0.1	7	6.00	4.43	0.709	16.0	73.8
Sr	ppm	0.5	7	158	148	6.70	4.54	93.4
Te	ppm	0.1	7	0.600	0.686	0.318	46.4	114
Th	ppm	0.2	7	19.0	19.7	1.38	7.03	104
Ti	%	0.01	7	0.250	0.213	0.00951	4.47	85.1
Tl	ppm	0.1	7	1.40	1.33	0.125	9.44	94.9
U	ppm	0.1	7	5.20	4.26	0.190	4.47	81.9
V	ppm	1.0	7	140	135	9.56	7.09	96.3
W	ppm	0.1	7	3.70	3.17	0.111	3.51	85.7
Y	ppm	0.1	7	44.0	36.7	2.69	7.33	83.4
Zn	ppm	1.0	7	420	432	21.1	4.88	103

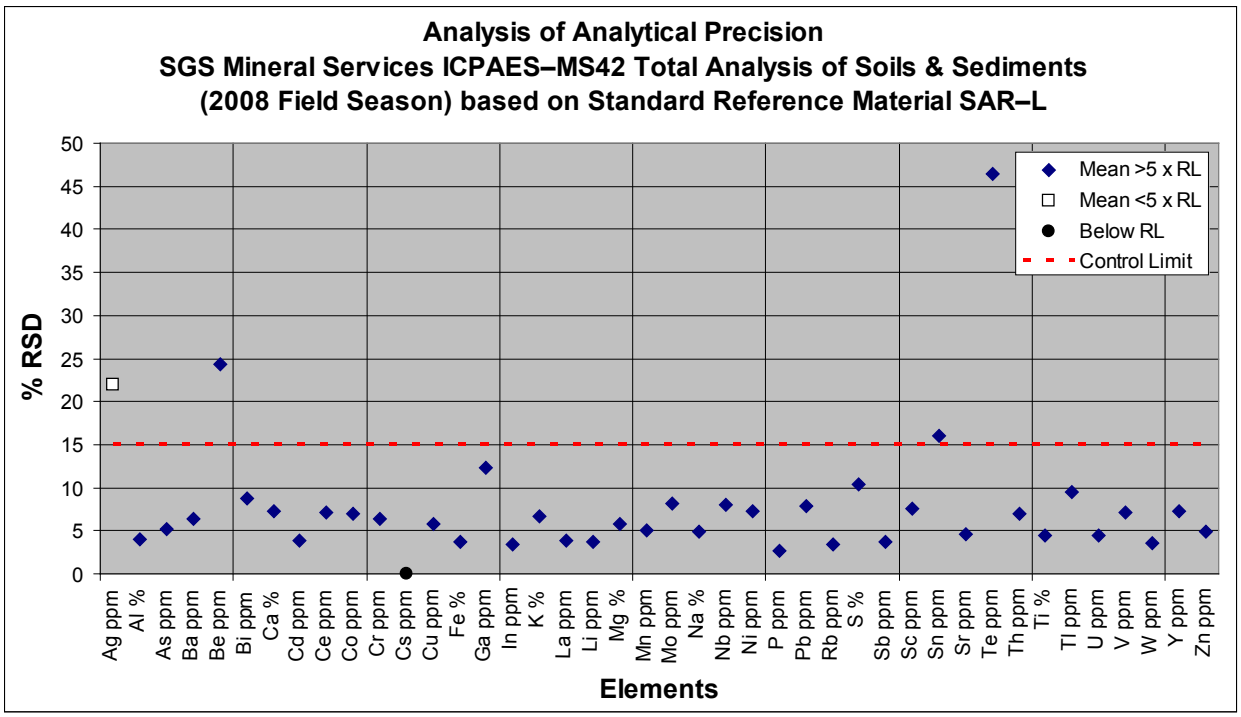

Figure 12-8. Precision plot for seven analyses of standard reference material SAR–L by ICPAES–MS42 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

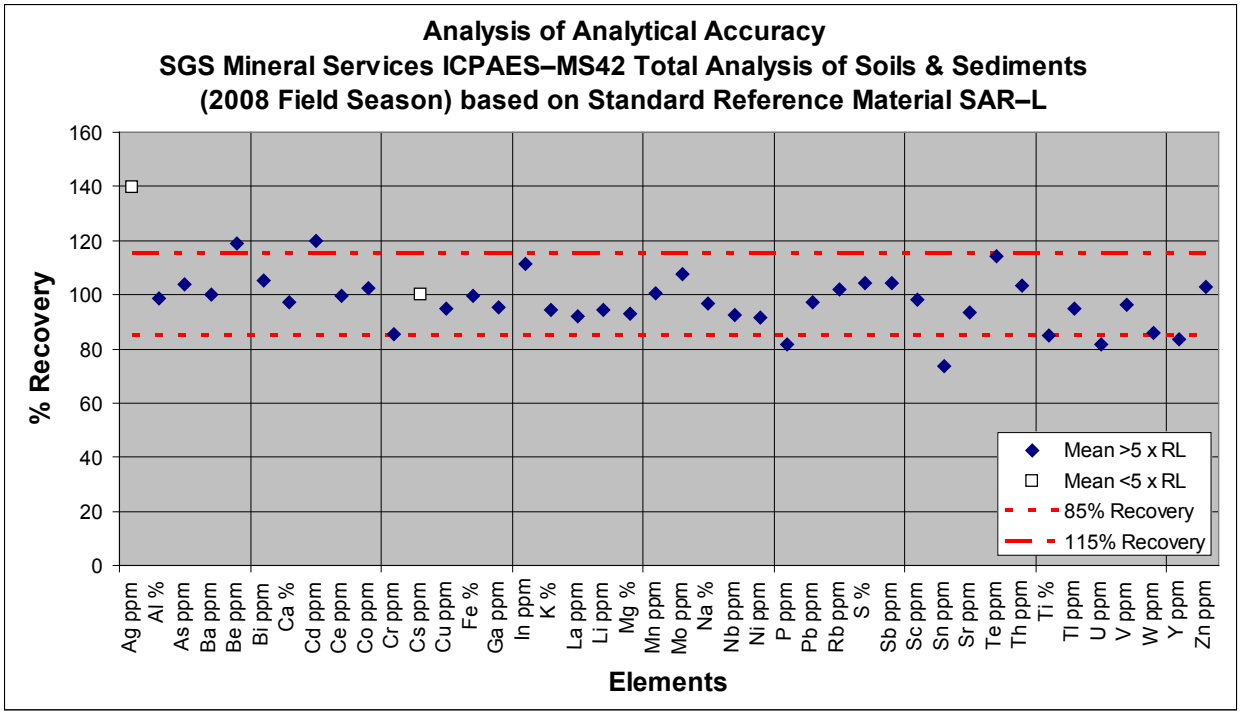

Figure 12-9. Accuracy plot for seven analyses of standard reference material SAR–L by ICPAES–MS42 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-7. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	8	3.10	3.63	0.518	14.3	117
Al	%	0.01	8	6.09	5.84	0.231	3.96	95.8
As	ppm	1	8	37.0	38.8	2.31	5.97	105
Ba	ppm	5	8	764	744	56.9	7.65	97.4
Be	ppm	0.1	8	2.40	2.64	0.737	27.9	110
Bi	ppm	0.04	8	1.33	1.75	0.137	7.82	131
Ca	%	0.01	8	0.580	0.549	0.0376	6.85	94.6
Cd	ppm	0.1	8	4.76	5.26	0.288	5.46	111
Ce	ppm	0.05	8	120	109	8.44	7.76	90.6
Co	ppm	0.1	8	11.0	11.3	0.623	5.50	103
Cr	ppm	1	8	101	85.0	4.78	5.62	84.2
Cs	ppm	5	8	4.80	5.25	0.463	8.82	109
Cu	ppm	0.5	8	320	290	12.4	4.27	90.6
Fe	%	0.01	8	3.22	3.08	0.150	4.88	95.7
Ga	ppm	0.05	8	20.0	16.7	1.85	11.1	83.7
In	ppm	0.02	8	0.970	1.06	0.0612	5.80	109
K	%	0.01	8	2.92	2.70	0.192	7.10	92.4
La	ppm	0.5	8	61.0	51.9	4.45	8.59	85.0
Li	ppm	1	8	30.0	26.8	0.707	2.64	89.2
Mg	%	0.01	8	0.500	0.456	0.0207	4.53	91.3
Mn	ppm	5	8	5,200	4,910	194	3.96	94.3
Mo	ppm	0.05	8	12.0	13.5	0.967	7.17	112

Table 12-7. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Na	%	0.01	8	1.19	1.14	0.0697	6.13	95.5
Nb	ppm	0.1	8	31.0	29.5	4.86	16.5	95.1
Ni	ppm	0.5	8	41.0	38.2	1.37	3.58	93.2
P	ppm	50	8	800	639	28.0	4.38	79.8
Pb	ppm	0.5	8	960	879	32.2	3.67	91.5
Rb	ppm	0.2	8	142	149	6.78	4.56	105
S	%	0.01	8	0.130	0.123	0.0128	10.5	94.2
Sb	ppm	0.05	8	5.60	6.85	0.328	4.79	122
Sc	ppm	0.1	8	8.30	7.64	0.540	7.07	92.0
Sn	ppm	0.1	8	9.40	2.94	0.381	13.0	31.3
Sr	ppm	0.5	8	156	143	4.10	2.87	91.5
Te	ppm	0.1	8	0.680	0.963	0.0518	5.38	142
Th	ppm	0.2	8	18.0	16.1	1.53	9.53	89.2
Ti	%	0.01	8	0.350	0.241	0.00991	4.11	68.9
Tl	ppm	0.1	8	2.80	2.64	0.119	4.50	94.2
U	ppm	0.1	8	5.10	3.36	0.233	6.92	65.9
V	ppm	1	8	66.0	64.6	3.11	4.82	97.9
W	ppm	0.1	8	14.0	9.40	1.08	11.5	67.1
Y	ppm	0.1	8	33.0	25.1	1.66	6.62	76.0
Zn	ppm	1	8	888	868	49.3	5.68	97.8

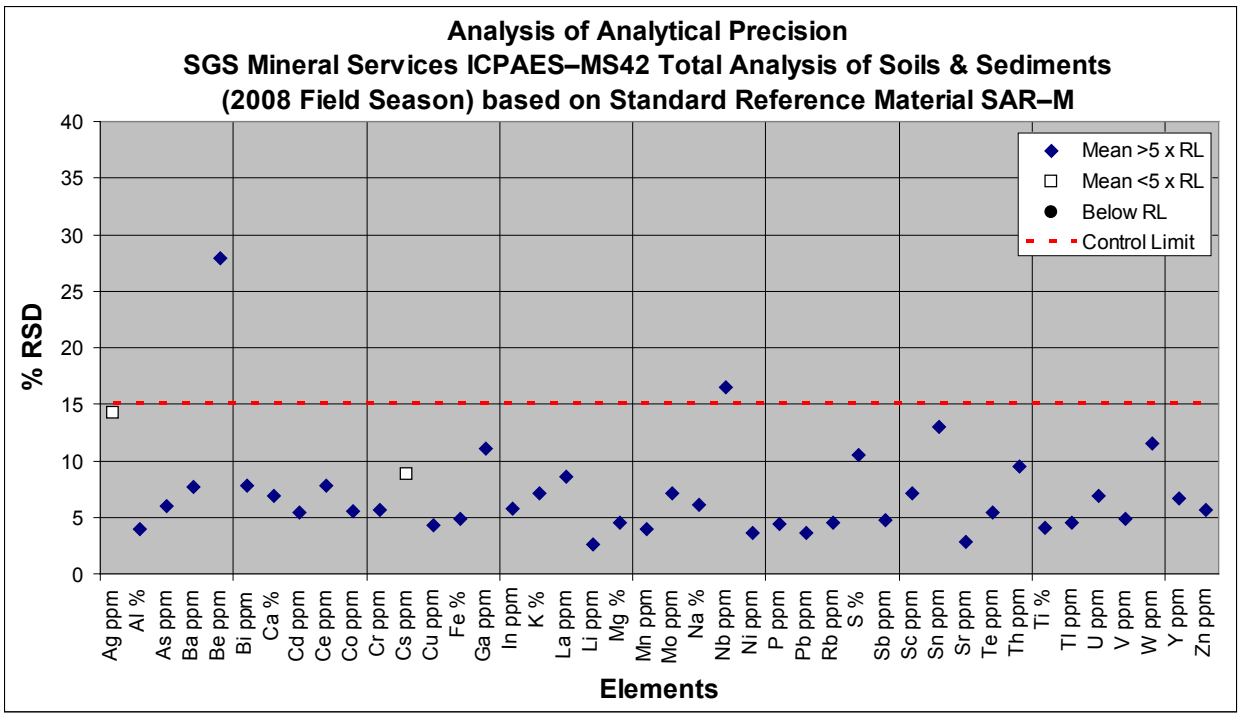

Figure 12-10. Precision plot for eight analyses of standard reference material SAR–M by ICPAES–MS42 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

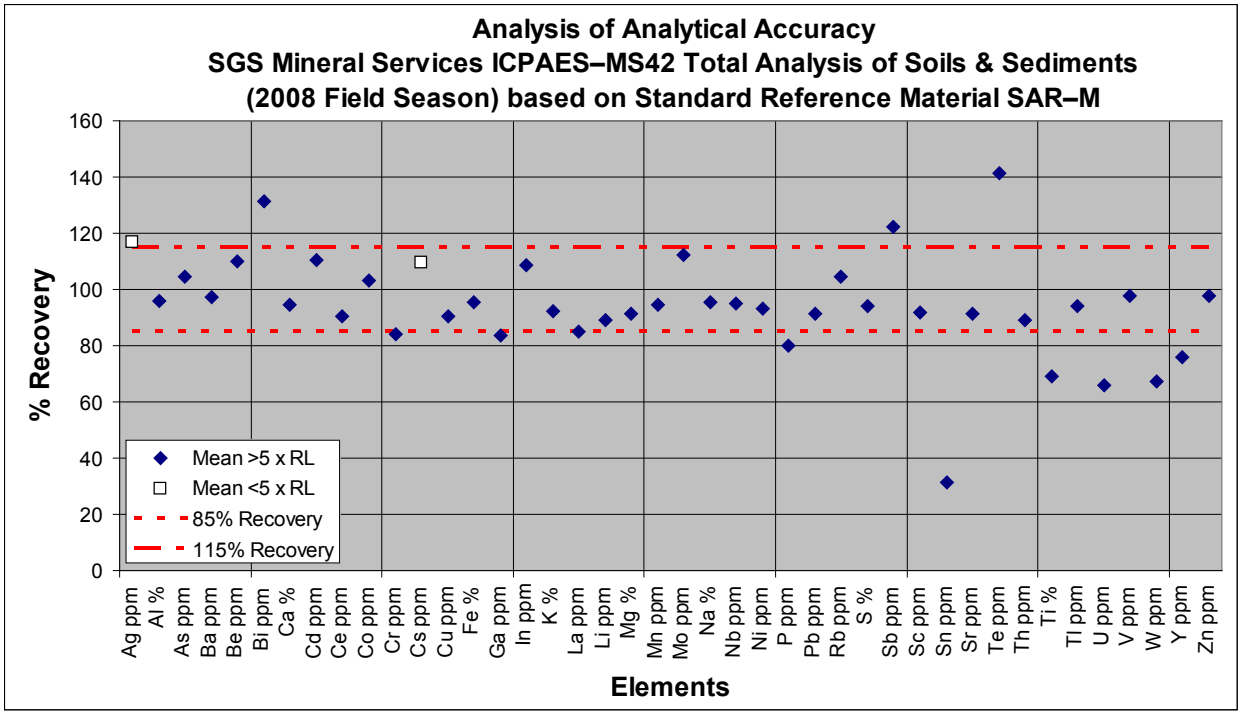

Figure 12-11. Accuracy plot for eight analyses of standard reference material SAR–M by ICPAES–MS42 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-8. Summary statistics for assessing analytical variation on the standard reference material DGPM; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1.0	3	<1	<1	*na*	*na*	100
Al	%	0.01	3	4.94	4.80	0.227	4.73	97.2
As	ppm	1.0	3	177	186	7.81	4.20	105
Ba	ppm	5.0	3	1,326	1,230	120	9.79	92.5
Be	ppm	0.1	3	1.54	2.00	0.436	21.8	130
Bi	ppm	0.04	3	0.114	0.117	0.0115	9.90	102
Ca	%	0.01	3	0.144	0.130	0.0100	7.69	90.3
Cd	ppm	0.1	3	0.330	0.333	0.0577	17.3	101
Ce	ppm	0.05	3	91.3	91.8	2.17	2.36	101
Co	ppm	0.1	3	1.36	1.53	0.153	9.96	112
Cr	ppm	1.0	3	97.0	98.7	23.1	23.4	102
Cs	ppm	5.0	3	8.87	9.33	0.577	6.19	105
Cu	ppm	0.5	3	13.7	14.2	4.18	29.4	104
Fe	%	0.01	3	1.34	1.36	0.0950	6.97	102
Ga	ppm	0.05	3	10.8	11.2	0.351	3.14	103
In	ppm	0.02	3	<0.02	<0.02	*na*	*na*	103
K	%	0.01	3	2.25	2.14	0.0854	3.99	95.2
La	ppm	0.5	3	51.5	49.2	4.85	9.86	95.6
Li	ppm	1.0	3	39.6	38.0	1.00	2.63	96.0
Mg	%	0.01	3	0.322	0.303	0.0115	3.81	94.2
Mn	ppm	5.0	3	28.0	28.3	1.53	5.39	101
Mo	ppm	0.05	3	13.7	14.5	0.896	6.20	106

Table 12-8. Summary statistics for assessing analytical variation on the standard reference material DGPM; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Na	%	0.01	3	0.0600	0.0567	0.00577	10.2	94.4
Nb	ppm	0.1	3	7.20	7.60	0.458	6.03	106
Ni	ppm	0.5	3	11.4	9.73	0.603	6.19	85.7
P	ppm	50	3	418	380	10.0	2.63	90.9
Pb	ppm	0.5	3	9.78	12.1	3.82	31.5	124
Rb	ppm	0.2	3	89.8	94.4	4.15	4.39	105
S	%	0.01	3	0.363	0.337	0.0513	15.2	92.7
Sb	ppm	0.05	3	13.2	14.2	0.265	1.86	108
Sc	ppm	0.1	3	9.83	9.90	0.557	5.62	101
Sn	ppm	0.1	3	1.81	1.77	0.0577	3.27	97.6
Sr	ppm	0.5	3	91.5	87.2	3.06	3.51	95.3
Te	ppm	0.1	3	<0.1	<0.1	*na*	*na*	100
Th	ppm	0.2	3	10.7	10.9	0.513	4.69	102
Ti	%	0.01	3	0.266	0.243	0.0252	10.3	91.5
Tl	ppm	0.1	3	8.15	8.77	0.643	7.33	108
U	ppm	0.1	3	2.75	2.73	0.0577	2.11	99.4
V	ppm	1.0	3	106	106	7.23	6.85	99.7
W	ppm	0.1	3	75.0	78.1	1.92	2.45	104
Y	ppm	0.1	3	17.5	17.3	0.929	5.36	99.0
Zn	ppm	1.0	3	24.4	21.0	1.00	4.76	86.1

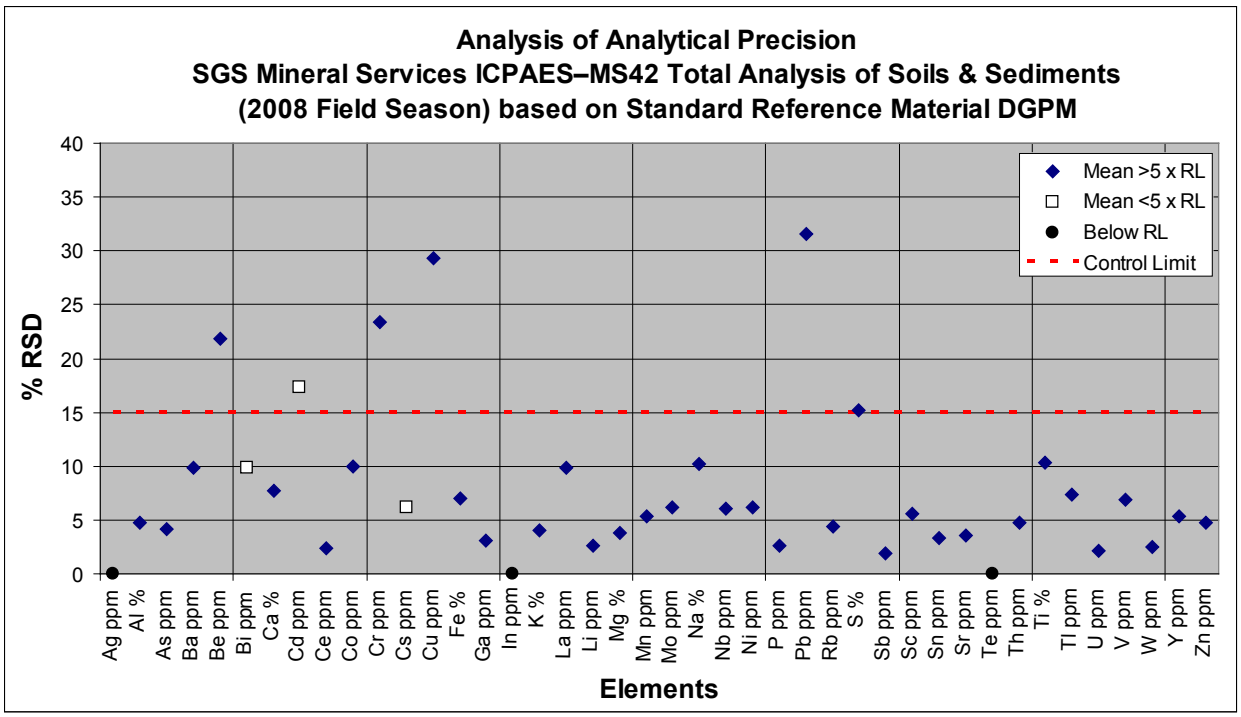

Figure 12-12. Precision plot for three analyses of standard reference material DGPM by ICPAES–MS42 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

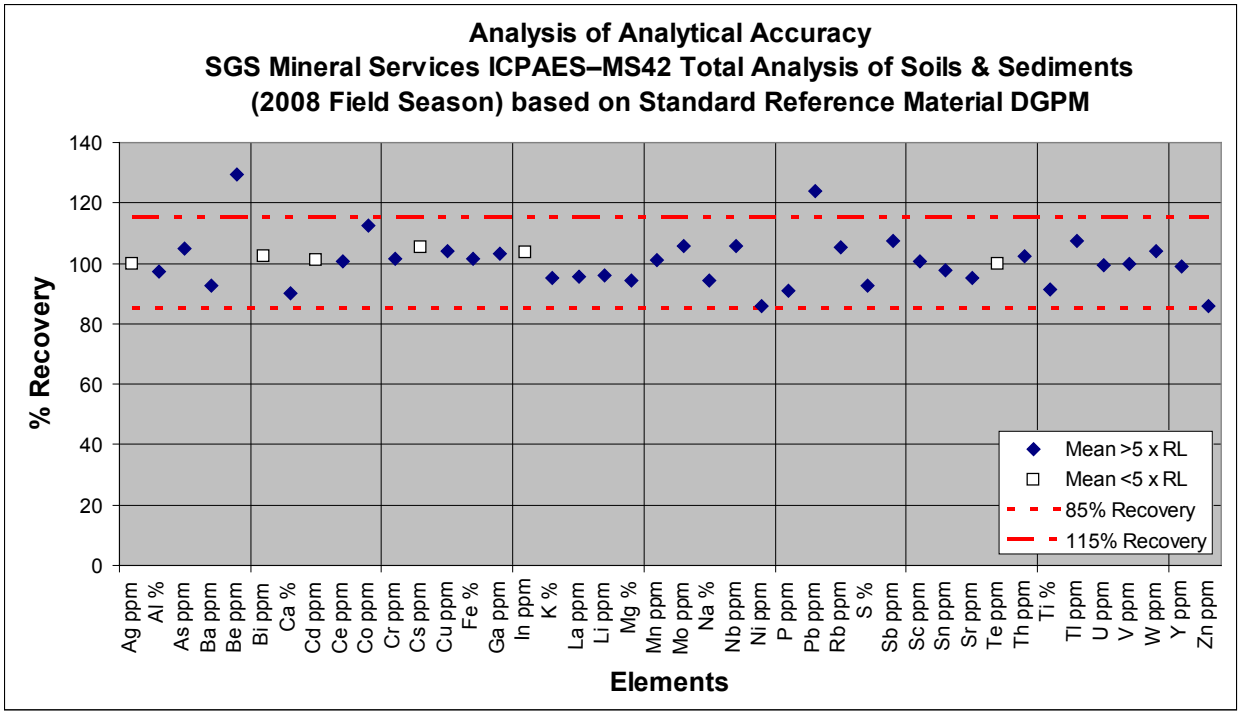

Figure 12-13. Accuracy plot for three analyses of standard reference material DGPM by ICPAES–MS42 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-9. Summary statistics for assessing analytical variation on the standard reference material GSP–QC; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1.0	4	3.07	3.50	0.577	16.5	114
Al	%	0.01	4	7.57	7.07	0.328	4.65	93.3
As	ppm	1.0	4	31.4	36.8	2.50	6.80	117
Ba	ppm	5.0	4	1,310	1,240	69.0	5.55	94.8
Be	ppm	0.1	4	1.17	1.48	0.126	8.53	126
Bi	ppm	0.04	4	4.28	4.49	0.263	5.87	105
Ca	%	0.01	4	1.50	1.38	0.133	9.67	91.8
Cd	ppm	0.1	4	0.227	0.225	0.0500	22.2	99.1
Ce	ppm	0.05	4	405	417	29.6	7.09	103
Co	ppm	0.1	4	6.36	7.15	0.580	8.12	112
Cr	ppm	1.0	4	16.6	20.0	2.71	13.5	120
Cs	ppm	5.0	4	<5	<5	*na*	*na*	100
Cu	ppm	0.5	4	31.3	29.0	2.12	7.33	92.7
Fe	%	0.01	4	2.77	2.72	0.121	4.45	98.0
Ga	ppm	0.05	4	22.2	23.5	0.206	0.876	106
In	ppm	0.02	4	0.0440	0.0475	0.00500	10.5	108
K	%	0.01	4	4.25	3.69	0.319	8.64	86.8
La	ppm	0.5	4	173	180	13.6	7.58	104
Li	ppm	1.0	4	34.0	31.0	2.16	6.97	91.2
Mg	%	0.01	4	0.615	0.548	0.0222	4.05	89.0
Mn	ppm	5.0	4	281	260	8.69	3.35	92.4
Mo	ppm	0.05	4	1.31	1.45	0.173	12.0	110

Table 12-9. Summary statistics for assessing analytical variation on the standard reference material GSP–QC; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Na	%	0.01	4	1.87	1.73	0.0455	2.63	92.5
Nb	ppm	0.1	4	18.6	19.2	0.842	4.39	103
Ni	ppm	0.5	4	11.5	8.43	0.544	6.46	73.3
P	ppm	50	4	1,230	1,120	32.0	2.86	90.9
Pb	ppm	0.5	4	40.4	43.9	3.40	7.74	109
Rb	ppm	0.2	4	228	245	16.3	6.67	107
S	%	0.01	4	0.0740	0.0625	0.00500	8.00	84.5
Sb	ppm	0.05	4	0.877	0.933	0.0310	3.32	106
Sc	ppm	0.1	4	6.23	6.63	0.359	5.42	106
Sn	ppm	0.1	4	4.72	4.93	0.126	2.55	104
Sr	ppm	0.5	4	226	203	14.8	7.27	89.8
Te	ppm	0.1	4	4.07	4.33	0.263	6.08	106
Th	ppm	0.2	4	104	113	9.06	8.01	109
Ti	%	0.01	4	0.339	0.298	0.0189	6.36	87.8
Tl	ppm	0.1	4	2.07	2.20	0.141	6.43	106
U	ppm	0.1	4	2.27	2.30	0	0	101
V	ppm	1.0	4	73.3	71.0	4.83	6.80	96.9
W	ppm	0.1	4	6.65	6.85	0.265	3.86	103
Y	ppm	0.1	4	25.5	24.6	1.49	6.07	96.5
Zn	ppm	1.0	4	117	109	1.73	1.60	92.7

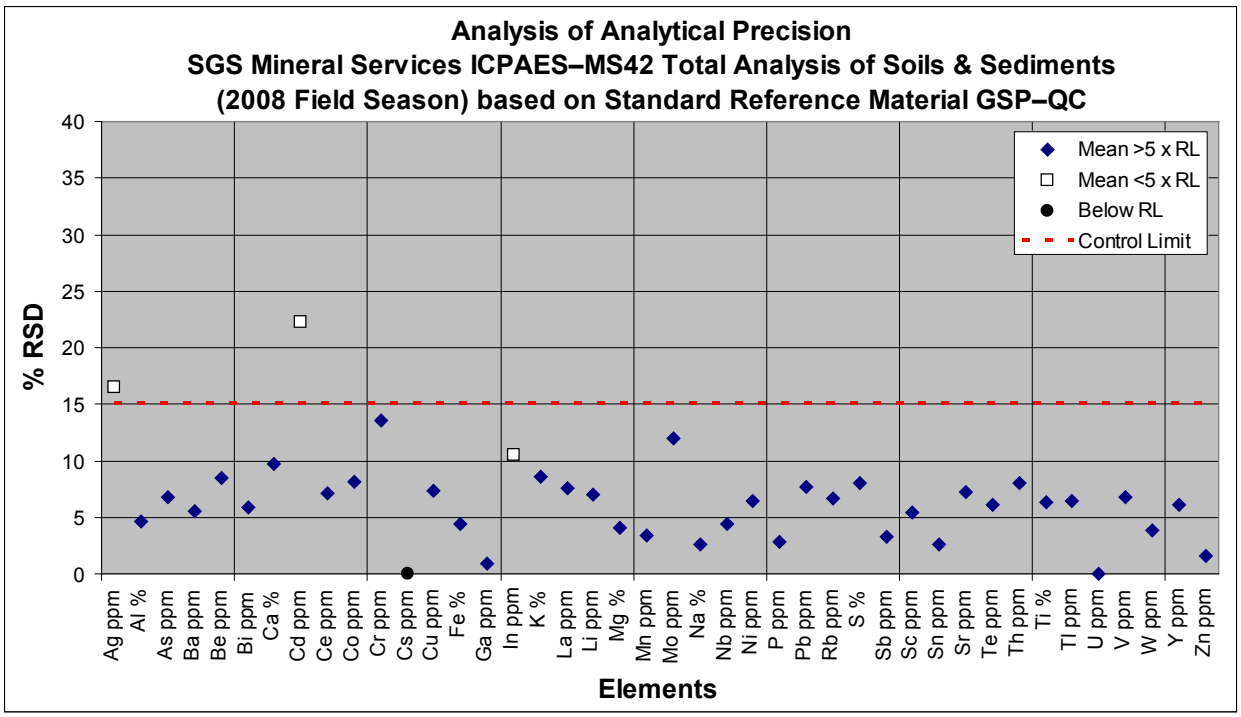

Figure 12-14. Precision plot for four analyses of standard reference material GSP–QC by ICPAES–MS42 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

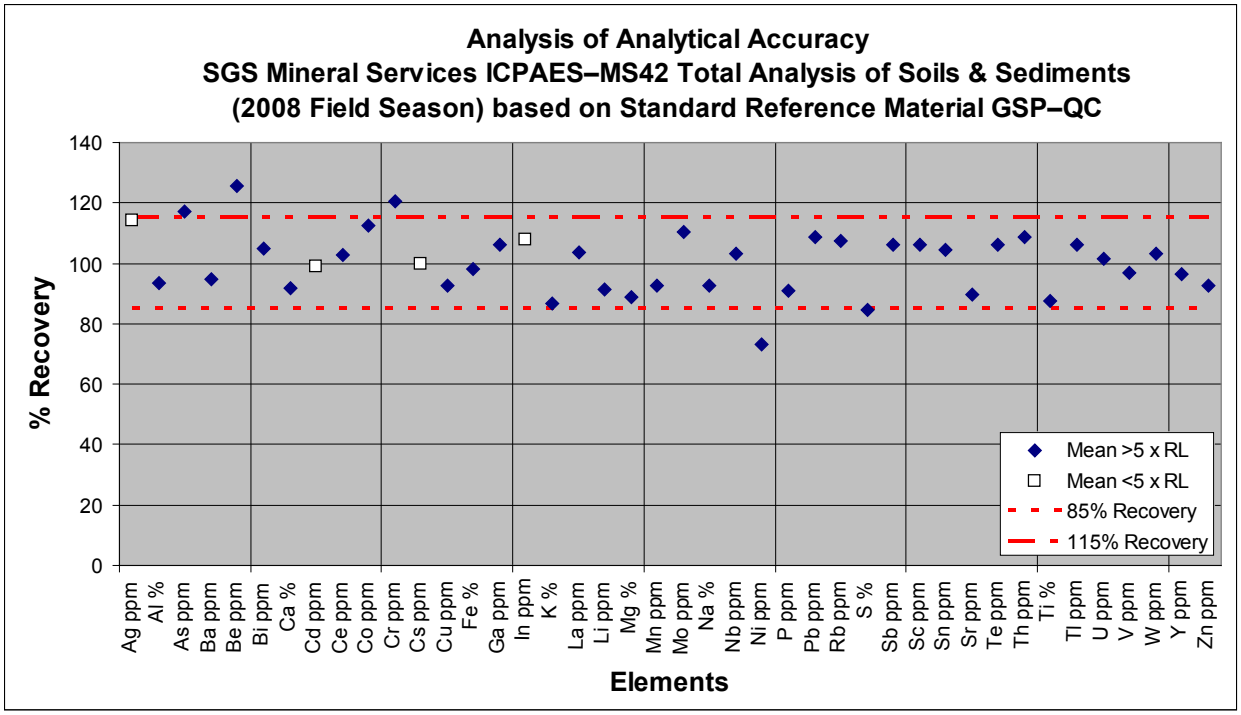

Figure 12-15. Accuracy plot for four analyses of standard reference material GSP–QC by ICPAES–MS42 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-10. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	20	*na*	<1	*na*	*na*	*na*
Al	%	0.01	20	7.69	8.09	0.330	4.08	105
As	ppm	1	20	15.8	15.4	0.831	5.41	97.3
Ba	ppm	5	20	761	729	42.3	5.80	95.8
Be	ppm	0.1	20	1.42	1.34	0.421	31.5	94.1
Bi	ppm	0.04	20	0.214	0.249	0.0421	16.9	117
Ca	%	0.01	20	1.52	1.46	0.107	7.34	96.0
Cd	ppm	0.1	20	0.240	<0.1	*na*	*na*	*na*
Ce	ppm	0.05	20	39.0	38.7	2.78	7.19	99.2
Co	ppm	0.1	20	14.0	14.2	0.590	4.14	102
Cr	ppm	1	20	50.8	51.6	4.06	7.86	102
Cs	ppm	5	20	*na*	<5	*na*	*na*	*na*
Cu	ppm	0.5	20	134	140	8.17	5.85	105
Fe	%	0.01	20	4.43	4.62	0.186	4.01	104
Ga	ppm	0.05	20	18.1	16.0	2.31	14.5	88.0
In	ppm	0.02	20	0.0660	0.0605	0.00405	6.69	91.7
K	%	0.01	20	1.33	1.38	0.119	8.64	104
La	ppm	0.5	20	18.2	19.2	1.47	7.68	106
Li	ppm	1	20	19.2	19.3	1.53	7.92	101
Mg	%	0.01	20	0.882	0.825	0.0473	5.73	93.6
Mn	ppm	5	20	761	755	38.4	5.09	99.2
Mo	ppm	0.05	20	4.19	4.16	0.417	10.0	99.4

Table 12-10. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined after a four-acid total digestion of soil and sediment samples by the ICPAES–MS42 multielement package at SGS Minerals (2008 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Na	%	0.01	20	1.64	1.72	0.0903	5.24	105
Nb	ppm	0.1	20	10.0	10.1	1.29	12.9	101
Ni	ppm	0.5	20	16.3	16.1	1.70	10.6	98.3
P	ppm	50	20	1,204	1,130	46.5	4.11	94.1
Pb	ppm	0.5	20	17.8	15.1	1.18	7.84	84.9
Rb	ppm	0.2	20	45.8	47.6	2.48	5.21	104
S	%	0.01	20	0.0820	0.0558	0.00507	9.09	68.0
Sb	ppm	0.05	20	1.27	1.29	0.0771	6.00	102
Sc	ppm	0.1	20	16.2	14.5	1.27	8.73	89.4
Sn	ppm	0.1	20	1.38	1.43	0.137	9.59	103
Sr	ppm	0.5	20	237	246	14.3	5.81	104
Te	ppm	0.1	20	0.200	0.163	0.0496	30.4	81.6
Th	ppm	0.2	20	4.22	4.19	0.165	3.93	99.4
Ti	%	0.01	20	0.532	0.503	0.0300	5.96	94.5
Tl	ppm	0.1	20	0.400	0.421	0.0419	9.95	105
U	ppm	0.1	20	1.94	2.04	0.117	5.73	105
V	ppm	1	20	133	130	7.72	5.93	98.1
W	ppm	0.1	20	1.18	0.995	0.172	17.2	84.3
Y	ppm	0.1	20	17.3	18.3	0.959	5.25	106
Zn	ppm	1	20	89.0	70.5	2.82	4.00	79.2

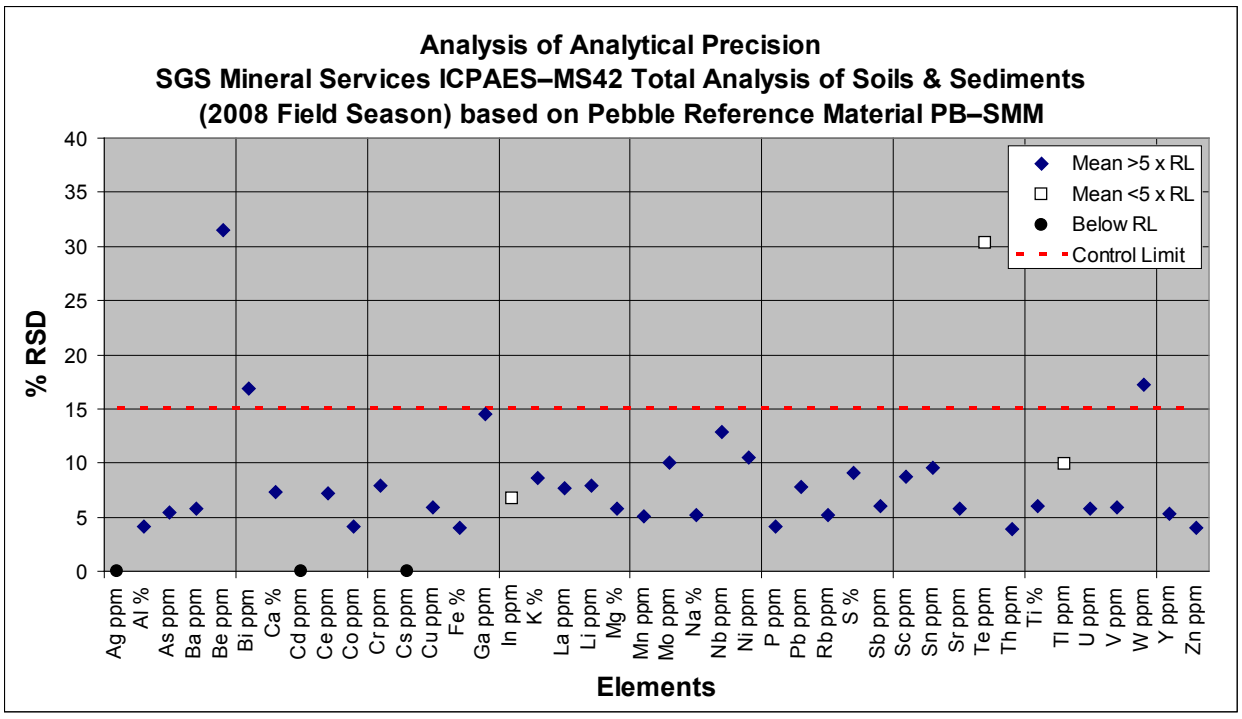

Figure 12-16. Precision plot for twenty analyses of Pebble reference material PB–SMM by ICPAES–MS42 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

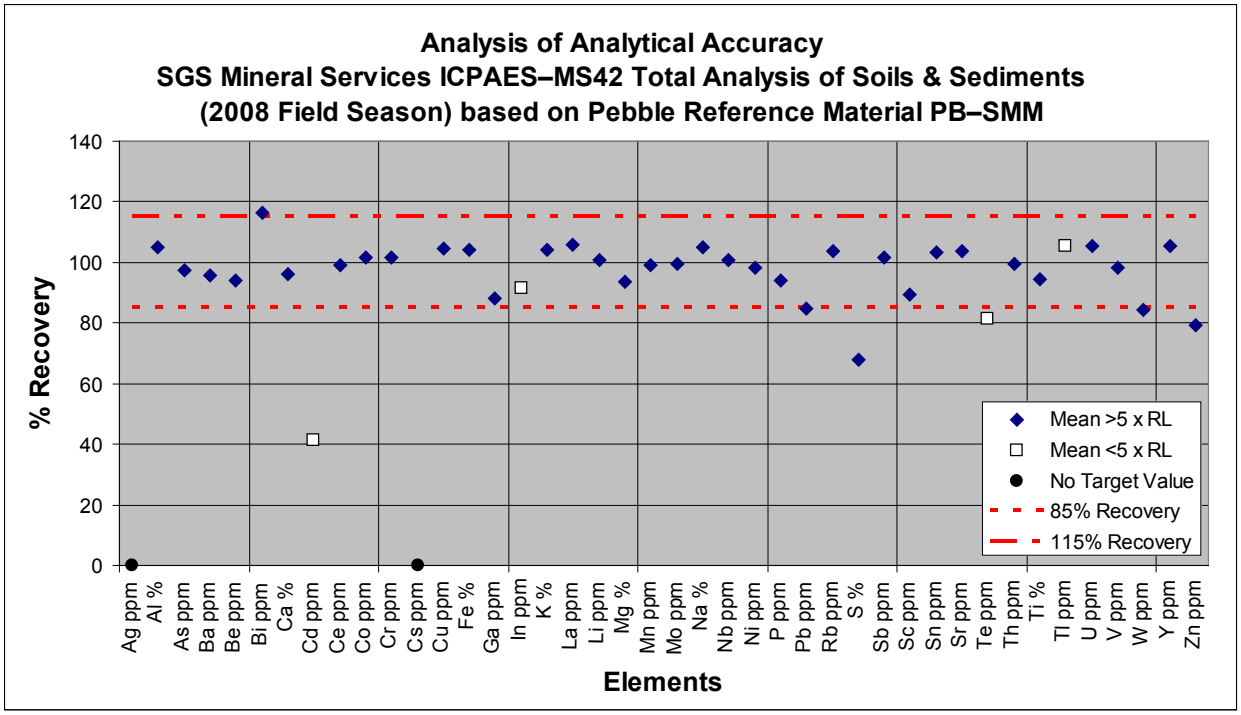

Figure 12-17. Accuracy plot for twenty analyses of Pebble reference material PB–SMM by ICPAES–MS42 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-11. Summary statistics for assessing analytical variation on duplicate samples; determined after a four-acid total digestion of soil, sediment, and rock samples by the ICPAES–MS42 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	1	5	<1	<1	<1	*na*	*na*
Al	%	0.01	5	7.20	8.19	7.68	0.146	1.90
As	ppm	1	5	15.0	17.0	16.3	0.548	3.36
Ba	ppm	5	5	692	778	729	20.0	2.75
Be	ppm	0.1	5	1.10	1.40	1.30	0.0775	5.96
Bi	ppm	0.04	5	0.180	0.210	0.192	0.00632	3.29
Ca	%	0.01	5	1.32	1.49	1.41	0.0274	1.95
Cd	ppm	0.1	5	<0.1	0.100	<0.1	*na*	*na*
Ce	ppm	0.05	5	36.0	45.2	40.3	1.52	3.77
Co	ppm	0.1	5	12.3	15.2	13.5	0.542	4.00
Cr	ppm	1	5	45.0	56.0	48.2	4.17	8.65
Cs	ppm	5	5	<5	<5	<5	*na*	*na*
Cu	ppm	0.5	5	127	144	134	2.95	2.21
Fe	%	0.01	5	4.3	4.66	4.45	0.0733	1.65
Ga	ppm	0.05	5	17.3	19.7	18.5	0.436	2.36
In	ppm	0.02	5	0.0600	0.0600	0.0600	0	0
K	%	0.01	5	1.19	1.55	1.42	0.0548	3.86
La	ppm	0.5	5	18.3	21.6	20.0	1.20	6.00
Li	ppm	1	5	17.0	21.0	19.0	0.447	2.35
Mg	%	0.01	5	0.800	0.900	0.832	0.0232	2.79
Mn	ppm	5	5	680	721	697	4.70	0.674
Mo	ppm	0.05	5	3.76	4.77	4.03	0.324	8.05
Na	%	0.01	5	1.61	1.76	1.67	0.0249	1.49

Table 12-11. Summary statistics for assessing analytical variation on duplicate samples; determined after a four-acid total digestion of soil, sediment, and rock samples by the ICPAES–MS42 multielement package at SGS Minerals (2009 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Nb	ppm	0.1	5	10.2	13.8	11.9	1.01	8.49
Ni	ppm	0.5	5	15.2	17.3	16.0	0.470	2.95
P	ppm	50	5	1,160	1,270	1,210	30.5	2.53
Pb	ppm	0.5	5	12.0	14.2	13.1	0.504	3.86
Rb	ppm	0.2	5	41.1	51.8	48.7	1.66	3.41
S	%	0.01	5	0.0500	0.0600	0.0550	0.00316	5.75
Sb	ppm	0.05	5	1.15	1.25	1.19	0.0303	2.54
Sc	ppm	0.1	5	13.1	14.6	13.9	0.550	3.96
Sn	ppm	0.1	5	1.20	3.80	1.65	0.699	42.4
Sr	ppm	0.5	5	213	244	226	4.34	1.92
Te	ppm	0.1	5	<0.1	0.100	<0.1	*na*	*na*
Th	ppm	0.2	5	3.70	4.50	4.05	0.187	4.62
Ti	%	0.01	5	0.520	0.600	0.564	0.00894	1.59
Tl	ppm	0.1	5	0.400	0.400	0.400	0	0
U	ppm	0.1	5	1.80	2.00	1.86	0.0447	2.40
V	ppm	1	5	103	120	114	5.11	4.49
W	ppm	0.1	5	1.20	2.40	1.60	0.272	17.0
Y	ppm	0.1	5	17.3	22.9	20.3	0.382	1.88
Zn	ppm	1	5	65.0	74.0	68.6	2.97	4.32

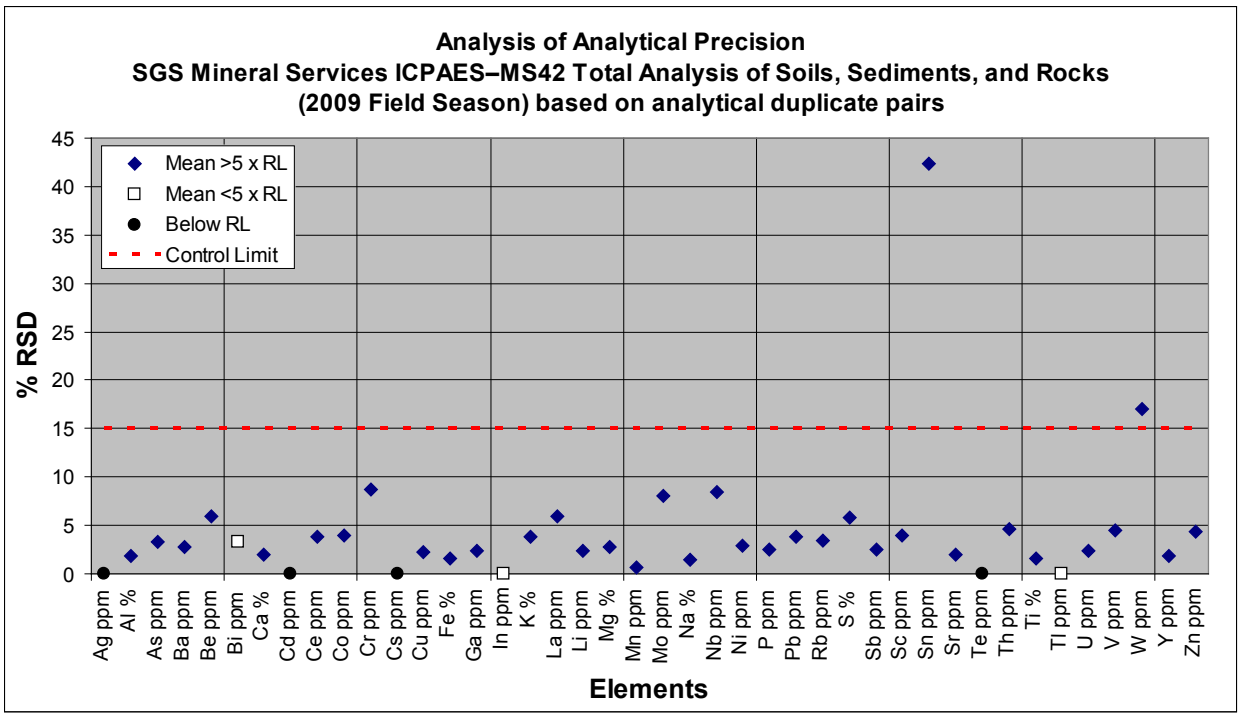

Figure 12-18. Precision plot for five analytical duplicate sample pairs by ICPAES–MS42 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 12-12. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a four-acid total digestion of soil, sediment, and rock samples by the ICPAES–MS42 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	2	2.56	3.00	1.41	47.1	117
Al	%	0.01	2	5.79	5.74	0.0849	1.48	99.1
As	ppm	1	2	16.5	18.0	0	0	109
Ba	ppm	5	2	879	911	28.3	3.10	104
Be	ppm	0.1	2	3.24	5.65	0.778	13.8	174
Bi	ppm	0.04	2	1.10	0.990	0.0707	7.14	90.0
Ca	%	0.01	2	1.06	1.02	0	0	96.2
Cd	ppm	0.1	2	2.50	2.65	0.0707	2.67	106
Ce	ppm	0.05	2	2.50	134	4.24	3.17	89.3
Co	ppm	0.1	2	7.50	7.10	0.283	3.98	94.7
Cr	ppm	1	2	110	84.0	2.83	3.37	76.4
Cs	ppm	5	2	<5	<5	*na*	*na*	100
Cu	ppm	0.5	2	370	379	2.12	0.560	102
Fe	%	0.01	2	2.67	2.73	0.0566	2.07	102
Ga	ppm	0.05	2	17.0	17.3	0.849	4.90	102
In	ppm	0.02	2	0.260	0.285	0.00707	2.48	110
K	%	0.01	2	2.98	3.20	0.0283	0.884	107
La	ppm	0.5	2	75.0	66.1	2.97	4.49	88.1
Li	ppm	1	2	28.0	29.0	0	0	104
Mg	%	0.01	2	0.550	0.530	0	0	96.4
Mn	ppm	5	2	2,094	2,040	42.4	2.08	97.4
Mo	ppm	0.05	2	13.0	12.6	0.141	1.12	96.9
Na	%	0.01	2	1.53	1.55	0.0141	0.912	101
Nb	ppm	0.1	2	35.0	39.9	0.495	1.24	114
Ni	ppm	0.5	2	52.0	49.4	2.05	4.16	94.9
P	ppm	50	2	900	810	14.1	1.75	90.0
Pb	ppm	0.5	2	578	517	6.36	1.23	89.4
Rb	ppm	0.2	2	140	135	2.12	1.58	96.1
S	%	0.01	2	0.0700	0.0700	0	0	100
Sb	ppm	0.05	2	5.10	5.05	0.226	4.48	99.0
Sc	ppm	0.1	2	7.80	7.60	0.141	1.86	97.4
Sn	ppm	0.1	2	6.00	3.90	0.141	3.63	65.0
Sr	ppm	0.5	2	158	144	0.707	0.493	90.8
Te	ppm	0.1	2	0.600	1.10	0.849	77.1	183
Th	ppm	0.2	2	19.0	17.9	0.919	5.15	93.9
Ti	%	0.01	2	0.250	0.290	0.0141	4.88	116
Tl	ppm	0.1	2	1.40	1.20	0	0	85.7
U	ppm	0.1	2	5.20	3.95	0.212	5.37	76.0
V	ppm	1	2	140	119	0.707	0.597	84.6
W	ppm	0.1	2	3.70	3.95	0.495	12.5	107
Y	ppm	0.1	2	44.0	41.0	1.06	2.59	93.1
Zn	ppm	1	2	420	435	9.19	2.12	103

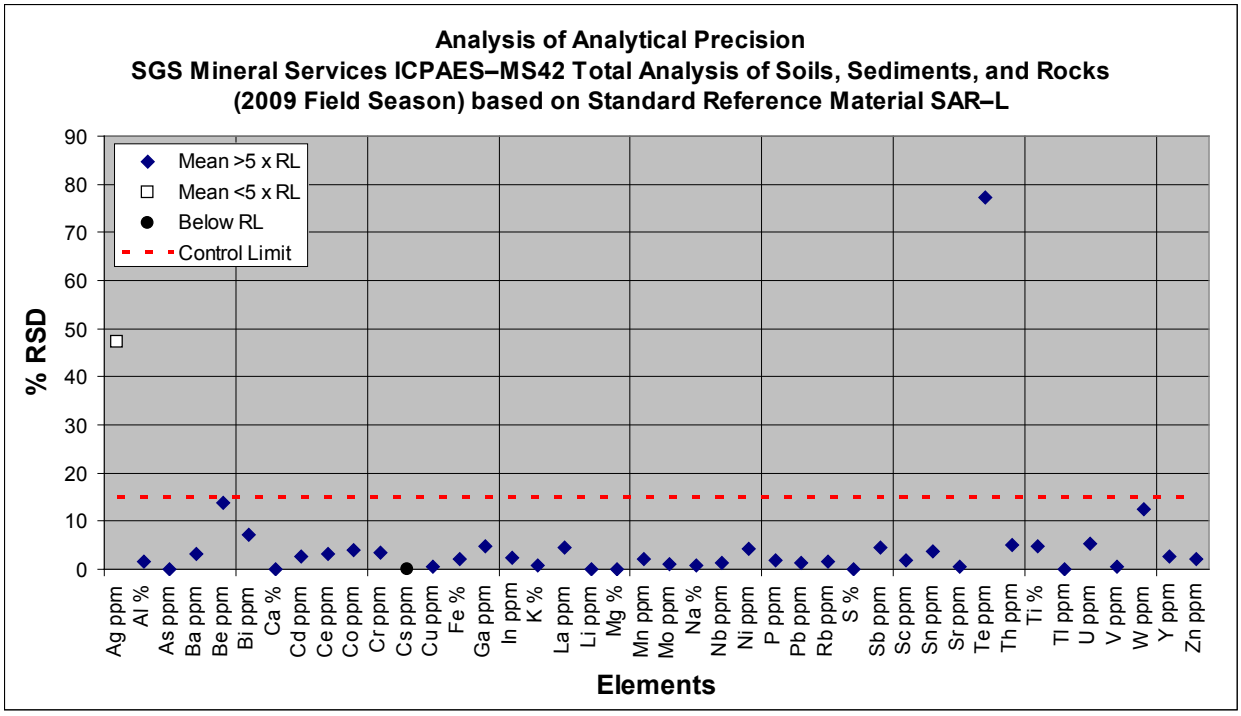

Figure 12-19. Precision plot for two analyses of standard reference material SAR–L by ICPAES–MS42 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

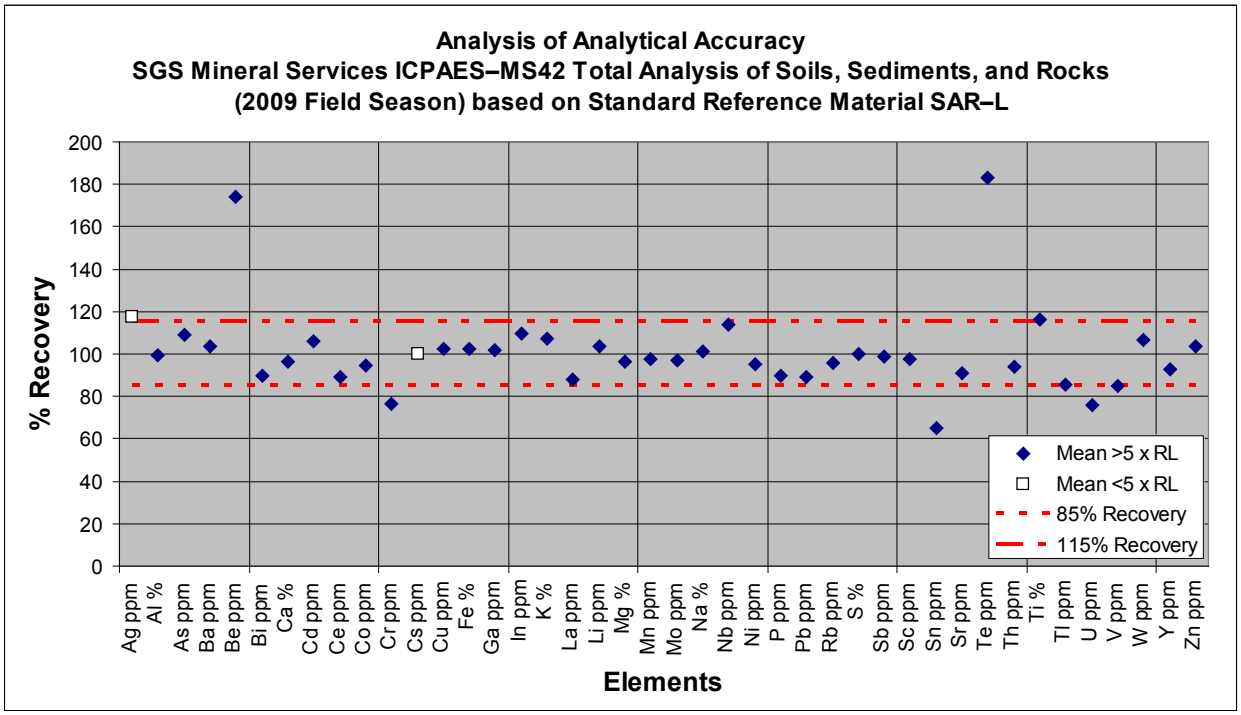

Figure 12-20. Accuracy plot for two analyses of standard reference material SAR–L by ICPAES–MS42 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-13. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined after a four-acid total digestion of soil, sediment, and rock samples by the ICPAES–MS42 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	2	3.10	3.00	0	0	96.8
Al	%	0.01	2	6.09	6.11	0.0212	0.347	100
As	ppm	1	2	37.0	42.5	0.707	1.66	115
Ba	ppm	5	2	764	857	41.7	4.87	112
Be	ppm	0.1	2	2.40	2.60	0	0	108
Bi	ppm	0.04	2	1.33	1.59	0.113	7.12	120
Ca	%	0.01	2	0.580	0.560	0	0	96.6
Cd	ppm	0.1	2	4.76	4.95	0.0707	1.43	104
Ce	ppm	0.05	2	120	113	2.83	2.50	94.2
Co	ppm	0.1	2	11.0	11.4	0.778	6.85	103
Cr	ppm	1	2	101	64	1.41	2.21	63.4
Cs	ppm	5	2	<5	5.00	0	0	104
Cu	ppm	0.5	2	320	341	4.24	1.24	107
Fe	%	0.01	2	3.22	3.27	0.0778	2.38	101
Ga	ppm	0.05	2	20.0	18.8	0.707	3.76	94.0
In	ppm	0.02	2	0.970	1.09	0.0141	1.30	112
K	%	0.01	2	2.92	3.18	0.00707	0.223	109
La	ppm	0.5	2	61.0	53.8	0.778	1.45	88.1
Li	ppm	1	2	30.0	31.0	0	0	103
Mg	%	0.01	2	0.500	0.485	0.00707	1.46	97.0
Mn	ppm	5	2	5,200	5,050	77.8	1.54	97.0
Mo	ppm	0.05	2	12.0	12.5	0.424	3.39	104
Na	%	0.01	2	1.19	1.21	0.0141	1.17	102
Nb	ppm	0.1	2	31.0	42.0	1.48	3.54	135
Ni	ppm	0.5	2	41.0	38.2	0.495	1.30	93.0
P	ppm	50	2	800	770	42.4	5.51	96.3
Pb	ppm	0.5	2	960	883	6.36	0.721	91.9
Rb	ppm	0.2	2	142	142	4.24	2.99	100
S	%	0.01	2	0.130	0.130	0	0	100
Sb	ppm	0.05	2	5.60	6.66	0	0	119
Sc	ppm	0.1	2	8.30	8.00	0.283	3.54	96.4
Sn	ppm	0.1	2	5.00	2.95	0.0707	2.40	59.0
Sr	ppm	0.5	2	156	145	3.54	2.45	92.6
Te	ppm	0.1	2	0.680	0.900	0	0	132
Th	ppm	0.2	2	18.0	18.0	1.84	10.2	100
Ti	%	0.01	2	0.350	0.360	0	0	103
Tl	ppm	0.1	2	2.80	2.60	0	0	92.9
U	ppm	0.1	2	5.10	3.75	0.212	5.66	73.5
V	ppm	1	2	66.0	61.0	1.41	2.32	92.4
W	ppm	0.1	2	14.0	11.8	0.141	1.20	84.3
Y	ppm	0.1	2	33.0	31.6	0.354	1.12	95.6
Zn	ppm	1	2	888	920	8.49	0.922	104

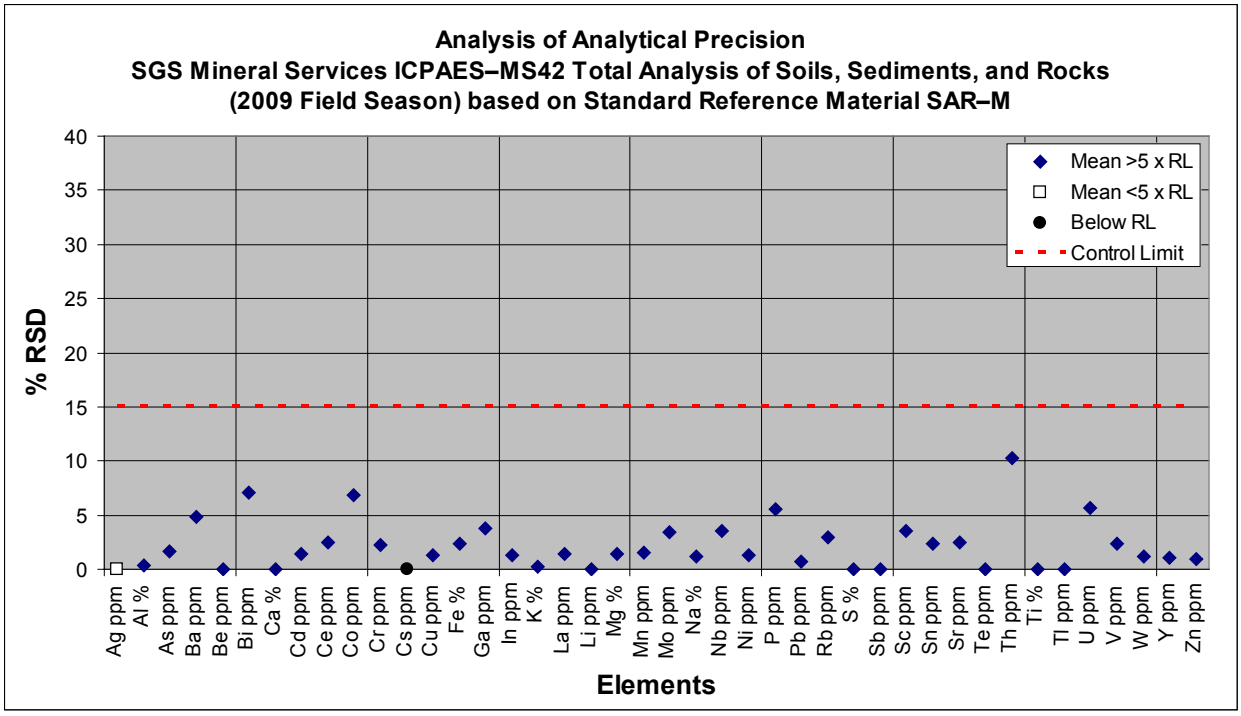

Figure 12-21. Precision plot for two analyses of standard reference material SAR–M by ICPAES–MS42 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

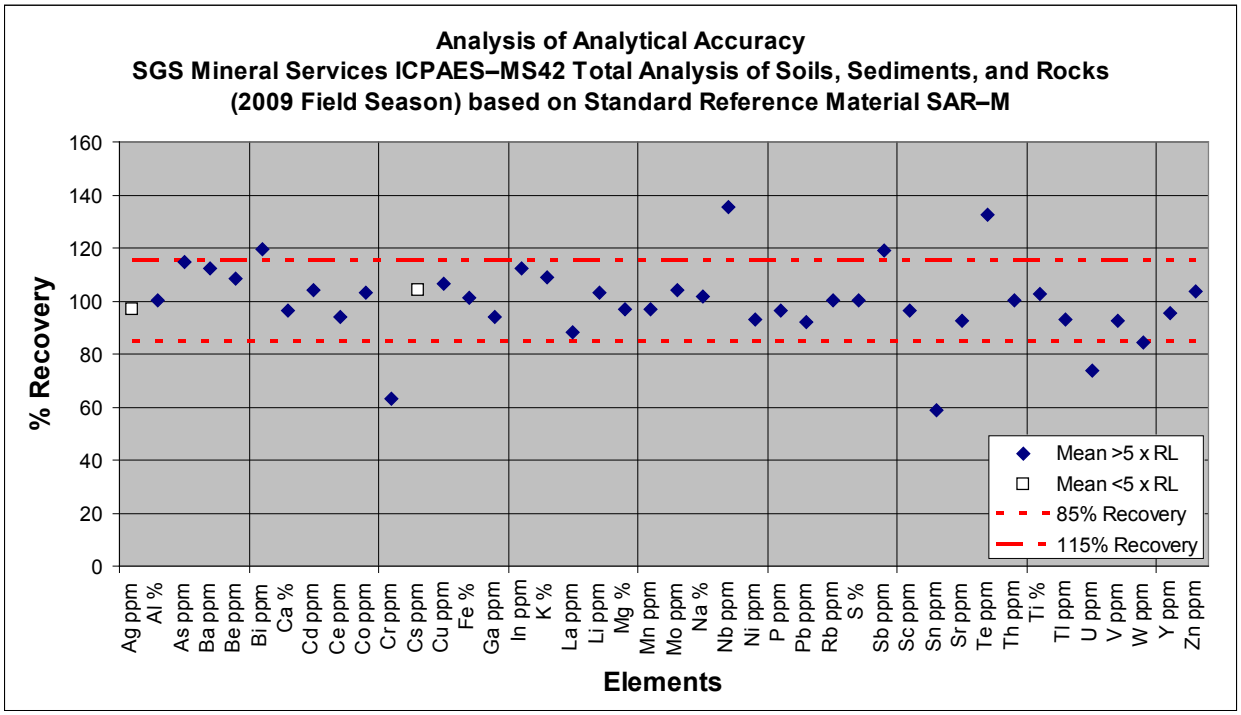

Figure 12-22. Accuracy plot for two analyses of standard reference material SAR–M by ICPAES–MS42 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-14. Summary statistics for assessing analytical variation on the standard reference material DGPM; determined after a four-acid total digestion of soil, sediment, and rock samples by the ICPAES–MS42 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	5	<1	<1	*na*	*na*	100
Al	%	0.01	5	4.94	4.84	0.179	3.70	98.0
As	ppm	1	5	177	189	7.33	3.89	107
Ba	ppm	5	5	1,326	1,300	83.5	6.43	97.9
Be	ppm	0.1	5	1.54	2.40	0.224	9.32	156
Bi	ppm	0.04	5	0.114	0.116	0.0391	33.7	102
Ca	%	0.01	5	0.144	0.130	0	0	90.3
Cd	ppm	0.1	5	0.330	0.240	0.0548	22.8	72.7
Ce	ppm	0.05	5	91.3	90.2	4.60	5.11	98.8
Co	ppm	0.1	5	1.36	1.32	0.0837	6.34	96.8
Cr	ppm	1	5	97.0	59.8	4.49	7.52	61.6
Cs	ppm	5	5	8.87	9.00	0	0	102
Cu	ppm	0.5	5	13.7	11.8	0.871	7.35	86.6
Fe	%	0.01	5	1.34	1.35	0.0472	3.49	101
Ga	ppm	0.05	5	10.8	12.1	0.370	3.05	112
In	ppm	0.02	5	<0.02	<0.02	*na*	*na*	100
K	%	0.01	5	2.25	2.21	0.265	12.0	98.5
La	ppm	0.5	5	51.5	51.0	3.11	6.11	99.1
Li	ppm	1	5	39.6	39.6	2.88	7.28	100
Mg	%	0.01	5	0.322	0.314	0.0114	3.63	97.5
Mn	ppm	5	5	28.0	26.2	3.03	11.6	93.5
Mo	ppm	0.05	5	13.7	12.9	0.863	6.69	94.2
Na	%	0.01	5	0.0600	0.0520	0.00447	8.60	86.7
Nb	ppm	0.1	5	7.20	10.9	0.666	6.13	151
Ni	ppm	0.5	5	11.4	9.64	0.796	8.25	84.9
P	ppm	50	5	418	418	26.8	6.42	100
Pb	ppm	0.5	5	9.78	8.62	0.676	7.84	88.1
Rb	ppm	0.2	5	89.8	89.1	3.68	4.13	99.3
S	%	0.01	5	0.363	0.350	0.00707	2.02	96.4
Sb	ppm	0.05	5	13.2	13.8	0.526	3.81	105
Sc	ppm	0.1	5	9.83	9.50	0.265	2.79	96.6
Sn	ppm	0.1	5	1.81	1.80	0.0707	3.93	99.4
Sr	ppm	0.5	5	91.5	84.2	3.14	3.73	92.0
Te	ppm	0.1	5	<0.1	<0.1	*na*	*na*	100
Th	ppm	0.2	5	10.7	9.92	0.327	3.30	92.7
Ti	%	0.01	5	0.266	0.322	0.0179	5.56	121
Tl	ppm	0.1	5	8.15	8.10	0.283	3.49	99.4
U	ppm	0.1	5	2.75	2.64	0.114	4.32	96.0
V	ppm	1	5	106	94.8	1.79	1.89	89.4
W	ppm	0.1	5	75.0	82.2	3.81	4.64	110
Y	ppm	0.1	5	17.5	18.8	1.40	7.49	107
Zn	ppm	1	5	24.4	20.8	1.30	6.27	85.2

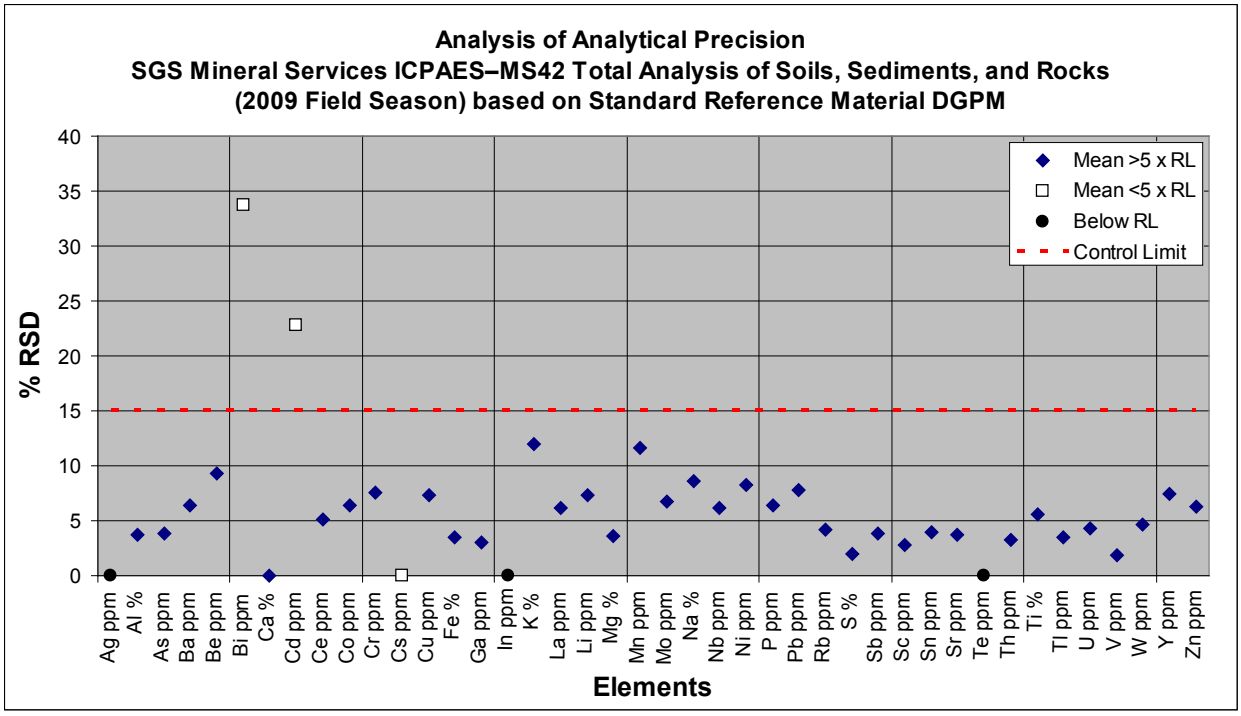

Figure 12-23. Precision plot for five analyses of standard reference material DGPM by ICPAES–MS42 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

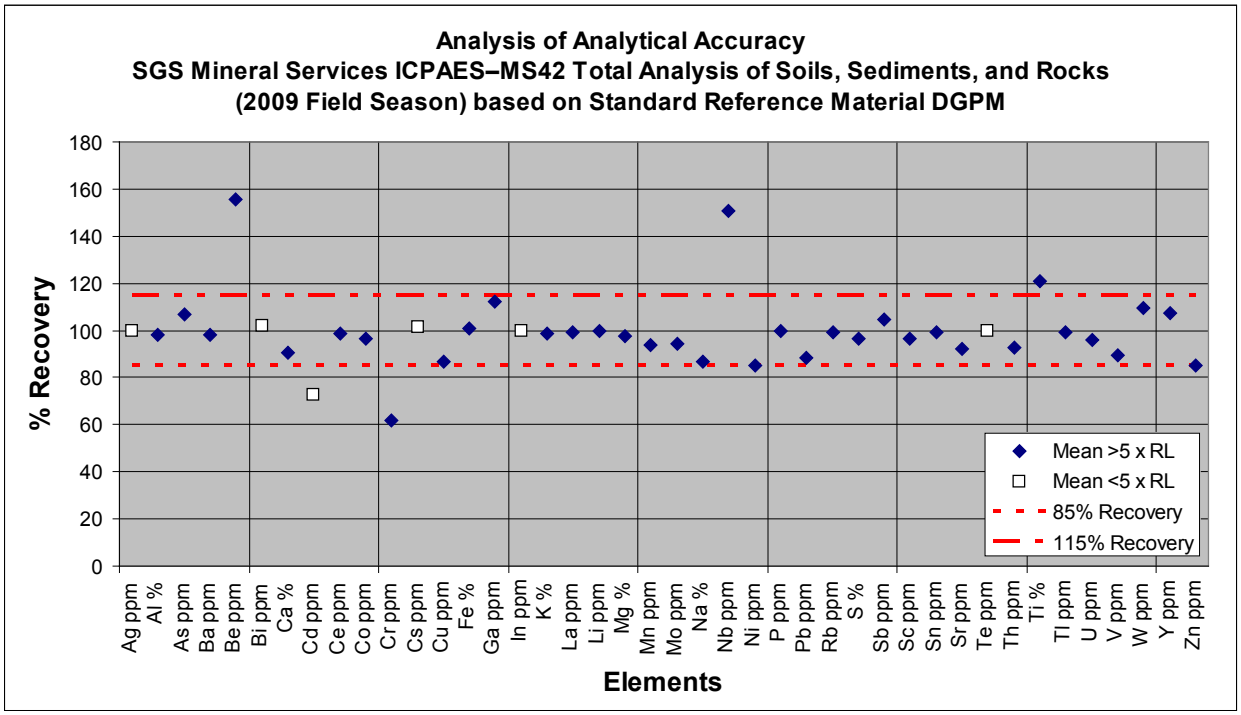

Figure 12-24. Accuracy plot for five analyses of standard reference material DGPM by ICPAES–MS42 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-15. Summary statistics for assessing analytical variation on the standard reference material GSP–QC; determined after a four-acid total digestion of soil, sediment, and rock samples by the ICPAES–MS42 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	4	3.07	2.75	0.500	18.2	89.6
Al	%	0.01	4	7.57	7.35	0.339	4.62	97.1
As	ppm	1	4	31.4	33.3	4.27	12.8	106
Ba	ppm	5	4	1,310	1,290	70.7	5.48	98.5
Be	ppm	0.1	4	1.17	1.28	0.0500	3.92	109
Bi	ppm	0.04	4	4.28	3.86	0.0741	1.92	90.2
Ca	%	0.01	4	1.50	1.42	0.0618	4.35	94.8
Cd	ppm	0.1	4	0.227	0.200	0	0	88.1
Ce	ppm	0.05	4	405	392	22.6	5.77	96.7
Co	ppm	0.1	4	6.36	6.73	0.479	7.12	106
Cr	ppm	1	4	16.6	12.5	1.29	10.3	75.3
Cs	ppm	5	4	<5	<5	*na*	*na*	100
Cu	ppm	0.5	4	31.3	30.6	2.20	7.19	97.8
Fe	%	0.01	4	2.77	2.83	0.0616	2.18	102
Ga	ppm	0.05	4	22.2	24.6	0.163	0.664	111
In	ppm	0.02	4	0.0440	0.0475	0.00500	10.5	108
K	%	0.01	4	4.25	4.44	0.0294	0.663	104
La	ppm	0.5	4	173	172	14.8	8.60	99.6
Li	ppm	1	4	34.0	32.5	2.89	8.88	95.6
Mg	%	0.01	4	0.615	0.580	0.0163	2.82	94.3
Mn	ppm	5	4	281	255	6.27	2.46	90.7
Mo	ppm	0.05	4	1.31	1.29	0.0173	1.35	98.1
Na	%	0.01	4	1.87	1.89	0.0635	3.37	101
Nb	ppm	0.1	4	18.6	24.1	2.16	8.97	130
Ni	ppm	0.5	4	11.5	8.58	0.340	3.97	74.6
P	ppm	50	4	1,230	1,250	84.2	6.75	101
Pb	ppm	0.5	4	40.4	36.0	4.10	11.4	89.2
Rb	ppm	0.2	4	228	250	22.0	8.81	110
S	%	0.01	4	0.0740	0.0700	0	0	94.6
Sb	ppm	0.05	4	0.877	0.875	0.0520	5.94	99.8
Sc	ppm	0.1	4	6.23	6.13	0.189	3.09	98.3
Sn	ppm	0.1	4	4.72	4.48	0.457	10.2	94.8
Sr	ppm	0.5	4	226	204	9.75	4.79	90.0
Te	ppm	0.1	4	4.07	3.58	0.275	7.70	87.8
Th	ppm	0.2	4	104	94.8	3.66	3.87	91.1
Ti	%	0.01	4	0.339	0.358	0.0206	5.77	105
Tl	ppm	0.1	4	2.07	2.00	0.0816	4.08	96.6
U	ppm	0.1	4	2.27	2.08	0.150	7.23	91.4
V	ppm	1	4	73.3	68.3	1.71	2.50	93.1
W	ppm	0.1	4	6.65	7.35	0.661	8.99	111
Y	ppm	0.1	4	25.5	25.2	2.13	8.46	98.8
Zn	ppm	1	4	117	111	3.70	3.35	94.4

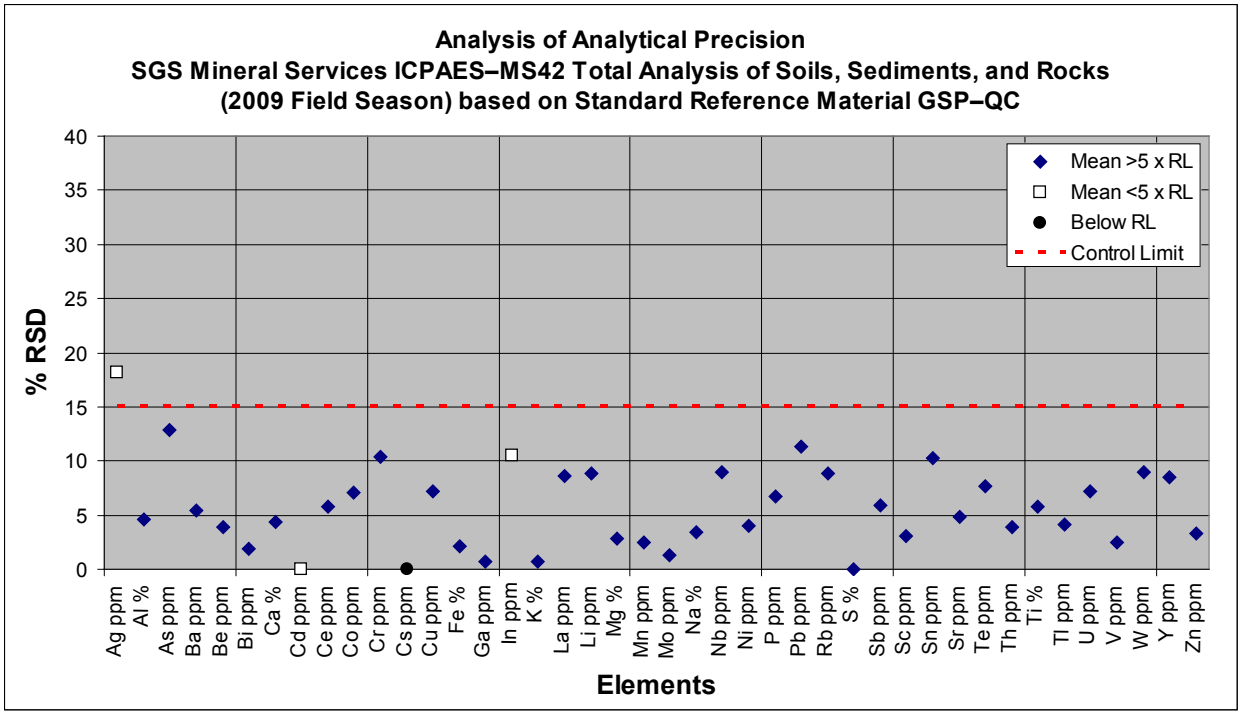

Figure 12-25. Precision plot for four analyses of standard reference material GSP–QC by ICPAES–MS42 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

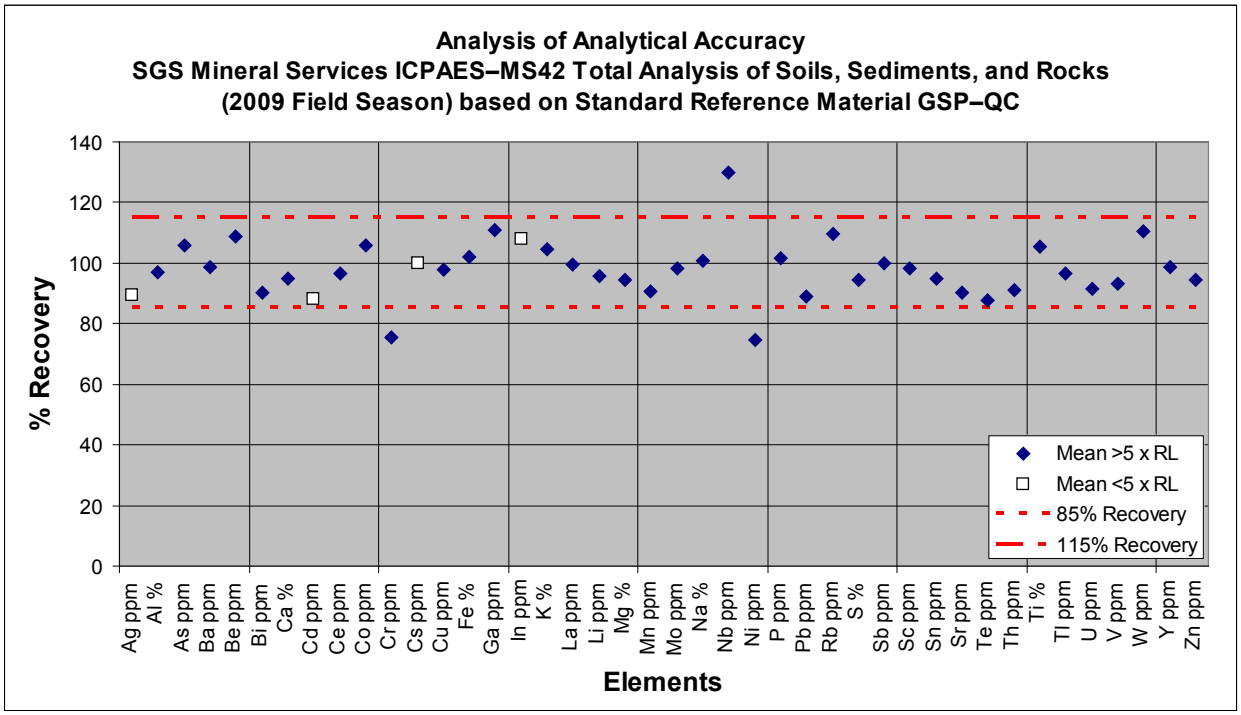

Figure 12-26. Accuracy plot for four analyses of standard reference material GSP–QC by ICPAES–MS42 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 12-16. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined after a four-acid total digestion of soil, sediment, and rock samples by the ICPAES–MS42 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	10	*na*	<1	*na*	*na*	*na*
Al	%	0.01	10	7.69	7.68	0.342	4.46	99.8
As	ppm	1	10	15.8	16.3	0.823	5.05	103
Ba	ppm	5	10	761	729	31.2	4.28	95.8
Be	ppm	0.1	10	1.42	1.30	0.0816	6.28	91.5
Bi	ppm	0.04	10	0.214	0.192	0.0123	6.40	89.7
Ca	%	0.01	10	1.52	1.41	0.0620	4.42	92.4
Cd	ppm	0.1	10	0.240	<0.1	*na*	*na*	40.2
Ce	ppm	0.05	10	39.0	40.3	2.43	6.02	103
Co	ppm	0.1	10	14.0	13.5	0.941	6.95	96.9
Cr	ppm	1	10	50.8	48.2	3.39	7.04	94.9
Cs	ppm	5	10	*na*	<5	*na*	*na*	*na*
Cu	ppm	0.5	10	134	134	4.60	3.44	100
Fe	%	0.01	10	4.43	4.45	0.118	2.66	100
Ga	ppm	0.05	10	18.1	18.5	0.822	4.44	102
In	ppm	0.02	10	0.0660	0.0600	0	0	90.9
K	%	0.01	10	1.33	1.42	0.124	8.71	107
La	ppm	0.5	10	18.2	20.0	1.24	6.22	110
Li	ppm	1	10	19.2	19.0	1.83	9.61	99.0
Mg	%	0.01	10	0.882	0.832	0.0282	3.39	94.3
Mn	ppm	5	10	761	697	12.2	1.75	91.6
Mo	ppm	0.05	10	4.19	4.03	0.298	7.41	96.2
Na	%	0.01	10	1.64	1.67	0.0529	3.16	102
Nb	ppm	0.1	10	10.0	11.9	1.30	11.0	119
Ni	ppm	0.5	10	16.3	16.0	0.626	3.92	97.6
P	ppm	50	10	1,204	1,210	40.6	3.36	100
Pb	ppm	0.5	10	17.8	13.1	0.692	5.30	73.5
Rb	ppm	0.2	10	45.8	48.7	3.30	6.78	106
S	%	0.01	10	0.0820	0.0550	0.00527	9.58	67.1
Sb	ppm	0.05	10	1.27	1.19	0.0326	2.73	94.2
Sc	ppm	0.1	10	16.2	13.9	0.470	3.38	85.6
Sn	ppm	0.1	10	1.38	1.65	0.774	46.9	120
Sr	ppm	0.5	10	237	226	10.6	4.71	95.2
Te	ppm	0.1	10	0.200	<0.1	*na*	*na*	49.6
Th	ppm	0.2	10	4.22	4.05	0.237	5.85	96.0
Ti	%	0.01	10	0.532	0.564	0.0263	4.67	106
Tl	ppm	0.1	10	0.400	0.400	0	0	100
U	ppm	0.1	10	1.94	1.86	0.0699	3.76	95.9
V	ppm	1	10	133	114	4.88	4.29	85.6
W	ppm	0.1	10	1.18	1.60	0.383	23.9	136
Y	ppm	0.1	10	17.3	20.3	2.18	10.8	117
Zn	ppm	1	10	89.0	68.6	2.63	3.84	77.1

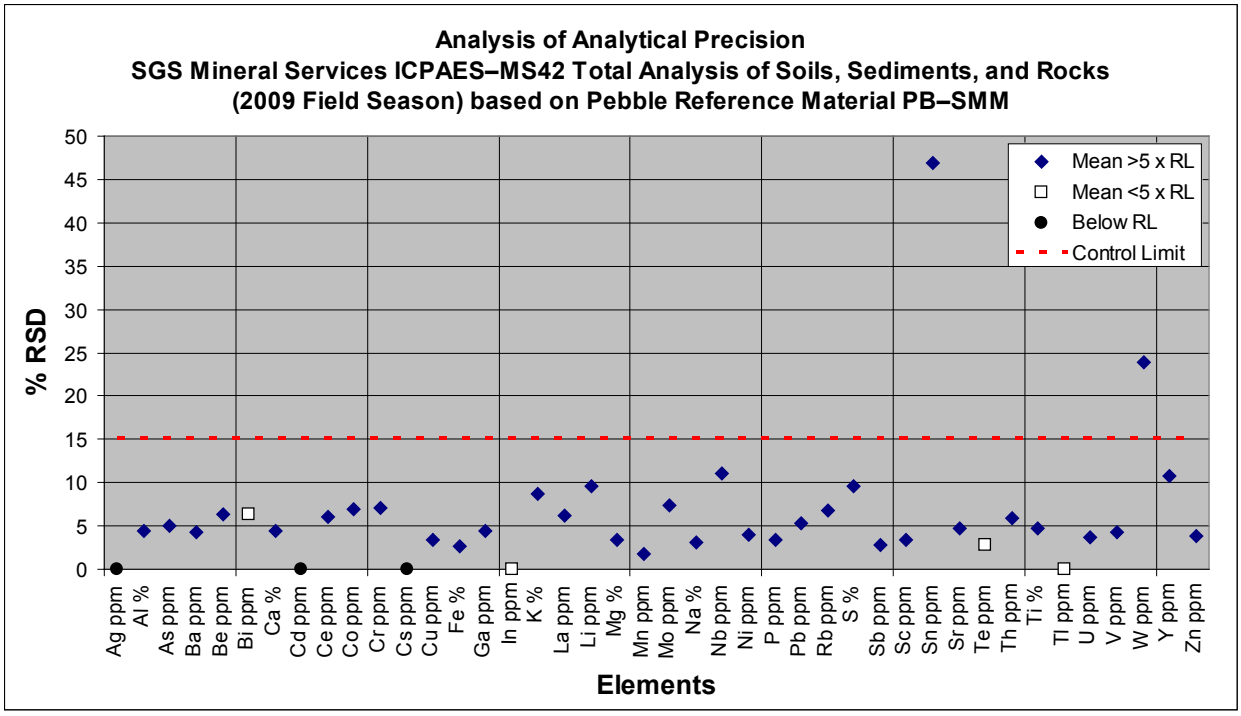

Figure 12-27. Precision plot for ten analyses of Pebble reference material PB–SMM by ICPAES–MS42 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

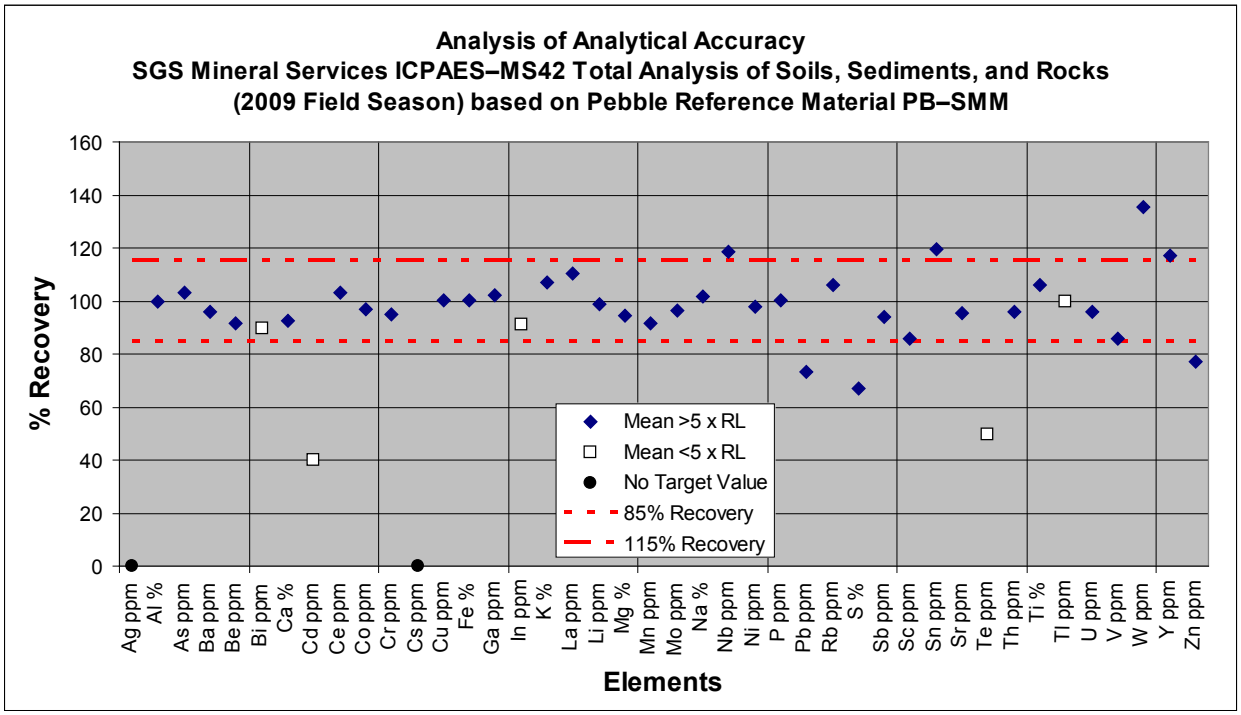

Figure 12-28. Accuracy plot for ten analyses of Pebble reference material PB–SMM by ICPAES–MS42 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for SGS Mineral Services (USGS contract) ICPAES–MS55 Multielement Package Data

Table 13-1. Summary statistics for assessing analytical variation on duplicate samples; determined after a sodium peroxide sinter of soil samples by the ICPAES–MS55 multielement package at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	1	4	<1	<1	<1	*na*	*na*
Al	%	0.01	4	5.34	8.49	6.94	0.243	3.50
As	ppm	30	4	<30	<30	<30	*na*	*na*
Ba	ppm	0.5	4	406	784	574	33.8	5.89
Be	ppm	5	4	<5	<5	<5	*na*	*na*
Bi	ppm	0.1	4	0.200	0.400	0.225	0.0707	31.4
Ca	%	0.01	4	0.990	1.61	1.30	0.0887	6.80
Cd	ppm	0.2	4	<0.2	<0.2	<0.2	*na*	*na*
Ce	ppm	0.1	4	21.7	40.3	33.6	2.91	8.66
Co	ppm	0.5	4	4.80	14.6	8.84	0.799	9.04
Cr	ppm	10	4	20.0	70.0	42.5	5.00	11.8
Cs	ppm	0.1	4	2.00	3.60	2.56	0.0612	2.39
Cu	ppm	5	4	11.0	219	61.5	17.4	28.2
Dy	ppm	0.05	4	2.17	4.14	3.24	0.144	4.45
Er	ppm	0.05	4	1.45	2.52	2.04	0.140	6.87
Eu	ppm	0.05	4	0.580	1.24	0.911	0.0619	6.80
Fe	%	0.01	4	3.02	5.19	4.01	0.129	3.22
Ga	ppm	1	4	14.0	18.0	16.1	0.612	3.80
Gd	ppm	0.05	4	2.23	4.68	3.45	0.301	8.73
Ge	ppm	1	4	1.00	2.00	1.38	0.354	25.7
Hf	ppm	1	4	3.00	7.00	5.00	0.707	14.1
Ho	ppm	0.05	4	0.400	0.840	0.659	0.042	6.37
In	ppm	0.2	4	<0.2	<0.2	<0.2	*na*	*na*
K	%	0.01	4	0.800	1.43	1.11	0.0389	3.50
La	ppm	0.1	4	9.60	22.2	16.8	2.84	16.9
Li	ppm	10	4	<10	20.0	13.5	3.54	26.1
Lu	ppm	0.05	4	0.200	0.400	0.304	0.0314	10.4
Mg	%	0.01	4	0.500	0.990	0.743	0.0563	7.59
Mn	%	0.001	4	0.0400	0.0700	0.0563	0.00354	6.29
Mo	ppm	2	4	<2	5.00	2.48	0.354	14.2
Nb	ppm	1	4	8.00	13.0	10.1	0.612	6.05
Nd	ppm	0.1	4	9.70	19.9	15.8	1.18	7.46
Ni	ppm	5	4	5.00	17.0	11.4	1.54	13.6
P	%	0.01	4	0.100	0.190	0.139	0.0203	14.6
Pb	ppm	5	4	9.00	12.0	10.4	0.791	7.62
Pr	ppm	0.05	4	2.52	4.99	4.01	0.279	6.96
Rb	ppm	0.2	4	25.1	47.4	36.3	1.31	3.62
Sb	ppm	0.1	4	0.600	1.30	0.913	0.137	15.0
Sc	ppm	5	4	7.00	14.0	10.3	0.707	6.90
Sm	ppm	0.1	4	2.30	4.60	3.53	0.150	4.26
Sn	ppm	1	4	<1	2.00	1.22	0.525	43.1
Sr	ppm	0.1	4	165	264	218	12.1	5.55
Ta	ppm	0.5	4	<0.5	0.700	0.526	0.0897	17.1
Tb	ppm	0.05	4	0.380	0.720	0.559	0.0117	2.10
Th	ppm	0.1	4	3.10	4.40	3.98	0.287	7.23
Ti	%	0.01	4	0.350	0.650	0.480	0.0122	2.55
Tl	ppm	0.5	4	<0.5	<0.5	<0.5	*na*	*na*
Tm	ppm	0.05	4	0.180	0.340	0.284	0.0154	5.43
U	ppm	0.05	4	1.46	1.99	1.79	0.100	5.62
V	ppm	5	4	76.0	137	108	5.07	4.72
W	ppm	1	4	<1	2.00	1.21	0.0444	3.69

Table 13-1. Summary statistics for assessing analytical variation on duplicate samples; determined after a sodium peroxide sinter of soil samples by the ICPAES–MS55 multielement package at SGS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Y	ppm	0.5	4	12.4	21.9	17.4	0.638	3.68
Yb	ppm	0.1	4	1.30	2.30	1.93	0.132	6.87
Zn	ppm	5	4	36.0	81.0	60.4	11.7	19.3
Zr	ppm	0.5	4	134	270	201	8.90	4.43

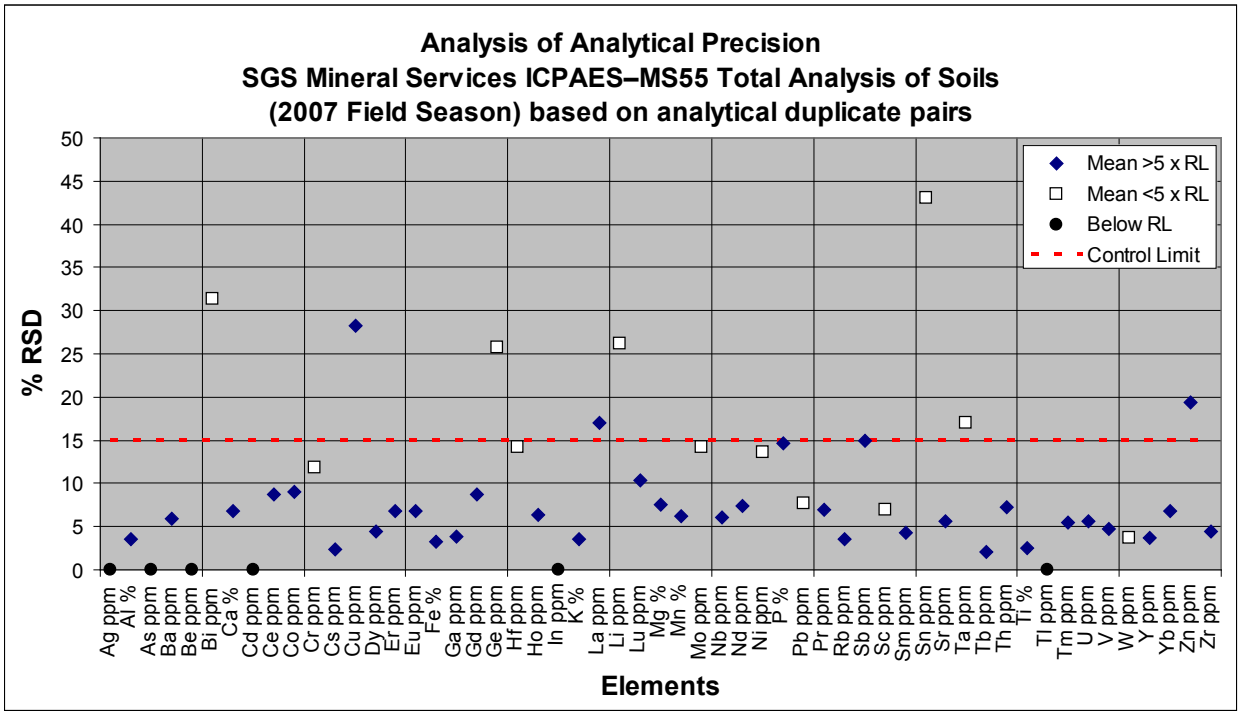

Figure 13-1. Precision plot for four analytical duplicate sample pairs by ICPAES–MS55 (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 13-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a sodium peroxide sinter of soil samples by the ICPAES–MS55 multielement package at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	3	2.56	3.00	0	0	117
Al	%	0.01	3	5.79	5.80	0.0529	0.912	100
As	ppm	30	3	<30	<30	*na*	*na*	100
Ba	ppm	0.5	3	879	930	34.6	3.72	106
Be	ppm	5	3	<5	<5	*na*	*na*	104
Bi	ppm	0.1	3	1.10	1.13	0.0577	5.09	103
Ca	%	0.01	3	1.06	1.00	0.0115	1.15	94.7
Cd	ppm	0.2	3	2.50	3.33	0.0577	1.73	133
Ce	ppm	0.1	3	150	139	4.00	2.88	92.7
Co	ppm	0.5	3	7.50	7.53	0.0577	0.766	100
Cr	ppm	10	3	110	90.0	0	0	81.8
Cs	ppm	0.1	3	4.00	4.50	0.520	11.6	113

Table 13-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a sodium peroxide sinter of soil samples by the ICPAES–MS55 multielement package at SGS Minerals (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Cu	ppm	5	3	370	377	22.1	5.85	102
Dy	ppm	0.05	3	*na*	9.64	0.398	4.13	*na*
Er	ppm	0.05	3	*na*	6.71	0.376	5.60	*na*
Eu	ppm	0.05	3	1.50	1.28	0.0115	0.900	85.6
Fe	%	0.01	3	2.67	2.70	0.0173	0.642	101
Ga	ppm	1	3	17.0	16.3	0.577	3.53	96.1
Gd	ppm	0.05	3	*na*	10.4	0.361	3.47	*na*
Ge	ppm	1	3	*na*	2.00	0	0	*na*
Hf	ppm	1	3	10.0	10.0	0	0	100
Ho	ppm	0.05	3	1.90	2.05	0.0643	3.14	108
In	ppm	0.2	3	0.260	0.300	0	0	115
K	%	0.01	3	2.98	2.86	0.0208	0.727	96.1
La	ppm	0.1	3	75.0	70.5	1.80	2.56	94.0
Li	ppm	10	3	28.0	23.3	5.77	24.7	83.3
Lu	ppm	0.05	3	1.00	0.910	0.0529	5.81	91.0
Mg	%	0.01	3	0.550	0.540	0.0100	1.85	98.2
Mn	%	0.001	3	0.209	0.200	0	0	95.7
Mo	ppm	2	3	13.0	13.7	0.577	4.22	105
Nb	ppm	1	3	35.0	42.0	2.00	4.76	120
Nd	ppm	0.1	3	66.0	55.1	1.18	2.14	83.5
Ni	ppm	5	3	52.0	52.3	0.577	1.10	101
P	%	0.01	3	0.0900	0.0700	0	0	77.8
Pb	ppm	5	3	578	556	11.8	2.12	96.2
Pr	ppm	0.05	3	*na*	15.2	0.252	1.66	*na*
Rb	ppm	0.2	3	140	142	2.52	1.78	101
Sb	ppm	0.1	3	5.10	5.03	0.116	2.29	98.7
Sc	ppm	5	3	7.80	6.00	0	0	76.9
Sm	ppm	0.1	3	13.0	10.5	0.208	1.98	81.0
Sn	ppm	1	3	6.00	4.33	1.15	26.7	72.2
Sr	ppm	0.1	3	158	161	1.53	0.951	102
Ta	ppm	0.5	3	2.80	1.97	0.0577	2.94	70.2
Tb	ppm	0.05	3	1.70	1.67	0.0557	3.33	98.2
Th	ppm	0.1	3	19.0	18.6	0.929	4.99	98.1
Ti	%	0.01	3	0.250	0.293	0.00577	1.97	117
Tl	ppm	0.5	3	1.40	1.20	0	0	85.7
Tm	ppm	0.05	3	*na*	0.883	0.0321	3.64	*na*
U	ppm	0.05	3	5.20	4.36	0.0493	1.13	83.8
V	ppm	5	3	140	126	1.15	0.919	89.8
W	ppm	1	3	3.70	3.33	0.577	17.3	90.1
Y	ppm	0.5	3	44.0	61.8	3.16	5.11	140
Yb	ppm	0.1	3	5.70	6.13	0.416	6.79	108
Zn	ppm	5	3	420	398	3.21	0.808	94.7
Zr	ppm	0.5	3	408	419	15.9	3.81	103

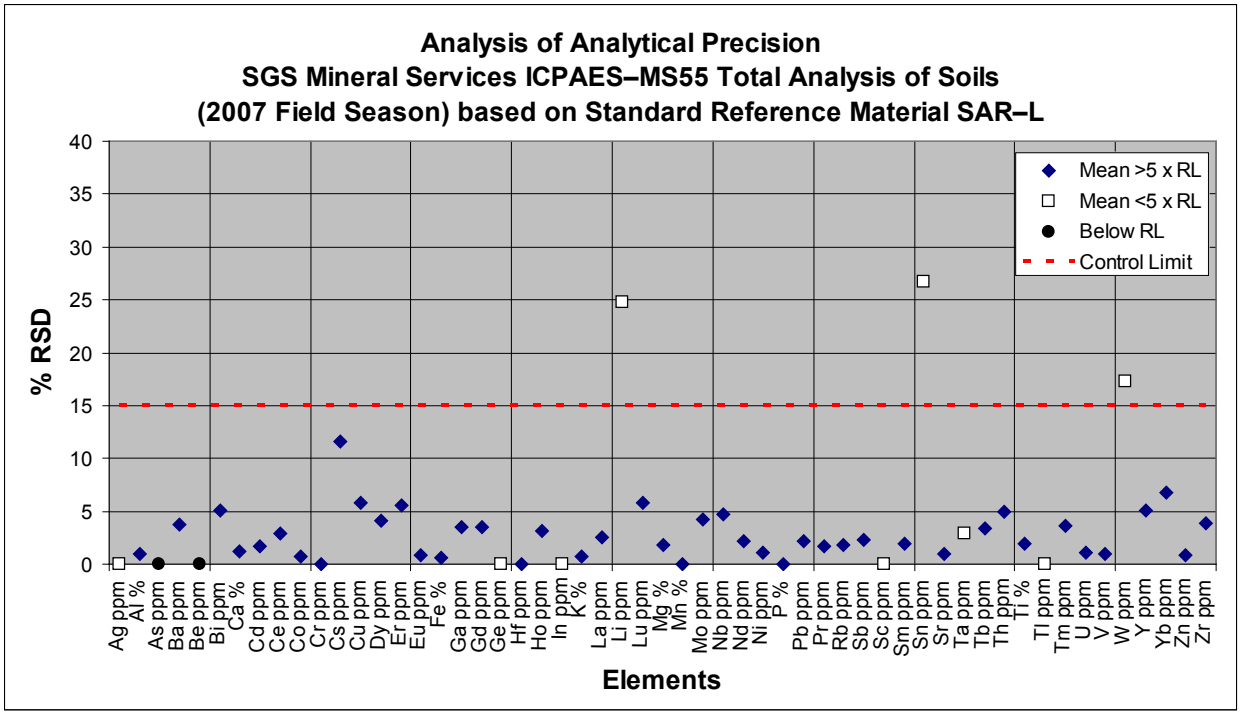

Figure 13-2. Precision plot for three analyses of standard reference material SAR–L by ICPAES–MS55 (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

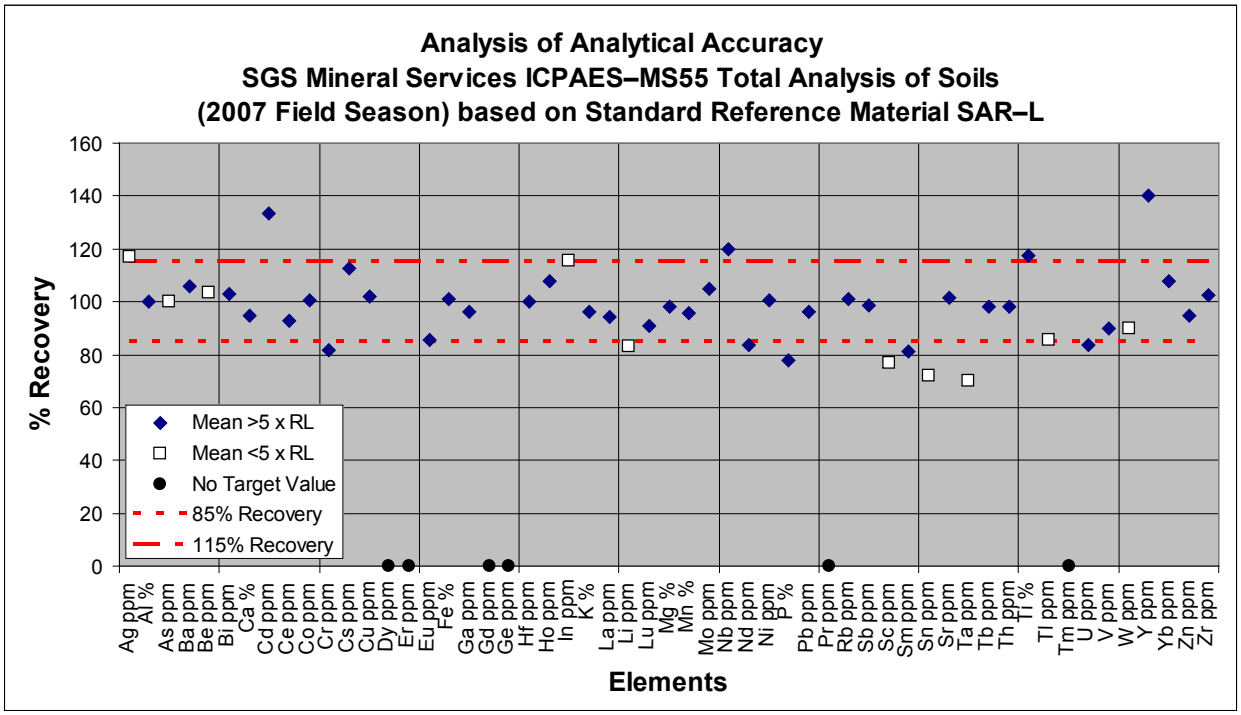

Figure 13-3. Accuracy plot for three analyses of standard reference material SAR–L by ICPAES–MS55 (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-3. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined after a sodium peroxide sinter of soil samples by the ICPAES–MS55 multielement package at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	4	3.10	3.00	0.817	27.2	96.8
Al	%	0.01	4	6.09	5.99	0.414	6.91	98.3
As	ppm	30	4	37.0	37.5	5.00	13.3	101
Ba	ppm	0.5	4	764	803	42.0	5.23	105
Be	ppm	5	4	<5	<5	*na*	*na*	100
Bi	ppm	0.1	4	1.33	1.68	0.222	13.2	126
Ca	%	0.01	4	0.580	0.585	0.0129	2.21	101
Cd	ppm	0.2	4	4.76	5.45	0.507	9.30	115
Ce	ppm	0.1	4	120	117	16.4	14.0	97.5
Co	ppm	0.5	4	11.0	11.1	0.572	5.15	101
Cr	ppm	10	4	101	87.5	5.00	5.71	86.6
Cs	ppm	0.1	4	4.80	5.15	0.0577	1.12	107
Cu	ppm	5	4	320	320	25.5	7.97	99.9
Dy	ppm	0.05	4	*na*	6.88	1.24	18.1	*na*
Er	ppm	0.05	4	*na*	4.56	0.438	9.61	*na*
Eu	ppm	0.05	4	1.26	1.21	0.0556	4.59	96.2
Fe	%	0.01	4	3.22	3.29	0.0377	1.15	102
Ga	ppm	1	4	20.0	17.3	0.500	2.90	86.3
Gd	ppm	0.05	4	*na*	7.97	1.20	15.1	*na*
Ge	ppm	1	4	*na*	1.25	0.500	40.0	*na*
Hf	ppm	1	4	*na*	9.25	0.957	10.4	*na*
Ho	ppm	0.05	4	1.90	1.43	0.241	16.9	75.3
In	ppm	0.2	4	0.970	1.10	0.0816	7.42	113
K	%	0.01	4	2.92	2.83	0.126	4.44	96.8
La	ppm	0.1	4	61.0	59.4	4.84	8.15	97.4
Li	ppm	10	4	30.0	30.0	0	0	100
Lu	ppm	0.05	4	0.700	0.638	0.0793	12.4	91.1
Mg	%	0.01	4	0.500	0.488	0.0189	3.88	97.5
Mn	%	0.001	4	0.520	0.500	0.00820	1.63	96.2
Mo	ppm	2	4	12.0	14.0	0.817	5.83	117
Nb	ppm	1	4	31.0	37.5	1.91	5.11	121
Nd	ppm	0.1	4	53.4	47.1	6.80	14.5	88.2
Ni	ppm	5	4	41.0	39.0	0.817	2.09	95.1
P	%	0.01	4	0.0800	0.0650	0.0100	15.4	81.3
Pb	ppm	5	4	960	924	9.22	1.00	96.3
Pr	ppm	0.05	4	*na*	12.7	1.69	13.4	*na*
Rb	ppm	0.2	4	142	148	3.37	2.27	104
Sb	ppm	0.1	4	5.60	7.23	0.695	9.61	129
Sc	ppm	5	4	8.30	7.00	0	0	84.3
Sm	ppm	0.1	4	9.80	8.55	1.15	13.4	87.2
Sn	ppm	1	4	9.40	3.75	0.957	25.5	39.9
Sr	ppm	0.1	4	156	159	11.0	6.89	102
Ta	ppm	0.5	4	2.60	1.83	0.189	10.4	70.2
Tb	ppm	0.05	4	1.30	1.22	0.177	14.5	93.7
Th	ppm	0.1	4	18.0	18.4	1.98	10.7	102
Ti	%	0.01	4	0.350	0.363	0.0126	3.47	104
Tl	ppm	0.5	4	2.80	2.63	0.189	7.21	93.8
Tm	ppm	0.05	4	*na*	0.638	0.0877	13.8	*na*
U	ppm	0.05	4	5.10	4.46	0.399	8.96	87.4
V	ppm	5	4	66.0	67.0	0.817	1.22	102
W	ppm	1	4	14.0	12.3	2.63	21.5	87.5
Y	ppm	0.5	4	33.0	42.4	4.70	11.1	128
Yb	ppm	0.1	4	4.90	4.35	0.646	14.8	88.8
Zn	ppm	5	4	888	891	5.91	0.663	100
Zr	ppm	0.5	4	370	382	50.3	13.2	103

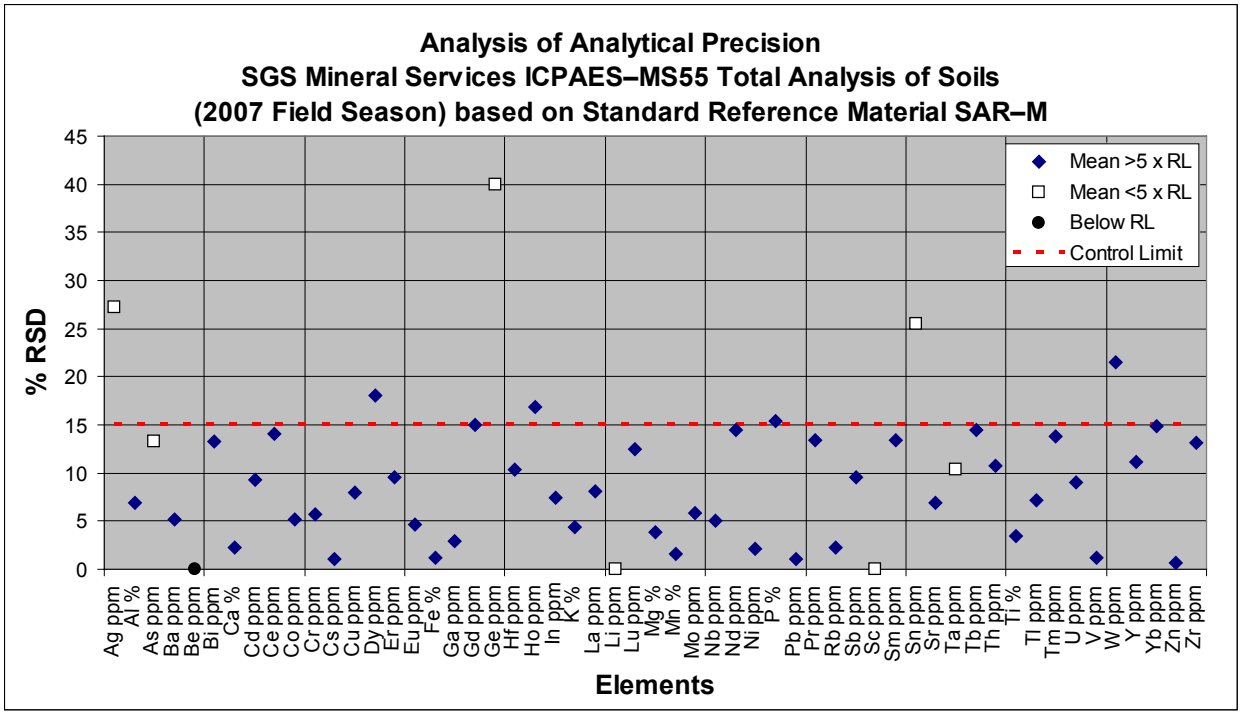

Figure 13-4. Precision plot for four analyses of standard reference material SAR–M by ICPAES–MS55 (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

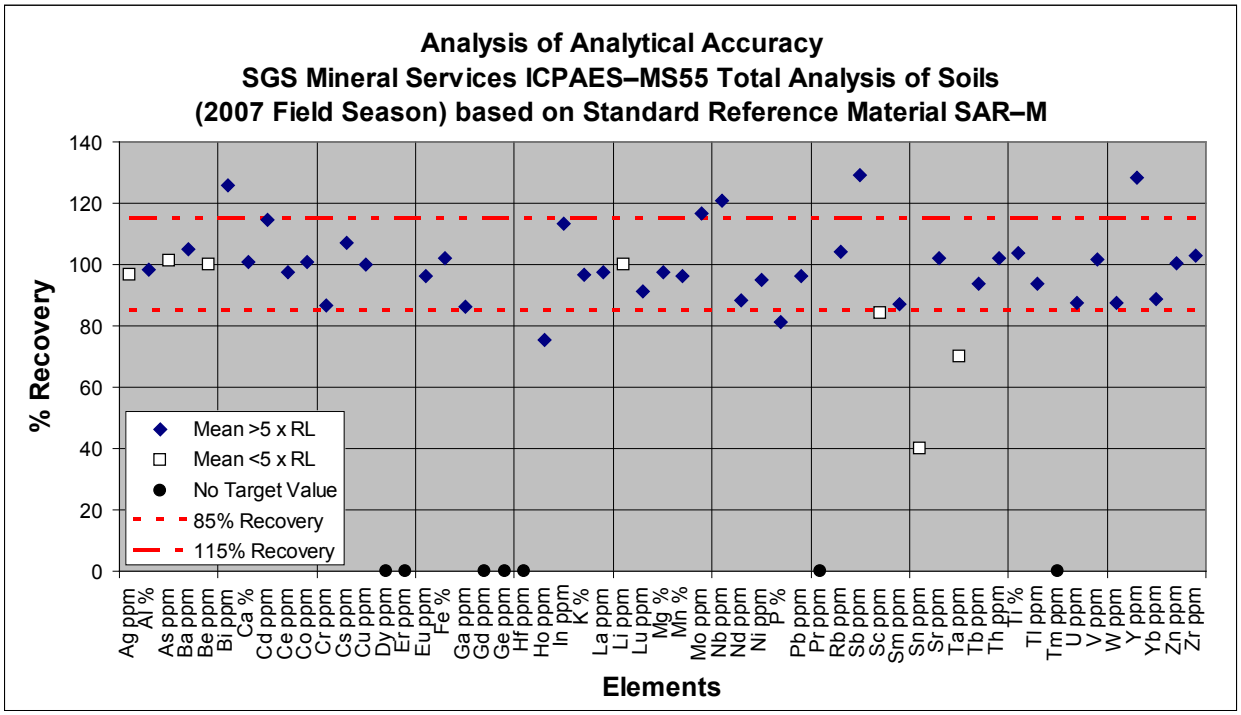

Figure 13-5. Accuracy plot for four analyses of standard reference material SAR–M by ICPAES–MS55 (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-4. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined after a sodium peroxide sinter of soil samples by the ICPAES–MS55 multielement package at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	5	*na*	1.53	1.38	90.4	*na*
Al	%	0.01	5	*na*	7.71	0.0921	1.19	*na*
As	ppm	30	5	*na*	<30	*na*	*na*	*na*
Ba	ppm	0.5	5	*na*	721	9.73	1.35	*na*
Be	ppm	5	5	*na*	5.01	1.11	22.2	*na*
Bi	ppm	0.1	5	*na*	0.200	0	0	*na*
Ca	%	0.01	5	*na*	1.53	0.0297	1.94	*na*
Cd	ppm	0.2	5	*na*	<0.2	*na*	*na*	*na*
Ce	ppm	0.1	5	*na*	39.1	1.08	2.75	*na*
Co	ppm	0.5	5	*na*	12.9	0.303	2.35	*na*
Cr	ppm	10	5	*na*	56.0	5.48	9.78	*na*
Cs	ppm	0.1	5	*na*	3.12	0.0837	2.68	*na*
Cu	ppm	5	5	*na*	124	3.21	2.60	*na*
Dy	ppm	0.05	5	*na*	4.18	0.217	5.19	*na*
Er	ppm	0.05	5	*na*	2.47	0.208	8.41	*na*
Eu	ppm	0.05	5	*na*	1.18	0.0483	4.10	*na*
Fe	%	0.01	5	*na*	4.55	0.0436	0.958	*na*
Ga	ppm	1	5	*na*	17.8	0.447	2.51	*na*
Gd	ppm	0.05	5	*na*	4.28	0.139	3.25	*na*
Ge	ppm	1	5	*na*	2.00	0	0	*na*
Hf	ppm	1	5	*na*	5.00	0	0	*na*
Ho	ppm	0.05	5	*na*	0.854	0.0727	8.51	*na*
In	ppm	0.2	5	*na*	<0.2	*na*	*na*	*na*
K	%	0.01	5	*na*	1.37	0.0249	1.81	*na*
La	ppm	0.1	5	*na*	18.1	0.241	1.33	*na*
Li	ppm	10	5	*na*	16.0	5.48	34.2	*na*
Lu	ppm	0.05	5	*na*	0.376	0.0195	5.18	*na*
Mg	%	0.01	5	*na*	0.808	0.00837	1.04	*na*
Mn	%	0.001	5	*na*	0.0700	0	0	*na*
Mo	ppm	2	5	*na*	4.60	0.548	11.9	*na*
Nb	ppm	1	5	*na*	11.8	0.447	3.79	*na*
Nd	ppm	0.1	5	*na*	19.4	0.572	2.95	*na*
Ni	ppm	5	5	*na*	14.8	2.49	16.8	*na*
P	%	0.01	5	*na*	0.118	0.00447	3.79	*na*
Pb	ppm	5	5	*na*	15.6	5.94	38.1	*na*
Pr	ppm	0.05	5	*na*	4.80	0.138	2.88	*na*
Rb	ppm	0.2	5	*na*	45.9	0.924	2.01	*na*
Sb	ppm	0.1	5	*na*	1.34	0.0548	4.09	*na*
Sc	ppm	5	5	*na*	14.2	2.17	15.3	*na*
Sm	ppm	0.1	5	*na*	4.54	0.114	2.51	*na*
Sn	ppm	1	5	*na*	3.60	3.13	87.0	*na*
Sr	ppm	0.1	5	*na*	275	5.64	2.05	*na*
Ta	ppm	0.5	5	*na*	0.660	0.0548	8.30	*na*
Tb	ppm	0.05	5	*na*	0.734	0.0270	3.68	*na*
Th	ppm	0.1	5	*na*	4.18	0.0837	2.00	*na*
Ti	%	0.01	5	*na*	0.552	0.00837	1.52	*na*
Tl	ppm	0.5	5	*na*	<0.5	*na*	*na*	*na*
Tm	ppm	0.05	5	*na*	0.360	0.0354	9.82	*na*
U	ppm	0.05	5	*na*	2.28	0.0719	3.15	*na*
V	ppm	5	5	*na*	122	1.58	1.30	*na*
W	ppm	1	5	*na*	2.00	0	0	*na*
Y	ppm	0.5	5	*na*	22.6	1.27	5.62	*na*
Yb	ppm	0.1	5	*na*	2.50	0.173	6.93	*na*
Zn	ppm	5	5	*na*	86.4	3.71	4.30	*na*
Zr	ppm	0.5	5	*na*	200	9.91	4.96	*na*

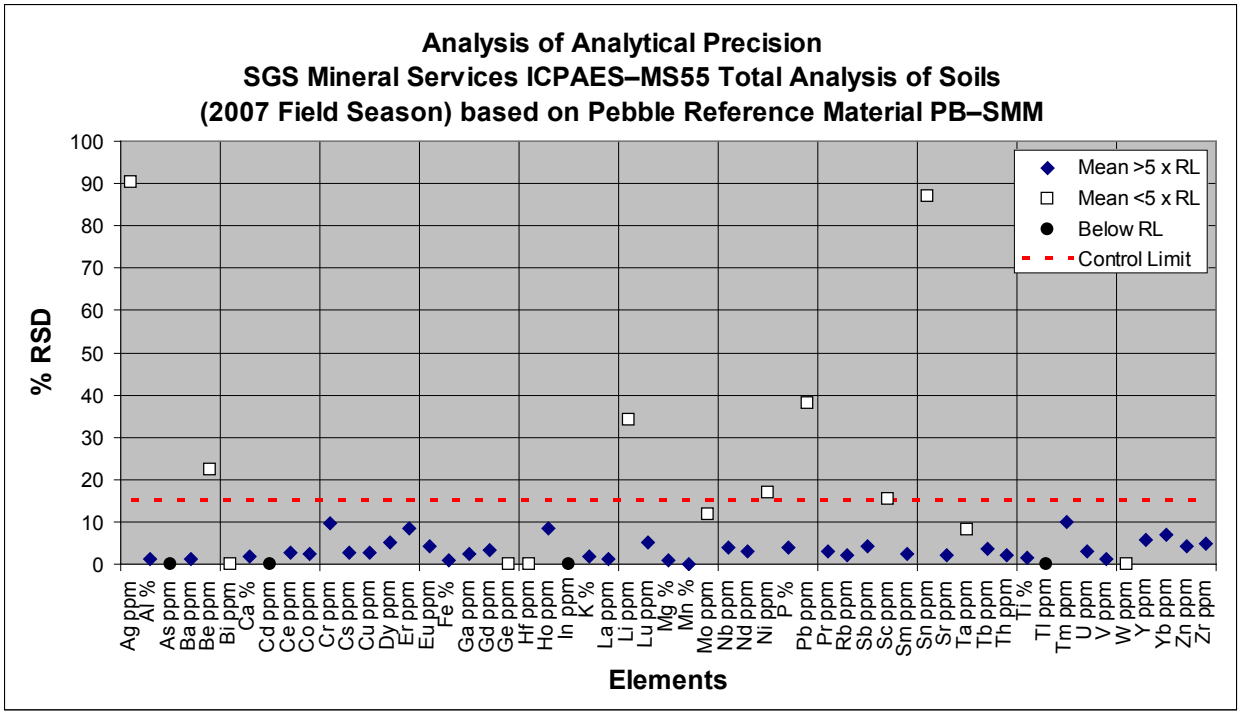

Figure 13-6. Precision plot for five analyses of Pebble reference material PB–SMM by ICPAES–MS55 (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

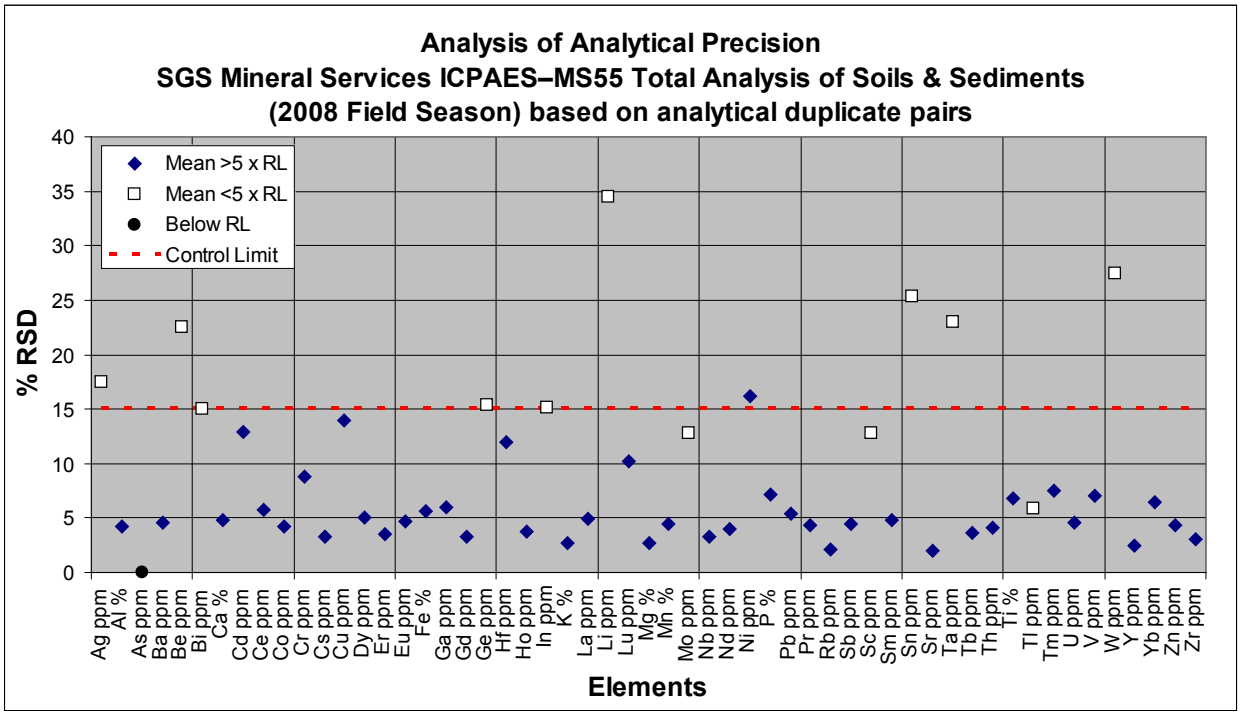

Figure 13-7. Precision plot for ten analytical duplicate sample pairs by ICPAES–MS55 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 13-5. Summary statistics for assessing analytical variation on duplicate samples; determined after a sodium peroxide sinter of soil and sediment samples by the ICPAES–MS55 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppm	1	10	<1	5.00	1.28	0.224	17.5
Al	%	0.01	10	5.64	9.31	7.74	0.325	4.21
As	ppm	30	10	<30	40.0	<30	*na*	*na*
Ba	ppm	0.5	10	614	872	756	34.8	4.61
Be	ppm	5	10	<5	9.00	5.11	1.15	22.5
Bi	ppm	0.1	10	<0.1	1.50	0.393	0.0592	15.1
Ca	%	0.01	10	0.520	2.85	1.49	0.0721	4.84
Cd	ppm	0.2	10	<0.2	4.90	1.05	0.136	12.9
Ce	ppm	0.1	10	29.0	119	57.5	3.33	5.80
Co	ppm	0.5	10	6.70	16.1	11.6	0.496	4.28
Cr	ppm	10	10	30.0	170	84.5	7.42	8.78
Cs	ppm	0.1	10	1.90	4.90	2.95	0.0975	3.31
Cu	ppm	5	10	12.0	584	153	21.4	13.9
Dy	ppm	0.05	10	2.86	7.61	4.58	0.231	5.04
Er	ppm	0.05	10	1.90	4.37	2.75	0.0959	3.49
Eu	ppm	0.05	10	0.840	1.44	1.15	0.0544	4.75
Fe	%	0.01	10	3.07	7.20	4.25	0.237	5.59
Ga	ppm	1	10	16.0	22.0	18.2	1.10	6.02
Gd	ppm	0.05	10	3.21	7.89	4.98	0.161	3.23
Ge	ppm	1	10	1.00	2.00	1.45	0.224	15.4
Hf	ppm	1	10	4.00	22.0	8.15	0.975	12.0
Ho	ppm	0.05	10	0.600	1.57	0.928	0.0349	3.76
In	ppm	0.2	10	<0.2	1.10	0.330	0.0500	15.2
K	%	0.01	10	1.19	2.95	1.63	0.0439	2.70
La	ppm	0.1	10	13.3	61.0	28.2	1.40	4.97
Li	ppm	10	10	10.0	50.0	21.5	7.42	34.5
Lu	ppm	0.05	10	0.280	0.720	0.434	0.0442	10.2
Mg	%	0.01	10	0.470	1.09	0.752	0.0206	2.74
Mn	%	0.001	10	0.0400	0.500	0.158	0.00707	4.48
Mo	ppm	2	10	<2	13.0	3.90	0.500	12.8
Nb	ppm	1	10	8.00	37.0	16.7	0.548	3.28
Nd	ppm	0.1	10	13.4	49.6	25.7	1.02	3.96
Ni	ppm	5	9.5	10.0	108	44.7	7.23	16.2
P	%	0.01	10	0.0600	0.150	0.0935	0.00671	7.17
Pb	ppm	5	10	10.0	930	185	10.0	5.40
Pr	ppm	0.05	10	3.19	13.3	6.52	0.286	4.39
Rb	ppm	0.2	10	37.4	153	66.4	1.43	2.16
Sb	ppm	0.1	10	0.800	6.70	2.11	0.0949	4.50
Sc	ppm	5	10	5.00	19.0	12.1	1.55	12.8
Sm	ppm	0.1	10	3.20	9.50	5.19	0.249	4.80
Sn	ppm	1	10	1.00	5.00	2.50	0.632	25.3
Sr	ppm	0.1	10	152	351	250	5.05	2.02
Ta	ppm	0.5	10	0.600	2.00	1.29	0.297	22.9
Tb	ppm	0.05	10	0.510	1.35	0.773	0.0278	3.60
Th	ppm	0.1	10	3.90	18.5	7.34	0.297	4.06
Ti	%	0.01	10	0.350	1.27	0.570	0.0385	6.77
Tl	ppm	0.5	10	<0.5	2.60	0.846	0.0500	5.91
Tm	ppm	0.05	10	0.280	0.730	0.408	0.0308	7.55
U	ppm	0.05	10	1.78	4.39	2.51	0.115	4.57
V	ppm	5	10	67.0	264	124	8.76	7.06
W	ppm	1	10	<1	9.00	2.10	0.576	27.4
Y	ppm	0.5	10	16.5	37.9	24.7	0.602	2.44
Yb	ppm	0.1	10	2.00	4.70	2.79	0.179	6.41
Zn	ppm	5	10	48.0	886	225	9.76	4.34
Zr	ppm	0.5	10	170	871	302	9.29	3.08

Table 13-6. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a sodium peroxide sinter of soil and sediment samples by the ICPAES–MS55 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	7	2.56	3.00	0	0	117
Al	%	0.01	7	5.79	6.09	0.207	3.41	105
As	ppm	30	7	<30	<30	*na*	*na*	100
Ba	ppm	0.5	7	879	930	79.8	8.58	106
Be	ppm	5	7	<5	5.72	2.01	35.2	127
Bi	ppm	0.1	7	1.10	1.20	0.0577	4.81	109
Ca	%	0.01	7	1.06	1.03	0.0601	5.83	97.3
Cd	ppm	0.2	7	2.50	2.76	0.113	4.11	110
Ce	ppm	0.1	7	150	147	6.13	4.18	97.7
Co	ppm	0.5	7	7.50	7.30	0.356	4.88	97.3
Cr	ppm	10	7	110	106	9.76	9.23	96.1
Cs	ppm	0.1	7	4.00	4.20	0.351	8.36	105
Cu	ppm	5	7	370	358	31.1	8.68	96.8
Dy	ppm	0.05	7	*na*	10.5	0.720	6.82	*na*
Er	ppm	0.05	7	*na*	6.66	0.356	5.34	*na*
Eu	ppm	0.05	7	1.50	1.39	0.0711	5.13	92.4
Fe	%	0.01	7	2.67	2.69	0.0759	2.82	101
Ga	ppm	1	7	17.0	17.6	1.62	9.21	103
Gd	ppm	0.05	7	*na*	11.1	0.610	5.48	*na*
Ge	ppm	1	7	*na*	1.57	0.535	34.0	*na*
Hf	ppm	1	7	10.0	10.4	0.787	7.54	104
Ho	ppm	0.05	7	1.90	2.16	0.0549	2.54	114
In	ppm	0.2	7	0.260	0.286	0.0378	13.2	110
K	%	0.01	7	2.98	2.86	0.138	4.83	96.0
La	ppm	0.1	7	75.0	69.7	3.54	5.08	92.9
Li	ppm	10	7	28.0	27.1	15.0	55.1	96.9
Lu	ppm	0.05	7	1.00	0.940	0.0462	4.91	94.0
Mg	%	0.01	7	0.550	0.506	0.0207	4.09	91.9
Mn	%	0.001	7	0.209	0.214	0.00535	2.49	103
Mo	ppm	2	7	13.0	13.4	0.787	5.86	103
Nb	ppm	1	7	35.0	37.9	2.79	7.38	108
Nd	ppm	0.1	7	66.0	59.7	2.07	3.46	90.5
Ni	ppm	5	7	52.0	66.9	25.0	37.4	129
P	%	0.01	7	0.0900	0.0786	0.00690	8.78	87.3
Pb	ppm	5	7	578	590	21.0	3.56	102
Pr	ppm	0.05	7	*na*	16.0	0.793	4.96	*na*
Rb	ppm	0.2	7	140	146	5.40	3.69	104
Sb	ppm	0.1	7	5.10	5.07	0.180	3.55	99.4
Sc	ppm	5	7	7.80	7.14	1.95	27.3	91.6
Sm	ppm	0.1	7	13.0	11.3	0.359	3.19	86.7
Sn	ppm	1	7	6.00	5.57	0.787	14.1	92.9
Sr	ppm	0.1	7	158	149	6.92	4.63	94.6
Ta	ppm	0.5	7	2.80	2.04	0.151	7.40	73.0
Tb	ppm	0.05	7	1.70	1.75	0.0801	4.58	103
Th	ppm	0.1	7	19.0	18.9	1.39	7.37	99.2
Ti	%	0.01	7	0.250	0.299	0.0135	4.51	119
Tl	ppm	0.5	7	1.40	1.23	0.0488	3.97	87.8
Tm	ppm	0.05	7	*na*	0.937	0.0407	4.34	*na*
U	ppm	0.05	7	5.20	4.50	0.242	5.37	86.5
V	ppm	5	7	140	136	5.18	3.81	97.0
W	ppm	1	7	3.70	3.71	0.488	13.1	100
Y	ppm	0.5	7	44.0	57.7	2.21	3.83	131
Yb	ppm	0.1	7	5.70	6.33	0.298	4.72	111
Zn	ppm	5	7	420	456	27.4	6.00	109
Zr	ppm	0.5	7	408	359	31.8	8.86	88.1

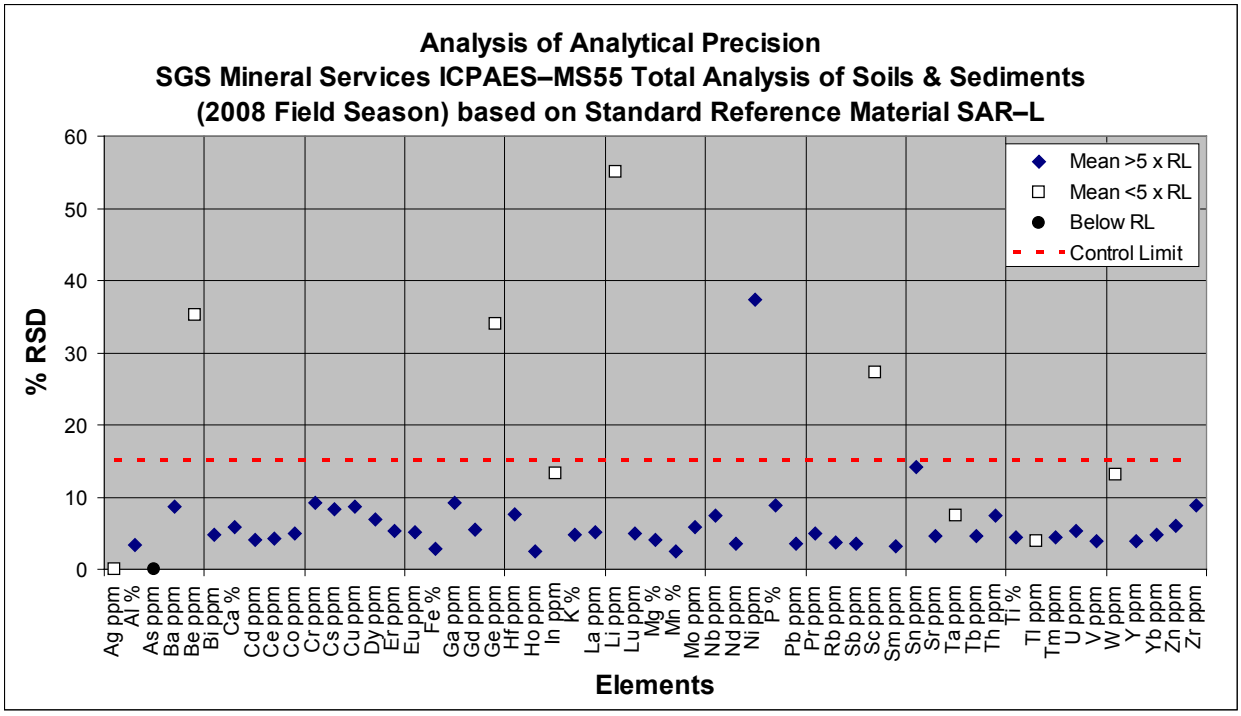

Figure 13-8. Precision plot for seven analyses of standard reference material SAR–L by ICPAES–MS55 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

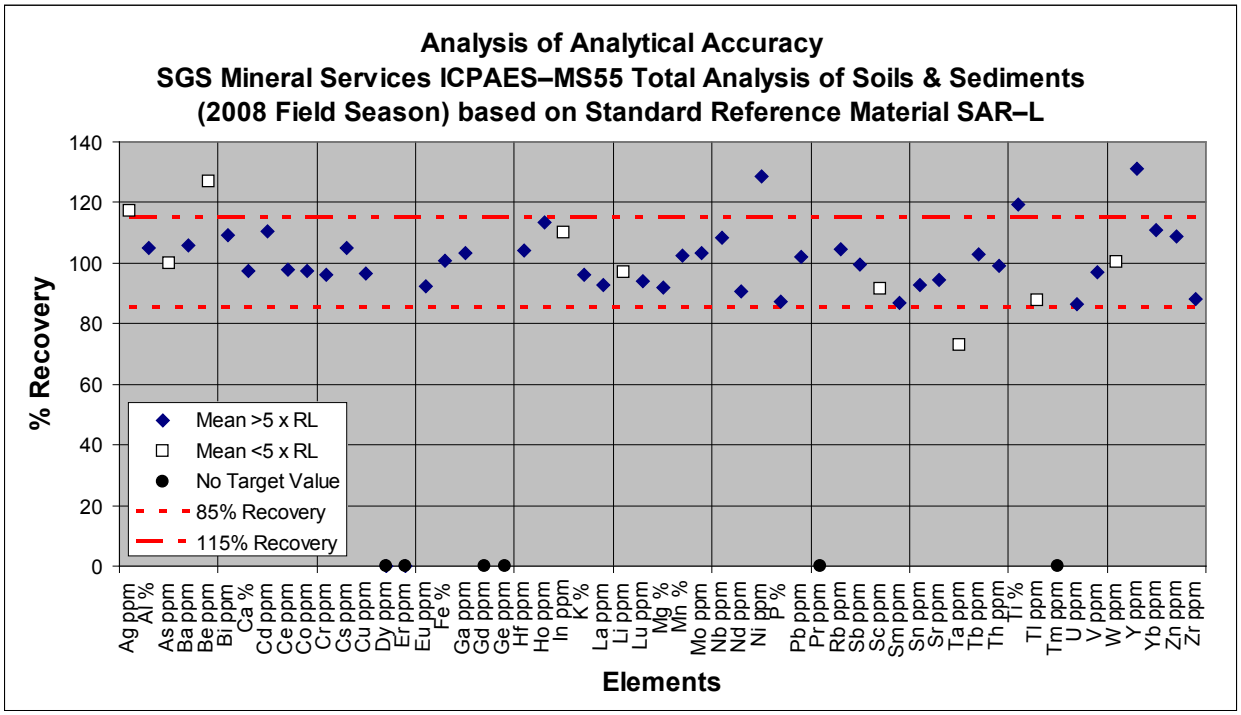

Figure 13-9. Accuracy plot for seven analyses of standard reference material SAR–L by ICPAES–MS55 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-7. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined after a sodium peroxide sinter of soil and sediment samples by the ICPAES–MS55 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	8	3.10	3.25	0.886	27.3	105
Al	%	0.01	8	6.09	6.29	0.259	4.12	103
As	ppm	30	8	37.0	33.8	5.18	15.3	91.2
Ba	ppm	0.5	8	764	788	60.5	7.68	103
Be	ppm	5	8	<5	5.76	2.32	40.4	128
Bi	ppm	0.1	8	1.33	1.50	0.107	7.13	113
Ca	%	0.01	8	0.580	0.603	0.136	22.5	104
Cd	ppm	0.2	8	4.76	4.71	0.360	7.65	99.0
Ce	ppm	0.1	8	120	110	9.42	8.59	91.4
Co	ppm	0.5	8	11.0	10.8	0.595	5.51	98.2
Cr	ppm	10	8	101	111	16.4	14.8	110
Cs	ppm	0.1	8	4.80	4.76	0.362	7.61	99.2
Cu	ppm	5	8	320	293	24.5	8.36	91.6
Dy	ppm	0.05	8	*na*	7.18	0.388	5.40	*na*
Er	ppm	0.05	8	*na*	4.36	0.356	8.17	*na*
Eu	ppm	0.05	8	1.26	1.24	0.0644	5.21	98.0
Fe	%	0.01	8	3.22	3.16	0.0935	2.96	98.1
Ga	ppm	1	8	20.0	17.8	1.91	10.8	88.8
Gd	ppm	0.05	8	*na*	7.79	0.494	6.34	*na*
Ge	ppm	1	8	*na*	1.25	0.463	37.0	*na*
Hf	ppm	1	8	*na*	9.38	0.916	9.77	*na*
Ho	ppm	0.05	8	1.90	1.43	0.162	11.3	75.5
In	ppm	0.2	8	0.970	0.963	0.0916	9.52	99.2
K	%	0.01	8	2.92	2.81	0.127	4.51	96.4
La	ppm	0.1	8	61.0	53.9	4.08	7.57	88.3
Li	ppm	10	8	30.0	32.5	12.8	39.4	108
Lu	ppm	0.05	8	0.700	0.655	0.0621	9.48	93.6
Mg	%	0.01	8	0.500	0.471	0.0280	5.94	94.3
Mn	%	0.001	8	0.520	0.483	0.0205	4.25	92.8
Mo	ppm	2	8	12.0	12.0	0.756	6.30	100
Nb	ppm	1	8	31.0	36.3	2.12	5.85	117
Nd	ppm	0.1	8	53.4	45.3	3.01	6.65	84.7
Ni	ppm	5	8	41.0	71.1	35.0	49.2	173
P	%	0.01	8	0.0800	0.0700	0.00756	10.8	87.5
Pb	ppm	5	8	960	919	68.8	7.49	95.7
Pr	ppm	0.05	8	*na*	12.1	0.466	3.85	*na*
Rb	ppm	0.2	8	142	153	3.31	2.17	108
Sb	ppm	0.1	8	5.60	6.38	0.167	2.62	114
Sc	ppm	5	8	8.30	8.75	2.87	32.8	105
Sm	ppm	0.1	8	9.80	8.39	0.584	6.96	85.6
Sn	ppm	1	8	9.40	4.88	2.95	60.5	51.9
Sr	ppm	0.1	8	156	150	6.58	4.39	96.1
Ta	ppm	0.5	8	2.60	1.94	0.0916	4.73	74.5
Tb	ppm	0.05	8	1.30	1.21	0.0864	7.17	92.7
Th	ppm	0.1	8	18.0	18.7	2.71	14.5	104
Ti	%	0.01	8	0.350	0.358	0.0167	4.67	102
Tl	ppm	0.5	8	2.80	2.46	0.119	4.82	87.9
Tm	ppm	0.05	8	*na*	0.634	0.0811	12.8	*na*
U	ppm	0.05	8	5.10	4.34	0.298	6.85	85.1
V	ppm	5	8	66.0	71.9	5.91	8.23	109
W	ppm	1	8	14.0	8.63	1.06	12.3	61.6
Y	ppm	0.5	8	33.0	39.0	3.66	9.40	118
Yb	ppm	0.1	8	4.90	4.26	0.563	13.2	87.0
Zn	ppm	5	8	888	893	102	11.5	101
Zr	ppm	0.5	8	370	341	22.9	6.72	92.2

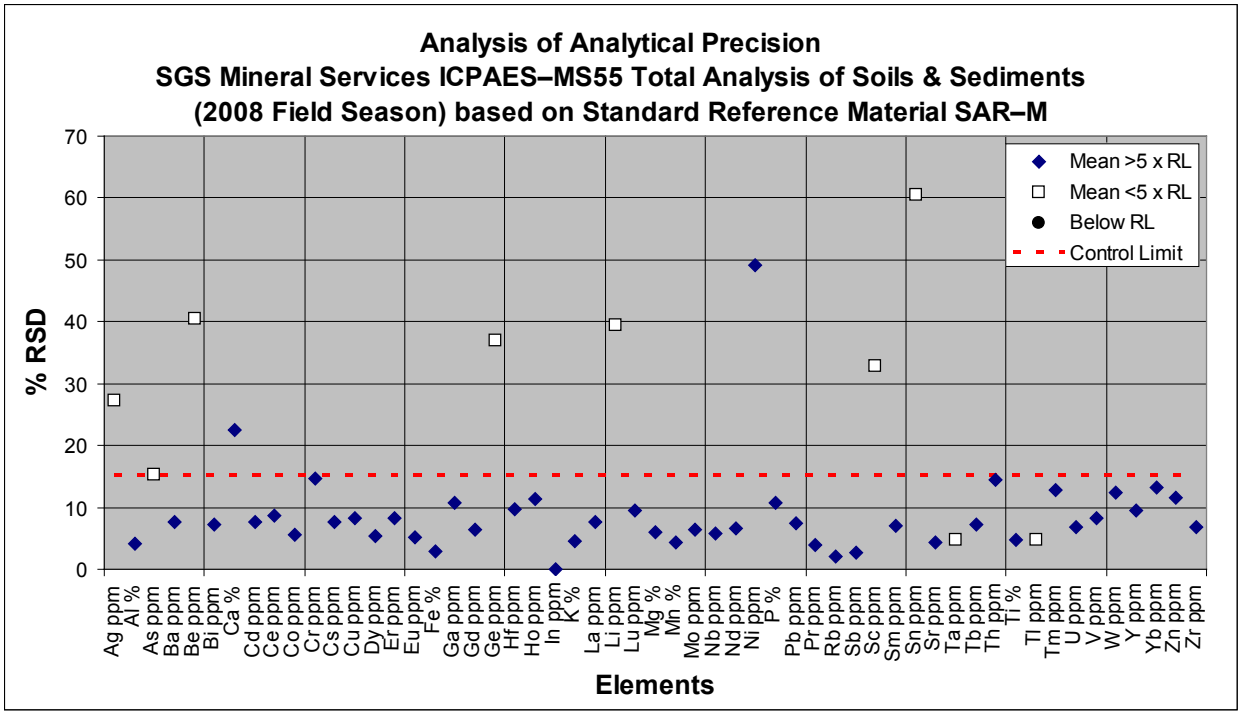

Figure 13-10. Precision plot for eight analyses of standard reference material SAR–M by ICPAES–MS55 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

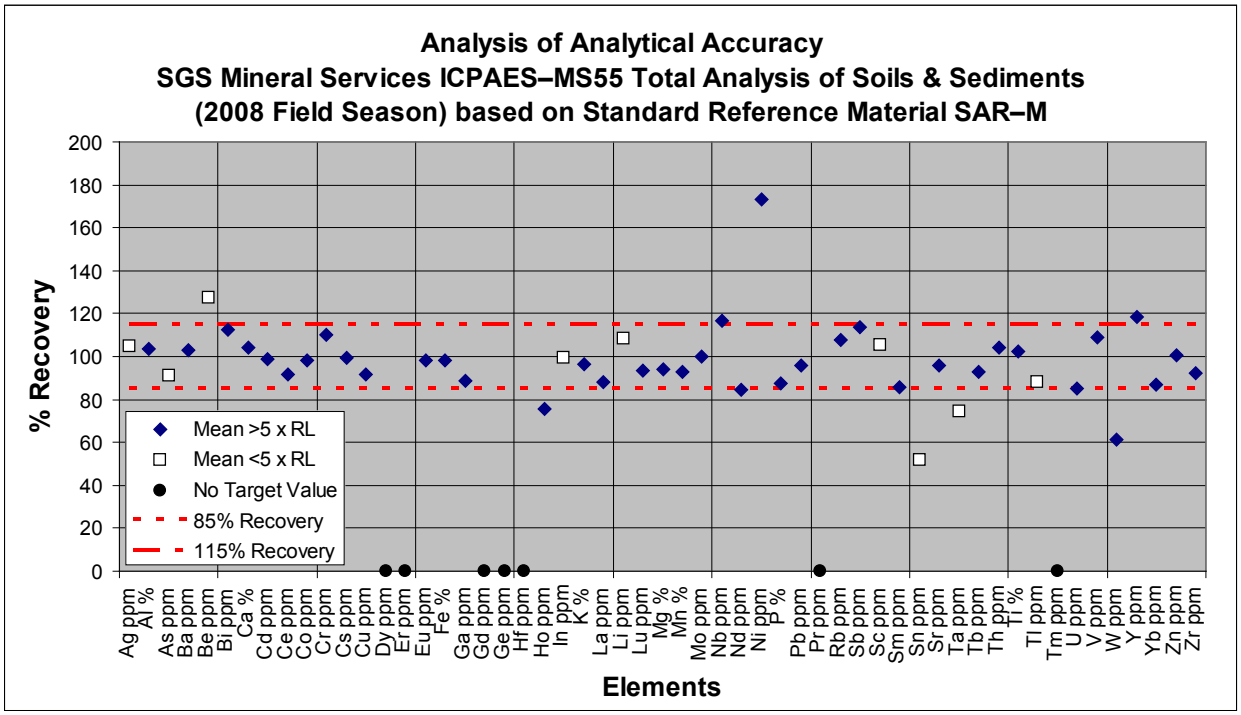

Figure 13-11. Accuracy plot for eight analyses of standard reference material SAR–M by ICPAES–MS55 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-8. Summary statistics for assessing analytical variation on the standard reference material DGPM; determined after a sodium peroxide sinter of soil and sediment samples by the ICPAES–MS55 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	3	<1	<1	*na*	*na*	100
Al	%	0.01	3	4.82	5.11	0.122	2.39	106
As	ppm	30	3	169	175	18.0	10.3	104
Ba	ppm	0.5	3	1,272	1,280	103	8.04	100
Be	ppm	5	3	<5	5.34	1.44	26.9	118
Bi	ppm	0.1	3	<0.1	<0.1	*na*	*na*	107
Ca	%	0.01	3	0.170	0.200	0.0458	22.9	118
Cd	ppm	0.2	3	0.340	0.300	0	0	88.2
Ce	ppm	0.1	3	90.5	63.8	52.4	82.2	70.5
Co	ppm	0.5	3	1.36	1.50	0.173	11.5	110
Cr	ppm	10	3	120	133	25.2	18.9	111
Cs	ppm	0.1	3	8.92	9.00	0.500	5.56	101
Cu	ppm	5	3	13.0	13.3	4.16	31.2	103
Dy	ppm	0.05	3	3.22	3.54	0.225	6.36	110
Er	ppm	0.05	3	2.08	2.14	0.0874	4.08	103
Eu	ppm	0.05	3	0.780	0.733	0.0321	4.38	94.0
Fe	%	0.01	3	1.36	1.39	0.0173	1.25	102
Ga	ppm	1	3	11.3	11.0	1.00	9.09	97.3
Gd	ppm	0.05	3	3.90	3.95	0.0252	0.637	101
Ge	ppm	1	3	2.34	2.00	0	0	85.5
Hf	ppm	1	3	9.82	10.7	0.577	5.41	109
Ho	ppm	0.05	3	0.668	0.687	0.0153	2.22	103
In	ppm	0.2	3	<0.2	<0.2	*na*	*na*	100
K	%	0.01	3	2.23	2.25	0.0751	3.34	101
La	ppm	0.1	3	51.7	53.9	2.97	5.52	104
Li	ppm	10	3	41.9	46.7	11.5	24.7	111
Lu	ppm	0.05	3	0.315	0.360	0.0361	10.0	114
Mg	%	0.01	3	0.322	0.310	0.0100	3.23	96.3
Mn	%	0.001	3	0.00250	0.00394	0.00525	133	158
Mo	ppm	2	3	13.6	12.7	0.577	4.56	93.1
Nb	ppm	1	3	9.80	9.67	0.577	5.97	98.6
Nd	ppm	0.1	3	30.5	30.2	0.361	1.19	99.0
Ni	ppm	5	3	14.3	30.5	37.1	122	213
P	%	0.01	3	0.0410	0.0433	0.00577	13.3	106
Pb	ppm	5	3	10.0	10.0	0	0	100
Pr	ppm	0.05	3	9.43	9.49	0.326	3.43	101
Rb	ppm	0.2	3	94.0	97.9	5.45	5.57	104
Sb	ppm	0.1	3	13.0	12.7	0.100	0.787	97.7
Sc	ppm	5	3	8.79	10.0	2.00	20.0	114
Sm	ppm	0.1	3	4.70	4.83	0.0577	1.19	103
Sn	ppm	1	3	1.80	2.33	0.577	24.7	130
Sr	ppm	0.1	3	91.0	88.4	7.85	8.89	97.1
Ta	ppm	0.5	3	0.670	0.617	0.175	28.4	92.1
Tb	ppm	0.05	3	0.599	0.593	0.0306	5.15	99.1
Th	ppm	0.1	3	9.90	10.7	0.300	2.80	108
Ti	%	0.01	3	0.325	0.320	0.0100	3.13	98.5
Tl	ppm	0.5	3	8.21	8.43	0.306	3.62	103
Tm	ppm	0.05	3	0.295	0.303	0.0252	8.30	103
U	ppm	0.05	3	3.26	3.48	0.244	7.02	107
V	ppm	5	3	104	107	8.54	7.99	103
W	ppm	1	3	73.6	76.3	1.15	1.51	104
Y	ppm	0.5	3	19.9	20.2	0.700	3.47	102
Yb	ppm	0.1	3	2.05	2.10	0.173	8.25	102
Zn	ppm	5	3	22.0	29.3	16.3	55.5	133
Zr	ppm	0.5	3	410	378	12.5	3.31	92.1

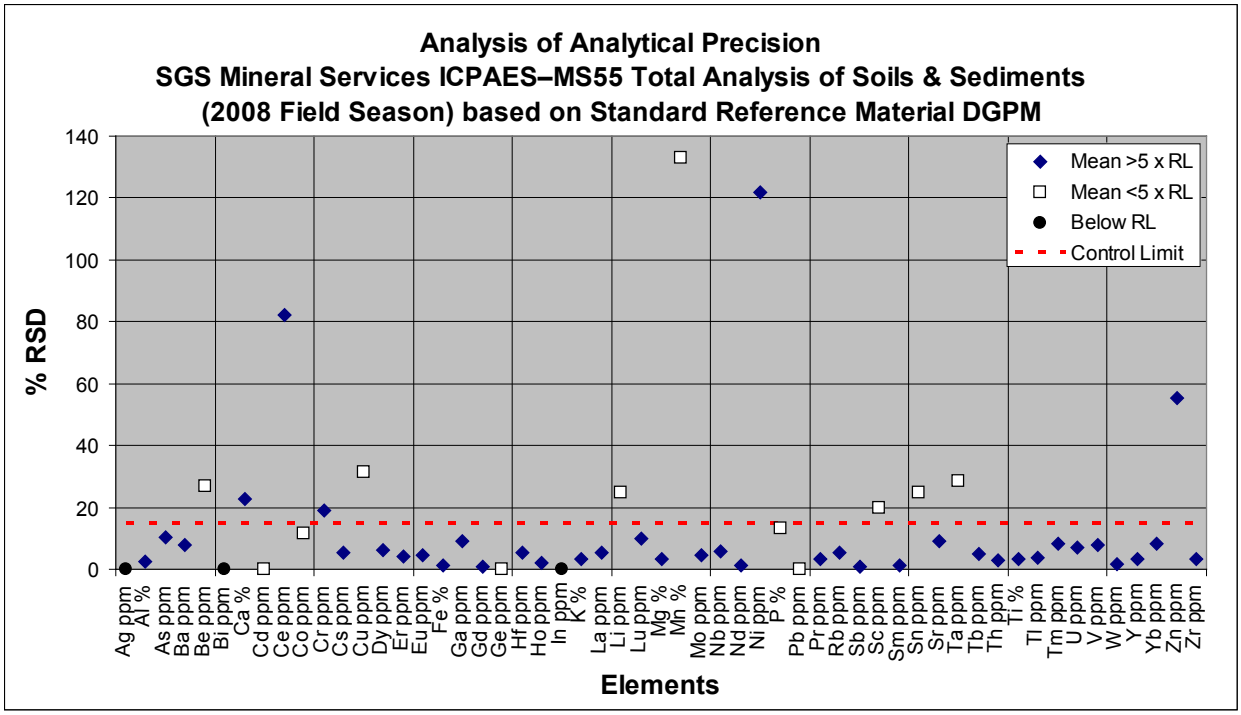

Figure 13-12. Precision plot for three analyses of standard reference material DGPM by ICPAES–MS55 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

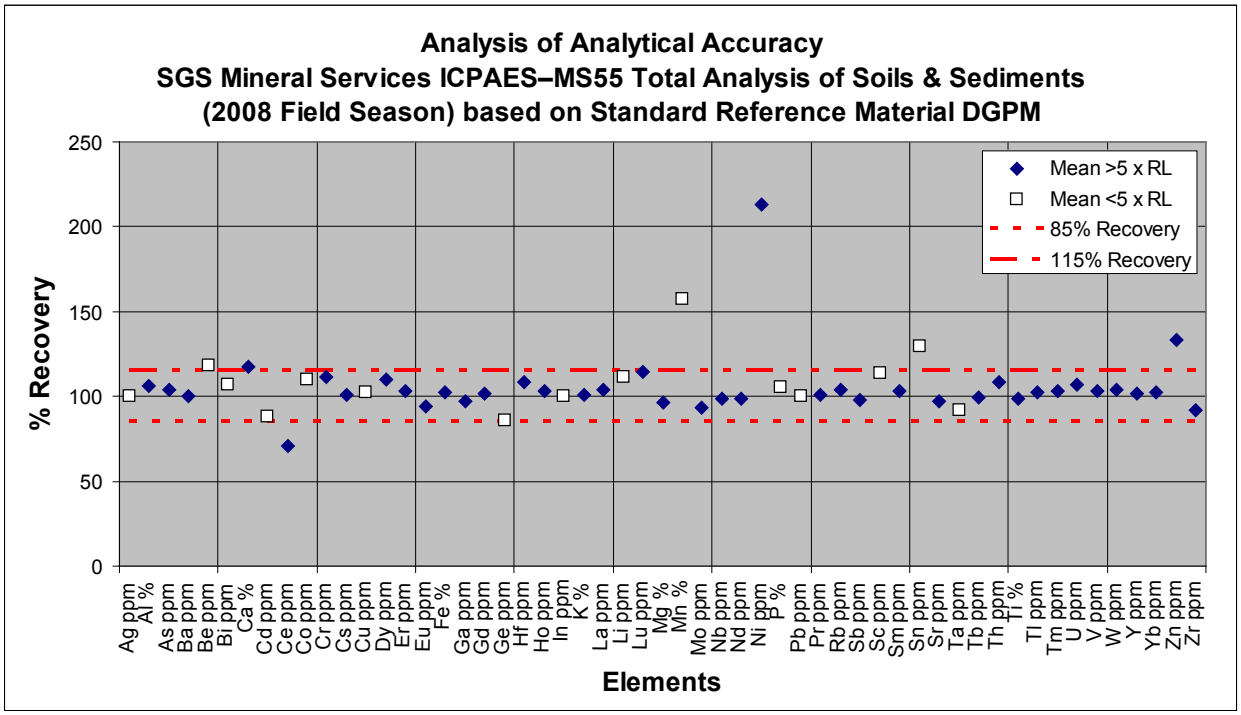

Figure 13-13. Accuracy plot for three analyses of standard reference material DGPM by ICPAES–MS55 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-9. Summary statistics for assessing analytical variation on the standard reference material GSP–QC; determined after a sodium peroxide sinter of soil and sediment samples by the ICPAES–MS55 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	4	2.75	3.50	0.577	16.5	127
Al	%	0.01	4	7.40	7.87	0.302	3.84	106
As	ppm	30	4	<30	<30	*na*	*na*	108
Ba	ppm	0.5	4	1,320	1,360	98.0	7.20	103
Be	ppm	5	4	<5	<5	*na*	*na*	100
Bi	ppm	0.1	4	4.30	4.43	0.0500	1.13	103
Ca	%	0.01	4	1.55	1.44	0.0698	4.84	92.9
Cd	ppm	0.2	4	0.262	0.300	0.0816	27.2	115
Ce	ppm	0.1	4	369	423	23.4	5.54	115
Co	ppm	0.5	4	6.37	6.65	0.191	2.88	104
Cr	ppm	10	4	22.1	30.0	14.1	47.1	136
Cs	ppm	0.1	4	1.99	2.03	0.0957	4.73	102
Cu	ppm	5	4	31.1	30.8	3.77	12.3	98.9
Dy	ppm	0.05	4	5.56	5.93	0.326	5.50	107
Er	ppm	0.05	4	2.64	2.49	0.101	4.06	94.1
Eu	ppm	0.05	4	2.02	2.12	0.0614	2.90	105
Fe	%	0.01	4	2.85	2.88	0.0473	1.64	101
Ga	ppm	1	4	22.0	23.0	2.45	10.6	105
Gd	ppm	0.05	4	14.8	15.4	0.709	4.60	104
Ge	ppm	1	4	1.62	1.50	0.577	38.5	92.6
Hf	ppm	1	4	9.69	14.8	0.957	6.49	152
Ho	ppm	0.05	4	0.924	0.970	0.0141	1.46	105
In	ppm	0.2	4	<0.2	<0.2	*na*	*na*	100
K	%	0.01	4	4.12	4.02	0.103	2.56	97.6
La	ppm	0.1	4	166	181	2.31	1.28	109
Li	ppm	10	4	33.6	32.5	5.00	15.4	96.7
Lu	ppm	0.05	4	0.248	0.265	0.0265	9.98	107
Mg	%	0.01	4	0.599	0.578	0.0250	4.33	96.4
Mn	%	0.001	4	0.0270	0.0300	0	0	111
Mo	ppm	2	4	<2	2.61	1.59	61.1	144
Nb	ppm	1	4	22.6	24.3	1.71	7.04	107
Nd	ppm	0.1	4	186	194	3.20	1.65	104
Ni	ppm	5	4	10.6	27.4	29.7	109	258
P	%	0.01	4	0.118	0.123	0.00957	7.82	104
Pb	ppm	5	4	43.3	43.5	1.73	3.98	100
Pr	ppm	0.05	4	47.7	52.2	1.51	2.89	109
Rb	ppm	0.2	4	240	249	9.13	3.67	104
Sb	ppm	0.1	4	0.800	0.800	0	0	100
Sc	ppm	5	4	5.75	5.88	1.54	26.3	102
Sm	ppm	0.1	4	23.8	24.8	0.351	1.42	104
Sn	ppm	1	4	4.88	5.25	0.500	9.52	108
Sr	ppm	0.1	4	219	215	10.8	5.04	98.1
Ta	ppm	0.5	4	7.99	8.03	0.206	2.57	100
Tb	ppm	0.05	4	1.68	1.66	0.0544	3.27	99.0
Th	ppm	0.1	4	99.9	106	4.99	4.70	106
Ti	%	0.01	4	0.376	0.378	0.00957	2.54	100
Tl	ppm	0.5	4	2.11	2.20	0.0816	3.71	104
Tm	ppm	0.05	4	0.271	0.295	0.0173	5.87	109
U	ppm	0.05	4	2.56	2.55	0.0469	1.84	99.6
V	ppm	5	4	72.8	75.8	7.14	9.42	104
W	ppm	1	4	6.33	6.50	0.577	8.88	103
Y	ppm	0.5	4	25.0	25.4	0.640	2.53	101
Yb	ppm	0.1	4	1.71	1.83	0.0500	2.74	107
Zn	ppm	5	4	115	119	7.16	6.02	103
Zr	ppm	0.5	4	396	522	18.4	3.52	132

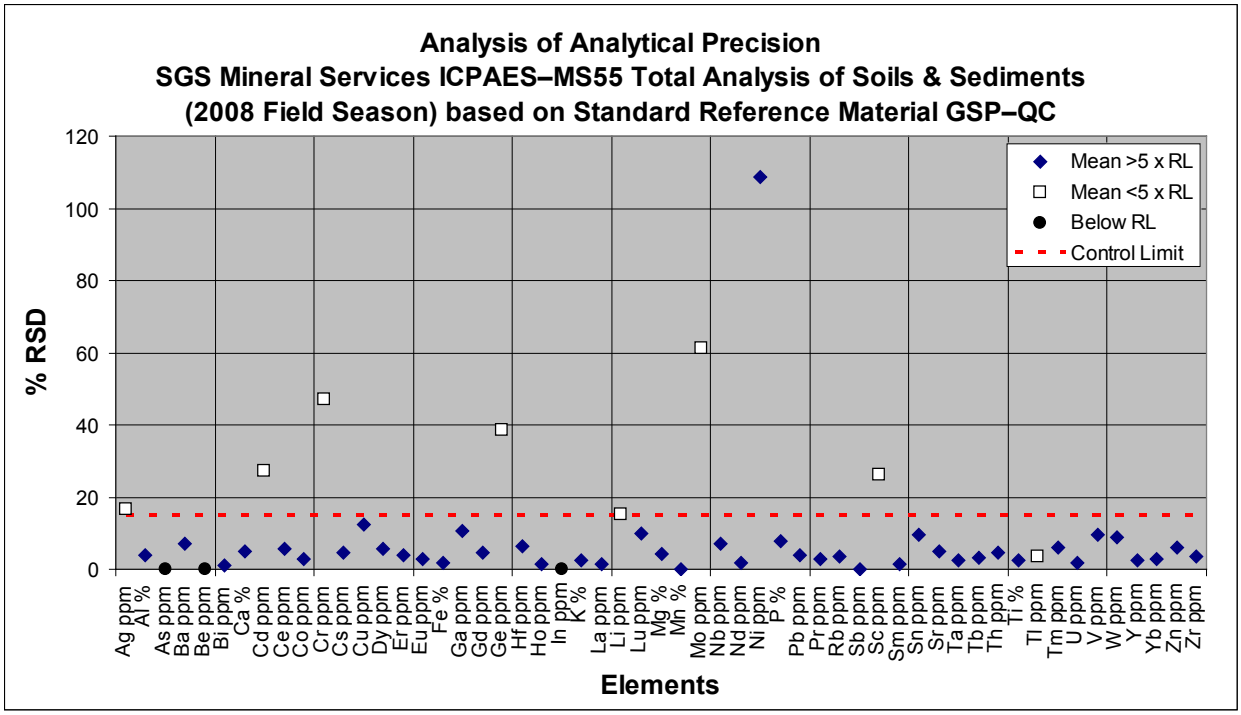

Figure 13-14. Precision plot for four analyses of standard reference material GSP–QC by ICPAES–MS55 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

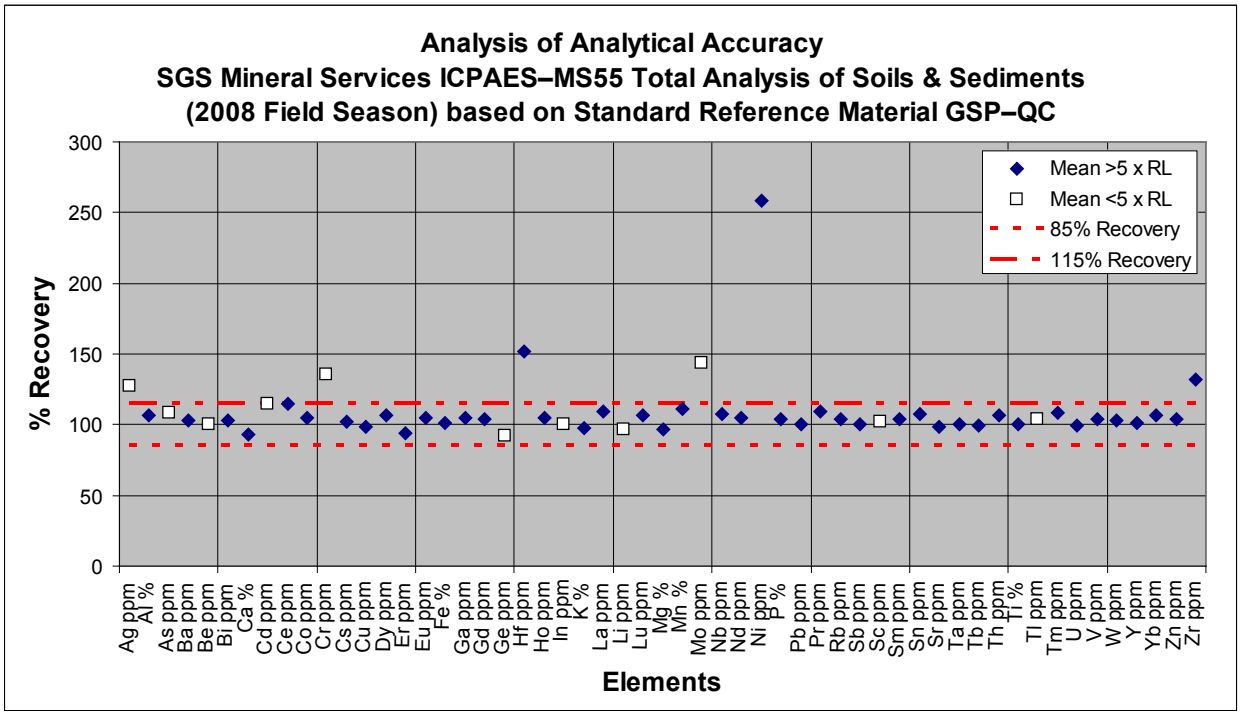

Figure 13-15. Accuracy plot for four analyses of standard reference material GSP–QC by ICPAES–MS55 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-10. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined after a sodium peroxide sinter of soil and sediment samples by the ICPAES–MS55 multielement package at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	20	1.53	<1	*na*	*na*	64.8
Al	%	0.01	20	7.71	8.33	0.406	4.87	108
As	ppm	30	20	*na*	<30	*na*	*na*	*na*
Ba	ppm	0.5	20	721	773	53.5	6.92	107
Be	ppm	5	20	5.01	<5	*na*	*na*	90.0
Bi	ppm	0.1	20	0.200	0.221	0.0535	24.2	111
Ca	%	0.01	20	1.53	1.53	0.0821	5.37	100
Cd	ppm	0.2	20	*na*	0.205	0.0688	33.5	*na*
Ce	ppm	0.1	20	39.1	42.9	2.31	5.39	110
Co	ppm	0.5	20	12.9	14.2	1.06	7.45	110
Cr	ppm	10	20	56.0	65.8	8.38	12.7	117
Cs	ppm	0.1	20	3.12	3.21	0.221	6.88	103
Cu	ppm	5	20	124	134	9.54	7.15	108
Dy	ppm	0.05	20	4.18	4.12	0.164	3.99	98.4
Er	ppm	0.05	20	2.47	2.46	0.143	5.83	99.6
Eu	ppm	0.05	20	1.18	1.18	0.0411	3.47	101
Fe	%	0.01	20	4.55	4.66	0.123	2.65	102
Ga	ppm	1	20	17.8	17.9	1.87	10.4	101
Gd	ppm	0.05	20	4.28	4.60	0.219	4.77	107
Ge	ppm	1	20	2.00	1.63	0.496	30.4	81.6
Hf	ppm	1	20	5.00	5.11	0.567	11.1	102
Ho	ppm	0.05	20	0.854	0.817	0.0327	4.00	95.6
In	ppm	0.2	20	*na*	<0.2	*na*	*na*	*na*
K	%	0.01	20	1.37	1.38	0.0831	6.03	101
La	ppm	0.1	20	18.1	20.9	1.29	6.18	115
Li	ppm	10	20	16.0	17.9	4.19	23.4	112
Lu	ppm	0.05	20	0.376	0.366	0.0287	7.84	97.4
Mg	%	0.01	20	0.808	0.826	0.0289	3.50	102
Mn	%	0.001	20	0.0700	0.0747	0.00513	6.86	107
Mo	ppm	2	20	4.60	3.95	0.524	13.3	85.8
Nb	ppm	1	20	11.8	10.8	0.765	7.05	91.9
Nd	ppm	0.1	20	19.4	20.7	0.908	4.39	107
Ni	ppm	5	20	14.8	26.9	6.76	25.1	182
P	%	0.01	20	0.118	0.118	0.00602	5.08	100
Pb	ppm	5	20	15.6	16.5	2.34	14.2	106
Pr	ppm	0.05	20	4.80	5.07	0.315	6.22	106
Rb	ppm	0.2	20	45.9	49.2	1.66	3.38	107
Sb	ppm	0.1	20	1.34	1.44	0.822	57.2	107
Sc	ppm	5	20	14.2	12.9	2.59	20.0	91.2
Sm	ppm	0.1	20	4.54	4.47	0.200	4.48	98.4
Sn	ppm	1	20	3.60	2.26	1.49	65.9	62.7
Sr	ppm	0.1	20	275	243	11.1	4.58	88.6
Ta	ppm	0.5	20	0.660	0.647	0.0697	10.8	98.1
Tb	ppm	0.05	20	0.734	0.689	0.0310	4.50	93.9
Th	ppm	0.1	20	4.18	4.64	0.250	5.39	111
Ti	%	0.01	20	0.552	0.568	0.0272	4.79	103
Tl	ppm	0.5	20	*na*	<0.5	*na*	*na*	*na*
Tm	ppm	0.05	20	0.360	0.359	0.0133	3.70	99.7
U	ppm	0.05	20	2.28	2.27	0.0885	3.90	99.5
V	ppm	5	20	122	136	3.85	2.84	111
W	ppm	1	20	2.00	2.05	0.229	11.2	103
Y	ppm	0.5	20	22.6	21.9	0.566	2.59	96.7
Yb	ppm	0.1	20	2.50	2.42	0.0958	3.97	96.6
Zn	ppm	5	20	86.4	75.3	5.24	6.96	87.2
Zr	ppm	0.5	20	200	191	21.0	11.0	95.7

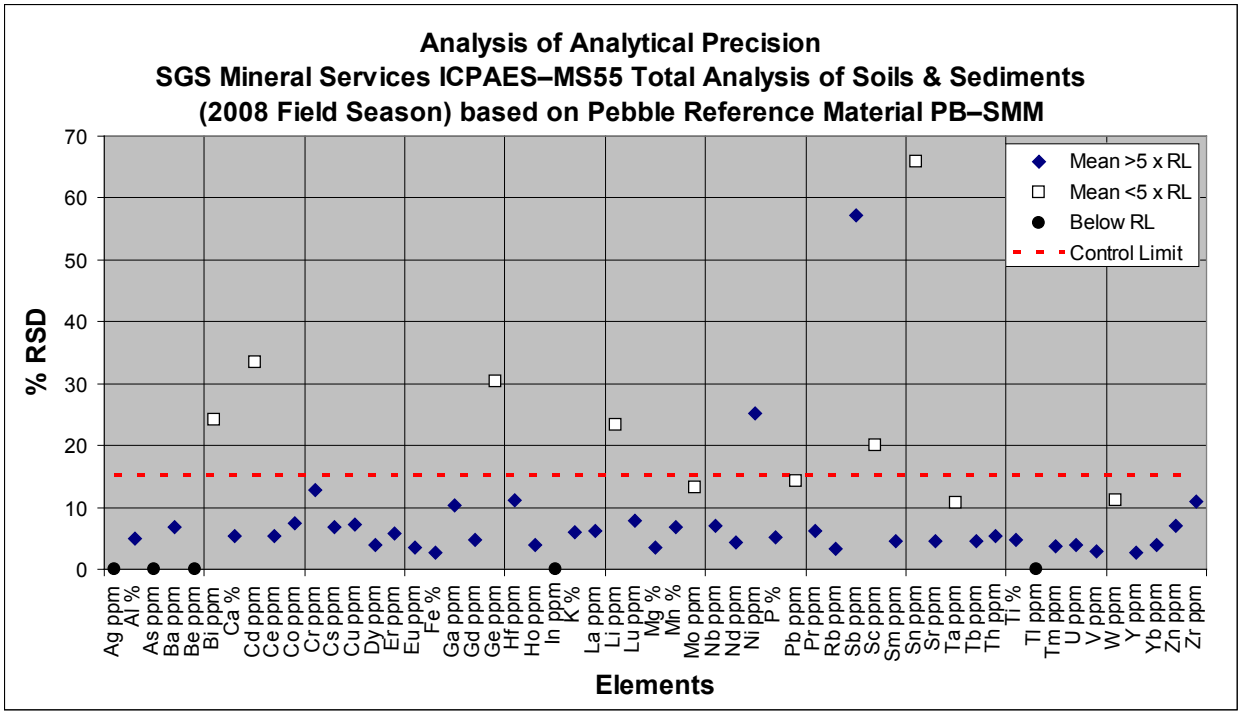

Figure 13-16. Precision plot for twenty analyses of Pebble reference material PB–SMM by ICPAES–MS55 (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

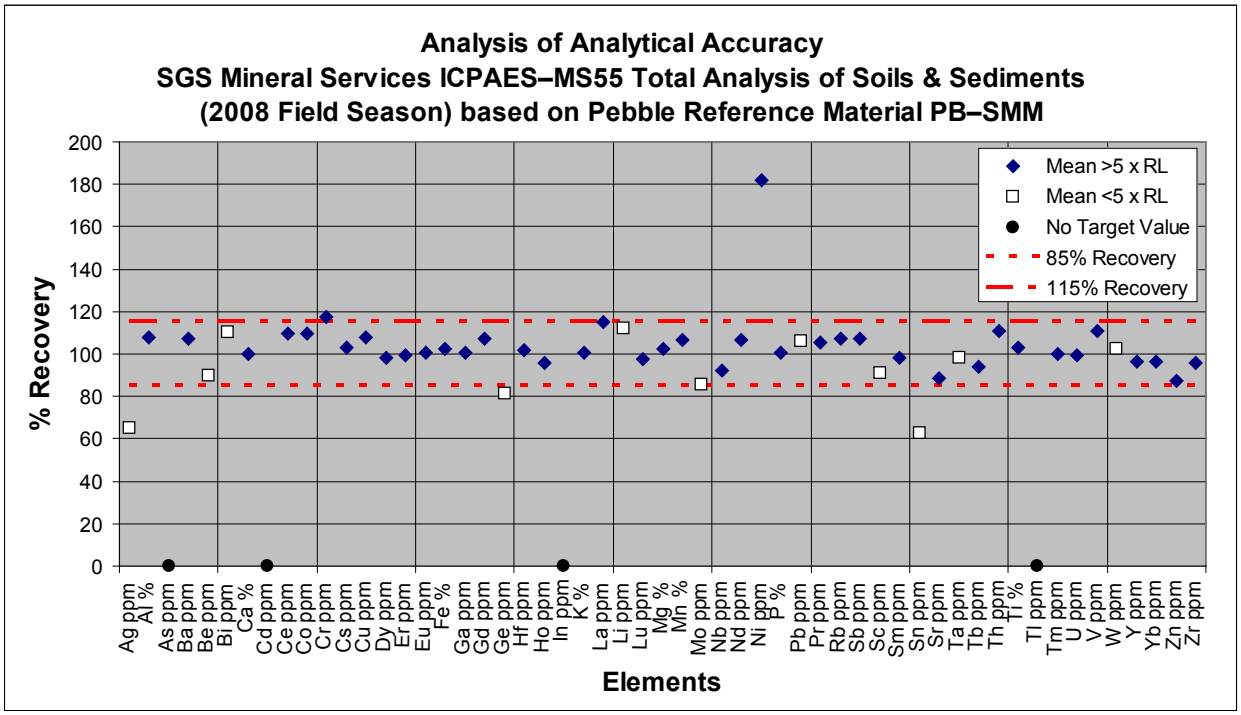

Figure 13-17. Accuracy plot for twenty analyses of Pebble reference material PB–SMM by ICPAES–MS55 (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-11. Summary statistics for assessing analytical variation on duplicate samples; determined after a sodium peroxide sinter of soil, sediment, and rock samples by the ICPAES–MS55 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Dev. for Duplicates	%RSD
Ag	ppm	1	8	<1	1.00	<1	*na*	*na*
Al	%	0.01	8	6.47	8.50	7.40	0.214	2.90
As	ppm	30	8	<30	<30	<30	*na*	*na*
Ba	ppm	0.5	8	577	1,090	716	25.0	3.49
Be	ppm	5	8	<5	<5	<5	*na*	*na*
Bi	ppm	0.1	8	<0.1	0.300	0.167	0.0559	33.5
Ca	%	0.01	8	0.380	2.09	1.50	0.0487	3.24
Cd	ppm	0.2	8	<0.2	0.600	0.217	0.108	49.6
Ce	ppm	0.1	8	28.6	59.5	41.2	1.50	3.63
Co	ppm	0.5	8	2.30	15.6	10.3	0.591	5.73
Cr	ppm	10	8	<10	80.0	46.1	9.35	20.3
Cs	ppm	0.1	8	1.50	4.70	2.79	0.235	8.41
Cu	ppm	5	8	6.00	408	108	3.77	3.48
Dy	ppm	0.05	8	2.50	5.56	3.81	0.133	3.48
Er	ppm	0.05	8	1.90	3.42	2.37	0.0779	3.28
Eu	ppm	0.05	8	0.430	1.33	0.998	0.0386	3.87
Fe	%	0.01	8	1.39	5.09	3.42	0.295	8.62
Ga	ppm	1	8	14.0	19.0	16.6	0.707	4.25
Gd	ppm	0.05	8	2.31	6.00	4.03	0.0574	1.43
Ge	ppm	1	8	1.00	2.00	1.50	0.500	33.3
Hf	ppm	1	8	3.00	7.00	5.13	0.791	15.4
Ho	ppm	0.05	8	0.590	1.14	0.813	0.0298	3.67
In	ppm	0.2	8	<0.2	<0.2	<0.2	*na*	*na*
K	%	0.01	8	1.17	4.01	1.93	0.106	5.48
La	ppm	0.1	8	13.9	28.8	20.6	0.988	4.80
Li	ppm	10	8	20.0	40.0	25.6	2.50	9.76
Lu	ppm	0.05	8	0.320	0.560	0.393	0.0190	4.85
Mg	%	0.01	8	0.120	1.05	0.708	0.0313	4.42
Mn	%	0.001	8	0.0200	0.120	0.0600	0	0
Mo	ppm	2	8	<2	20.0	5.97	0.250	4.19
Nb	ppm	1	8	8.00	15.0	11.0	1.17	10.7
Nd	ppm	0.1	8	13.8	27.5	19.1	0.798	4.17
Ni	ppm	5	8	<5	35.0	16.7	4.35	26.1
P	%	0.01	8	0.0200	0.160	0.0850	0.00935	11.0
Pb	ppm	5	8	10.0	25.0	16.8	2.17	12.9
Pr	ppm	0.05	8	3.54	6.85	4.87	0.196	4.02
Rb	ppm	0.2	8	33.6	111	57.0	2.37	4.15
Sb	ppm	0.1	8	0.900	2.20	1.31	0.179	13.7
Sc	ppm	5	8	<5	17.0	11.3	0.791	6.99
Sm	ppm	0.1	8	2.50	5.60	4.00	0.177	4.42
Sn	ppm	1	8	<1	2.00	1.34	0.534	39.9
Sr	ppm	0.1	8	72.4	311	231	5.65	2.45
Ta	ppm	0.5	8	<0.5	3.60	0.878	0.702	79.9
Tb	ppm	0.05	8	0.380	0.970	0.630	0.0218	3.46
Th	ppm	0.1	8	3.30	6.50	4.58	0.432	9.44
Ti	%	0.01	8	0.120	0.690	0.456	0.0278	6.10
Tl	ppm	0.5	8	<0.5	0.800	<0.5	*na*	*na*
Tm	ppm	0.05	8	0.320	0.500	0.364	0.00935	2.57
U	ppm	0.05	8	1.52	4.29	2.21	0.148	6.70
V	ppm	5	8	7.00	155	98.9	6.11	6.18
W	ppm	1	8	<1	5.00	1.52	0.252	16.6
Y	ppm	0.5	8	16.7	31.0	21.6	0.982	4.54
Yb	ppm	0.1	8	2.00	3.30	2.45	0.106	4.33
Zn	ppm	5	8	37.0	114	72.4	6.34	8.77
Zr	ppm	0.5	8	133	272	190	18.6	9.81

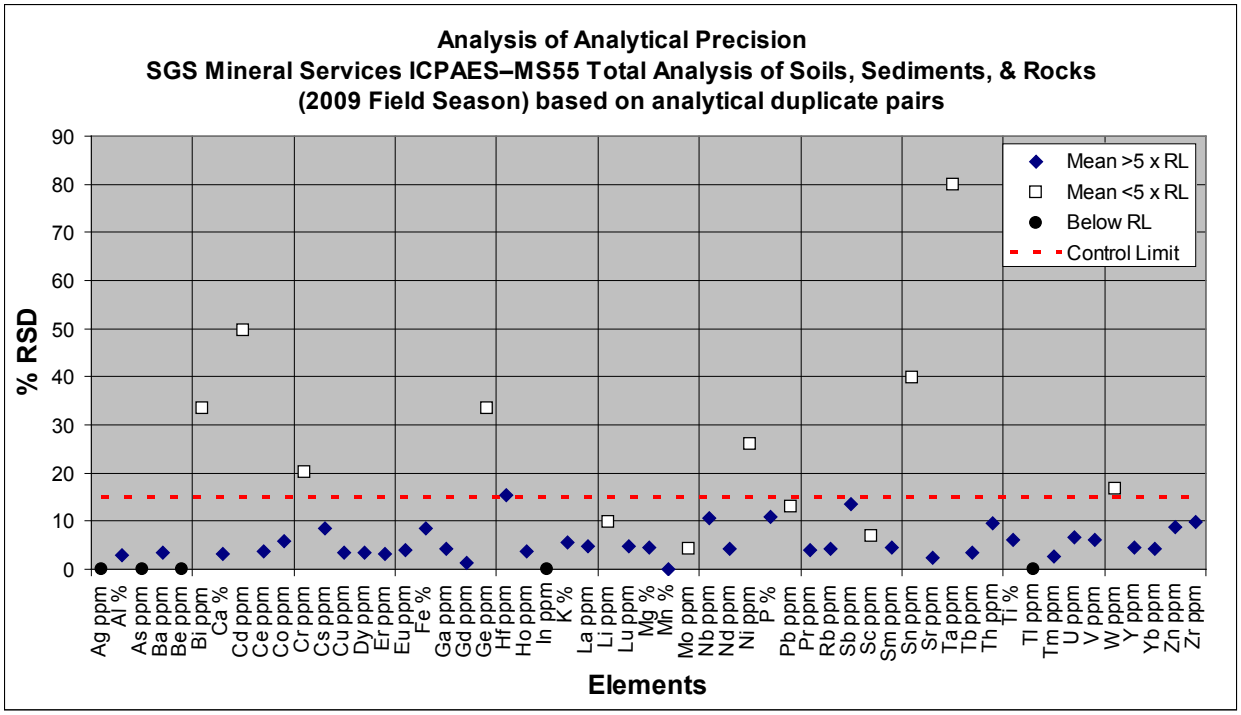

Figure 13-18. Precision plot for eight analytical duplicate sample pairs by ICPAES–MS55 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 13-12. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a sodium peroxide sinter of soil, sediment, and rock samples by the ICPAES–MS55 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	2	2.56	2.50	0.707	28.3	97.7
Al	%	0.01	2	5.79	5.66	0.0990	1.75	97.8
As	ppm	30	2	<30	<30	*na*	*na*	100
Ba	ppm	0.5	2	879	923	21.9	2.38	105
Be	ppm	5	2	<5	13.5	9.19	68.1	299
Bi	ppm	0.1	2	1.10	0.950	0.0707	7.44	86.4
Ca	%	0.01	2	1.06	1.07	0.0141	1.32	101
Cd	ppm	0.2	2	2.50	2.95	0.212	7.19	118
Ce	ppm	0.1	2	150	145	9.19	6.36	96.3
Co	ppm	0.5	2	7.50	7.60	0.990	13.0	101
Cr	ppm	10	2	110	105	7.07	6.73	95.5
Cs	ppm	0.1	2	4.00	4.90	1.41	28.9	123
Cu	ppm	5	2	370	386	16.3	4.22	104
Dy	ppm	0.05	2	*na*	10.3	0.354	3.45	*na*
Er	ppm	0.05	2	*na*	6.58	0.0141	0.215	*na*
Eu	ppm	0.05	2	1.50	1.35	0.0778	5.78	89.7
Fe	%	0.01	2	2.67	2.72	0.156	5.72	102
Ga	ppm	1	2	17.0	16.0	1.41	8.84	94.1
Gd	ppm	0.05	2	*na*	10.1	0.361	3.55	*na*
Ge	ppm	1	2	*na*	2.00	0	0	*na*
Hf	ppm	1	2	10.0	11.0	0	0	110
Ho	ppm	0.05	2	1.90	2.20	0.0636	2.90	116

Table 13-12. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined after a sodium peroxide sinter of soil, sediment, and rock samples by the ICPAES–MS55 multielement package at SGS Minerals (2009 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
In	ppm	0.2	2	0.260	0.300	0	0	115
K	%	0.01	2	2.98	3.26	0.0212	0.652	109
La	ppm	0.1	2	75.0	67.3	2.47	3.68	89.7
Li	ppm	10	2	28.0	40.0	0	0	143
Lu	ppm	0.05	2	1.00	1.01	0.0354	3.52	101
Mg	%	0.01	2	0.550	0.525	0.00707	1.35	95.5
Mn	%	0.001	2	0.209	0.230	0	0	110
Mo	ppm	2	2	13.0	14.0	0	0	108
Nb	ppm	1	2	35.0	40.5	0.707	1.75	116
Nd	ppm	0.1	2	66.0	56.2	2.26	4.03	85.2
Ni	ppm	5	2	52.0	58.0	1.41	2.44	112
P	%	0.01	2	0.0900	0.0800	0	0	88.9
Pb	ppm	5	2	578	608	27.6	4.54	105
Pr	ppm	0.05	2	*na*	15.3	0.707	4.62	*na*
Rb	ppm	0.2	2	140	141	7.78	5.54	100
Sb	ppm	0.1	2	5.10	5.50	0.849	15.4	108
Sc	ppm	5	2	7.80	8.00	1.41	17.7	103
Sm	ppm	0.1	2	13.0	10.7	0.283	2.64	82.3
Sn	ppm	1	2	6.00	4.50	2.12	47.1	75.0
Sr	ppm	0.1	2	158	165	4.24	2.57	104
Ta	ppm	0.5	2	2.80	2.30	0.141	6.15	82.1
Tb	ppm	0.05	2	1.70	1.68	0.0707	4.21	98.8
Th	ppm	0.1	2	19.0	17.6	0.141	0.804	92.6
Ti	%	0.01	2	0.250	0.325	0.00707	2.18	130
Tl	ppm	0.5	2	1.40	1.20	0	0	85.7
Tm	ppm	0.05	2	*na*	1.02	0.0424	4.16	*na*
U	ppm	0.05	2	5.20	4.56	0.0990	2.17	87.7
V	ppm	5	2	140	136	0	0	97.1
W	ppm	1	2	3.70	3.50	0.707	20.2	94.6
Y	ppm	0.5	2	44.0	57.8	3.39	5.87	131
Yb	ppm	0.1	2	5.70	6.65	0.354	5.32	117
Zn	ppm	5	2	420	462	21.9	4.75	110
Zr	ppm	0.5	2	408	417	7.78	1.87	102

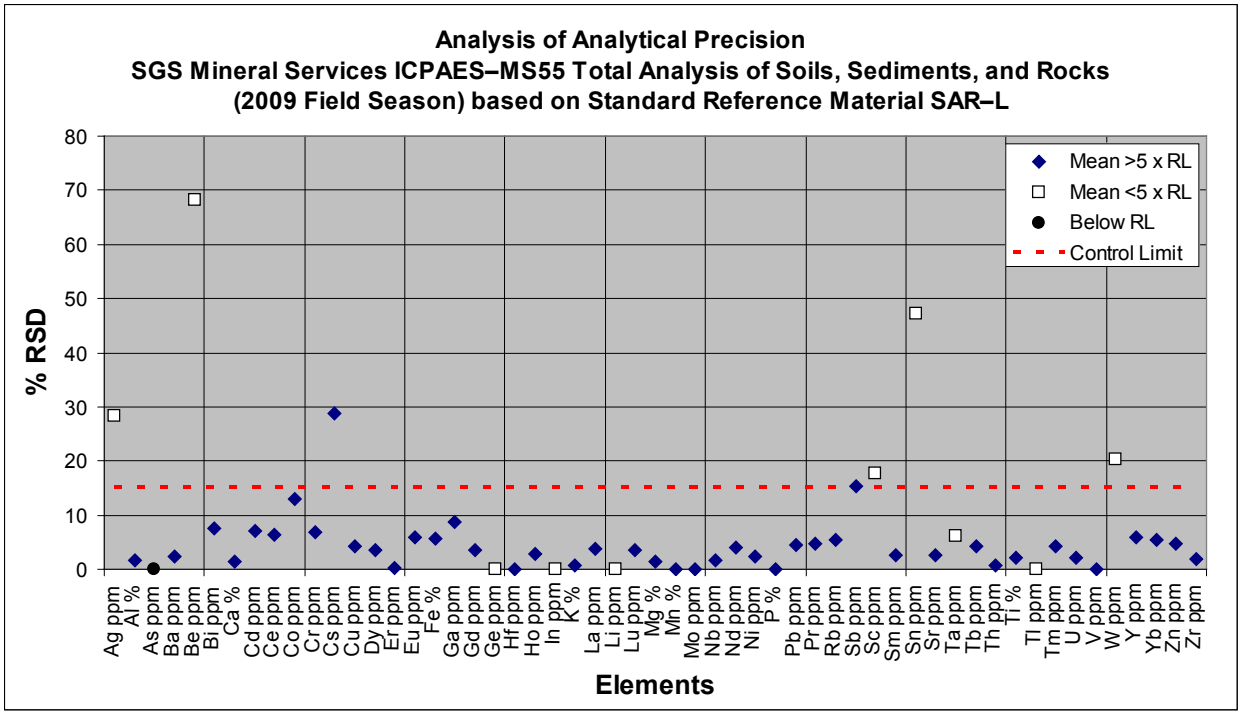

Figure 13-19. Precision plot for two analyses of standard reference material SAR–L by ICPAES–MS55 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

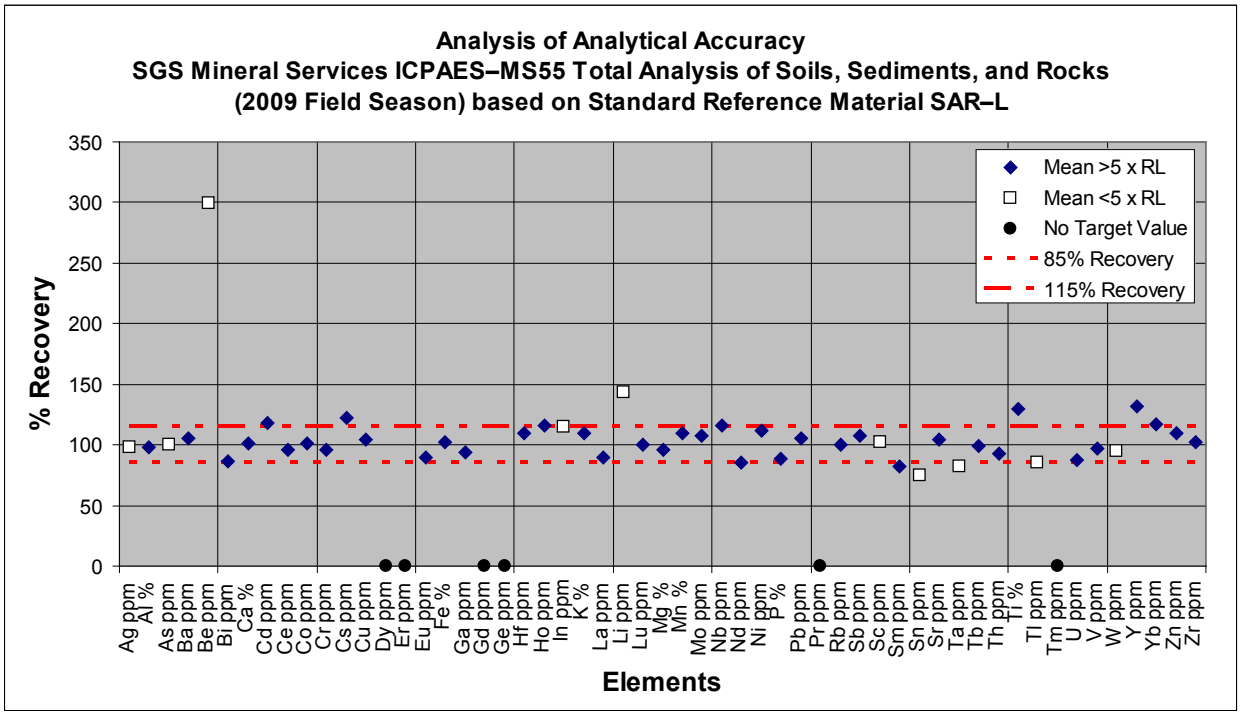

Figure 13-20. Accuracy plot for two analyses of standard reference material SAR–L by ICPAES–MS55 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-13. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined after a sodium peroxide sinter of soil, sediment, and rock samples by the ICPAES–MS55 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	2	3.10	4.00	1.41	35.4	129
Al	%	0.01	2	6.09	6.16	0.0778	1.26	101
As	ppm	30	2	37.0	30.0	0	0	81.1
Ba	ppm	0.5	2	764	829	27.6	3.33	108
Be	ppm	5	2	<5	<5	*na*	*na*	100
Bi	ppm	0.1	2	1.33	1.80	0.424	23.6	135
Ca	%	0.01	2	0.580	0.650	0.0283	4.35	112
Cd	ppm	0.2	2	4.76	5.35	0.212	3.97	112
Ce	ppm	0.1	2	120	114	0	0	95.0
Co	ppm	0.5	2	11.0	10.2	0.212	2.09	92.3
Cr	ppm	10	2	101	95.0	7.07	7.44	94.1
Cs	ppm	0.1	2	4.80	4.95	0.0707	1.43	103
Cu	ppm	5	2	320	339	25.5	7.51	106
Dy	ppm	0.05	2	*na*	7.44	0.0141	0.190	*na*
Er	ppm	0.05	2	*na*	4.79	0.00707	0.148	*na*
Eu	ppm	0.05	2	1.26	1.21	0.0354	2.93	95.6
Fe	%	0.01	2	3.22	3.27	0.191	5.85	101
Ga	ppm	1	2	20.0	15.5	0.707	4.56	77.5
Gd	ppm	0.05	2	*na*	7.61	0.120	1.58	*na*
Ge	ppm	1	2	*na*	1.00	0	0	*na*
Hf	ppm	1	2	*na*	9.50	0.707	7.44	*na*
Ho	ppm	0.05	2	1.90	1.61	0.0141	0.878	84.7
In	ppm	0.2	2	0.970	1.10	0	0	113
K	%	0.01	2	2.92	3.27	0	0	112
La	ppm	0.1	2	61.0	53.4	2.90	5.43	87.5
Li	ppm	10	2	30.0	40.0	0	0	133
Lu	ppm	0.05	2	0.700	0.755	0.0354	4.68	108
Mg	%	0.01	2	0.500	0.500	0.0283	5.66	100
Mn	%	0.001	2	0.520	0.580	0.0283	4.88	112
Mo	ppm	2	2	12.0	12.5	0.707	5.66	104
Nb	ppm	1	2	31.0	35.0	0	0	113
Nd	ppm	0.1	2	53.4	43.0	1.34	3.13	80.4
Ni	ppm	5	2	41.0	44.5	0.707	1.59	109
P	%	0.01	2	0.0800	0.0750	0.00707	9.43	93.8
Pb	ppm	5	2	960	976	0.707	0.0725	102
Pr	ppm	0.05	2	*na*	11.9	0.636	5.37	*na*
Rb	ppm	0.2	2	142	141	0	0	99.3
Sb	ppm	0.1	2	5.60	6.65	0.212	3.19	119
Sc	ppm	5	2	8.30	8.00	0	0	96.4
Sm	ppm	0.1	2	9.80	8.10	0	0	82.7
Sn	ppm	1	2	9.40	3.00	0	0	31.9
Sr	ppm	0.1	2	156	167	2.12	1.27	107
Ta	ppm	0.5	2	2.60	1.95	0.0707	3.63	75.0
Tb	ppm	0.05	2	1.30	1.18	0.0141	1.20	90.8
Th	ppm	0.1	2	18.0	16.7	0.849	5.08	92.8
Ti	%	0.01	2	0.350	0.400	0.0141	3.54	114
Tl	ppm	0.5	2	2.80	2.55	0.0707	2.77	91.1
Tm	ppm	0.05	2	*na*	0.745	0.00707	0.949	*na*
U	ppm	0.05	2	5.10	4.45	0.106	2.39	87.2
V	ppm	5	2	66.0	71.0	1.41	1.99	108
W	ppm	1	2	14.0	11.5	0.707	6.15	82.1
Y	ppm	0.5	2	33.0	42.1	0.990	2.35	128
Yb	ppm	0.1	2	4.90	4.80	0.283	5.89	98.0
Zn	ppm	5	2	888	957	75.7	7.91	108
Zr	ppm	0.5	2	370	344	24.0	6.99	93.0

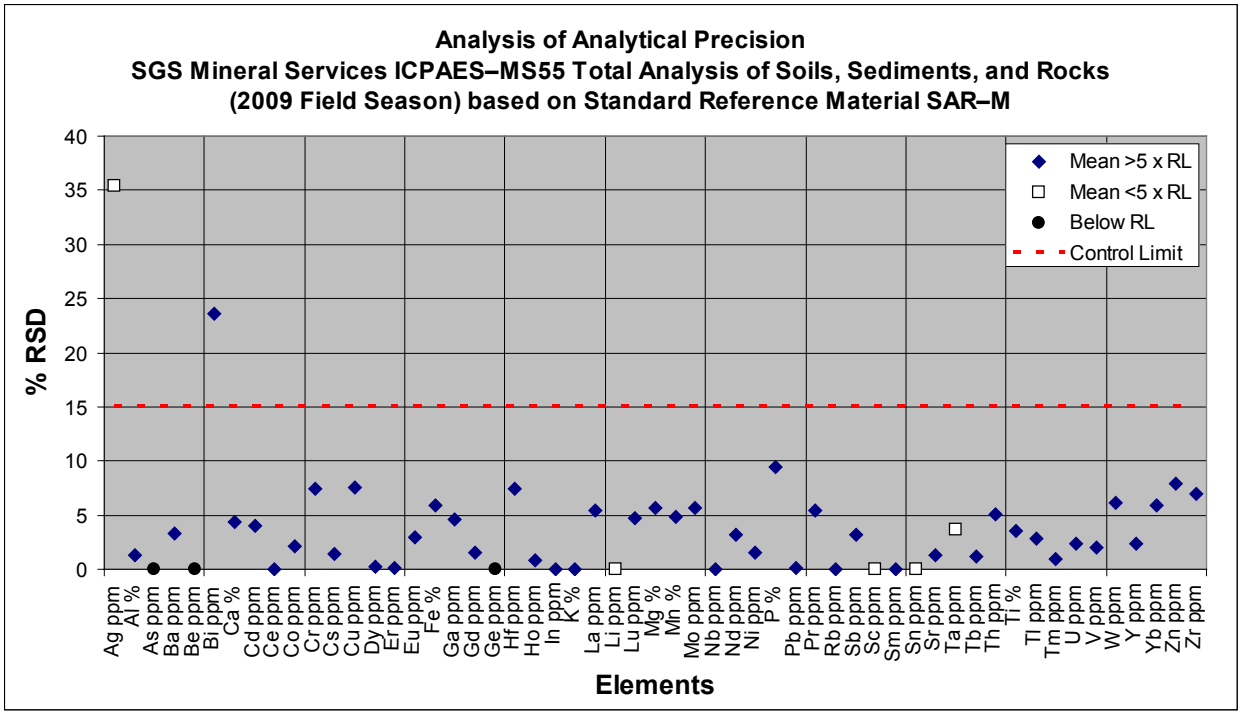

Figure 13-21. Precision plot for two analyses of standard reference material SAR–M by ICPAES–MS55 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

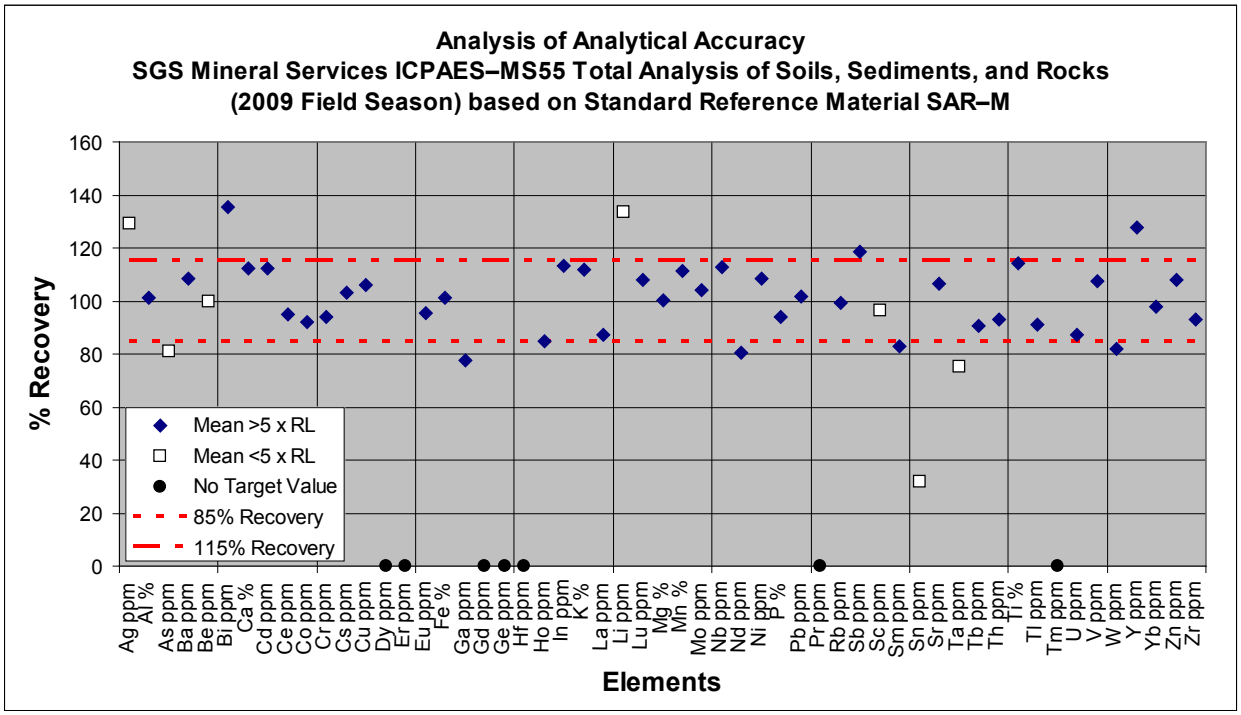

Figure 13-22. Accuracy plot for two analyses of standard reference material SAR–M by ICPAES–MS55 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-14. Summary statistics for assessing analytical variation on the standard reference material DGPM; determined after a sodium peroxide sinter of soil, sediment, and rock samples by the ICPAES–MS55 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	5	<1	1.76	1.33	75.5	194
Al	%	0.01	5	4.82	4.93	0.141	2.87	102
As	ppm	30	5	169	166	13.4	8.08	98.2
Ba	ppm	0.5	5	1,272	1,300	81.1	6.26	102
Be	ppm	5	5	<5	<5	*na*	*na*	100
Bi	ppm	0.1	5	<0.1	<0.1	*na*	*na*	102
Ca	%	0.01	5	0.170	0.196	0.0297	15.1	115
Cd	ppm	0.2	5	0.340	0.276	0.113	41.0	81.2
Ce	ppm	0.1	5	90.5	88.2	4.31	4.89	97.5
Co	ppm	0.5	5	1.36	1.30	0.200	15.4	95.6
Cr	ppm	10	5	120	118	16.4	13.9	98.3
Cs	ppm	0.1	5	8.92	8.50	0.324	3.81	95.3
Cu	ppm	5	5	13.0	14.0	2.92	20.8	108
Dy	ppm	0.05	5	3.22	3.24	0.108	3.32	101
Er	ppm	0.05	5	2.08	1.99	0.0424	2.13	95.7
Eu	ppm	0.05	5	0.780	0.746	0.0456	6.11	95.6
Fe	%	0.01	5	1.36	1.32	0.0378	2.87	96.8
Ga	ppm	1	5	11.3	11.2	1.30	11.6	99.1
Gd	ppm	0.05	5	3.90	3.38	0.158	4.67	86.7
Ge	ppm	1	5	2.34	2.00	0	0	85.5
Hf	ppm	1	5	9.82	10.8	0.447	4.14	110
Ho	ppm	0.05	5	0.668	0.674	0.0297	4.40	101
In	ppm	0.2	5	<0.2	<0.2	*na*	*na*	100
K	%	0.01	5	2.23	2.38	0.143	6.01	107
La	ppm	0.1	5	51.7	50.6	1.51	2.99	97.8
Li	ppm	10	5	41.9	48.0	4.47	9.32	115
Lu	ppm	0.05	5	0.315	0.336	0.0261	7.76	107
Mg	%	0.01	5	0.322	0.322	0.0164	5.10	100
Mn	%	0.001	5	0.00250	0.00311	0	0	104
Mo	ppm	2	5	13.6	13.6	0.548	4.03	100
Nb	ppm	1	5	9.80	10.6	0.894	8.44	108
Nd	ppm	0.1	5	30.5	29.5	1.66	5.63	96.8
Ni	ppm	5	5	14.3	10.8	3.96	36.7	75.5
P	%	0.01	5	0.0410	0.0420	0.00837	19.9	102
Pb	ppm	5	5	10.0	10.6	1.14	10.8	106
Pr	ppm	0.05	5	9.43	9.38	0.572	6.10	99.4
Rb	ppm	0.2	5	94.0	94.0	3.29	3.50	100
Sb	ppm	0.1	5	13.0	13.1	0.554	4.22	101
Sc	ppm	5	5	8.79	8.80	0.447	5.08	100
Sm	ppm	0.1	5	4.70	4.56	0.270	5.93	97.0
Sn	ppm	1	5	1.80	1.38	0.565	40.9	76.8
Sr	ppm	0.1	5	91.0	96.4	7.34	7.62	106
Ta	ppm	0.5	5	0.670	0.760	0.134	17.7	113
Tb	ppm	0.05	5	0.599	0.524	0.0134	2.56	87.5
Th	ppm	0.1	5	9.90	10.4	1.02	9.74	105
Ti	%	0.01	5	0.325	0.334	0.0167	5.01	103
Tl	ppm	0.5	5	8.21	8.22	0.268	3.26	100
Tm	ppm	0.05	5	0.295	0.308	0.0164	5.33	104
U	ppm	0.05	5	3.26	3.43	0.0665	1.94	105
V	ppm	5	5	104	103	6.07	5.91	98.7
W	ppm	1	5	73.6	77.2	2.17	2.81	105
Y	ppm	0.5	5	19.9	19.7	0.862	4.37	99.2
Yb	ppm	0.1	5	2.05	2.16	0.0548	2.54	105
Zn	ppm	5	5	22.0	25.0	2.83	11.3	114
Zr	ppm	0.5	5	410	375	94.6	25.3	91.4

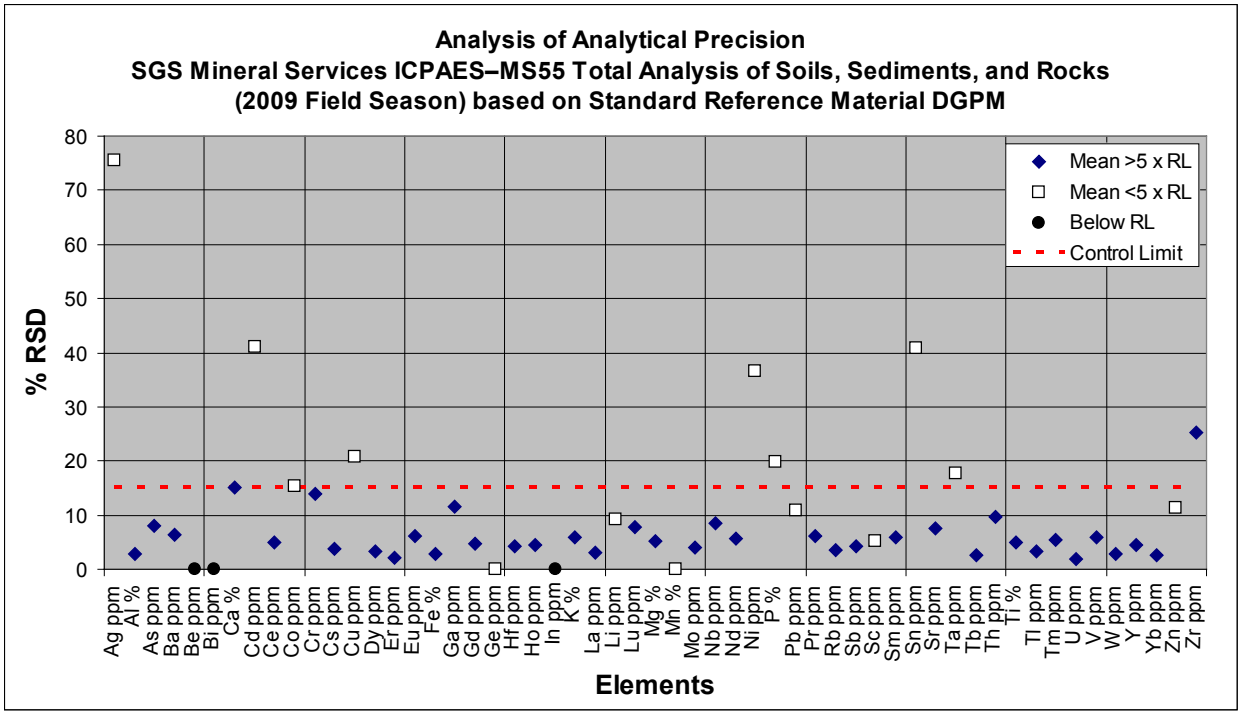

Figure 13-23. Precision plot for five analyses of standard reference material DGPM by ICPAES–MS55 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

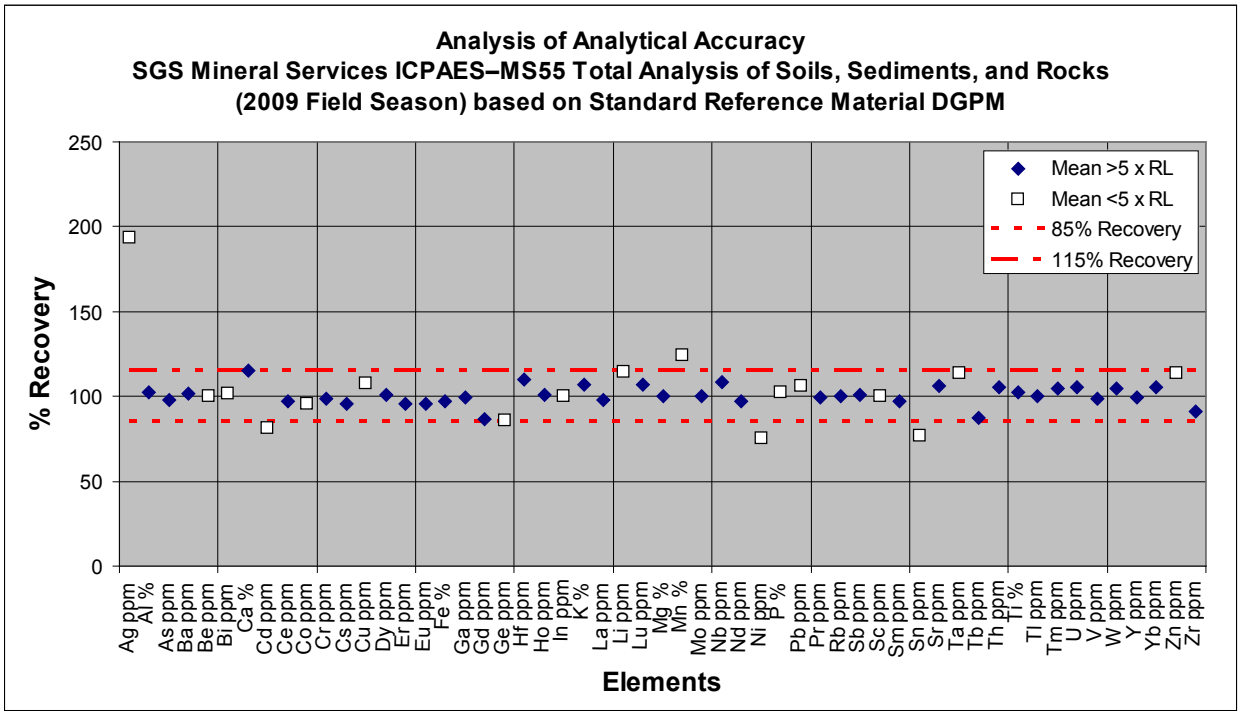

Figure 13-24. Accuracy plot for five analyses of standard reference material DGPM by ICPAES–MS55 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-15. Summary statistics for assessing analytical variation on the standard reference material GSP–QC; determined after a sodium peroxide sinter of soil, sediment, and rock samples by the ICPAES–MS55 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	4	2.75	3.75	0.500	13.3	136
Al	%	0.01	4	7.40	7.41	0.159	2.15	100
As	ppm	30	4	<30	<30	*na*	*na*	103
Ba	ppm	0.5	4	1,320	1,310	97.5	7.47	98.9
Be	ppm	5	4	<5	<5	*na*	*na*	100
Bi	ppm	0.1	4	4.30	4.35	0.173	3.98	101
Ca	%	0.01	4	1.55	1.55	0.00816	0.527	100
Cd	ppm	0.2	4	0.262	0.220	0.0539	24.5	84.1
Ce	ppm	0.1	4	369	384	20.5	5.35	104
Co	ppm	0.5	4	6.37	6.60	0.424	6.43	104
Cr	ppm	10	4	22.1	20.0	8.16	40.8	90.5
Cs	ppm	0.1	4	1.99	2.25	0.904	40.2	113
Cu	ppm	5	4	31.1	30.5	5.20	17.0	98.1
Dy	ppm	0.05	4	5.56	5.46	0.176	3.22	98.2
Er	ppm	0.05	4	2.64	2.27	0.0126	0.555	85.9
Eu	ppm	0.05	4	2.02	2.04	0.101	4.98	101
Fe	%	0.01	4	2.85	2.72	0.172	6.33	95.5
Ga	ppm	1	4	22.0	24.8	2.75	11.1	113
Gd	ppm	0.05	4	14.8	10.7	0.549	5.11	72.6
Ge	ppm	1	4	1.62	1.25	0.500	40.0	77.2
Hf	ppm	1	4	9.69	14.8	1.71	11.6	152
Ho	ppm	0.05	4	0.924	0.928	0.0499	5.38	100
In	ppm	0.2	4	<0.2	<0.2	*na*	*na*	100
K	%	0.01	4	4.12	4.36	0.143	3.28	106
La	ppm	0.1	4	166	166	5.89	3.55	100
Li	ppm	10	4	33.6	37.5	5.00	13.3	112
Lu	ppm	0.05	4	0.248	0.263	0.0544	20.7	106
Mg	%	0.01	4	0.599	0.623	0.0189	3.04	104
Mn	%	0.001	4	0.0270	0.0300	0	0	111
Mo	ppm	2	4	<2	<2	*na*	*na*	100
Nb	ppm	1	4	22.6	23.5	1.29	5.49	104
Nd	ppm	0.1	4	186	186	13.6	7.33	100
Ni	ppm	5	4	10.6	10.0	3.16	31.6	94.3
P	%	0.01	4	0.118	0.120	0	0	102
Pb	ppm	5	4	43.3	41.5	1.29	3.11	95.8
Pr	ppm	0.05	4	47.7	50.4	3.37	6.69	106
Rb	ppm	0.2	4	240	242	13.5	5.57	101
Sb	ppm	0.1	4	0.800	0.800	0.0816	10.2	100
Sc	ppm	5	4	5.75	5.13	0.625	12.2	89.2
Sm	ppm	0.1	4	23.8	23.7	1.52	6.41	99.4
Sn	ppm	1	4	4.88	4.50	0.577	12.8	92.2
Sr	ppm	0.1	4	219	226	6.58	2.91	103
Ta	ppm	0.5	4	7.99	7.98	0.427	5.36	99.8
Tb	ppm	0.05	4	1.68	1.16	0.0655	5.66	68.9
Th	ppm	0.1	4	99.9	99.6	11.3	11.3	99.7
Ti	%	0.01	4	0.376	0.405	0.0191	4.73	108
Tl	ppm	0.5	4	2.11	2.05	0.100	4.88	97.2
Tm	ppm	0.05	4	0.271	0.295	0.0129	4.38	109
U	ppm	0.05	4	2.56	2.44	0.0465	1.90	95.4
V	ppm	5	4	72.8	74.0	3.56	4.81	102
W	ppm	1	4	6.33	7.00	0	0	111
Y	ppm	0.5	4	25.0	24.3	1.21	4.99	97.1
Yb	ppm	0.1	4	1.71	1.70	0.0816	4.80	99.4
Zn	ppm	5	4	115	115	1.26	1.09	100
Zr	ppm	0.5	4	396	494	66.6	13.5	125

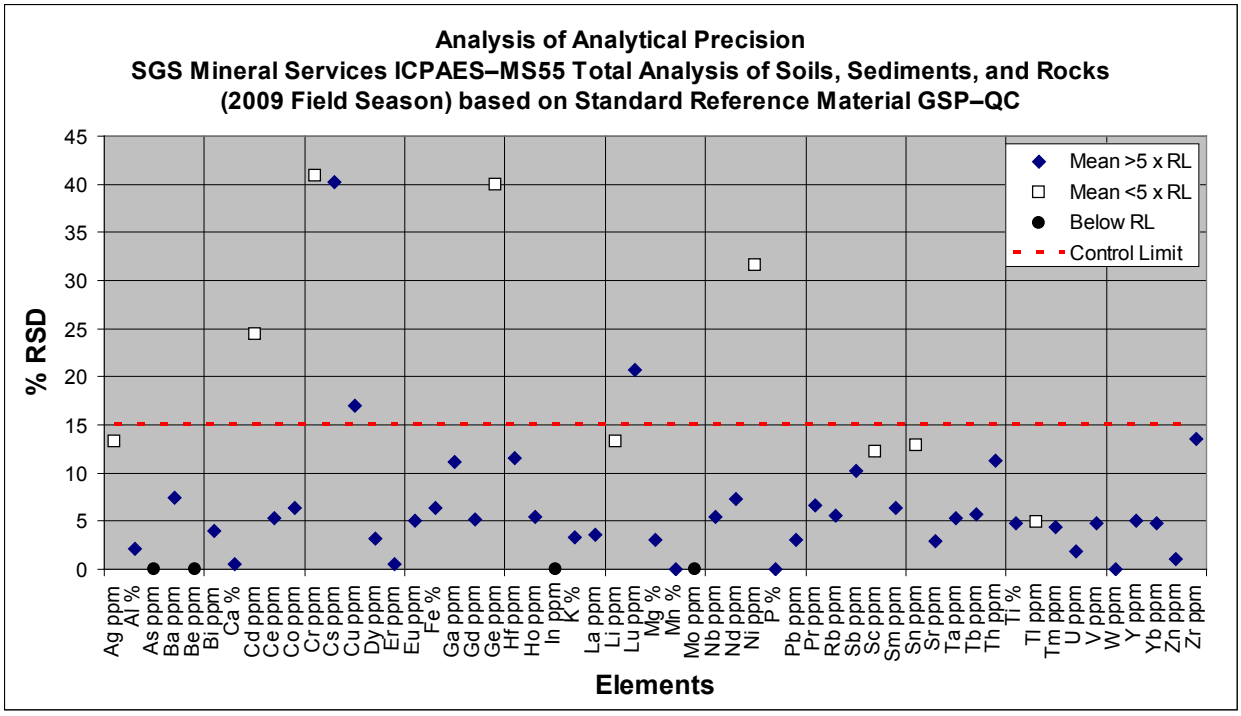

Figure 13-25. Precision plot for four analyses of standard reference material GSP–QC by ICPAES–MS55 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

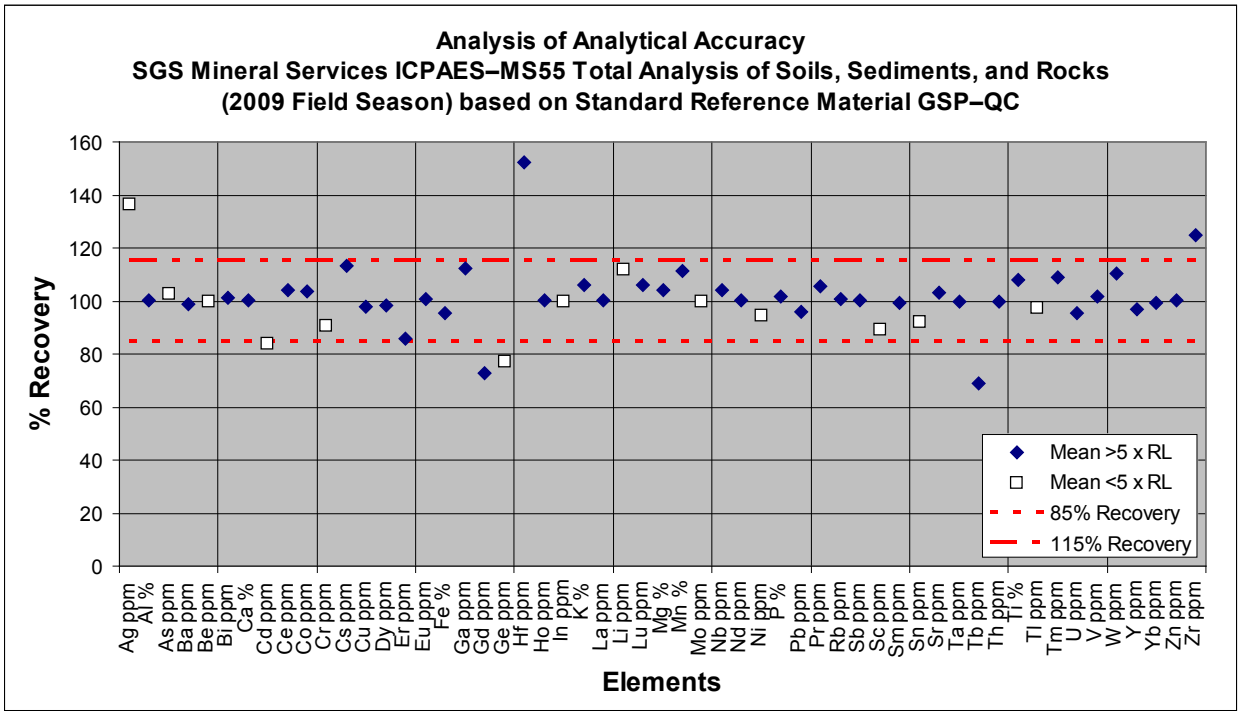

Figure 13-26. Accuracy plot for four analyses of standard reference material GSP–QC by ICPAES–MS55 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 13-16. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined after a sodium peroxide sinter of soil, sediment, and rock samples by the ICPAES–MS55 multielement package at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppm	1	10	1.53	<1	*na*	*na*	61.3
Al	%	0.01	10	7.71	7.92	0.226	2.85	103
As	ppm	30	10	*na*	<30	*na*	*na*	*na*
Ba	ppm	0.5	10	721	736	13.8	1.87	102
Be	ppm	5	10	5.01	<5	*na*	*na*	90.0
Bi	ppm	0.1	10	0.200	0.190	0.0738	38.8	95.0
Ca	%	0.01	10	1.53	1.51	0.0298	1.97	99.0
Cd	ppm	0.2	10	*na*	0.227	0.0784	34.6	*na*
Ce	ppm	0.1	10	39.1	41.3	1.83	4.42	106
Co	ppm	0.5	10	12.9	13.5	0.624	4.63	104
Cr	ppm	10	10	56.0	67.0	16.4	24.4	120
Cs	ppm	0.1	10	3.12	2.99	0.137	4.58	95.8
Cu	ppm	5	10	124	146	5.50	3.78	118
Dy	ppm	0.05	10	4.18	3.95	0.133	3.36	94.5
Er	ppm	0.05	10	2.47	2.38	0.0749	3.14	96.5
Eu	ppm	0.05	10	1.18	1.16	0.0503	4.34	98.6
Fe	%	0.01	10	4.55	4.43	0.0903	2.04	97.3
Ga	ppm	1	10	17.8	17.7	1.95	11.0	99.4
Gd	ppm	0.05	10	4.28	4.14	0.227	5.47	96.8
Ge	ppm	1	10	2.00	1.80	0.422	23.4	90.0
Hf	ppm	1	10	5.00	5.50	0.707	12.9	110
Ho	ppm	0.05	10	0.854	0.815	0.0292	3.58	95.4
In	ppm	0.2	10	*na*	<0.2	*na*	*na*	*na*
K	%	0.01	10	1.37	1.58	0.0787	4.97	115
La	ppm	0.1	10	18.1	19.6	0.706	3.60	108
Li	ppm	10	10	16.0	22.0	4.22	19.2	138
Lu	ppm	0.05	10	0.376	0.371	0.0325	8.75	98.7
Mg	%	0.01	10	0.808	0.849	0.0152	1.79	105
Mn	%	0.001	10	0.0700	0.0780	0.00422	5.41	111
Mo	ppm	2	10	4.60	4.10	0.316	7.71	89.1
Nb	ppm	1	10	11.8	11.7	0.949	8.11	99.2
Nd	ppm	0.1	10	19.4	19.6	0.937	4.77	101
Ni	ppm	5	10	14.8	18.3	3.02	16.5	124
P	%	0.01	10	0.118	0.119	0.00316	2.66	101
Pb	ppm	5	10	15.6	17.3	3.02	17.5	111
Pr	ppm	0.05	10	4.80	4.88	0.252	5.17	102
Rb	ppm	0.2	10	45.9	47.6	1.97	4.13	104
Sb	ppm	0.1	10	1.34	1.27	0.106	8.34	94.8
Sc	ppm	5	10	14.2	13.7	1.89	13.8	96.5
Sm	ppm	0.1	10	4.54	4.28	0.230	5.37	94.3
Sn	ppm	1	10	3.60	1.47	0.556	37.7	40.9
Sr	ppm	0.1	10	275	255	3.89	1.53	92.7
Ta	ppm	0.5	10	0.660	0.710	0.0738	10.4	108
Tb	ppm	0.05	10	0.734	0.663	0.0250	3.77	90.3
Th	ppm	0.1	10	4.18	4.48	0.297	6.64	107
Ti	%	0.01	10	0.552	0.598	0.0175	2.93	108
Tl	ppm	0.5	10	*na*	<0.5	*na*	*na*	*na*
Tm	ppm	0.05	10	0.360	0.362	0.0140	3.86	101
U	ppm	0.05	10	2.28	2.29	0.116	5.08	100
V	ppm	5	10	122	128	3.49	2.72	105
W	ppm	1	10	2.00	2.00	0	0	100
Y	ppm	0.5	10	22.6	21.5	1.02	4.76	94.8
Yb	ppm	0.1	10	2.50	2.37	0.0823	3.47	94.8
Zn	ppm	5	10	86.4	74.1	8.27	11.2	85.8
Zr	ppm	0.5	10	200	198	28.6	14.4	99.2

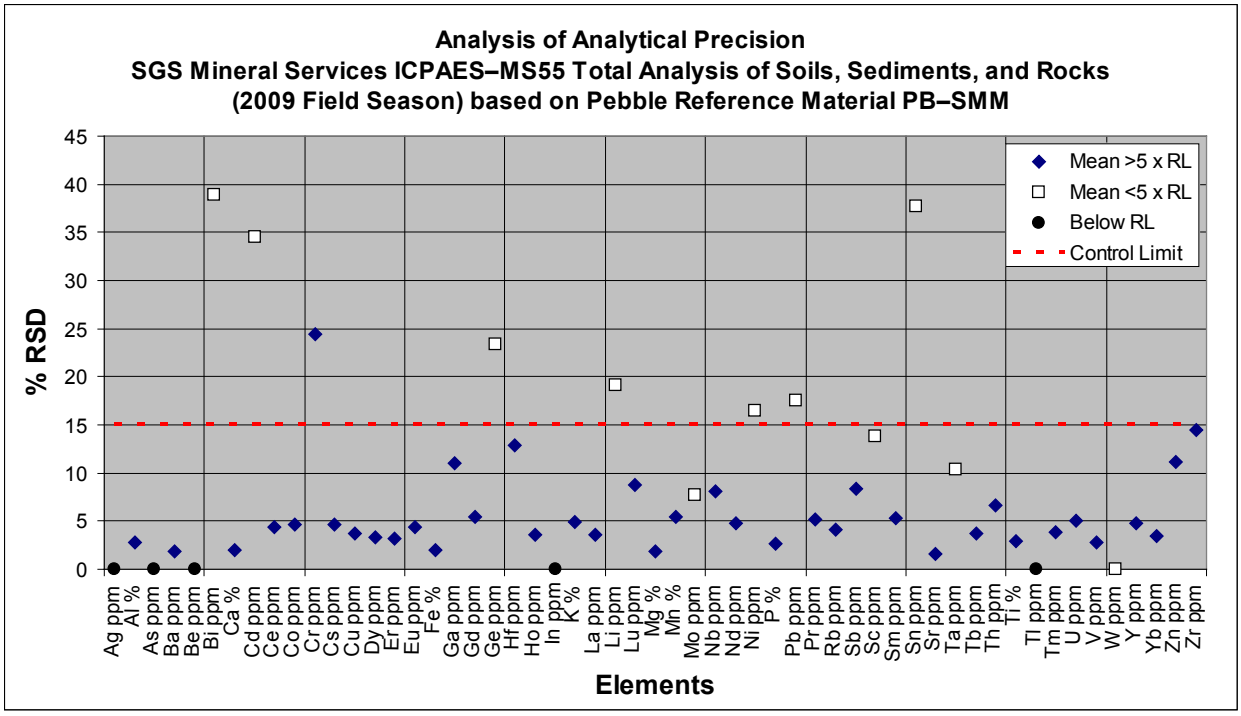

Figure 13-27. Precision plot for ten analyses of Pebble reference material PB–SMM by ICPAES–MS55 (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

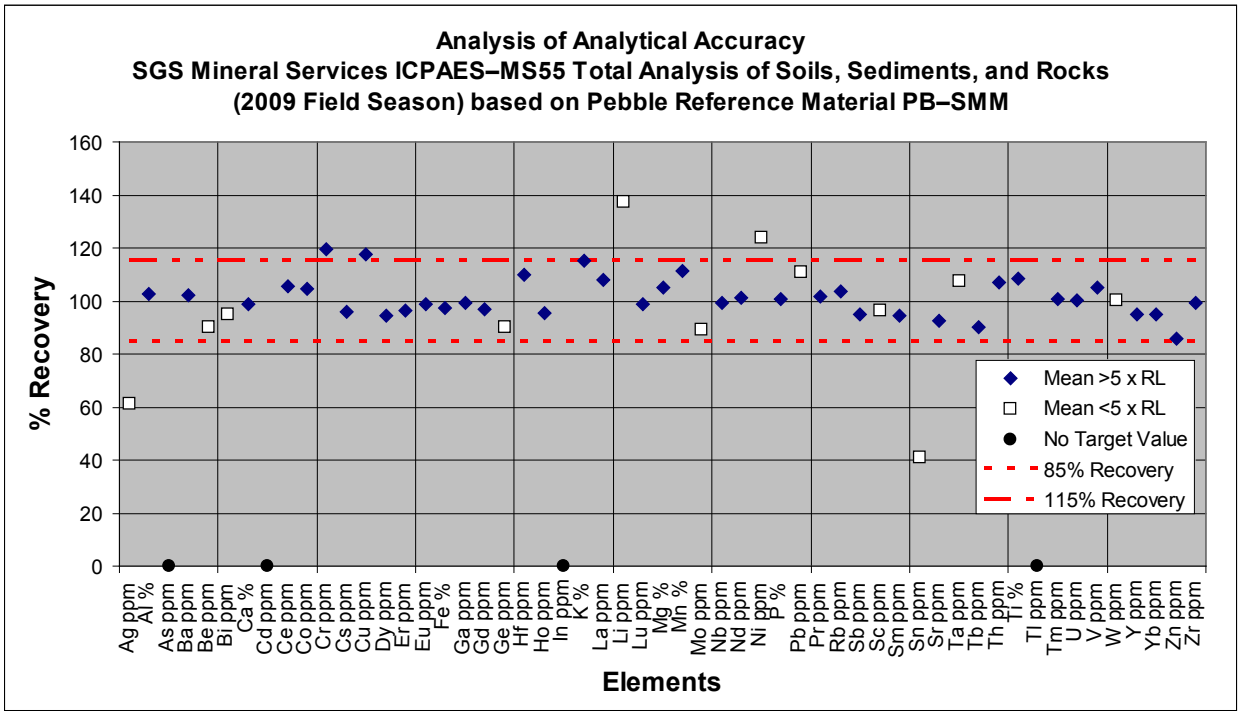

Figure 13-28. Accuracy plot for ten analyses of Pebble reference material PB–SMM by ICPAES–MS55 (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for SGS Mineral Services (USGS contract) Selected Single Element Methods Data

Table 14-1. Summary statistics for assessing analytical variation on duplicate samples; determined by various single-element methods on soil samples at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
As_Hyd	ppm	0.6	4	5.20	15.3	9.46	1.29	13.6
Sb_Hyd	ppm	0.6	4	<0.6	1.30	0.773	0.284	36.7
Se_Hyd	ppm	0.2	4	0.400	1.20	0.850	0.150	17.6
Hg_CVAA	ppm	0.02	4	0.0400	0.100	0.0625	0.0150	24.0
Au_FA	ppm	0.005	4	<0.005	0.126	0.0245	0.0439	179
Cl_ISE	ppm	50	4	110	330	226	36.2	16.0
F_ISE	ppm	20	4	180	370	240	38.1	15.9
CO2	%	0.01	4	0.0700	0.320	0.174	0.0414	23.8
Carb C	%	0.01	4	0.0200	0.0900	0.0488	0.0106	21.8
Org C	%	0.05	4	3.17	14.4	7.49	0.261	3.49
Tot C	%	0.01	4	3.19	14.5	7.54	0.261	3.46

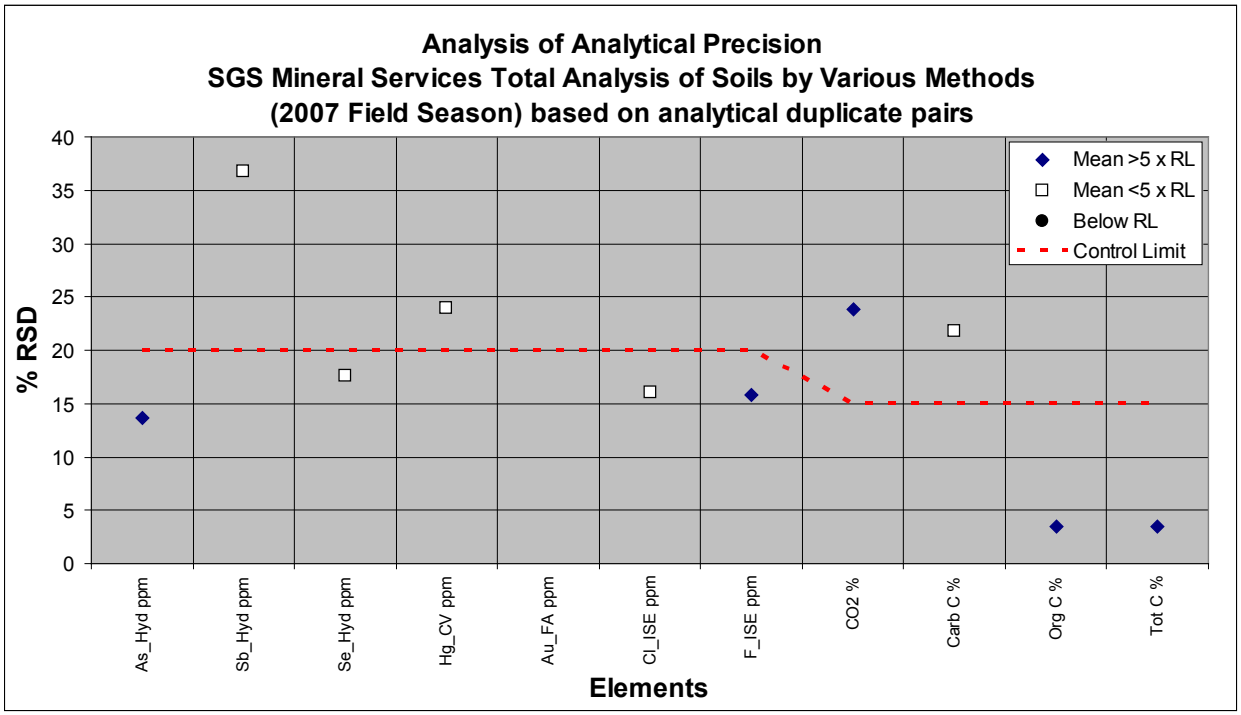

Figure 14-1. Precision plot for four analytical duplicate sample pairs by various methods (2007 field season). The %RSD for Au (not shown above) is 179%. %RSD is percent relative standard deviation; RL is reporting limit.

Table 14-2. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by various single-element methods on soil samples at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd	ppm	0.6	3	16.5	16.0	0.0577	0.360	97.2
Sb_Hyd	ppm	0.6	3	5.10	4.60	0.265	5.75	90.2
Se_Hyd	ppm	0.2	3	0.900	0.800	0	0	88.9
Hg_CVAA	ppm	0.02	3	0.155	0.173	0.0115	6.66	112
Au_FA	ppm	0.005	3	0.325	0.539	0.117	21.7	166
Cl_ISE	ppm	50	3	137	147	5.77	3.94	107
F_ISE	ppm	20	3	947	903	37.9	4.19	95.4
CO2	%	0.01	3	0.400	0.380	0	0	95.0
Carb C	%	0.01	3	0.110	0.100	0	0	90.9
Org C	%	0.05	3	0.860	0.943	0.00577	0.612	110
Tot C	%	0.01	3	0.970	1.04	0.00577	0.553	108

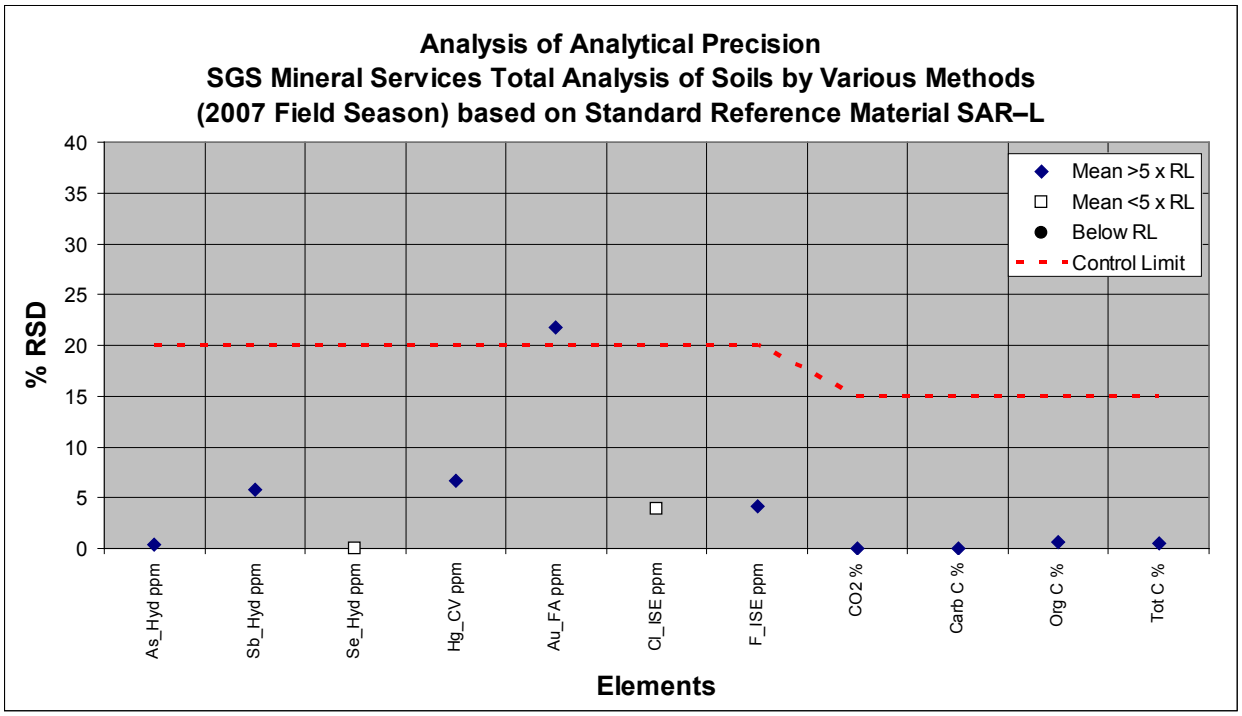

Figure 14-2. Precision plot for three analyses of standard reference material SAR–L by various methods (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

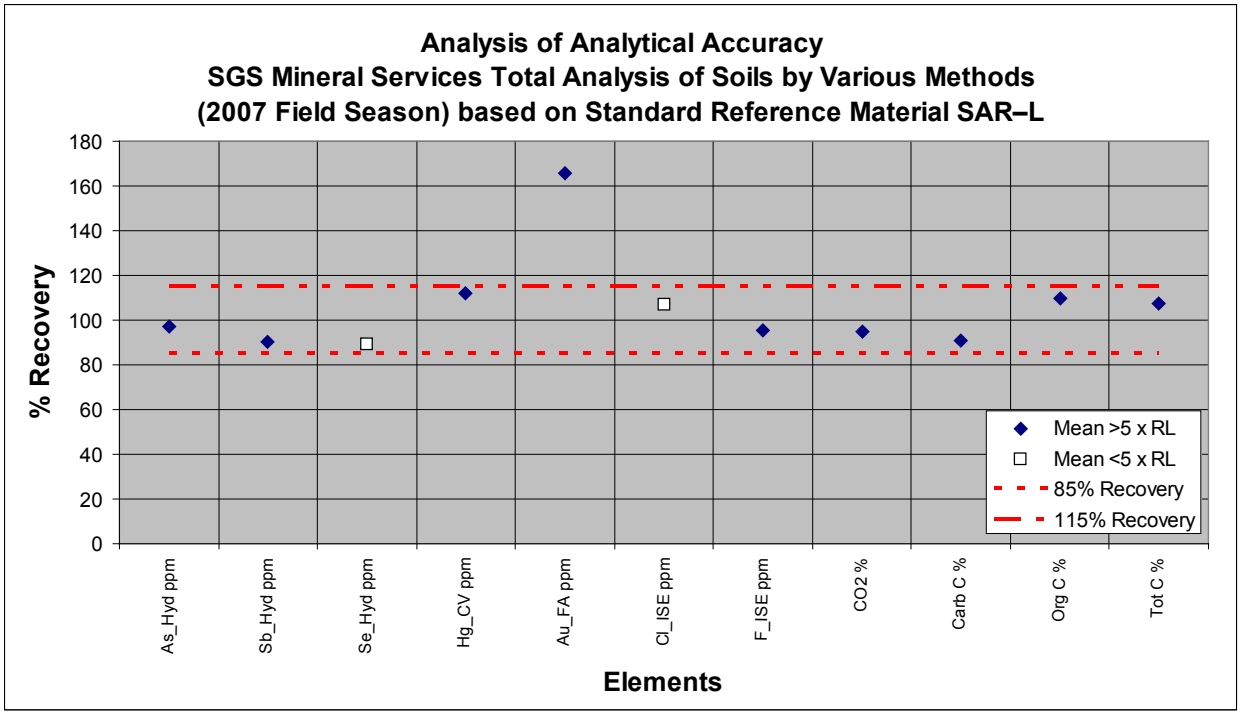

Figure 14-3. Accuracy plot for three analyses of standard reference material SAR–L by various methods (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 14-3. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined by various single-element methods on soil samples at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd	ppm	0.6	4	37.0	36.1	3.55	9.84	97.6
Sb_Hyd	ppm	0.6	4	5.60	6.15	0.289	4.69	110
Se_Hyd	ppm	0.2	4	0.330	0.325	0.126	38.7	98.5
Hg_CVAA	ppm	0.02	4	0.117	0.138	0.00957	6.96	118
Au_FA	ppm	0.005	4	0.345	0.362	0.0360	9.93	105
Cl_ISE	ppm	50	4	115	110	27.1	24.6	95.7
F_ISE	ppm	20	4	930	840	8.16	0.972	90.3
CO2	%	0.01	3	0.0700	0.0833	0.00577	6.93	119
Carb C	%	0.01	3	0.0200	0.0200	0	0	100
Org C	%	0.05	3	0.280	0.320	0.0361	11.3	114
Tot C	%	0.01	3	0.300	0.340	0.0361	10.6	113

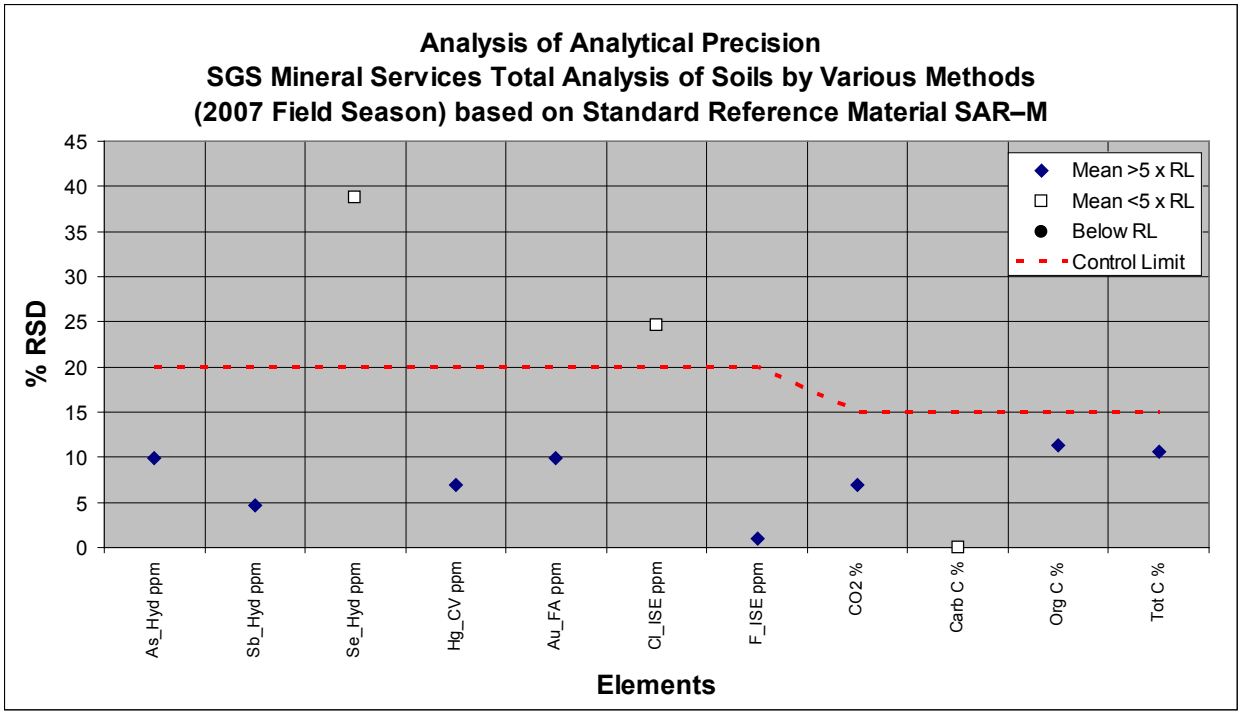

Figure 14-4. Precision plot for four analyses of standard reference material SAR–M by various methods (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

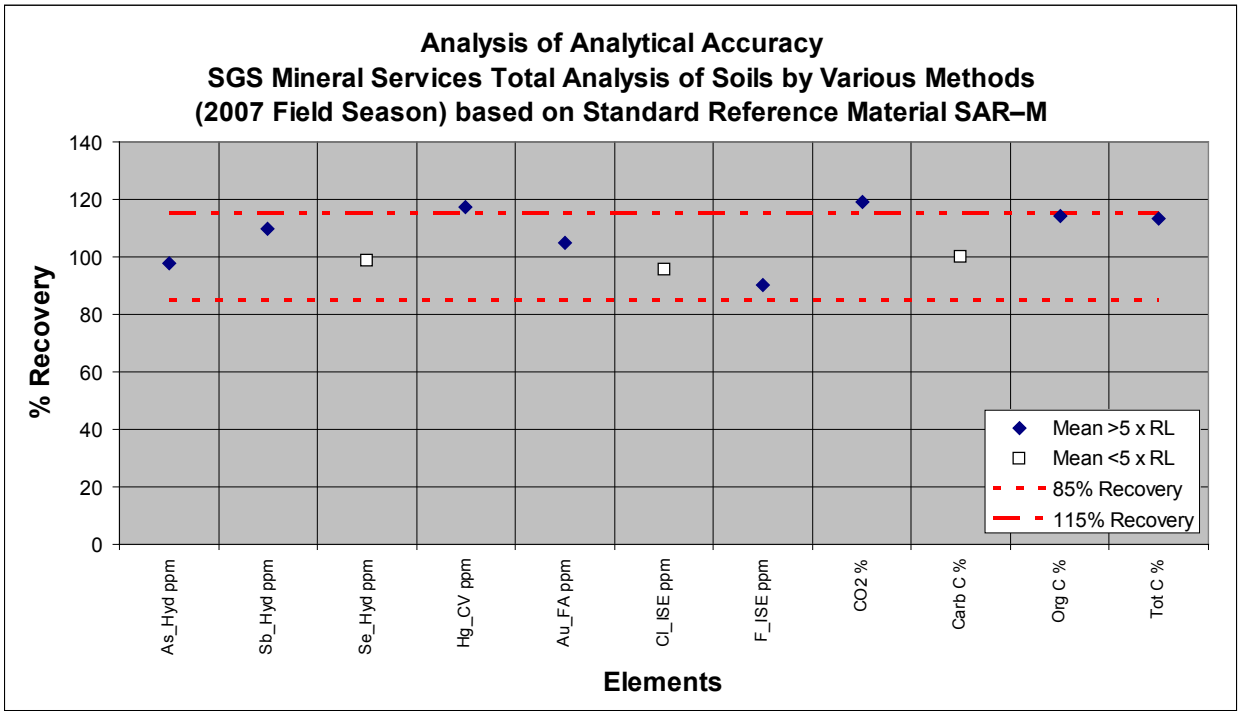

Figure 14-5. Accuracy plot for four analyses of standard reference material SAR–M by various methods (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 14-4. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by various single-element methods on soil samples at SGS Minerals (2007 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd	ppm	0.6	5	*na*	16.8	0.907	5.41	*na*
Sb_Hyd	ppm	0.6	5	*na*	1.24	0.241	19.4	*na*
Se_Hyd	ppm	0.2	5	*na*	0.880	0.0837	9.51	*na*
Hg_CVAA	ppm	0.02	5	*na*	0.0680	0.00837	12.3	*na*
Au_FA	ppm	0.005	5	*na*	0.0332	0.00687	20.7	*na*
Cl_ISE	ppm	50	5	*na*	130	12.2	9.42	*na*
F_ISE	ppm	20	5	*na*	360	10.0	2.78	*na*
CO2	%	0.01	5	*na*	0.142	0.0130	9.18	*na*
Carb C	%	0.01	5	*na*	0.0400	0	0	*na*
Org C	%	0.05	5	*na*	3.55	0.0212	0.598	*na*
Tot C	%	0.01	5	*na*	3.59	0.0212	0.591	*na*

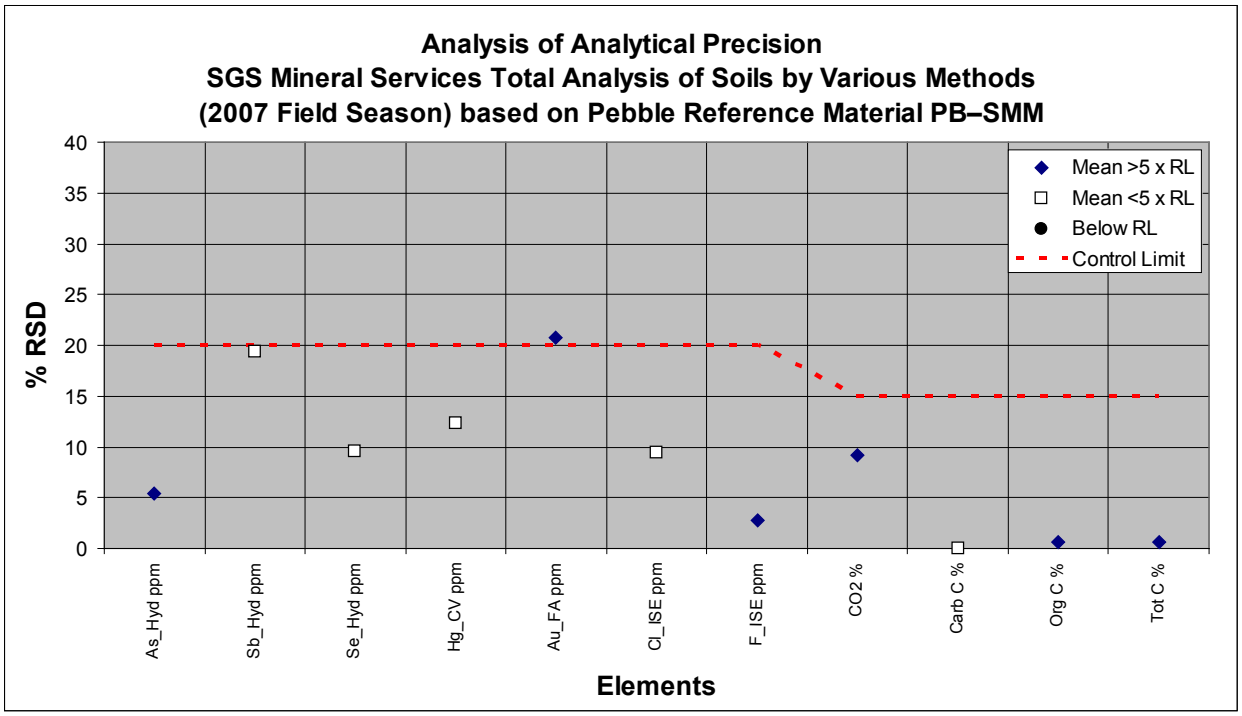

Figure 14-6. Precision plot for five analyses of Pebble reference material PB–SMM by various methods (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 14-5. Summary statistics for assessing analytical variation on duplicate samples; determined by various single-element methods on soil and sediment samples at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	11	0.600	6.60	1.68	0.117	6.94
Se_Hyd	ppm	0.2	11	<0.2	1.20	0.471	0.0833	17.7
Hg_CVAA	ppm	0.02	6	0.0200	0.230	0.0875	0.00500	5.71
Au_FA	ppm	0.005	11	<0.005	0.454	0.0496	0.0966	195
Cl_ISE	ppm	50	11	70.0	310	171	10.7	6.22
F_ISE	ppm	20	11	190	850	366	11.1	3.03
CO2	%	0.01	11	<0.01	0.300	0.0918	0.0234	25.5
Carb C	%	0.01	11	<0.01	0.0819	0.0250	0.00638	25.5
Org C	%	0.05	11	0.308	4.92	2.16	0.0208	0.962
Tot C	%	0.01	11	0.330	4.97	2.18	0.0162	0.744

[1]Elements designated with an asterisk (*) were not determined for these samples.

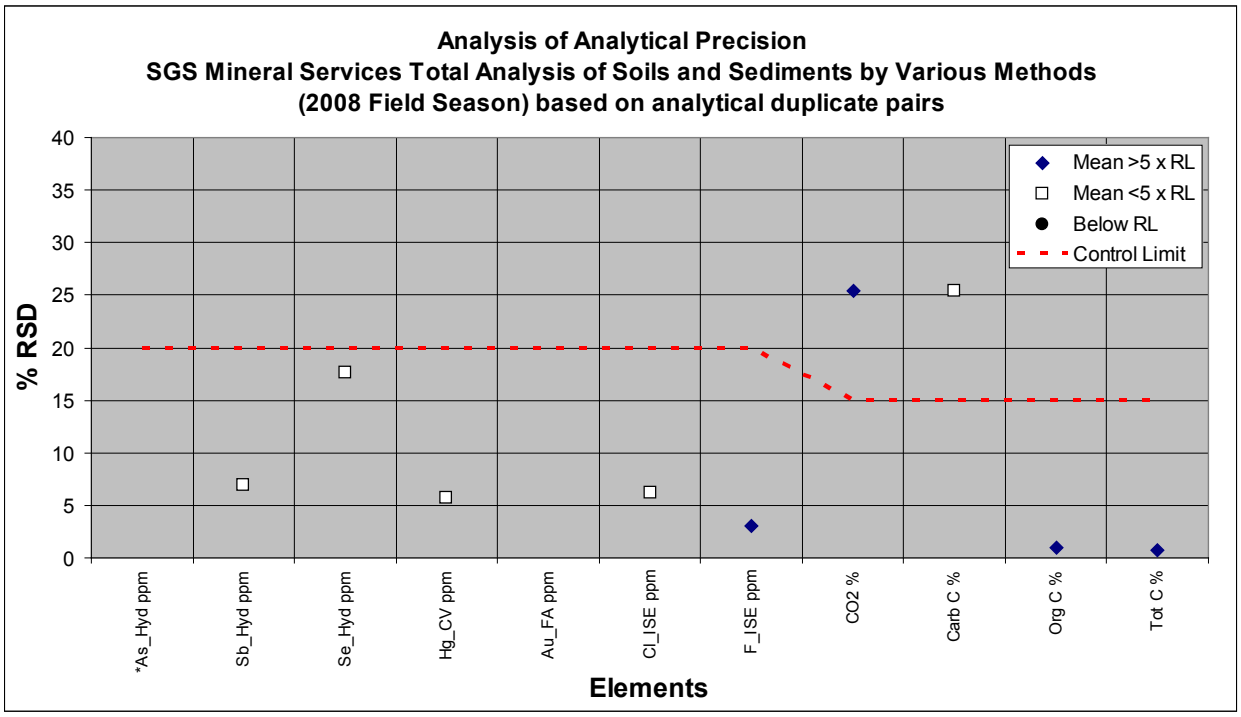

Figure 14-7. Precision plot for eleven analytical duplicate sample pairs by various methods (2008 field season). The %RSD for Au (not shown above) is 195%. Elements designated with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

Table 14-6. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by various single-element methods on soil and sediment samples at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	7	5.10	4.57	0.377	8.25	89.6
Se_Hyd	ppm	0.2	7	0.900	0.857	0.0535	6.24	95.2
Hg_CVAA	ppm	0.02	4	0.155	0.175	0.00577	3.30	113
Au_FA	ppm	0.005	6	0.325	0.511	0.274	53.7	157
Cl_ISE	ppm	50	7	137	146	5.35	3.67	106
F_ISE	ppm	20	7	947	874	25.1	2.87	92.3
CO2	%	0.01	7	0.400	0.380	0.00816	2.15	95.0
Carb C	%	0.01	7	0.110	0.103	0.00488	4.74	93.5
Org C	%	0.05	7	0.860	1.01	0.0177	1.76	117
Tot C	%	0.01	7	0.970	1.11	0.0177	1.60	115

[1]Elements desig*na*ted with an asterisk (*) were not determined for these samples.

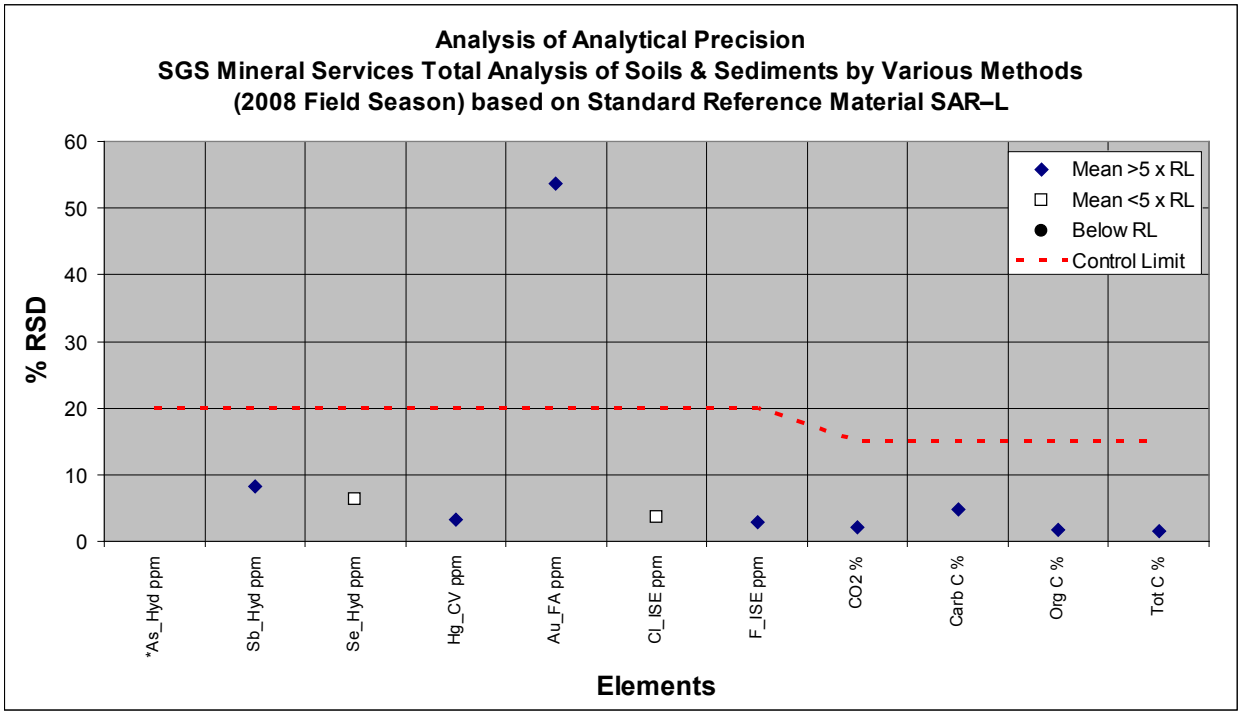

Figure 14-8. Precision plot for seven analyses of standard reference material SAR–L by various methods (2008 field season). Elements desig*na*ted with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

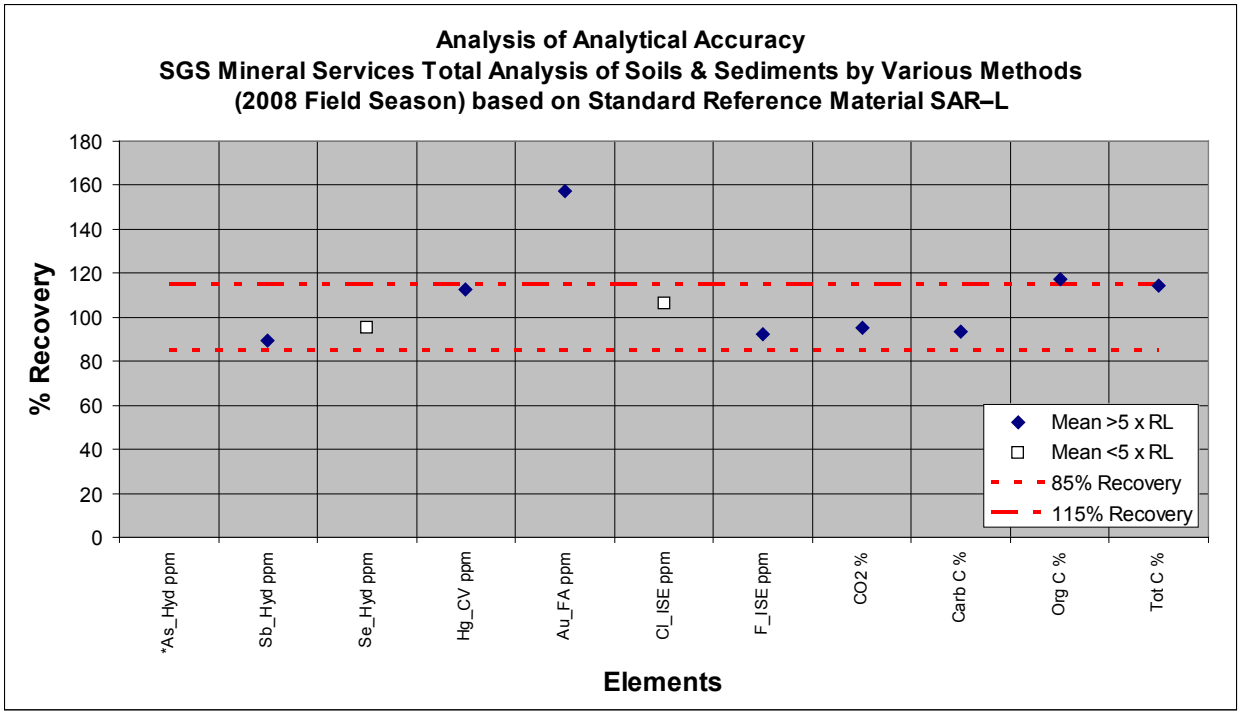

Figure 14-9. Accuracy plot for seven analyses of standard reference material SAR–L by various methods (2008 field season). Elements designated with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Table 14-7. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined by various single-element methods on soil and sediment samples at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	8	5.60	5.94	0.510	8.58	106
Se_Hyd	ppm	0.2	8	0.330	0.363	0.0518	14.3	110
Hg_CVAA	ppm	0.02	4	0.117	0.113	0.00957	8.51	96.2
Au_FA	ppm	0.005	6	0.345	0.318	0.0915	28.8	92.1
Cl_ISE	ppm	50	8	115	123	10.4	8.45	107
F_ISE	ppm	20	8	930	830	29.3	3.53	89.2
CO2	%	0.01	8	0.0700	0.0825	0.0128	15.5	118
Carb C	%	0.01	8	0.0200	0.0213	0.00354	16.6	106
Org C	%	0.05	8	0.280	0.330	0.0185	5.61	118
Tot C	%	0.01	8	0.300	0.351	0.0189	5.37	117

[1]Elements designated with an asterisk (*) were not determined for these samples.

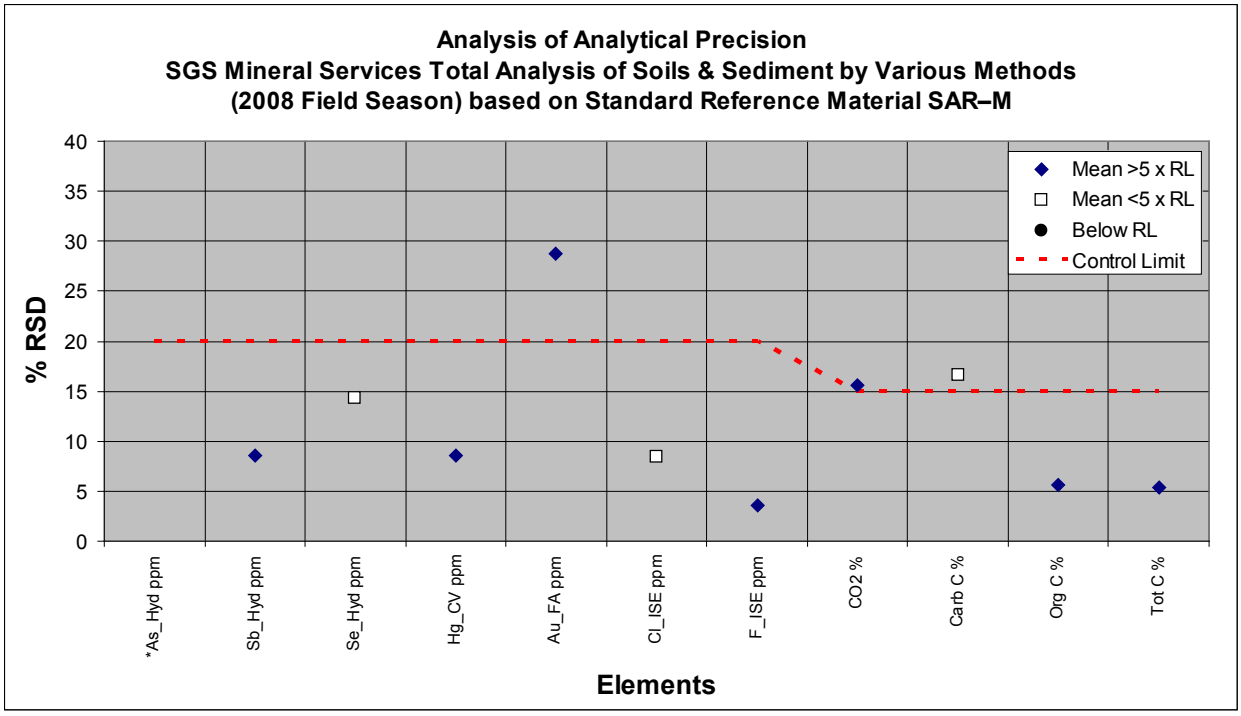

Figure 14-10. Precision plot for eight analyses of standard reference material SAR–M by various methods (2008 field season). Elements designated with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

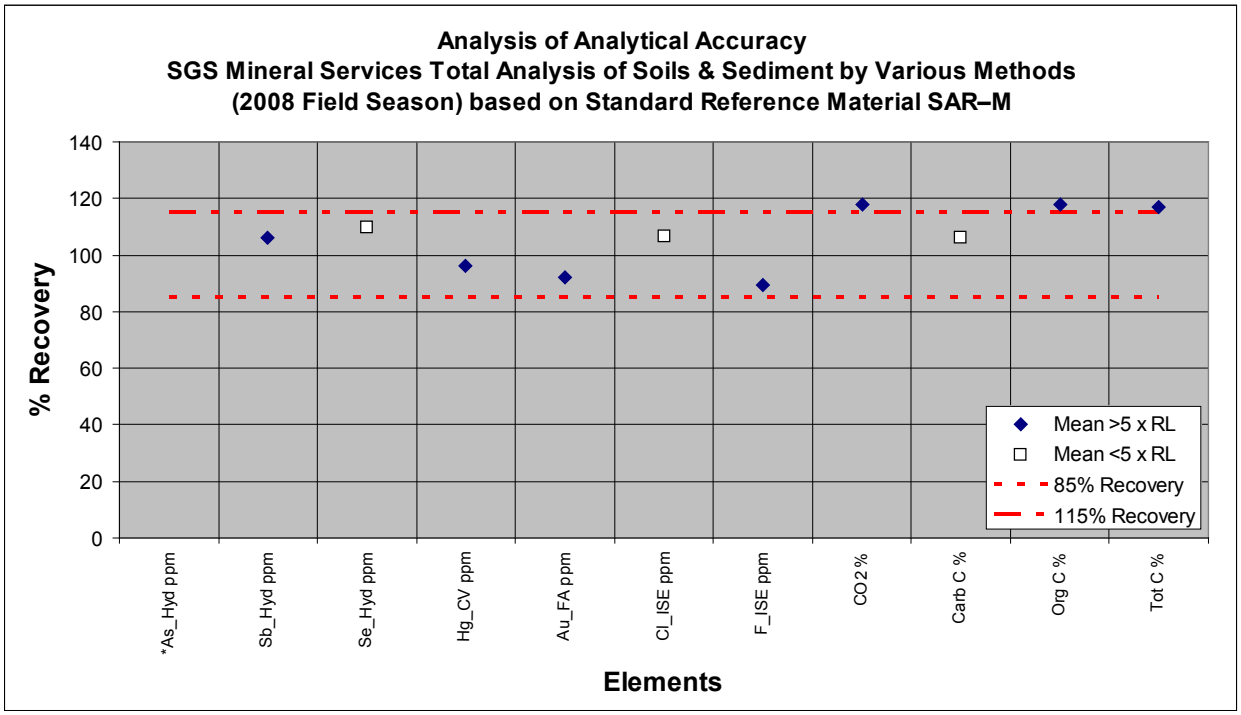

Figure 14-11. Accuracy plot for eight analyses of standard reference material SAR–M by various methods (2008 field season). Elements designated with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Table 14-8. Summary statistics for assessing analytical variation on the standard reference material DGPM; determined by various single-element methods on soil and sediment samples at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	3	14.0	15.8	1.35	8.51	113
Se_Hyd	ppm	0.2	3	1.24	1.30	0	0	105
Hg_CVAA	ppm	0.02	1	1.08	1.08	*na*	*na*	100
Au_FA	ppm	0.005	1	0.730	0.654	*na*	*na*	89.6
Cl_ISE	ppm	50	3	347	323	5.77	1.79	93.2
F_ISE	ppm	20	3	944	863	28.9	3.34	91.5
CO2	%	0.01	3	0.0300	0.0267	0.00577	21.7	88.9
Carb C	%	0.01	3	0.0100	0.0100	0	0	100
Org C	%	0.05	3	0.0900	0.113	0.0115	10.2	126
Tot C	%	0.01	3	0.100	0.123	0.0115	9.36	123

[1]Elements desig*na*ted with an asterisk (*) were not determined for these samples.

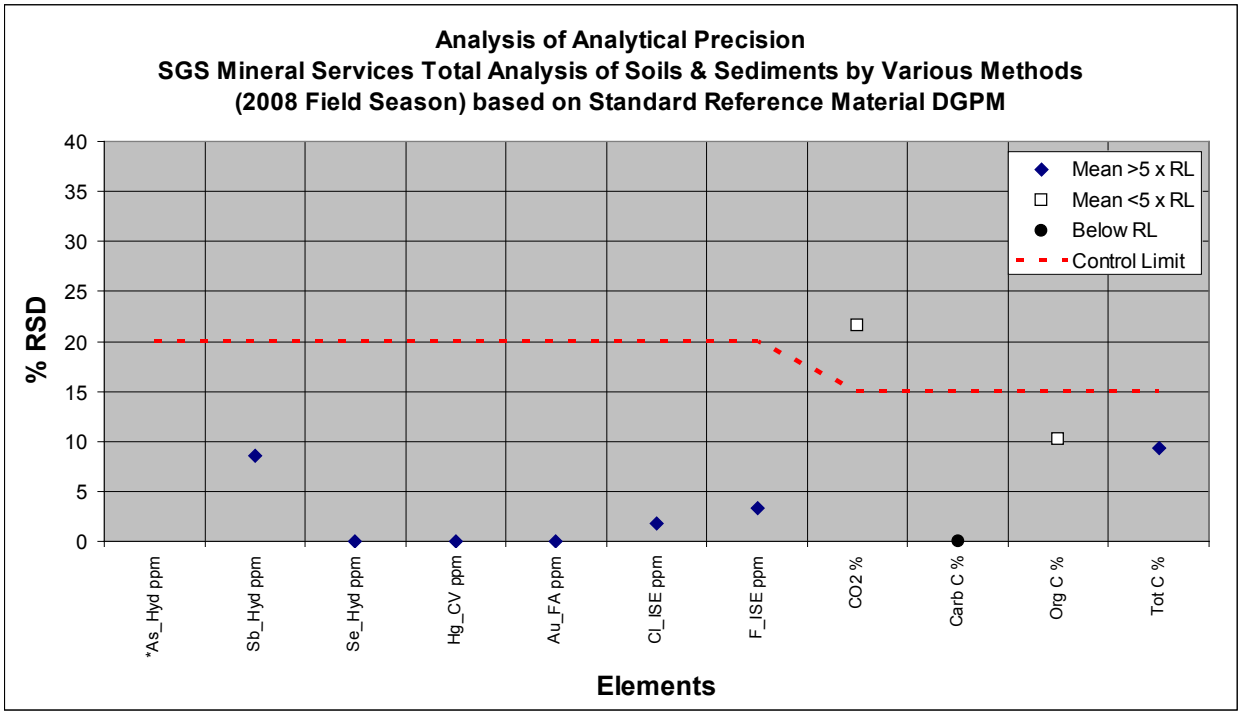

Figure 14-12. Precision plot for three analyses of standard reference material DGPM by various methods (2008 field season). Elements desig*na*ted with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

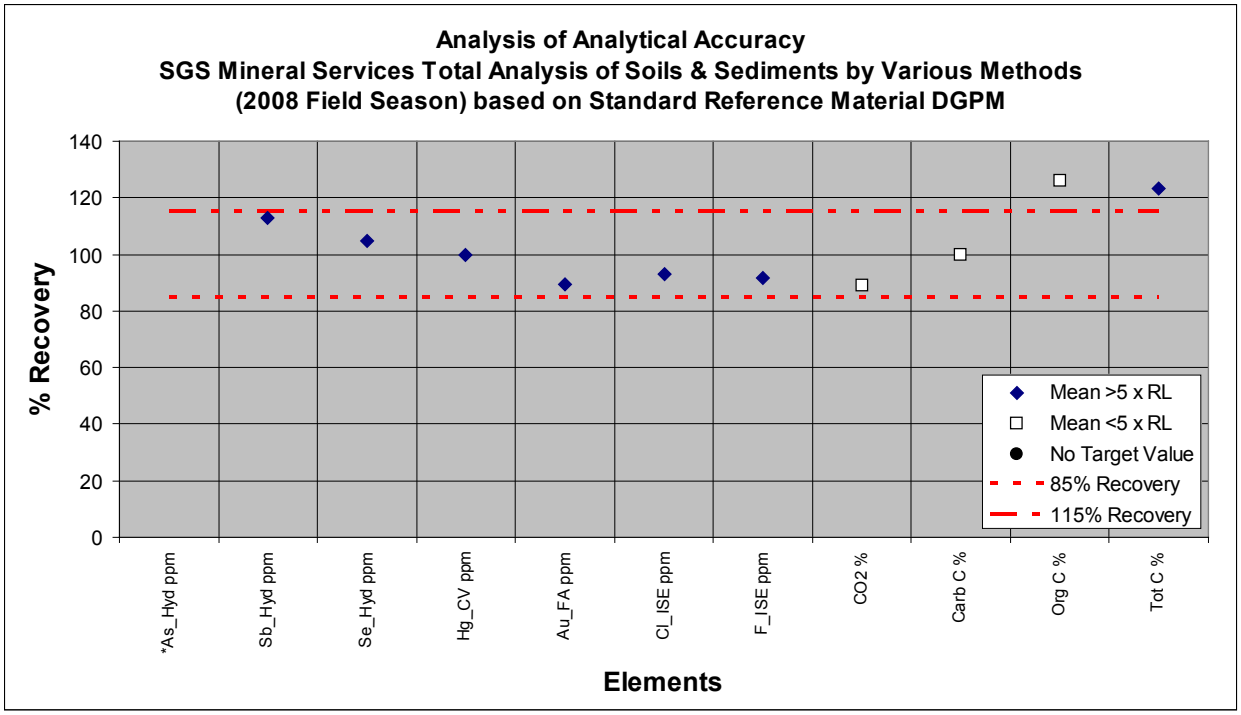

Figure 14-13. Accuracy plot for three analyses of standard reference material DGPM by various methods (2008 field season). Elements designated with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Table 14-9. Summary statistics for assessing analytical variation on the standard reference material GSP–QC; determined by various single-element methods on soil and sediment samples at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	4	*na*	0.800	0.0816	10.2	*na*
Se_Hyd	ppm	0.2	4	3.97	3.95	0.238	6.03	99.5
Hg_CVAA	ppm	0.02	2	0.260	0.245	0.00707	2.89	94.2
Au_FA	ppm	0.005	3	0.156	0.152	0.0115	7.59	97.4
Cl_ISE	ppm	50	4	372	343	20.6	6.02	92.1
F_ISE	ppm	20	4	3,100	3,160	32.0	1.01	102
CO2	%	0.01	4	0.330	0.330	0.00816	2.47	100
Carb C	%	0.01	4	0.0900	0.0900	0	0	100
Org C	%	0.05	4	0.0900	0.133	0.0171	12.9	147
Tot C	%	0.01	4	0.180	0.223	0.0171	7.68	124

[1]Elements designated with an asterisk (*) were not determined for these samples.

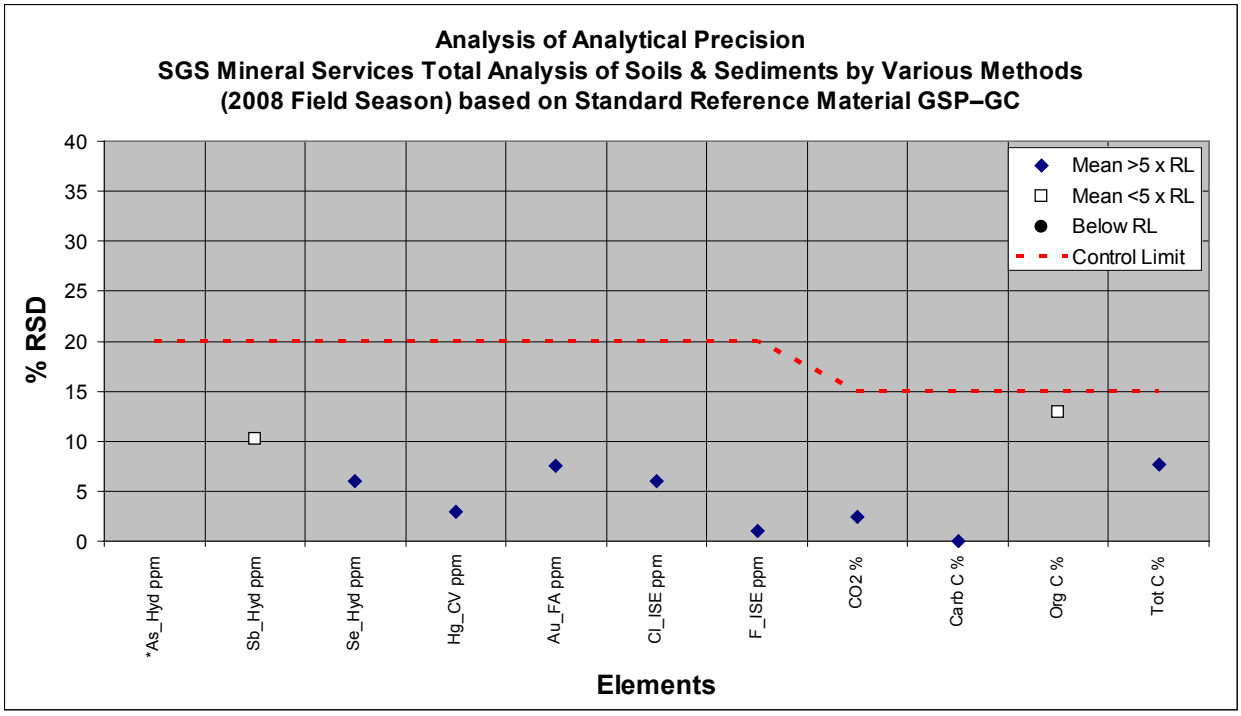

Figure 14-14. Precision plot for four analyses of standard reference material GSP–QC by various methods (2008 field season). Elements designated with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

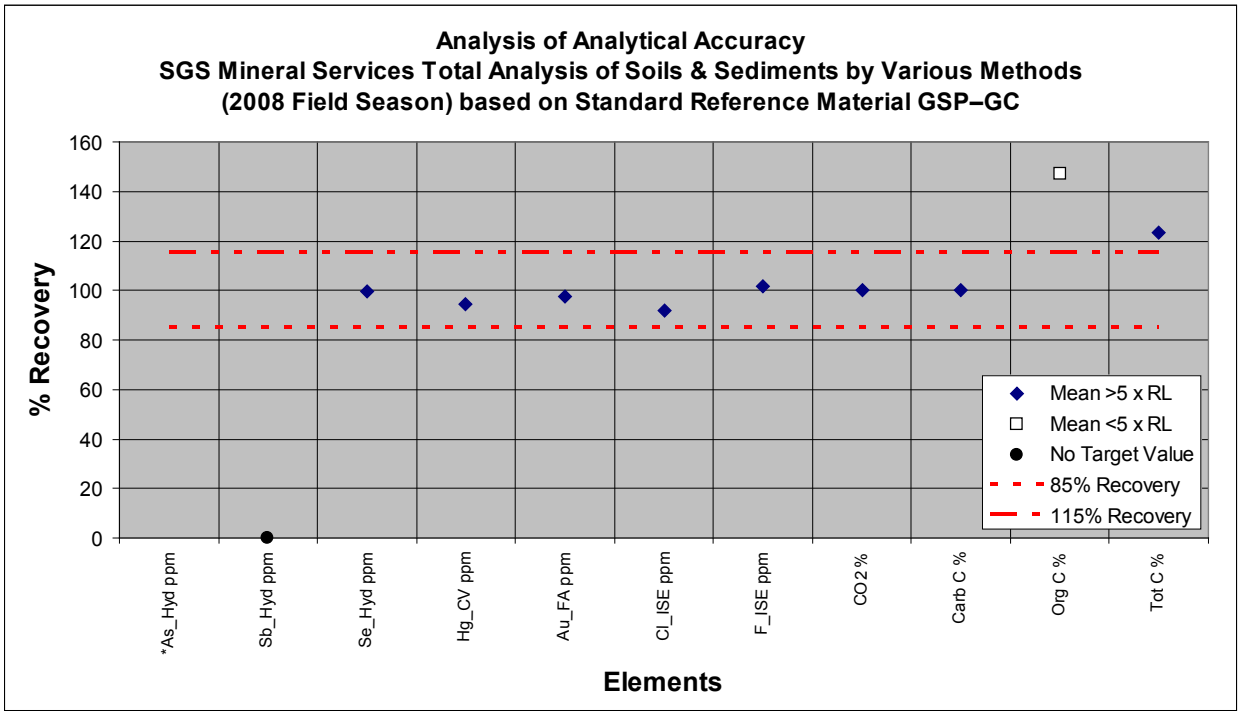

Figure 14-15. Accuracy plot for four analyses of standard reference material GSP–QC by various methods (2008 field season). Elements designated with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Table 14-10. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by various single-element methods on soil and sediment samples at SGS Minerals (2008 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	20	1.24	1.02	0.104	10.3	82.0
Se_Hyd	ppm	0.2	20	0.880	0.683	0.0857	12.5	77.7
Hg_CVAA	ppm	0.02	14	0.0680	0.0800	0.0226	28.2	118
Au_FA	ppm	0.005	19	0.0332	0.0389	0.0339	87.1	117
Cl_ISE	ppm	50	20	130	182	36.2	19.9	140
F_ISE	ppm	20	20	360	306	19.7	6.45	85.0
CO2	%	0.01	20	0.142	0.137	0.0382	27.9	96.2
Carb C	%	0.01	20	0.0400	0.0372	0.0102	27.3	93.1
Org C	%	0.05	20	3.55	3.64	0.0708	1.95	102
Tot C	%	0.01	20	3.59	3.67	0.0708	1.93	102

[1]Elements desig*na*ted with an asterisk (*) were not determined for these samples.

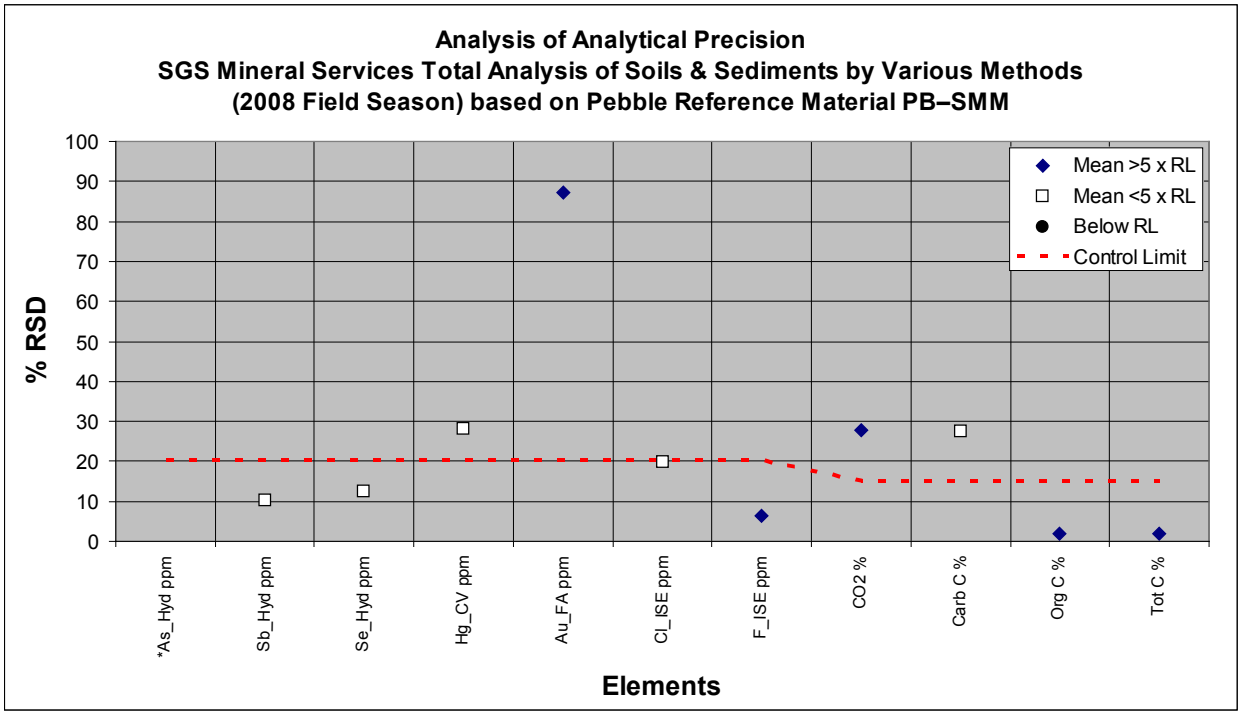

Figure 14-16. Precision plot for twenty analyses of Pebble reference material PB–SMM by various methods (2008 field season). Elements desig*na*ted with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

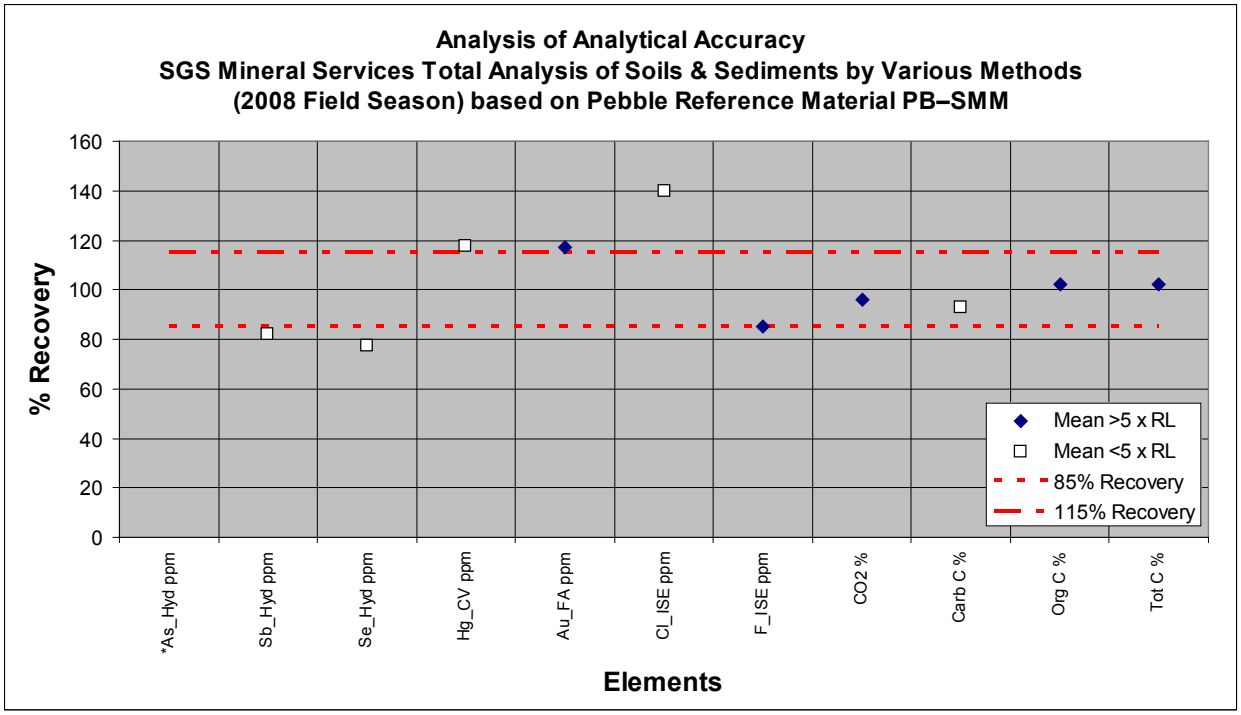

Figure 14-17. Accuracy plot for twenty analyses of Pebble reference material PB–SMM by various methods (2008 field season). Elements desig*na*ted with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Table 14-11. Summary statistics for assessing analytical variation on duplicate samples; determined by various single-element methods on soil, sediment, and rock samples at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element[1]	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	8	0.700	1.90	1.02	0.0559	5.49
Se_Hyd	ppm	0.2	8	<0.2	2.10	0.852	0.0661	7.77
Hg_CVAA	ppm	0.02	8	<0.02	0.100	0.0405	0.00251	6.20
Au_FA*	ppm	0.005	*na*	*na*	*na*	*na*	*na*	*na*
Cl_ISE	ppm	50	8	110	240	181	7.91	4.36
F_ISE	ppm	20	8	180	390	268	11.2	4.18
CO2	%	0.01	8	<0.01	0.140	0.0485	0.00866	17.8
Carb C	%	0.01	8	<0.01	0.0382	0.0132	0.00236	17.9
Org C	%	0.05	8	<0.05	6.19	2.26	0.0442	1.96
Tot C	%	0.01	8	0.0500	6.20	2.27	0.0426	1.87

[1]Elements desig*na*ted with an asterisk (*) were not determined for these samples.

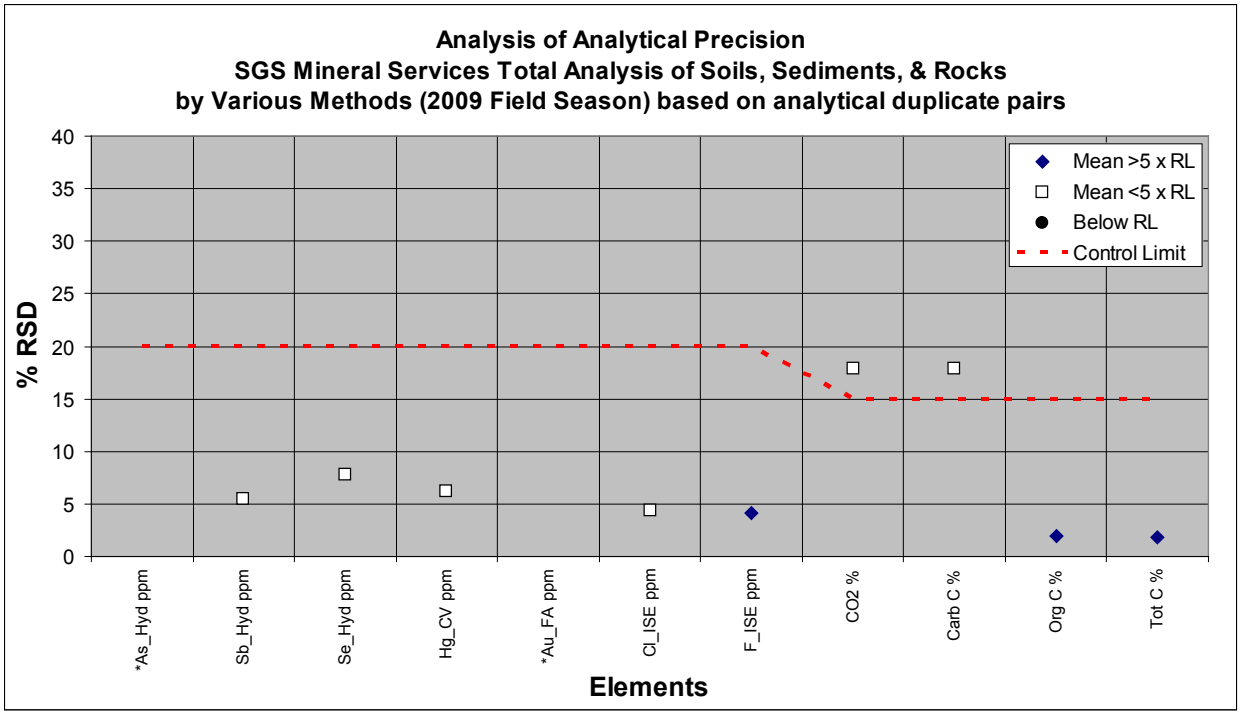

Figure 14-18. Precision plot for eight analytical duplicate sample pairs by various methods (2009 field season). Elements designated with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

Table 14-12. Summary statistics for assessing analytical variation on the standard reference material SAR–L; determined by various single-element methods on soil, sediment and rock samples at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	2	5.10	4.35	0.212	4.88	85.3
Se_Hyd	ppm	0.2	2	0.900	1.20	0	0	133
Hg_CVAA	ppm	0.02	2	0.155	0.166	0.00778	4.70	107
Au_FA*	ppm	0.005	*na*	*na*	*na*	*na*	*na*	*na*
Cl_ISE	ppm	50	2	137	140	0	0	102
F_ISE	ppm	20	2	947	820	14.1	1.72	86.6
CO2	%	0.01	2	0.400	0.375	0.00707	1.89	93.8
Carb C	%	0.01	2	0.110	0.100	0	0	90.9
Org C	%	0.05	2	0.860	0.940	0	0	109
Tot C	%	0.01	2	0.970	1.04	0	0	107

[1]Elements designated with an asterisk (*) were not determined for these samples.

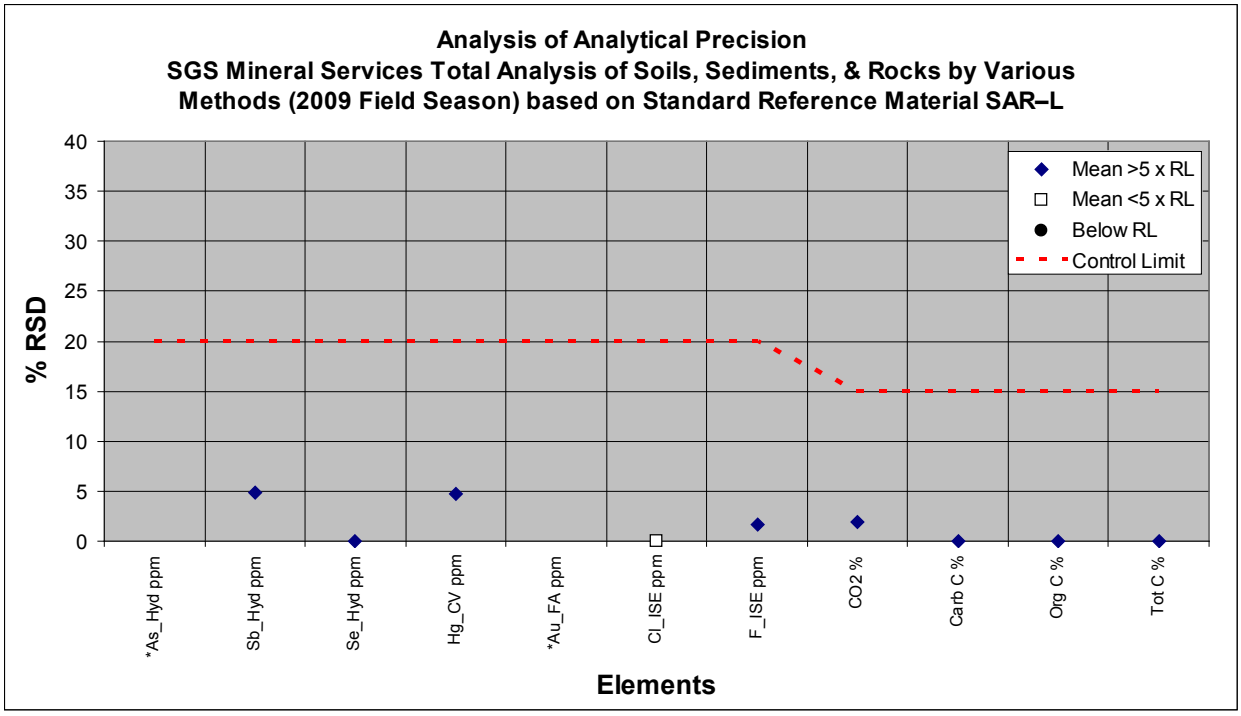

Figure 14-19. Precision plot for two analyses of standard reference material SAR–L by various methods (2009 field season). Elements designated with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

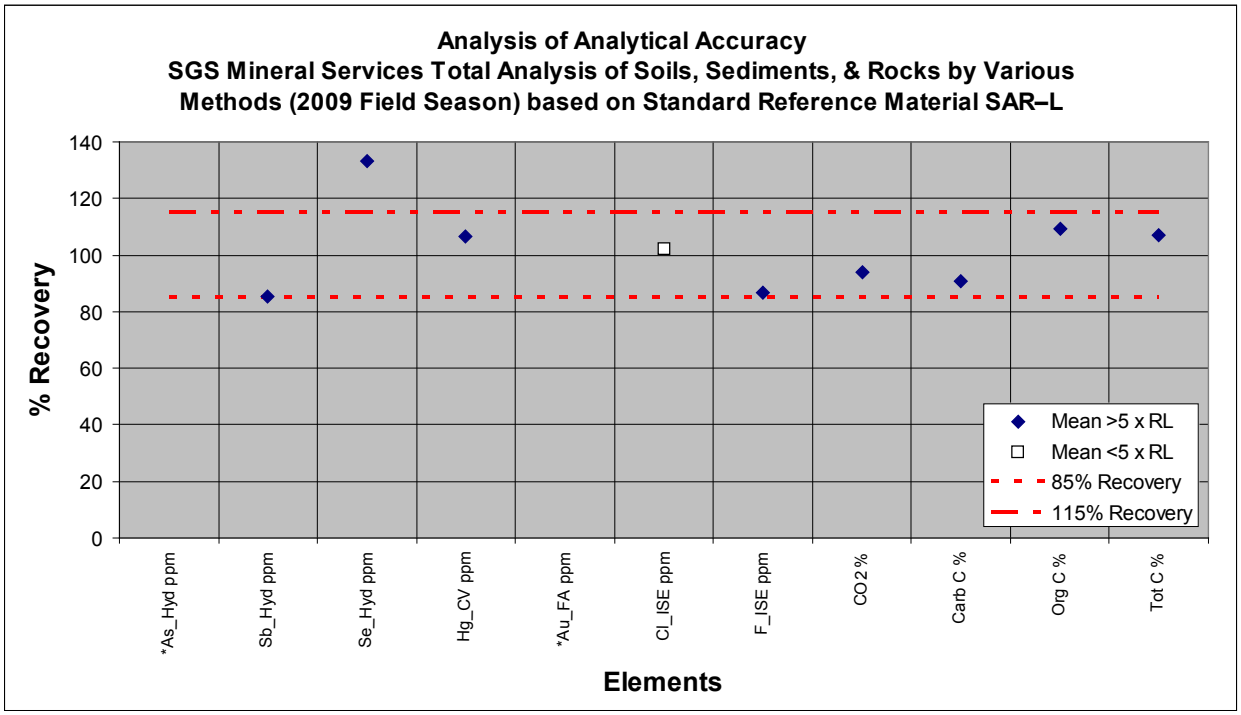

Figure 14-20. Accuracy plot for two analyses of standard reference material SAR–L by various methods (2009 field season). Elements designated with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Table 14-13. Summary statistics for assessing analytical variation on the standard reference material SAR–M; determined by various single-element methods on soil, sediment and rock samples at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	2	5.60	5.15	0.0707	1.37	92.0
Se_Hyd	ppm	0.2	2	0.330	0.300	0	0	90.9
Hg_CVAA	ppm	0.02	2	0.117	0.130	0	0	111
Au_FA*	ppm	0.005	*na*	*na*	*na*	*na*	*na*	*na*
Cl_ISE	ppm	50	2	115	110	0	0	95.7
F_ISE	ppm	20	2	930	795	21.2	2.67	85.5
CO2	%	0.01	2	0.0700	0.0800	0	0	114
Carb C	%	0.01	2	0.0200	0.0200	0	0	100
Org C	%	0.05	2	0.280	0.330	0	0	118
Tot C	%	0.01	2	0.300	0.350	0	0	117

[1]Elements desig*na*ted with an asterisk (*) were not determined for these samples.

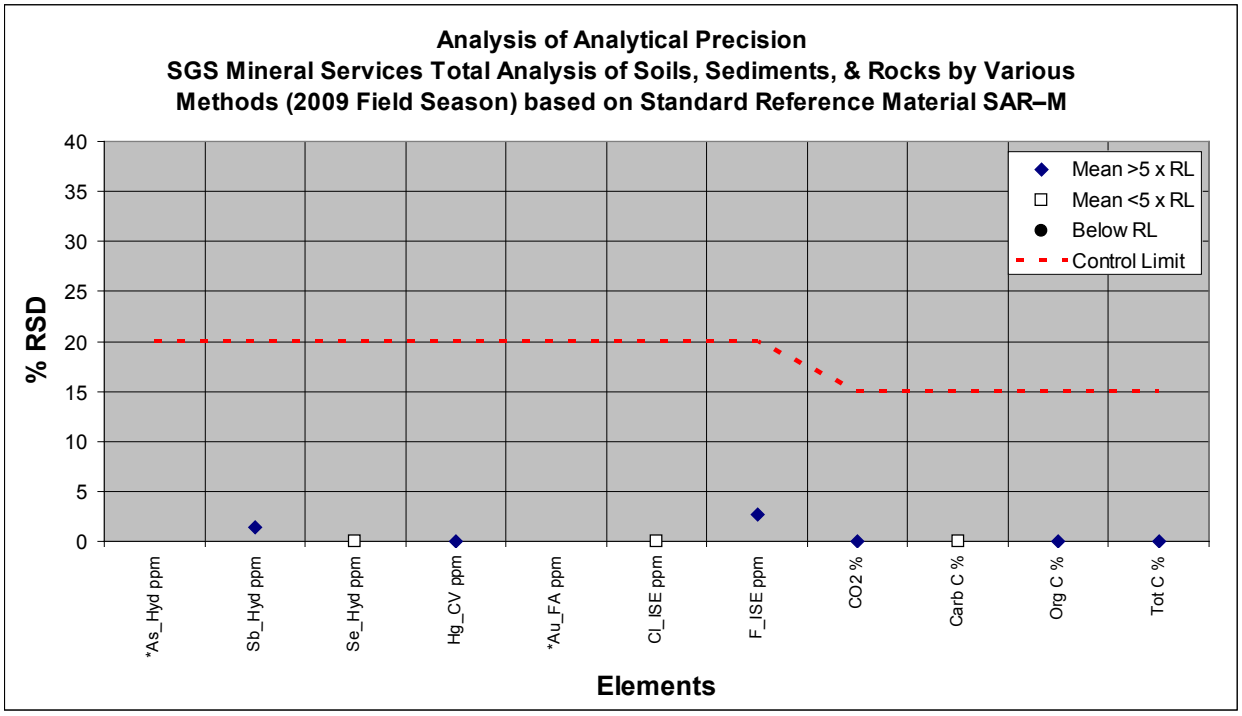

Figure 14-21. Precision plot for two analyses of standard reference material SAR–M by various methods (2009 field season). Elements desig*na*ted with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

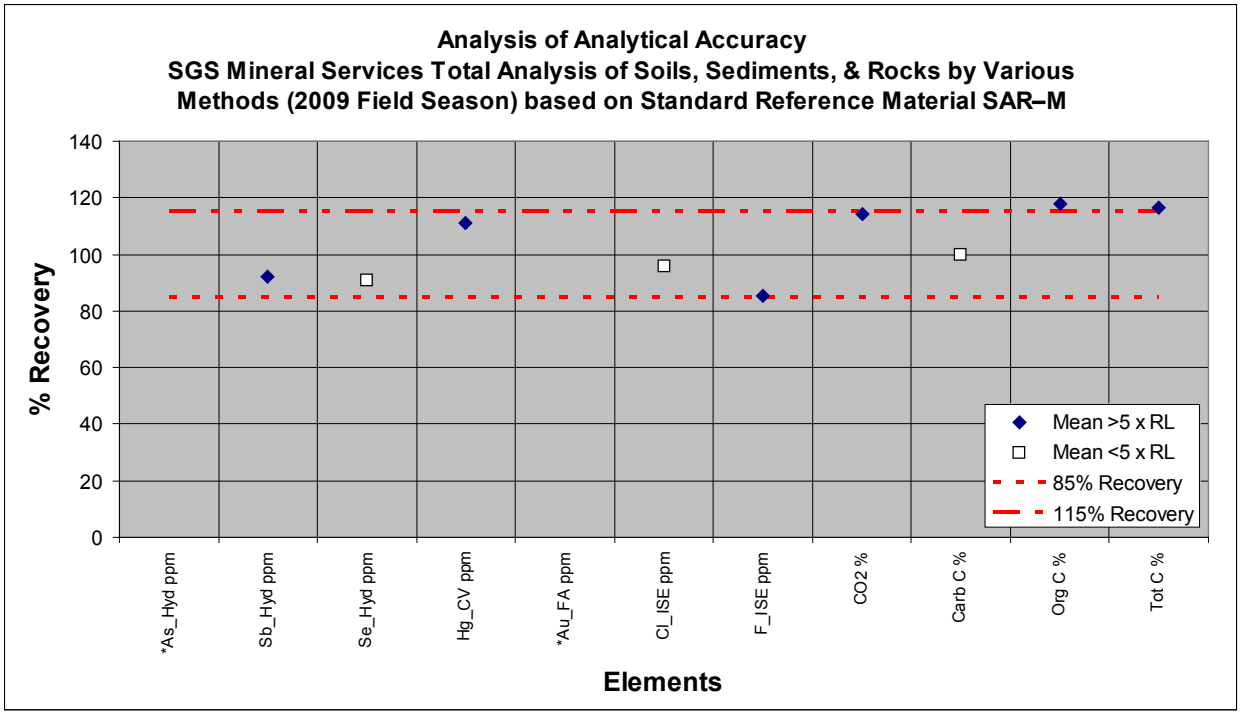

Figure 14-22. Accuracy plot for two analyses of standard reference material SAR–M by various methods (2009 field season). Elements designated with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Table 14-14. Summary statistics for assessing analytical variation on the standard reference material DGPM; determined by various single-element methods on soil, sediment and rock samples at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	5	14.0	11.1	0.829	7.48	79.1
Se_Hyd	ppm	0.2	5	1.24	1.32	0.0837	6.34	106
Hg_CVAA	ppm	0.02	5	1.08	1.06	0.0134	1.26	98.5
Au_FA	ppm	0.005	2	0.730	0.782	0.00495	0.633	107
Cl_ISE	ppm	50	5	347	326	20.7	6.36	93.9
F_ISE	ppm	20	5	944	880	43.0	4.89	93.2
CO2	%	0.01	5	0.0300	0.0218	0.0112	51.3	72.7
Carb C	%	0.01	5	0.0100	<0.01	*na*	*na*	98.2
Org C	%	0.05	5	0.0900	0.0980	0.00837	8.54	109
Tot C	%	0.01	5	0.100	0.106	0.00548	5.17	106

[1]Elements designated with an asterisk (*) were not determined for these samples.

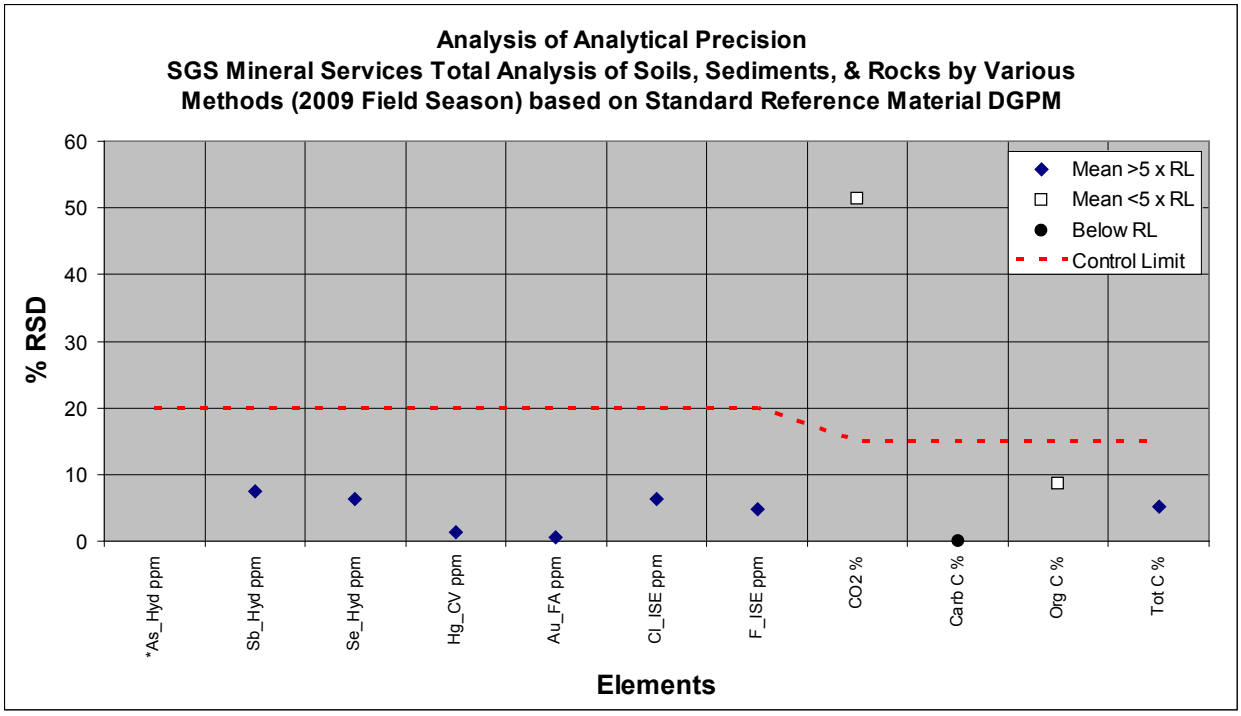

Figure 14-23. Precision plot for five analyses of standard reference material DGPM by various methods (2009 field season). Elements designated with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

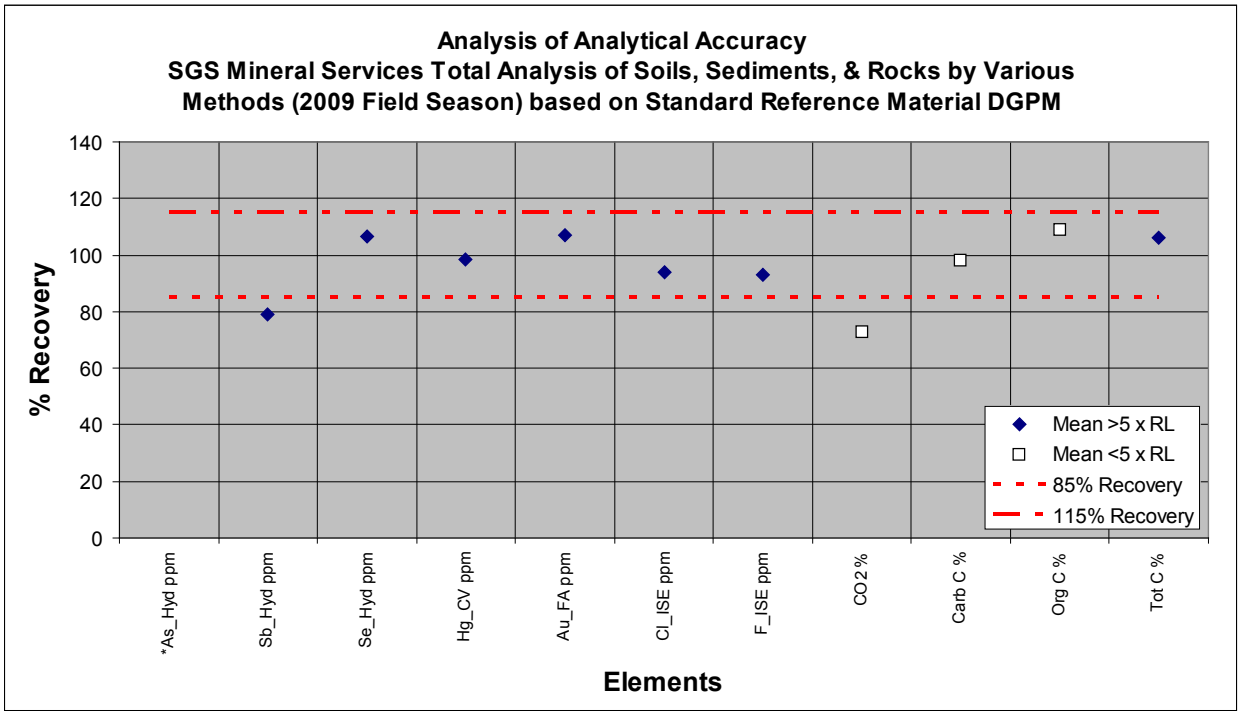

Figure 14-24. Accuracy plot for five analyses of standard reference material DGPM by various methods (2009 field season). Elements designated with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Table 14-15. Summary statistics for assessing analytical variation on the standard reference material GSP–QC; determined by various single-element methods on soil, sediment and rock samples at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	4	*na*	<0.6	*na*	*na*	*na*
Se_Hyd	ppm	0.2	4	3.97	3.85	0.0577	1.50	97.0
Hg_CVAA	ppm	0.02	4	0.260	0.253	0.00500	1.98	97.1
Au_FA	ppm	0.005	3	0.156	0.163	0.00208	1.28	104
Cl_ISE	ppm	50	4	372	333	18.9	5.69	89.4
F_ISE	ppm	20	4	3,100	3,140	51.9	1.65	101
CO2	%	0.01	4	0.330	0.328	0.0206	6.29	99.2
Carb C	%	0.01	4	0.0900	0.0875	0.00957	10.9	97.2
Org C	%	0.05	4	0.0900	0.103	0.0222	21.6	114
Tot C	%	0.01	4	0.180	0.190	0.0141	7.44	106

[1]Elements desig*na*ted with an asterisk (*) were not determined for these samples.

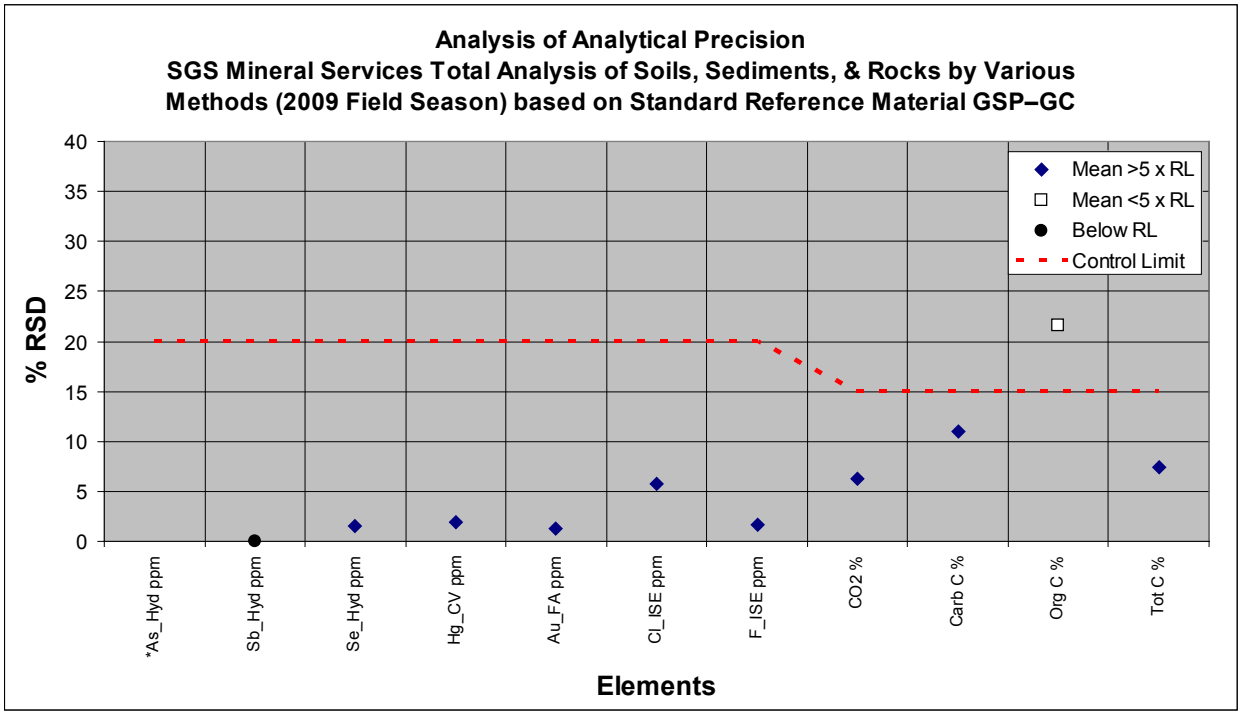

Figure 14-25. Precision plot for four analyses of standard reference material GSP–GC by various methods (2009 field season). Elements desig*na*ted with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

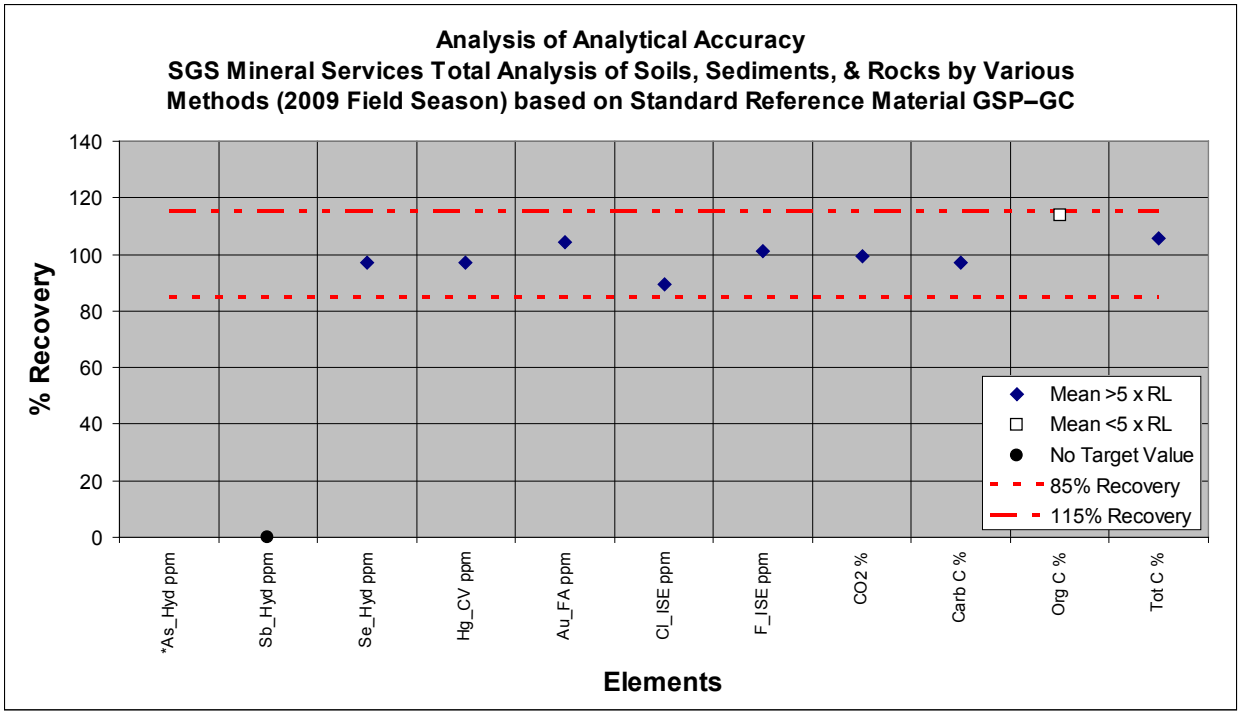

Figure 14-26. Accuracy plot for four analyses of standard reference material GSP–GC by various methods (2009 field season). Elements designated with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Table 14-16. Summary statistics for assessing analytical variation on the Pebble reference material PB–SMM; determined by various single-element methods on soil, sediment and rock samples at SGS Minerals (2009 field season).

[%, percent; ppm, parts per million; n, number of samples; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element[1]	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
As_Hyd*	ppm	0.6	*na*	*na*	*na*	*na*	*na*	*na*
Sb_Hyd	ppm	0.6	10	1.24	1.06	0.107	10.1	85.5
Se_Hyd	ppm	0.2	10	0.880	0.640	0.117	18.3	72.7
Hg_CVAA	ppm	0.02	10	0.0680	0.0725	0.00858	11.8	107
Au_FA	ppm	0.005	6	0.0332	0.0278	0.00319	11.5	83.8
Cl_ISE	ppm	50	10	130	163	14.9	9.17	125
F_ISE	ppm	20	10	360	285	37.5	13.2	79.2
CO2	%	0.01	10	0.142	0.0729	0.0584	80.1	51.3
Carb C	%	0.01	10	0.0400	0.0219	0.0163	74.2	54.8
Org C	%	0.05	10	3.55	3.62	0.0622	1.72	102
Tot C	%	0.01	10	3.59	3.64	0.0537	1.48	101

[1]Elements designated with an asterisk (*) were not determined for these samples.

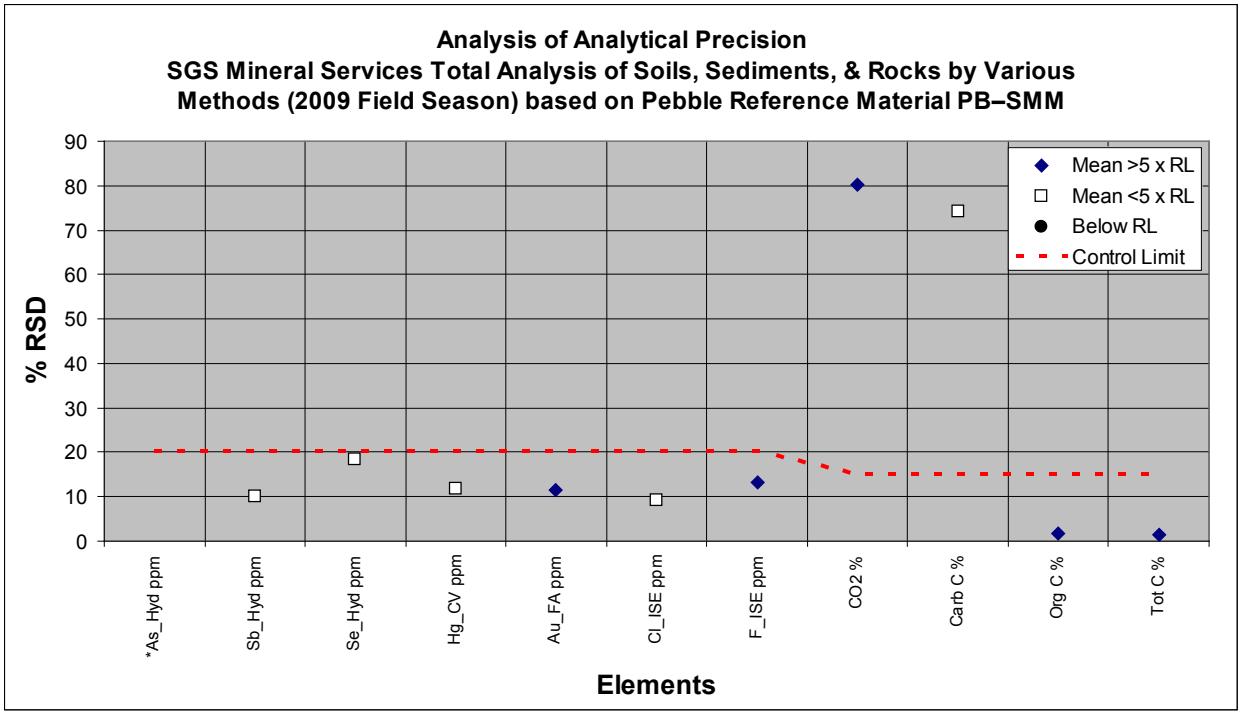

Figure 14-27. Precision plot for ten analyses of Pebble reference material PB–SMM by various methods (2009 field season). Elements designated with an asterisk (*) were not determined for these samples. %RSD is percent relative standard deviation; RL is reporting limit.

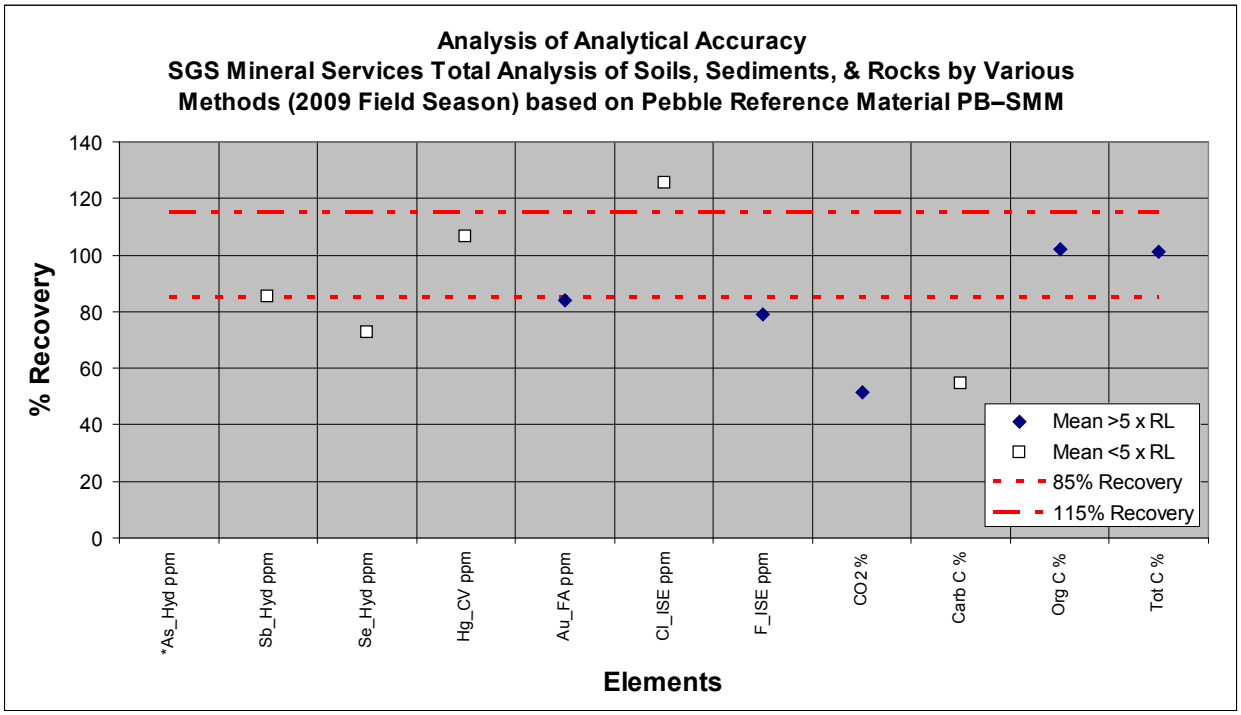

Figure 14-28. Accuracy plot for ten analyses of Pebble reference material PB–SMM by various methods (2009 field season). Elements designated with an asterisk (*) were not determined for these samples. %Recovery is percent recovery; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for Activation Laboratories, Ltd., High-Resolution ICP–MS Data

Table 15-1. Accuracy statistics for two standard reference materials determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2007 field season).

[ppb, parts per billion; ppt, parts per trillion; %Recovery, percent recovery; *na*, not applicable]

High Resolution ICP–MS			Results for SLRS–4			Results for NIST–1640		
Element	Units	Reporting Limit	Target Value	Measured Value	%Recovery	Target Value	Measured Value	%Recovery
Ag	ppt	2	*na*	*na*	*na*	7,620	7,520	98.7
As	ppb	0.04	0.680	0.765	113	26.7	26.7	100
Au	ppt	7	*na*	*na*	*na*	*na*	*na*	*na*
B	ppb	2	*na*	*na*	*na*	301	270	89.5
Ba	ppb	0.004	12.2	11.9	97.5	148	145	97.9
Be	ppt	1	7.00	4.93	70.5	34,940	31,900	91.3
Bi	ppt	0.3	*na*	*na*	*na*	*na*	*na*	*na*
Ca	ppb	0.005	6,200	5,100	82.3	7,045	6,830	96.9
Cd	ppt	0.3	12.0	14.7	122	22,790	22,800	100
Ce	ppt	2	*na*	*na*	*na*	*na*	*na*	*na*
Co	ppt	1	33.0	33.1	100	20,280	19,900	98.1
Cr	ppb	0.006	0.330	0.284	86.1	38.6	37.0	95.8
Cs	ppt	1	*na*	*na*	*na*	*na*	*na*	*na*
Cu	ppb	0.01	1.81	1.71	94.6	85.2	84.8	99.5
Dy	ppt	0.03	*na*	*na*	*na*	*na*	*na*	*na*
Er	ppt	0.02	*na*	*na*	*na*	*na*	*na*	*na*
Eu	ppt	0.03	*na*	*na*	*na*	*na*	*na*	*na*
Fe	ppb	0.1	103	95.0	92.2	34.3	32.2	93.9
Ga	ppt	1	*na*	*na*	*na*	*na*	*na*	*na*
Gd	ppt	0.03	*na*	*na*	*na*	*na*	*na*	*na*
Ge	ppt	1	*na*	*na*	*na*	*na*	*na*	*na*
Hf	ppt	0.1	*na*	*na*	*na*	*na*	*na*	*na*
Hg	ppb	0.04	*na*	*na*	*na*	*na*	*na*	*na*
Ho	ppt	0.01	*na*	*na*	*na*	*na*	*na*	*na*
In	ppt	0.1	*na*	*na*	*na*	*na*	*na*	*na*
K	ppb	1	680	607	89.3	994	948	95.3
La	ppt	2	*na*	*na*	*na*	*na*	*na*	*na*
Li	ppb	0.03	*na*	*na*	*na*	50.7	46.0	90.7
Lu	ppt	0.01	*na*	*na*	*na*	*na*	*na*	*na*
Mg	ppb	0.2	1,600	1,490	93.1	5,819	5,600	96.2
Mn	ppb	0.1	3.37	3.17	94.2	122	123	101
Mo	ppb	0.004	0.210	0.186	88.6	46.75	42.6	91.1
Na	ppb	20	2,400	2,060	85.8	29,350	28,000	95.4
Nb	ppt	0.1	*na*	*na*	*na*	*na*	*na*	*na*
Nd	ppt	0.1	*na*	*na*	*na*	*na*	*na*	*na*
Ni	ppb	0.05	0.670	0.633	94.5	27.4	26.8	97.9
Pb	ppb	0.003	0.0860	0.0810	94.2	27.9	26.6	95.2
Pr	ppt	0.03	*na*	*na*	*na*	*na*	*na*	*na*
Rb	ppb	0.04	*na*	*na*	*na*	2.00	1.82	91.1
Re	ppt	0.1	*na*	*na*	*na*	*na*	*na*	*na*
Sb	ppt	1	230	257	112	13,790	13,000	94.3
Sc	ppt	10	*na*	*na*	*na*	*na*	*na*	*na*
Se	ppb	3	*na*	*na*	*na*	22.0	17.7	80.4
Sm	ppt	0.3	*na*	*na*	*na*	*na*	*na*	*na*
Sn	ppt	6	*na*	*na*	*na*	*na*	*na*	*na*
Sr	ppb	0.01	26.3	26.9	102	124	119	96.1
Ta	ppt	0.5	*na*	*na*	*na*	*na*	*na*	*na*
Tb	ppt	0.02	*na*	*na*	*na*	*na*	*na*	*na*
Te	ppt	1	*na*	*na*	*na*	*na*	*na*	*na*
Th	ppt	0.02	*na*	*na*	*na*	*na*	*na*	*na*
Ti	ppb	0.01	*na*	*na*	*na*	*na*	*na*	*na*

Table 15-1. Accuracy statistics for two standard reference materials determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2007 field season)—Continued.

High Resolution ICP–MS			Results for SLRS–4			Results for NIST–1640		
Element	Units	Reporting Limit	Target Value	Measured Value	%Recovery	Target Value	Measured Value	%Recovery
Tl	ppt	0.1	*na*	*na*	*na*	*na*	*na*	*na*
Tm	ppt	0.1	*na*	*na*	*na*	*na*	*na*	*na*
U	ppt	0.1	50.0	46.5	93.0	*na*	*na*	*na*
V	ppt	0.4	320	307	95.8	12,990	13,000	100
W	ppt	1	*na*	*na*	*na*	*na*	*na*	*na*
Y	ppt	0.3	*na*	*na*	*na*	*na*	*na*	*na*
Yb	ppt	0.05	*na*	*na*	*na*	*na*	*na*	*na*
Zn	ppb	0.4	0.930	0.911	98.0	53.2	51.8	97.3
Zr	ppt	1	*na*	*na*	*na*	*na*	*na*	*na*

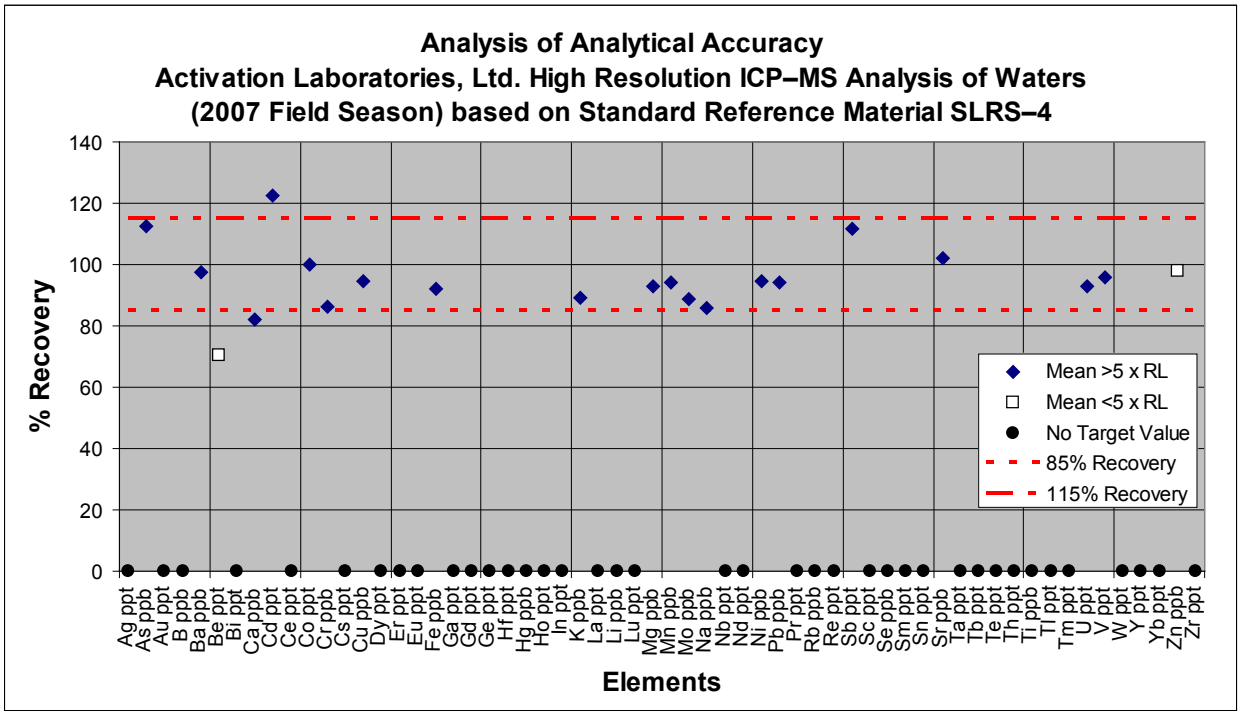

Figure 15-1. Accuracy plot for one analysis of standard reference material SLRS–4 by HR ICP–MS (2007 field season). %Recovery is percent recovery; RL is reporting limit.

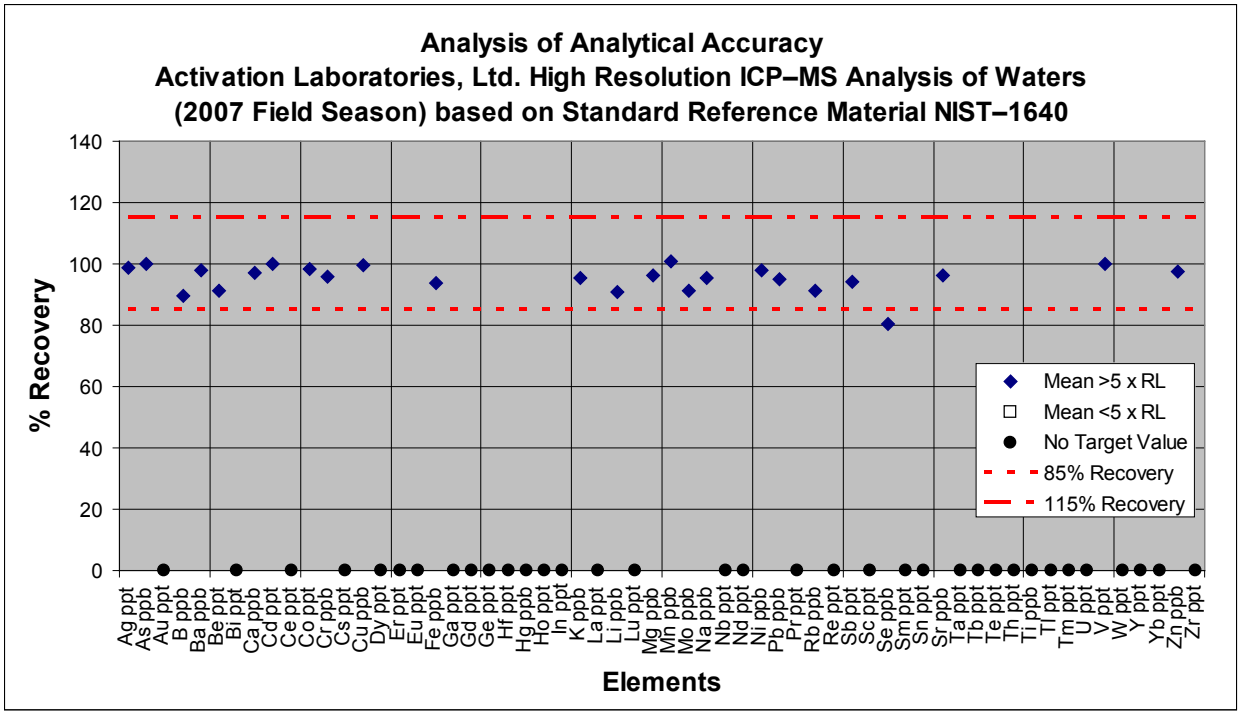

Figure 15-2. Accuracy plot for one analysis of standard reference material NIST–1640 by HR ICP–MS (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 15-2. Summary statistics for assessing analytical variation on the standard reference material NIST–1643e; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2008 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.002	3	1.06	1.03	0.00765	0.740	97.3
As	ppb	0.04	3	60.5	57.7	1.28	2.21	95.5
Au	ppb	0.007	3	*na*	<0.007	*na*	*na*	*na*
B	ppb	2	3	158	147	0.507	0.346	93.0
Ba	ppb	0.004	3	544	538	16.0	2.98	98.8
Be	ppb	0.001	3	14.0	13.7	0.141	1.03	98.0
Bi	ppb	0.0003	3	14.1	14.0	0.526	3.76	99.4
Ca	ppb	0.005	3	32,300	30,800	224	0.726	95.4
Cd	ppb	0.0003	3	6.57	6.54	0.0452	0.691	99.6
Ce	ppb	0.002	3	*na*	0.0426	0.00801	18.8	*na*
Co	ppb	0.001	3	27.1	26.6	0.334	1.25	98.4
Cr	ppb	0.006	3	20.4	20.1	0.0686	0.341	98.6
Cs	ppb	0.001	3	*na*	0.00538	0.00141	26.3	*na*
Cu	ppb	0.01	3	22.8	22.6	0.510	2.25	99.5
Dy	ppb	0.00003	3	*na*	0.000466	0.0000536	11.5	*na*
Er	ppb	0.00002	3	*na*	0.00944	0.000276	2.92	*na*
Eu	ppb	0.00003	3	*na*	0.169	0.00751	4.44	*na*
Fe	ppb	0.1	3	98.1	103	2.69	2.62	105
Ga	ppb	0.001	3	*na*	0.0257	0.00434	16.8	*na*
Gd	ppb	0.00003	3	*na*	0.00208	0.000209	10.0	*na*
Ge	ppb	0.001	3	*na*	<0.001	*na*	*na*	*na*
Hf	ppb	0.0001	3	*na*	0.00371	0.000661	17.9	*na*
Hg	ppb	0.04	3	*na*	<0.04	*na*	*na*	*na*

Table 15-2. Summary statistics for assessing analytical variation on the standard reference material NIST–1643e; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2008 field season)—Continued.

[ppb, parts per billion; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ho	ppb	0.00001	3	*na*	0.000333	0.0000107	3.21	*na*
In	ppb	0.0001	3	*na*	0.00270	0.000384	14.3	*na*
K	ppb	1	3	2,034	1,990	55.9	2.81	97.7
La	ppb	0.002	3	*na*	0.124	0.00813	6.54	*na*
Li	ppb	0.03	3	17.4	18.3	1.12	6.14	105
Lu	ppb	0.00001	3	*na*	<0.00001	*na*	*na*	*na*
Mg	ppb	0.2	3	8,037	8,090	225	2.78	101
Mn	ppb	0.1	3	39.0	38.6	0.285	0.738	99.0
Mo	ppb	0.004	3	121	122	1.02	0.835	101
Na	ppb	20	3	20,740	20,900	62.2	0.298	101
Nb	ppb	0.0001	3	*na*	0.00335	0.0000170	0.509	*na*
Nd	ppb	0.0001	3	*na*	0.0150	0.000682	4.54	*na*
Ni	ppb	0.05	3	62.4	58.3	1.82	3.12	93.4
Pb	ppb	0.003	3	19.6	19.5	0.154	0.788	99.2
Pd	ppb	0.001	3	*na*	0.241	0.00400	1.66	*na*
Pr	ppb	0.00003	3	*na*	0.00887	0.000537	6.05	*na*
Pt	ppb	0.001	3	*na*	<0.001	*na*	*na*	*na*
Rb	ppb	0.04	3	14.1	13.8	1.03	7.44	97.9
Re	ppb	0.0001	3	*na*	95.7	0.264	0.275	*na*
Ru	ppb	0.001	3	*na*	<0.001	*na*	*na*	*na*
Sb	ppb	0.001	3	58.3	57.4	0.349	0.609	98.4
Sc	ppb	0.01	3	*na*	<0.01	*na*	*na*	*na*
Se	ppb	3	3	12.0	11.9	0.674	5.66	99.5
Sm	ppb	0.0003	3	*na*	0.00321	0.000240	7.48	*na*
Sn	ppb	0.006	3	*na*	0.0232	0.00594	25.6	*na*
Sr	ppb	0.01	3	323	323	5.71	1.77	100
Ta	ppb	0.0005	3	*na*	0.00101	0.000237	23.5	*na*
Tb	ppb	0.00002	3	*na*	0.000256	0.0000150	5.88	*na*
Te	ppb	0.001	3	1.09	1.10	0.0218	1.98	101
Th	ppb	0.00002	3	*na*	0.00144	0.000117	8.13	*na*
Ti	ppb	0.01	3	*na*	0.167	0.00208	1.25	*na*
Tl	ppb	0.0001	3	7.45	7.34	0.127	1.74	98.6
Tm	ppb	0.0001	3	*na*	<0.0001	*na*	*na*	*na*
U	ppb	0.0001	3	*na*	0.00220	0.000273	12.4	*na*
V	ppb	0.0004	3	37.9	37.4	0.477	1.27	98.9
W	ppb	0.001	3	*na*	0.0510	0.0153	29.9	*na*
Y	ppb	0.0003	3	*na*	0.0355	0.00258	7.26	*na*
Yb	ppb	0.00005	3	*na*	0.000284	0.0000176	6.20	*na*
Zn	ppb	0.4	3	78.5	80.8	2.29	2.83	103
Zr	ppb	0.001	3	*na*	0.0208	0.00153	7.34	*na*

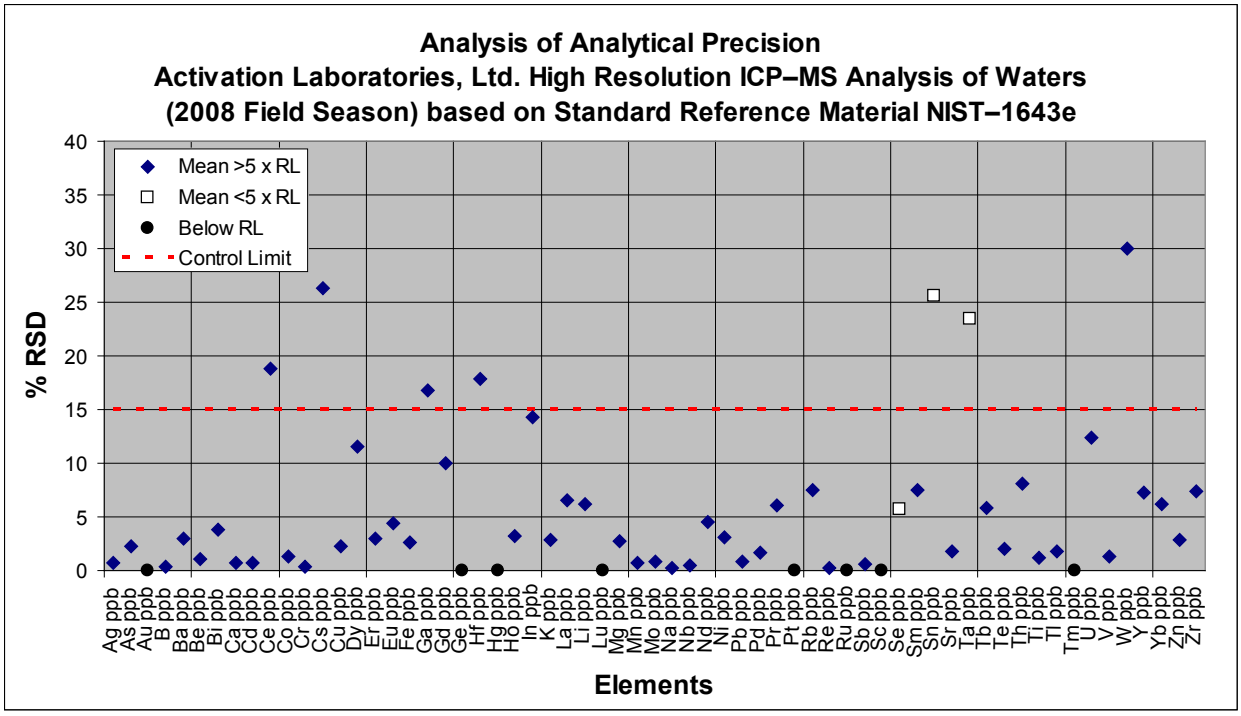

Figure 15-3. Precision plot for three analyses of standard reference material NIST–1643e by HR ICP–MS (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

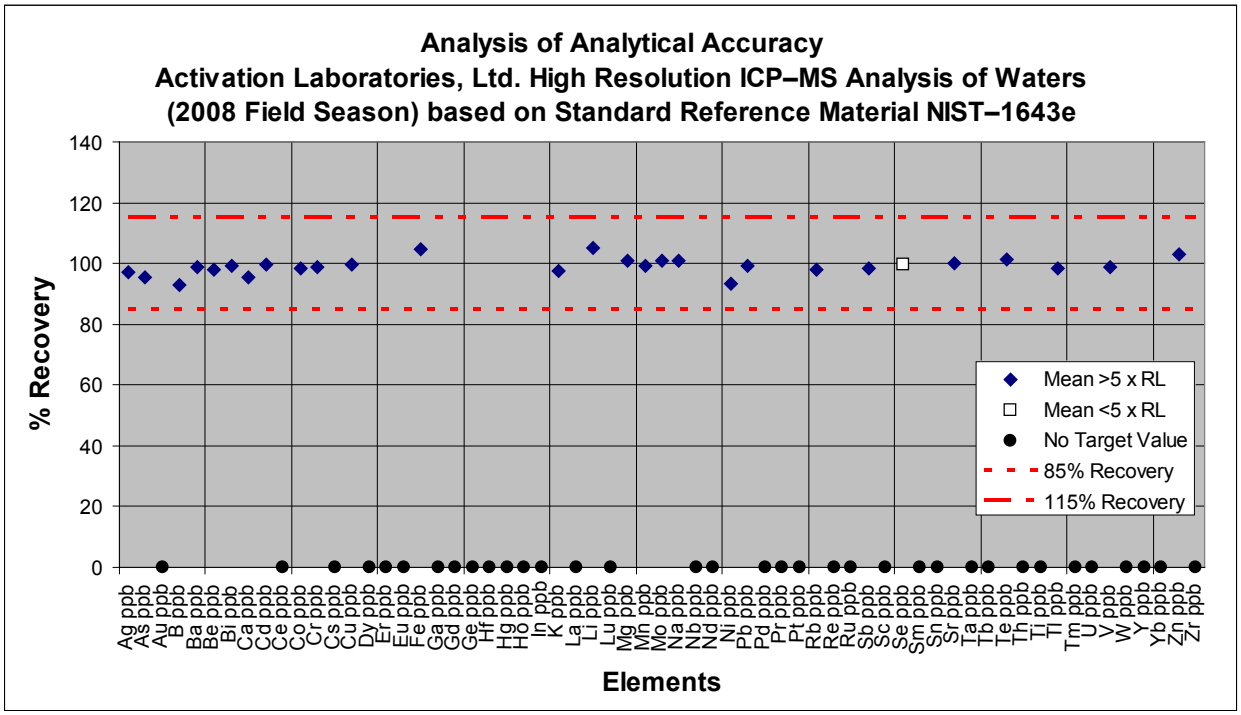

Figure 15-4. Accuracy plot for three analyses of standard reference material NIST–1643e by HR ICP–MS (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 15-3. Summary statistics for assessing analytical variation on the standard reference material T–159; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2008 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.002	8	9.67	9.53	0.936	9.82	98.5
As	ppb	0.04	8	28.4	39.8	2.02	5.07	140
Au	ppb	0.007	8	*na*	<0.007	*na*	*na*	*na*
B	ppb	2	8	28.4	30.6	2.00	6.53	108
Ba	ppb	0.004	8	38.1	43.5	2.21	5.09	114
Be	ppb	0.001	8	10.8	13.9	1.20	8.58	129
Bi	ppb	0.0003	8	*na*	0.00120	0.000839	70.1	*na*
Ca	ppb	0.005	8	25,500	27,000	1,090	4.04	106
Cd	ppb	0.0003	8	24.0	28.5	1.79	6.25	119
Ce	ppb	0.002	8	*na*	0.0356	0.00978	27.5	*na*
Co	ppb	0.001	8	13.3	13.4	0.860	6.43	101
Cr	ppb	0.006	8	26.8	29.9	1.79	5.96	112
Cs	ppb	0.001	8	*na*	0.0104	0.00122	11.7	*na*
Cu	ppb	0.01	8	33.4	34.3	2.26	6.60	103
Dy	ppb	0.00003	8	*na*	0.00430	0.000506	11.8	*na*
Er	ppb	0.00002	8	*na*	0.00321	0.000433	13.5	*na*
Eu	ppb	0.00003	8	*na*	0.0196	0.0114	58.5	*na*
Fe	ppb	0.1	8	48.9	52.8	4.02	7.61	108
Ga	ppb	0.001	8	*na*	0.0208	0.00298	14.3	*na*
Gd	ppb	0.00003	8	*na*	0.00338	0.000723	21.4	*na*
Ge	ppb	0.001	8	*na*	0.0110	0.00373	33.8	*na*
Hf	ppb	0.0001	8	*na*	0.00175	0.00107	61.6	*na*
Hg	ppb	0.04	8	*na*	0.191	0.316	166	*na*
Ho	ppb	0.00001	8	*na*	0.000891	0.0000505	5.66	*na*
In	ppb	0.0001	8	*na*	0.0251	0.00233	9.29	*na*
K	ppb	1	8	1,520	1,680	68.3	4.06	110
La	ppb	0.002	8	*na*	0.0443	0.0224	50.6	*na*
Li	ppb	0.03	8	8.97	8.99	3.86	43.0	100
Lu	ppb	0.00001	8	*na*	0.000459	0.0000789	17.2	*na*
Mg	ppb	0.2	8	5,600	5,470	1,370	25.1	97.6
Mn	ppb	0.1	8	22.0	23.6	1.51	6.39	107
Mo	ppb	0.004	8	41.4	46.9	2.98	6.36	113
Na	ppb	20	8	100,000	79,500	39,300	49.4	79.5
Nb	ppb	0.0001	8	*na*	0.00347	0.00164	47.3	*na*
Nd	ppb	0.0001	8	*na*	0.0228	0.00262	11.5	*na*
Ni	ppb	0.05	8	22.2	20.8	1.47	7.07	93.9
Pb	ppb	0.003	8	16.6	14.6	1.08	7.38	87.8
Pd	ppb	0.001	8	*na*	0.757	0.0798	10.5	*na*
Pr	ppb	0.00003	8	*na*	0.00626	0.00184	29.4	*na*
Pt	ppb	0.001	8	*na*	<0.001	*na*	*na*	*na*
Rb	ppb	0.04	8	*na*	1.08	0.0751	6.97	*na*
Re	ppb	0.0001	8	*na*	0.0109	0.000759	6.99	*na*
Ru	ppb	0.001	8	*na*	0.00186	0.00114	60.9	*na*
Sb	ppb	0.001	8	13.9	15.6	0.860	5.53	112
Sc	ppb	0.01	8	*na*	<0.01	*na*	*na*	*na*
Se	ppb	3	8	5.49	5.22	2.74	52.5	95.1
Sm	ppb	0.0003	8	*na*	0.00720	0.000269	3.74	*na*
Sn	ppb	0.006	8	*na*	8.64	0.753	8.72	*na*
Sr	ppb	0.01	8	190	218	11.8	5.44	115
Ta	ppb	0.0005	8	*na*	0.00128	0.000599	46.7	*na*
Tb	ppb	0.00002	8	*na*	0.00110	0.000213	19.3	*na*
Te	ppb	0.001	8	*na*	0.00394	0.00305	77.5	*na*
Th	ppb	0.00002	8	*na*	0.00141	0.000270	19.2	*na*
Ti	ppb	0.01	8	*na*	0.370	0.0519	14.0	*na*
Tl	ppb	0.0001	8	13.8	11.9	1.18	9.88	86.6

Table 15-3. Summary statistics for assessing analytical variation on the standard reference material T–159; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2008 field season)—Continued.

[ppb, parts per billion; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tm	ppb	0.0001	8	*na*	0.000388	0.0000267	6.88	*na*
U	ppb	0.0001	8	5.04	5.12	0.348	6.80	102
V	ppb	0.0004	8	14.4	15.9	1.85	11.7	110
W	ppb	0.001	8	*na*	0.102	0.0130	12.7	*na*
Y	ppb	0.0003	8	*na*	0.0557	0.0224	40.3	*na*
Yb	ppb	0.00005	8	*na*	0.00279	0.000160	5.76	*na*
Zn	ppb	0.4	8	19.2	26.1	2.45	9.38	136
Zr	ppb	0.001	8	*na*	0.0906	0.0330	36.5	*na*

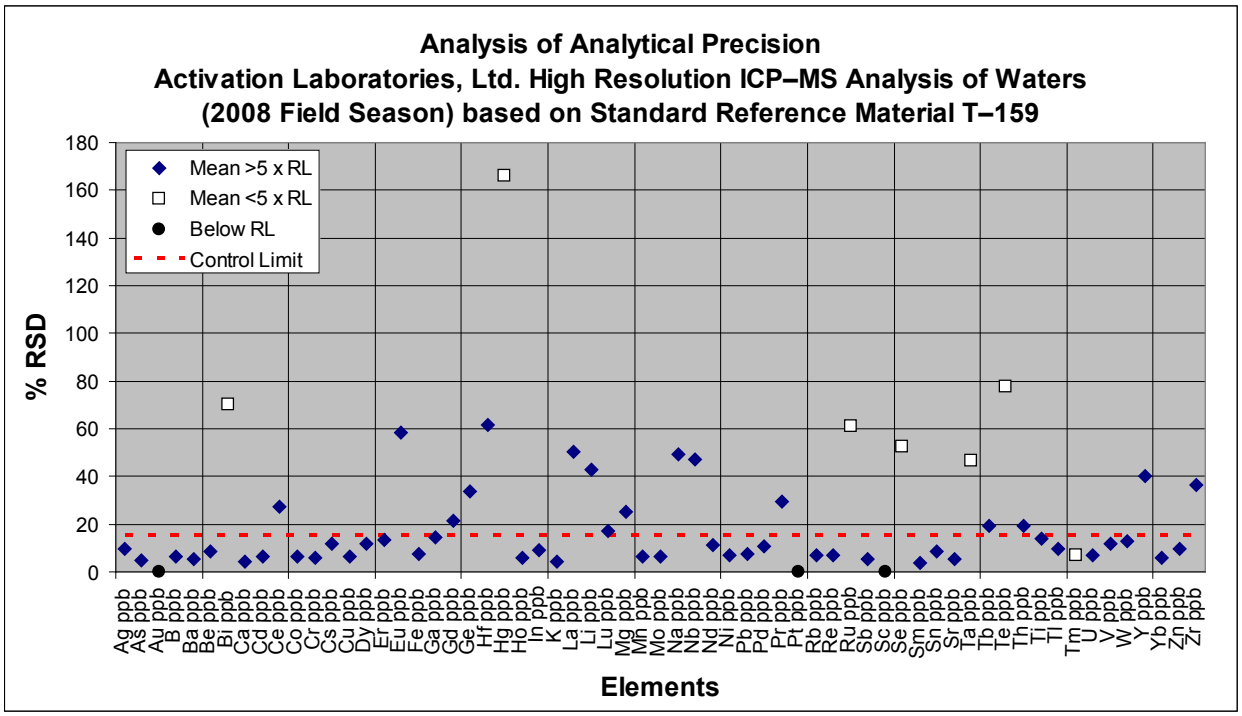

Figure 15-5. Precision plot for eight analyses of standard reference material T–159 by HR ICP–MS (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

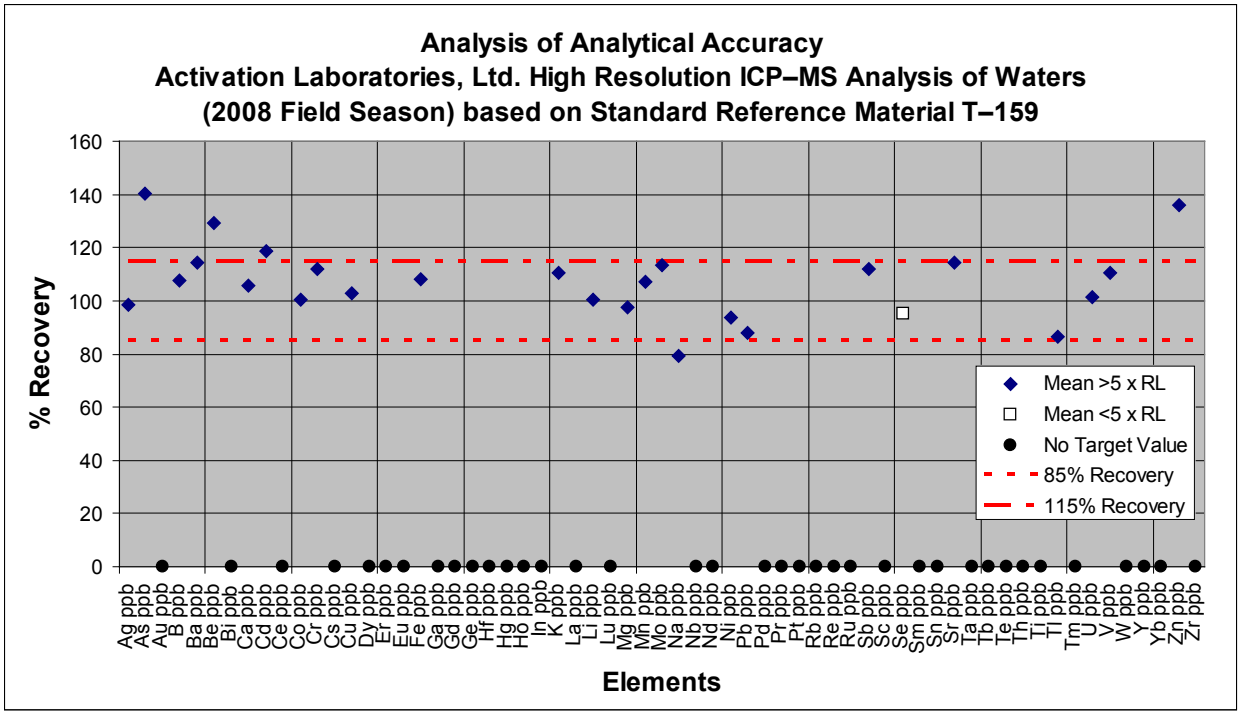

Figure 15-6. Accuracy plot for eight analyses of standard reference material T–159 by HR ICP–MS (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 15-4. Summary statistics for assessing analytical variation on the standard reference material T–177; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2008 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.002	8	0.100	<0.002	*na*	*na*	1.98
As	ppb	0.04	8	3.30	6.82	3.47	50.9	207
Au	ppb	0.007	8	*na*	<0.007	*na*	*na*	*na*
B	ppb	2	8	90.7	98.6	3.58	3.63	109
Ba	ppb	0.004	8	40.8	43.4	2.38	5.48	106
Be	ppb	0.001	8	1.00	1.26	0.0391	3.10	126
Bi	ppb	0.0003	8	*na*	0.000331	0.000162	49.1	*na*
Ca	ppb	0.005	8	31,400	32,600	2,170	6.65	104
Cd	ppb	0.0003	8	2.50	3.04	0.334	11.0	122
Ce	ppb	0.002	8	*na*	0.636	0.101	15.8	*na*
Co	ppb	0.001	8	2.60	2.65	0.202	7.62	102
Cr	ppb	0.006	8	8.50	9.07	0.320	3.53	107
Cs	ppb	0.001	8	*na*	0.592	0.0381	6.44	*na*
Cu	ppb	0.01	8	7.80	8.02	0.720	8.98	103
Dy	ppb	0.00003	8	*na*	0.0437	0.00289	6.60	*na*
Er	ppb	0.00002	8	*na*	0.0352	0.00540	15.3	*na*
Eu	ppb	0.00003	8	*na*	0.0323	0.0144	44.5	*na*
Fe	ppb	0.1	8	12.3	15.7	3.13	20.0	128
Ga	ppb	0.001	8	*na*	0.00993	0.00333	33.5	*na*
Gd	ppb	0.00003	8	*na*	0.0540	0.0140	25.9	*na*
Ge	ppb	0.001	8	*na*	0.0295	0.0129	43.6	*na*
Hf	ppb	0.0001	8	*na*	0.00137	0.000633	46.3	*na*
Hg	ppb	0.04	8	*na*	0.0485	0.0247	51.0	*na*

Table 15-4. Summary statistics for assessing analytical variation on the standard reference material T–177; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2008 field season)—Continued.

[ppb, parts per billion; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ho	ppb	0.00001	8	*na*	0.00898	0.000457	5.09	*na*
In	ppb	0.0001	8	*na*	0.00382	0.000593	15.6	*na*
K	ppb	1	8	3,300	3,520	106	3.02	107
La	ppb	0.002	8	*na*	0.500	0.0860	17.2	*na*
Li	ppb	0.03	8	15.8	19.3	7.03	36.4	122
Lu	ppb	0.00001	8	*na*	0.00318	0.000251	7.89	*na*
Mg	ppb	0.2	8	7,630	8,270	554	6.71	108
Mn	ppb	0.1	8	346	353	16.4	4.66	102
Mo	ppb	0.004	8	4.12	3.80	0.278	7.30	92.3
Na	ppb	20	8	37,200	42,300	2,530	5.98	114
Nb	ppb	0.0001	8	*na*	0.000676	0.000250	37.0	*na*
Nd	ppb	0.0001	8	*na*	0.398	0.0337	8.49	*na*
Ni	ppb	0.05	8	3.71	3.23	0.215	6.67	87.0
Pb	ppb	0.003	8	4.24	3.67	0.114	3.11	86.5
Pd	ppb	0.001	8	*na*	0.0921	0.0150	16.3	*na*
Pr	ppb	0.00003	8	*na*	0.108	0.0128	11.9	*na*
Pt	ppb	0.001	8	*na*	<0.001	*na*	*na*	*na*
Rb	ppb	0.04	8	*na*	8.19	0.574	7.00	*na*
Re	ppb	0.0001	8	*na*	0.0310	0.00170	5.50	*na*
Ru	ppb	0.001	8	*na*	0.00197	0.00121	61.4	*na*
Sb	ppb	0.001	8	1.80	1.98	0.0871	4.41	110
Sc	ppb	0.01	8	*na*	<0.01	*na*	*na*	*na*
Se	ppb	3	8	*na*	<3	*na*	*na*	*na*
Sm	ppb	0.0003	8	*na*	0.0689	0.00436	6.33	*na*
Sn	ppb	0.006	8	*na*	1.10	0.109	9.87	*na*
Sr	ppb	0.01	8	239	255	11.1	4.34	107
Ta	ppb	0.0005	8	*na*	0.000794	0.000304	38.3	*na*
Tb	ppb	0.00002	8	*na*	0.0166	0.00549	33.0	*na*
Te	ppb	0.001	8	*na*	0.00325	0.00239	73.4	*na*
Th	ppb	0.00002	8	*na*	0.000911	0.000825	90.6	*na*
Ti	ppb	0.01	8	*na*	0.378	0.0758	20.0	*na*
Tl	ppb	0.0001	8	1.57	1.41	0.129	9.15	89.5
Tm	ppb	0.0001	8	*na*	0.00310	0.000291	9.38	*na*
U	ppb	0.0001	8	1.76	1.78	0.163	9.18	101
V	ppb	0.0004	8	1.18	1.32	0.164	12.5	111
W	ppb	0.001	8	*na*	0.00646	0.00546	84.5	*na*
Y	ppb	0.0003	8	*na*	0.362	0.0310	8.55	*na*
Yb	ppb	0.00005	8	*na*	0.0234	0.00185	7.92	*na*
Zn	ppb	0.4	8	304	421	38.6	9.17	138
Zr	ppb	0.001	8	*na*	0.0543	0.0188	34.6	*na*

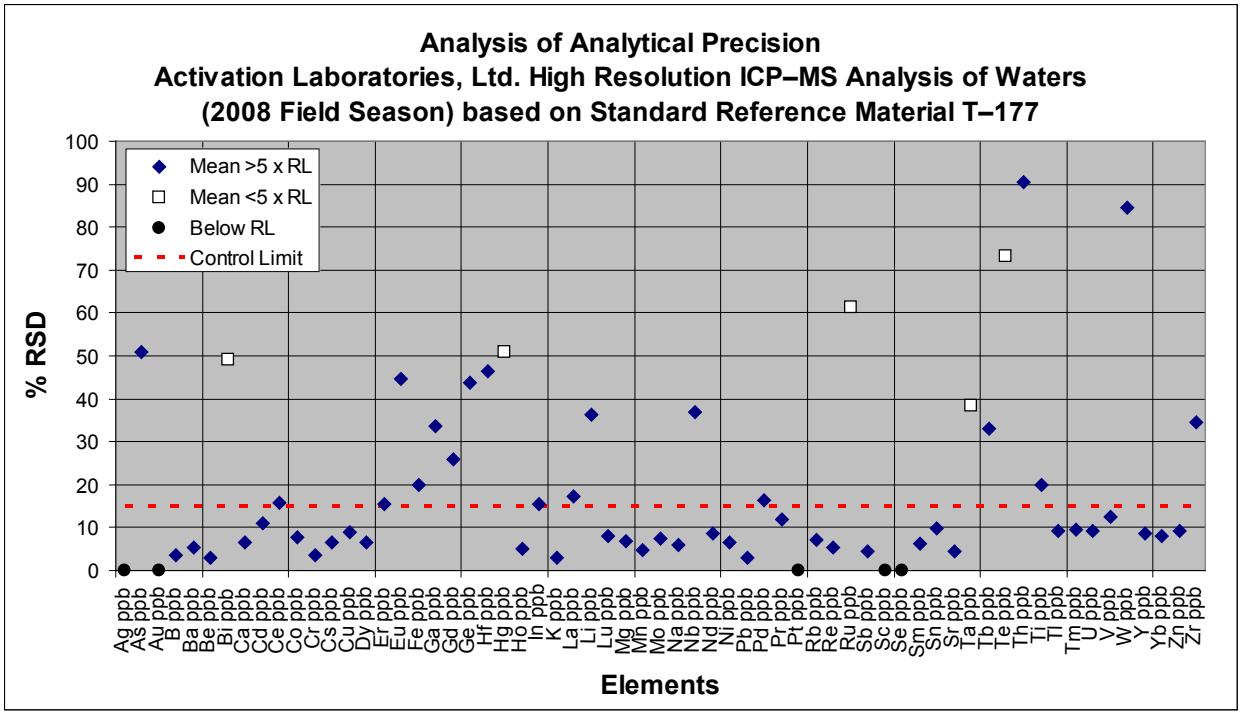

Figure 15-7. Precision plot for eight analyses of standard reference material T–177 by HR ICP–MS (2008 field season). %RSD is percent relative standard deviation; RL is reporting limit.

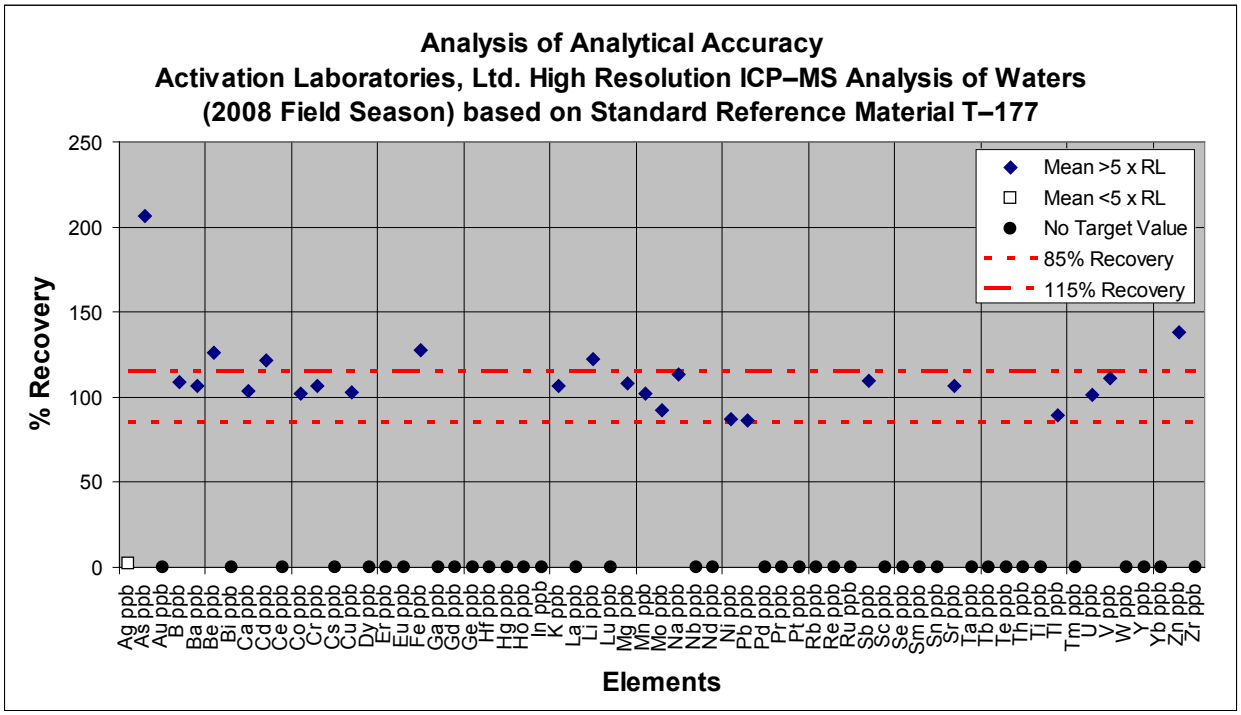

Figure 15-8. Accuracy plot for eight analyses of standard reference material T–177 by HR ICP–MS (2008 field season). %Recovery is percent recovery; RL is reporting limit.

Table 15-5. Summary statistics for assessing analytical variation on the standard reference material NIST–1643e; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2009 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.002	3	1.06	1.05	0.0519	4.93	99.1
As	ppb	0.04	3	60.5	58.9	1.64	2.78	97.4
Au	ppb	0.007	3	*na*	<0.007	*na*	*na*	*na*
B	ppb	2	3	158	152	3.93	2.58	96.3
Ba	ppb	0.004	3	544	530	1.20	0.226	97.4
Be	ppb	0.001	3	14.0	13.4	0.405	3.02	95.8
Bi	ppb	0.0003	3	14.1	13.6	0.263	1.94	96.5
Ca	ppb	0.005	3	32,300	34,100	32.4	0.0949	106
Cd	ppb	0.0003	3	6.57	6.61	0.0220	0.332	101
Ce	ppb	0.002	3	*na*	0.0194	0.000529	2.73	*na*
Co	ppb	0.001	3	27.1	25.6	0.334	1.31	94.4
Cr	ppb	0.006	3	20.4	20.2	0.259	1.28	98.8
Cs	ppb	0.001	3	*na*	0.00569	0.00161	28.4	*na*
Cu	ppb	0.01	3	22.8	23.0	0.00656	0.0286	101
Dy	ppb	0.00003	3	*na*	0.000518	0.000174	33.7	*na*
Er	ppb	0.00002	3	*na*	0.0109	0.000559	5.12	*na*
Eu	ppb	0.00003	3	*na*	0.330	0.00168	0.508	*na*
Fe	ppb	0.1	3	98.1	98.4	0.935	0.951	100
Ga	ppb	0.001	3	*na*	0.00589	0.00143	24.3	*na*
Gd	ppb	0.00003	3	*na*	0.00177	0.000142	8.01	*na*
Ge	ppb	0.001	3	*na*	<0.001	*na*	*na*	*na*
Hf	ppb	0.0001	3	*na*	0.00317	0.000177	5.59	*na*
Hg	ppb	0.04	3	*na*	<0.04	*na*	*na*	*na*
Ho	ppb	0.00001	3	*na*	0.000184	0.0000101	5.52	*na*
In	ppb	0.0001	3	*na*	0.00345	0.000537	15.6	*na*
K	ppb	1	3	2,034	2,270	21.6	0.954	111
La	ppb	0.002	3	*na*	0.0503	0.00226	4.49	*na*
Li	ppb	0.03	3	17.4	18.1	0.705	3.90	104
Lu	ppb	0.00001	3	*na*	0.000236	0.0000174	7.36	*na*
Mg	ppb	0.2	3	8,037	8,000	172	2.15	99.6
Mn	ppb	0.1	3	39.0	38.8	0.332	0.856	99.5
Mo	ppb	0.004	3	121	119	0.871	0.734	97.8
Na	ppb	20	3	20,740	20,700	243	1.17	99.9
Nb	ppb	0.0001	3	*na*	0.000395	0.000115	29.0	*na*
Nd	ppb	0.0001	3	*na*	0.0220	0.000508	2.31	*na*
Ni	ppb	0.05	3	62.4	55.3	1.55	2.81	88.7
Pb	ppb	0.003	3	19.6	19.7	0.0246	0.125	101
Pd	ppb	0.001	3	*na*	0.299	0.0226	7.56	*na*
Pr	ppb	0.00003	3	*na*	0.00212	0.0000428	2.02	*na*
Pt	ppb	0.001	3	*na*	<0.001	*na*	*na*	*na*
Rb	ppb	0.04	3	14.1	14.2	0.232	1.63	101
Re	ppb	0.0001	3	*na*	90.3	1.26	1.40	*na*
Ru	ppb	0.001	3	*na*	<0.001	*na*	*na*	*na*
Sb	ppb	0.001	3	58.3	53.8	0.580	1.08	92.3
Sc	ppb	0.01	3	*na*	<0.01	*na*	*na*	*na*
Se	ppb	3	3	12.0	9.73	2.97	30.6	81.2
Sm	ppb	0.0003	3	*na*	0.00404	0.000128	3.17	*na*
Sn	ppb	0.006	3	*na*	0.00781	0.00416	53.2	*na*
Sr	ppb	0.01	3	323	327	2.31	0.706	101
Ta	ppb	0.0005	3	*na*	0.000795	0.000214	26.9	*na*
Tb	ppb	0.00002	3	*na*	0.000674	0.0000947	14.0	*na*
Te	ppb	0.001	3	1.09	1.04	0.0656	6.30	95.6
Th	ppb	0.00002	3	*na*	0.00107	0.0000790	7.41	*na*
Ti	ppb	0.01	3	*na*	0.177	0.00551	3.12	*na*
Tl	ppb	0.0001	3	7.45	7.23	0.126	1.74	97.1

Table 15-5. Summary statistics for assessing analytical variation on the standard reference material NIST–1643e; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2009 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tm	ppb	0.0001	3	*na*	0.000127	0.0000308	24.3	*na*
U	ppb	0.0001	3	*na*	0.00214	0.000181	8.47	*na*
V	ppb	0.0004	3	37.9	37.5	0.0680	0.181	99.2
W	ppb	0.001	3	*na*	0.0285	0.00538	18.9	*na*
Y	ppb	0.0003	3	*na*	0.0167	0.000138	0.829	*na*
Yb	ppb	0.00005	3	*na*	0.000637	0.000195	30.6	*na*
Zn	ppb	0.4	3	78.5	77.7	0.321	0.413	99.0
Zr	ppb	0.001	3	*na*	0.0279	0.000423	1.52	*na*

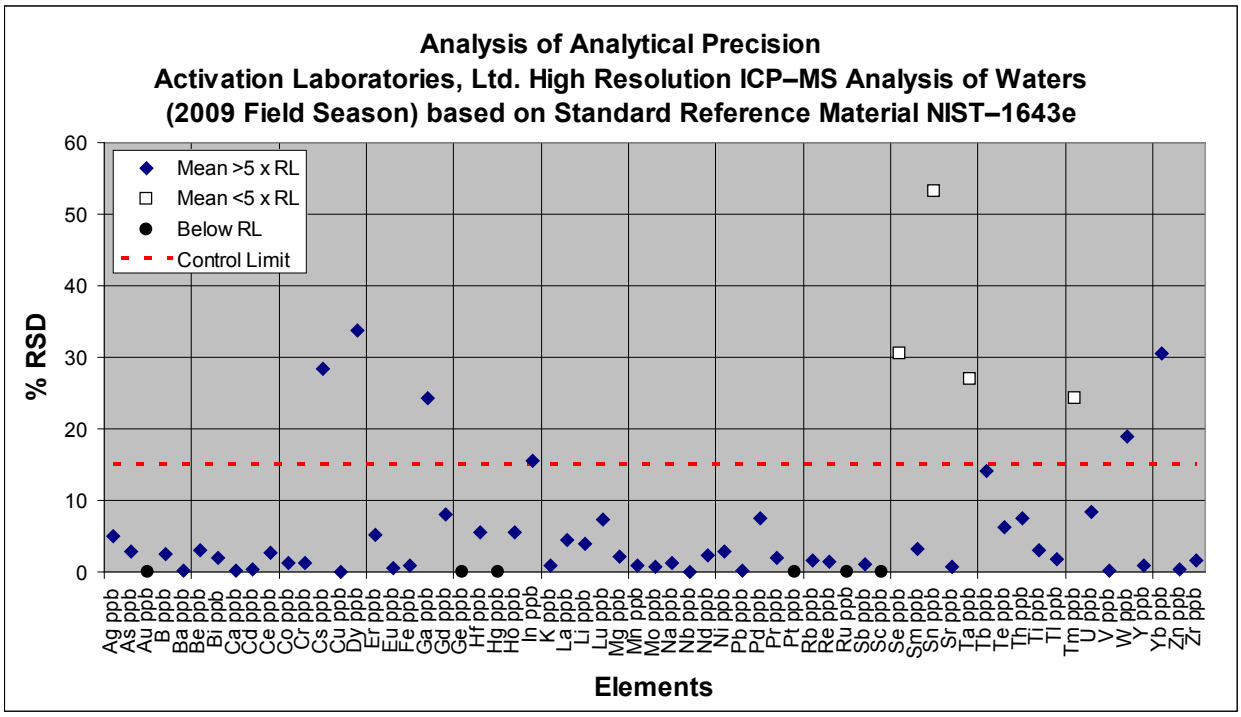

Figure 15-9. Precision plot for three analyses of standard reference material NIST–1643e by HR ICP–MS (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

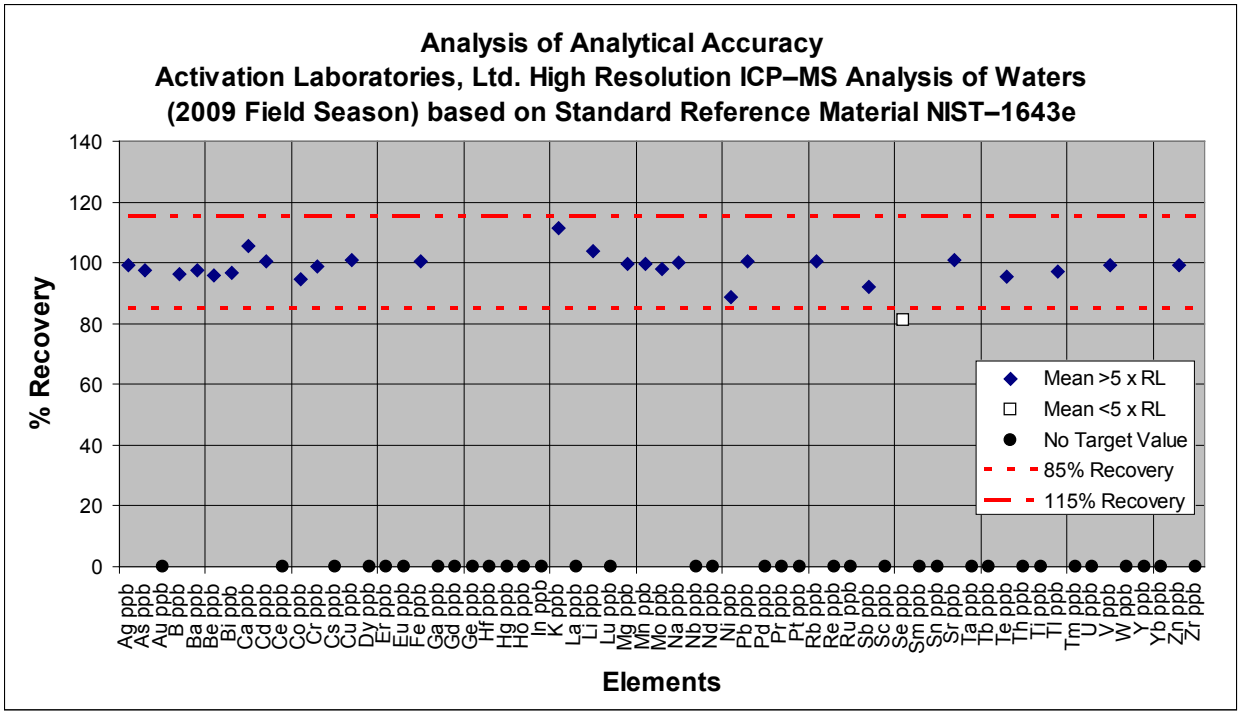

Figure 15-10. Accuracy plot for three analyses of standard reference material NIST–1643e by HR ICP–MS (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 15-6. Summary statistics for assessing analytical variation on the standard reference material T–167; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2009 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.002	2	6.70	6.68	0.451	6.76	99.7
As	ppb	0.04	2	22.1	30.0	3.13	10.4	136
Au	ppb	0.007	2	*na*	<0.007	*na*	*na*	*na*
B	ppb	2	2	24.3	30.3	1.76	5.80	125
Ba	ppb	0.004	2	20.6	19.1	0.585	3.06	92.7
Be	ppb	0.001	2	10.8	14.6	1.13	7.73	135
Bi	ppb	0.0003	2	*na*	<0.0003	*na*	*na*	*na*
Ca	ppb	0.005	2	5,150	6,210	136	2.19	121
Cd	ppb	0.0003	2	10.4	14.1	0.944	6.70	136
Ce	ppb	0.002	2	*na*	0.246	0.00754	3.07	*na*
Co	ppb	0.001	2	6.80	6.85	0.777	11.3	101
Cr	ppb	0.006	2	22.6	25.9	1.63	6.30	115
Cs	ppb	0.001	2	*na*	0.00421	0.000439	10.4	*na*
Cu	ppb	0.01	2	20.6	24.5	0.725	2.96	119
Dy	ppb	0.00003	2	*na*	0.0260	0.00134	5.17	*na*
Er	ppb	0.00002	2	*na*	0.0233	0.000251	1.08	*na*
Eu	ppb	0.00003	2	*na*	0.0194	0.00122	6.27	*na*
Fe	ppb	0.1	2	56.1	62.2	0.0403	0.0648	111
Ga	ppb	0.001	2	*na*	0.00670	0.00176	26.3	*na*
Gd	ppb	0.00003	2	*na*	0.0272	0.000953	3.50	*na*
Ge	ppb	0.001	2	*na*	0.0164	0.00987	60.2	*na*
Hf	ppb	0.0001	2	*na*	0.000837	0.0000594	7.10	*na*
Hg	ppb	0.04	2	*na*	<0.04	*na*	*na*	*na*

Table 15-6. Summary statistics for assessing analytical variation on the standard reference material T–167; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2009 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ho	ppb	0.00001	2	*na*	0.00541	0.000201	3.71	*na*
In	ppb	0.0001	2	*na*	0.00440	0.000474	10.8	*na*
K	ppb	1	2	4,760	5,980	354	5.93	126
La	ppb	0.002	2	*na*	0.304	0.0162	5.34	*na*
Li	ppb	0.03	2	13.6	14.6	0.332	2.27	108
Lu	ppb	0.00001	2	*na*	0.00192	0.0000453	2.36	*na*
Mg	ppb	0.2	2	4,800	5,630	336	5.98	117
Mn	ppb	0.1	2	18.5	19.4	1.42	7.30	105
Mo	ppb	0.004	2	20.1	22.6	0.203	0.896	113
Na	ppb	20	2	7,340	8,240	257	3.12	112
Nb	ppb	0.0001	2	*na*	0.00134	0.0000438	3.27	*na*
Nd	ppb	0.0001	2	*na*	0.248	0.00219	0.882	*na*
Ni	ppb	0.05	2	12.0	12.3	1.06	8.66	102
Pb	ppb	0.003	2	21.5	18.7	0.0693	0.371	86.9
Pd	ppb	0.001	2	*na*	0.395	0.0221	5.58	*na*
Pr	ppb	0.00003	2	*na*	0.0635	0.000762	1.20	*na*
Pt	ppb	0.001	2	*na*	0.00130	0.00103	79.7	*na*
Rb	ppb	0.04	2	*na*	0.631	0.0262	4.15	*na*
Re	ppb	0.0001	2	*na*	0.00159	0.000170	10.7	*na*
Ru	ppb	0.001	2	*na*	<0.001	*na*	*na*	*na*
Sb	ppb	0.001	2	22.1	22.2	1.02	4.59	101
Sc	ppb	0.01	2	*na*	<0.01	*na*	*na*	*na*
Se	ppb	3	2	3.67	4.85	0.769	15.8	132
Sm	ppb	0.0003	2	*na*	0.0451	0.000735	1.63	*na*
Sn	ppb	0.006	2	*na*	1.64	0.0235	1.44	*na*
Sr	ppb	0.01	2	41.2	42.7	1.09	2.56	104
Ta	ppb	0.0005	2	*na*	<0.0005	*na*	*na*	*na*
Tb	ppb	0.00002	2	*na*	0.0105	0.000473	4.52	*na*
Te	ppb	0.001	2	*na*	0.00849	0.00292	34.4	*na*
Th	ppb	0.00002	2	*na*	0.000363	0.000151	41.7	*na*
Ti	ppb	0.01	2	*na*	0.697	0.0304	4.37	*na*
Tl	ppb	0.0001	2	22.0	19.7	0.803	4.08	89.6
Tm	ppb	0.0001	2	*na*	0.00192	0.0000714	3.72	*na*
U	ppb	0.0001	2	4.00	3.55	0.0391	1.10	88.8
V	ppb	0.0004	2	16.8	19.7	0.558	2.84	117
W	ppb	0.001	2	*na*	0.0112	0.00884	78.7	*na*
Y	ppb	0.0003	2	*na*	0.241	0.00108	0.449	*na*
Yb	ppb	0.00005	2	*na*	0.0148	0.00162	10.9	*na*
Zn	ppb	0.4	2	3.90	5.50	0.751	13.6	141
Zr	ppb	0.001	2	*na*	0.00101	0.000381	37.6	*na*

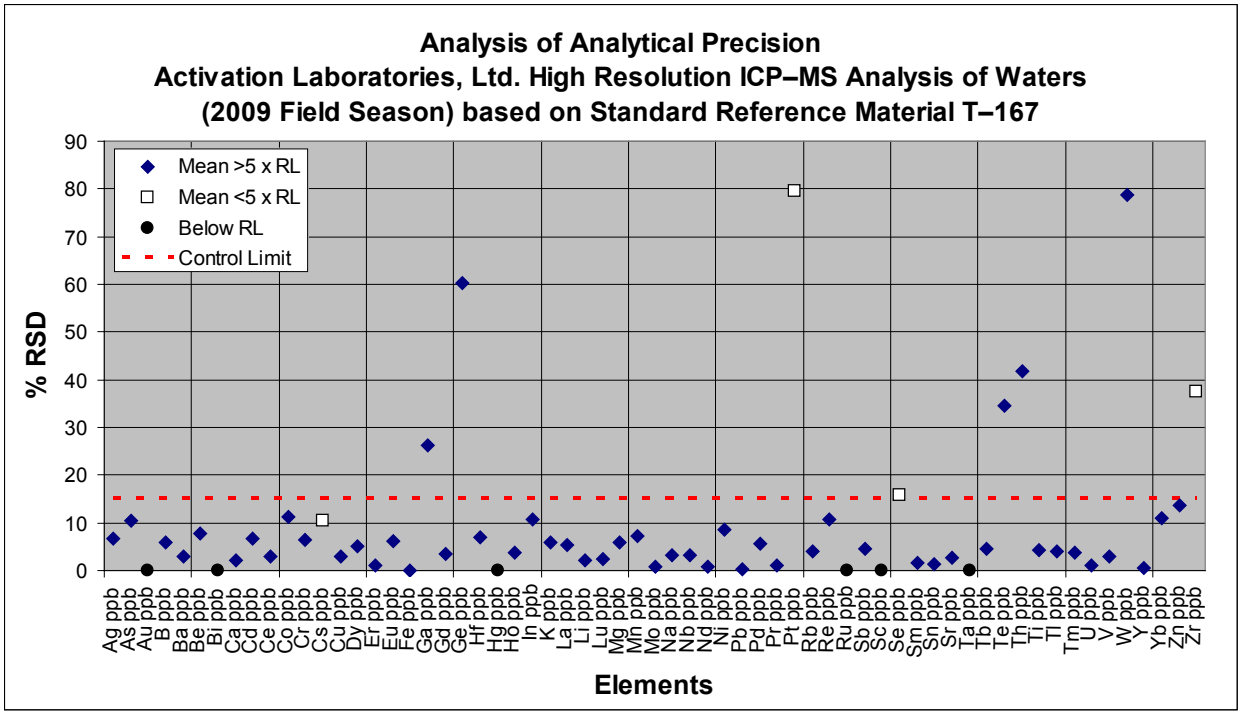

Figure 15-11. Precision plot for two analyses of standard reference material T–167 by HR ICP–MS (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

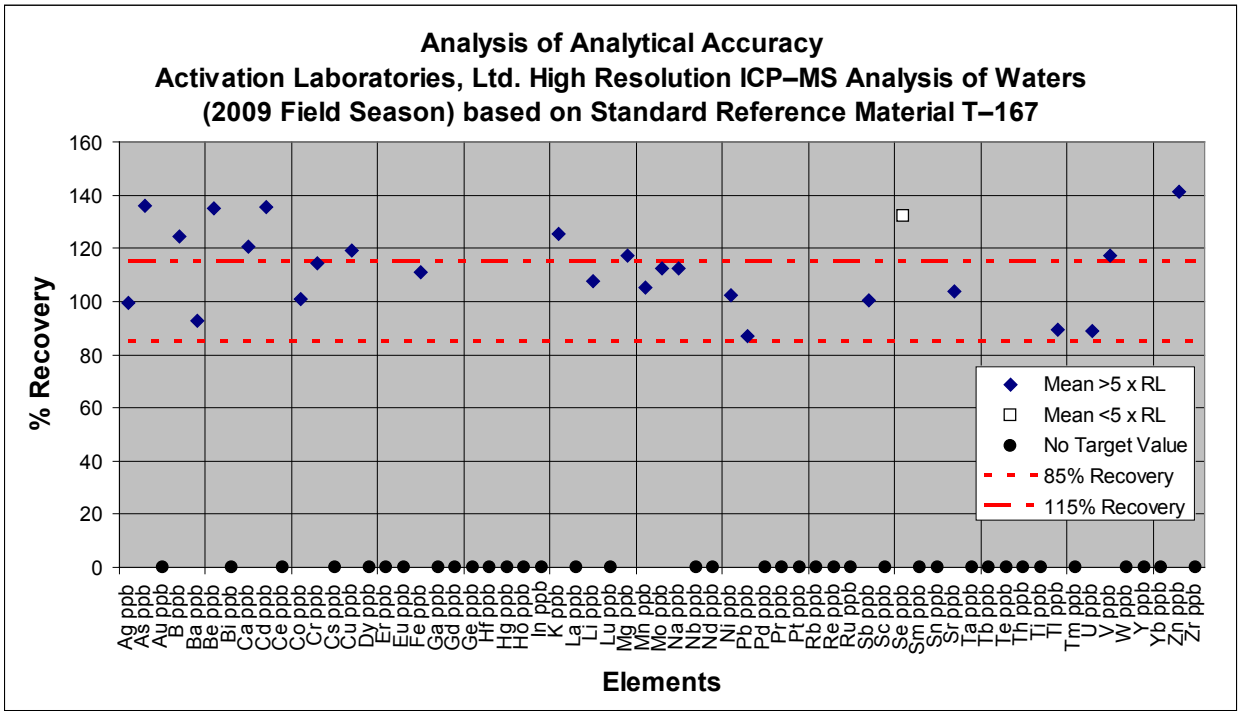

Figure 15-12. Accuracy plot for two analyses of standard reference material T–167 by HR ICP–MS (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 15-7. Summary statistics for assessing analytical variation on the standard reference material T–177; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2009 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.002	2	0.100	0.00593	0.00148	24.9	5.93
As	ppb	0.04	2	3.30	4.67	0.191	4.09	141
Au	ppb	0.007	2	*na*	<0.007	*na*	*na*	*na*
B	ppb	2	2	90.7	122	11.3	9.22	135
Ba	ppb	0.004	2	40.8	37.9	0.586	1.55	92.9
Be	ppb	0.001	2	1.00	1.50	0.139	9.24	150
Bi	ppb	0.0003	2	*na*	0.00168	0.000132	7.83	*na*
Ca	ppb	0.005	2	31,400	40,800	2,080	5.09	130
Cd	ppb	0.0003	2	2.50	3.07	0.0309	1.01	123
Ce	ppb	0.002	2	*na*	0.762	0.0225	2.96	*na*
Co	ppb	0.001	2	2.60	2.71	0.0855	3.16	104
Cr	ppb	0.006	2	8.50	10.5	0.429	4.08	124
Cs	ppb	0.001	2	*na*	0.569	0.00793	1.39	*na*
Cu	ppb	0.01	2	7.80	9.37	1.04	11.1	120
Dy	ppb	0.00003	2	*na*	0.0424	0.000482	1.14	*na*
Er	ppb	0.00002	2	*na*	0.0374	0.000685	1.83	*na*
Eu	ppb	0.00003	2	*na*	0.0371	0.00129	3.48	*na*
Fe	ppb	0.1	2	12.3	14.0	0.639	4.56	114
Ga	ppb	0.001	2	*na*	0.00787	0.00235	29.9	*na*
Gd	ppb	0.00003	2	*na*	0.0484	0.00174	3.58	*na*
Ge	ppb	0.001	2	*na*	0.0458	0.0237	51.7	*na*
Hf	ppb	0.0001	2	*na*	0.00180	0.000173	9.62	*na*
Hg	ppb	0.04	2	*na*	<0.04	*na*	*na*	*na*
Ho	ppb	0.00001	2	*na*	0.00913	0.000162	1.77	*na*
In	ppb	0.0001	2	*na*	0.00398	0.000585	14.7	*na*
K	ppb	1	2	3,300	4,660	261	5.60	141
La	ppb	0.002	2	*na*	0.573	0.0295	5.16	*na*
Li	ppb	0.03	2	15.8	15.1	0.573	3.80	95.4
Lu	ppb	0.00001	2	*na*	0.00352	0.0000948	2.69	*na*
Mg	ppb	0.2	2	7,630	9,600	635	6.62	126
Mn	ppb	0.1	2	346	382	31.9	8.35	110
Mo	ppb	0.004	2	4.12	4.24	0.154	3.64	103
Na	ppb	20	2	37,200	49,700	3,510	7.06	133
Nb	ppb	0.0001	2	*na*	0.000478	0.0000120	2.52	*na*
Nd	ppb	0.0001	2	*na*	0.437	0.0238	5.44	*na*
Ni	ppb	0.05	2	3.71	3.29	0.424	12.9	88.7
Pb	ppb	0.003	2	4.24	3.52	0.309	8.77	83.1
Pd	ppb	0.001	2	*na*	0.0994	0.00266	2.67	*na*
Pr	ppb	0.00003	2	*na*	0.118	0.00259	2.19	*na*
Pt	ppb	0.001	2	*na*	<0.001	*na*	*na*	*na*
Rb	ppb	0.04	2	*na*	8.25	0.163	1.98	*na*
Re	ppb	0.0001	2	*na*	0.0304	0.00126	4.14	*na*
Ru	ppb	0.001	2	*na*	0.00202	0.0000488	2.42	*na*
Sb	ppb	0.001	2	1.80	1.84	0.124	6.76	102
Sc	ppb	0.01	2	*na*	<0.01	*na*	*na*	*na*
Se	ppb	3	2	*na*	3.27	0.786	24.1	*na*
Sm	ppb	0.0003	2	*na*	0.0668	0.00423	6.34	*na*
Sn	ppb	0.006	2	*na*	0.978	0.0621	6.35	*na*
Sr	ppb	0.01	2	239	257	7.33	2.85	108
Ta	ppb	0.0005	2	*na*	<0.0005	*na*	*na*	*na*
Tb	ppb	0.00002	2	*na*	0.0169	0.000192	1.14	*na*
Te	ppb	0.001	2	*na*	0.0198	0.0200	101	*na*
Th	ppb	0.00002	2	*na*	0.00133	0.0000877	6.61	*na*
Ti	ppb	0.01	2	*na*	0.447	0.0262	5.86	*na*
Tl	ppb	0.0001	2	1.57	1.33	0.0414	3.11	84.8

Table 15-7. Summary statistics for assessing analytical variation on the standard reference material T–177; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2009 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Tm	ppb	0.0001	2	*na*	0.00304	0.000120	3.96	*na*
U	ppb	0.0001	2	1.76	1.71	0.105	6.14	97.2
V	ppb	0.0004	2	1.18	1.43	0.181	12.6	121
W	ppb	0.001	2	*na*	0.00683	0.000909	13.3	*na*
Y	ppb	0.0003	2	*na*	0.363	0.0125	3.44	*na*
Yb	ppb	0.00005	2	*na*	0.0232	0.000375	1.62	*na*
Zn	ppb	0.4	2	304	443	6.11	1.38	146
Zr	ppb	0.001	2	*na*	0.0287	0.00218	7.61	*na*

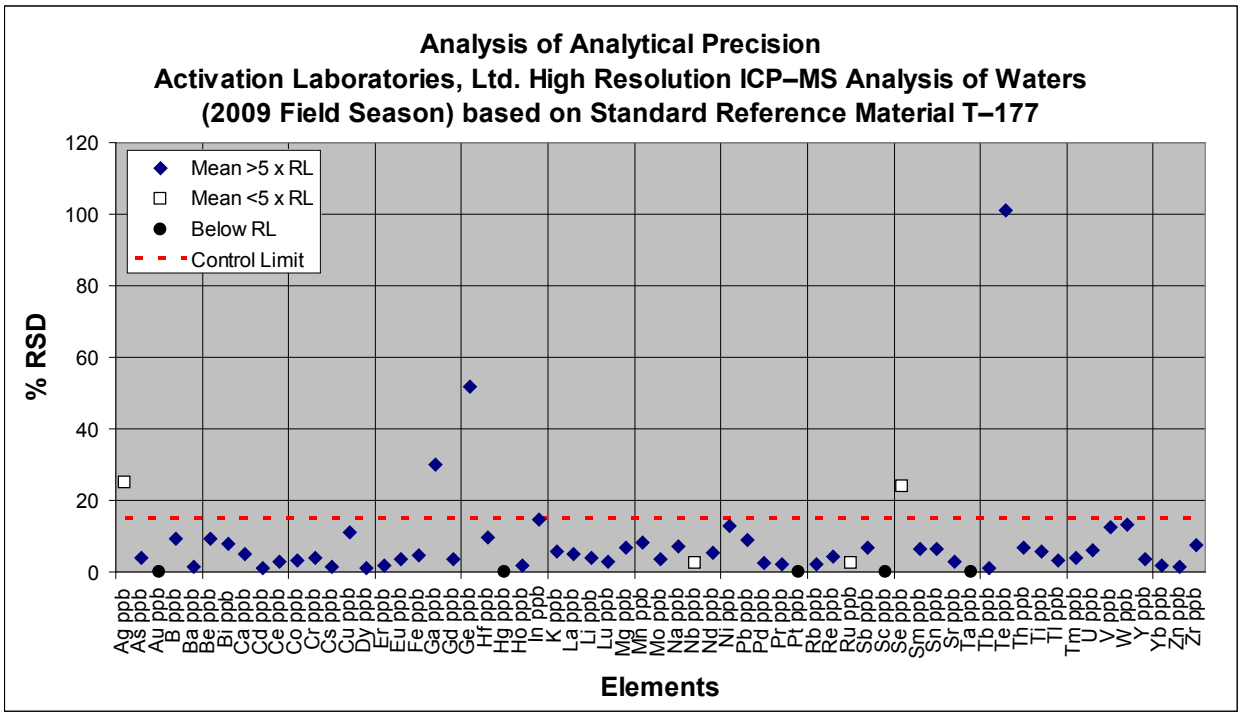

Figure 15-13. Precision plot for two analyses of standard reference material T–177 by HR ICP–MS (2009 field season). %RSD is percent relative standard deviation; RL is reporting limit.

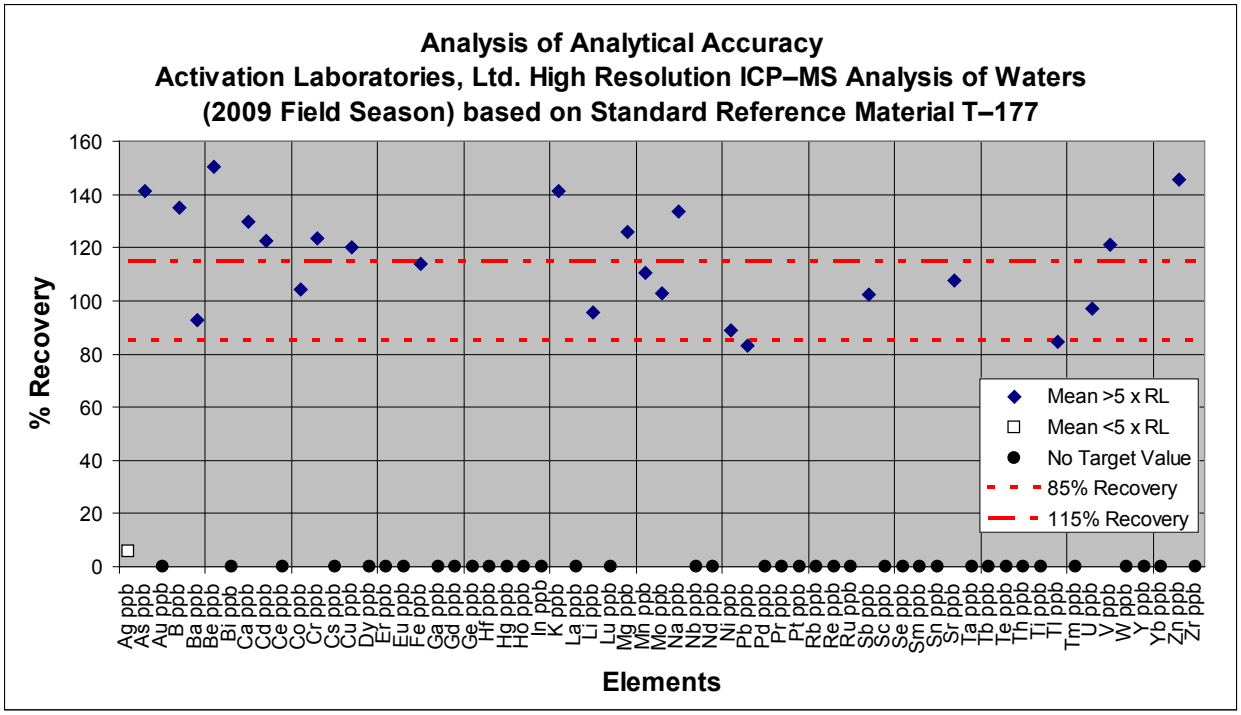

Figure 15-14. Accuracy plot for two analyses of standard reference material T–177 by HR ICP–MS (2009 field season). %Recovery is percent recovery; RL is reporting limit.

Table 15-8. Summary statistics for assessing analytical variation on the standard reference material NIST–1643e; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2010 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.001	3	1.06	1.00	0.0176	1.75	94.4
Al	ppb	2	3	142	143	1.26	0.883	101
As	ppb	0.01	3	60.5	60.2	0.653	1.08	99.6
B	ppb	0.3	3	158	155	2.05	1.32	98.0
Ba	ppb	0.04	3	544	539	1.61	0.298	99.1
Be	ppb	0.002	3	14.0	14.0	0.0297	0.212	100
Bi	ppb	0.001	3	14.1	13.2	0.178	1.35	93.6
Ca	ppb	14	3	32,300	27,900	1,260	4.51	86.3
Cd	ppb	0.001	3	6.57	6.48	0.0421	0.650	98.6
Ce	ppb	0.002	3	*na*	0.0159	0.000968	6.09	*na*
Co	ppb	0.002	3	27.1	27.3	0.274	1.00	101
Cr	ppb	0.01	3	20.4	21.0	0.0659	0.314	103
Cs	ppb	0.001	3	*na*	<0.001	*na*	*na*	*na*
Cu	ppb	0.01	3	22.8	22.7	0.137	0.602	99.9
Dy	ppb	0.0005	3	*na*	0.000862	0.0000520	6.04	*na*
Er	ppb	0.0003	3	*na*	0.0105	0.0000471	0.447	*na*
Eu	ppb	0.0004	3	*na*	0.192	0.00163	0.847	*na*
Fe	ppb	0.3	3	98.1	100	0.320	0.319	102
Ga	ppb	0.001	3	*na*	0.00781	0.000527	6.75	*na*
Gd	ppb	0.0003	3	*na*	0.00275	0.0000537	1.95	*na*
Ge	ppb	0.002	3	*na*	<0.002	*na*	*na*	*na*
Hf	ppb	0.0002	3	*na*	0.00330	0.000105	3.17	*na*
Hg	ppb	0.001	3	*na*	<0.001	*na*	*na*	*na*

Table 15-8. Summary statistics for assessing analytical variation on the standard reference material NIST–1643e; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2010 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ho	ppb	0.0003	3	*na*	<0.0003	*na*	*na*	*na*
In	ppb	0.001	3	*na*	0.00188	0.000407	21.6	*na*
K	ppb	1	3	2,034	2,060	16.8	0.818	101
La	ppb	0.003	3	*na*	0.0223	0.00101	4.54	*na*
Li	ppb	0.04	3	17.4	17.2	0.404	2.34	99.0
Lu	ppb	0.0005	3	*na*	<0.0005	*na*	*na*	*na*
Mg	ppb	1	3	8,037	8,380	50.8	0.606	104
Mn	ppb	0.03	3	39.0	39.7	0.105	0.266	102
Mo	ppb	0.02	3	121	121	0.667	0.551	99.6
Na	ppb	2	3	20,740	20,200	108	0.533	97.5
Nb	ppb	0.0003	3	*na*	0.00159	0.0000496	3.12	*na*
Nd	ppb	0.001	3	*na*	0.0150	0.000164	1.09	*na*
Ni	ppb	0.2	3	62.4	59.0	0.531	0.900	94.5
Pb	ppb	0.01	3	19.6	18.2	0.0881	0.484	92.6
Pr	ppb	0.0005	3	*na*	0.00209	0.0000116	0.554	*na*
Rb	ppb	0.003	3	14.1	13.6	0.0564	0.415	96.1
Re	ppb	0.001	3	*na*	90.8	0.171	0.188	*na*
Sb	ppb	0.02	3	58.3	55.9	0.528	0.944	95.8
Sc	ppb	0.04	3	*na*	<0.04	*na*	*na*	*na*
Se	ppb	1	3	12.0	11.6	0.478	4.11	97.1
Sm	ppb	0.0002	3	*na*	0.00309	0.000273	8.84	*na*
Sn	ppb	0.05	3	*na*	<0.05	*na*	*na*	*na*
Sr	ppb	0.03	3	323	321	2.41	0.751	99.3
Ta	ppb	0.0002	3	*na*	<0.0002	*na*	*na*	*na*
Tb	ppb	0.0005	3	*na*	<0.0005	*na*	*na*	*na*
Te	ppb	0.001	3	1.09	0.922	0.0573	6.22	84.6
Th	ppb	0.00005	3	*na*	0.00122	0.0000056	0.458	*na*
Ti	ppb	0.1	3	*na*	0.127	0.0200	15.8	*na*
Tl	ppb	0.001	3	7.445	6.87	0.0427	0.621	92.3
Tm	ppb	0.0002	3	*na*	<0.0002	*na*	*na*	*na*
U	ppb	0.0005	3	*na*	0.000942	0.0000220	2.34	*na*
V	ppb	0.0005	3	37.9	37.8	0.292	0.773	99.8
W	ppb	0.001	3	*na*	0.0220	0.000288	1.31	*na*
Y	ppb	0.001	3	*na*	0.0205	0.000508	2.48	*na*
Yb	ppb	0.001	3	*na*	0.00112	0.0000776	6.90	*na*
Zn	ppb	1	3	78.5	78.3	0.262	0.335	99.8
Zr	ppb	0.001	3	*na*	0.0391	0.000997	2.55	*na*

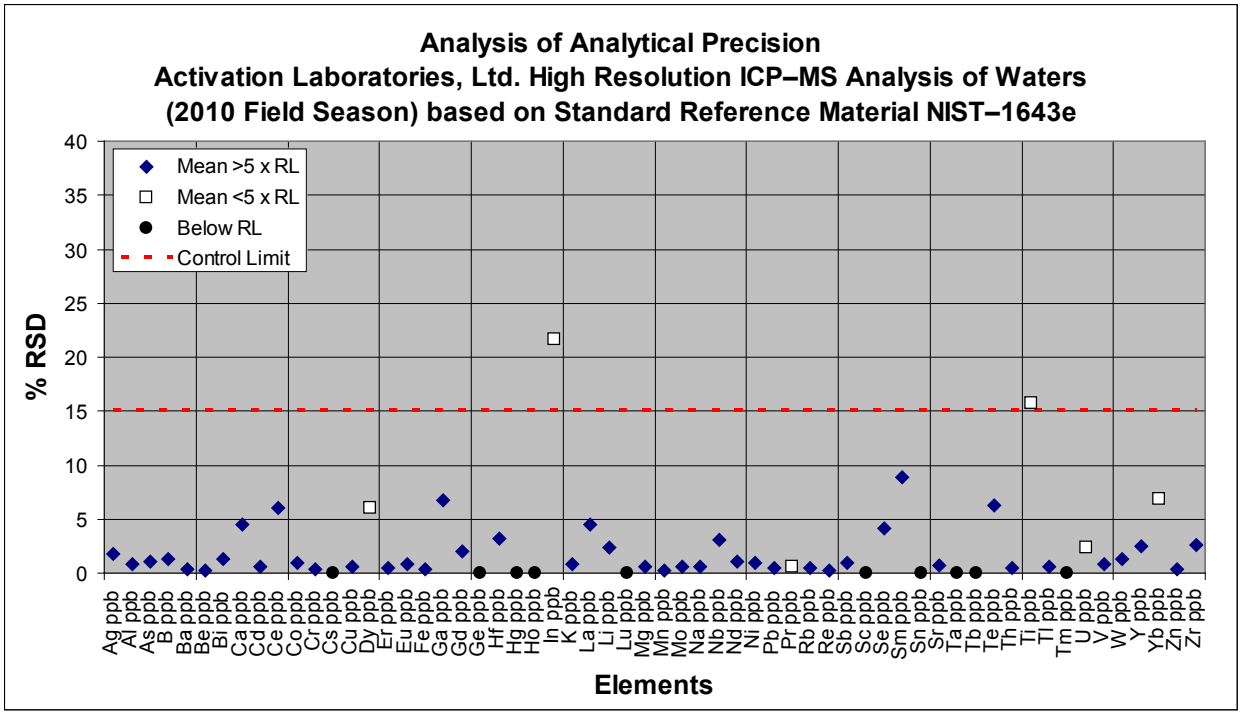

Figure 15-15. Precision plot for three analyses of standard reference material NIST–1643e by HR ICP–MS (2010 field season). %RSD is percent relative standard deviation; RL is reporting limit.

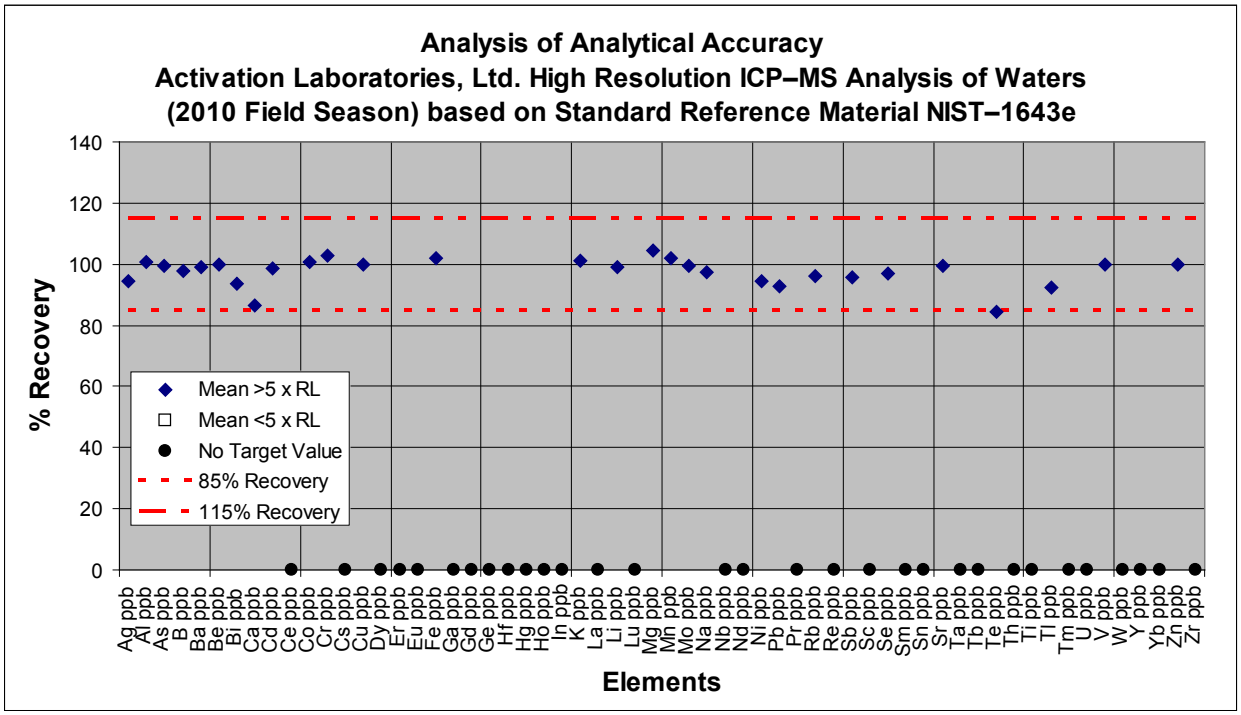

Figure 15-16. Accuracy plot for three analyses of standard reference material NIST–1643e by HR ICP–MS (2010 field season). %Recovery is percent recovery; RL is reporting limit.

Table 15-9. Summary statistics for assessing analytical variation on the standard reference material T–167; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2010 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.001	2	6.70	6.88	0.280	4.06	103
Al	ppb	2	2	*na*	26.3	1.94	7.40	*na*
As	ppb	0.01	2	22.1	30.2	0.0643	0.213	137
B	ppb	0.3	2	24.3	30.7	3.19	10.4	127
Ba	ppb	0.04	2	20.6	18.7	0.756	4.04	90.9
Be	ppb	0.002	2	10.8	16.3	1.80	11.1	151
Bi	ppb	0.001	2	*na*	<0.001	*na*	*na*	*na*
Ca	ppb	14	2	5,150	7,420	246	3.31	144
Cd	ppb	0.001	2	10.4	13.1	0.221	1.69	126
Ce	ppb	0.002	2	*na*	0.265	0.0207	7.81	*na*
Co	ppb	0.002	2	6.80	8.13	0.706	8.69	120
Cr	ppb	0.01	2	22.6	27.4	1.83	6.66	121
Cs	ppb	0.001	2	*na*	0.00379	0.000167	4.40	*na*
Cu	ppb	0.01	2	20.6	24.0	0.753	3.14	116
Dy	ppb	0.0005	2	*na*	0.0299	0.000595	1.99	*na*
Er	ppb	0.0003	2	*na*	0.0187	0.00143	7.65	*na*
Eu	ppb	0.0004	2	*na*	0.0166	0.000394	2.38	*na*
Fe	ppb	0.3	2	56.1	68.9	7.38	10.7	123
Ga	ppb	0.001	2	*na*	0.00845	0.000442	5.23	*na*
Gd	ppb	0.0003	2	*na*	0.0332	0.00162	4.89	*na*
Ge	ppb	0.002	2	*na*	0.0217	0.00406	18.7	*na*
Hf	ppb	0.0002	2	*na*	0.000347	0.000102	29.3	*na*
Hg	ppb	0.001	2	*na*	<0.001	*na*	*na*	*na*
Ho	ppb	0.0003	2	*na*	0.00594	0.000219	3.69	*na*
In	ppb	0.001	2	*na*	0.00516	0.000366	7.10	*na*
K	ppb	1	2	4,760	6,530	96.5	1.48	137
La	ppb	0.003	2	*na*	0.326	0.0252	7.74	*na*
Li	ppb	0.04	2	13.6	17.7	1.16	6.59	130
Lu	ppb	0.0005	2	*na*	0.00194	0.0000297	1.53	*na*
Mg	ppb	1	2	4,800	5,750	552	9.60	120
Mn	ppb	0.03	2	18.5	22.6	1.99	8.83	122
Mo	ppb	0.02	2	20.1	21.0	0.152	0.722	105
Na	ppb	2	2	7,340	8,830	712	8.07	120
Nb	ppb	0.0003	2	*na*	0.00169	0.000376	22.2	*na*
Nd	ppb	0.001	2	*na*	0.274	0.000371	0.135	*na*
Ni	ppb	0.2	2	12.0	13.2	1.09	8.26	110
Pb	ppb	0.01	2	21.5	18.5	0.349	1.89	86.1
Pr	ppb	0.0005	2	*na*	0.0650	0.00116	1.79	*na*
Rb	ppb	0.003	2	*na*	0.606	0.000707	0.117	*na*
Re	ppb	0.001	2	*na*	0.00164	0.0000021	0.129	*na*
Sb	ppb	0.02	2	22.1	22.8	0.249	1.09	103
Sc	ppb	0.04	2	*na*	<0.04	*na*	*na*	*na*
Se	ppb	1	2	3.67	5.76	0.0488	0.847	157
Sm	ppb	0.0002	2	*na*	0.0530	0.000571	1.08	*na*
Sn	ppb	0.05	2	*na*	1.46	0.0356	2.44	*na*
Sr	ppb	0.03	2	41.2	41.9	0.583	1.39	102
Ta	ppb	0.0002	2	*na*	<0.0002	*na*	*na*	*na*
Tb	ppb	0.0005	2	*na*	0.00649	0.0000057	0.0872	*na*
Te	ppb	0.001	2	*na*	0.00634	0.000503	7.94	*na*
Th	ppb	0.00005	2	*na*	0.000518	0.0000127	2.46	*na*
Ti	ppb	0.1	2	*na*	0.769	0.0460	5.98	*na*
Tl	ppb	0.001	2	22.0	20.2	1.07	5.29	91.8
Tm	ppb	0.0002	2	*na*	0.00217	0.0000163	0.751	*na*

Table 15-9. Summary statistics for assessing analytical variation on the standard reference material T–167; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2010 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
U	ppb	0.0005	2	4.00	3.25	0.367	11.3	81.3
V	ppb	0.0005	2	16.8	20.9	1.40	6.68	125
W	ppb	0.001	2	*na*	0.00490	0.0000672	1.37	*na*
Y	ppb	0.001	2	*na*	0.241	0.00275	1.14	*na*
Yb	ppb	0.001	2	*na*	0.0133	0.00139	10.4	*na*
Zn	ppb	1	2	3.90	7.39	0.409	5.53	189
Zr	ppb	0.001	2	*na*	<0.001	0.0000474	5.41	*na*

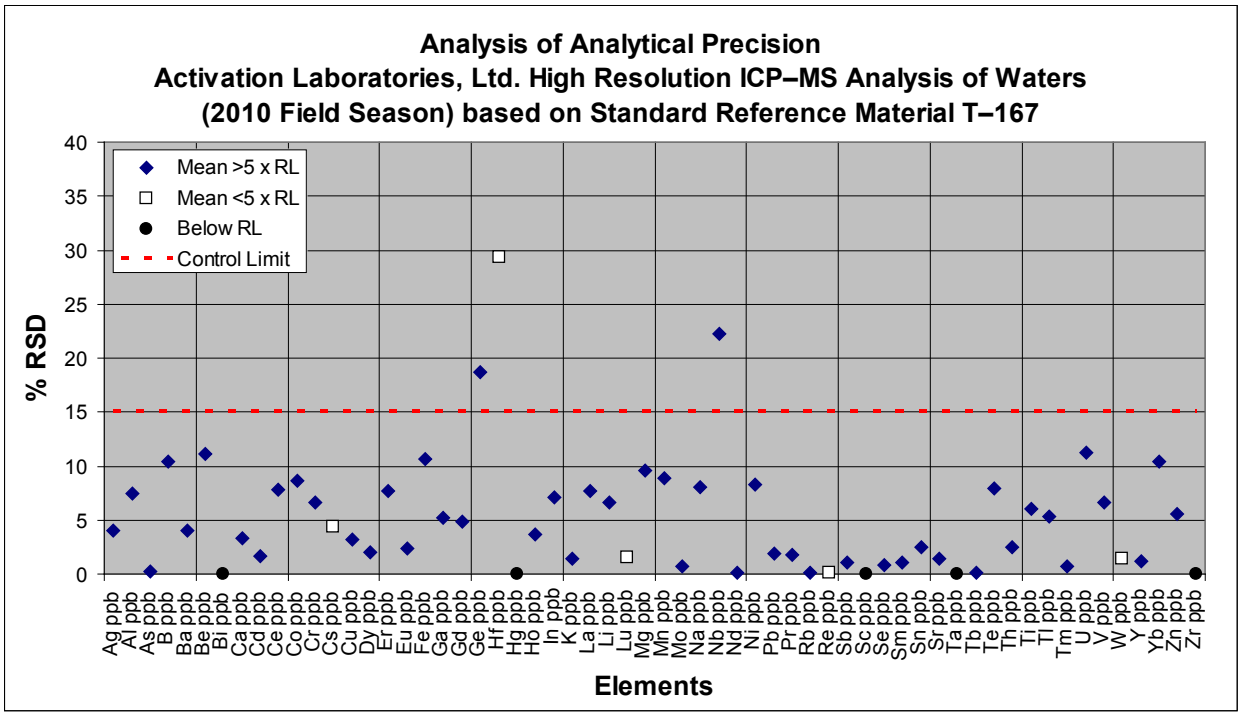

Figure 15-17. Precision plot for two analyses of standard reference material T–167 by HR ICP–MS (2010 field season). %RSD is percent relative standard deviation; RL is reporting limit.

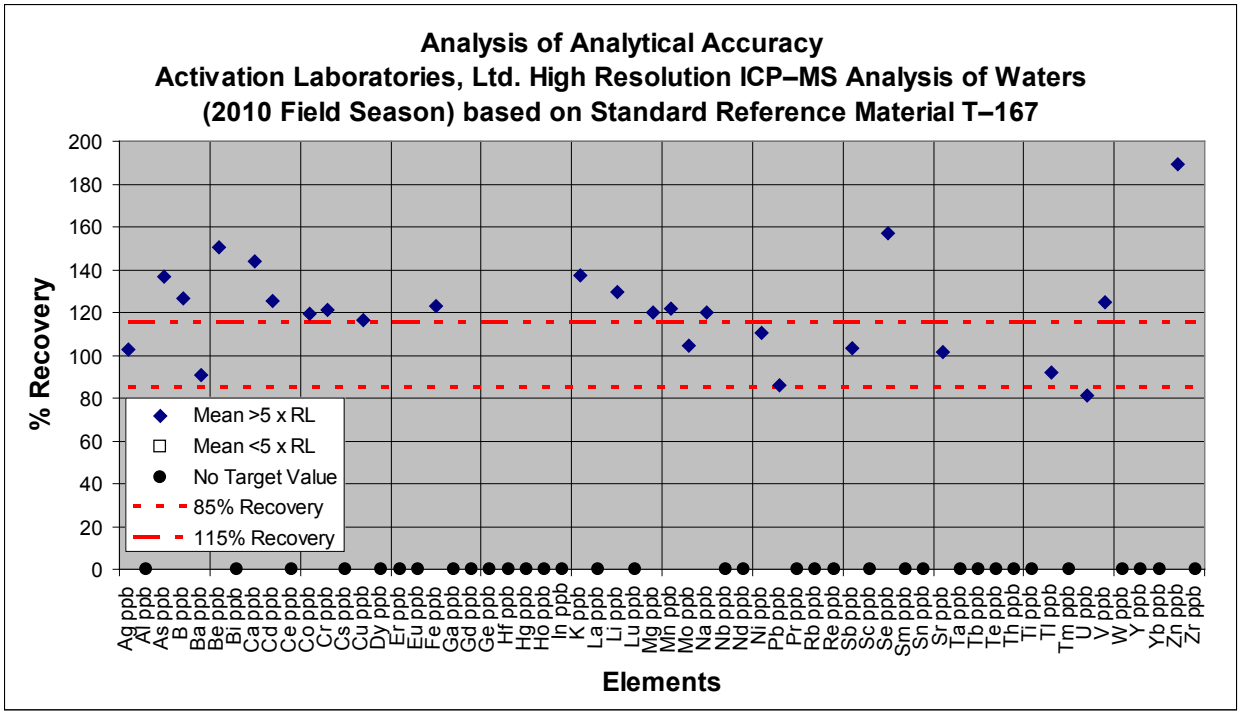

Figure 15-18. Accuracy plot for two analyses of standard reference material T–167 by HR ICP–MS (2010 field season). %Recovery is percent recovery; RL is reporting limit.

Table 15-10. Summary statistics for assessing analytical variation on the standard reference material T–177; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2010 field season).

[ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	0.001	2	0.100	0.00336	0.00208	62.0	3.36
Al	ppb	2	2	*na*	98.3	4.58	4.66	*na*
As	ppb	0.01	2	3.30	4.82	0.472	9.79	146
B	ppb	0.3	2	90.7	113	5.84	5.16	125
Ba	ppb	0.04	2	40.8	38.3	0.515	1.34	93.9
Be	ppb	0.002	2	1.00	1.53	0.0873	5.70	153
Bi	ppb	0.001	2	*na*	<0.001	*na*	*na*	*na*
Ca	ppb	14	2	31,400	38,700	6,430	16.6	123
Cd	ppb	0.001	2	2.50	3.01	0.0616	2.05	120
Ce	ppb	0.002	2	*na*	0.743	0.0378	5.08	*na*
Co	ppb	0.002	2	2.60	3.01	0.0857	2.85	116
Cr	ppb	0.01	2	8.50	10.5	0.437	4.15	124
Cs	ppb	0.001	2	*na*	0.519	0.0178	3.44	*na*
Cu	ppb	0.01	2	7.80	9.02	0.193	2.14	116
Dy	ppb	0.0005	2	*na*	0.0488	0.0000806	0.165	*na*
Er	ppb	0.0003	2	*na*	0.0311	0.000223	0.716	*na*
Eu	ppb	0.0004	2	*na*	0.0245	0.00104	4.22	*na*
Fe	ppb	0.3	2	12.3	15.4	0.507	3.28	126
Ga	ppb	0.001	2	*na*	0.0107	0.00120	11.2	*na*
Gd	ppb	0.0003	2	*na*	0.0546	0.00371	6.79	*na*
Ge	ppb	0.002	2	*na*	0.0536	0.0216	40.3	*na*
Hf	ppb	0.0002	2	*na*	0.00144	0.0000757	5.27	*na*
Hg	ppb	0.001	2	*na*	<0.001	*na*	*na*	*na*

Table 15-10. Summary statistics for assessing analytical variation on the standard reference material T–177; determined by High-Resolution ICP–MS analysis of water samples at Actlabs (2010 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ho	ppb	0.0003	2	*na*	0.00979	0.000282	2.88	*na*
In	ppb	0.001	2	*na*	0.00417	0.000395	9.48	*na*
K	ppb	1	2	3,300	4,020	406	10.1	122
La	ppb	0.003	2	*na*	0.564	0.0370	6.57	*na*
Li	ppb	0.04	2	15.8	19.2	7.75	40.3	122
Lu	ppb	0.0005	2	*na*	0.00342	0.0000509	1.49	*na*
Mg	ppb	1	2	7,630	9,570	217	2.27	125
Mn	ppb	0.03	2	346	414	5.27	1.27	120
Mo	ppb	0.02	2	4.12	4.21	0.112	2.67	102
Na	ppb	2	2	37,200	47,500	1,220	2.58	128
Nb	ppb	0.0003	2	*na*	0.000636	0.000226	35.6	*na*
Nd	ppb	0.001	2	*na*	0.465	0.0191	4.12	*na*
Ni	ppb	0.2	2	3.71	3.64	0.165	4.52	98.2
Pb	ppb	0.01	2	4.24	3.56	0.373	10.5	84.0
Pr	ppb	0.0005	2	*na*	0.119	0.000908	0.766	*na*
Rb	ppb	0.003	2	*na*	8.09	0.0806	0.997	*na*
Re	ppb	0.001	2	*na*	0.0319	0.000328	1.03	*na*
Sb	ppb	0.02	2	1.80	1.85	0.0676	3.66	103
Sc	ppb	0.04	2	*na*	<0.04	*na*	*na*	*na*
Se	ppb	1	2	1.33	1.72	0.317	18.4	130
Sm	ppb	0.0002	2	*na*	0.0777	0.00387	4.98	*na*
Sn	ppb	0.05	2	*na*	1.05	0.0265	2.52	*na*
Sr	ppb	0.03	2	239	257	1.52	0.591	108
Ta	ppb	0.0002	2	*na*	<0.0002	*na*	*na*	*na*
Tb	ppb	0.0005	2	*na*	0.0109	0.000260	2.39	*na*
Te	ppb	0.001	2	*na*	0.0149	0.0165	111	*na*
Th	ppb	0.00005	2	*na*	0.000908	0.000137	15.1	*na*
Ti	ppb	0.1	2	*na*	0.510	0.0339	6.66	*na*
Tl	ppb	0.001	2	1.57	1.39	0.138	9.88	88.7
Tm	ppb	0.0002	2	*na*	0.00359	0.000298	8.31	*na*
U	ppb	0.0005	2	1.76	1.58	0.0517	3.27	90.0
V	ppb	0.0005	2	1.18	1.50	0.00201	0.134	127
W	ppb	0.001	2	*na*	0.00591	0.000364	6.16	*na*
Y	ppb	0.001	2	*na*	0.353	0.000378	0.107	*na*
Yb	ppb	0.001	2	*na*	0.0219	0.000475	2.17	*na*
Zn	ppb	1	2	304	474	14.0	2.95	156
Zr	ppb	0.001	2	*na*	0.0599	0.00250	4.17	*na*

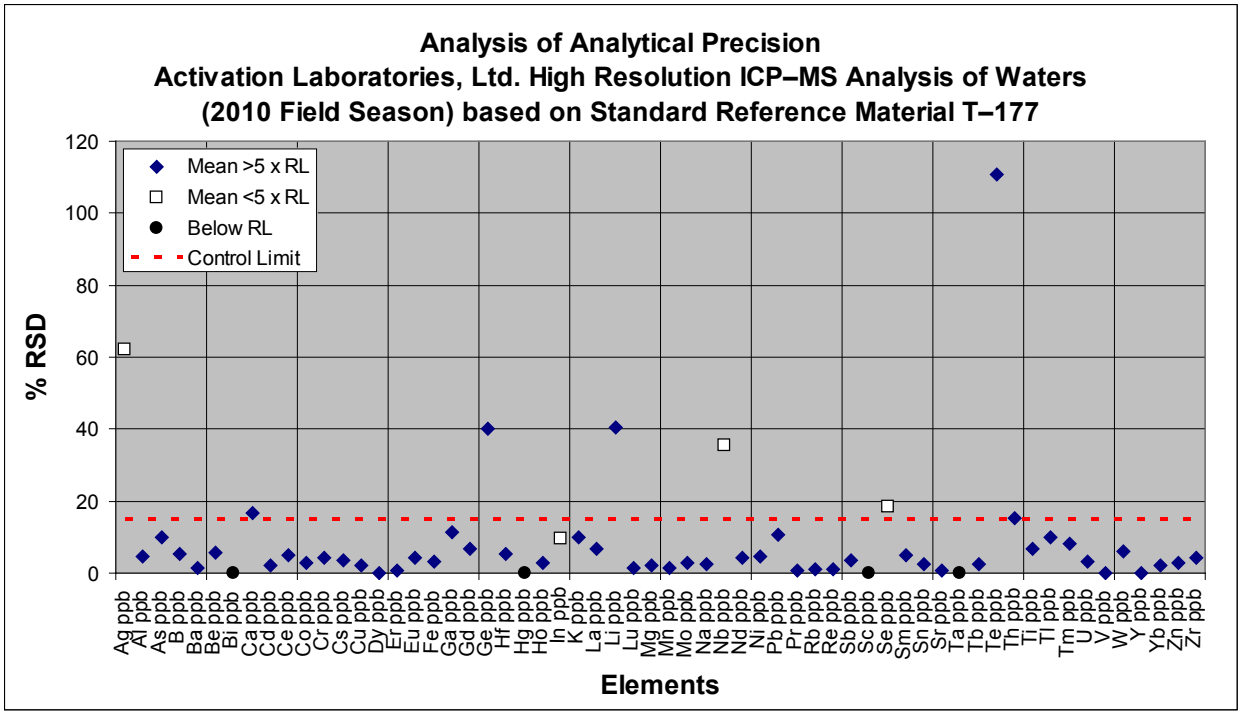

Figure 15-19. Precision plot for two analyses of standard reference material T–177 by HR ICP–MS (2010 field season). %RSD is percent relative standard deviation; RL is reporting limit.

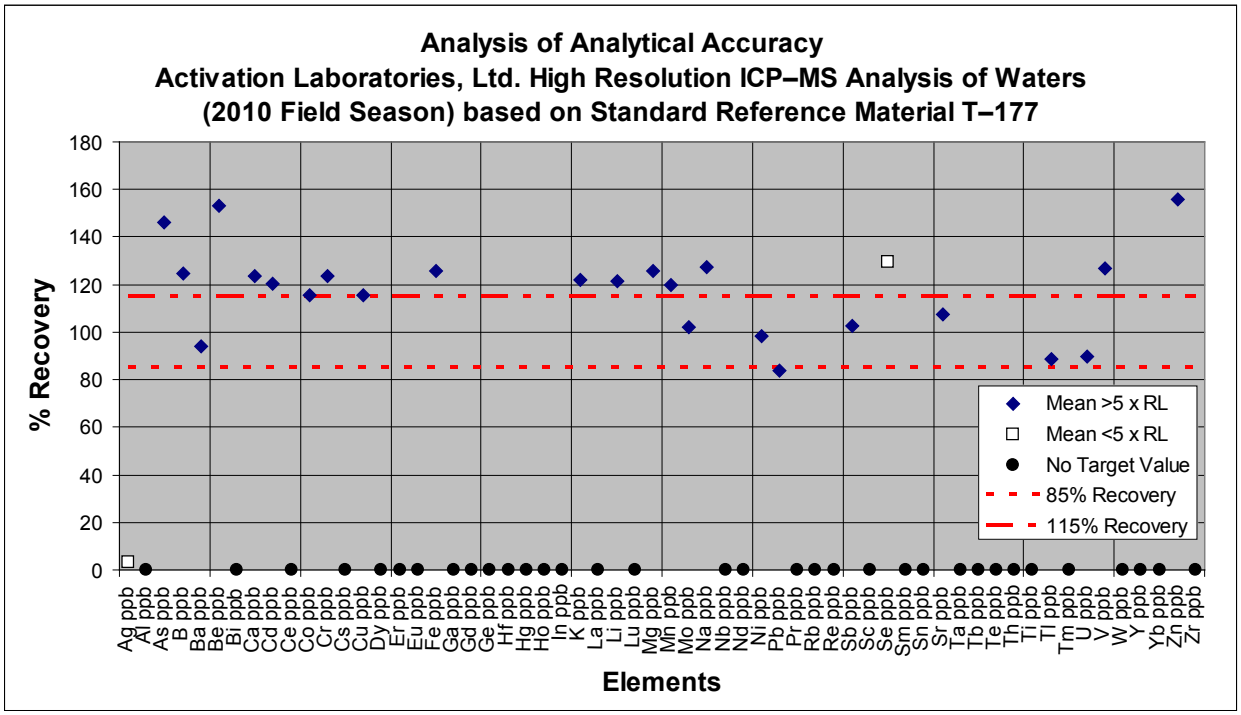

Figure 15-20. Accuracy plot for two analyses of standard reference material T–177 by HR ICP–MS (2010 field season). %Recovery is percent recovery; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for Acme A*nal*ytical Laboratories, Ltd. Vegetation Data

Table 16-1. Summary statistics for assessing analytical variation on duplicate samples; determined by ICP–MS analysis of vegetation samples at Acme A*nal*ytical Laboratories, Ltd. (2007 field season).

[%, percent; ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	2	2	<2	3.00	2.45	0.0944	3.85
Al	%	0.01	2	<0.01	<0.01	<0.01	*na*	*na*
As	ppm	0.1	2	<0.1	0.200	0.121	0.0500	41.5
Au	ppb	0.2	2	0.200	0.700	0.450	0.0707	15.7
B	ppm	1	2	5.00	12.0	8.75	0.500	5.71
Ba	ppm	0.1	2	5.70	8.70	7.23	0.0500	0.692
Be	ppm	0.1	2	<0.1	<0.1	<0.1	*na*	*na*
Bi	ppm	0.02	2	<0.02	<0.02	<0.02	*na*	*na*
Ca	%	0.01	2	0.350	0.420	0.385	0.00707	1.84
Cd	ppm	0.01	2	0.0400	0.0700	0.0475	0.0150	31.6
Ce	ppm	0.01	2	0.0200	0.0300	0.0225	0.00500	22.2
Co	ppm	0.01	2	0.0200	0.0700	0.0400	0.0100	25.0
Cr	ppm	0.1	2	1.50	2.40	1.95	0.141	7.25
Cs	ppm	0.005	2	0.0330	0.204	0.118	0.00255	2.17
Cu	ppm	0.01	2	3.12	6.64	4.88	0.0532	1.09
Fe	%	0.001	2	0.00500	0.0130	0.00925	0.000500	5.41
Ga	ppm	0.1	2	<0.1	<0.1	<0.1	*na*	*na*
Ge	ppm	0.01	2	<0.01	0.0200	0.0123	0.00502	40.9
Hf	ppm	0.001	2	<0.001	0.00100	<0.001	*na*	*na*
Hg	ppb	1	2	5.00	13.0	8.25	2.06	25.0
In	ppm	0.02	2	<0.02	<0.02	<0.02	*na*	*na*
K	%	0.01	2	0.440	1.13	0.793	0.0150	1.89
La	ppm	0.01	2	0.0100	0.020	0.0150	0	0
Li	ppm	0.01	2	0.0200	0.0300	0.0225	0.00500	22.2
Mg	%	0.001	2	0.198	0.224	0.213	0.00350	1.65
Mn	ppm	1	2	380	563	472	3.20	0.679
Mo	ppm	0.01	2	0.0300	0.130	0.0825	0.0112	13.6
Na	%	0.001	2	0.00300	0.00400	0.00350	0	0
Nb	ppm	0.01	2	<0.01	<0.01	<0.01	*na*	*na*
Ni	ppm	0.1	2	0.300	0.500	0.375	0.0500	13.3
P	%	0.001	2	0.136	0.373	0.256	0.00350	1.37
Pb	ppm	0.01	2	0.200	0.330	0.258	0.0335	13.0
Pd	ppb	2	2	<2	<2	<2	*na*	*na*
Pt	ppb	1	2	<1	<1	<1	*na*	*na*
Rb	ppm	0.1	2	2.80	21.9	12.4	0.0707	0.573
Re	ppb	1	2	<1	1.00	<1	*na*	*na*
S	%	0.01	2	0.150	0.210	0.183	0.0112	6.13
Sb	ppm	0.02	2	<0.02	0.0300	0.0211	0.00594	28.2
Sc	ppm	0.1	2	0.100	0.200	0.150	0	0
Se	ppm	0.1	2	0.100	0.200	0.150	0	0
Sn	ppm	0.02	2	<0.02	0.0300	0.0216	0.00500	23.2
Sr	ppm	0.5	2	19.7	20.9	20.3	0.112	0.550
Tb	ppm	0.001	2	<0.001	<0.001	<0.001	*na*	*na*
Te	ppm	0.02	2	<0.02	<0.02	<0.02	*na*	*na*
Th	ppm	0.01	2	<0.01	<0.01	<0.01	*na*	*na*
Ti	ppm	1	2	9.00	15.0	12.0	0	0
Tl	ppm	0.02	2	<0.02	<0.02	<0.02	*na*	*na*

Table 16-1. Summary statistics for assessing analytical variation on duplicate samples; determined by ICP–MS analysis of vegetation samples at Acme Analytical Laboratories, Ltd. (2007 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
U	ppm	0.01	2	<0.01	<0.01	<0.01	*na*	*na*
V	ppm	2	2	<2	<2	<2	*na*	*na*
W	ppm	0.1	2	<0.1	<0.1	<0.1	*na*	*na*
Y	ppm	0.001	2	0.00900	0.0110	0.0103	0.000500	4.88
Zn	ppm	0.1	2	45.3	166	104	3.15	3.03
Zr	ppm	0.01	2	0.0300	0.0600	0.0500	0.0158	31.6

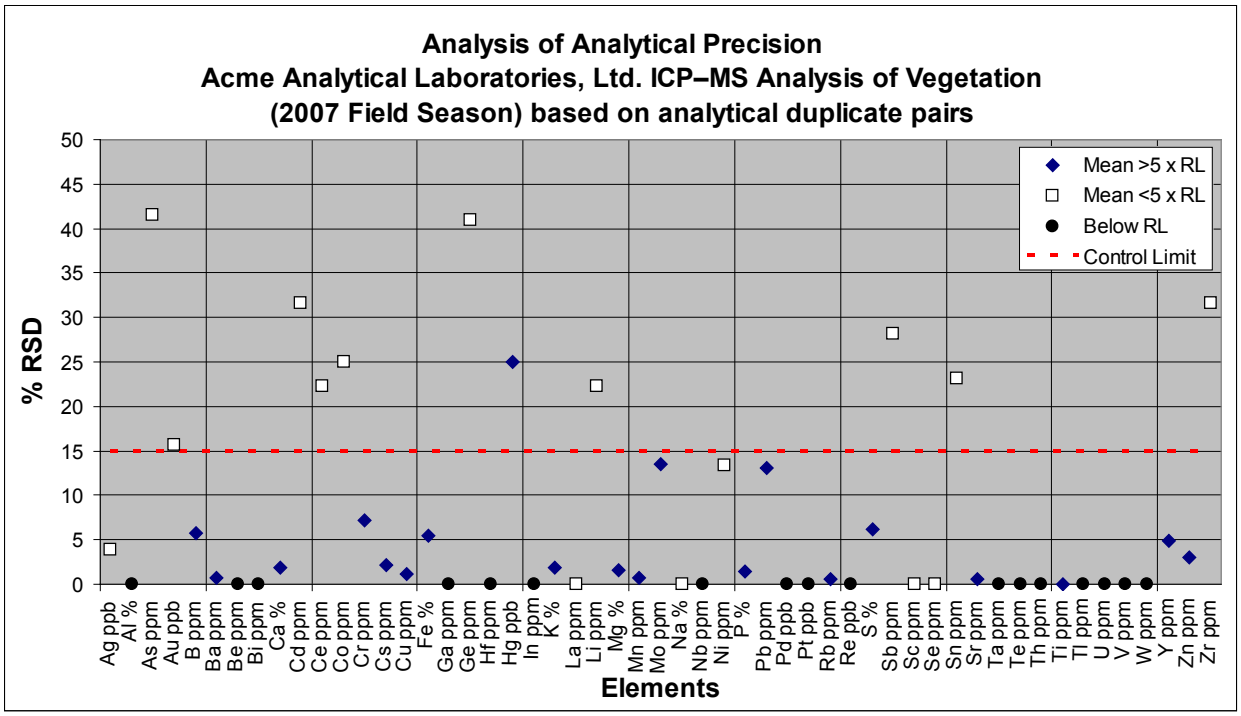

Figure 16-1. Precision plot for two analytical duplicate sample pairs by ICP–MS (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 16-2. Summary statistics for assessing analytical variation on the standard reference material V6; determined by ICP–MS analysis of vegetation samples at Acme Analytical Laboratories, Ltd. (2007 field season).

[%, percent; ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	2	3	18.8	15.0	1.00	6.67	79.8
Al	%	0.01	3	0.0500	0.0433	0.00577	13.3	86.7
As	ppm	0.1	3	0.500	0.433	0.208	48.0	86.7
Au	ppb	0.2	3	0.600	0.467	0.0577	12.4	77.8
B	ppm	1	3	10.0	9.00	0	0	90.0
Ba	ppm	0.1	3	10.0	8.60	0.436	5.07	86.0
Be	ppm	0.1	3	<0.1	<0.1	*na*	*na*	100
Bi	ppm	0.02	3	0.0200	<0.02	*na*	*na*	96.9
Ca	%	0.01	3	0.780	0.720	0.0300	4.17	92.3

Table 16-2. Summary statistics for assessing analytical variation on the standard reference material V6; determined by ICP–MS analysis of vegetation samples at Acme A*n*alytical Laboratories, Ltd. (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Cd	ppm	0.01	3	0.220	0.227	0.0115	5.09	103
Ce	ppm	0.01	3	1.66	1.56	0.108	6.93	94.0
Co	ppm	0.01	3	0.400	0.413	0.0473	11.4	103
Cr	ppm	0.1	3	4.08	3.87	0.116	2.99	94.8
Cs	ppm	0.005	3	0.0280	0.0310	0.00100	3.23	111
Cu	ppm	0.01	3	8.08	8.89	2.57	28.9	110
Fe	%	0.001	3	0.0740	0.0763	0.00153	2.00	103
Ga	ppm	0.1	3	0.100	0.167	0.0577	34.6	167
Ge	ppm	0.01	3	0.0200	0.0233	0.0115	49.5	117
Hf	ppm	0.001	3	0.00800	0.0103	0.00231	22.4	129
Hg	ppb	1	3	39.0	32.3	4.16	12.9	82.9
In	ppm	0.02	3	<0.02	<0.02	*na*	*na*	100
K	%	0.01	3	0.0900	0.0833	0.00577	6.93	92.6
La	ppm	0.01	3	0.830	0.807	0.0493	6.12	97.2
Li	ppm	0.01	3	0.360	0.320	0.0265	8.27	88.9
Mg	%	0.001	3	0.119	0.112	0.00289	2.59	93.8
Mn	ppm	1	3	48.0	43.7	1.15	2.64	91.0
Mo	ppm	0.01	3	0.270	0.273	0.0153	5.59	101
Na	%	0.001	3	0.00700	0.00800	0.00100	12.5	114
Nb	ppm	0.01	3	0.0850	0.0633	0.00577	9.12	74.5
Ni	ppm	0.1	3	3.30	2.93	0.116	3.94	88.9
P	%	0.001	3	0.0450	0.0363	0.00404	11.1	80.7
Pb	ppm	0.01	3	18.6	16.5	0.341	2.07	88.5
Pd	ppb	2	3	3.51	<2	*na*	*na*	51.6
Pt	ppb	1	3	<1	<1	*na*	*na*	107
Rb	ppm	0.1	3	1.00	1.00	0	0	100
Re	ppb	1	3	1.00	<1	*na*	*na*	91.1
S	%	0.01	3	0.0600	0.0633	0.0153	24.1	106
Sb	ppm	0.02	3	0.0500	0.0500	0.0100	20.0	100
Sc	ppm	0.1	3	0.200	0.233	0.0577	24.7	117
Se	ppm	0.1	3	0.100	0.233	0.0577	24.7	233
Sn	ppm	0.02	3	0.180	0.150	0.0200	13.3	83.3
Sr	ppm	0.5	3	33.5	31.3	1.65	5.28	93.3
Tb	ppm	0.001	3	0.00200	0.00200	0	0	100
Te	ppm	0.02	3	<0.02	<0.02	*na*	*na*	100
Th	ppm	0.01	3	0.100	0.103	0.00577	5.59	103
Ti	ppm	1	3	16.0	25.0	1.73	6.93	156
Tl	ppm	0.02	3	<0.02	<0.02	*na*	*na*	100
U	ppm	0.01	3	0.0500	0.0600	0	0	120
V	ppm	2	3	1.90	2.00	0	0	105
W	ppm	0.1	3	<0.1	<0.1	*na*	*na*	100
Y	ppm	0.001	3	0.472	0.460	0.0259	5.62	97.5
Zn	ppm	0.1	3	38.0	37.4	3.26	8.73	98.3
Zr	ppm	0.01	3	0.250	0.303	0.0115	3.81	121

[1]Target Values from Acme Labs based on the average of 183 analyses of V6.

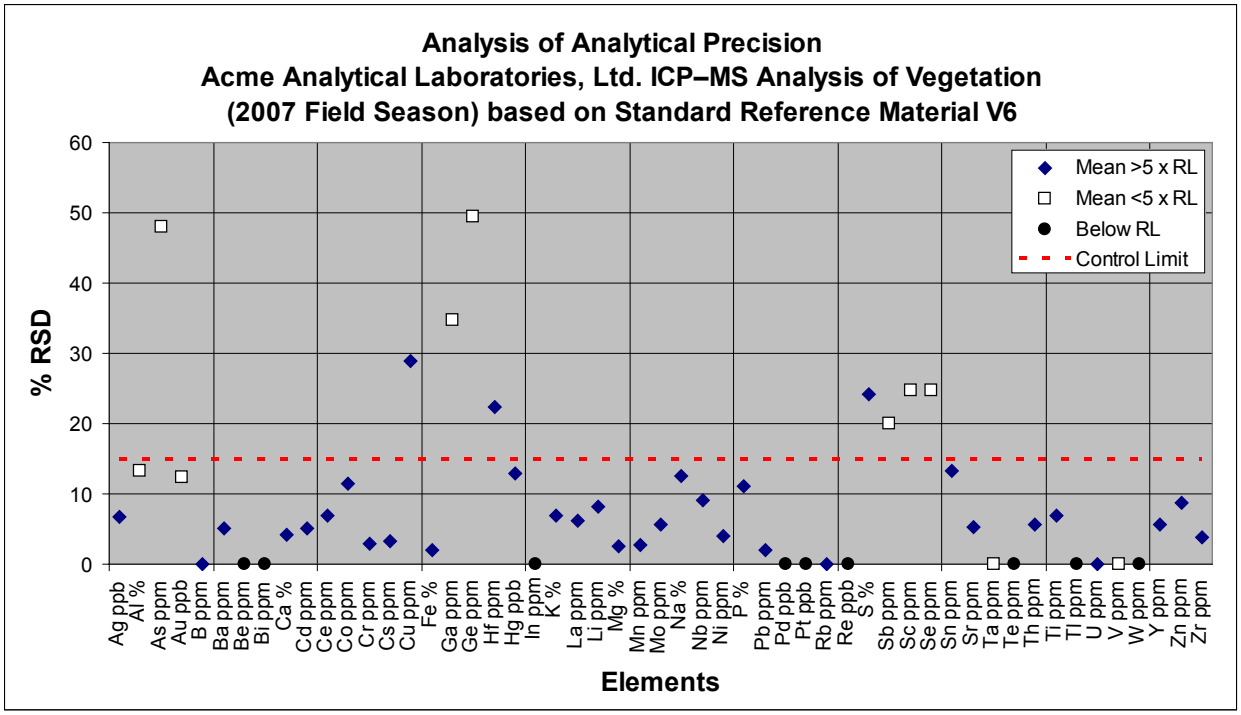

Figure 16-2. Precision plot for three analyses of standard reference material V6 by ICP–MS (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

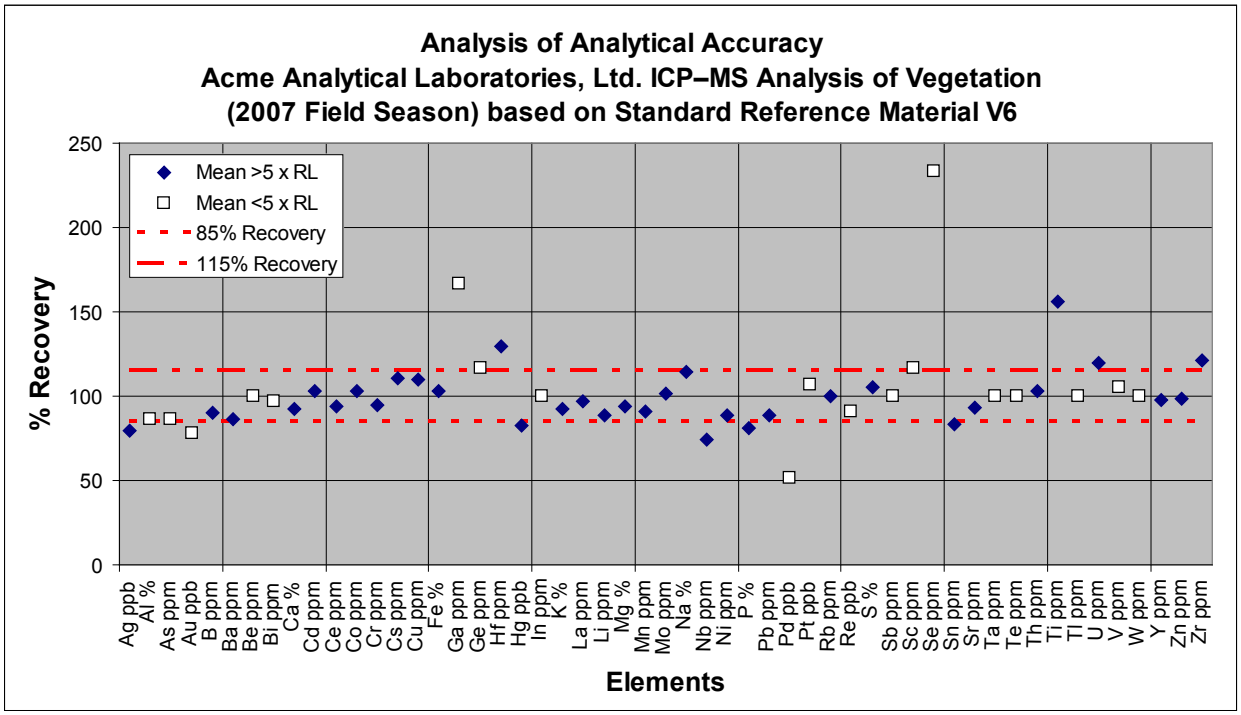

Figure 16-3. Accuracy plot for three analyses of standard reference material V6 by ICP–MS (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Table 16-3. Summary statistics for assessing analytical variation on the standard reference material V14; determined by ICP–MS analysis of vegetation samples at Acme A*na*lytical Laboratories, Ltd. (2007 field season).

[%, percent; ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	2	2	24.0	23.0	2.83	12.3	95.8
Al	%	0.01	2	0.150	0.150	0	0	100
As	ppm	0.1	2	11.3	10.5	0	0	92.9
Au	ppb	0.2	2	8.60	5.95	2.05	34.5	69.2
B	ppm	1	2	17.0	17.5	2.12	12.1	103
Ba	ppm	0.1	2	1.40	1.45	0.0707	4.88	104
Be	ppm	0.1	2	*na*	<0.1	*na*	*na*	*na*
Bi	ppm	0.02	2	0.0900	0.0850	0.00707	8.32	94.4
Ca	%	0.01	2	0.670	0.650	0.0283	4.35	97.0
Cd	ppm	0.01	2	0.230	0.215	0.00707	3.29	93.5
Ce	ppm	0.01	2	*na*	0.0600	0	0	*na*
Co	ppm	0.01	2	0.830	0.825	0.0778	9.43	99.4
Cr	ppm	0.1	2	1.20	1.40	0.141	10.1	117
Cs	ppm	0.005	2	0.0290	0.0310	0	0	107
Cu	ppm	0.01	2	5.17	5.06	0.410	8.11	97.9
Fe	%	0.001	2	0.0160	0.0170	0.00141	8.32	106
Ga	ppm	0.1	2	0.100	0.100	0	0	100
Ge	ppm	0.01	2	*na*	<0.01	*na*	*na*	*na*
Hf	ppm	0.001	2	*na*	0.00150	0.000707	47.1	*na*
Hg	ppb	1	2	52.0	51.5	0.707	1.37	99.0
In	ppm	0.02	2	*na*	<0.02	*na*	*na*	*na*
K	%	0.01	2	0.510	0.485	0.0495	10.2	95.1
La	ppm	0.01	2	0.0300	0.0350	0.00707	20.2	117
Li	ppm	0.01	2	*na*	0.0850	0.0212	25.0	*na*
Mg	%	0.001	2	0.0790	0.0815	0.000707	0.868	103
Mn	ppm	1	2	2,150	2,200	21.9	1.00	103
Mo	ppm	0.01	2	0.0700	0.0900	0.0283	31.4	129
Na	%	0.001	2	0.00200	0.00100	0	0	50.0
Nb	ppm	0.01	2	*na*	<0.01	*na*	*na*	*na*
Ni	ppm	0.1	2	1.50	1.40	0	0	93.3
P	%	0.001	2	0.0930	0.0840	0.00990	11.8	90.3
Pb	ppm	0.01	2	0.880	0.860	0.0141	1.64	97.7
Pd	ppb	2	2	*na*	<2	*na*	*na*	*na*
Pt	ppb	1	2	*na*	<1	*na*	*na*	*na*
Rb	ppm	0.1	2	*na*	1.70	0	0	*na*
Re	ppb	1	2	*na*	<1	*na*	*na*	*na*
S	%	0.01	2	0.0600	0.0750	0.0212	28.3	125
Sb	ppm	0.02	2	0.0700	0.0550	0.00707	12.9	78.6
Sc	ppm	0.1	2	0.100	0.150	0.0707	47.1	150
Se	ppm	0.1	2	0.200	0.200	0	0	100
Sn	ppm	0.02	2	*na*	0.0350	0.00707	20.2	*na*
Sr	ppm	0.5	2	6.70	6.55	0.354	5.40	97.8
Ta	ppm	0.001	2	*na*	<0.001	*na*	*na*	*na*
Te	ppm	0.02	2	<0.02	<0.02	*na*	*na*	100
Th	ppm	0.01	2	<0.01	<0.01	*na*	*na*	100
Ti	ppm	1	2	7.00	7.50	0.707	9.43	107
Tl	ppm	0.02	2	0.0400	0.0300	0	0	75.0
U	ppm	0.01	2	<0.01	<0.01	*na*	*na*	100
V	ppm	2	2	<2	<2	*na*	*na*	100
W	ppm	0.1	2	<0.1	<0.1	*na*	*na*	100
Y	ppm	0.001	2	*na*	0.0180	0.00141	7.86	*na*
Zn	ppm	0.1	2	15.8	15.5	1.34	8.70	97.8
Zr	ppm	0.01	2	*na*	0.0350	0.00707	20.2	*na*

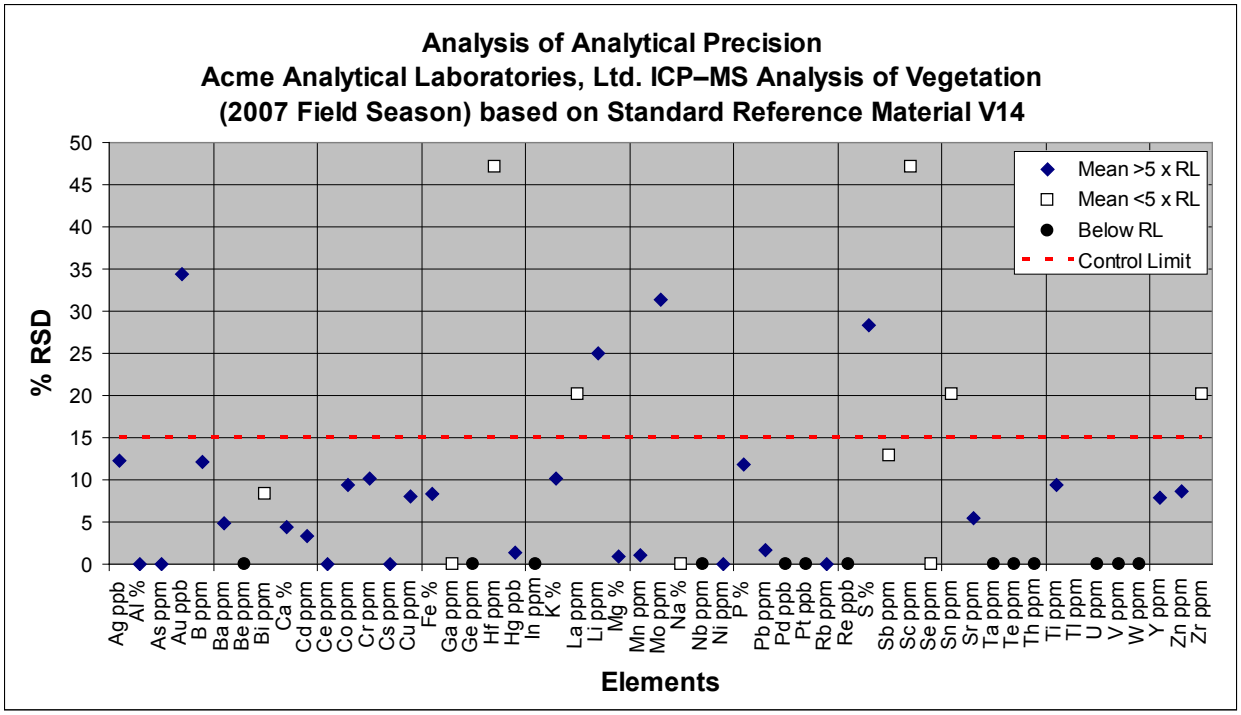

Figure 16-4. Precision plot for two analyses of standard reference material V14 by ICP–MS (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

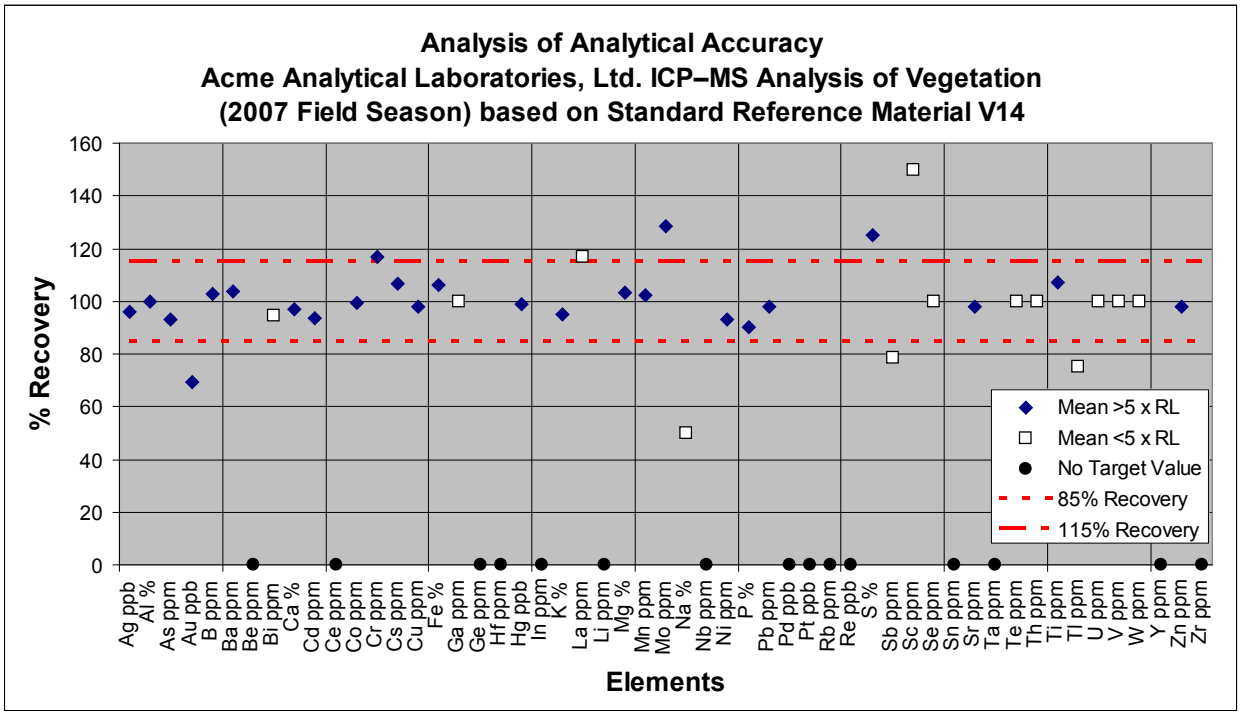

Figure 16-5. Accuracy plot for two analyses of standard reference material V14 by ICP–MS (2007 field season). %Recovery is percent recovery; RL is reporting limit.

Appendix 4: Quality Control Tables and Charts for Activation Laboratories, Ltd. Vegetation Data

Table 17-1. Summary statistics for assessing analytical variation on duplicate samples; determined by ICP–MS analysis of vegetation samples at Actlabs (2007 field season).

[ppm, parts per million; ppb, parts per billion; k, number of duplicate pairs; <, less than; %RSD, percent relative standard deviation; *na*, not applicable]

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Ag	ppb	1	5	<1	9.00	3.88	1.23	31.8
As	ppb	5	5	<5	67.0	23.6	6.24	26.4
Au	ppb	0.1	5	<0.1	1.00	0.346	0.192	55.7
B	ppb	200	5	1,800	10,000	7,370	251	3.41
Ba	ppm	1	5	1.00	64.0	30.3	1.22	4.04
Be	ppb	0.1	5	<0.1	1.60	1.05	0.210	20.0
Bi	ppb	1	5	<1	2.00	1.04	0.318	30.6
Ca	ppm	2	5	142	4,730	2,860	143	4.98
Cd	ppb	0.1	5	11.8	679	183	16.1	8.78
Ce	ppb	0.5	5	2.80	20.6	13.2	2.02	15.4
Co	ppb	0.5	5	5.30	591	251	13.0	5.19
Cr	ppb	10	5	40.0	480	174	31.6	18.2
Cs	ppb	0.1	5	0.800	697	154	0.396	0.258
Cu	ppb	20	5	1,710	8,190	5,040	114	2.27
Dy	ppb	0.05	5	0.200	1.60	1.11	0.102	9.13
Er	ppb	0.05	5	0.120	0.940	0.625	0.0481	7.69
Eu	ppb	0.1	5	0.300	16.3	6.14	0.827	13.5
Fe	ppm	0.05	5	12.4	55.9	30.5	1.97	6.46
Ga	ppb	10	5	<10	<10	<10	*na*	*na*
Gd	ppb	1	5	<1	10.0	4.68	0.548	11.7
Ge	ppm	0.1	5	<0.1	<0.1	<0.1	*na*	*na*
Hf	ppb	2	5	<2	13.0	3.67	4.06	111
Hg	ppb	5	5	<5	18.0	7.21	0.316	4.39
Ho	ppb	0.01	5	0.0400	0.320	0.217	0.0122	5.64
In	ppb	0.1	5	<0.1	0.300	0.178	0.0447	25.1
K	ppm	10	5	900	6,760	4,170	74.1	1.78
La	ppb	0.2	5	1.60	42.6	13.4	1.07	8.01
Li	ppb	5	5	<5	70.0	15.3	7.27	47.5
Lu	ppb	0.2	5	<0.2	0.800	0.436	0.0447	10.3
Mg	ppm	0.5	5	312	1,520	962	20.2	2.10
Mn	ppb	10	5	8,120	557,000	208,000	7,220	3.47
Mo	ppb	1	5	7.00	1,940	475	9.52	2.00
Na	ppm	10	5	<10	50.0	28.8	3.16	11.0
Nb	ppb	0.5	5	0.600	4.80	1.53	0.836	54.6
Nd	ppb	0.2	5	1.40	13.5	7.58	1.05	13.9
Ni	ppm	0.1	5	<0.1	3.80	1.18	0	0
Pb	ppb	10	5	20.0	270	93.0	29.5	31.7
Pr	ppb	0.5	5	<0.5	3.80	1.95	0.249	12.8
Rb	ppb	10	5	520	20,400	7,160	273	3.81
Re	ppb	0.1	5	<0.1	0.500	0.174	0.00281	1.62
Sb	ppb	0.2	5	1.50	15.3	7.76	1.66	21.4
Sc	ppb	1	5	<1	5.00	2.16	1.00	46.2
Se	ppm	0.2	5	<0.2	1.00	0.335	0.0316	9.44
Sm	ppb	0.1	5	0.300	2.30	1.59	0.187	11.8
Sn	ppb	40	5	<40	<40	<40	*na*	*na*
Sr	ppb	20	5	830	65,700	25,800	1,250	4.86
Ta	ppb	0.1	5	<0.1	1.50	0.253	0.379	150
Tb	ppb	0.02	5	0.100	0.430	0.306	0.0161	5.27
Te	ppb	1	5	<1	<1	<1	*na*	*na*
Th	ppb	5	5	<5	<5	<5	*na*	*na*
Ti	ppb	20	5	100	1,050	600	141	23.5
Tl	ppb	0.5	5	<0.5	3.70	2.37	0.319	13.5

Table 17-1. Summary statistics for assessing analytical variation on duplicate samples; determined by ICP–MS analysis of vegetation samples at Actlabs (2007 field season)—Continued.

Element	Units	Reporting Limit	Pairs (k)	Minimum	Maximum	Mean	Standard Deviation for Duplicates	%RSD
Tm	ppb	0.05	5	<0.05	0.160	0.120	0.0114	9.50
U	ppb	1	5	<1	<1	<1	*na*	*na*
V	ppb	10	5	<10	40.0	26.7	8.58	32.1
W	ppb	5	5	<5	5.00	<5	*na*	*na*
Y	ppb	0.2	5	1.10	14.4	7.14	0.484	6.78
Yb	ppb	0.4	5	<0.4	2.30	1.34	0.0707	5.27
Zn	ppm	0.2	5	9.80	174	79.2	4.21	5.32
Zr	ppb	50	5	<50	470	121	161	134

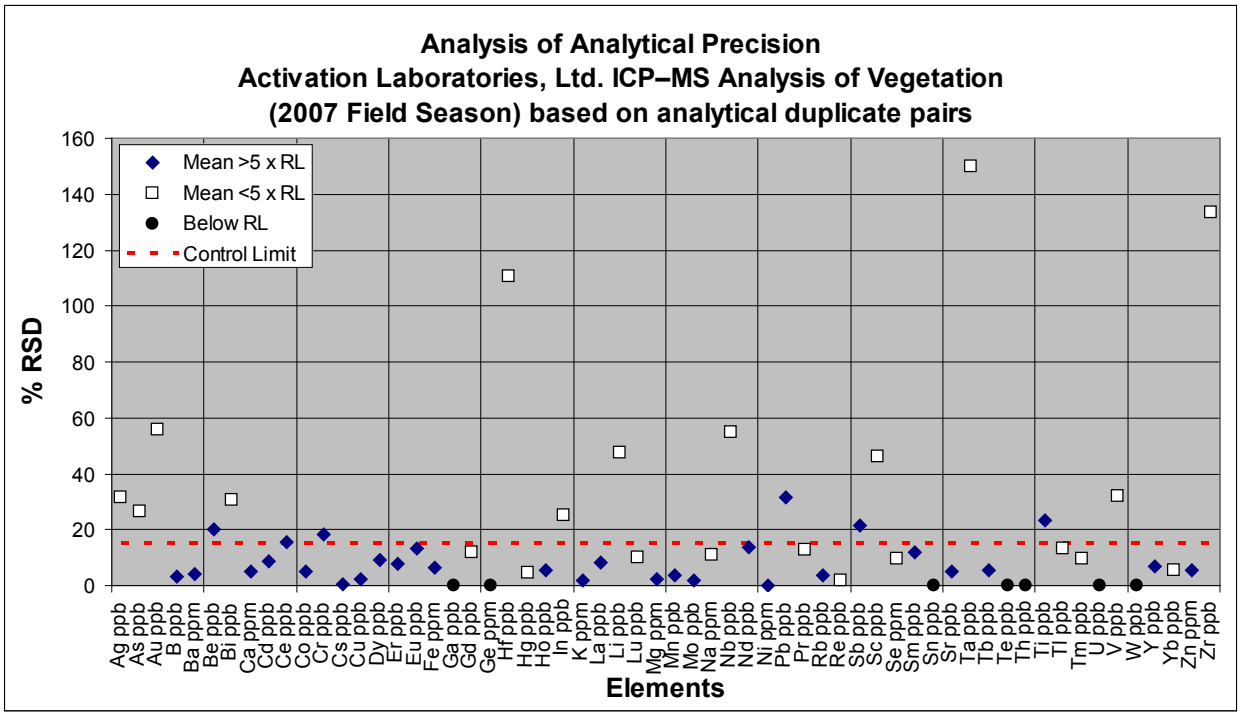

Figure 17-1. Precision plot for five analytical duplicate sample pairs by ICP–MS (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

Table 17-2. Summary statistics for assessing analytical variation on the standard reference material NIST–1575a; determined by ICP–MS analysis of vegetation samples at Actlabs (2007 field season).

[ppm, parts per million; ppb, parts per billion; n, number of samples; <, less than; %RSD, percent relative standard deviation; %Recovery, percent recovery; *na*, not applicable]

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ag	ppb	1	2	*na*	10.5	0.707	6.73	*na*
As[2]	ppb	5	2	39.0	58.0	29.7	51.2	149
Au	ppb	0.1	2	*na*	0.500	0.283	56.6	*na*
B	ppb	200	2	9,600	9,000	1,270	14.1	93.8
Ba	ppm	1	2	6.00	6.00	0	0	100
Be	ppb	0.1	2	*na*	6.35	0.919	14.5	*na*
Bi	ppb	1	2	*na*	2.00	0	0	*na*

Table 17-2. Summary statistics for assessing analytical variation on the standard reference material NIST–1575a; determined by ICP–MS analysis of vegetation samples at Actlabs (2007 field season)—Continued.

Element	Units	Reporting Limit	n	Target Value[1]	Mean	Standard Deviation	%RSD	%Recovery
Ca	ppm	2	2	2,500	2,540	361	14.2	101
Cd	ppb	0.1	2	233	248	10.6	4.29	106
Ce	ppb	0.5	2	110	76.7	13.4	17.4	69.7
Co	ppb	0.5	2	61.0	60.6	6.43	10.6	99.3
Cr	ppb	10	2	400	310	28.3	9.12	77.5
Cs	ppb	0.1	2	283	279	13.4	4.82	98.4
Cu	ppb	20	2	2,800	2,870	276	9.63	102
Dy	ppb	0.05	2	*na*	4.21	0.446	10.6	*na*
Er	ppb	0.05	2	*na*	2.49	0.262	10.5	*na*
Eu	ppb	0.1	2	*na*	2.10	0.283	13.5	*na*
Fe	ppm	0.05	2	46.0	46.0	3.75	8.16	99.9
Ga	ppb	10	2	*na*	15.0	7.07	47.1	*na*
Gd	ppb	1	2	*na*	6.00	0	0	*na*
Ge	ppm	0.1	2	*na*	<0.1	*na*	*na*	*na*
Hf	ppb	2	2	*na*	2.00	0	0	*na*
Hg	ppb	5	2	39.9	39.5	0.707	1.79	99.0
Ho	ppb	0.01	2	*na*	0.795	0.0778	9.78	*na*
In	ppb	0.1	2	*na*	0.250	0.0707	28.3	*na*
K	ppm	10	2	4,170	4,180	785	18.8	100
La	ppb	0.2	2	*na*	36.2	6.15	17.0	*na*
Li	ppb	5	2	*na*	121	20.5	17.0	*na*
Lu	ppb	0.2	2	*na*	0.400	0	0	*na*
Mg	ppm	0.5	2	1,060	958	173	18.0	90.4
Mn	ppb	10	2	488,000	472,000	36,800	7.79	96.7
Mo	ppb	1	2	*na*	13.0	0	0	*na*
Na	ppm	10	2	63.0	60.0	14.1	23.6	95.2
Nb	ppb	0.5	2	*na*	7.95	0.354	4.45	*na*
Nd	ppb	0.2	2	*na*	35.4	5.09	14.4	*na*
Ni	ppm	0.1	2	1.47	1.35	0.0707	5.24	91.8
Pb	ppb	10	2	167	160	0	0	95.8
Pr	ppb	0.5	2	*na*	8.80	1.27	14.5	*na*
Rb	ppb	10	2	16,500	16,000	1,340	8.42	96.7
Re	ppb	0.1	2	*na*	0.300	0	0	*na*
Sb	ppb	0.2	2	*na*	6.85	0.354	5.16	*na*
Sc	ppb	1	2	10.1	7.50	0.707	9.43	74.3
Se	ppm	0.2	2	0.0990	<0.2	*na*	*na*	183
Sm	ppb	0.1	2	*na*	6.75	0.778	11.5	*na*
Sn	ppb	40	2	*na*	43.1	9.82	22.8	*na*
Sr	ppb	20	2	*na*	6,590	346	5.26	*na*
Ta	ppb	0.1	2	*na*	0.450	0.0707	15.7	*na*
Tb	ppb	0.02	2	*na*	0.955	0.106	11.1	*na*
Te	ppb	1	2	*na*	<1	*na*	*na*	*na*
Th	ppb	5	2	*na*	12.0	1.41	11.8	*na*
Ti	ppb	20	2	*na*	2,430	495	20.4	*na*
Tl	ppb	0.5	2	*na*	19.9	0.495	2.49	*na*
Tm	ppb	0.05	2	*na*	0.325	0.0212	6.53	*na*
U	ppb	1	2	*na*	4.50	0.707	15.7	*na*
V	ppb	10	2	*na*	105	7.07	6.73	*na*
W	ppb	5	2	*na*	<5	*na*	*na*	*na*
Y	ppb	0.2	2	*na*	24.2	1.91	7.91	*na*
Yb	ppb	0.4	2	*na*	2.25	0.0707	3.14	*na*
Zn	ppm	0.2	2	38.0	38.9	3.11	8.00	102
Zr	ppb	50	2	*na*	60.0	14.1	23.6	*na*

[1]Target Values for NIST–1575a include certified values for Ba, Ca, Cd, Cu, Fe, Hg, K, Rb, and Zn; reference values for As, B, Co, Cs, Mg, Mn, Na, Ni, Pb, Sc, and Se; and information values for Ce and Cr.
[2]Actlabs reports that in their experience, NIST–1574a is not homogeneous for As.

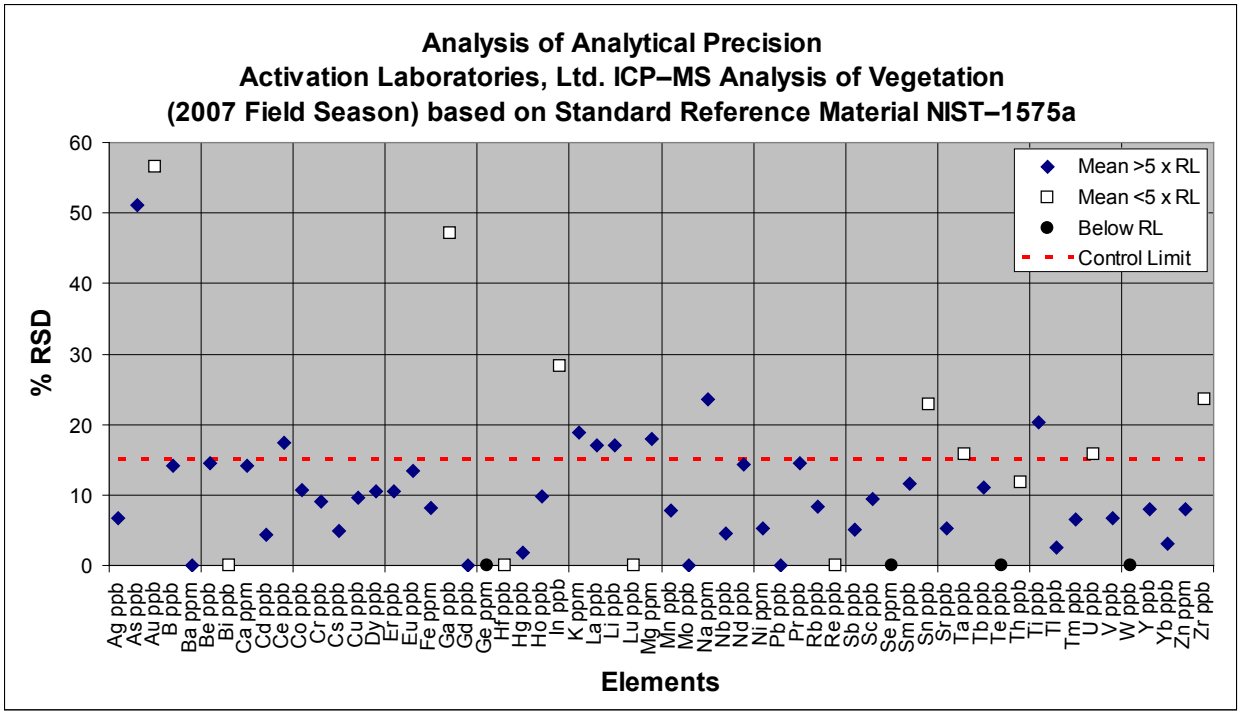

Figure 17-2. Precision plot for two analyses of standard reference material NIST–1575a by ICP–MS (2007 field season). %RSD is percent relative standard deviation; RL is reporting limit.

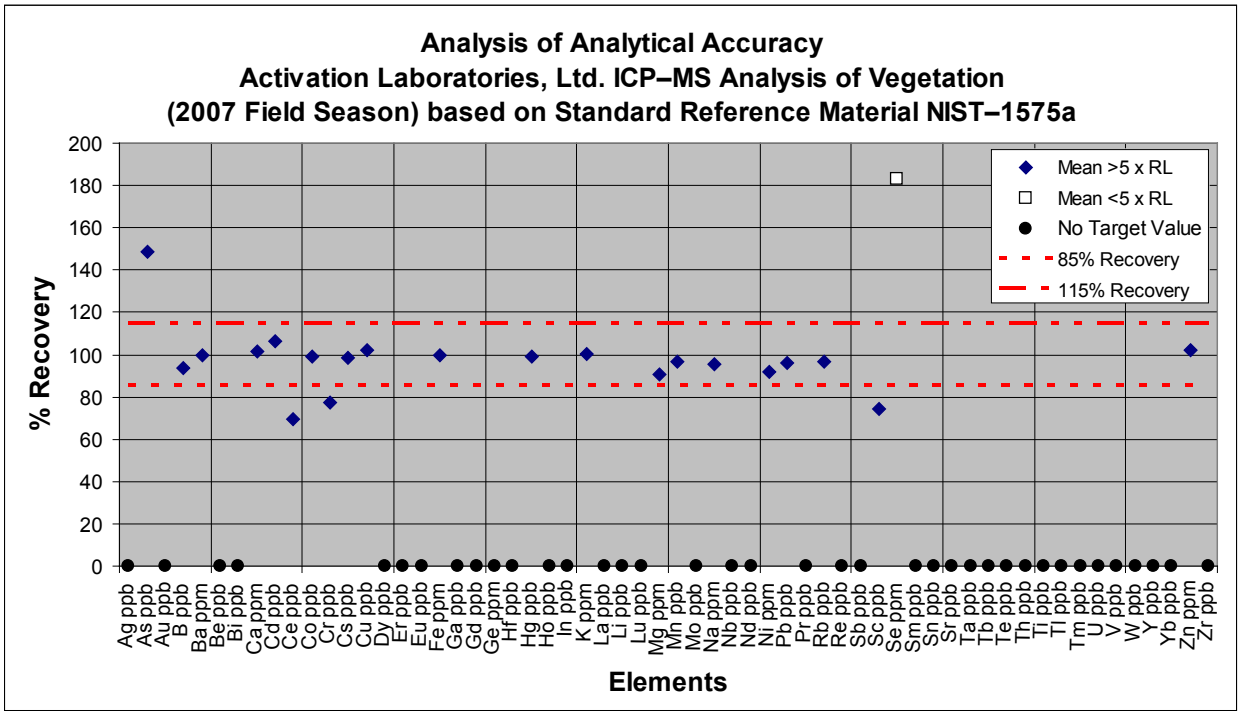

Figure 17-3. Accuracy plot for two analyses of standard reference material NIST–1575a by ICP–MS (2007 field season). %Recovery is percent recovery; RL is reporting limit.