FLUXANA®
XRF Application Solutions

RV-2017-03

Final Proficiency Test Report

for Cement

FLX-137, FLX-138

Bedburg-Hau, February 20, 2018

Coordinator of PT
Charlotte Winkels-Herding

Head of Laboratory
Dr. Barbara Schäfer

Statistics and Report
Dr. Rainer Schramm

Tel 49(0)2821 997320/ Fax 49(0)2821 9973229, e-mail: info@fluxana.de, web: www.fluxana.com, FLUXANA® GmbH & Co.KG, Borschelstr.3, 47551 Bedburg-Hau Germany,
GM Dr. R. Schramm, reg.in Kleve HRA 2935, personal liability FLUXANA Verwaltungs-GmbH Bedburg-Hau, reg.in Kleve HRB 8211, FLUXANA®registered trademark

FLUXANA®
XRF Application Solutions

RV-2017-03

FLX-137	Al_2O_3	CaO	Cr_2O_3	Fe_2O_3	K_2O	LOI	MgO	Mn_2O_3
Unit	%	%	%	%	%	%	%	%
No. of laboratories	15	15	7	15	15	14	15	13
Mean m	**5,016**	**64,674**	**0,008**	**3,047**	**0,782**	**2,513**	**1,607**	**0,257**
Repoducibility standard diviation S_R	0,074	0,292	0,002	0,079	0,066	0,227	0,052	0,010
Repeatability standard deviation s_r	0,022	0,073	0,002	0,009	0,007	0,006	0,011	0,002
Robust standard deviation s*	0,071	0,344	0,001	0,081	0,065	0,230	0,052	0,009
Uncertainty U (s*)	0,046	0,222	0,001	0,052	0,042	0,154	0,033	0,007
Uncertainty U (S_R)	0,048	0,188	0,002	0,051	0,043	0,152	0,034	0,007
Mean - 2*s_R	4,868	64,090	0,004	2,889	0,649	2,059	1,504	0,238
Mean + 2*s_R	5,164	65,257	0,012	3,205	0,914	2,966	1,710	0,277

	Na_2O	P_2O_5	SiO_2	SO_3	SrO	TiO_2	ZnO
Unit	%	%	%	%	%	%	%
No. of laboratories	13	12	15	14	12	13	11
Mean m	**0,091**	**0,172**	**20,606**	**3,222**	**0,078**	**0,225**	**0,030**
Repoducibility standard diviation S_R	0,051	0,003	0,195	0,076	0,004	0,008	0,003
Repeatability standard deviation s_r	0,005	0,002	0,041	0,019	0,001	0,003	0,001
Robust standard deviation s*	0,052	0,003	0,178	0,085	0,004	0,006	0,003
Uncertainty U (s*)	0,036	0,002	0,115	0,057	0,003	0,004	0,002
Uncertainty U (S_R)	0,035	0,002	0,126	0,051	0,003	0,006	0,002
Mean - 2*s_R	-0,012	0,166	20,216	3,069	0,069	0,210	0,025
Mean + 2*s_R	0,193	0,178	20,996	3,375	0,087	0,240	0,035

All values are in mass % and are based on annealed sample material.

Mean	**calculated from laboratory means using traceable methods only**
s_R	**Reproducibility standard deviation**
s_r	**Repeatability standard deviation**
s*	**Robust standard deviation**
U (s*)	**uncertainty calculated for a confidence interval of P= 95% (k=2)**
U (s_R)	**uncertainty calculated for a confidence interval of P= 95% (k=2)**
Range of tolerance	**Mean ± 2 x s_R ; all labs within this range show satisfactory performance**

FLUXANA®
XRF Application Solutions

RV-2017-03

FLX-138	Al_2O_3	CaO	Cr_2O_3	Fe_2O_3	K_2O	LOI	MgO	Mn_2O_3
Unit	%	%	%	%	%	%	%	%
No. of laboratories	15	15	7	15	15	14	15	13
Mean m	**4,442**	**68,465**	**0,007**	**1,782**	**0,786**	**9,667**	**1,078**	**0,106**
Repoducibility standard diviation S_R	0,090	0,313	0,002	0,064	0,039	0,142	0,027	0,006
Repeatability standard deviation s_r	0,010	0,058	0,001	0,006	0,005	0,014	0,014	0,001
Robust standard deviation s*	0,086	0,328	0,002	0,061	0,036	0,132	0,017	0,005
Uncertainty U (s*)	0,056	0,212	0,002	0,040	0,023	0,088	0,011	0,004
Uncertainty U (S_R)	0,058	0,202	0,002	0,041	0,025	0,095	0,017	0,004
Mean - 2*s_R	4,262	67,838	0,002	1,653	0,708	9,384	1,024	0,095
Mean + 2*s_R	4,622	69,091	0,011	1,910	0,863	9,950	1,132	0,117

	Na_2O	P_2O_5	SiO_2	SO_3	SrO	TiO_2	ZnO
Unit	%	%	%	%	%	%	%
No. of laboratories	12	12	15	14	12	13	11
Mean m	**0,142**	**0,112**	**18,930**	**3,521**	**0,188**	**0,227**	**0,011**
Repoducibility standard diviation S_R	0,043	0,005	0,265	0,097	0,008	0,009	0,001
Repeatability standard deviation s_r	0,010	0,001	0,061	0,016	0,002	0,003	0,001
Robust standard deviation s*	0,043	0,004	0,253	0,095	0,007	0,008	0,001
Uncertainty U (s*)	0,031	0,003	0,163	0,063	0,005	0,006	0,000
Uncertainty U (S_R)	0,031	0,004	0,171	0,065	0,006	0,006	0,001
Mean - 2*s_R	0,056	0,103	18,399	3,327	0,171	0,209	0,009
Mean + 2*s_R	0,228	0,121	19,460	3,716	0,205	0,246	0,013

All values are in mass % and are based on annealed sample material.

Mean	**calculated from laboratory means using traceable methods only**
s_R	**Reproducibility standard deviation**
s_r	**Repeatability standard deviation**
s*	**Robust standard deviation**
U (s*)	**uncertainty calculated for a confidence interval of P= 95% (k=2)**
U (s_R)	**uncertainty calculated for a confidence interval of P= 95% (k=2)**
Range of tolerance	**Mean ± 2 x s_R ; all labs within this range show satisfactory performance**

FLUXANA®
XRF Application Solutions

RV-2017-03

Introduction

X-ray fluorescence analysis is a widely used technique for the rapid screening analysis of catalytic converter samples.

However, dedicated standard material is needed for the calibration of XRF instruments. As a worldwide supplier for XRF laboratories, FLUXANA has developed a number of services to support XRF users. One of these services is the production of new reference materials and the organization of proficiency tests (PT).

In 2011, FLUXANA introduced its own quality management.

In February 2014, FLUXANA received accreditation from German DAKKS according to DIN EN ISO/IEC 17025 for its test laboratory in Bedburg-Hau.

The production of reference materials and the performance of proficiency tests is not yet accredited. However, FLUXANA has applied for the accreditation process at DAKKS.

Nevertheless, all evaluations are performed in agreement with DIN EN ISO/IEC 17043:2010-05, ISO Guide 34:2009, ISO Guide 31:2000 and ISO Guide 35:2006.

Further information

All laboratory data are listed in the following evaluation report. Additional information about laboratory accreditation and analytical methods used is also provided. Calculation was done only on traceable methods. The laboratory performance is shown based on z-scores. The diagrams show the laboratory data in comparison with the calculated mean values.

Outliers

Outliers in the statistical sense are typically not detected when using robust statistical methods, because the robust A+S algorithms were found to work better for small populations than the classical approach (which is outlier detection plus arithmetic mean and classical s.d. formula). Analytical data identified as errors were removed before performing the statistical evaluation.

FLUXANA®
XRF Application Solutions

RV-2017-03

Participants

VBE Verein für Baustoffprüfung und -entwicklung	Austria
Mastercodi Industrial Ltda	Brasilia
Rio Tinto, Aluminium Devision	Canada
Rio Tinto, Centre Analytique	Canada
Chemische Fabrik Budenheim KG	Germany
Dyckerhoff GmbH	Germany
FLUXANA GmbH & Co.KG	Germany
Fraunhofer-Institut für Bauphysik IBP, Standort Holzkirchen	Germany
Holcim (Deutschland) AG	Germany
Monier Technical Centre GmbH	Germany
ACC Limited	India
Fassa srl	Italy
Sharrcem Sh. P. K. - Titan Group	Kosovo
CRH (Srbija) d.o.o	Serbia
PPC Cement Group Lab Services	South Africa
Holcim (Schweiz) AG	Switzerland

FLUXANA®
XRF Application Solutions

RV-2017-03

Statistical Evaluation

Calculation of Mean m

The mean m for all laboratories was calculated using the Hampel estimator (ISO/TS 20612:2007 9.2.3) based on the laboratory means µ using traceable methods only.

Calculation of reproducibility standard deviation s_R

The reproducibility standard deviation s_R was calculated using the Q-method (ISO/TS 20612:2007 9.2.3).

Calculation of repeatability standard deviation s_r

The repeatability standard deviation s_r was also calculated using the Q-method.

Calculation of robust standard deviation s*

The robust standard deviation s* was calculated from the laboratory means µ using the Q-method.

Calculation of uncertainty U_{s_R} (according to Nordtest TR 537 ed 3.1.)

The **uncertainty** U_{s_R} for a confidence interval of P=95% (k=2) can be calculated from the **reproducibility standard deviation** s_R (factor 1.25 for average median, robust statistics):

$$U_{s_R} = 2 * 1.25 * \frac{s_R}{\sqrt{p}}$$

Calculation of uncertainty U_{s^*} (according to ISO 13528:2015)

The **uncertainty** U_{s^*} for a confidence interval of P=95% (k=2) can be calculated from the **robust standard deviation** s* (factor 1.25 for average median, robust statistics):

$$U_{s^*} = 2 * 1.25 * \frac{s^*}{\sqrt{p}}$$

The **uncertainty** U_{s^*} only takes the between laboratories uncertainty into account while the **uncertainty** U_{s_R} also includes the within laboratories uncertainty. Therefore U_{s_R} is recommended for use in accredited laboratories.

FLUXANA®
XRF Application Solutions

RV-2017-03

Laboratory performance

Laboratory proficiency assessment was based on z-scores.
The **z-score** z was calculated from all laboratory means µ:

$$z = \frac{m - \mu}{s_R}$$

m	Mean value for all laboratories (assigned value)
µ	Mean value of individual laboratory
s_R	Reproducibility standard deviation

Assessment on z-scores:

$\|z\|$ <= 2.0	indicates “satisfactory” performance = generates no signal
2.0 < $\|z\|$ < 3.0	indicates “questionable” performance = generates a warning signal
$\|z\|$ >= 3.0	indicates “unsatisfactory” performance = generates an action signal

Z-scores with 3 >= $|z|$ >= 2 were highlighted with a yellow color, z-scores with $|z|$ >= 3 were highlighted with a red color.

Traceable analytical methods used

XRF (fusion)
AAS
ASTM C114
LOI @ 950°C
SO_3 Gravimetric
Wet chemistry

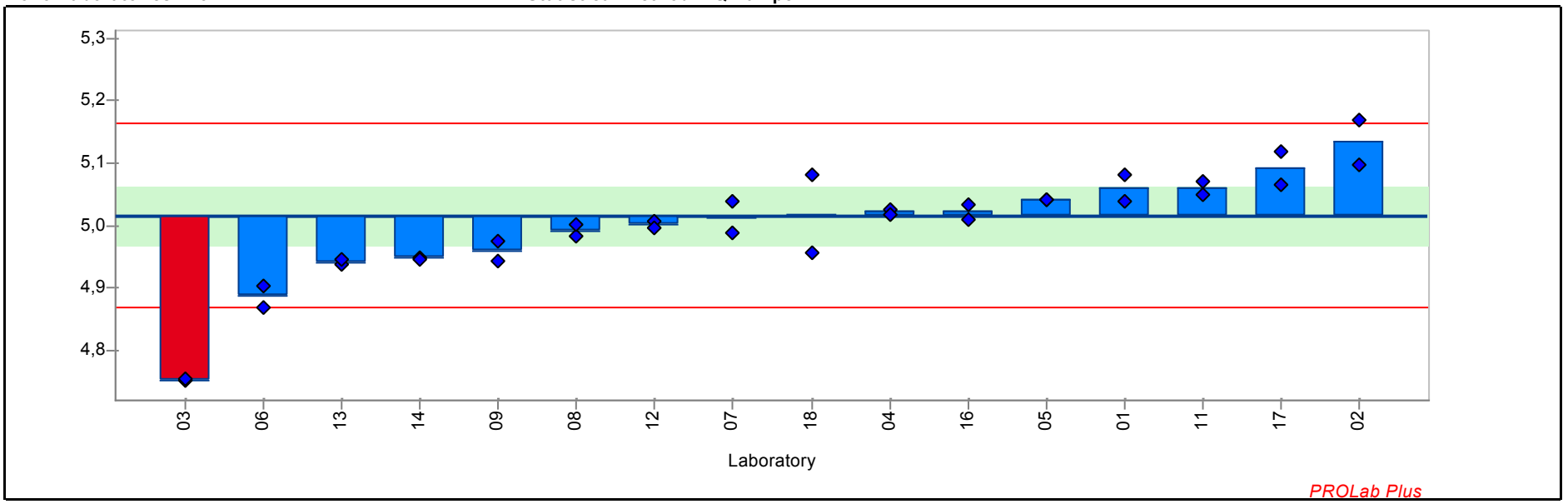
Analytical methods shown as info only

XRF (pellet)

RV-2017_03_Cement

Summary results

Sample:	**FLX-137**	**Reprod. s.d.**	**0,074**
Measurand:	**Al2O3**	**Repeat. s.d**	**0,022**
Mean ± U(Mean):	**5,016 ± 0,046**	**Range of tolerance:**	**4,868 - 5,164 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



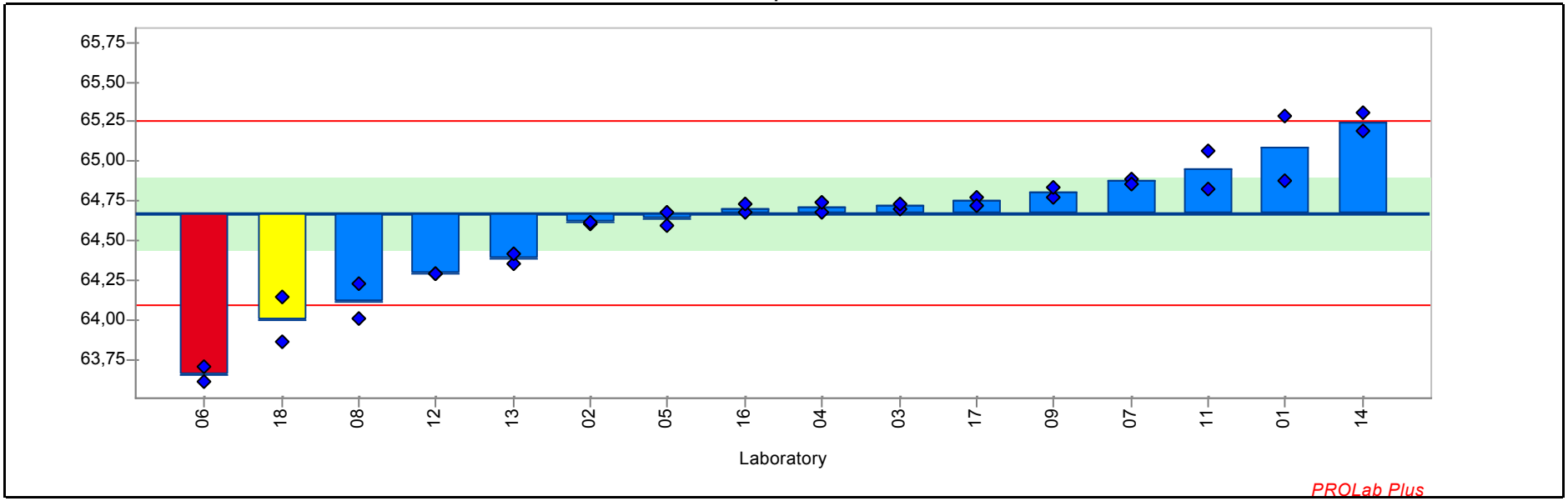
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	5,059	0,029	0,587	5,080	5,039	no accreditation	XRF (fusion)	
02	5,133	0,049	1,579	5,098	5,168	ISO 17025	XRF (fusion)	
03	4,752	0,001	-3,564	4,751	4,753	ISO 17025	XRF (fusion)	
04	5,021	0,005	0,074	5,025	5,018	ISO 17025	XRF (fusion)	
05	5,040	0,000	0,324	5,040	5,040	no accreditation	XRF (fusion)	
06	4,886	0,025	-1,755	4,904	4,868	no accreditation	XRF (pressed pellet)	info only

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
07	5,013	0,036	-0,048	4,987	5,038	ISO 17025	XRF (fusion)	
08	4,992	0,014	-0,324	4,982	5,002	no accreditation	XRF (fusion)	
09	4,960	0,023	-0,763	4,976	4,943	no accreditation	XRF (fusion)	ISO 29581-part 2
11	5,060	0,014	0,594	5,050	5,070	no accreditation	XRF (fusion)	EN 196-2
12	5,002	0,008	-0,196	5,007	4,996	no accreditation	XRF (fusion)	
13	4,941	0,005	-1,006	4,938	4,945	no accreditation	XRF (fusion)	
14	4,947	0,002	-0,925	4,949	4,946	ISO 17025	XRF (fusion)	
16	5,022	0,017	0,081	5,010	5,034	no accreditation	XRF (fusion)	
17	5,091	0,036	1,019	5,117	5,066	no accreditation	XRF (fusion)	
18	5,018	0,088	0,020	5,080	4,955	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,292**
Measurand:	**CaO**	**Repeat. s.d**	**0,073**
Mean ± U(Mean):	**64,674 ± 0,222**	**Range of tolerance:**	**64,090 - 65,257 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



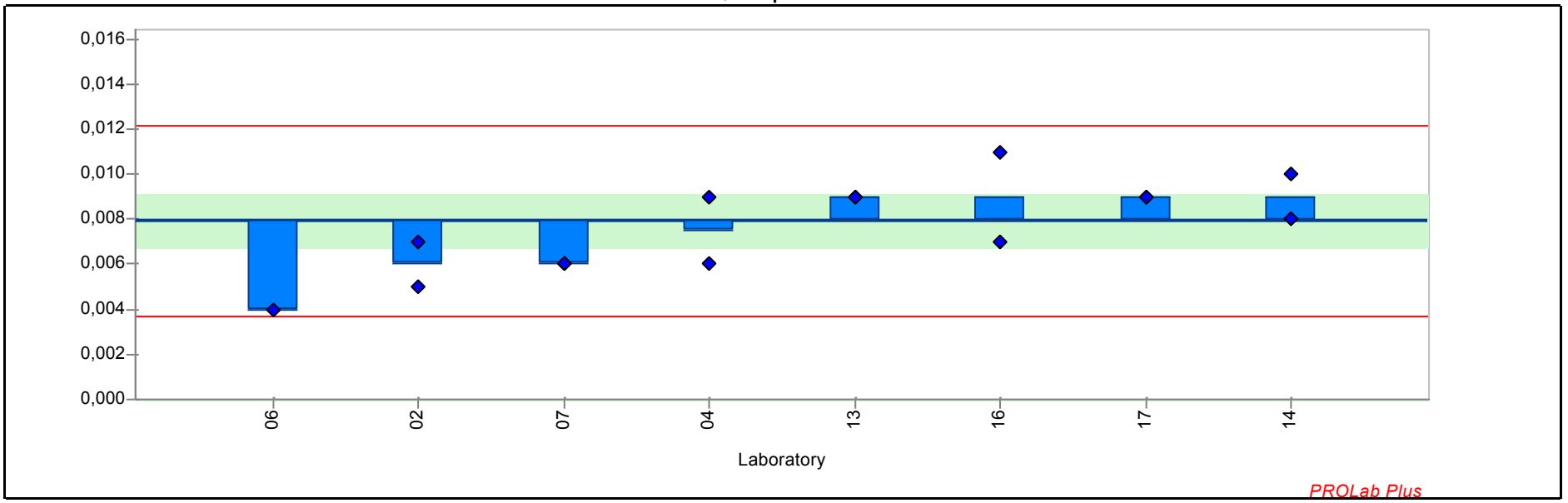
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	65,083	0,293	1,401	65,290	64,875	no accreditation	XRF (fusion)	
02	64,614	0,005	-0,206	64,610	64,617	ISO 17025	XRF (fusion)	
03	64,717	0,018	0,148	64,704	64,730	ISO 17025	XRF (fusion)	
04	64,713	0,047	0,133	64,679	64,746	ISO 17025	XRF (fusion)	
05	64,640	0,057	-0,115	64,600	64,680	no accreditation	XRF (fusion)	
06	63,657	0,062	-3,484	63,613	63,701	no accreditation	XRF (pressed pellet)	info only
07	64,875	0,023	0,690	64,891	64,859	ISO 17025	XRF (fusion)	
08	64,118	0,153	-1,906	64,009	64,226	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	64,805	0,050	0,448	64,769	64,840	no accreditation	XRF (fusion)	ISO 29581-part 2
11	64,950	0,170	0,947	64,830	65,070	no accreditation	XRF (fusion)	EN 196-2
12	64,290	0,004	-1,317	64,292	64,287	no accreditation	XRF (fusion)	
13	64,385	0,049	-0,989	64,350	64,420	no accreditation	XRF (fusion)	
14	65,245	0,081	1,959	65,303	65,188	ISO 17025	XRF (fusion)	
16	64,705	0,038	0,107	64,678	64,732	no accreditation	XRF (fusion)	
17	64,748	0,036	0,253	64,773	64,722	no accreditation	XRF (fusion)	
18	64,000	0,198	-2,309	64,140	63,860	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,002**
Measurand:	**Cr2O3**	**Repeat. s.d**	**0,002**
Mean ± U(Mean):	**0,008 ± 0,001**	**Range of tolerance:**	**0,004 - 0,012 (|z-score| <= 2,000)**
No. of laboratories:	**7**	**Statistical method**	**Q/Hampel**



Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,006	0,001	-0,909	0,005	0,007	ISO 17025	XRF (fusion)	
04	0,007	0,002	-0,202	0,006	0,009	ISO 17025	XRF (fusion)	
05	<0,002			<0,002	<0,002	no accreditation	XRF (fusion)	
06	0,004		-1,852	0,004		no accreditation	XRF (pressed pellet)	info only
07	0,006	0,000	-0,909	0,006	0,006	ISO 17025	XRF (fusion)	
09	<0,010			<0,010	<0,010	no accreditation	XRF (fusion)	ISO 29581-part 2
13	0,009	0,000	0,505	0,009	0,009	no accreditation	XRF (fusion)	
14	0,009	0,001	0,505	0,008	0,010	ISO 17025	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
16	0,009	0,003	0,505	0,007	0,011	no accreditation	XRF (fusion)	
17	0,009	0,000	0,505	0,009	0,009	no accreditation	XRF (fusion)	

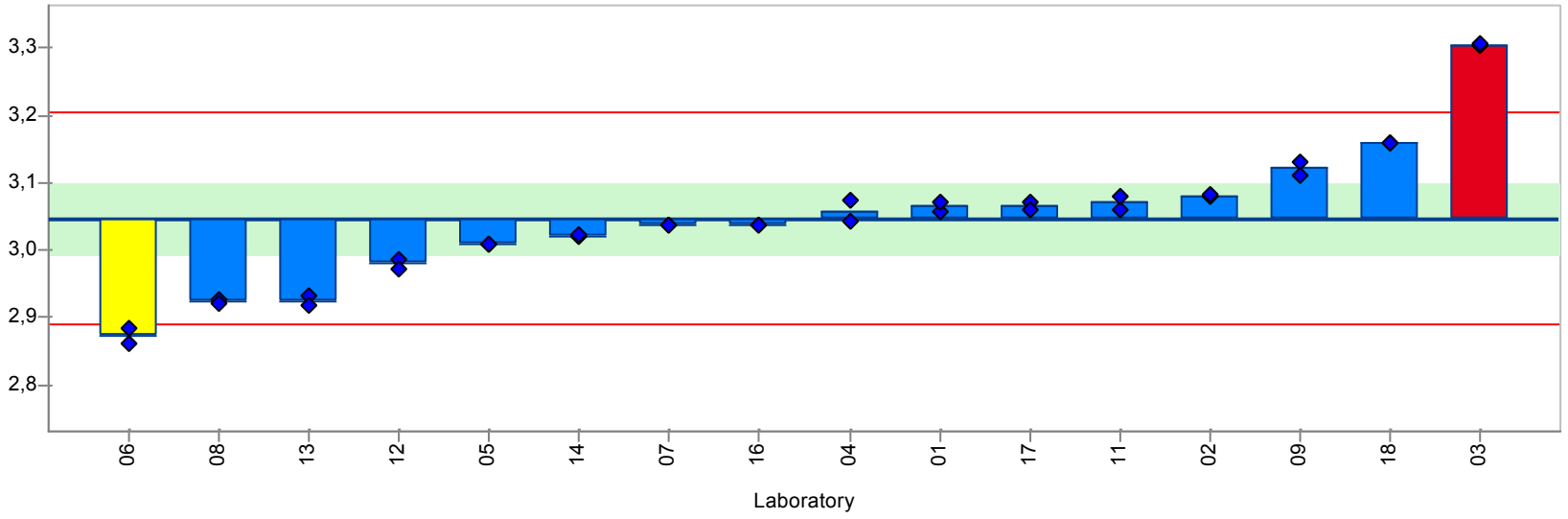
RV-2017_03_Cement

Sample: FLX-137 **Reprod. s.d.** 0,079

Measurand: Fe2O3 **Repeat. s.d** 0,009

Mean ± U(Mean): 3,047 ± 0,052 **Range of tolerance:** 2,889 - 3,205 (|z-score| <= 2,000)

No. of laboratories: 15 **Statistical method** Q/Hampel



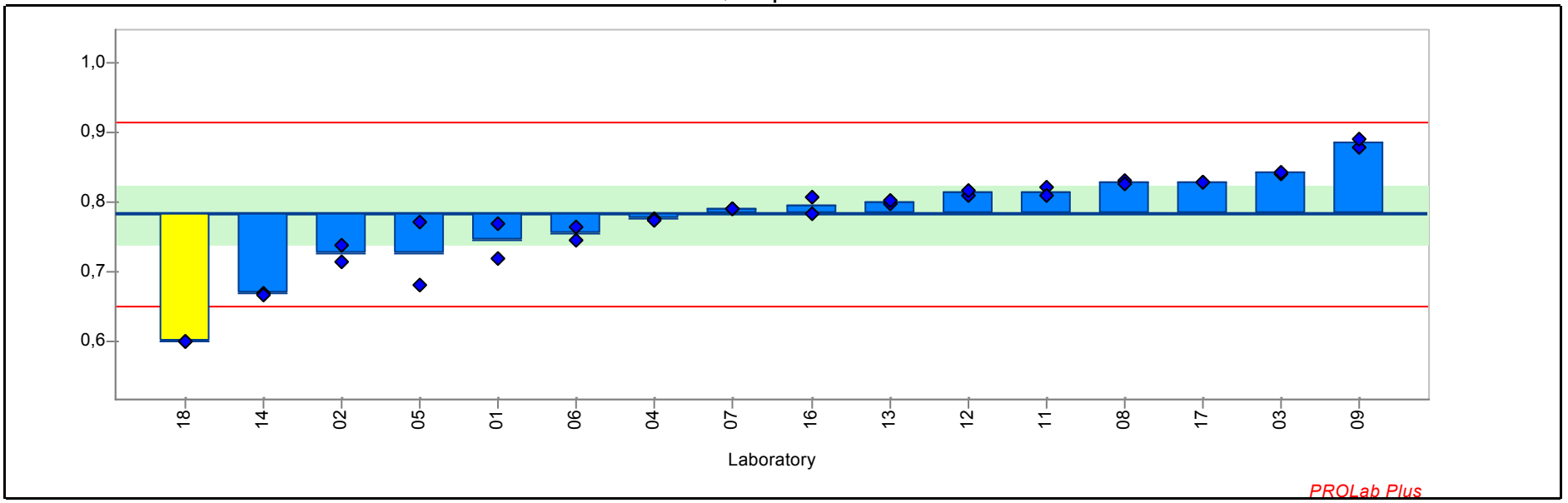
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	3,065	0,010	0,225	3,058	3,072	no accreditation	XRF (fusion)	
02	3,081	0,003	0,427	3,079	3,083	ISO 17025	XRF (fusion)	
03	3,306	0,001	3,264	3,305	3,306	ISO 17025	XRF (fusion)	
04	3,058	0,021	0,136	3,043	3,073	ISO 17025	XRF (fusion)	
05	3,010	0,000	-0,470	3,010	3,010	no accreditation	XRF (fusion)	
06	2,873	0,016	-2,195	2,885	2,862	no accreditation	XRF (pressed pellet)	info only
07	3,037	0,000	-0,129	3,037	3,037	ISO 17025	XRF (fusion)	
08	2,923	0,005	-1,563	2,927	2,920	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	3,122	0,013	0,939	3,131	3,112	no accreditation	XRF (fusion)	ISO 29581-part 2
11	3,070	0,014	0,288	3,060	3,080	no accreditation	XRF (fusion)	EN 196-2
12	2,979	0,009	-0,856	2,986	2,973	no accreditation	XRF (fusion)	
13	2,925	0,009	-1,551	2,931	2,918	no accreditation	XRF (fusion)	
14	3,022	0,002	-0,325	3,020	3,023	ISO 17025	XRF (fusion)	
16	3,037	0,001	-0,123	3,037	3,038	no accreditation	XRF (fusion)	
17	3,065	0,007	0,225	3,070	3,060	no accreditation	XRF (fusion)	
18	3,160	0,000	1,425	3,160	3,160	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,066**
Measurand:	**K2O**	**Repeat. s.d**	**0,007**
Mean ± U(Mean):	**0,782 ± 0,042**	**Range of tolerance:**	**0,649 - 0,914 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



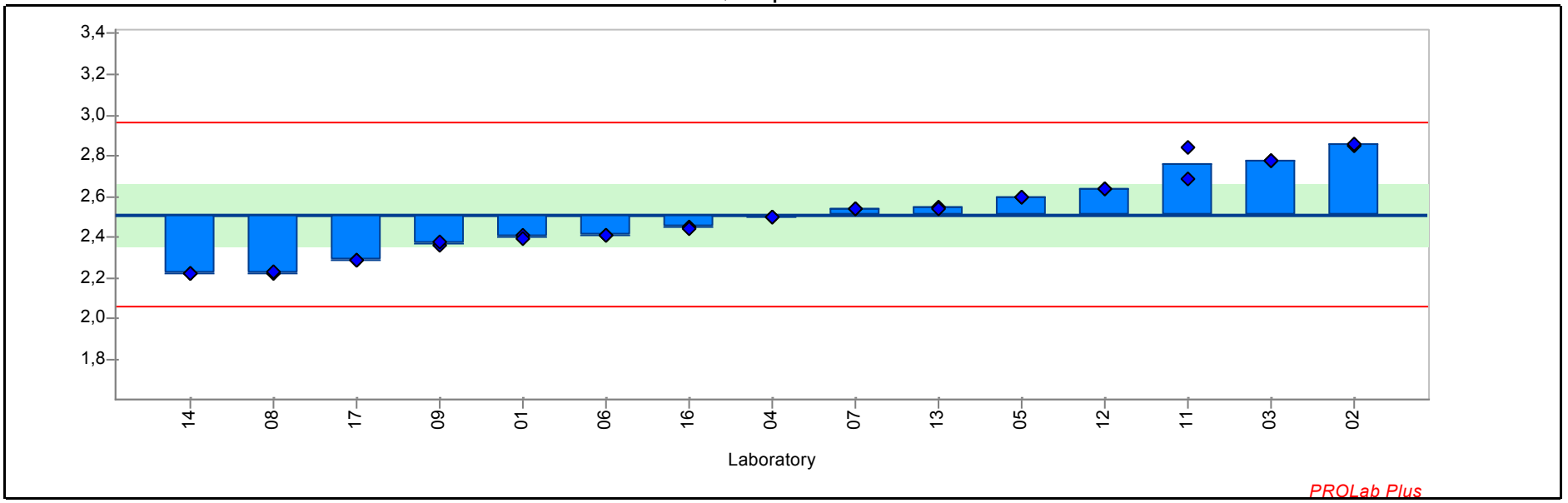
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	0,744	0,034	-0,571	0,768	0,720	no accreditation	XRF (fusion)	
02	0,725	0,017	-0,858	0,737	0,713	ISO 17025	XRF (fusion)	
03	0,841	0,001	0,902	0,841	0,842	ISO 17025	Other Method	AAS
04	0,775	0,001	-0,102	0,776	0,774	ISO 17025	XRF (fusion)	
05	0,726	0,064	-0,842	0,771	0,681	no accreditation	XRF (fusion)	
06	0,754	0,014	-0,419	0,764	0,744	no accreditation	XRF (pressed pellet)	info only
07	0,790	0,000	0,124	0,790	0,790	ISO 17025	XRF (fusion)	
08	0,828	0,003	0,698	0,830	0,826	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	0,885	0,008	1,552	0,879	0,890	no accreditation	Other Method	ASTM C114
11	0,815	0,007	0,502	0,820	0,810	no accreditation	XRF (fusion)	EN 196-2
12	0,814	0,005	0,479	0,810	0,817	no accreditation	XRF (fusion)	
13	0,800	0,002	0,268	0,798	0,801	no accreditation	XRF (fusion)	
14	0,668	0,001	-1,719	0,669	0,667	ISO 17025	XRF (fusion)	
16	0,794	0,017	0,185	0,806	0,782	no accreditation	XRF (fusion)	
17	0,829	0,000	0,714	0,829	0,829	no accreditation	XRF (fusion)	
18	0,600	0,000	-2,746	0,600	0,600	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,227**
Measurand:	**Loss on Ignition**	**Repeat. s.d**	**0,006**
Mean ± U(Mean):	**2,513 ± 0,154**	**Range of tolerance:**	**2,059 - 2,966 (|z-score| <= 2,000)**
No. of laboratories:	**14**	**Statistical method**	**Q/Hampel**



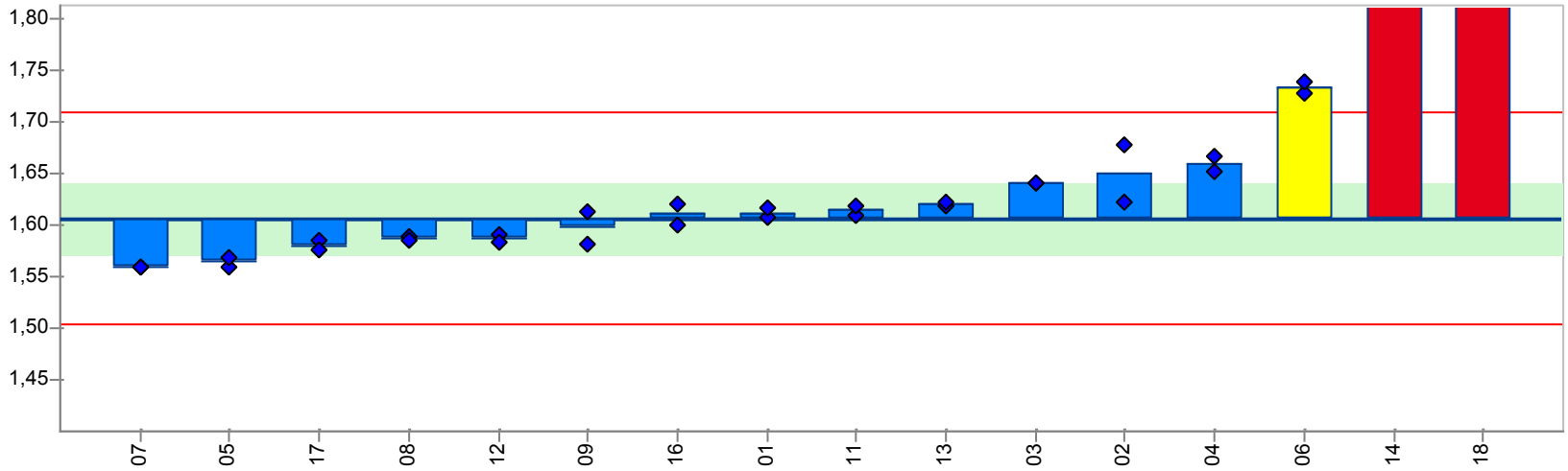
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	2,401	0,008	-0,490	2,407	2,396	no accreditation	Other Method	LOI @ 950 °C
02	2,855	0,007	1,509	2,850	2,860	ISO 17025	Other Method	LOI @ 950 °C
03	2,780	0,000	1,178	2,780	2,780	ISO 17025	Other Method	LOI @ 950°C
04	2,499	0,000	-0,060	2,499	2,499	ISO 17025	Other Method	LOI @ 950°C
05	2,600	0,000	0,385	2,600	2,600	no accreditation	Other Method	LOI @ 950°C
06	2,410	0,000	-0,452	2,410	2,410	no accreditation	XRF (pressed pellet)	info only
07	2,540	0,000	0,121	2,540	2,540	ISO 17025	Other Method	LOI @ 950°C
08	2,225	0,007	-1,268	2,220	2,230	no accreditation	Other Method	LOI @ 950°C

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	2,369	0,014	-0,633	2,359	2,379	no accreditation	Other Method	LOI @ 950°C
11	2,765	0,106	1,112	2,840	2,690	no accreditation	Other Method	LOI @ 950°C
12	2,639	0,000	0,557	2,639	2,639	no accreditation	Other Method	LOI @ 950°C
13	2,548	0,006	0,154	2,552	2,543	no accreditation	Other Method	LOI @ 950°C
14	2,220	0,000	-1,290	2,220	2,220	ISO 17025	Other Method	LOI @ 950°C
16	2,448	0,001	-0,285	2,449	2,447	no accreditation	Other Method	LOI @ 950°C
17	2,290	0,000	-0,981	2,290	2,290	no accreditation	Other Method	LOI @ 950°C

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,052**
Measurand:	**MgO**	**Repeat. s.d**	**0,011**
Mean ± U(Mean):	**1,607 ± 0,033**	**Range of tolerance:**	**1,504 - 1,710 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



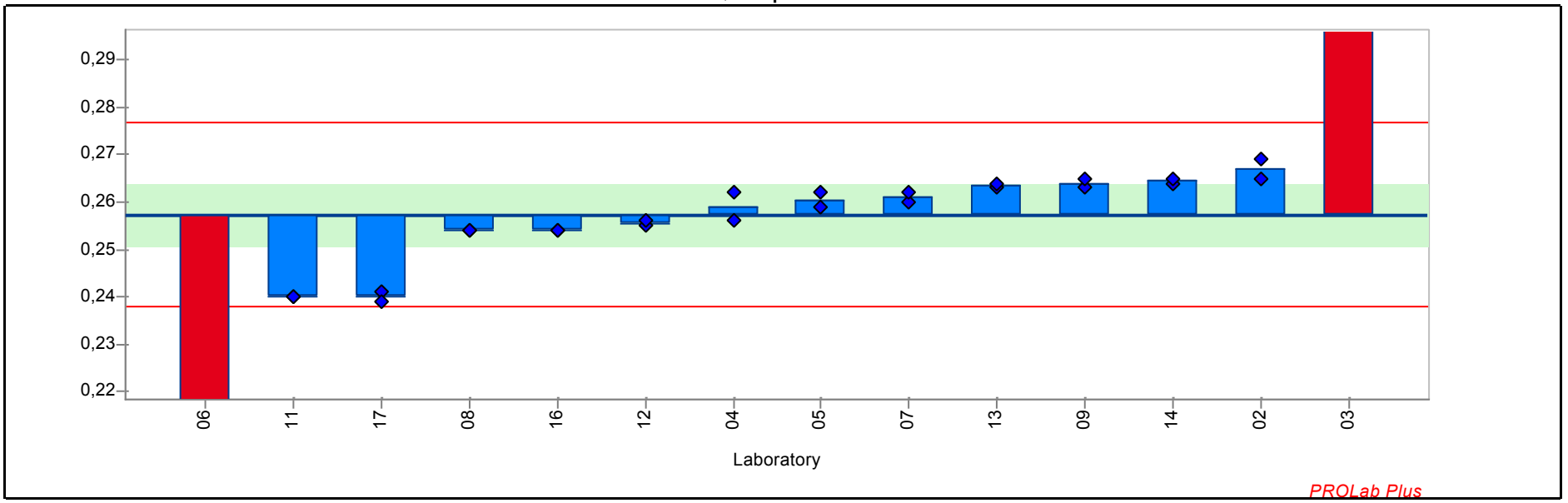
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	1,613	0,006	0,105	1,608	1,617	no accreditation	XRF (fusion)	
02	1,651	0,039	0,842	1,623	1,678	ISO 17025	XRF (fusion)	
03	1,641	0,001	0,668	1,641	1,642	ISO 17025	XRF (fusion)	
04	1,660	0,011	1,036	1,653	1,668	ISO 17025	XRF (fusion)	
05	1,565	0,007	-0,816	1,560	1,570	no accreditation	XRF (fusion)	
06	1,734	0,007	2,462	1,729	1,739	no accreditation	XRF (pressed pellet)	info only
07	1,560	0,000	-0,913	1,560	1,560	ISO 17025	XRF (fusion)	
08	1,588	0,003	-0,370	1,590	1,586	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	1,598	0,021	-0,176	1,613	1,583	no accreditation	XRF (fusion)	ISO 29581-part 2
11	1,615	0,007	0,154	1,610	1,620	no accreditation	XRF (fusion)	EN 196-2
12	1,588	0,006	-0,370	1,592	1,584	no accreditation	XRF (fusion)	
13	1,621	0,003	0,270	1,619	1,623	no accreditation	XRF (fusion)	
14	1,877	0,013	5,225	1,867	1,886	ISO 17025	XRF (fusion)	
16	1,611	0,014	0,076	1,601	1,621	no accreditation	XRF (fusion)	
17	1,581	0,007	-0,506	1,586	1,576	no accreditation	XRF (fusion)	
18	1,945	0,078	6,554	2,000	1,890	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,010**
Measurand:	**Mn2O3**	**Repeat. s.d**	**0,002**
Mean ± U(Mean):	**0,257 ± 0,007**	**Range of tolerance:**	**0,238 - 0,277 (|z-score| <= 2,000)**
No. of laboratories:	**13**	**Statistical method**	**Q/Hampel**



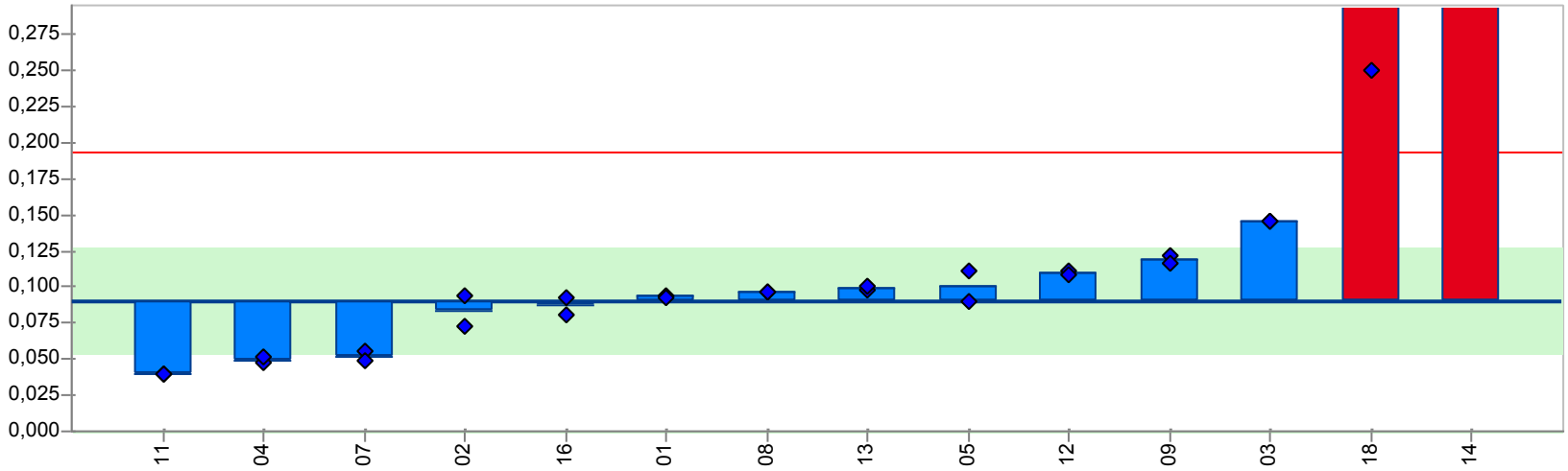
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,267	0,003	0,986	0,269	0,265	ISO 17025	XRF (fusion)	
03	0,470	0,000	21,762	0,470	0,470	ISO 17025	XRF (fusion)	
04	0,259	0,004	0,167	0,262	0,256	ISO 17025	XRF (fusion)	
05	0,261	0,002	0,320	0,262	0,259	no accreditation	XRF (fusion)	
06	0,021	0,000	-24,192	0,021	0,021	no accreditation	XRF (pressed pellet)	info only
07	0,261	0,001	0,372	0,260	0,262	ISO 17025	XRF (fusion)	
08	0,254	0,000	-0,345	0,254	0,254	no accreditation	XRF (fusion)	
09	0,264	0,001	0,679	0,263	0,265	no accreditation	XRF (fusion)	ISO 29581-part 2

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
11	0,240	0,000	-1,778	0,240	0,240	no accreditation	XRF (fusion)	EN 196-2
12	0,256	0,001	-0,191	0,255	0,256	no accreditation	XRF (fusion)	
13	0,264	0,001	0,628	0,263	0,264	no accreditation	XRF (fusion)	
14	0,265	0,001	0,730	0,264	0,265	ISO 17025	XRF (fusion)	
16	0,254	0,000	-0,345	0,254	0,254	no accreditation	XRF (fusion)	
17	0,240	0,001	-1,778	0,241	0,239	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,051**
Measurand:	**Na2O**	**Repeat. s.d**	**0,005**
Mean ± U(Mean):	**0,091 ± 0,036**	**Range of tolerance:**	**-0,012 - 0,193 (|z-score| <= 2,000)**
No. of laboratories:	**13**	**Statistical method**	**Q/Hampel**



Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	0,093	0,001	0,057	0,094	0,093	no accreditation	XRF (fusion)	
02	0,083	0,015	-0,139	0,073	0,094	ISO 17025	XRF (fusion)	
03	0,146	0,000	1,083	0,146	0,146	ISO 17025	Other Method	AAS
04	0,050	0,004	-0,804	0,047	0,052	ISO 17025	XRF (fusion)	
05	0,101	0,015	0,193	0,090	0,111	no accreditation	XRF (fusion)	info only
07	0,052	0,004	-0,755	0,055	0,049	ISO 17025	XRF (fusion)	
08	0,096	0,000	0,105	0,096	0,096	no accreditation	XRF (fusion)	
09	0,119	0,004	0,565	0,122	0,117	no accreditation	Other Method	ASTM C114

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
11	0,040	0,000	-0,990	0,040	0,040	no accreditation	XRF (fusion)	EN 196-2
12	0,110	0,001	0,379	0,111	0,109	no accreditation	XRF (fusion)	
13	0,099	0,001	0,164	0,098	0,100	no accreditation	XRF (fusion)	
14	0,401	0,008	6,080	0,407	0,396	ISO 17025	XRF (fusion)	
16	0,087	0,008	-0,071	0,093	0,081	no accreditation	XRF (fusion)	
18	0,300	0,071	4,095	0,250	0,350	no accreditation	Other Method	Wet chemistry

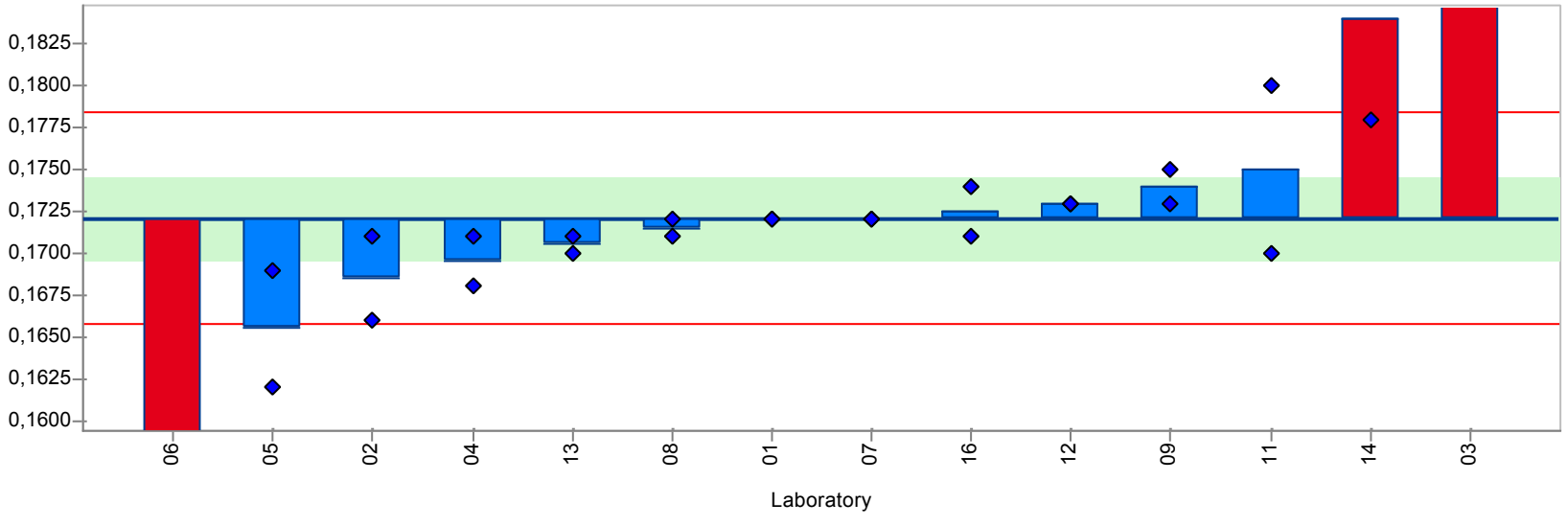
RV-2017_03_Cement

Sample: FLX-137 **Reprod. s.d.** 0,003

Measurand: P2O5 **Repeat. s.d** 0,002

Mean ± U(Mean): 0,172 ± 0,002 **Range of tolerance:** 0,166 - 0,178 (|z-score| <= 2,000)

No. of laboratories: 12 **Statistical method** Q/Hampel



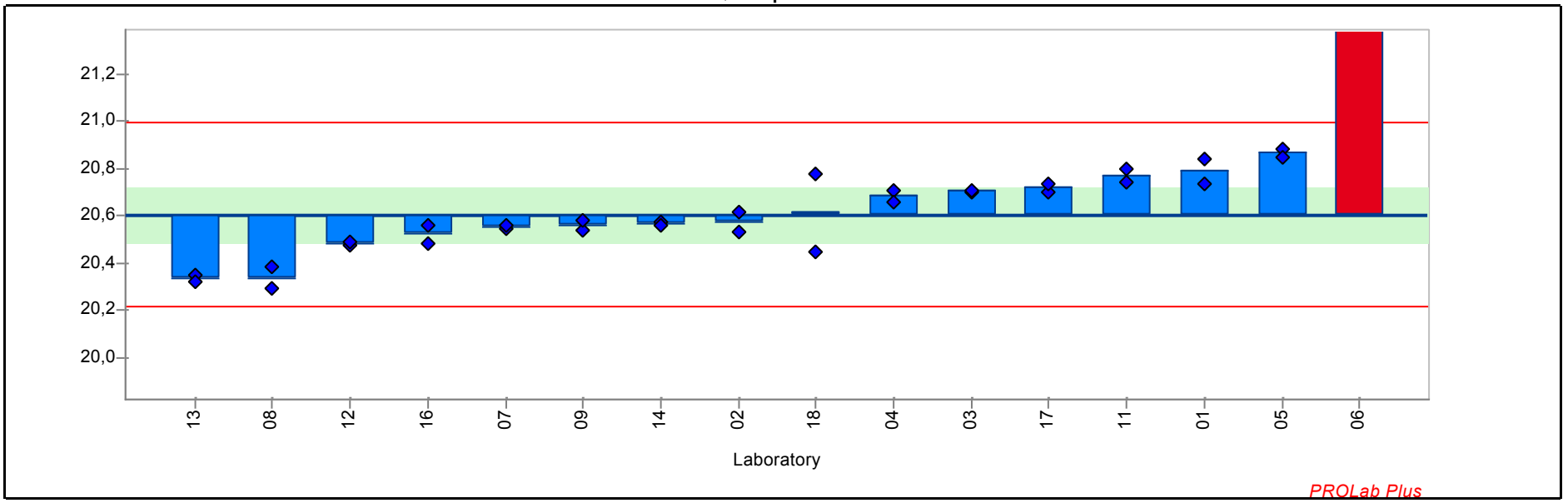
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	0,172	0,000	-0,028	0,172	0,172	no accreditation	XRF (fusion)	
02	0,169	0,004	-1,130	0,171	0,166	ISO 17025	XRF (fusion)	
03	0,212	0,000	12,564	0,212	0,212	ISO 17025	XRF (fusion)	
04	0,170	0,002	-0,815	0,171	0,168	ISO 17025	XRF (fusion)	
05	0,166	0,005	-2,000	0,169	0,162	no accreditation	XRF (fusion)	info only
06	0,103	0,001	-21,749	0,104	0,102	no accreditation	XRF (pressed pellet)	info only
07	0,172	0,000	-0,028	0,172	0,172	ISO 17025	XRF (fusion)	
08	0,171	0,001	-0,185	0,171	0,172	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	0,174	0,001	0,602	0,175	0,173	no accreditation	XRF (fusion)	ISO 29581-part 2
11	0,175	0,007	0,917	0,170	0,180	no accreditation	XRF (fusion)	EN 196-2
12	0,173	0,000	0,287	0,173	0,173	no accreditation	XRF (fusion)	
13	0,171	0,001	-0,500	0,171	0,170	no accreditation	XRF (fusion)	
14	0,184	0,008	3,750	0,178	0,190	ISO 17025	XRF (fusion)	
16	0,172	0,002	0,130	0,174	0,171	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,195**
Measurand:	**SiO2**	**Repeat. s.d**	**0,041**
Mean ± U(Mean):	**20,606 ± 0,115**	**Range of tolerance:**	**20,216 - 20,996 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



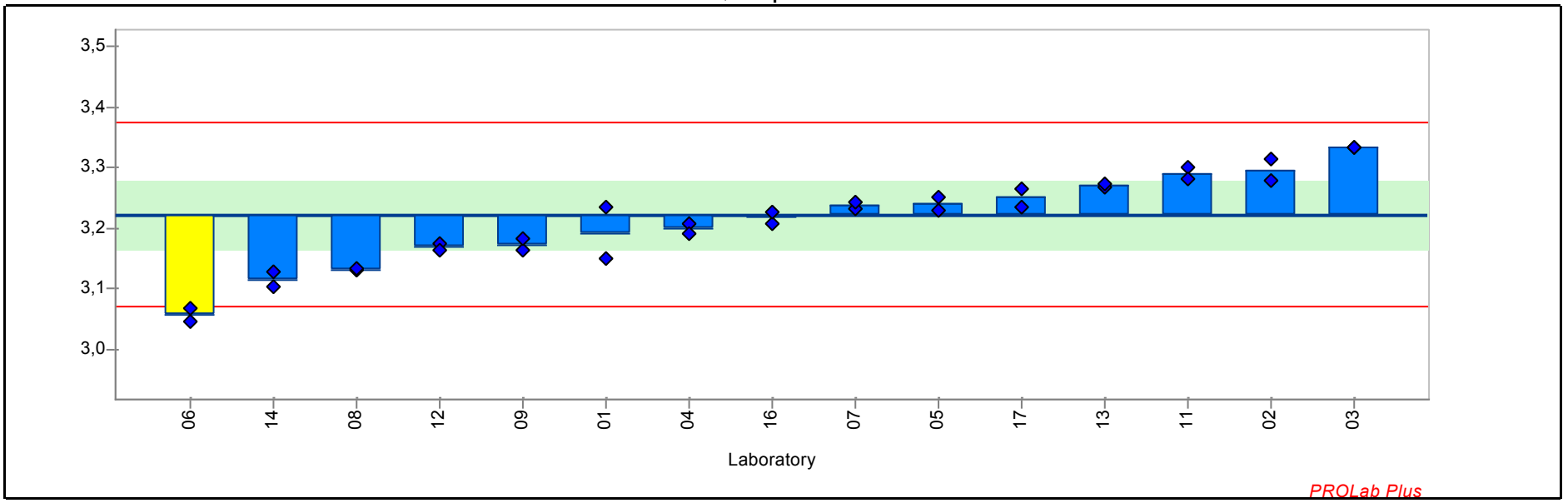
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	20,788	0,074	0,935	20,841	20,736	no accreditation	XRF (fusion)	
02	20,575	0,059	-0,162	20,533	20,616	ISO 17025	XRF (fusion)	
03	20,707	0,006	0,517	20,703	20,711	ISO 17025	XRF (fusion)	
04	20,686	0,034	0,410	20,710	20,662	ISO 17025	XRF (fusion)	
05	20,867	0,025	1,339	20,885	20,850	no accreditation	XRF (fusion)	
06	22,294	0,006	8,646	22,290	22,298	no accreditation	XRF (pressed pellet)	info only
07	20,553	0,014	-0,272	20,543	20,563	ISO 17025	XRF (fusion)	
08	20,340	0,064	-1,365	20,294	20,385	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	20,562	0,028	-0,228	20,542	20,581	no accreditation	XRF (fusion)	ISO 29581-part 2
11	20,770	0,042	0,840	20,740	20,800	no accreditation	XRF (fusion)	EN 196-2
12	20,480	0,010	-0,646	20,473	20,487	no accreditation	XRF (fusion)	
13	20,335	0,021	-1,388	20,350	20,320	no accreditation	XRF (fusion)	
14	20,569	0,012	-0,187	20,578	20,561	ISO 17025	XRF (fusion)	
16	20,524	0,055	-0,420	20,563	20,485	no accreditation	XRF (fusion)	
17	20,720	0,022	0,581	20,704	20,735	no accreditation	XRF (fusion)	
18	20,615	0,233	0,046	20,450	20,780	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,076**
Measurand:	**SO3**	**Repeat. s.d**	**0,019**
Mean ± U(Mean):	**3,222 ± 0,057**	**Range of tolerance:**	**3,069 - 3,375 (|z-score| <= 2,000)**
No. of laboratories:	**14**	**Statistical method**	**Q/Hampel**



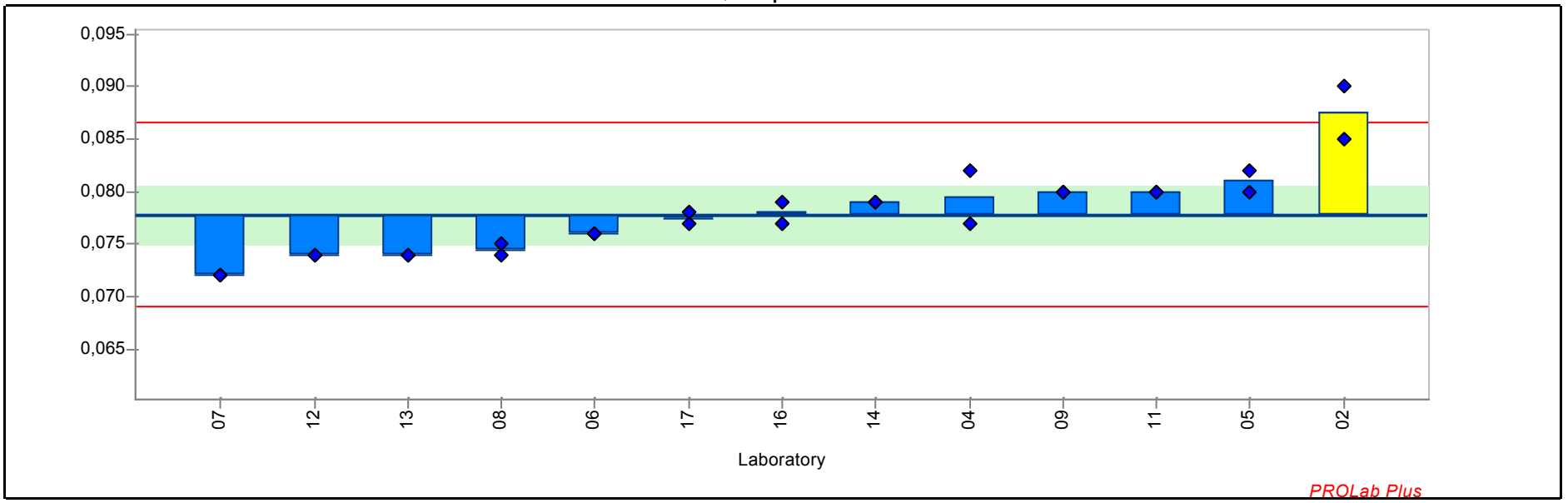
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	3,191	0,061	-0,405	3,234	3,148	no accreditation	XRF (fusion)	
02	3,295	0,025	0,957	3,313	3,277	ISO 17025	XRF (fusion)	
03	3,333	0,001	1,461	3,333	3,334	ISO 17025	Other Method	Gravimetric
04	3,200	0,012	-0,294	3,208	3,191	ISO 17025	XRF (fusion)	
05	3,240	0,014	0,237	3,230	3,250	no accreditation	XRF (fusion)	
06	3,056	0,016	-2,173	3,067	3,045	no accreditation	XRF (pressed pellet)	info only
07	3,237	0,007	0,197	3,232	3,242	ISO 17025	XRF (fusion)	
08	3,131	0,002	-1,197	3,129	3,132	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	3,171	0,013	-0,660	3,162	3,181	no accreditation	XRF (fusion)	ISO 29581-part 2
11	3,290	0,014	0,891	3,300	3,280	no accreditation	XRF (fusion)	EN 196-2
12	3,168	0,008	-0,700	3,174	3,163	no accreditation	XRF (fusion)	
13	3,269	0,004	0,623	3,267	3,272	no accreditation	XRF (fusion)	
14	3,115	0,017	-1,400	3,103	3,127	ISO 17025	XRF (fusion)	
16	3,216	0,012	-0,071	3,208	3,225	no accreditation	XRF (fusion)	
17	3,250	0,022	0,361	3,234	3,265	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,004**
Measurand:	**SrO**	**Repeat. s.d**	**0,001**
Mean ± U(Mean):	**0,078 ± 0,003**	**Range of tolerance:**	**0,069 - 0,087 (|z-score| <= 2,000)**
No. of laboratories:	**12**	**Statistical method**	**Q/Hampel**



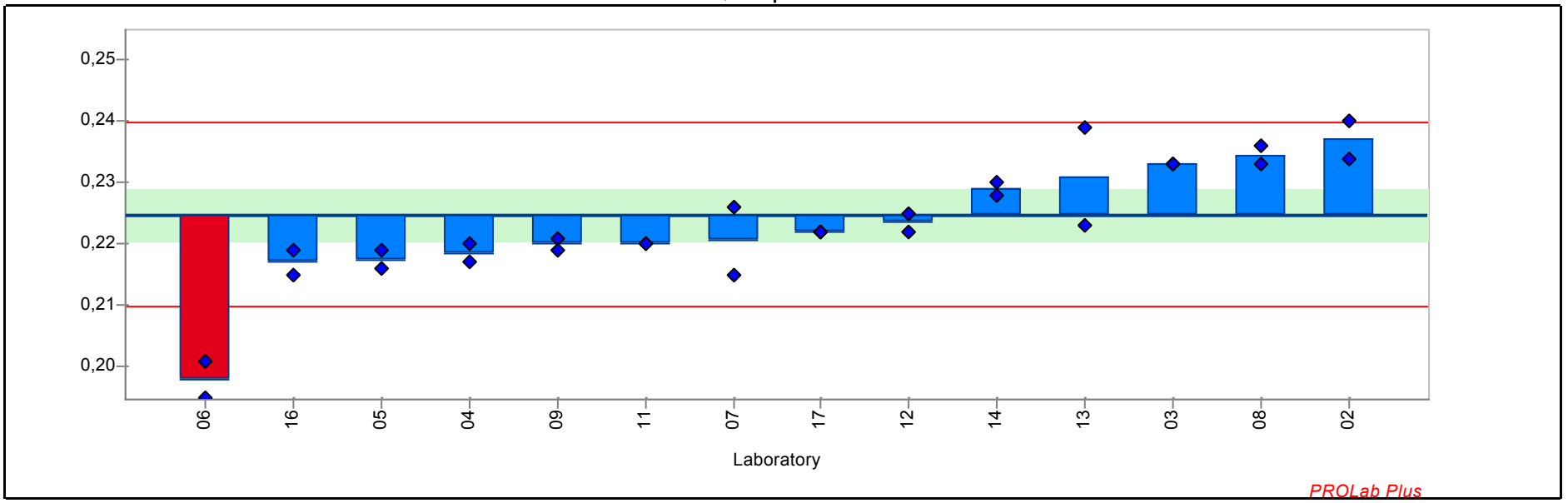
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,087	0,004	2,201	0,085	0,090	ISO 17025	XRF (fusion)	
04	0,080	0,004	0,381	0,077	0,082	ISO 17025	XRF (fusion)	
05	0,081	0,001	0,722	0,082	0,080	no accreditation	XRF (fusion)	
06	0,076	0,000	-0,416	0,076	0,076	no accreditation	XRF (pressed pellet)	info only
07	0,072	0,000	-1,326	0,072	0,072	ISO 17025	XRF (fusion)	
08	0,074	0,001	-0,757	0,074	0,075	no accreditation	XRF (fusion)	
09	0,080	0,000	0,495	0,080	0,080	no accreditation	XRF (fusion)	ISO 29581-part 2
11	0,080	0,000	0,495	0,080	0,080	no accreditation	XRF (fusion)	EN 196-2

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
12	0,074	0,000	-0,871	0,074	0,074	no accreditation	XRF (fusion)	
13	0,074	0,000	-0,871	0,074	0,074	no accreditation	XRF (fusion)	
14	0,079	0,000	0,267	0,079	0,079	ISO 17025	XRF (fusion)	
16	0,078	0,001	0,039	0,077	0,079	no accreditation	XRF (fusion)	
17	0,077	0,001	-0,074	0,077	0,078	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,008**
Measurand:	**TiO2**	**Repeat. s.d**	**0,003**
Mean ± U(Mean):	**0,225 ± 0,004**	**Range of tolerance:**	**0,210 - 0,240 (|z-score| <= 2,000)**
No. of laboratories:	**13**	**Statistical method**	**Q/Hampel**



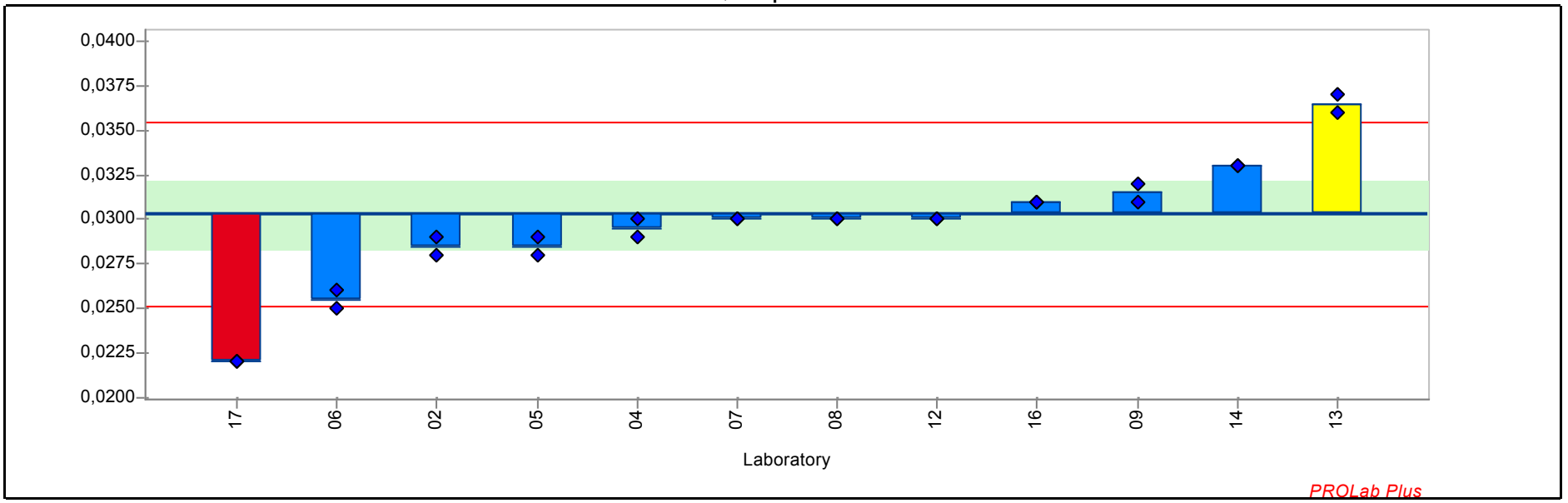
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,237	0,004	1,618	0,240	0,234	ISO 17025	XRF (fusion)	
03	0,233	0,000	1,087	0,233	0,233	ISO 17025	XRF (fusion)	
04	0,219	0,002	-0,839	0,220	0,217	ISO 17025	XRF (fusion)	
05	0,217	0,002	-0,971	0,219	0,216	no accreditation	XRF (fusion)	
06	0,198	0,004	-3,560	0,201	0,195	no accreditation	XRF (pressed pellet)	info only
07	0,221	0,008	-0,573	0,226	0,215	ISO 17025	XRF (fusion)	
08	0,234	0,002	1,286	0,233	0,236	no accreditation	XRF (fusion)	
09	0,220	0,001	-0,639	0,221	0,219	no accreditation	XRF (fusion)	ISO 29581-part 2

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
11	0,220	0,000	-0,639	0,220	0,220	no accreditation	XRF (fusion)	EN 196-2
12	0,224	0,002	-0,175	0,222	0,225	no accreditation	XRF (fusion)	
13	0,231	0,011	0,821	0,239	0,223	no accreditation	XRF (fusion)	
14	0,229	0,001	0,555	0,230	0,228	ISO 17025	XRF (fusion)	
16	0,217	0,003	-1,038	0,215	0,219	no accreditation	XRF (fusion)	
17	0,222	0,000	-0,374	0,222	0,222	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-137**	**Reprod. s.d.**	**0,003**
Measurand:	**ZnO**	**Repeat. s.d**	**0,001**
Mean ± U(Mean):	**0,030 ± 0,002**	**Range of tolerance:**	**0,025 - 0,035 (|z-score| <= 2,000)**
No. of laboratories:	**11**	**Statistical method**	**Q/Hampel**



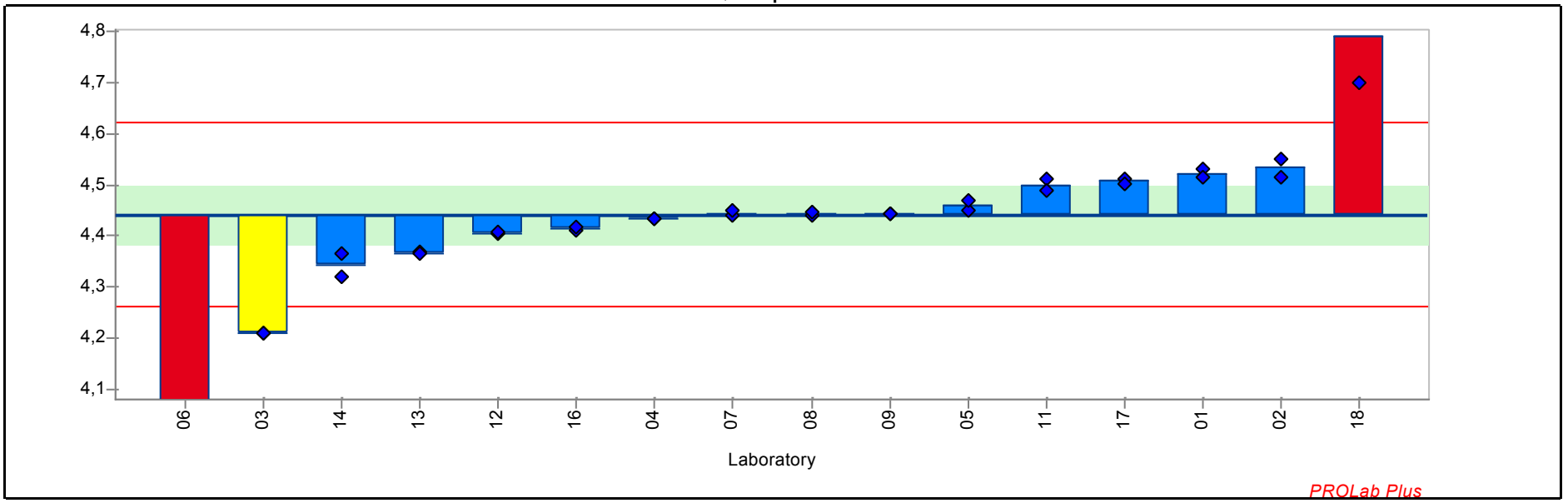
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,029	0,001	-0,682	0,028	0,029	ISO 17025	XRF (fusion)	
04	0,029	0,001	-0,298	0,029	0,030	ISO 17025	XRF (fusion)	
05	0,029	0,001	-0,682	0,028	0,029	no accreditation	XRF (fusion)	
06	0,026	0,001	-1,836	0,026	0,025	no accreditation	XRF (pressed pellet)	info only
07	0,030	0,000	-0,106	0,030	0,030	ISO 17025	XRF (fusion)	
08	0,030	0,000	-0,106	0,030	0,030	no accreditation	XRF (fusion)	
09	0,032	0,001	0,471	0,031	0,032	no accreditation	XRF (fusion)	ISO 29581-part 2
12	0,030	0,000	-0,106	0,030	0,030	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
13	0,036	0,001	2,394	0,036	0,037	no accreditation	XRF (fusion)	
14	0,033	0,000	1,048	0,033	0,033	ISO 17025	XRF (fusion)	
16	0,031	0,000	0,279	0,031	0,031	no accreditation	XRF (fusion)	
17	0,022	0,000	-3,182	0,022	0,022	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,090**
Measurand:	**Al2O3**	**Repeat. s.d**	**0,010**
Mean ± U(Mean):	**4,442 ± 0,056**	**Range of tolerance:**	**4,262 - 4,622 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



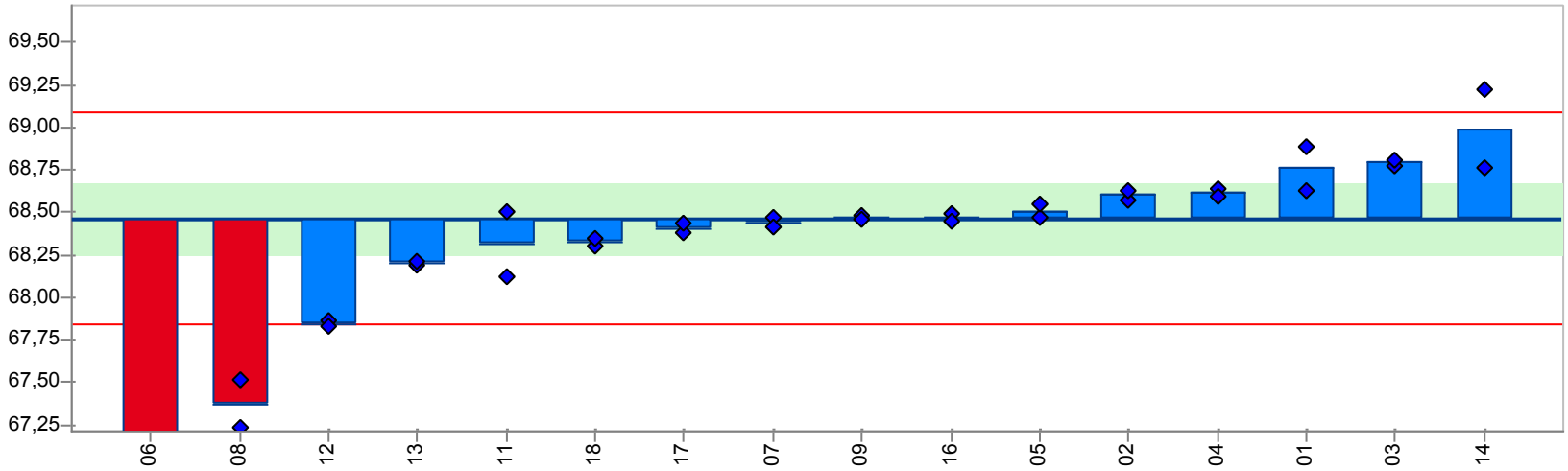
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	4,522	0,012	0,895	4,531	4,514	no accreditation	XRF (fusion)	
02	4,533	0,024	1,011	4,550	4,516	ISO 17025	XRF (fusion)	
03	4,211	0,001	-2,564	4,210	4,212	ISO 17025	XRF (fusion)	
04	4,434	0,000	-0,088	4,434	4,434	ISO 17025	XRF (fusion)	
05	4,460	0,014	0,201	4,450	4,470	no accreditation	XRF (fusion)	
06	3,762	0,280	-7,550	3,960	3,564	no accreditation	XRF (pressed pellet)	info only
07	4,444	0,007	0,023	4,439	4,449	ISO 17025	XRF (fusion)	
08	4,444	0,005	0,029	4,441	4,448	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	4,445	0,000	0,034	4,445	4,445	no accreditation	XRF (fusion)	ISO 29581-part 2
11	4,500	0,014	0,645	4,510	4,490	no accreditation	XRF (fusion)	EN 196-2
12	4,406	0,003	-0,399	4,404	4,408	no accreditation	XRF (fusion)	
13	4,367	0,002	-0,826	4,369	4,366	no accreditation	XRF (fusion)	
14	4,344	0,033	-1,087	4,321	4,367	ISO 17025	XRF (fusion)	
16	4,413	0,005	-0,316	4,410	4,417	no accreditation	XRF (fusion)	
17	4,508	0,008	0,728	4,513	4,502	no accreditation	XRF (fusion)	
18	4,788	0,125	3,848	4,700	4,877	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,313**
Measurand:	**CaO**	**Repeat. s.d**	**0,058**
Mean ± U(Mean):	**68,465 ± 0,212**	**Range of tolerance:**	**67,838 - 69,091 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	68,757	0,189	0,934	68,891	68,624	no accreditation	XRF (fusion)	
02	68,601	0,045	0,435	68,569	68,633	ISO 17025	XRF (fusion)	
03	68,794	0,025	1,053	68,777	68,812	ISO 17025	XRF (fusion)	
04	68,618	0,033	0,489	68,641	68,595	ISO 17025	XRF (fusion)	
05	68,507	0,060	0,137	68,465	68,550	no accreditation	XRF (fusion)	
06	67,001	4,960	-4,671	70,508	63,493	no accreditation	XRF (pressed pellet)	info only
07	68,440	0,043	-0,080	68,470	68,409	ISO 17025	XRF (fusion)	
08	67,373	0,192	-3,482	67,509	67,237	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	68,467	0,013	0,008	68,476	68,458	no accreditation	XRF (fusion)	ISO 29581-part 2
11	68,310	0,269	-0,493	68,500	68,120	no accreditation	XRF (fusion)	EN 196-2
12	67,846	0,021	-1,973	67,861	67,831	no accreditation	XRF (fusion)	
13	68,200	0,014	-0,844	68,190	68,210	no accreditation	XRF (fusion)	
14	68,991	0,324	1,679	68,762	69,220	ISO 17025	XRF (fusion)	
16	68,469	0,032	0,012	68,491	68,446	no accreditation	XRF (fusion)	
17	68,406	0,039	-0,189	68,378	68,433	no accreditation	XRF (fusion)	
18	68,325	0,035	-0,445	68,300	68,350	no accreditation	Other Method	Wet chemistry

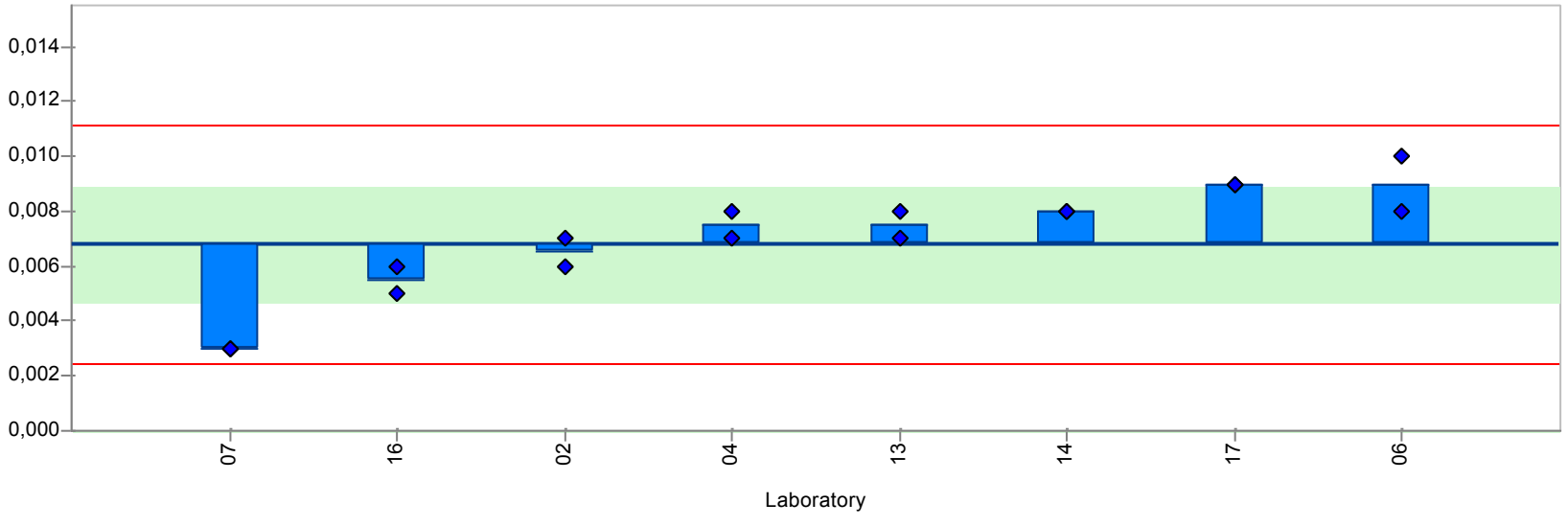
RV-2017_03_Cement

Sample: FLX-138 **Reprod. s.d.** 0,002

Measurand: Cr2O3 **Repeat. s.d** 0,001

Mean ± U(Mean): 0,007 ± 0,002 **Range of tolerance:** 0,002 - 0,011 (|z-score| <= 2,000)

No. of laboratories: 7 **Statistical method** Q/Hampel



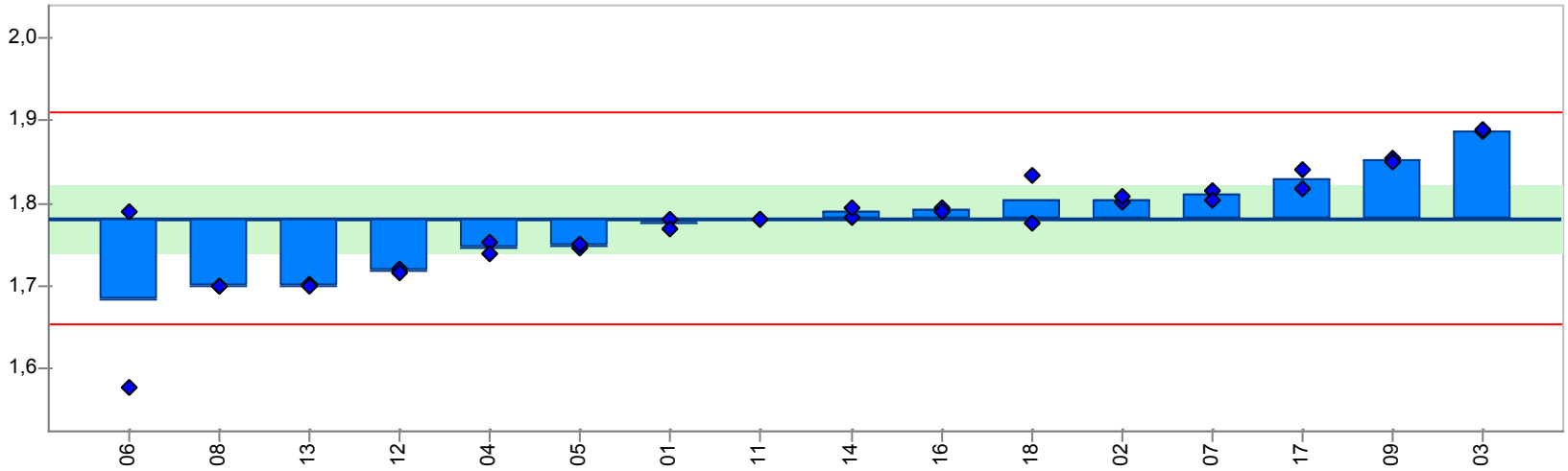
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,007	0,001	-0,133	0,006	0,007	ISO 17025	XRF (fusion)	
04	0,007	0,001	0,327	0,007	0,008	ISO 17025	XRF (fusion)	
05	<0,002			<0,002	<0,002	no accreditation	XRF (fusion)	
06	0,009	0,001	1,015	0,010	0,008	no accreditation	XRF (pressed pellet)	info only
07	0,003	0,000	-1,740	0,003	0,003	ISO 17025	XRF (fusion)	
09	<0,010			<0,010	<0,010	no accreditation	XRF (fusion)	ISO 29581-part 2
13	0,007	0,001	0,327	0,008	0,007	no accreditation	XRF (fusion)	
14	0,008	0,000	0,556	0,008	0,008	ISO 17025	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
16	0,005	0,001	-0,592	0,005	0,006	no accreditation	XRF (fusion)	
17	0,009	0,000	1,015	0,009	0,009	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,064**
Measurand:	**Fe2O3**	**Repeat. s.d**	**0,006**
Mean ± U(Mean):	**1,782 ± 0,040**	**Range of tolerance:**	**1,653 - 1,910 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	1,775	0,007	-0,104	1,780	1,770	no accreditation	XRF (fusion)	
02	1,804	0,005	0,355	1,801	1,808	ISO 17025	XRF (fusion)	
03	1,887	0,001	1,647	1,887	1,888	ISO 17025	XRF (fusion)	
04	1,746	0,009	-0,564	1,752	1,739	ISO 17025	XRF (fusion)	
05	1,748	0,004	-0,532	1,745	1,750	no accreditation	XRF (fusion)	
06	1,684	0,150	-1,521	1,790	1,578	no accreditation	XRF (pressed pellet)	info only
07	1,810	0,008	0,440	1,816	1,804	ISO 17025	XRF (fusion)	
08	1,700	0,001	-1,264	1,701	1,700	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	1,852	0,004	1,094	1,855	1,849	no accreditation	XRF (fusion)	ISO 29581-part 2
11	1,780	0,000	-0,027	1,780	1,780	no accreditation	XRF (fusion)	EN 196-2
12	1,718	0,004	-0,999	1,720	1,715	no accreditation	XRF (fusion)	
13	1,700	0,002	-1,264	1,702	1,699	no accreditation	XRF (fusion)	
14	1,789	0,008	0,114	1,783	1,795	ISO 17025	XRF (fusion)	
16	1,792	0,003	0,160	1,794	1,790	no accreditation	XRF (fusion)	
17	1,829	0,016	0,744	1,841	1,818	no accreditation	XRF (fusion)	
18	1,804	0,041	0,347	1,775	1,833	no accreditation	Other Method	Wet chemistry

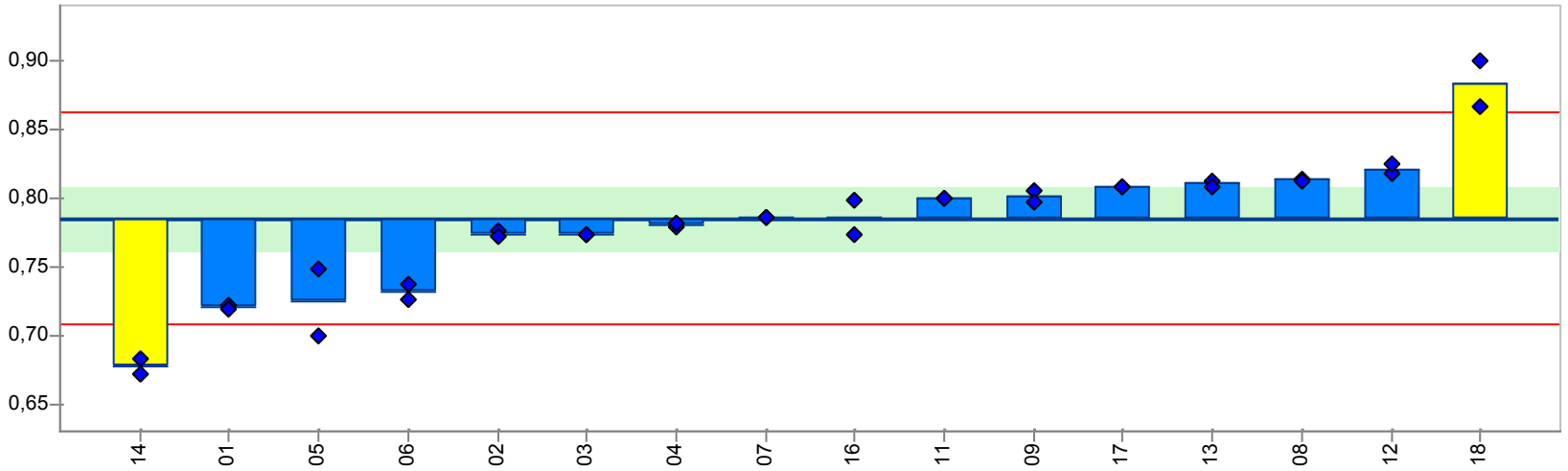
RV-2017_03_Cement

Sample: FLX-138 **Reprod. s.d.** 0,039

Measurand: K2O **Repeat. s.d** 0,005

Mean ± U(Mean): 0,786 ± 0,023 **Range of tolerance:** 0,708 - 0,863 (|z-score| <= 2,000)

No. of laboratories: 15 **Statistical method** Q/Hampel



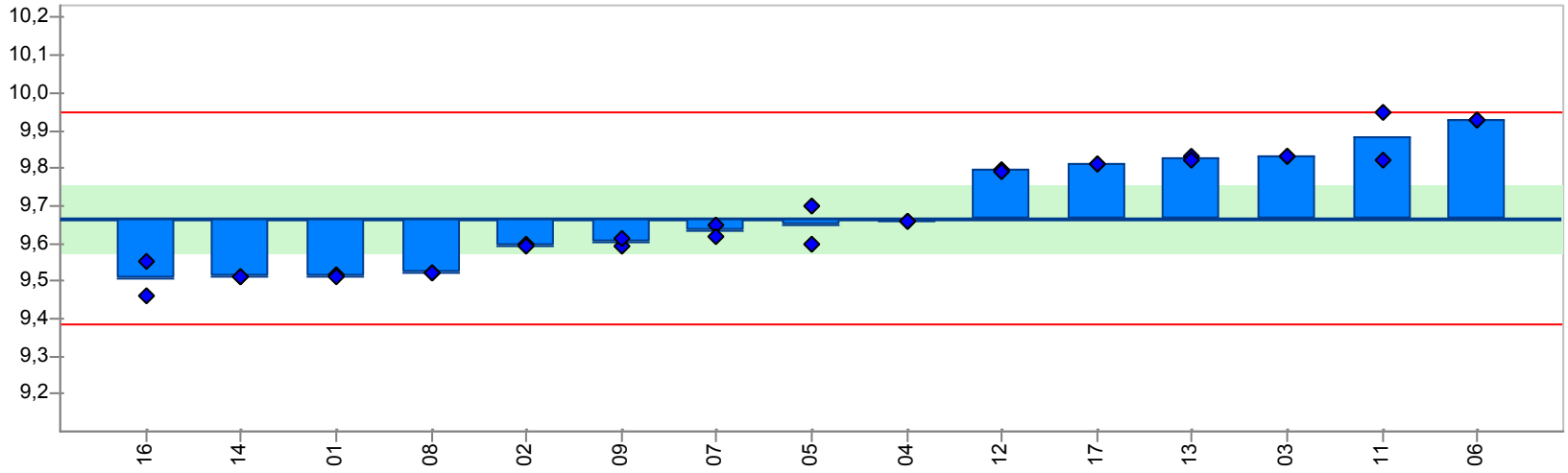
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	0,721	0,001	-1,669	0,722	0,720	no accreditation	XRF (fusion)	
02	0,774	0,003	-0,298	0,776	0,772	ISO 17025	XRF (fusion)	
03	0,774	0,000	-0,298	0,774	0,774	ISO 17025	Other Method	AAS
04	0,780	0,002	-0,129	0,779	0,782	ISO 17025	XRF (fusion)	
05	0,724	0,035	-1,578	0,749	0,700	no accreditation	XRF (fusion)	
06	0,732	0,008	-1,371	0,727	0,738	no accreditation	XRF (pressed pellet)	info only
07	0,786	0,000	0,013	0,786	0,786	ISO 17025	XRF (fusion)	
08	0,813	0,001	0,724	0,814	0,813	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	0,801	0,006	0,401	0,805	0,797	no accreditation	Other Method	ASTM C114
11	0,800	0,000	0,375	0,800	0,800	no accreditation	XRF (fusion)	EN 196-2
12	0,821	0,005	0,931	0,818	0,825	no accreditation	XRF (fusion)	
13	0,811	0,003	0,660	0,813	0,809	no accreditation	XRF (fusion)	
14	0,677	0,008	-2,794	0,672	0,683	ISO 17025	XRF (fusion)	
16	0,786	0,017	0,013	0,798	0,774	no accreditation	XRF (fusion)	
17	0,809	0,000	0,608	0,809	0,809	no accreditation	XRF (fusion)	
18	0,883	0,023	2,535	0,900	0,867	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,142**
Measurand:	**Loss on Ignition**	**Repeat. s.d**	**0,014**
Mean ± U(Mean):	**9,667 ± 0,088**	**Range of tolerance:**	**9,384 - 9,950 (|z-score| <= 2,000)**
No. of laboratories:	**14**	**Statistical method**	**Q/Hampel**



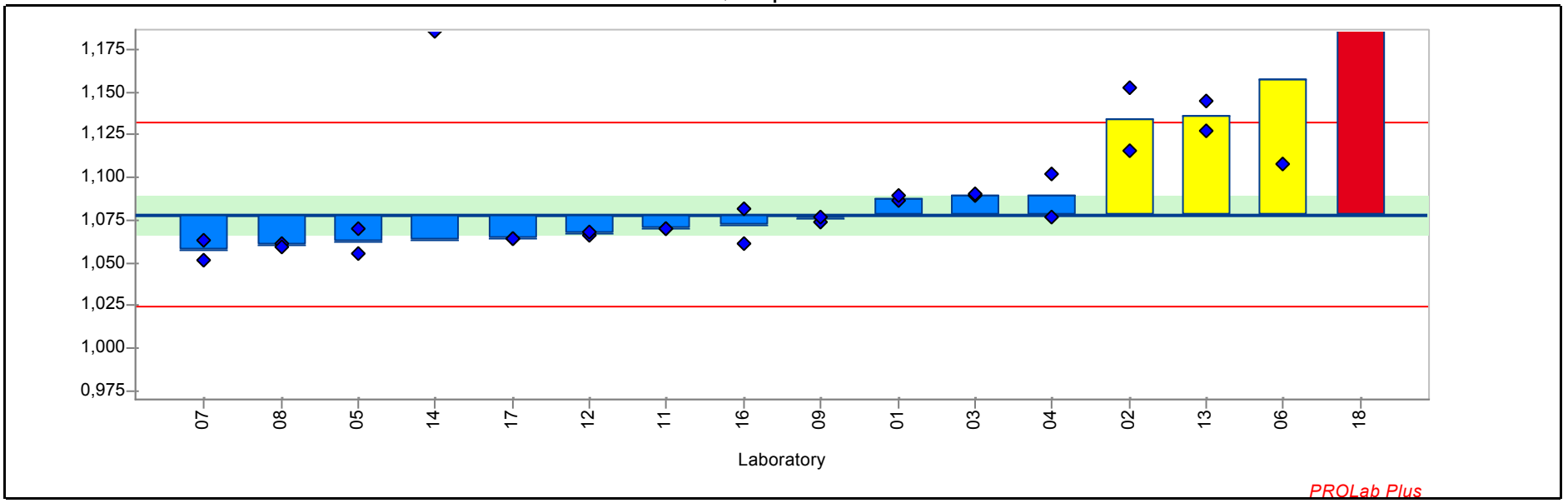
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	9,514	0,005	-1,084	9,517	9,510	no accreditation	Other Method	LOI @ 950 °C
02	9,595	0,006	-0,504	9,600	9,591	ISO 17025	Other Method	LOI @ 950 °C
03	9,830	0,000	1,153	9,830	9,830	ISO 17025	Other Method	LOI @ 950°C
04	9,660	0,000	-0,048	9,660	9,660	ISO 17025	Other Method	LOI @ 950°C
05	9,650	0,071	-0,119	9,600	9,700	no accreditation	Other Method	LOI @ 950°C
06	9,930	0,000	1,860	9,930	9,930	no accreditation	XRF (pressed pellet)	info only
07	9,635	0,021	-0,225	9,650	9,620	ISO 17025	Other Method	LOI @ 950°C
08	9,520	0,000	-1,038	9,520	9,520	no accreditation	Other Method	LOI @ 950°C

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	9,605	0,014	-0,437	9,595	9,615	no accreditation	Other Method	LOI @ 950°C
11	9,885	0,092	1,542	9,820	9,950	no accreditation	Other Method	LOI @ 950°C
12	9,794	0,003	0,899	9,796	9,792	no accreditation	Other Method	LOI @ 950°C
13	9,827	0,006	1,132	9,831	9,823	no accreditation	Other Method	LOI @ 950°C
14	9,510	0,000	-1,108	9,510	9,510	ISO 17025	Other Method	LOI @ 950°C
16	9,506	0,063	-1,133	9,551	9,462	no accreditation	Other Method	LOI @ 950°C
17	9,810	0,000	1,012	9,810	9,810	no accreditation	Other Method	LOI @ 950°C

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,027**
Measurand:	**MgO**	**Repeat. s.d**	**0,014**
Mean ± U(Mean):	**1,078 ± 0,011**	**Range of tolerance:**	**1,024 - 1,132 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



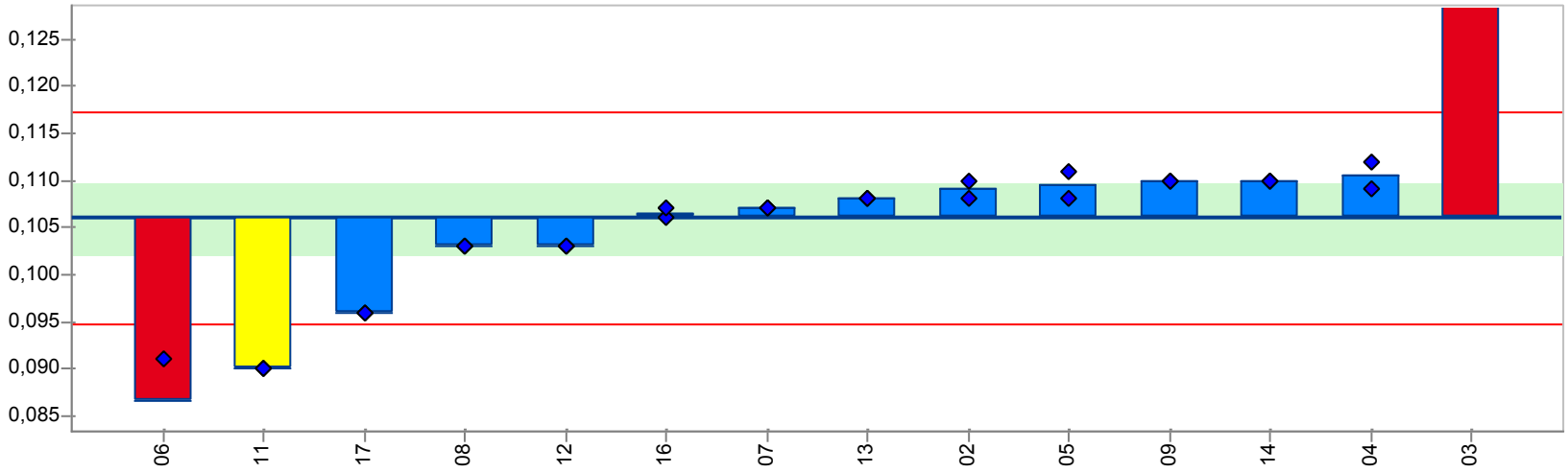
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	1,087	0,002	0,344	1,086	1,089	no accreditation	XRF (fusion)	
02	1,135	0,026	2,079	1,116	1,153	ISO 17025	XRF (fusion)	
03	1,090	0,001	0,418	1,089	1,090	ISO 17025	XRF (fusion)	
04	1,090	0,018	0,418	1,102	1,077	ISO 17025	XRF (fusion)	
05	1,063	0,011	-0,579	1,055	1,070	no accreditation	XRF (fusion)	
06	1,158	0,070	2,928	1,207	1,108	no accreditation	XRF (pressed pellet)	info only
07	1,057	0,008	-0,782	1,063	1,051	ISO 17025	XRF (fusion)	
08	1,060	0,001	-0,671	1,061	1,059	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	1,075	0,002	-0,099	1,074	1,077	no accreditation	XRF (fusion)	ISO 29581-part 2
11	1,070	0,000	-0,302	1,070	1,070	no accreditation	XRF (fusion)	EN 196-2
12	1,067	0,001	-0,413	1,066	1,068	no accreditation	XRF (fusion)	
13	1,136	0,013	2,134	1,145	1,127	no accreditation	XRF (fusion)	
14	1,063	0,174	-0,561	0,940	1,186	ISO 17025	XRF (fusion)	
16	1,071	0,015	-0,247	1,082	1,061	no accreditation	XRF (fusion)	
17	1,064	0,000	-0,524	1,064	1,064	no accreditation	XRF (fusion)	
18	1,411	0,119	12,286	1,495	1,327	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,006**
Measurand:	**Mn2O3**	**Repeat. s.d**	**0,001**
Mean ± U(Mean):	**0,106 ± 0,004**	**Range of tolerance:**	**0,095 - 0,117 (|z-score| <= 2,000)**
No. of laboratories:	**13**	**Statistical method**	**Q/Hampel**



Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,109	0,001	0,539	0,108	0,110	ISO 17025	XRF (fusion)	
03	0,253	0,000	26,028	0,253	0,253	ISO 17025	XRF (fusion)	
04	0,111	0,002	0,804	0,112	0,109	ISO 17025	XRF (fusion)	
05	0,110	0,002	0,627	0,108	0,111	no accreditation	XRF (fusion)	
06	0,086	0,006	-3,444	0,091	0,082	no accreditation	XRF (pressed pellet)	info only
07	0,107	0,000	0,185	0,107	0,107	ISO 17025	XRF (fusion)	
08	0,103	0,000	-0,523	0,103	0,103	no accreditation	XRF (fusion)	
09	0,110	0,000	0,716	0,110	0,110	no accreditation	XRF (fusion)	ISO 29581-part 2

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
11	0,090	0,000	-2,824	0,090	0,090	no accreditation	XRF (fusion)	EN 196-2
12	0,103	0,000	-0,523	0,103	0,103	no accreditation	XRF (fusion)	
13	0,108	0,000	0,362	0,108	0,108	no accreditation	XRF (fusion)	
14	0,110	0,000	0,716	0,110	0,110	ISO 17025	XRF (fusion)	
16	0,106	0,001	0,096	0,106	0,107	no accreditation	XRF (fusion)	
17	0,096	0,000	-1,762	0,096	0,096	no accreditation	XRF (fusion)	

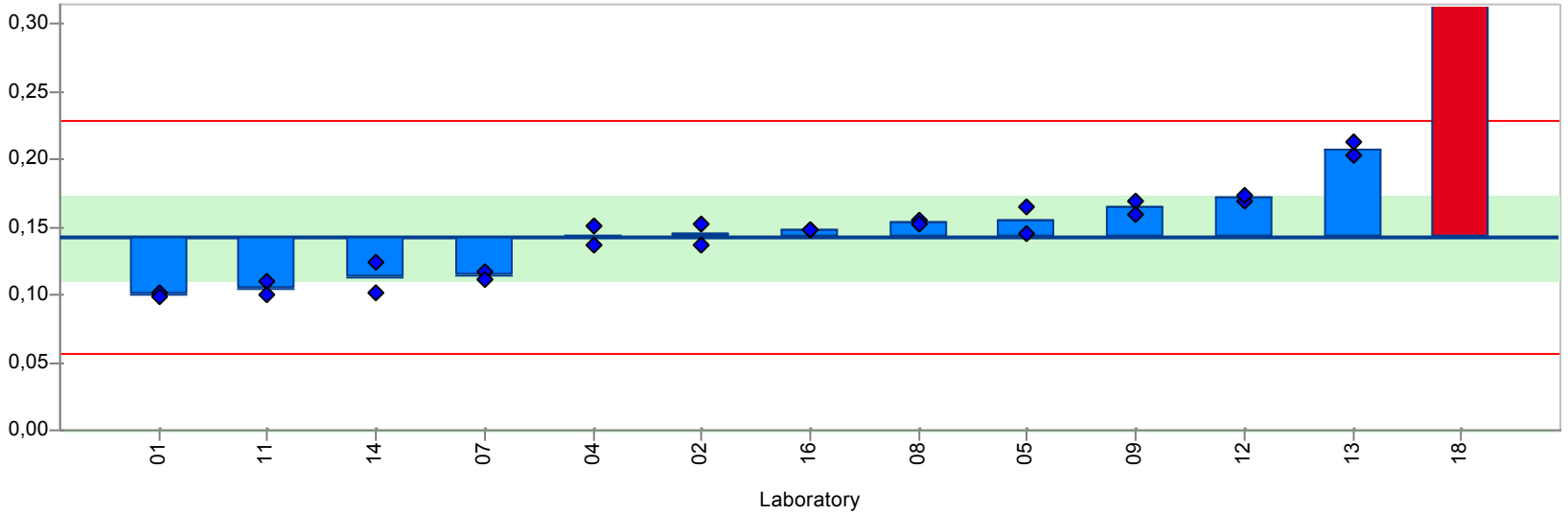
RV-2017_03_Cement

Sample: FLX-138 **Reprod. s.d.** 0,043

Measurand: Na2O **Repeat. s.d** 0,010

Mean ± U(Mean): 0,142 ± 0,031 **Range of tolerance:** 0,056 - 0,228 (|z-score| <= 2,000)

No. of laboratories: 12 **Statistical method** Q/Hampel



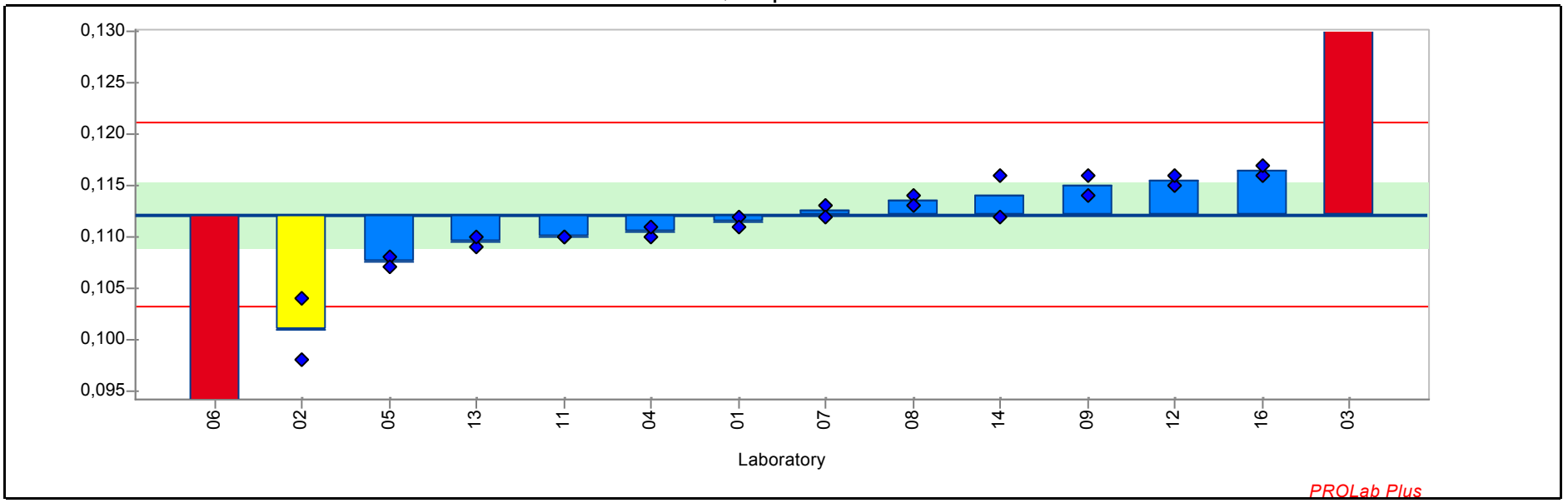
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	0,100	0,001	-0,984	0,101	0,099	no accreditation	XRF (fusion)	
02	0,145	0,011	0,061	0,137	0,153	ISO 17025	XRF (fusion)	
03	<0,003			<0,003	<0,003	ISO 17025	Other Method	AAS
04	0,144	0,010	0,038	0,137	0,151	ISO 17025	XRF (fusion)	
05	0,155	0,014	0,294	0,145	0,165	no accreditation	XRF (fusion)	info only
07	0,114	0,004	-0,659	0,117	0,111	ISO 17025	XRF (fusion)	
08	0,154	0,001	0,270	0,155	0,153	no accreditation	XRF (fusion)	
09	0,165	0,008	0,514	0,170	0,159	no accreditation	Other Method	ASTM C114

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
11	0,105	0,007	-0,868	0,110	0,100	no accreditation	XRF (fusion)	EN 196-2
12	0,171	0,002	0,677	0,170	0,173	no accreditation	XRF (fusion)	
13	0,208	0,007	1,524	0,203	0,213	no accreditation	XRF (fusion)	
14	0,113	0,016	-0,682	0,124	0,102	ISO 17025	XRF (fusion)	
16	0,148	0,000	0,131	0,148	0,148	no accreditation	XRF (fusion)	
18	0,342	0,012	4,624	0,350	0,333	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,005**
Measurand:	**P2O5**	**Repeat. s.d**	**0,001**
Mean ± U(Mean):	**0,112 ± 0,003**	**Range of tolerance:**	**0,103 - 0,121 (|z-score| <= 2,000)**
No. of laboratories:	**12**	**Statistical method**	**Q/Hampel**



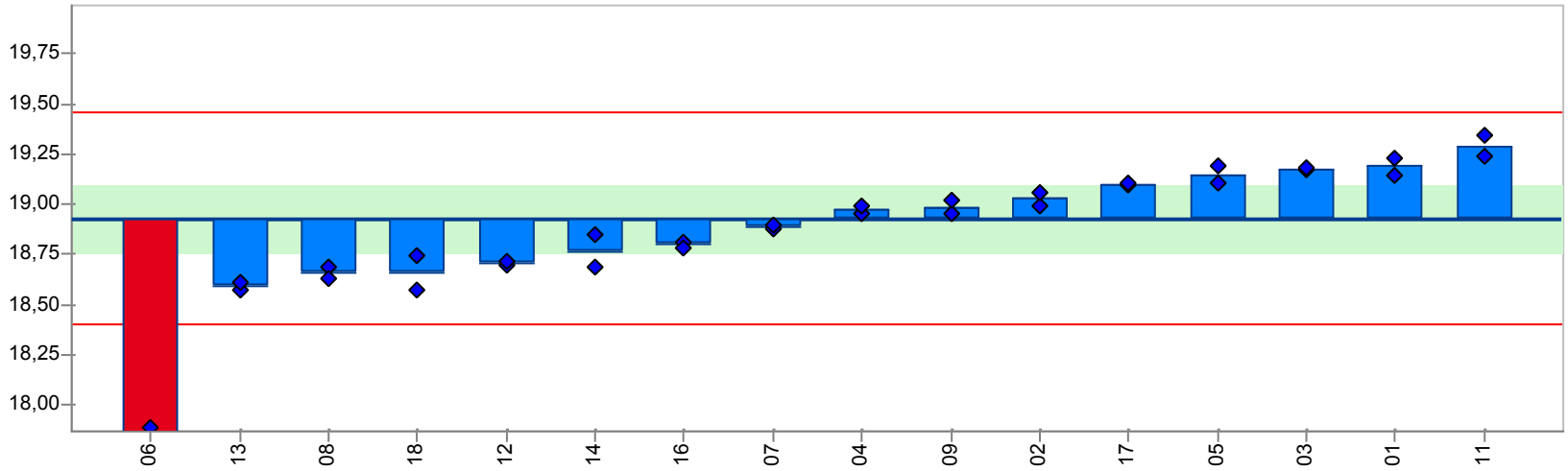
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	0,112	0,001	-0,149	0,112	0,111	no accreditation	XRF (fusion)	
02	0,101	0,004	-2,477	0,098	0,104	ISO 17025	XRF (fusion)	
03	0,154	0,000	9,272	0,154	0,154	ISO 17025	XRF (fusion)	
04	0,111	0,001	-0,371	0,110	0,111	ISO 17025	XRF (fusion)	
05	0,107	0,001	-1,036	0,108	0,107	no accreditation	XRF (fusion)	info only
06	0,060	0,004	-11,455	0,063	0,058	no accreditation	XRF (pressed pellet)	info only
07	0,113	0,001	0,072	0,113	0,112	ISO 17025	XRF (fusion)	
08	0,114	0,001	0,294	0,114	0,113	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	0,115	0,001	0,627	0,114	0,116	no accreditation	XRF (fusion)	ISO 29581-part 2
11	0,110	0,000	-0,482	0,110	0,110	no accreditation	XRF (fusion)	EN 196-2
12	0,116	0,001	0,737	0,115	0,116	no accreditation	XRF (fusion)	
13	0,110	0,001	-0,593	0,109	0,110	no accreditation	XRF (fusion)	
14	0,114	0,003	0,405	0,112	0,116	ISO 17025	XRF (fusion)	
16	0,117	0,001	0,959	0,116	0,117	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,265**
Measurand:	**SiO2**	**Repeat. s.d**	**0,061**
Mean ± U(Mean):	**18,930 ± 0,163**	**Range of tolerance:**	**18,399 - 19,460 (|z-score| <= 2,000)**
No. of laboratories:	**15**	**Statistical method**	**Q/Hampel**



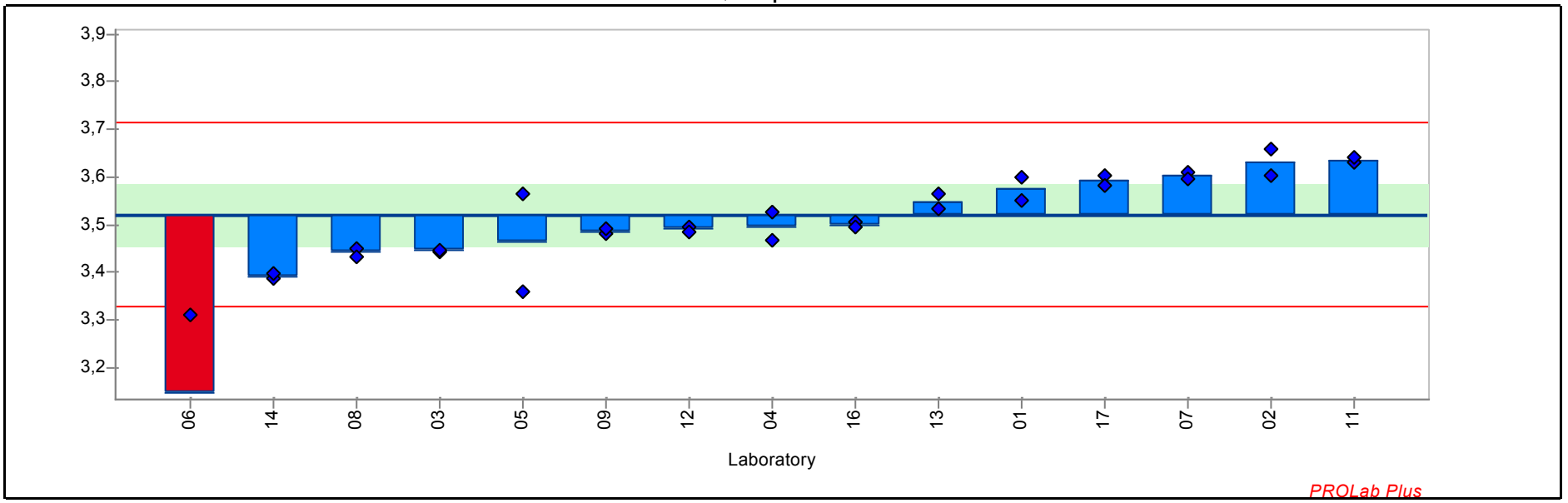
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	19,190	0,059	0,980	19,231	19,148	no accreditation	XRF (fusion)	
02	19,027	0,047	0,367	18,994	19,060	ISO 17025	XRF (fusion)	
03	19,176	0,007	0,929	19,171	19,181	ISO 17025	XRF (fusion)	
04	18,971	0,023	0,156	18,955	18,987	ISO 17025	XRF (fusion)	
05	19,148	0,060	0,821	19,105	19,190	no accreditation	XRF (fusion)	
06	17,007	1,250	-7,250	17,891	16,123	no accreditation	XRF (pressed pellet)	info only
07	18,883	0,012	-0,174	18,875	18,892	ISO 17025	XRF (fusion)	
08	18,661	0,041	-1,013	18,690	18,632	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	18,984	0,048	0,205	18,950	19,018	no accreditation	XRF (fusion)	ISO 29581-part 2
11	19,290	0,071	1,359	19,340	19,240	no accreditation	XRF (fusion)	EN 196-2
12	18,706	0,013	-0,845	18,696	18,715	no accreditation	XRF (fusion)	
13	18,590	0,028	-1,281	18,570	18,610	no accreditation	XRF (fusion)	
14	18,764	0,115	-0,625	18,683	18,845	ISO 17025	XRF (fusion)	
16	18,797	0,021	-0,502	18,811	18,782	no accreditation	XRF (fusion)	
17	19,099	0,008	0,637	19,093	19,104	no accreditation	XRF (fusion)	
18	18,661	0,122	-1,013	18,575	18,747	no accreditation	Other Method	Wet chemistry

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,097**
Measurand:	**SO3**	**Repeat. s.d**	**0,016**
Mean ± U(Mean):	**3,521 ± 0,063**	**Range of tolerance:**	**3,327 - 3,716 (|z-score| <= 2,000)**
No. of laboratories:	**14**	**Statistical method**	**Q/Hampel**



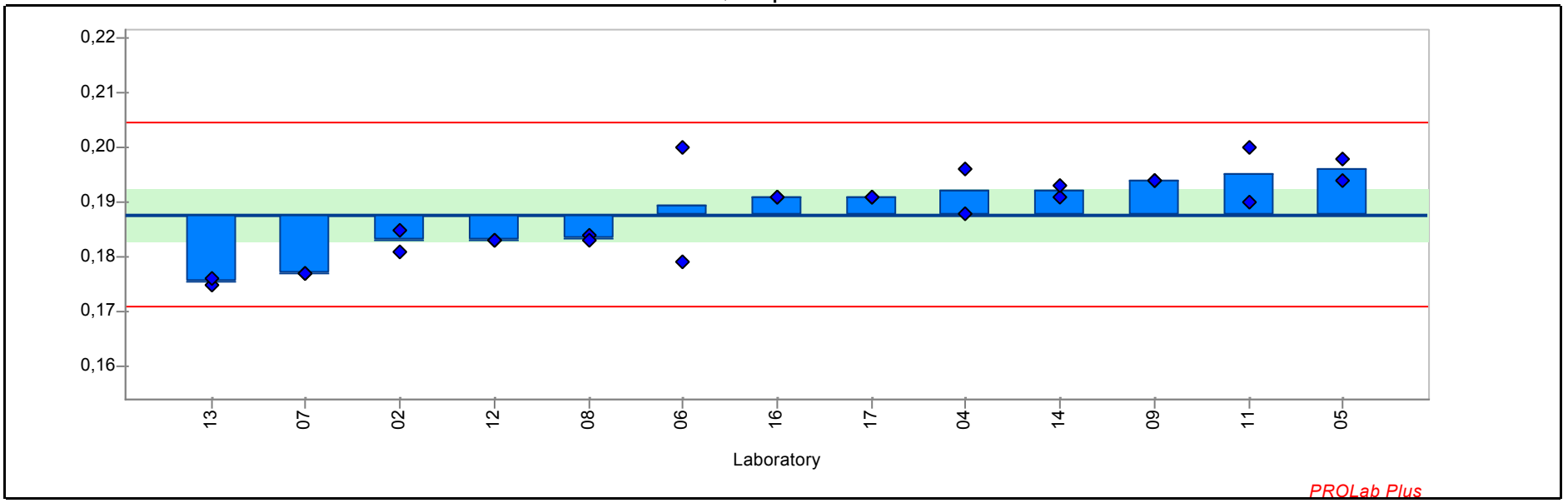
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
01	3,575	0,035	0,557	3,600	3,551	no accreditation	XRF (fusion)	
02	3,631	0,039	1,124	3,658	3,603	ISO 17025	XRF (fusion)	
03	3,445	0,001	-0,788	3,444	3,446	ISO 17025	Other Method	Gravimetric
04	3,496	0,041	-0,262	3,467	3,525	ISO 17025	XRF (fusion)	
05	3,462	0,145	-0,608	3,565	3,360	no accreditation	XRF (fusion)	
06	3,146	0,232	-3,869	3,310	2,982	no accreditation	XRF (pressed pellet)	info only
07	3,603	0,008	0,840	3,609	3,597	ISO 17025	XRF (fusion)	
08	3,442	0,012	-0,814	3,451	3,434	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
09	3,486	0,008	-0,360	3,481	3,492	no accreditation	XRF (fusion)	ISO 29581-part 2
11	3,635	0,007	1,170	3,630	3,640	no accreditation	XRF (fusion)	EN 196-2
12	3,491	0,007	-0,314	3,496	3,486	no accreditation	XRF (fusion)	
13	3,549	0,021	0,284	3,534	3,564	no accreditation	XRF (fusion)	
14	3,392	0,008	-1,334	3,386	3,398	ISO 17025	XRF (fusion)	
16	3,500	0,007	-0,221	3,505	3,495	no accreditation	XRF (fusion)	
17	3,592	0,016	0,727	3,603	3,581	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,008**
Measurand:	**SrO**	**Repeat. s.d**	**0,002**
Mean ± U(Mean):	**0,188 ± 0,005**	**Range of tolerance:**	**0,171 - 0,205 (|z-score| <= 2,000)**
No. of laboratories:	**12**	**Statistical method**	**Q/Hampel**



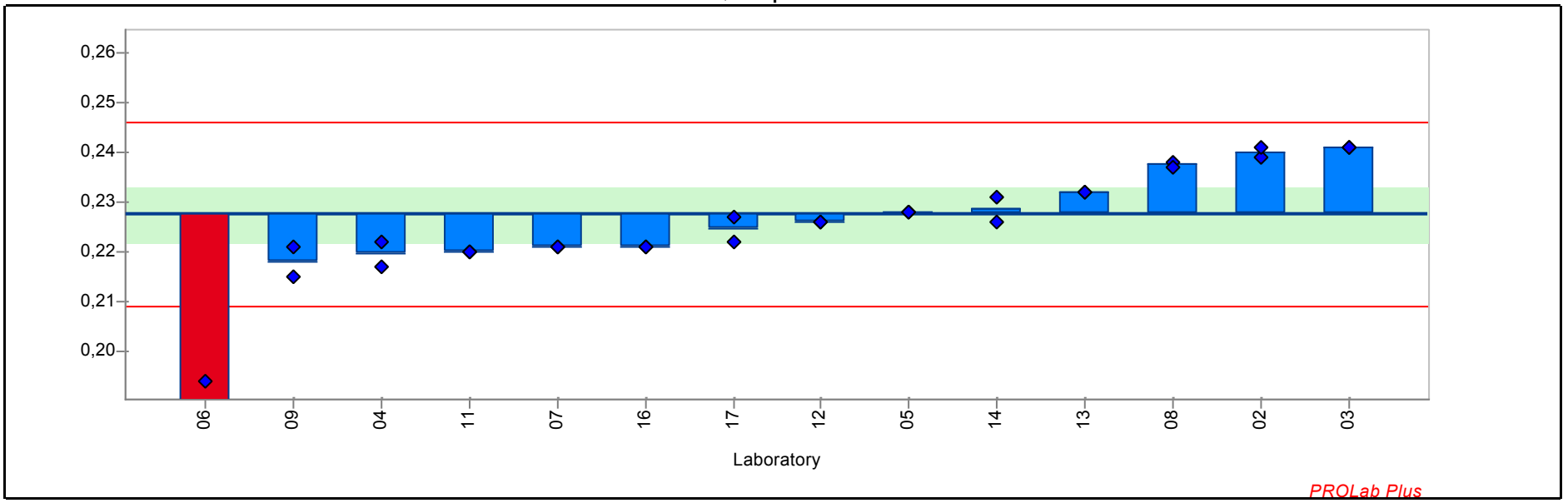
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,183	0,003	-0,564	0,181	0,185	ISO 17025	XRF (fusion)	
04	0,192	0,006	0,505	0,188	0,196	ISO 17025	XRF (fusion)	
05	0,196	0,003	0,980	0,194	0,198	no accreditation	XRF (fusion)	
06	0,190	0,015	0,208	0,200	0,179	no accreditation	XRF (pressed pellet)	info only
07	0,177	0,000	-1,277	0,177	0,177	ISO 17025	XRF (fusion)	
08	0,183	0,001	-0,505	0,184	0,183	no accreditation	XRF (fusion)	
09	0,194	0,000	0,742	0,194	0,194	no accreditation	XRF (fusion)	ISO 29581-part 2
11	0,195	0,007	0,861	0,200	0,190	no accreditation	XRF (fusion)	EN 196-2

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
12	0,183	0,000	-0,564	0,183	0,183	no accreditation	XRF (fusion)	
13	0,175	0,001	-1,455	0,175	0,176	no accreditation	XRF (fusion)	
14	0,192	0,001	0,505	0,191	0,193	ISO 17025	XRF (fusion)	
16	0,191	0,000	0,386	0,191	0,191	no accreditation	XRF (fusion)	
17	0,191	0,000	0,386	0,191	0,191	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,009**
Measurand:	**TiO2**	**Repeat. s.d**	**0,003**
Mean ± U(Mean):	**0,227 ± 0,006**	**Range of tolerance:**	**0,209 - 0,246 (|z-score| <= 2,000)**
No. of laboratories:	**13**	**Statistical method**	**Q/Hampel**



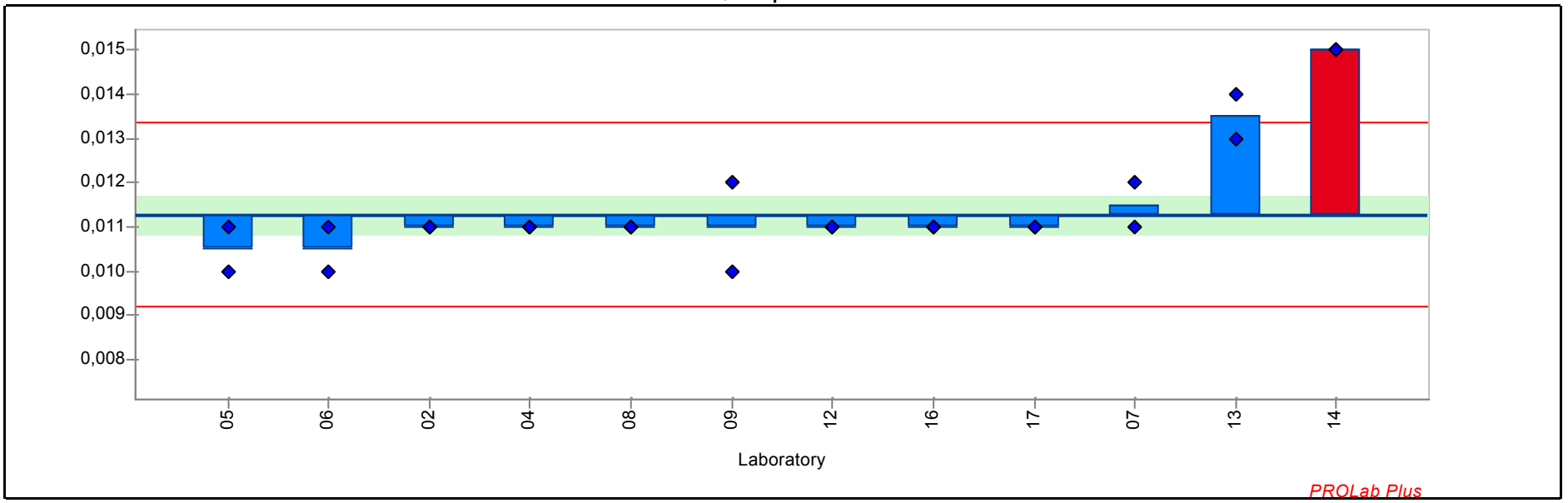
Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,240	0,001	1,348	0,239	0,241	ISO 17025	XRF (fusion)	
03	0,241	0,000	1,455	0,241	0,241	ISO 17025	XRF (fusion)	
04	0,220	0,004	-0,856	0,222	0,217	ISO 17025	XRF (fusion)	
05	0,228	0,000	0,058	0,228	0,228	no accreditation	XRF (fusion)	
06	0,183	0,016	-4,779	0,194	0,172	no accreditation	XRF (pressed pellet)	info only
07	0,221	0,000	-0,694	0,221	0,221	ISO 17025	XRF (fusion)	
08	0,237	0,001	1,079	0,238	0,237	no accreditation	XRF (fusion)	
09	0,218	0,004	-1,017	0,215	0,221	no accreditation	XRF (fusion)	ISO 29581-part 2

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
11	0,220	0,000	-0,802	0,220	0,220	no accreditation	XRF (fusion)	EN 196-2
12	0,226	0,000	-0,157	0,226	0,226	no accreditation	XRF (fusion)	
13	0,232	0,000	0,488	0,232	0,232	no accreditation	XRF (fusion)	
14	0,229	0,004	0,112	0,226	0,231	ISO 17025	XRF (fusion)	
16	0,221	0,000	-0,694	0,221	0,221	no accreditation	XRF (fusion)	
17	0,225	0,004	-0,318	0,227	0,222	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Sample:	**FLX-138**	**Reprod. s.d.**	**0,001**
Measurand:	**ZnO**	**Repeat. s.d**	**0,001**
Mean ± U(Mean):	**0,011 ± 0,000**	**Range of tolerance:**	**0,009 - 0,013 (|z-score| <= 2,000)**
No. of laboratories:	**11**	**Statistical method**	**Q/Hampel**



Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
02	0,011	0,000	-0,271	0,011	0,011	ISO 17025	XRF (fusion)	
04	0,011	0,000	-0,271	0,011	0,011	ISO 17025	XRF (fusion)	
05	0,010	0,001	-0,750	0,011	0,010	no accreditation	XRF (fusion)	
06	0,010	0,001	-0,750	0,011	0,010	no accreditation	XRF (pressed pellet)	info only
07	0,011	0,001	0,207	0,012	0,011	ISO 17025	XRF (fusion)	
08	0,011	0,000	-0,271	0,011	0,011	no accreditation	XRF (fusion)	
09	0,011	0,001	-0,271	0,010	0,012	no accreditation	XRF (fusion)	ISO 29581-part 2
12	0,011	0,000	-0,271	0,011	0,011	no accreditation	XRF (fusion)	

RV-2017_03_Cement

Lab code	Lab mean	s.d.	z-score	Conc. 1	Conc. 2	Accreditation	Analytical method	Comment
13	0,013	0,001	2,000	0,014	0,013	no accreditation	XRF (fusion)	
14	0,015	0,000	3,558	0,015	0,015	ISO 17025	XRF (fusion)	
16	0,011	0,000	-0,271	0,011	0,011	no accreditation	XRF (fusion)	
17	0,011	0,000	-0,271	0,011	0,011	no accreditation	XRF (fusion)	

Ring test RV-2017_03_Cement FLX-137

Survey of scores

Lab code	Al2O3	CaO	Cr2O3	Fe2O3	K2O	Loss on Ignition	MgO	Mn2O3	Na2O	P2O5	SiO2	SO3	SrO	TiO2	ZnO
01	0,587	1,401		0,225	-0,571	-0,490	0,105		0,057	-0,028	0,935	-0,405			
02	1,579	-0,206	-0,909	0,427	-0,858	1,509	0,842	0,986	-0,139	-1,130	-0,162	0,957	2,201	1,618	-0,682
03	-3,564	0,148		3,264	0,902	1,178	0,668	21,762	1,083	12,564	0,517	1,461		1,087	
04	0,074	0,133	-0,202	0,136	-0,102	-0,060	1,036	0,167	-0,804	-0,815	0,410	-0,294	0,381	-0,839	-0,298
05	0,324	-0,115		-0,470	-0,842	0,385	-0,816	0,320	0,193	-2,000	1,339	0,237	0,722	-0,971	-0,682
06	-1,755	-3,484	-1,852	-2,195	-0,419	-0,452	2,462	-24,192		-21,749	8,646	-2,173	-0,416	-3,560	-1,836
07	-0,048	0,690	-0,909	-0,129	0,124	0,121	-0,913	0,372	-0,755	-0,028	-0,272	0,197	-1,326	-0,573	-0,106
08	-0,324	-1,906		-1,563	0,698	-1,268	-0,370	-0,345	0,105	-0,185	-1,365	-1,197	-0,757	1,286	-0,106
09	-0,763	0,448		0,939	1,552	-0,633	-0,176	0,679	0,565	0,602	-0,228	-0,660	0,495	-0,639	0,471
11	0,594	0,947		0,288	0,502	1,112	0,154	-1,778	-0,990	0,917	0,840	0,891	0,495	-0,639	
12	-0,196	-1,317		-0,856	0,479	0,557	-0,370	-0,191	0,379	0,287	-0,646	-0,700	-0,871	-0,175	-0,106
13	-1,006	-0,989	0,505	-1,551	0,268	0,154	0,270	0,628	0,164	-0,500	-1,388	0,623	-0,871	0,821	2,394
14	-0,925	1,959	0,505	-0,325	-1,719	-1,290	5,225	0,730	6,080	3,750	-0,187	-1,400	0,267	0,555	1,048
16	0,081	0,107	0,505	-0,123	0,185	-0,285	0,076	-0,345	-0,071	0,130	-0,420	-0,071	0,039	-1,038	0,279
17	1,019	0,253	0,505	0,225	0,714	-0,981	-0,506	-1,778			0,581	0,361	-0,074	-0,374	-3,182
18	0,020	-2,309		1,425	-2,746		6,554		4,095		0,046				

Ring test RV-2017_03_Cement FLX-138

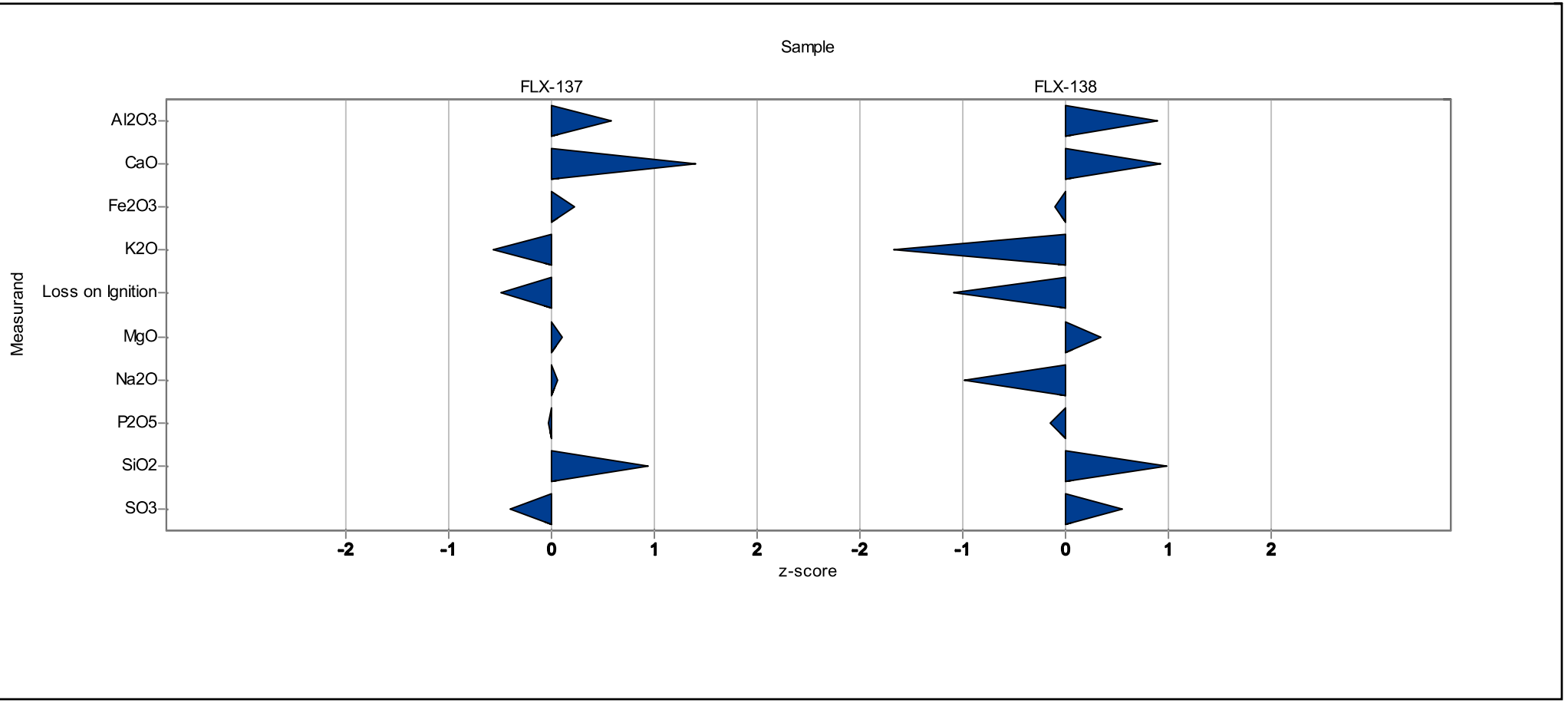
Survey of scores

Lab code	Al2O3	CaO	Cr2O3	Fe2O3	K2O	Loss on Ignition	MgO	Mn2O3	Na2O	P2O5	SiO2	SO3	SrO	TiO2	ZnO
01	0,895	0,934		-0,104	-1,669	-1,084	0,344		-0,984	-0,149	0,980	0,557			
02	1,011	0,435	-0,133	0,355	-0,298	-0,504	2,079	0,539	0,061	-2,477	0,367	1,124	-0,564	1,348	-0,271
03	-2,564	1,053		1,647	-0,298	1,153	0,418	26,028		9,272	0,929	-0,788		1,455	
04	-0,088	0,489	0,327	-0,564	-0,129	-0,048	0,418	0,804	0,038	-0,371	0,156	-0,262	0,505	-0,856	-0,271
05	0,201	0,137		-0,532	-1,578	-0,119	-0,579	0,627	0,294	-1,036	0,821	-0,608	0,980	0,058	-0,750
06	-7,550	-4,671	1,015	-1,521	-1,371	1,860	2,928	-3,444		-11,455	-7,250	-3,869	0,208	-4,779	-0,750
07	0,023	-0,080	-1,740	0,440	0,013	-0,225	-0,782	0,185	-0,659	0,072	-0,174	0,840	-1,277	-0,694	0,207
08	0,029	-3,482		-1,264	0,724	-1,038	-0,671	-0,523	0,270	0,294	-1,013	-0,814	-0,505	1,079	-0,271
09	0,034	0,008		1,094	0,401	-0,437	-0,099	0,716	0,514	0,627	0,205	-0,360	0,742	-1,017	-0,271
11	0,645	-0,493		-0,027	0,375	1,542	-0,302	-2,824	-0,868	-0,482	1,359	1,170	0,861	-0,802	
12	-0,399	-1,973		-0,999	0,931	0,899	-0,413	-0,523	0,677	0,737	-0,845	-0,314	-0,564	-0,157	-0,271
13	-0,826	-0,844	0,327	-1,264	0,660	1,132	2,134	0,362	1,524	-0,593	-1,281	0,284	-1,455	0,488	2,000
14	-1,087	1,679	0,556	0,114	-2,794	-1,108	-0,561	0,716	-0,682	0,405	-0,625	-1,334	0,505	0,112	3,558
16	-0,316	0,012	-0,592	0,160	0,013	-1,133	-0,247	0,096	0,131	0,959	-0,502	-0,221	0,386	-0,694	-0,271
17	0,728	-0,189	1,015	0,744	0,608	1,012	-0,524	-1,762			0,637	0,727	0,386	-0,318	-0,271
18	3,848	-0,445		0,347	2,535		12,286		4,624		-1,013				

RV-2017_03_Cement

Laboratory chart of z-scores

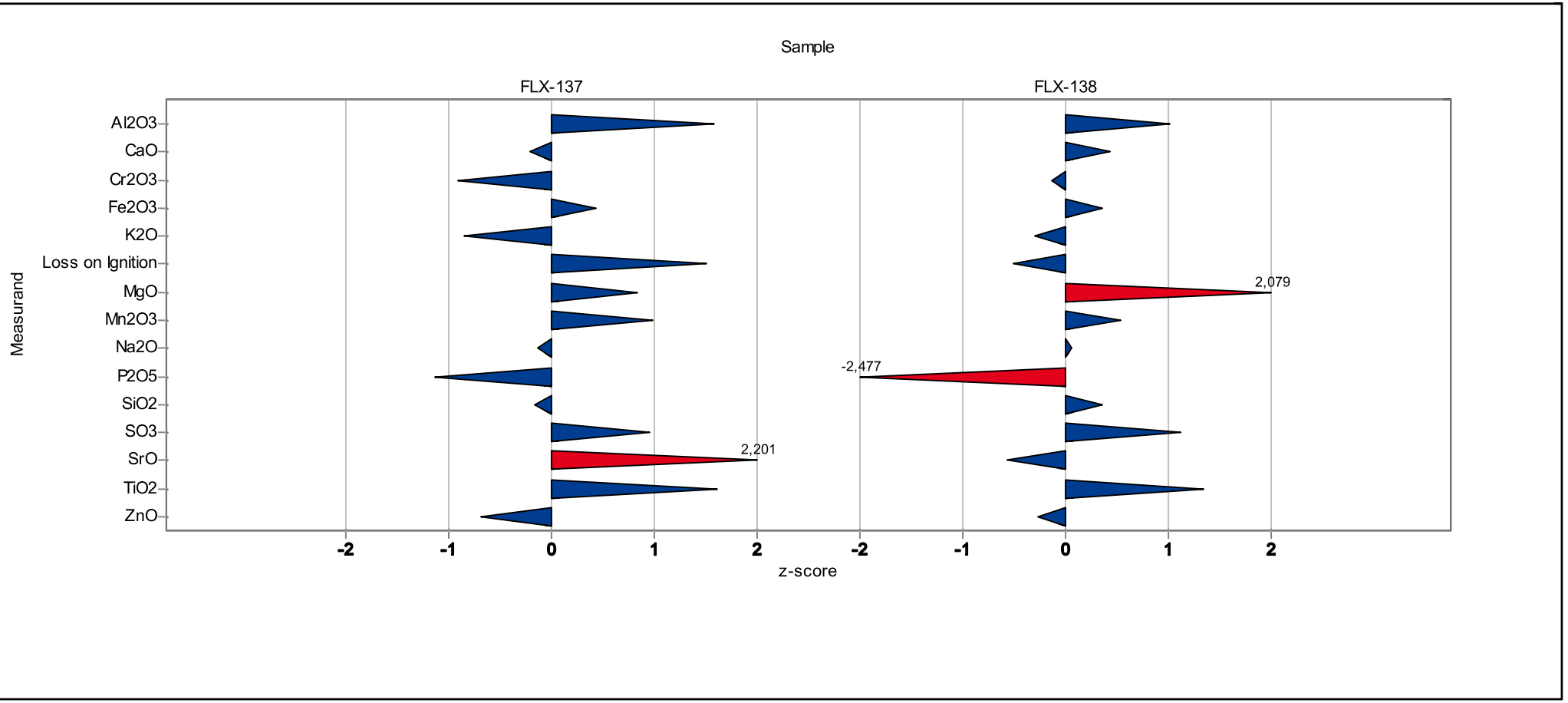
Laboratory: 01



RV-2017_03_Cement

Laboratory chart of z-scores

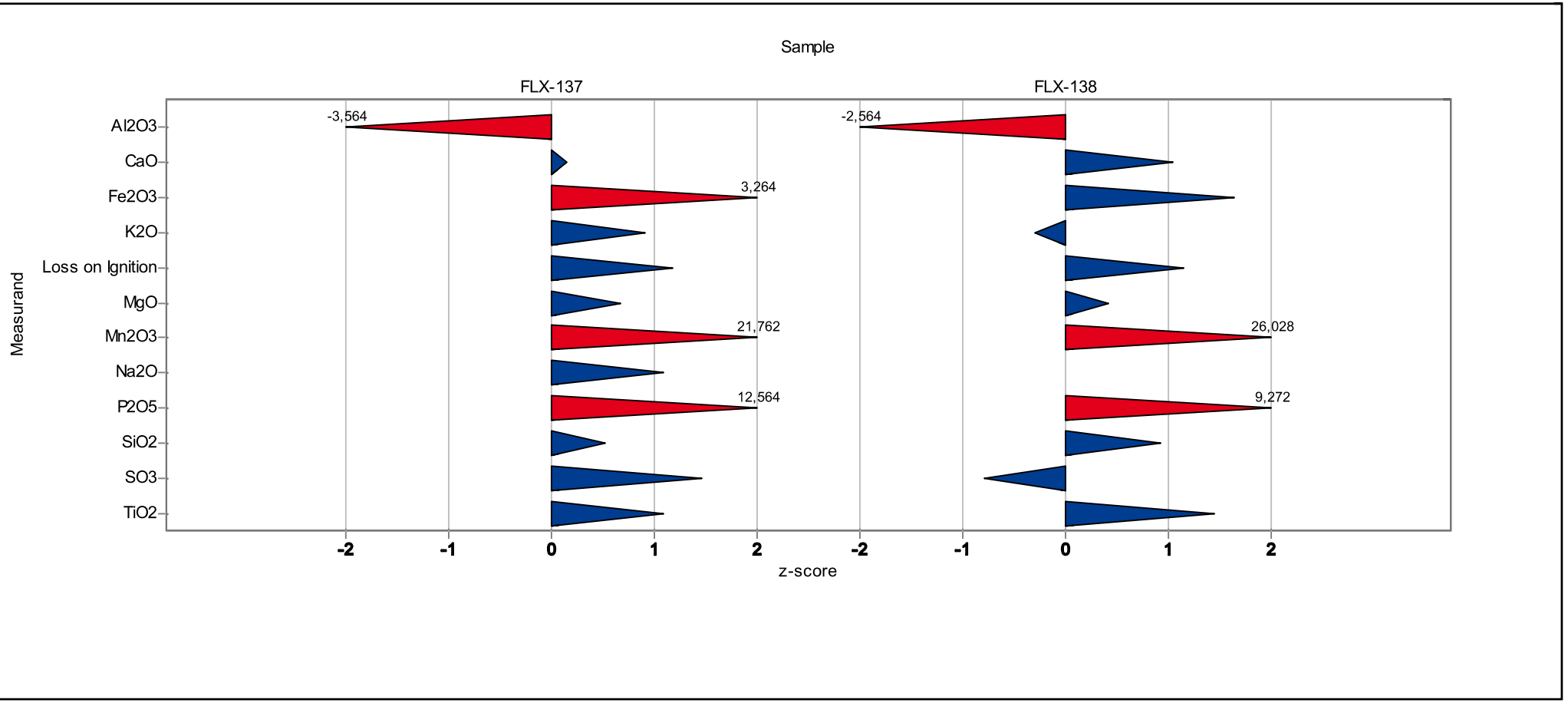
Laboratory: 02



RV-2017_03_Cement

Laboratory chart of z-scores

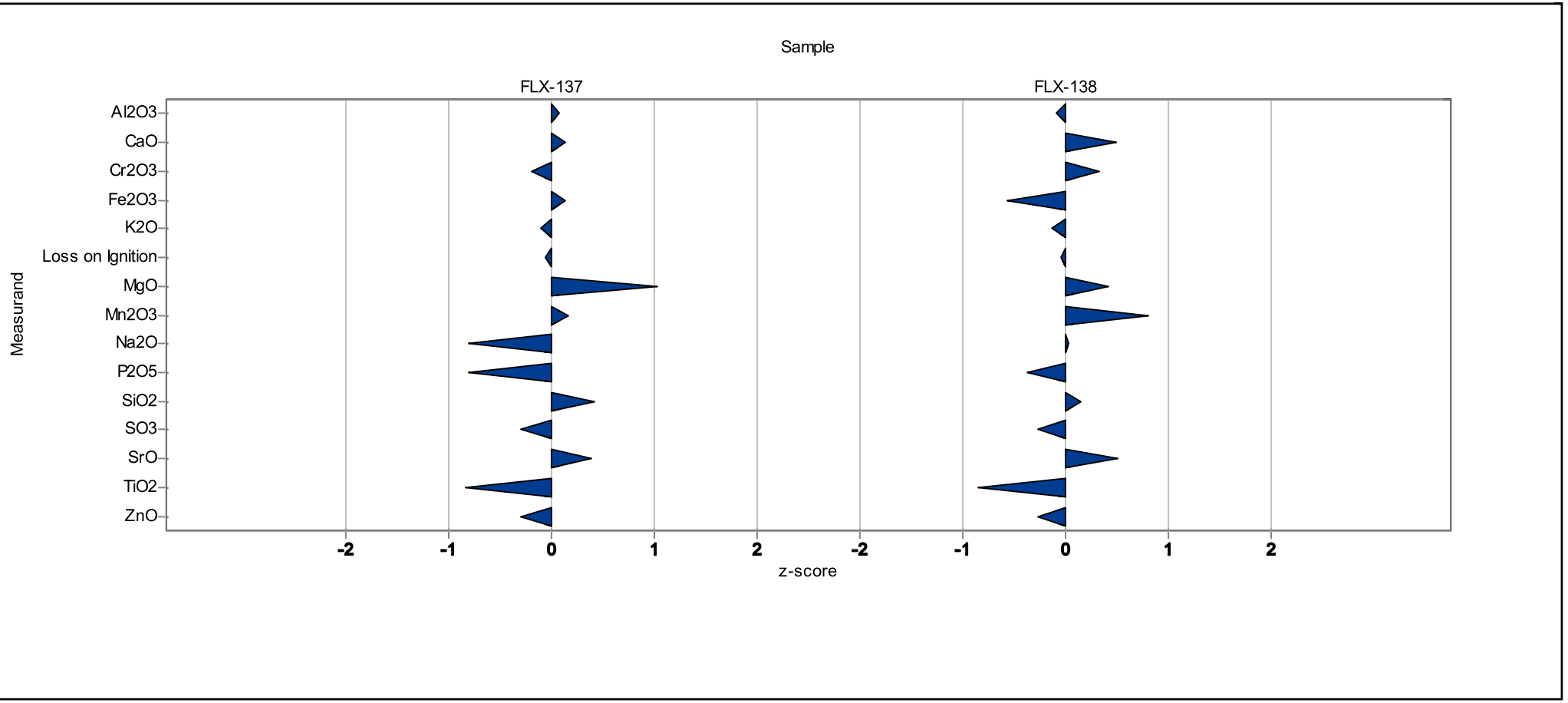
Laboratory: 03



RV-2017_03_Cement

Laboratory chart of z-scores

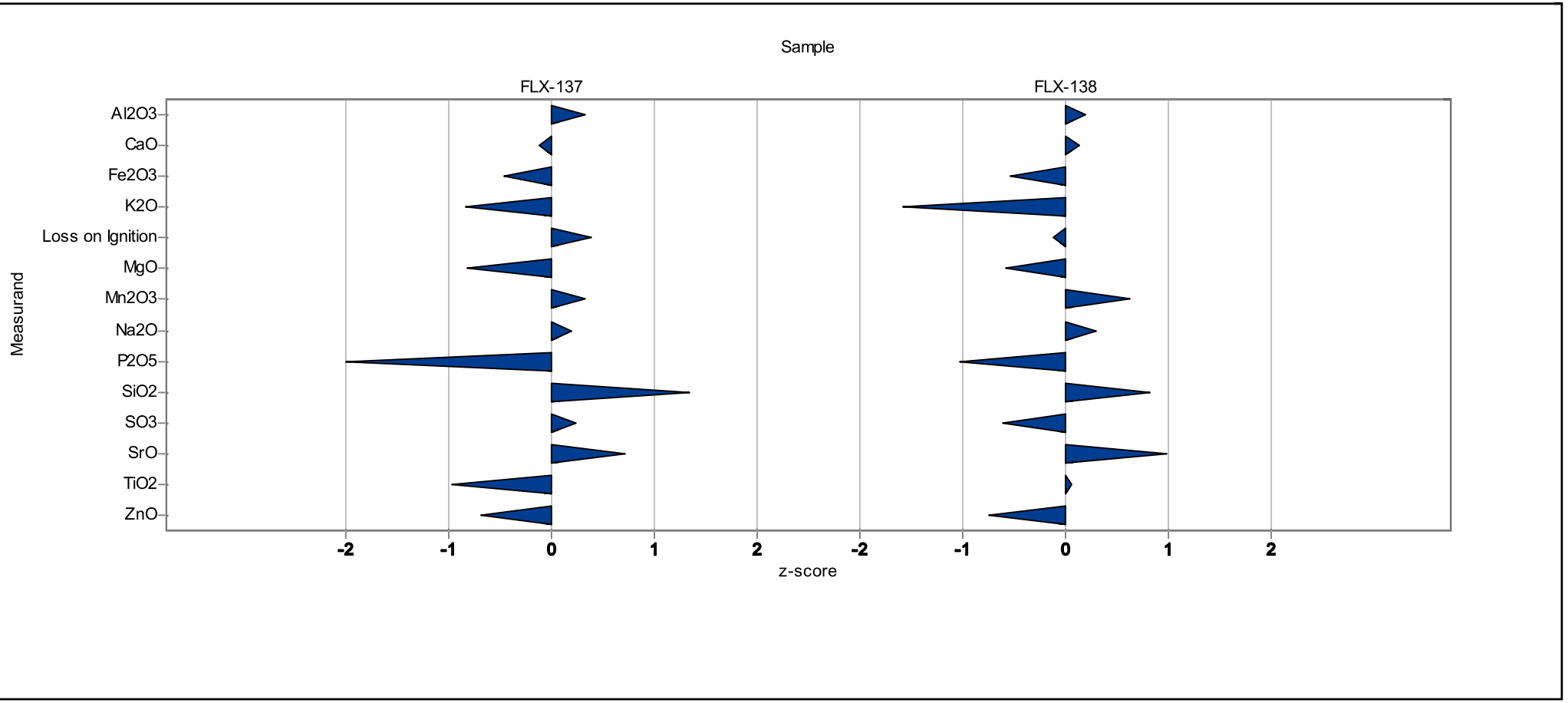
Laboratory: 04



RV-2017_03_Cement

Laboratory chart of z-scores

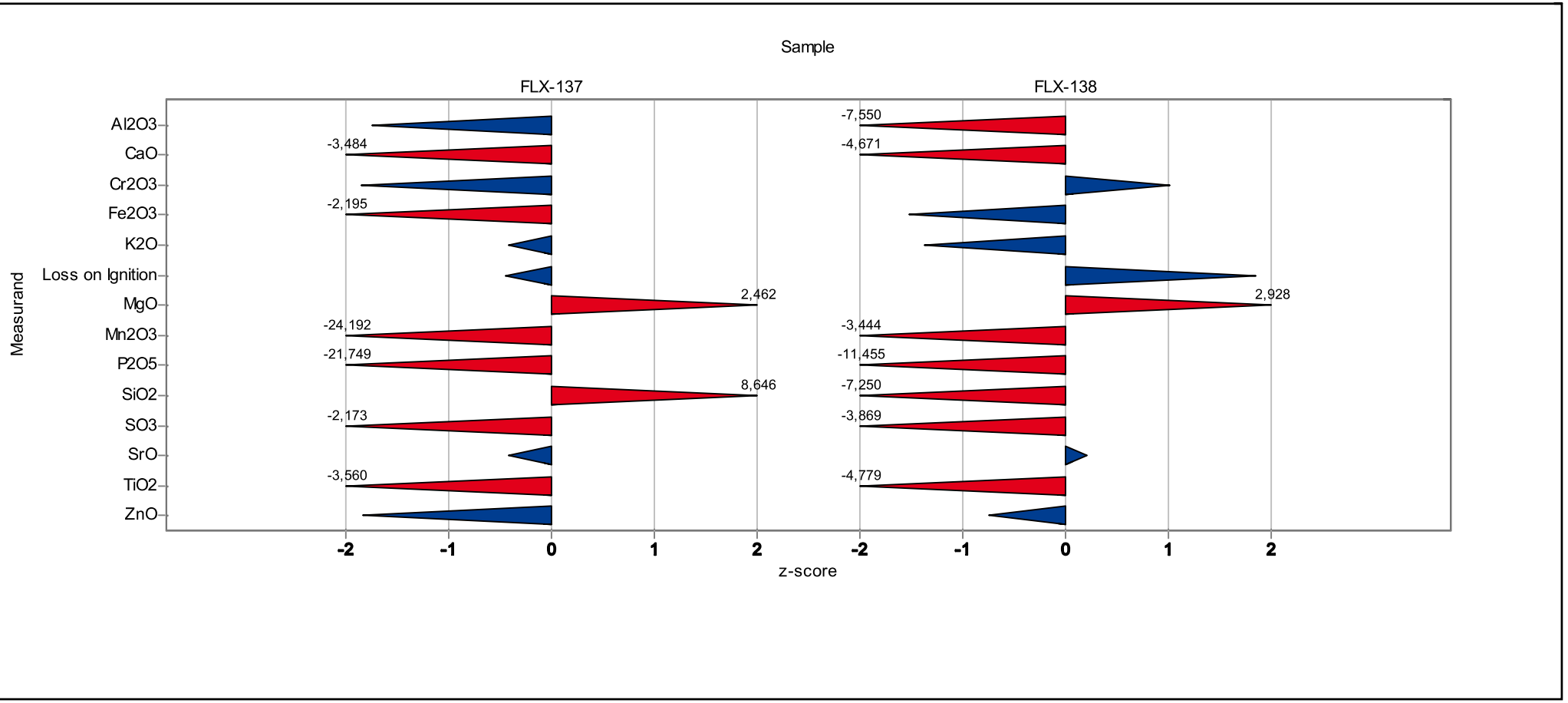
Laboratory: 05



RV-2017_03_Cement

Laboratory chart of z-scores

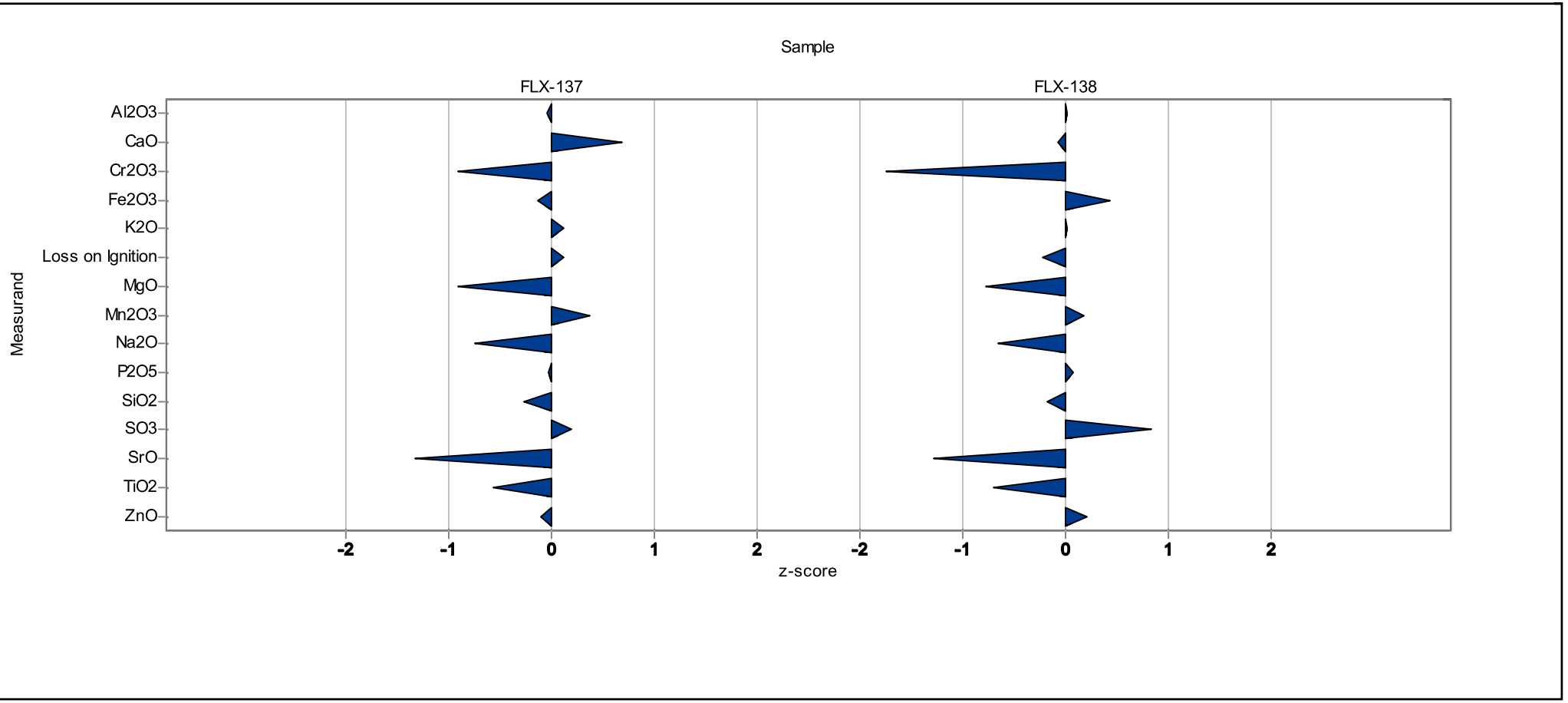
Laboratory: 06



RV-2017_03_Cement

Laboratory chart of z-scores

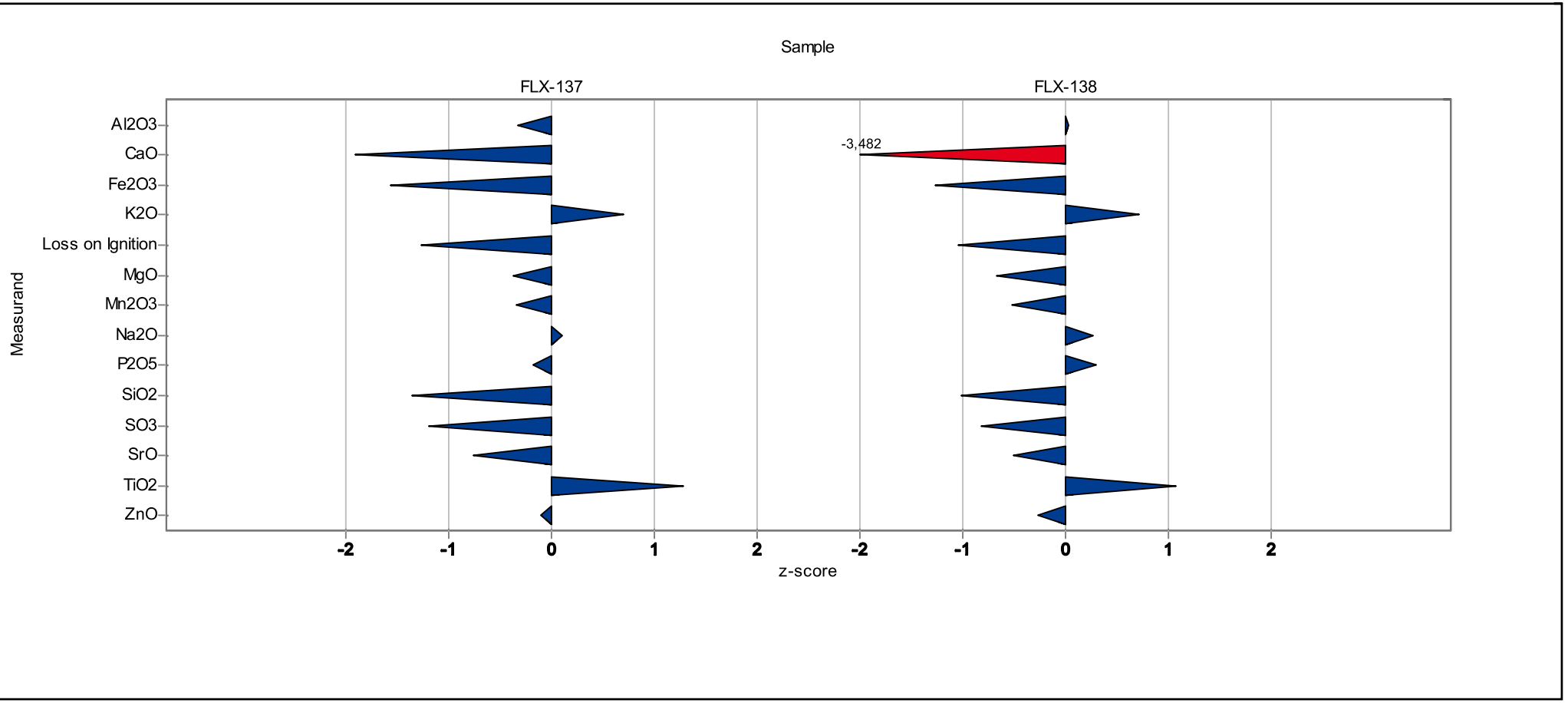
Laboratory: 07



RV-2017_03_Cement

Laboratory chart of z-scores

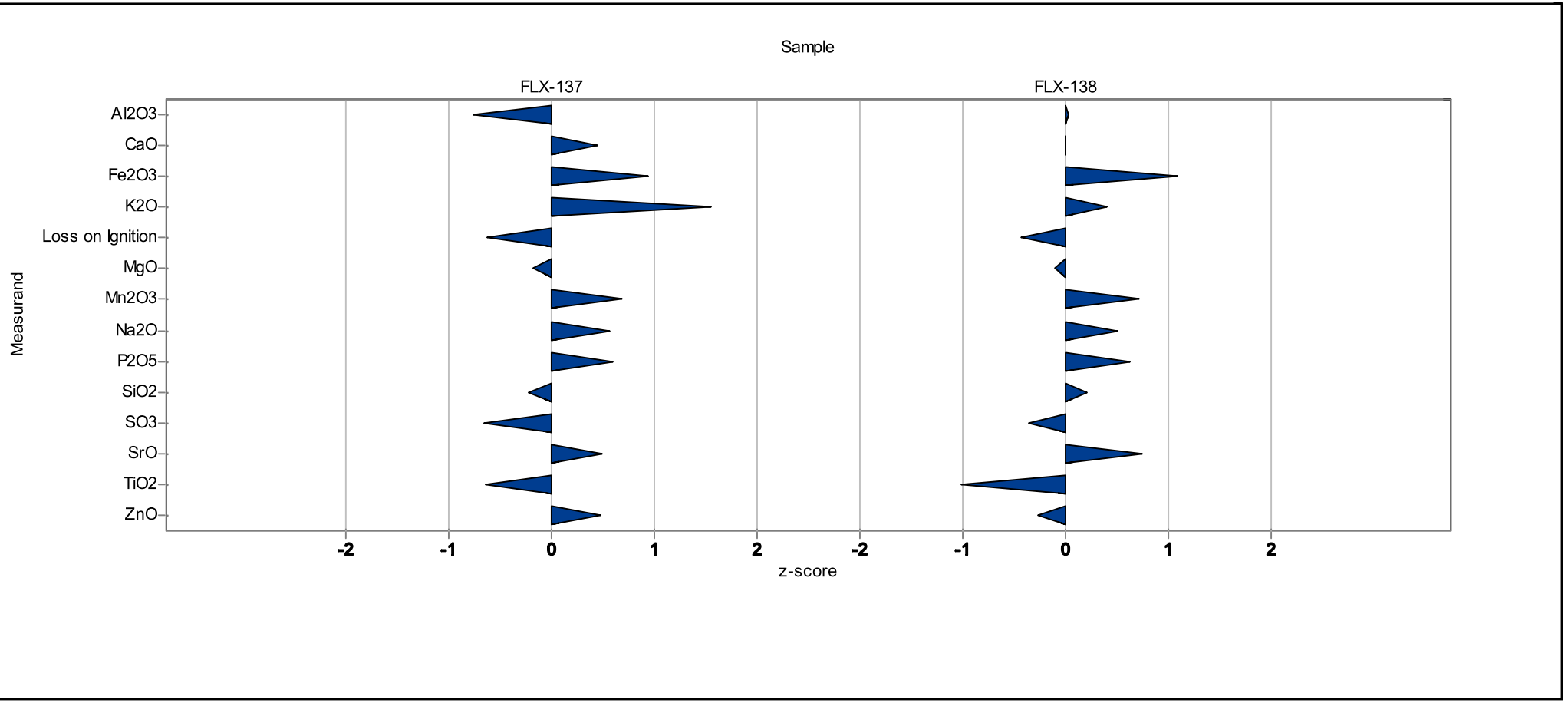
Laboratory: 08



RV-2017_03_Cement

Laboratory chart of z-scores

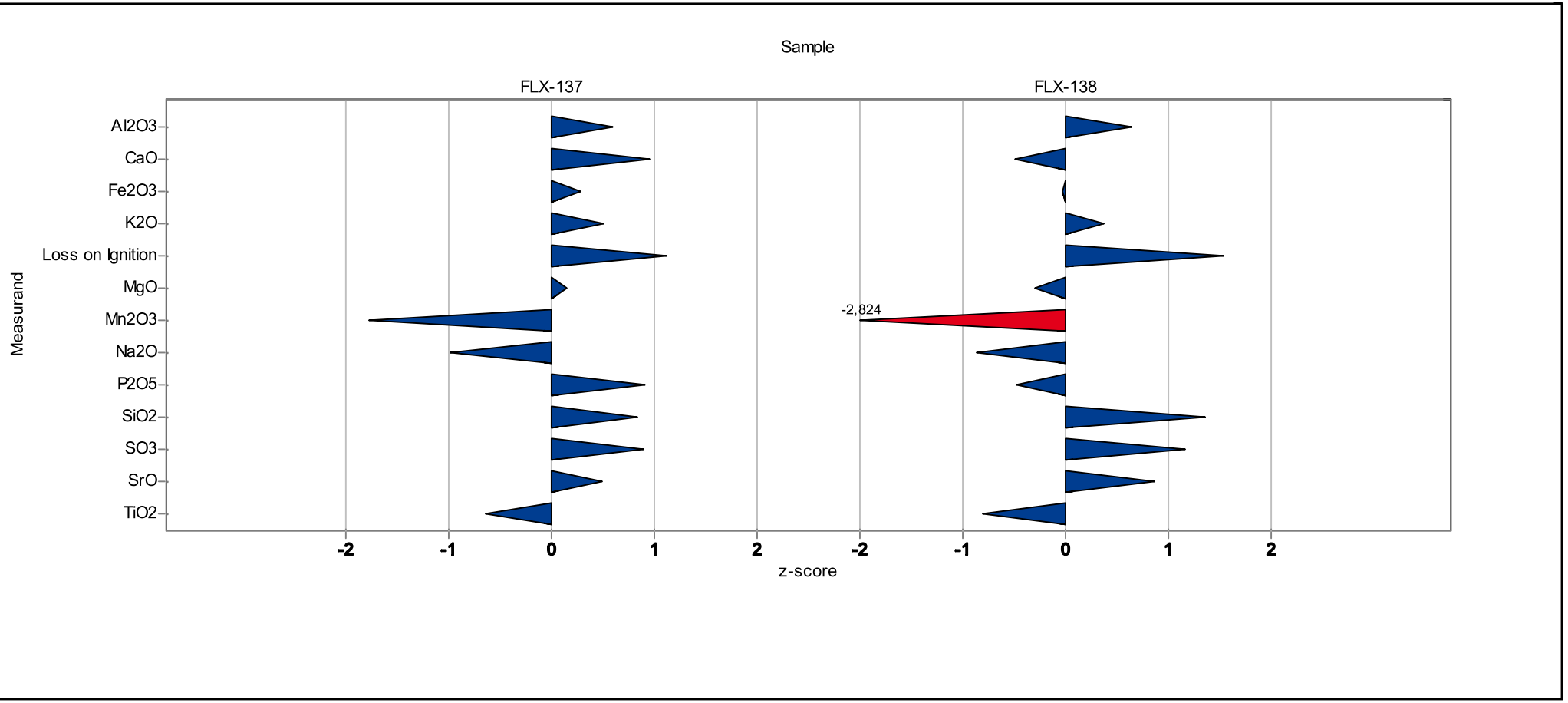
Laboratory: 09



RV-2017_03_Cement

Laboratory chart of z-scores

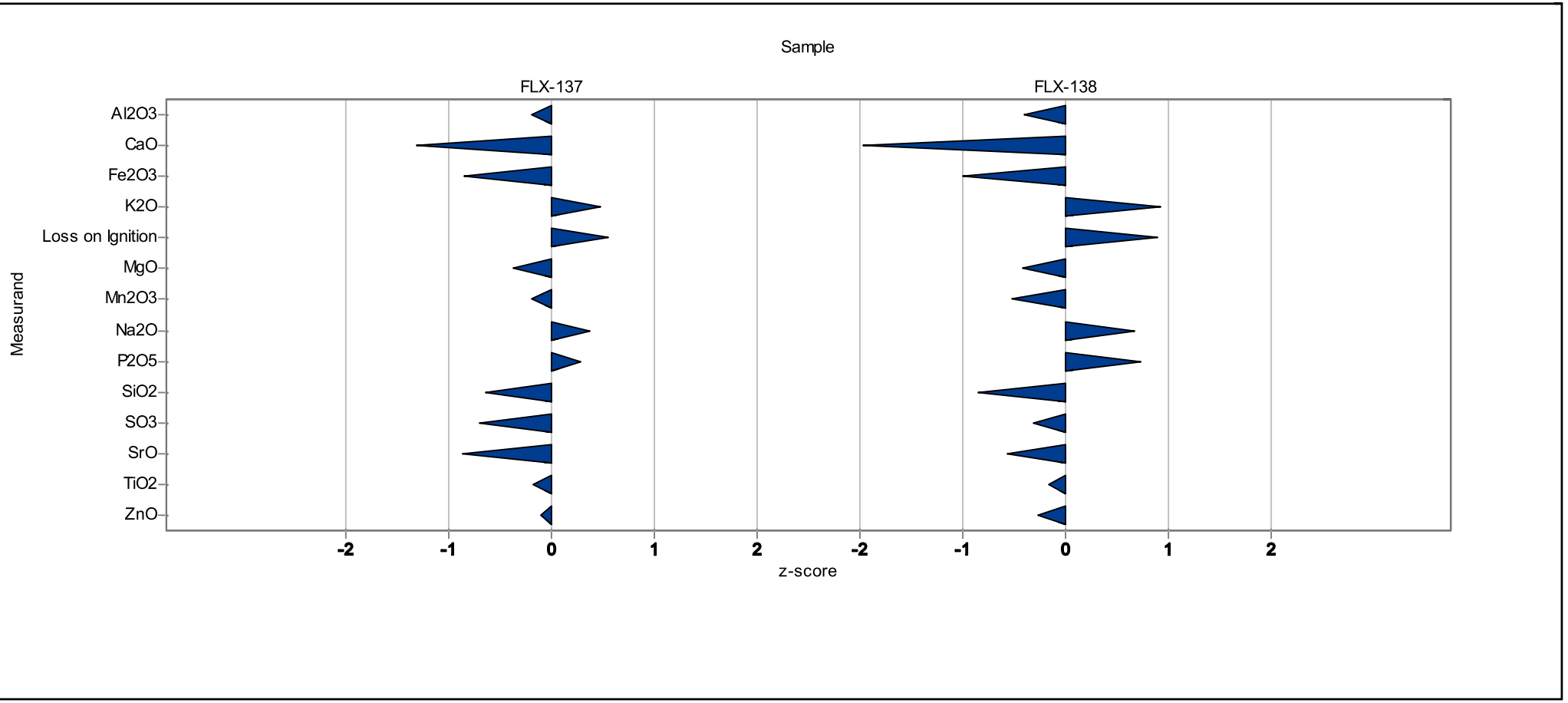
Laboratory: 11



RV-2017_03_Cement

Laboratory chart of z-scores

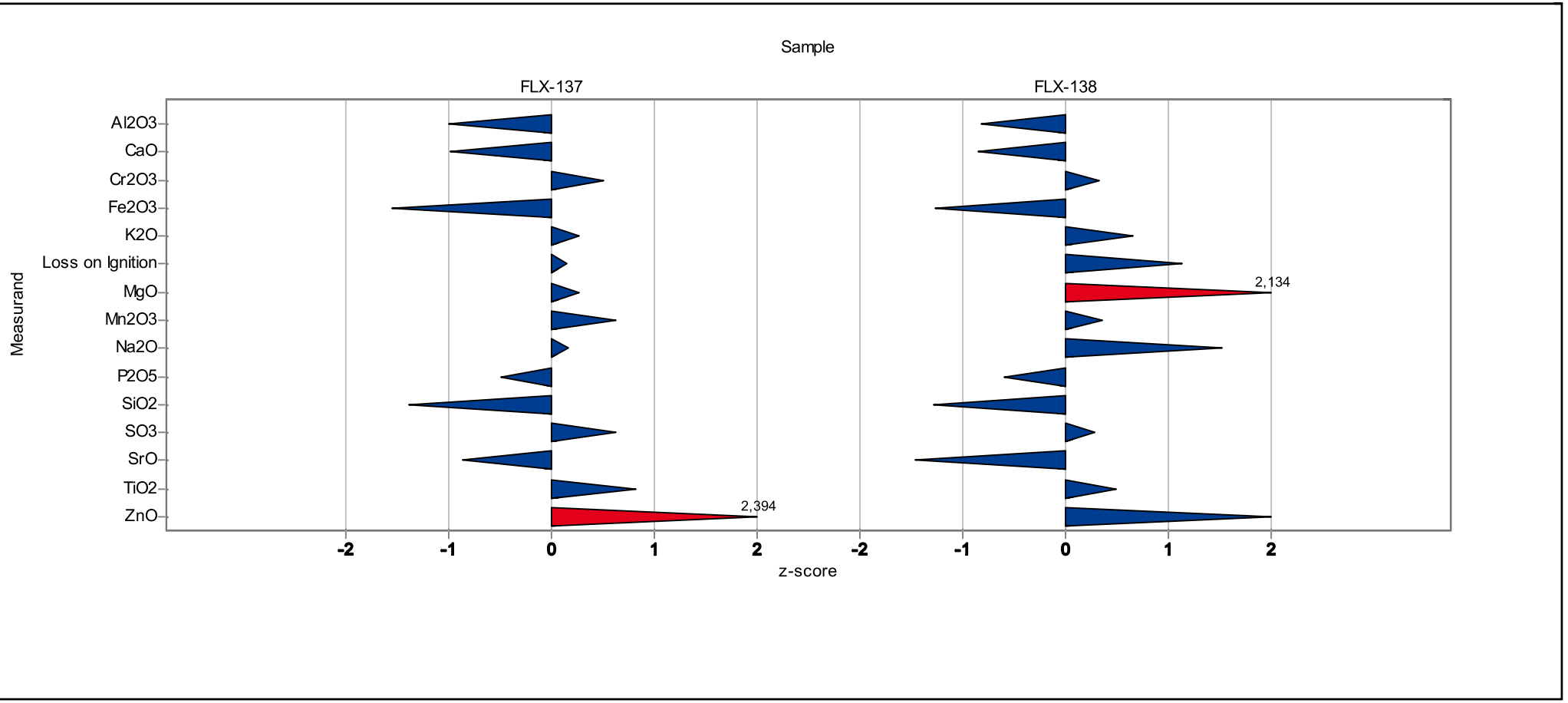
Laboratory: 12



RV-2017_03_Cement

Laboratory chart of z-scores

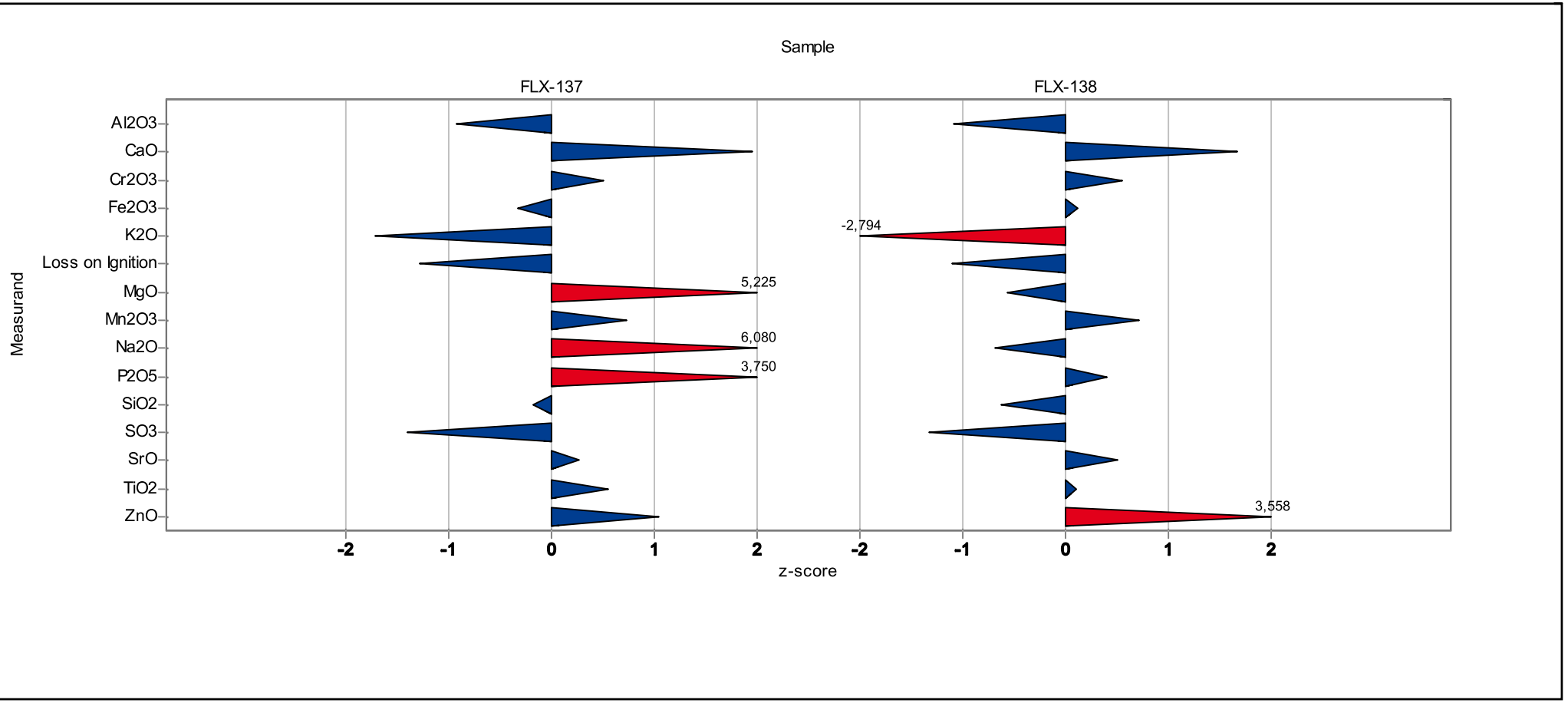
Laboratory: 13



RV-2017_03_Cement

Laboratory chart of z-scores

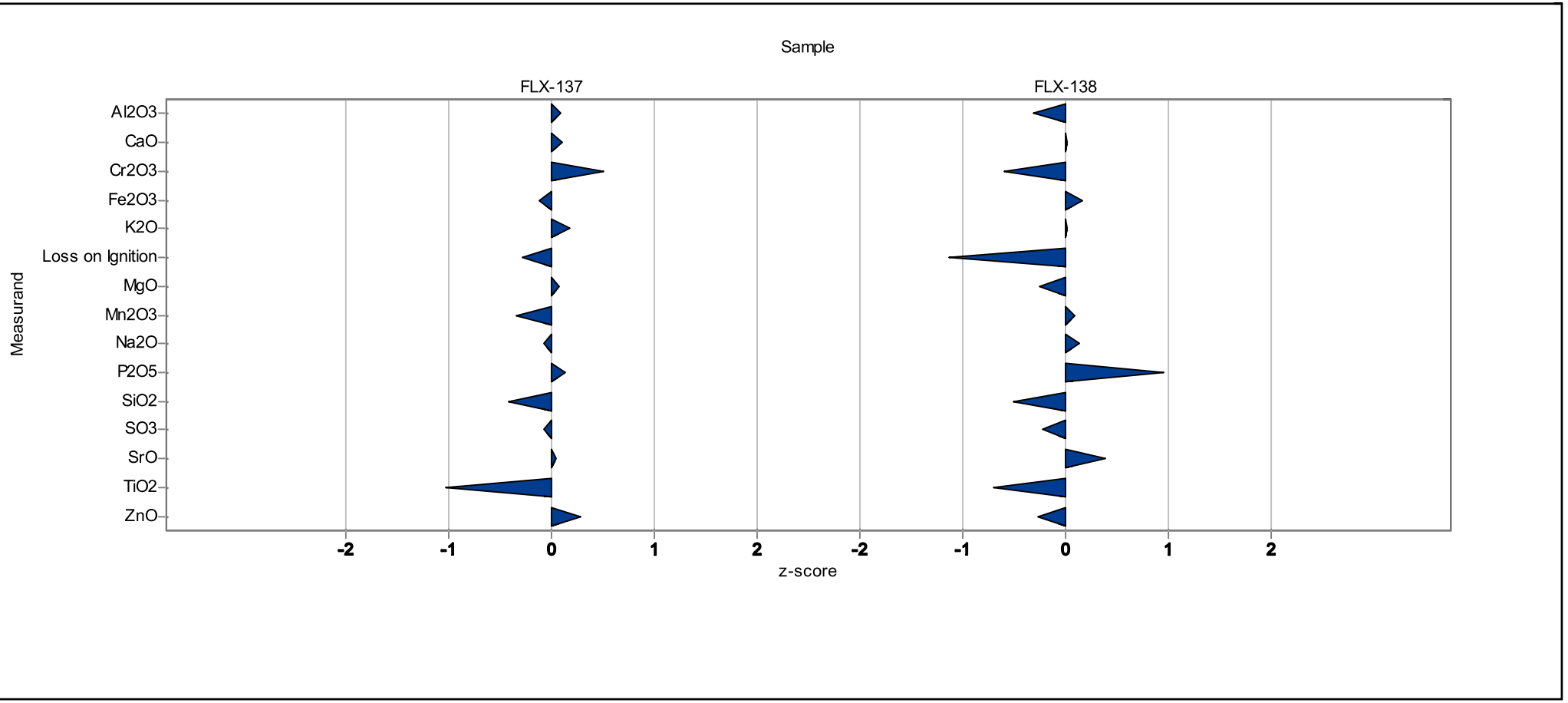
Laboratory: 14



RV-2017_03_Cement

Laboratory chart of z-scores

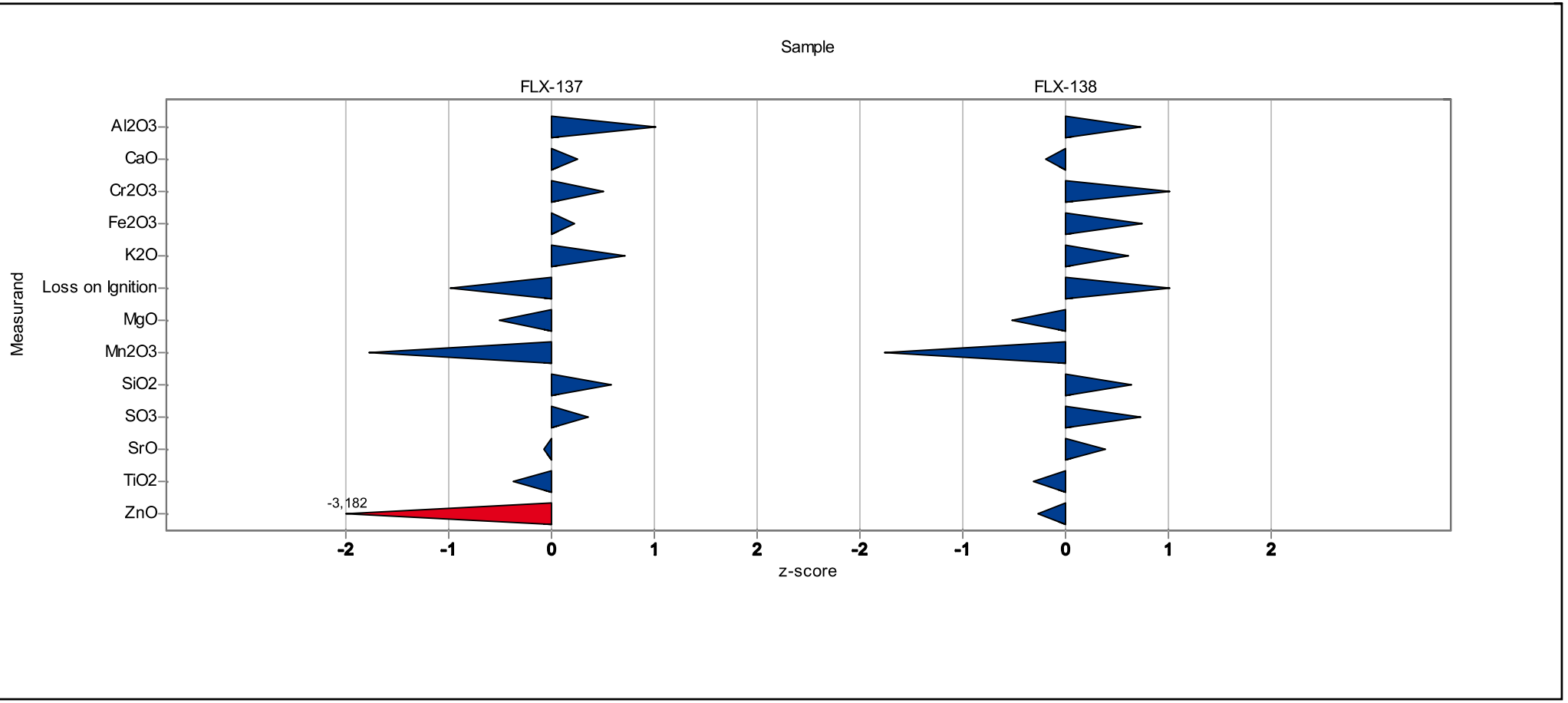
Laboratory: 16



RV-2017_03_Cement

Laboratory chart of z-scores

Laboratory: 17



RV-2017_03_Cement

Laboratory chart of z-scores

Laboratory: 18