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**CRM ACID BASE ACCOUNTING**

certified values		informational values listed in mass %															100 g units		
Number	Total S%	Al	Ba	C	CO <sub>2</sub>	CO <sub>3</sub>	Ca	Fe	K	Mg	Mn	Na	P	S as SO <sub>4</sub>	Si	Ti	LOI	LOM	Total
CAN NBM-1	0.28	7.86	0.117	0.79	.	0.50	2.30	4.09	2.36	1.39	0.046	2.70	0.10	0.02	28.47	0.335	3.45	0.32	98.38
CAN KZK-1	0.80	7.37	0.27	0.95	3.37	4.22	1.80	3.30	3.55	0.95	0.07	1.18	0.08	0.01	29.38	0.35	.	.	.

values listed in kgCaCO<sub>3</sub>/t

Number	Paste PH	Acid Producing Potential		Neutralization Potential		Fizz Rating	
		Sobek	Modified Sobek	Sobek	Moderate	Modified Sobek	Moderate
CAN NBM-1	8.45	8.73	8.46	(49.6)	(70.9)	(46.6)	(52.3)
CAN KZK-1	(8.8)	24.9	(24.6)	59.0	64.8	58.9	(61.6)

**CRM AIR PARTICULATE ON FILTER MEDIA**

SRM 278e is supplied as 2 loaded + 2 blank filters, analysis in ng, good for nondestructive analysis

Number	Al	As	Ba	Ca	Ce	Co	Cr	Cu	Fe	K	Mg	Mn	Na	Ni	Pb
SRM 2783 blank	(30)	.	(0.4)	.	.	(0.04)	(70)	.	.	.	.	.	(15)	(8)	(0.4)
SRM 2783 loaded	23210	11.8	335	13200	(23.4)	7.7	135	404	26500	5280	8620	320	1860	68	317

Number	Rb	S	Sb	Sc	Si	Sm	Th	Ti	U	V	W	Zn
SRM 2783 blank	.	(100)	.	.	.	.	.	.	.	.	.	(50)
SRM 2783 loaded	(24.0)	(1050)	71.8	(3.54)	(58600)	(2.04)	(3.23)	1490	(1.234)	48.5	(5.0)	1790

**CRM ATTRITION INDEX**

Number	Attrition Index (AI units)	Standard Deviation	Uncertainty @ 95% CL	Units
ASCRM 025	18.8	± 1.3	± 2.6	750 g

**RM CALCIUM ALUMINATE**

typical analysis 100 g

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	MoO <sub>3</sub>	S	SiO <sub>2</sub>	SrO	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>
DH X0101	72.2	26.74	0.006	0.118	.	0.191	0.008	.	0.011	0.17	.	.	<0.005
DH X0103	68.8	23.38	0.028	0.289	0.296	3.53	0.024	0.014	.	0.450	0.009	0.067	2.36
DH X0102	64.30	18.34	0.054	0.708	.	12.54	0.114	.	0.020	2.02	0.024	0.165	1.48

**CRM CALCIUM CARBONATE**

certified analysis in mass % and mg/kg

analysis in mg/kg

100 g

Number	CaCO <sub>3</sub>	Ba	Cr	Cu	Fe	Mg	Mn	Na	Sr	Zn	Al	B	Cd	Co	Ga	K	La	Ni	Pb	Si	Sn	Ti	Zr
BAM RS 3	99.79	45.3	<1	<1	<5	183	3.0	47.5	173	<2	<5	<1	<0.5	<1	<1.5	<20	<0.5	<3	<0.1	<20	<1	<0.5	<0.2

**CRM CASTING POWDER**

analysis listed in mass %

30 g

Number	Al <sub>2</sub> O <sub>3</sub>	BaO	C	CaO	CO <sub>2</sub>	Cr <sub>2</sub> O <sub>3</sub>	F	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO <sub>2</sub>	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	ZnO	ZrO <sub>2</sub>
FLX CRM127	7.82	0.301	(0.12)	34.85	(0.4)	0.021	8.7	0.57	0.09	2.59	0.032	10.45	0.037	37.27	0.241	0.079	0.016
FLX CRM124	7.36	0.287	(7.10)	32.83	(10.4)	0.009	5.2	1.73	0.36	0.90	3.845	5.84	0.111	28.26	0.337	0.010	0.020
FLX CRM125	7.12	0.207	(9.14)	32.07	(12.0)	0.011	4.6	0.77	0.21	0.95	0.259	3.90	0.065	33.29	0.216	(0.005)	0.018
FLX CRM126	5.49	0.061	(15.83)	23.72	(6.5)	0.008	4.5	(1.19)	0.36	2.47	0.082	7.84	0.066	33.45	0.330	(0.007)	0.020
FLX CRM123	4.63	0.265	(6.30)	29.82	(7.4)	0.018	6.6	1.69	0.41	2.75	0.041	7.84	0.095	35.56	0.202	0.010	0.021

**RM PORTLAND CEMENT WITH EXTENSIVE ANALYSIS** analysis listed in mass %

Number	Al <sub>2</sub> O <sub>3</sub>	BaO	CaO	T.Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Ni	P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	Sr	TiO <sub>2</sub>	Zr				
IAG OPC-1	4.55	0.0512	62.9	3.19	0.344	2.58	0.404	(0.00870)	(0.044)	21.85	0.01182	0.318	0.00812				
continued analysis listed in mg/kg ~35 g units																	
Number	As	Be	Ce	Co	Cs	Cu	Dy	Er	Eu	Ga	Gd	Hf	Ho	La	Li	Lu	
IAG OPC-1	(4.6)	(0.82)	48.9	21.4	1.00	(23.7)	2.87	1.52	1.00	7	3.75	2.12	0.55	25.9	(13.1)	0.20	
Number	Nb	Nd	Pb	Pr	Rb	Sb	Sm	Ta	Tb	Th	Tm	U	V	W	Y	Yb	Zn
IAG OPC-1	4.9	24.7	(7.2)	6.2	14.7	0.26	4.5	(0.35)	0.52	3.93	0.21	0.83	(64.0)	(0.7)	15.5	1.34	27.8

**CEMENT chart 1 of 2** # = class, where 1 = CRM and 2 = RM analysis listed in mass %

#	Number	CaO	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	SrO	TiO <sub>2</sub>	LOI	Units
1	BCS 354	70.0	21.8	4.84	0.30	0.11	0.42	0.10	0.12	2.25	0.11	(0.04)	.	100 g
2	FLX 138	68.6	19.0	4.39	1.78	0.77	1.09	0.15	0.114	3.44	0.189	0.220	.	30 g
1	FLX CRM110	68.13	22.01	4.70	0.18	0.94	0.65	0.05	0.037	2.88	0.041	0.170	(3.46)	30 g
<del>1</del>	<del>SRM 1886a</del>	<del>67.87</del>	<del>22.38</del>	<del>3.875</del>	<del>0.152</del>	<del>0.093</del>	<del>1.932</del>	<del>0.021</del>	<del>0.022</del>	<del>2.086</del>	<del>(0.016)</del>	<del>0.084</del>	<del>(1.56)</del>	<del>4 x 5 g</del>
1	FLX CRM107	67.19	21.81	4.23	1.29	0.70	0.70	0.18	0.160	3.13	0.151	0.194	(6.59)	30 g
1	FLX CRM109	66.45	20.39	4.25	2.32	1.06	1.59	0.18	0.052	3.11	0.144	0.203	(5.96)	30 g
2	JCA RM 611	66.25	21.84	5.41	3.20	0.34	1.08	0.40	0.59	0.25	0.28	0.30	(0.51)	30 g
1	SRM 1886b	66.05	22.08	3.903	0.297	0.0164	1.526	0.01682	0.0413	2.757	0.0886	0.2054	(2.174)	5 x 5 g
1	FLX CRM106	66.05	20.29	5.70	1.98	0.86	0.96	0.12	0.111	3.01	0.206	0.271	(2.06)	30 g
1	NCS DC62103h	65.78	22.07	4.56	3.22	0.69	2.11	0.16	.	0.32	.	0.37	0.60	20 g
2	TL 1Ca	65.77	20.23	5.24	2.00	0.28	1.13	0.19	0.57	3.06	0.05	0.20	(1.39)	40 g
1	NCS DC62117	65.71	20.49	4.61	0.26	0.05	0.14	0.05	.	1.9	.	0.12	6.43	20 g
1	JCA CRM-3	65.55	20.63	5.42	3.32	0.42	1.40	0.27	0.33	2.05	0.05	0.33	(2.24)	60 g
1	FLX CRM105	65.24	20.84	4.27	2.50	1.24	1.57	0.21	0.053	3.37	0.146	0.179	(2.61)	30 g
1	FLX CRM108	65.15	20.06	4.66	2.97	0.74	2.15	0.09	0.169	3.31	0.083	0.186	(2.68)	30 g
1	SRM 634a	65.07	20.493	5.015	3.362	0.3572	1.0057	0.0842	0.1767	2.780	(0.0735)	0.2463	(1.66)	100 g
1	BCS 353	64.8	20.5	3.77	4.82	0.49	2.42	0.10	0.077	2.25	0.23	0.16	.	100 g
2	FLX 137	64.77	20.78	4.99	3.07	0.769	1.64	.	0.171	3.17	0.076	0.221	.	30 g
1	FLX CRM100	64.51	20.89	5.54	2.62	0.82	1.47	0.23	0.166	2.97	0.286	0.283	2.37	50 g
<del>1</del>	<del>SRM 1880b</del>	<del>64.16</del>	<del>20.42</del>	<del>5.183</del>	<del>3.681</del>	<del>0.646</del>	<del>1.176</del>	<del>0.0914</del>	<del>0.2443</del>	<del>2.710</del>	<del>(0.0272)</del>	<del>0.236</del>	<del>(1.666)</del>	<del>4 x 5 g</del>
2	JCA 211T	64.15	20.47	5.59	3.08	0.38	0.76	0.17	0.15	1.97	.	0.30	2.66	40 g
1	SRM 633a	64.129	22.38	2.911	3.738	0.391	1.1532	0.203	0.14263	2.178	(0.0507)	0.2157	(2.460)	4 x 5 g
1	FLX CRM113	63.63	20.98	5.06	2.75	0.619	2.49	(0.092)	0.135	2.47	0.064	0.231	(1.53)	30 g
1	SRM 1888b	63.13	20.42	4.277	3.062	0.658	3.562	0.1364	0.07307	2.634	0.1099	0.2316	(various)	4 x 5 g
2	JCA RM 613	63.00	19.51	5.36	2.78	1.20	1.07	0.23	0.15	6.07	0.15	0.35	(3.45)	30 g
2	CCRL 173	62.45	20.01	4.49	2.62	0.447	3.03	0.309	0.192	4.10	.	0.27	2.02	30 g
2	CCRL 174	62.43	20.75	3.71	3.62	0.430	4.83	0.189	0.067	2.64	.	0.21	1.14	30 g
1	FLX 1002	62.23	22.48	6.02	2.01	0.795	1.62	0.150	0.138	3.86	.	0.360	.	30 g
1	NCS DC62101c	62.23	20.41	4.68	3.20	0.71	2.66	0.12	.	3.16	.	0.27	2.18	20 g
1	SRM 1885b	61.87	20.05	4.70	3.044	0.497	3.86	0.293	0.0737	2.832	0.0795	0.2361	(2.310)	5 x 5 g

Number	CO <sub>2</sub>	Free CaO	Cl	Cr <sub>2</sub> O <sub>3</sub>	F	Mn	MnO	Mn <sub>2</sub> O <sub>3</sub>	S	ZnO	Ins. Res.
BCS 354	.	.	.	.	.	.	.	0.058	.	.	.
FLX 138	.	.	.	.	.	.	.	0.095	.	0.017	.
FLX CRM110	.	.	(0.008)	0.004	.	.	0.029	.	.	0.003	.
<del>SRM 1886a</del>	<del>.</del>	<del>.</del>	<del>(0.0042)</del>	<del>0.0024</del>	<del>(0.02)</del>	<del>.</del>	<del>.</del>	<del>0.0073</del>	<del>.</del>	<del>(0.001)</del>	<del>(0.23)</del>
FLX CRM107	.	.	0.043	0.006	.	.	0.040	.	.	0.013	.
FLX CRM109	.	.	0.049	0.008	.	.	0.051	.	.	0.042	.
JCA RM 611	.	.	.	.	.	.	0.06	.	.	.	.
SRM 1886b	.	(0.24)	0.00399	0.00404	(0.0118)	.	.	0.02639	.	(0.00058)	(0.13)
FLX CRM106	.	.	0.055	0.008	.	.	0.161	.	.	0.012	.
NCS DC62103h	.	.	.	.	.	.	.	.	.	.	0.12
TL 1Ca	.	(0.83)	.	.	.	.	.	.	.	.	(0.21)
NCS DC62117	.	.	.	.	.	.	.	.	.	.	.
JCA CRM-3	.	.	.	.	.	.	0.06	.	.	.	.
FLX CRM105	.	.	0.049	0.008	.	.	0.040	.	.	0.054	.
FLX CRM108	.	.	0.042	0.007	.	.	0.219	.	.	0.036	.
SRM 634a	.	(1.86)	.	(0.0114)	.	.	.	(0.0229)	.	(0.0222)	(0.21)
BCS 353	.	.	.	.	.	.	.	0.23	.	.	.
FLX 137	.	.	.	.	.	.	.	0.266	.	0.029	.
FLX CRM100	.	.	(0.09)	0.009	.	.	.	0.066	.	0.051	last
<del>SRM 1880b</del>	<del>.</del>	<del>(2.227)</del>	<del>0.01830</del>	<del>0.01927</del>	<del>(0.0539)</del>	<del>.</del>	<del>.</del>	<del>0.1981</del>	<del>(0.0131)</del>	<del>(0.01054)</del>	<del>(0.487)</del>
JCA 211T	.	.	0.015	.	.	.	0.06	.	.	.	0.16
SRM 633a	.	(1.60)	0.0087	(0.0124)	(0.038)	BaO: (0.256)	0.1176	(0.049)	0.123	(0.23)	Hg: 0.02470 mg/kg
FLX CRM113	.	.	(0.007)	(0.007)	.	.	0.233	(0.137)	0.030	.	SO <sub>4</sub> as SO <sub>3</sub> : 2.40
SRM 1888b	.	(1.42)	0.0143	(0.01021)	(0.048)	.	0.0652	(0.15)	(0.01253)	(0.32)	.
JCA RM 613	.	.	.	.	.	0.08	.	.	.	.	.
CCRL 173	0.6	1.65	0.023	0.009	.	.	.	0.060	.	0.024	0.36 last, expires 12/31/2014
CCRL 174	.	1.04	0.005	0.006	.	.	.	0.073	.	0.014	0.26 last, expires 12/31/2014
FLX 1002	.	.	.	.	.	.	.	0.123	.	.	.
NCS DC62101c	.	.	.	.	.	.	.	.	.	.	1.20
SRM 1885b	.	(0.27)	(0.0021)	0.02709	(0.0524)	.	.	0.1282	(0.042)	0.0354	(0.36) BaO: 0.0149

## CEMENT chart 2 of 2

# = class, where 1 = CRM and 2 = RM

analysis listed in mass %

#	Number	CaO	Ca	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	SrO	TiO <sub>2</sub>	LOI	Units
1	SRM 1884b	61.31	.	19.30	4.851	2.937	0.957	4.74	0.278	0.0965	4.034	0.0258	0.2651	(various)	4 x 4.5 g
1	SRM 1887b	61.15	.	19.59	4.911	2.471	0.961	3.624	0.288	0.1540	4.599	0.2625	0.2034	2.121	5 x 4 g
1	NCS DC62118	60.99	.	21.73	4.75	4.12	0.43	4.37	0.12	.	2.27	.	0.23	0.81	20 g
1	SRM 1889b	60.11	.	18.39	5.79	2.891	1.115	2.82	0.36	0.297	4.3721	0.284	0.260	(3.117)	5 x 5 g
1	FLX 1003	59.70	.	23.76	6.92	1.85	0.885	2.23	0.158	0.104	3.75	.	0.434	(7.80)	30 g
1	FLX CRM122	59.00	.	21.94	5.60	1.67	0.900	2.02	0.204	0.066	(3.27)	0.131	0.353	(4.86)	30 g
1	NCS DC62102g	57.10	.	21.15	6.01	3.92	0.72	3.67	0.19	.	2.29	.	0.46	3.93	20 g
2	TL 203Ca	57.09	.	18.75	4.78	2.34	0.93	4.80	0.21	(0.13)	3.28	(0.06)	0.24	(7.24)	40 g
1	FLX 1001	56.91	.	24.70	8.06	3.09	1.42	1.42	0.291	0.249	2.97	0.171	0.388	.	30 g
1	FLX CRM130	56.60	.	14.35	11.62	2.88	0.682	1.84	0.277	0.067	10.91	0.052	0.563	(5.12)	30 g
1	JCA CRM-2	56.33	.	25.66	8.94	2.08	0.31	3.05	0.24	0.07	(2.59)	0.07	0.50	(0.47)	60 g
1	FLX CRM118	55.47	.	21.57	6.94	3.88	0.983	2.08	0.181	0.163	(2.97)	0.087	0.301	(5.02)	30 g
1	FLX CRM103	54.90	.	26.95	7.75	1.78	0.77	4.44	0.33	0.09	2.73	0.070	0.372	.	50 g
1	TL 201C	54.48	.	25.63	6.81	2.08	0.73	3.35	0.32	.	3.16	.	.	1.96	40 g
1	FLX CRM117	54.22	.	28.05	7.68	1.37	0.916	2.95	0.223	(0.035)	(3.49)	0.098	0.564	(0.402)	30 g
1	FLX CRM115	53.93	.	27.29	8.13	0.972	0.612	2.93	0.194	0.073	(3.90)	0.117	0.610	(1.56)	30 g
1	FLX CRM119	53.78	.	24.04	7.36	3.04	1.23	1.34	0.292	0.153	(2.43)	0.158	0.347	(6.42)	30 g
1	FLX CRM120	53.63	.	26.51	7.64	1.11	0.692	3.55	0.184	0.086	(4.35)	0.124	0.598	(1.71)	30 g
1	FLX CRM114	51.29	.	28.61	6.94	1.37	0.954	4.93	0.277	0.027	(4.07)	0.108	0.525	(1.28)	30 g
1	FLX CRM116	50.05	.	30.81	9.11	0.86	0.693	4.47	0.201	0.034	(3.14)	0.091	0.690	(-0.394)	30 g
1	TL 200Ca	49.97	.	26.55	8.72	4.07	1.10	2.06	0.21	0.45	2.84	0.13	0.46	(3.30)	40 g
1	SRM 1881b	49.27	.	29.045	8.812	3.365	0.721	2.741	0.790	0.0510	2.72	0.0836	0.3011	(1.699)	4 x 5 g
1	FLX CRM101	48.43	.	30.29	8.86	3.54	2.10	1.72	0.657	0.189	3.12	0.248	0.463	(5.13)	50 g
2	DH X0210	46.72	33.39	30.30	9.99	1.66	0.541	4.96	0.236	0.066	.	0.077	0.421	.	100 g
1	TL 202C	45.12	.	29.61	10.14	3.27	1.05	4.46	0.32	.	3.17	.	.	1.51	40 g
1	NCS DC62116a	44.73	.	27.12	10.99	3.43	1.10	2.82	0.23	.	2.49	.	0.57	6.00	20 g
1	FLX CRM121	44.45	.	30.81	8.78	3.04	2.73	1.41	1.23	0.112	2.55	0.140	0.344	(4.24)	30 g
1	FLX CRM131	42.89	.	8.73	23.10	3.24	0.287	1.62	0.466	0.060	18.19	0.067	1.15	(2.03)	30 g
1	NCS DC62105g	42.40	.	13.76	3.12	2.13	0.50	2.11	0.14	.	0.21	.	0.18	34.94	20 g
1	NCS DC62104b	39.65	.	12.77	3.66	2.02	0.93	1.20	0.18	.	0.72	.	0.18	38.32	20 g
1	SRM 1882a	39.29	.	4.01	39.14	14.67	0.051	0.51	0.021	(0.070)	.	(0.024)	1.786	(0.20)	4 x 5 g
1	SRM 1883a	29.52	.	0.24	70.04	0.078	0.014	0.19	0.30	(0.003)	.	(0.019)	0.020	(0.59)	4 x 5 g
2	DH X0209	.	48.78	21.95	4.63	0.204	1.01	0.717	0.078	0.043	.	0.051	0.095	.	100 g
2	DH X0212	.	46.48	21.16	4.41	3.94	0.495	0.945	0.084	0.191	.	0.086	0.242	.	100 g
2	DH X0211	.	40.63	25.04	6.86	2.98	0.524	2.79	0.156	0.137	.	0.083	0.319	.	100 g

Number	BaO	Free CaO	Cl	Cr <sub>2</sub> O <sub>3</sub>	F	Mn	Mn <sub>2</sub> O <sub>3</sub>	S	Unignited SO <sub>3</sub>	V <sub>2</sub> O <sub>5</sub>	ZnO	Ins. Res.
SRM 1884b	.	(0.418)	(0.0065)	0.00791	(0.0394)	.	0.0750	.	.	.	.	(0.159)
SRM 1887b	(0.022)	0.21	0.01001	0.01551	0.101	.	0.0957	0.025	.	.	0.01560	0.26
NCS DC62118	.	.	.	.	.	.	.	.	.	.	.	1.18
SRM 1889b	.	(0.52)	0.0101	0.0083	(0.10)	.	0.084	.	.	.	0.0770	(0.30)
FLX 1003	C: (0.08)	.	.	.	.	.	0.174	.	.	.	0.012	.
FLX CRM122	.	.	.	(0.004)	.	.	0.111	(0.288)	SO <sub>4</sub> as SO <sub>3</sub> : 2.62	.	0.027	.
NCS DC62102g	.	.	.	.	.	.	.	.	.	.	.	.
TL 203Ca	.	(1.23)	.	.	.	.	.	.	.	.	.	(0.58)
FLX 1001	0.046	.	.	0.011	.	.	0.037	.	.	0.015	0.044	.
FLX CRM130	.	.	.	0.021	.	.	0.062	.	SO <sub>4</sub> as SO <sub>3</sub> : (10.18)	.	0.018	.
JCA CRM-2	.	.	.	.	.	0.15	.	(0.32)	(1.91)	.	.	.
FLX CRM118	.	.	.	0.009	.	.	0.176	(0.131)	SO <sub>4</sub> as SO <sub>3</sub> : 2.89	.	0.053	.
FLX CRM103	.	.	.	0.007	.	.	0.170	.	.	.	0.014	.
TL 201C	.	.	0.06 Cl-	.	.	.	.	0.31 S2-	.	.	.	.
FLX CRM117	.	.	.	(0.004)	.	.	0.193	(0.602)	SO <sub>4</sub> as SO <sub>3</sub> : 1.80	.	0.024	.
FLX CRM115	.	.	.	(0.004)	.	.	0.214	(0.611)	SO <sub>4</sub> as SO <sub>3</sub> : 2.41	.	0.008	.
FLX CRM119	.	.	.	0.008	.	.	0.040	(0.029)	SO <sub>4</sub> as SO <sub>3</sub> : 2.38	.	0.040	.
FLX CRM120	.	.	.	(0.005)	.	.	0.188	(0.632)	SO <sub>4</sub> as SO <sub>3</sub> : 3.18	.	0.008	.
FLX CRM114	.	.	.	(0.005)	.	.	0.154	(0.676)	SO <sub>4</sub> as SO <sub>3</sub> : 2.50	.	0.022	.
FLX CRM116	.	.	.	(0.005)	.	.	0.238	(0.737)	SO <sub>4</sub> as SO <sub>3</sub> : 1.22	.	0.015	.
TL 200Ca	.	(0.34)	.	.	.	.	.	.	.	.	.	(17.42)
SRM 1881b	0.191	(1.16)	0.0081	0.00949	(0.09)	.	0.1175	.	.	.	0.1198	(16.4)
FLX CRM101	.	.	.	0.011	.	.	0.116	.	.	.	0.046	.
DH X0210	0.071	.	.	.	.	.	0.327	1.77	.	0.011	.	last
TL 202C	.	.	0.01 Cl-	.	.	.	.	0.20 S2-	.	.	.	.
NCS DC62116a	.	.	.	.	.	.	.	.	.	.	.	.
FLX CRM121	.	.	.	0.008	.	.	0.111	(0.025)	SO <sub>4</sub> as SO <sub>3</sub> : 2.37	.	0.031	.
FLX CRM131	.	.	.	0.038	.	.	0.029	.	SO <sub>4</sub> as SO <sub>3</sub> : (17.85)	.	0.006	.
NCS DC62105g	.	.	.	.	.	.	.	.	.	.	.	.
NCS DC62104b	.	.	.	.	.	.	.	.	.	.	.	.
SRM 1882a	.	.	.	(0.113)	.	.	(0.060)	.	.	.	(0.004)	.
SRM 1883a	.	.	.	(0.006)	.	.	(0.003)	.	.	.	.	.
DH X0209	0.028	.	.	.	.	.	0.025	1.19	.	.	.	.
DH X0212	.	.	.	.	.	.	0.062	1.18	.	.	.	.
DH X0211	0.041	.	.	.	.	.	0.172	1.48	.	0.014	.	.

## RM

## CEMENT SET JCA 601B

available in set/15 only

number 1-14 powder 20 g number 15 powder 30 g

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	SiO <sub>2</sub>	SrO	TiO <sub>2</sub>
JCA 601B 1	5.10	59.07	2.37	1.191	1.31	0.404	0.809	1.479	9.83	17.61	(0.38)	0.282
JCA 601B 2	5.98	65.23	2.90	0.370	1.37	0.097	0.272	0.119	2.34	20.75	(0.06)	0.299
JCA 601B 3	4.45	63.18	2.37	0.696	2.36	0.050	0.373	0.758	5.97	19.11	(0.19)	0.222
JCA 601B 4	5.23	66.63	2.77	0.281	0.87	0.090	0.166	0.198	2.70	20.36	(0.04)	0.333
JCA 601B 5	3.28	64.96	3.37	0.355	1.02	0.058	0.199	0.111	1.79	24.41	(0.03)	0.189
JCA 601B 6	3.87	64.15	4.13	0.413	0.83	0.105	0.223	0.126	2.20	23.18	(0.03)	0.201
JCA 601B 7	2.82	63.36	3.14	0.398	0.80	0.037	0.153	0.096	2.57	26.27	(0.03)	0.164
JCA 601B 8	2.73	63.49	3.05	0.304	0.59	0.104	0.186	0.169	2.48	26.61	(0.02)	0.143
JCA 601B 9	7.94	58.91	2.07	0.320	2.49	0.081	0.328	0.110	.	24.53	(0.05)	0.370
JCA 601B 10	9.47	54.60	1.83	0.342	3.22	0.148	0.239	0.154	.	26.50	(0.05)	0.379
JCA 601B 11	8.89	55.64	1.98	0.337	2.96	0.181	0.311	0.283	.	26.11	(0.06)	0.399
JCA 601B 12	8.75	55.78	2.14	0.319	3.13	0.620	0.189	0.085	.	24.75	(0.04)	1.035
JCA 601B 13	11.03	50.51	1.10	0.291	4.20	0.112	0.348	0.055	.	28.61	(0.05)	0.449

**CRM CHLORINE and FLUORINE in CEMENT**

Number	Description	CaF <sub>2</sub>	F	Cl-	Units
NCS DC62121a	Cement Raw Meal	.	.	0.016	20 g
NCS DC62122a	Cement	.	.	0.009	20 g
NCS DC62125a	Cement	(0.37)	0.18	.	20 g

**CRM PORTLAND CEMENT HEAT OF HYDRATION**

Number	Heat of Solution J/g	7 Days J/g	28 Days J/g	Units
JCA 301S	2,483.5	274.0	325.2	500 g
JCA 301T	2,447.0	261.3	321.0	500 g

**CRM COMPRESSIVE STRENGTH N/mm<sup>2</sup>**

Number	3 Days	7 Days	28 Days	Units
JCA 401J	29.6	44.4	62.1	4.8 kg
JCA 401L	30.2	42.9	59.0	4.8 kg

**CRM CLASSIC CEMENT CHEMISTRIES**

20 g units

Number	P - Pozzolana	S - Slag	D - Limestone	D1 - CO <sub>2</sub>	R5 - Unsolved Slag (EDTA)	Description
NCS DC62119a	9.3	4.5	2.4	(1.50)	.	Ordinary Portland Cement
NCS DC62120	0.5	18.5	7	3.5	97.5	Portland Blast-Furnace Slag Cement

**CRM CEMENT CLINKER PHASE ABUNDANCE**

Number	Alite	Aluminate	Arcanite	Belite	Ferrite	Free Lime	Periclase	Units
SRM 2688	64.95	4.99	.	17.45	12.20	.	.	3 x 10 g
SRM 2686b	64.82	3.76	(0.20)	16.68	10.42	(0.53)	3.31	50 g
SRM 2687a	57.88	9.56	.	24.70	6.27	.	.	5 x 8 g

**CRM PORTLAND CEMENT FINENESS AND BLAINE STANDARD**

Number	Remaining after passing through 80 micron sieve	Blaine	Density g/cm <sup>3</sup>	Units
NCS DC62127f	1.89 %	363.2 m <sup>2</sup> /kg	(3.05)	200 g
TL 201B	.	4,231 cm <sup>2</sup> /g	3.03	40 g
TL 202B	.	4,135 cm <sup>2</sup> /g	2.94	40 g
JCA 102N	.	3,300 cm <sup>2</sup> /g	.	30 g
JCA 102P	.	3,230 cm <sup>2</sup> /g	.	30 g

expired, last of stock  
expries March 2027

**CRM CEMENT FINENESS**

certified analysis

informational analysis listed in mass %

20 x 5 g units

Number	Surface Area Blaine	45 µm Sieve Residue	C <sub>2</sub> S	C <sub>3</sub> S	C <sub>3</sub> A	C <sub>4</sub> AF	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	LOI
SRM 114r	3932 cm <sup>2</sup> /g	5.97 %	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
TL 2BGa	3727 cm <sup>2</sup> /g	3.14 %	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SRM 46h	.	7.43 %	15	59	8	8	4.9	63.9	2.8	0.68	1.9	0.19	0.21	2.9	20.6	0.30	1.5

**CRM CEMENT FINENESS**

Number	Density g/cm <sup>3</sup>	Blaine cm <sup>2</sup> /g	Units
TL 2BGa	3.15	4,206	40 g powder, particle size analysis detailed on certificates
TL 203BGa	3.05	4,329	40 g powder, particle size analysis detailed on certificates

last

**RM CEMENT FINENESS - SIEVING METHOD**

Number	45 µm	32 µm	20 µm	16 µm	10 µm	units	percent remaining, ordinary portland cement
JCA 701B	10.4	22.8	43.0	52.4	70.1	30 g	last of stock
JCA 701C	10.2	22.1	42.6	51.8	69.9	30 g	

**CRM CEMENT COMPONENT MATERIAL**

analysis listed in mass %

NCS DC61106: 50g

others: 20 g units

Number	Material	CaO	T.CaCO <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	F	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	S	SO <sub>3</sub>	TiO <sub>2</sub>	LOI
NCS DC62110a	Portland Blast Furnace Slag	55.21	.	7.24	24.78	.	3.00	0.71	2.64	0.18	.	2.47	0.51	2.70
NCS DC62109a	Portland Pozzolanitic	48.62	.	10.82	27.12	.	3.39	0.83	2.93	0.23	.	1.90	0.56	2.82
NCS DC62111a	Portland Fly Ash	47.25	.	11.25	28.07	.	3.36	0.92	2.71	0.27	.	1.88	0.58	3.26
NCS DC62123	Sulphoaluminate Cement Clinker	43.4	.	32.6	8.56	.	2.21	0.22	1.37	0.09	.	9.55	1.51	0.41
NCS DC62126b	Cement Black Raw Meal	39.28	.	.	.	.	2.07	.	.	.	.	.	.	38.51
NCS DC62112	Aluminate	34.56	.	51.15	7.95	.	1.91	0.13	0.63	0.04	0.1	.	.	2.03
NCS DC62113a	Blast Furnace Slag	33.72	.	15.89	34.42	.	2.13	0.56	9.39	0.46	0.79	(0.23)	1.87	0.52
NCS DC62124	Sulphoaluminate Cement Raw Meal	33.05	.	22.29	5.09	.	1.34	0.14	1.21	0.06	.	7.07	1.07	28.21
NCS DC62115a	Fly Ash for Cement	4.13	.	33.07	51.38	.	4.58	0.86	1.02	0.33	.	0.24	1.14	2.80
NCS DC62114a	Pozzolana for Cement	2.15	.	20.66	56.86	.	3.52	1.95	0.86	0.83	.	0.50	0.78	11.53
NCS DC61106	Albite Cement	0.48	.	19.62	67.96	.	0.10	0.098	0.015	11.26	.	.	0.054	0.36

**CRM MAGNETIC CENOSPHERE FROM COAL POWER PLANTS**

analysis listed in mass %      fine powder concentrate, 100 g units

Number	Al <sub>2</sub> O <sub>3</sub>	Ba	CaO	CO <sub>2</sub>	F%	FeO	T.Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	S	SiO <sub>2</sub>	Sr	TiO <sub>2</sub>	Zr	LOI
VS 9234-2008	25.9	0.084	1.19	(0.43)	.	1.67	2.85	2.9	0.86	0.039	0.48	0.076	.	63.7	0.0217	0.74	0.026	(0.92)
VS 9235-2008	19.3	0.089	2.77	0.51	(0.2)	(2.4)	4.04	3.5	1.64	0.049	1.33	0.19	(0.07)	64.1	0.0480	0.78	0.0246	(1.6)
VS 9236-2008	2.6	0.38	8.2	(0.64)	.	(15.4)	(78.4)	0.12	(1.3)	(0.082)	0.27	(0.036)	0.86	7.7	0.17	0.21	0.0039	(0.42)

continued      analysis listed in mg/kg except

Number	Ag	As	Be	Ce	Co	Cr	Cs	Cu	Dy	Er	Eu	Ga	Gd	Ge	Hf	Ho	La	Li	Lu	Mo	Nb
VS 9234-2008	.	.	4.6	115	7.6	59	12	33	(6)	(3.5)	1.5	(11)	(7.3)	.	7.1	(1.2)	60	(42)	0.56	(16)	19
VS 9235-2008	(0.2)	(11)	2.8	89	11	66	8.6	34	(5.5)	(3.0)	1.4	9.3	(6.7)	(0.9)	(6.9)	(1.1)	46	(55)	0.53	(3.4)	15
VS 9236-2008	.	.	(0.7)	11	23	67	(0.21)	28	(1.0)	(0.6)	(0.5)	(3)	(1.2)	.	0.97	(0.19)	5.7	.	0.10	(4.6)	(3.1)

Number	Nd	Ni	Pb	Pr	Rb	Sb	Sc	Sm	Sn	Ta	Tb	Th	Tl	Tm	U	V	Y	Yb	Zn
VS 9234-2008	48	30	17	(13)	116	(0.5)	13	8.4	(1.6)	(1.5)	(1.1)	19	(0.5)	(0.5)	4.3	60	34	3.5	28
VS 9235-2008	39	35	20	(10)	135	(1.3)	15	7.2	(2.3)	(1.2)	0.92	14	(0.7)	(0.5)	4.6	102	33	3.3	50
VS 9236-2008	(5.3)	62	3.5	(1.3)	3.8	(0.3)	2.5	1.0	(1)	(0.15)	(0.16)	1.4	(0.06)	(0.09)	(1.0)	26	5.6	0.50	38

**COAL chart 1 of 2**

#=class, 1=CRM and 2=RM      mass % except \* for mg/kg      ACIRS, AS(C)RM, COCO: 50-250 g      SABS: 100-150 g      USZ: as shown      others: 50 g

#	Number	S	Ash	Volatile Matter	Heat in J/g or BTU/lb	Density	Moisture	C	Fixed C	Cl	F	H	Hg*	N	O	P
1	AR 1715-715617	7.06	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28143	6.40	31.80	14.00	20,650 J	1.82	.	53.28	.	.	.	2.58	.	0.72	.	.
1	COCO 062	6.00	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	AR 1712-712321	5.83	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	AR 1730-730219	5.38	23.64	32.24	10,031 BTU	.	.	.	(44.12)	.	.	.	.	.	.	.
1	AR 1711-711218	5.13	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28009w	4.31	31.50	23.46	20,500 J	1.74	.	52.06	.	.	.	2.93	.	0.66	.	.
1	AR 1710-710621	4.25	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28142a	4.10	10.68	10.13	31,300 J	1.45	.	78.97	.	.	.	3.33	.	0.96	.	.
1	NCS FC28221	4.04	18.98	32.0	27,790 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28220	4.03	16.52	11.15	28,670 J	.	.	.	.	.	.	.	.	.	.	.
1	AR 1709-709618	3.54	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28012L	3.42	16.21	12.03	28,960 J	1.53	.	72.57	.	.	.	3.29	.	1.03	.	.
1	NCS FC28210	3.17	25.80	8.77	24,130 J	.	.	.	.	.	.	.	.	.	.	.
1	CZ SF-06-14	3.13	27.21	26.84	23,990 J	10,314 BTU	.	58.28	.	.	.	3.51	.	3.80	.	.
1	AR 1729-729320	3.04	19.33	30.37	11,571 BTU	.	.	.	(50.30)	.	.	.	.	.	.	.
1	NCS FC28141a	3.02	29.66	14.10	21,460 J	1.74	.	56.15	.	.	.	2.70	.	0.78	.	.
1	COCO 019	3.02	.	10.30	9,550 J	.	.	.	.	.	.	.	.	.	.	.
1	AR 1708-708221	2.99	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	ACIRS S2D	2.877	18.02	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28216	2.79	8.62	10.86	32,300 J	1.44	.	81.27	.	.	.	3.55	.	1.16	.	.
1	NCS FC28008y	2.74	22.94	31.19	24,720 J	1.56	.	60.74	.	.	.	3.86	.	0.96	.	.
1	AR 1707-707617	2.63	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	CZ SF-07-14	2.52	28.73	38.80	21,023 J	9,038 BTU	.	50.97	.	.	.	4.26	.	1.05	.	.
1	NCS FC28138c	2.46	34.14	13.64	20,850 J	1.73	.	53.69	.	.	.	2.84	.	0.82	.	.
1	NCS FC28011o	2.23	19.98	7.40	26,690 J	1.72	.	72.12	.	.	.	2.08	.	0.68	.	.
1	COCO 036	2.23	13.18	10.03	29,700 J	.	.	.	.	.	.	.	.	.	.	0.091
1	AR 1726-726122	2.27	42.89	26.30	8,097 BTU	.	.	.	(30.81)	.	.	.	.	.	.	.
1	COCO 029	2.24	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28215	2.17	25.2	28.79	24,830 J	.	.	.	.	.	.	.	.	.	.	.
1	COCO 026	2.10	31.63	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28112	2.07	8.08	33.70	32,620 J	1.33	.	78.64	.	.	.	5.01	.	1.31	.	.
1	AR 1706-706818	2.04	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28007u	1.95	13.95	32.61	28,150 J	1.47	.	69.05	.	.	.	4.28	.	1.22	.	.
1	SRM 2683C	1.95	.	.	.	.	.	.	.	.	.	.	0.0900	.	.	.
1	NCS FC28139a	1.80	20.22	21.09	27,530 J	1.49	.	68.53	.	.	.	3.93	.	1.19	.	.
1	NCS FC28217	1.79	8.68	36.06	31,330 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28002z	1.78	15.68	30.18	27,460 J	1.48	.	67.88	.	.	.	4.08	.	1.19	.	.
1	NCS FC28209	1.76	27.33	8.21	23,960 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28144b	1.75	85.72	9.12	2,280 J	2.54	.	5.80	.	.	.	1.03	.	0.27	.	.
1	SABS 062	1.74	11.46	5.34	30,170 J	.	.	82.28	.	.	.	2.16	.	1.83	.	0.040
1	NCS FC28005L	1.72	17.94	7.17	27,880 J	1.66	.	74.62	.	.	.	2.32	.	0.83	.	.
1	NCS FC28106a	1.72	8.25	31.68	32,420 J	1.35	.	78.58	.	.	.	4.84	.	1.35	.	.
1	NCS FC28010t	1.70	21.11	28.32	25,620 J	1.53	.	63.35	.	.	.	3.87	.	0.96	.	.
1	NCS FC28005k	1.65	12.09	8.44	30,920 J	1.49	.	79.30	.	.	.	3.10	.	1.10	.	.
1	COCO 039	1.63	14.54	18.61	29,530 J	.	.	74.69	.	.	.	3.77	.	1.95	.	0.046
1	NCS FC28004o	1.62	30.22	7.60	23,060 J	1.81	.	61.33	.	.	.	1.91	.	0.74	.	.
1	NCS FC28214b	1.62	26.62	28.93	23,320 J	1.57	.	56.70	.	.	.	3.67	.	1.09	.	.
1	NCS FC28140a	1.53	28.18	12.86	24,420 J	1.61	.	62.30	.	.	.	3.11	.	1.02	.	.
1	NCS FC28002b	1.52	10.71	34.11	29,550 J	1.42	.	72.25	.	.	.	4.58	.	1.36	.	.
1	AR 1705-051020	1.46	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	AR 1724-241014	1.42	17.26	32.27	12,216 BTU	.	.	.	(50.47)	.	.	.	.	.	.	.
1	NCS FC28213b	1.42	9.59	34.50	30,300 J	1.39	.	73.29	.	.	.	4.54	.	1.38	.	.
1	NCS FC28218	1.35	14.58	6.16	29,260 J	.	.	.	.	.	.	.	.	.	.	.
1	CZ SF-01-14	1.33	44.90	31.72	14,617 J	6,284 BTU	.	36.40	.	.	.	3.31	.	0.60	.	.
1	NCS FC28111A	1.30	23.50	28.96	24,350 J	1.56	.	61.20	.	.	.	3.78	.	1.10	.	.
2	ACIRS S2C	1.230	15.10	.	.	.	.	.	.	.	0.0086	0.0094	.	0.111	.	0.0352
2	USZ TTKN	1.21	15.2	29.3	35,260 J	.	.	.	.	.	.	4.88	.	.	80 or 150 g units	.

#	Number	S	Ash	Volatile Matter	Heat in J/g or BTU/lb	Density	Moisture	C	Fixed C	Cl	F	H	Hg*	N	O	P
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COAL chart 2 of 2

#=class, 1=CRM and 2=RM		mass % except * for mg/kg				ACIRS, AS(C)RM, COCO: 120-250 g			SABS: 100-150 g		USZ: as shown		others: 50 g			
#	Number	S	Ash	Volatile Matter	Heat in J/g or BTU/lb	Density	Moisture	C	Fixed C	Cl	F	H	Hg*	N	O	P
1	AR 1704-041220	1.07	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	SRM 2692C	1.064	(7.499)	.	.	.	.	.	.	(0.1338*)	.	.	0.1790	.	.	.
1	SABS 069	1.06	8.22	6.10	32,060 J	.	.	85.36	.	.	.	2.66	.	1.89	.	0.018
1	NCS FC28205	1.05	8.62	33.44	30,750 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28208	1.03	15.47	20.59	29,200 J	1.46	.	72.60	.	.	.	3.98	.	1.14	.	.
1	NCS FC28105b	1.02	10.99	8.96	31,380 J	1.47	.	80.74	.	.	.	3.25	.	1.16	.	.
1	COCO 056	0.98	33.53	19.37	20,230 J	.	.	53.05	.	.	.	2.84	.	1.20	.	0.043
1	SABS 065	0.97	8.04	5.70	32,070 J	.	.	85.60	.	.	.	2.68	.	1.84	.	0.018
1	COCO 049	0.96	25.05	17.76	23,960 J	.	.	62.83	.	(0.0136)	(0.0153)	2.87	.	1.35	.	0.048
1	AR 1723-723823	0.95	9.43	35.64	12,495 BTU	.	.	.	(54.93)	.	.	.	.	.	.	.
1	SABS 068	0.95	27.09	21.22	25,600 J	.	.	63.47	.	.	.	3.57	.	1.46	.	0.038
1	NCS FC28204	0.95	8.11	34.01	31,340 J	1.36	.	76.22	.	.	.	4.93	.	1.45	.	.
1	COCO 047	0.91	23.49	21.72	24,090 J	.	.	61.95	.	.	.	3.06	.	1.45	.	0.093
1	COCO 052	0.90	23.81	23.01	24,140 J	.	.	61.75	.	.	.	3.32	.	1.49	.	0.033
1	COCO 052	0.90	23.81	23.01	24,140 J	.	.	61.75	.	.	.	3.32	.	1.49	.	0.033
1	SABS 055	0.88	14.1	11.5	29,120 J	.	.	75.70	.	.	.	2.93	.	1.93	.	0.031
1	NCS FC28211	0.88	13.41	9.08	30,230 J	.	.	.	.	.	.	.	.	.	.	.
1	AR 1703-031120	0.87	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28206a	0.84	8.16	33.99	31,150 J	1.38	.	75.55	.	.	.	4.63	.	1.45	.	.
1	COCO 042	0.82	40.69	21.43	16,440 J	.	.	44.17	.	.	.	2.43	.	1.03	.	0.061
1	SABS 059	0.82	16.0	11.0	28,330 J	.	.	74.50	.	.	.	2.84	.	1.79	.	0.031
1	AR 1722-722421	0.81	21.02	15.76	11,232 BTU	.	.	.	(63.22)	.	.	.	.	.	.	.
1	NCS FC28110a	0.81	9.62	33.64	29,830 J	1.42	.	74.16	.	.	.	4.44	.	1.38	.	.
2	USZ SOEN	0.78	6.29	44.8	32,160 J	.	.	76.62	.	.	.	5.41	.	.	80 or 200 g units	.
1	COCO 038	0.76	15.05	23.53	28,060 J	.	.	.	.	.	.	.	.	.	.	0.079
1	AR 1702-702819	0.76	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	AR 1702-702819	0.76	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	SABS 039	0.75	24.51	23.34	.	.	.	59.97	.	.	.	2.93	.	1.56	0.079	.
1	SABS 043	0.74	22.31	23.82	.	.	.	61.69	.	.	.	3.03	.	1.56	.	0.071
1	COCO 034	0.74	17.54	.	.	.	.	.	.	.	.	.	.	.	.	.
1	SABS 051	0.72	39.70	20.89	.	.	.	44.44	.	.	.	2.45	.	1.10	.	0.109
1	NCS FC28107a	0.70	10.96	15.62	31,120 J	1.45	.	79.17	.	.	.	3.82	.	1.14	.	.
2	ACIRS S2B	0.692	.	.	.	.	.	.	.	0.027	0.0037	.	0.057	.	.	.
1	NCS FC28203a	0.69	8.60	29.51	31,600 J	1.39	.	77.23	.	.	.	4.56	.	1.42	.	.
1	SABS 046	0.66	11.86	26.87	.	.	.	74.21	.	.	.	3.77	.	1.76	.	.
2	ACIRS G10	0.606	10.46	19.79	32,331 J	1.379	.	.	.	0.052	0.0076	.	0.029	.	.	0.020
1	COCO 025	0.59	23.93	.	.	.	.	.	.	.	.	.	.	.	.	0.036
1	NCS FC28109A	0.59	12.21	11.72	30,350 J	1.49	.	78.45	.	.	.	3.27	.	1.09	.	.
1	COCO 045	0.60	10.52	27.38	28,860 J	.	.	72.98	.	.	.	4.01	.	1.76	.	0.033
1	SABS 066	0.57	15.02	24.11	27,730 J	.	.	71.97	.	.	.	3.62	.	1.71	.	0.110
1	NCS FC28108	0.57	13.68	30.55	29,530 J	1.42	.	72.65	.	.	.	4.46	.	1.23	.	.
2	ACIRS G5	0.568	10.68	20.03	32,186 J	1.381	.	(79.19)	.	0.046	.	(4.34)	.	(1.77)	last	0.0196
1	COCO 055	0.55	18.94	23.96	25,560 J	.	.	66.43	.	.	.	3.57	.	1.58	.	0.099
2	USZ BNN	0.54	9.04	46.28	28,950 J	.	.	70.49	.	.	.	5.27	.	.	150 g units	.
1	AR 1721-721913	0.52	5.03	29.48	12,572 BTU	.	.	.	(65.49)	.	.	.	.	.	.	.
1	AR 1721-721913	0.52	5.03	29.48	12,572 BTU	.	.	.	(65.49)	.	.	.	.	.	.	.
1	SABS 058	0.50	31.1	23.1	20,180 J	.	.	53.64	.	.	.	3.06	.	1.33	.	0.023
1	NCS FC28116a	0.50	11.06	23.77	30,000 J	1.44	.	75.34	.	.	.	4.00	.	1.18	.	.
1	SABS CCS 008b	0.49	15.8	25.6	27,550 J	.	.	71.19	.	.	.	3.85	.	1.70	.	0.111
1	SABS 045	0.49	15.45	24.50	.	.	.	71.24	.	.	.	3.73	.	1.71	.	.
1	SABS 050	0.48	16.36	24.58	.	.	.	70.79	.	.	.	3.80	.	1.62	.	0.095
1	SABS 049	0.48	16.34	24.31	.	.	.	70.96	.	.	.	3.61	.	1.63	last	0.087
1	SABS 057	0.48	15.49	25.42	.	.	.	71.19	.	.	.	3.85	.	1.70	.	1.093
1	SABS 037	0.48	15.26	24.84	.	.	.	71.17	.	.	.	3.67	.	1.72	0.102	.
1	AR 1701-011119	0.48	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28212b	0.48	9.25	23.84	32,400 J	.	.	.	.	.	.	.	.	.	.	.
1	CZ SF-04-14	0.48	4.43	22.95	34,618 J	14,883 BTU	.	85.53	.	.	.	4.59	.	1.35	.	.
1	AR 1701-011119	0.48	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	COCO 053	0.46	14.33	27.40	27,580 J	.	.	70.04	.	.	.	4.08	.	1.70	.	0.138
1	COCO 050	0.45	13.06	26.73	27,740 J	.	.	70.68	.	.	(0.0295)	3.87	.	1.73	.	0.147
2	ACIRS S2A	0.433	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28207	0.43	16.26	7.26	26,100 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28115	0.42	6.38	31.74	30,570 J	1.41	.	77.28	.	.	.	4.47	.	1.19	.	.
1	NCS FC28104	0.40	10.09	11.00	31,860 J	1.45	.	81.45	.	.	.	3.52	.	1.31	.	.
1	NCS FC28201a	0.40	9.70	18.48	31,580 J	1.42	.	78.94	.	.	.	3.98	.	1.36	.	.
2	COCO 001	0.39	14.66	24.58	26,820 J	.	.	.	.	.	.	.	.	.	last	0.079
1	SABS 023	0.37	16.5	25.6	.	.	.	68.25	.	.	.	3.63	.	1.62	.	0.102
1	NCS FC28103	0.35	10.51	9.70	31,740 J	1.47	.	81.44	.	.	.	3.40	.	1.26	.	.
1	AR 1700-700421	0.35	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28003o	0.32	10.47	10.54	32,000 J	1.45	.	81.53	.	.	.	3.55	.	1.34	.	.
1	NCS FC28017g	0.27	9.49	8.14	32,210 J	1.47	.	83.28	.	.	.	3.16	.	1.15	.	.
1	NCS FC28113	0.27	7.06	33.18	29,580 J	1.41	.	74.60	.	.	.	4.47	.	1.02	.	.
1	AR 1700-700421	0.35	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	COCO 048	0.26	4.95	3.07	32,080 J	.	.	90.45	.	(0.0607)	(0.0058)	1.35	.	0.95	.	0.017
1	NCS FC28114	0.20	4.66	33.07	30,280 J	1.42	.	76.69	.	.	.	4.42	.	1.04	.	.
1	NCS FC28101	0.20	3.95	6.97	34,340 J	1.47	.	90.10	.	.	.	3.01	.	0.56	.	.
1	NCS FC28102	0.19	6.40	8.20	33,100 J	1.50	.	87.34	.	.	.	2.86	.	0.58	.	.
1	CZ SF-02-14	0.16	2.80	13.10	33,090 J	14,226 BTU	.	91.84	.	.	.	2.09	.	0.65	.	.
1	CZ SF-03-14	0.14	2.98	1.15	32,060 J	13,783 BTU	.	96.30	.	.	.	0.21	.	0.32	.	.
2	ACIRS M2	.	9.32	.	.	.	.	As:0.0003	.	.	0.0176	.	0.041	.	Se*:0.3	0.1109
2	ASRM 015	.	.	.	.	1.42	.	.	.	.	.	.	.	.	.	.

#	Number	S	Ash	Volatile Matter	Heat in J/g or BTU/lb	Density	Moisture	C	Fixed C	Cl	F	H	Hg*	N	O	P
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**CRM FUSIBILITY OF COAL**

Number	analysis listed in mass %					250 g units			Reducing Temperature °C			
	C	H	N	P	S	MJ/Kg	Volatility	Ash	Deformation	Softening	Hemisphere	Flow
COCO 005	81.70	4.57	1.44	0.015	1.05	32.90	27.19	7.49	1402	1425	1443	1473
COCO 007	72.55	3.69	1.83	0.036	1.55	28.71	21.60	14.51	1329	1353	1381	1420
COCO 035	62.17	2.98	1.71	0.039	1.92	24.16	15.46	27.55	1369	1394	1419	1452
COCO 035	60.13	2.89	1.63	0.036	1.92	23.73	16.35	27.27	1340	1370	1435	1460
COCO 059	54.81	3.11	1.46	0.013	1.80	21.48	22.87	29.98	1280	1310	1340	1400
COCO 041	58.41	2.86	1.52	0.040	1.67	22.39	18.55	29.36	1310	1340	1370	1410
COCO 060	.	.	.	0.040	1.57	27.59	20.45	19.12	1335	1370	1390	1420
COCO 046	71.43	3.75	1.87	0.039	1.47	28.64	20.06	16.55	1325	1355	1385	1425
COCO 030	.	.	.	.	1.34	.	.	25.52	1383	1418	1446	1488
COCO 063	66.88	4.57	1.42	0.013	1.21	27.57	33.96	19.38	1250	1290	1330	1380
COCO 061	71.34	4.73	1.57	0.024	1.07	29.44	35.60	12.26	1405	1430	1460	1490
COCO 028	.	.	.	.	0.94	.	.	17.86	1228	1253	1277	1325
COCO 054	62.76	3.46	1.51	0.034	0.94	24.69	25.12	22.81	1380	1410	1440	1480
COCO 027	.	.	.	0.015	0.82	.	.	10.63	1350	1375	1405	1430
COCO 058	69.31	4.02	1.67	0.082	0.53	27.66	28.3	15.81	1410	1430	1468	1495

**SULFUR IN COAL**

# = class, where 1=CRM and 2=RM

analysis listed in mass %

#	Number	S	Units	#	Number	S	Units	#	Number	S	Units
2	COCO 037	4.74	50 g	2	VS1-1.91	1.91	50g, last	2	VS1-0.96	0.96	50g, last
2	VS1-4.18	4.18	50g, last	1	BCR 333	1.344	20 g	1	IARM HC20075C	0.76	50g, last
1	BCR 336	3.290	20 g	1	BCR 332	0.961	20 g	1	BCR 331	0.499	20 g

**RM COAL**

typical analysis listed in mass %

50 g units, last of stock

Number	S	DRY ANALYSIS			Volatile Matter	IGNITED ANALYSIS										
		C	Heat BTU/lb	Ash		Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO <sub>2</sub>	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>
VS6-016	1.41	(47.64)	(12,293)	16.71	35.59	27.07	0.81	7.96	3.56	1.18	0.02	0.38	0.12	0.77	55.62	1.20

**CRM COAL**

analysis listed in mass %

(T) = Total

SARM 20 also contains Ta: 0.00012, Y: 0.0029

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Mn	Na <sub>2</sub> O	P	P <sub>2</sub> O <sub>5</sub>	S	SiO <sub>2</sub>	Sr	TiO <sub>2</sub>	Zr	LOI	Units
SARM 20	11.27	1.87	1.17	0.14	0.43	0.0080	0.27	.	0.14	0.51	17.66	0.0330	0.63	(0.0100)	64.66	120 g
SARM 19	8.01	1.39	1.75	0.24	0.20	0.0157	0.29	0.0130	.	1.49	15.00	0.0126	0.341	0.0351	71.28	120 g
SARM 18	2.57	0.18	0.29	0.145	0.11	0.0022	.	0.0030	.	0.56	6.20	0.0044	0.114	0.0067	90.11	120 g

analysis listed in mg/kg

Number	As	Ba	Be	Ce	Co	Cr	Cs	Cu	Ga	Ge	Hf	Hg	La	Ni	Pb	Rb	Sc	Se	Sm	Th	U	V	Zn
SARM 20	4.7	372	2.5	87	8.3	(67)	(2)	18	16	.	4.8	0.25	43	25	26	10	10	0.8	6.3	18	4	47	17
SARM 19	7	304	2.8	56	5.6	50	1.4	13	14	13	5.4	(0.2)	27	16	20	9	7.6	.	4.9	12	5	35	12
SARM 18	.	78	4.1	22	6.7	16	(1)	5.9	(8)	(8)	1.7	(0.04)	10	10.8	(5)	8.1	4.3	.	2.0	3.4	1.5	23	5.5

**CRM COAL**

analysis in mass %

50g units

analysis in mg/kg

Number	C	Al	Cl	Fe	H	K	N	Na	O	S	Si	Br	Hg	Mg	Mn	V	Zn
SRM 2684c	(76.82)	(0.8730)	(0.0975)	.	(5.17)	(0.0981)	(1.395)	(0.0606)	.	3.027	.	(11.1)	0.0688	(494)	(20.51)	(16.3)	.
SRM 1635a	(68.97)	0.5437	(0.0051)	0.2472	3.92	0.01874	(0.946)	0.1031	(0.294)	.	.	(1)	0.0836	.	6.69	13.34	7.3
SRM 2685c	.	.	(0.0554)	.	.	.	.	.	4.72	.	.	(4.94)	0.1494	(814)	(36.84)	.	.
SRM 8499	(76)	0.960	(0.0963)	1.42	4.97	0.1248	(1.4)	(0.0374)	(7)	2.738	1.81	(11.9)	(0.1351)	(391)	(18.4)	(29.2)	(13.0)

continued analysis in mg/kg

Number	As	Ba	Ca	Cd	Ce	Co	Cr	Cu	F	Ni	Pb	Rb	Sb	Se	Sr	Th	Ti	U
SRM 2684c	.	.	(3220)	.	.	.	.	.	(64)	.	.	.	.	(1.08)	.	.	.	.
SRM 1635a	0.860	357.8	.	0.282	5.45	2.004	3.56	11.42	(63)	5.37	2.85	1.226	0.251	0.662	160	1.299	254	0.4792
SRM 2685c	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SRM 8499	(8.55)	(62.8)	1714	.	(12.24)	(3.622)	(16.57)	(5.70)	.	(11.08)	.	(8.49)	(0.428)	(1.525)	(84.1)	.	(519)	(0.636)

**CRM COAL**

analysis listed in mass % except \* which is mg/kg

powder 50 g

Number	Al%	Ca%	Cd*	Co*	Cr*	Cu*	Fe%	K%	Mg%	Mn%	Na%	Ni*	P%	Pb%	Si%	Ti%	V*	Zn%
NCS FC28127	3.47	1.88	2	9	23	23	1.02	0.29	0.28	0.019	0.052	16	0.010	.	5.61	0.18	60	0.0040
NCS FC28125	2.27	0.28	(<1)	11	5	17	0.24	0.090	0.050	0.0009	0.048	18	0.013	0.0016	2.69	0.090	33	.
NCS FC28123	1.88	0.74	(<1)	4	10	12	0.35	0.026	0.081	0.0030	0.11	8	0.066	0.0016	1.86	0.096	12	(0.001)
NCS FC28124	1.75	0.79	(<1)	4	7	12	0.34	0.020	0.071	0.0016	0.13	8	0.044	0.0016	1.77	0.079	11	.
NCS FC28128	1.22	0.19	.	4	8	12	0.86	0.043	0.059	0.0026	0.026	8	0.0044	.	1.64	0.059	28	(<0.001)
NCS FC28126	0.83	0.65	(<1)	3	5	8	0.32	0.010	0.060	0.008	0.034	5	0.019	.	1.01	0.046	11	.
NCS FC28122	0.25	0.85	.	8	2	2	1.79	0.016	0.24	0.022	0.081	8	0.0029	0.002	0.47	0.010	1	.



**CRM COAL**

Number	As mg/kg	P mass %	Cl mass %	F mg/kg	Units
GBW 11117	51	0.092	.	.	50 g
GBW 11116	34	0.007	.	.	50 g
GBW 11115	15	0.031	.	.	50 g
NCS FC82006a	.	.	0.111	.	50 g
NCS FC82005a	.	.	0.050	.	50 g
NCS FC82004a	.	.	0.011	.	50 g
NCS FC82008a	.	.	.	1163	50 g
BCR 460	.	.	(0.0059)	225	40 g

**CRM COAL AIR DRIED vs. HEATED DRIED ANALYSIS**

20 g powder

Number	Heat J/g	Volatile Matter%	Ash%	Moisture%	S%	Expiry
NCS FC62002a	24190, 24980	4.29, 4.43	23.90, 24.68	3.15 (air dried)	0.36, 0.37	August 2019
NCS FC62001c	22840, 25680	28.37, 31.90	11.30, 12.71	11.06 (air dried)	0.63, 0.71	May 2018 H: (3.32%)

**CRM FUSIBILITY OF COAL ASH**

analysis listed in °C MRed = Mildly Reducing, Oxi = Oxidizing

Atmosphere Number	Initial MRed	Deformation Oxi	Softening MRed	Hemishpering MRed	Fluid MRed	Units
NCS FS82001f	1257, 1346		1335, 1408	1355, 1443	1434, >1500	30 g
NCS FS28001	1161, 1211		1190, 1230	1198, 1239	1204, 1252	5 g
NCS FS28002	1217, 1356		1340, 1408	1357, 1420	1369, 1445	5 g
NCS FS28003	1285, 1314		1314, 1345	1322, 1360	1340, 1381	5 g

**COAL ASH**

# = class, where 1 = CRM and 2 = RM

analysis listed in mass %

#	Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Mn	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	Units	Other
2	COCO ASH 015	55.67	31.44	2.42	3.99	0.65	0.74	MnO2: 0.036	0.13	0.37	1.89	1.78	.	20 g	
2	COCO ASH 013	54.89	32.44	2.16	4.43	0.84	0.54	MnO2: 0.041	0.06	0.33	2.05	1.82	.	20 g	
2	COCO ASH 020	53.91	25.22	6.36	5.10	2.14	1.12	MnO2: 0.102	0.97	0.40	2.22	1.26	.	20 g	
1	NCS FC28154	53.17	32.02	2.28	6.47	1.37	0.90	MnO: 0.035	0.41	0.19	0.78	1.34	0.027	5 g	
2	COCO ASH 025	52.93	32.14	3.89	3.31	0.64	1.03	MnO2: 0.047	0.20	0.50	2.53	1.75	.	20 g	
2	COCO ASH 021	52.72	33.33	2.67	4.09	0.71	0.97	MnO2: 0.039	0.21	0.35	2.43	1.90	.	20 g	
2	COCO ASH 019	52.71	31.35	4.54	3.60	0.53	0.99	MnO2: 0.038	0.23	0.41	2.44	1.58	.	20 g	
2	COCO ASH 014	52.29	31.67	2.53	6.46	0.85	0.51	MnO2: 0.050	0.07	0.44	2.73	1.86	.	20 g	
2	COCO ASH 026	52.18	26.87	7.76	3.21	1.00	2.16	MnO2: 0.058	0.15	0.68	3.30	1.94	.	20 g	
2	COCO ASH 006	52.14	26.98	4.55	5.56	0.99	1.11	MnO2: 0.044	0.26	0.25	3.19	1.18	.	20 g	
2	COCO ASH 023	51.86	25.54	4.24	8.29	2.12	1.07	MnO2: 0.052	1.00	0.34	4.08	1.22	.	20 g	
1	JCFA-1 *	50.56	24.25	8.91	4.22	1.27	2.12	MnO: 0.068	2.24	0.586	.	1.31	.	100 g	
2	COCO ASH 028	50.31	30.87	6.34	3.82	0.76	1.65	MnO2: 0.048	0.32	0.39	2.98	1.55	.	20 g	
2	COCO ASH 027	49.93	35.45	3.05	3.91	0.54	0.41	MnO2: 0.044	0.13	2.82	0.59	1.80	.	20 g	
1	NCS FC28040a	49.39	40.34	3.25	1.12	0.53	0.54	.	0.46	0.24	1.65	1.23	.	20 g	
2	COCO ASH 029	49.84	31.75	7.15	3.56	0.52	1.56	MnO2: 0.054	0.14	1.28	2.95	1.66	.	20 g	
1	NCS FC28148	48.03	35.80	3.27	2.81	0.90	0.69	MnO: 0.0073	0.54	0.25	.	1.25	0.049	5 g	
1	NCS FC28150	47.64	26.03	10.44	5.79	1.41	1.87	MnO: 0.097	0.28	0.091	.	1.21	0.042	5 g	
2	COCO ASH 022	46.48	29.30	4.88	8.99	1.38	1.32	MnO2: 0.050	1.22	0.49	4.46	1.34	.	20 g	
2	COCO ASH 024	45.69	28.62	8.70	8.21	0.46	2.16	MnO2: 0.092	0.19	0.79	3.42	1.64	.	20 g	
1	NCS FC28041	45.42	35.96	7.20	5.15	0.70	1.15	.	0.82	0.89	(0.08)	1.32	.	20 g	
1	NCS FC28151	43.42	28.53	3.33	15.18	0.64	1.21	MnO: 0.042	0.43	0.12	.	1.22	0.062	5 g	
1	NCS FC28039a	43.10	32.58	10.62	3.46	0.35	1.84	.	1.35	0.79	2.70	1.07	.	20 g	
1	NCS FC28146	37.86	33.71	9.90	4.74	0.30	1.27	MnO: 0.037	1.45	1.44	.	1.52	0.020	5 g	
1	NCS FC28147	37.52	32.78	10.97	4.81	0.24	1.17	MnO: 0.020	1.75	1.00	.	1.31	0.019	5 g	
1	NCS FC28149	35.54	25.92	14.92	7.56	0.20	1.63	MnO: 0.17	0.75	0.72	.	1.26	0.032	5 g	
1	NCS FC28038a	29.28	29.25	11.53	11.92	0.37	4.23	.	3.64	0.60	6.38	0.94	.	20 g	
1	NCS FC28145	15.66	7.34	18.37	39.61	0.30	6.05	MnO: 0.44	1.69	0.10	.	0.26	0.0042	5 g	

\* JCFA-1 also contains (in mg/kg) Be: 4.06, Co: 37.4, Cr: 75, Cs: 8.6, Cu: 122, Li: 91, Ni: 32.2, Pb: 47.2, Rb: 54.1, S: 1960, Sb: 2.1, V: 243, and Zn: 63.  
 \* JCFA-1 also contains (in mass %): FeO: 0.88, TFe2O3: 5.2, C: 1.35, H<sub>2</sub>O-: 0.18, H<sub>2</sub>O+: 0.37, Sr: 0.110

**CRM COAL ASH**

analysis listed in mass %

100 g units

Number	Al <sub>2</sub> O <sub>3</sub>	Ba	CaO	CO <sub>2</sub>	Org.C	FeO	T.Fe <sub>2</sub> O <sub>3</sub>	H <sub>2</sub> O	H <sub>2</sub> O+	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	S	SO <sub>3</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	LOI
VS 7177-95	27.07	0.028	4.88	.	.	1.59	5.48	(0.13)	.	0.59	1.48	0.059	0.14	(0.064)	.	(0.018)	58.68	0.60	(0.56)
VS 9237-2008	9.7	0.86	43.8	(2.9)	.	(0.3)	5.1	.	.	0.36	5.5	0.22	0.67	(0.024)	3.48	.	15.6	0.59	8.5
VS 7125-94	6.79	0.225	20.91	13.20	(1.33)	0.40	6.28	(2.41)	(5.74)	0.51	6.70	0.094	0.22	0.059	0.17	(0.40)	35.80	0.35	(21.29)

continued analysis listed in mg/kg except % which is mass %

Number	Ag	As	Au	B%	Be	Bi	Ce	Co	Cr	Cs	Cu	Dy	Er	Eu	F%	Ga	Gd	Ge	Hf	Hg	Ho	La
VS 7177-95	(0.15)	.	.	(0.044)	11	(2.1)	138	25	99	(3.3)	176	.	.	(2.6)	(0.017)	(21)	.	(2.7)	(13)	.	.	70
VS 9237-2008	(0.2)	(8.0)	.	.	2.9	.	37	26	42	(1.2)	51	(2.7)	(1.4)	(0.8)	.	15	(3.3)	(6)	3.3	(0.1)	(14)	20
VS 7125-94	0.16	(1.0)	(0.003)	0.0097	2.9	.	38	16	45	(1.1)	45	(3.8)	(2.4)	0.9	(0.0230)	9	(4.2)	2.3	2.6	(0.03)	(0.87)	20

Number	Li	Lu	Mo	Nb	Nd	Ni	Pb	Pr	Rb	Sb	Sc	Sm	Sn	Sr%	Ta	Tb	Th	Tl	Tm	U	V	W	Y	Yb	Zn	Zr%
VS 7177-95	96	.	7.4	34	.	66	35	.	22	.	27	(15)	11	0.0403	.	.	(45)	.	.	(15)	145	(3.7)	87	7.8	77	0.033
VS 9237-2008	(9)	0.26	(3.0)	7.8	17	68	22	(4.2)	13	3.0	8.6	3.2	(3.2)	0.83	(0.61)	0.45	7.0	(0.4)	(0.25)	3.1	63	.	15	1.5	76	0.013
VS 7125-94	32	0.40	1.4	8.4	20	49	13	(4.3)	15	.	11	4.1	2.7	0.33	(0.53)	0.68	5.8	.	(0.38)	3.3	61	(1.1)	29	2.6	65	0.0119

**CRM COAL ASH**

Number	Ash%	C%	S%	Units
CZ SFA-01-14	96.60	3.10	0.029	50 g

**CRM COAL WASTE ROCK** analysis listed in mass % 50 g units

Number	Al	Ca	Fe	K	Mg	Mn	Na	P	Si	Ti	V
NCS FC28152	10.76	0.34	2.57	1.27	0.53	0.023	0.15	0.026	20.59	0.44	0.012

**CRM ASH OF COAL WASTE ROCK** analysis in mass % 5 g units

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>
NCS FC28153	27.71	0.65	5.01	2.09	1.20	0.041	0.27	0.082	60.03	1.01	0.028

**CRM COAL FLY ASH** analysis listed in mass %

Number	As	Al	Ba	Ca	Fe	K	Mg	Mn	Na	Ni	P	S	Si	Ti	Zn	LOI
SRM 2689	(0.0200)	12.94	(0.0800)	2.18	9.32	2.20	0.61	(0.0300)	0.25	(0.0122)	0.10	.	24.06	0.75	(0.0240)	(1.76)
SRM 1633c	0.01862	13.28	0.1126	1.365	10.49	1.773	0.498	0.02402	0.1707	0.0132	(0.192)	(0.110)	(21.30)	0.724	(0.0235)	.
BCR 176R	0.0054	.	(0.4650)	.	1.3100	.	.	(0.0730)	(3.4800)	0.0117	.	.	.	.	1.6800	.
BCR 038	0.00480	.	.	.	3.3800	.	.	0.0479	0.3740	(0.0194)	.	.	.	.	0.0581	.
SRM 2691	(0.0030)	9.81	(0.5900)	18.45	4.42	0.34	3.12	(0.0200)	1.09	(0.0053)	0.51	0.83	16.83	0.90	(0.0120)	(0.23)
SRM 2690	(0.0026)	12.35	(0.5800)	5.71	3.57	1.04	1.53	(0.0300)	0.24	(0.0046)	0.52	0.15	25.85	0.52	(0.0120)	(0.53)

continued analysis listed in mg/kg except % which is mass %

Number	Ag	Au	Be	Br	Cd	Ce	Co	Cr	Cs	Cu	Eu	Hf	Hg	La
SRM 2689	.	.	(21)	.	(3)	.	(48)	(170)	(11)	.	(3)	(7)	(<0.003)	.
SRM 1633c	.	.	(16)	.	0.758	(180)	42.9	(258)	(9.39)	173.7	(4.67)	.	1.005	(87.0)
BCR 176R	(33.1)	(0.604)	.	(836)	226	(47.7)	26.7	810	(8.27)	1050	(0.868)	(4.85)	(1.60)	(30.2)
BCR 038	.	.	.	.	4.6	.	53.8	(178)	.	176	.	.	.	.
SRM 2691	.	.	(8)	.	(0.9)	.	(26)	(68)	(1)	.	(2)	(10)	(<0.003)	.
SRM 2690	.	.	(8)	.	(0.7)	.	(19)	(67)	(8)	.	(2)	(8)	(<0.003)	.

Number	Pb	Rb	Sb	Sc	Se	Sr	Ta	Th	Tl	U	V	W	Yb	Units
SRM 2689	(52)	.	(9)	(32)	(7)	(700)	.	(25)	.	.	.	.	.	3 x 10 g
SRM 1633c	95.2	117.42	8.56	(37.6)	(13.9)	901	(1.58)	(23.0)	.	(9.25)	286.2	.	(7.7)	75 g
BCR 176R	5000	(102)	850	(2.91)	18.3	.	(2.02)	(5.28)	1.32	.	(35)	(28.3)	.	40 g
BCR 038	262	.	.	.	.	.	.	.	.	.	.	.	.	5 to 6 g
SRM 2691	(29)	.	(3)	(24)	(17)	(2700)	.	(26)	.	.	.	.	.	3 x 10 g
SRM 2690	(39)	.	(6)	(17)	(0.8)	(2000)	.	(25)	.	.	.	.	.	3 x 10 g

\* IRNT certificates expired, however use and sales continue without problems worldwide

**CRM COAL FLY ASH** analysis listed in mass % powder 50 g

Number	Al <sub>2</sub> O <sub>3</sub>	As	Ba	CaO	Cr	T.Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	S	SiO <sub>2</sub>	Sr	TiO <sub>2</sub>	Zn	Zr
CGL 208	13.64	0.01309	0.0999	15.47	0.005385	12.00	1.217	2.02	0.338	0.349	0.092	0.395	52.15	0.1205	0.560	0.011114	0.012313

continued analysis in mg/kg

Number	Be	Cd	Ce	Co	Cs	Cu	Dy	Er	Eu	Ga	Gd	Hf	Ho	La	Li	Lu	Mo	Nb	Nd
CGL 208	(9.95)	(0.68)	89.88	32.42	16.38	(74.23)	6.39	(3.57)	1.366	24.65	(6.89)	3.3	(1.24)	43.69	(43.50)	0.498	20.21	12.45	37.82

Number	Ni	Pb	Pr	Rb	Sb	Sc	Sm	Sn	Ta	Tb	Th	Tl	U	V	W	Y	Yb	Tm
CGL 208	34.9	32.53	9.82	84.75	2.18	11.51	7.37	(6.10)	(0.984)	1.093	19.8	(2.32)	12.26	79.5	26.54	38.64	3.35	0.526

**COAL FLY ASH** analysis listed in mass % ACIRS: RM, 80g SABS: CRM, 20g NCS: CRM. 30g

Number	Al <sub>2</sub> O <sub>3</sub>	BaO	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Mn <sub>3</sub> O <sub>4</sub>	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	SO <sub>3</sub>	SrO	TiO <sub>2</sub>	Units	REDUCING, OXIDIZING TEMPERATURES °C			
															Deformation	Spherical	Hemishperical	Flow
NCS FC82016b	34.03	.	6.04	10.05	0.39	0.64	.	0.31	0.35	41.53	3.91	.	1.38	30 g	.	.	.	.
NCS FC82012b	33.83	.	4.00	8.09	1.30	0.53	.	0.44	0.24	47.07	2.24	.	1.00	30 g	.	.	.	.
ACIRS A1 *	28.9	0.18	6.05	14.6	0.46	1.25	0.22	0.43	1.26	44.1	0.32	0.16	1.56	80 g	1257, 1349	1287, 1383	1309, 1398	1367, 1429

\* ACIRS A1 also contains Co:(0.0043) Cr:(0.0058) Cu:(0.0099) Ni:(0.0047) Pb:(0.0047) V:(0.0176) Zn:(0.0090)

**INDUSTRIAL FLY ASH**

analysis listed in mass % except \* which is mg/kg

Number	Al	As	Ca	Cd	Cr	Hg*	Na	Ni	Pb	Cu	Fe	K	Sb	V	Zn	ZnO
ECRM 882-1	0.375	0.0054	10.11	0.0183	0.490	0.75	0.697	0.0263	1.324	0.218	22.20	0.960	0.0116	0.0090	.	28.49
JK 43	(0.2)	.	(12)	0.0023	(8)	3.9	(0.5)	(2)	0.21	(0.2)	(20)	(0.3)	.	(0.02)	4.96	.
JK 44	(0.2)	.	(5)	0.0469	(0.2)	2.8	(1)	(0.02)	2.74	(0.2)	(27)	(1.3)	.	(0.02)	27.3	.
JK 45	(0.1)	.	(7)	0.0047	(0.3)	0.25	(7)	(0.05)	0.11	(0.01)	(40)	(0.4)	.	(0.1)	1.53	.
502-843-1000	.	.	.	.	.	0.827	.	.	.	.	.	.	.	.	.	.

Number	Bi	C	Cl	F	Mg	Mn	S	Si	Sn	Units, Class
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ECRM 882-1	0.0026	(1.0)	(2.35)	(0.07)	(0.48)	(2)	(0.5)	(1.05)	(0.02)	100 g, CRM
JK 43	.	.	.	.	.	.	.	.	.	15 g, CRM
JK 44	.	.	.	.	.	.	.	.	.	25 g, CRM
JK 45	.	.	.	.	.	.	.	.	.	15 g, CRM
502-843-1000	.	42.4	.	.	.	.	0.29	.	.	20 g, RM

**RM****COAL-TAR PITCH**

analysis listed in mg/kg except as noted

60 g units

Number	%C	S%	%H	Ash	Al	As	Br	Ca	Cd	Cl	Cr	Fe	I	K	Mg	Mn	Na	Ni	P	Pb
DOMTAR CTP A	94.0	0.49	4.0	0.27	245	.	1.7	91	.	118	0.87	200	0.33	43	17	2.7	257	2.5	10	91
DOMTAR CTP B	93.4	0.52	4.3	0.22	228	9	4.8	41	2.5	122	1.1	280	0.6	34	<30	3.3	150	.	3	80
DOMTAR CTP C	83.4	4.46	10.31	0.19	9	0.18	0.25	3	<0.05	18	0.4	14	1.4	2.2	<16	0.21	10	76	236	1

continued informational values listed in mg/kg except as noted

Number	Sb	Si	Sn	Ti	V	Zn	Soft Point °C
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DOMTAR CTP A	.	358	.	18	1.2	88	115	last
DOMTAR CTP B	0.57	408	3.7	16	0.89	90	118	last
DOMTAR CTP C	0.03	20	<0.7	19	170	1	129	last

**CRM COATING THICKNESS**Number nominal  $\mu\text{m}$  coating thickness

SRM 1361b	6	12	25	48
SRM 1358b	20	80	255	1000
SRM 1362b	40	80	140	205
SRM 1359b	48	140	505	800
SRM 1363b	255	385	505	635
SRM 1364b	800	1000	1525	1935

These samples are designed for calibrating thickness gauges using magnetic principles. Each sample is a set of four 45 mm x 45 mm plates of coated 1010 sheet steel substrate coated with copper and a thin protective layer of chromium.

**CONTINUOUS CASTING POWDER**

analysis listed in mass %

IRSID: RM, 100 g units NCS: CRM, 50 g units

Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	C	C.Free	CO <sub>2</sub>	Ca	F	Fe	K	MgO	Mn	Na	Na <sub>2</sub> O	P	S	TiO <sub>2</sub>	LOI
NCS HC26805	41.31	6.93	3.06	1.57	.	21.46	(4.79)	.	.	3.26	.	.	4.07	.	.	.	.
NCS HC26804	34.95	5.30	15.86	14.49	.	19.13	(5.15)	.	.	0.78	.	.	4.99	.	.	.	.
IRSID 2701	32.70	6.10	3.37	(1.78)	(5.59)	22.90	7.58	(0.145)	0.159	2.19	.	9.42	.	(0.014)	(0.055)	(0.048)	(2.08)
NCS HC26803	30.10	2.14	5.98	4.06	.	30.78	(10.59)	.	.	1.30	.	.	0.52	.	.	.	.
IRSID 2702	28.70	12.60	16.54	15.80	(2.53)	17.80	6.08	1.260	(0.750)	(1.47)	0.071	3.61	.	(0.180)	(0.490)	0.564	(1.26)
NCS HC26802	23.08	14.14	12.71	9.94	.	17.93	(3.86)	.	.	5.86	.	.	2.94	.	.	.	.
NCS HC26801	18.96	16.99	19.97	18.14	.	12.89	(4.47)	.	.	1.39	.	.	9.86	.	.	.	.

**RM****CONTINUOUS CASTING POWDER**

typical analysis listed in mass %

100 g units

Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Ca	F	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	S	SrO	TiO <sub>2</sub>	Other
DH X2802	57.50	3.09	25.15	0.074	0.488	0.830	0.981	0.030	1.097	0.060	0.132	0.020	0.055	ZnO: 0.004
DH X2801	55.0	3.58	23.08	0.047	0.467	1.092	4.80	0.033	1.33	0.044	0.245	0.019	0.069	BaO: 0.019

**RM****COVER POWDER**

analysis listed in mass %

100 g units

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Mn <sub>3</sub> O <sub>4</sub>	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	S	SiO <sub>2</sub>	SrO	TiO <sub>2</sub>
DH 5905	19.32	46.50	0.435	0.321	9.17	0.051	.	0.039	0.074	22.93	.	0.035
DH 5906	14.34	33.29	0.598	0.210	19.38	0.052	0.32	0.037	0.061	30.78	0.015	0.037

## COKE

# = class, where 1 = CRM and 2 = RM i = individually certified

#	Number		S	Heat	Vol.Matter	Ash	C	H	N	P	Units
1	AR 2721-211018	Green Petroleum	5.43	.	.	.	.	.	.	.	50 g
1	AR 756-561117	Green Petroleum	5.00	14,204	BTU	6.85	(0.60)	87.89	1.89	1.79	50 g
1	SRM 2718a	Green Petroleum	4.690	(35,000)	J/g	.	(1)	(90)	(3.725)	(1)	50 g
1	AR 2720-201013	Green Petroleum	4.34	.	.	.	.	.	.	.	50 g
1	AR 747-747919	Green Petroleum	3.66	14,919	BTU	10.97	0.41	88.46	3.11	1.45	0.0019
1	AR 2719-7192160	Calcined	2.50	.	.	.	.	.	.	.	50 g
2	AR 2716-716703	Green Petroleum	2.47	.	.	.	.	.	.	.	50 g
2	AR 2717-717102	Green Petroleum	2.21	.	.	.	.	.	.	.	50 g
2	COCO SRM012	Metallurgical	2.16	.	.	7.14	20.45	.	.	.	0.066
2	COCO SRM014		2.13	.	.	2.68	4.55	.	.	.	0.016
2	COCO SRM011	Metallurgical	1.69	.	.	5.53	17.56	.	.	.	0.042
1	NCS FC28015		1.69	.	.	2.11	7.04	.	.	.	
2	COCO SRM015		1.66	.	.	6.6	23.04	.	.	.	0.031
1	NCS FC28014		1.55	.	.	3.47	27.15	.	.	.	
1	VS R18/4		1.34	.	.	.	12.45	.	.	.	0.037
2	COCO SRM018		1.22	.	.	5.93	15.96	.	.	.	0.044
1	AR 724-724517	Metallurgical	1.21	.	.	.	.	.	.	.	
1	NCS FC28134		1.20	28,240	J/g	2.00	14.40	.	.	.	0.026
2	AR 2715-715901	Green Petroleum	1.20	.	.	.	.	.	.	.	
1	AR 742B-742271	Green Petroleum	1.11	15,697	BTU	12.91	(0.14)	91.58	4.06	1.78	.
1	NCS FC28133		1.00	29,180	J/g	1.79	12.30	.	.	.	0.024
1	SRM 2719	Calcined Petroleum	0.8877	(32,900)	J/g	(0.54)	(0.12)	(97.06)	(0.16)	(1.17)	.
1	AR 2714-714318	Green Petroleum	0.88	.	.	.	.	.	.	.	
1	NCS FC28118a		0.87	29,100	J/g	2.05	12.01	.	.	.	0.022
1	SRM 2776		0.825	.	.	(0.98)	(8.06)	(89.15)	(0.26)	(1.21)	.
1	NCS FC28019B		0.81	28,740	J/g	1.68	13.20	.	.	.	0.022
1	AR 2772-772920		0.80	12,777	BTU	(1.0)	9.19	88.39	(0.15)	1.14	
1	AR 734-734920		0.80	12,777	BTU	(1.0)	9.19	.	.	.	
1	NCS FC28121a		0.77	28,580	J/g	1.44	13.42	.	.	.	0.018
1	AR 720-720317	Metallurgical	0.77	.	.	.	.	.	.	.	
2	COCO SRM017		0.76	.	.	1.27	10.19	.	.	.	0.012
2	COCO SRM007	Metallurgical	0.76	.	.	1.40	11.74	.	.	.	0.023
1	AR 719-191109		0.61	.	.	.	.	.	.	.	
1	NCS FC28120a		0.68	28,540	J/g	1.48	13.51	.	.	.	0.022
1	NCS FC59001		0.63	.	.	1.39	7.22	.	.	.	
1	NCS FC28117a		0.60	28,190	J/g	1.62	15.15	.	.	.	
1	SRM 2775		0.5816	.	.	(1.31)	(5.77)	(91.34)	(0.41)	(1.16)	.
1	AR 2771-711014		0.57	13,178	BTU	(0.79)	7.53	89.89	(0.23)	1.08	
1	NCS FC28132a		0.50	29,160	J/g	1.40	12.26	.	.	.	0.030
1	AR 745-745418	Green Petroleum	0.49	14,861	BTU	5.79	(0.09)	95.92	1.91	0.80	
1	AR 732-732514	Metallurgical	0.47	13,242	BTU	1.15	6.57	.	.	.	
1	NCS FC59002		0.47	.	.	1.5	12.62	.	.	.	
1	AR 723-723110		0.47	.	.	.	.	.	.	.	
1	CZ SF-05-14	13,074 BTU/lb	0.45	30,410	J/g	1.28	7.84	90.40	0.20	0.98	
2	COCO SRM004	Metallurgical	0.44	.	.	1.17	11.56	.	.	.	0.019
2	AR 2712-7120497	Calcined	0.43	.	.	.	.	.	.	.	
2	COCO SRM016		0.42	.	.	1.58	11.53	.	.	.	0.021
2	COCO SRM010	Metallurgical	0.39	.	.	1.50	11.62	.	.	.	0.022
2	COCO SRM013	Metallurgical	0.39	.	.	1.49	11.45	.	.	.	0.021
2	COCO SRM008	Metallurgical	0.39	.	.	1.38	11.47	.	.	.	0.019
2	COCO SRM006	Metallurgical	0.39	.	.	1.06	11.40	.	.	.	0.016
2	COCO SRM009	Metallurgical	0.38	.	.	1.51	11.48	.	.	.	0.020
2	COCO SRM005	Metallurgical	0.38	.	.	1.41	11.36	.	.	.	0.017
2	COCO SRM002	Metallurgical	0.20	.	.	1.31	9.53	.	.	.	0.013

continued analysis for samples with more data

Number	Al	Fixed C	Ca	Cl	Co	F	Fe	Na	Ni	O	Si	V	Zn
AR 756-561117	.	(92.55)	0.0091	.	.	.	0.0282	.	0.0281	.	0.0343	0.1651	.
SRM 2718a	(0.00154)	.	(0.01655)	.	(0.000571)	.	0.0287	0.00830	(0.01446)	.	(0.0050)	0.0310	.
AR 747-747919	0.0146	(88.62)	0.0241	(0.0031)	.	(0.0026)	0.0492	0.0051	0.0203	.	0.0418	0.0794	(0.0007)
AR 742B-742271	.	(86.59)	0.0062	.	.	.	0.0254	.	0.0188	.	0.0156	0.0111	.
SRM 2719	0.00589	.	0.00577	.	(0.0186)	.	0.0216	(0.00151)	0.0204	.	(0.013080)	0.00586	.
AR 2772-772920	.	(89.82)	.	(0.029)	.	.	.	.	.	(0.33)	.	.	.
AR 734-734920	.	(89.82)	.	.	.	.	.	.	.	.	.	.	.
AR 2771-711014	.	(91.68)	.	(0.024)	.	.	.	.	.	(0.7)	.	.	.
AR 745-745418	.	(94.12)	(0.0034)	.	.	.	0.0227	.	(0.0093)	.	(0.0064)	(0.0040)	.
AR 732-732514	.	(92.28)	.	.	.	.	.	.	.	.	.	.	.

continued analysis for samples with more data

Number	Al <sub>2</sub> O <sub>3</sub>	BaO	CaO	Cl	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	NiO	P <sub>2</sub> O <sub>5</sub>	PbO	SO <sub>3</sub>	SiO <sub>2</sub>	SrO	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	ZnO	Ins.Res
AR 2772	27.72	(0.15)	1.77	(0.029)	11.80	(1.89)	(0.97)	(0.13)	0.52	(0.1)	0.35	(0.01)	(1.34)	50.33	(0.14)	(1.59)	(0.2)	(0.02)	.
AR 2771	25.83	(0.21)	2.85	(0.024)	15.88	1.80	1.16	(0.12)	0.81	.	0.34	.	(1.68)	46.99	(0.13)	1.35	.	.	(0.85)
VS R18/4	.	.	.	.	.	0.128	.	.	0.051	.	.	.	.	.	.	.	.	.	.

## CRM

## COKE

analysis listed in mass % unless otherwise noted

50 g units

Number	S	P	Heat J/g	Vol.Matter	ASH	Al <sub>2</sub> O <sub>3</sub>	As	CaO	Cl	Cr	Cu
NCS FC28023	1.45	0.018	27,550	2.24	16.20	5.27	0.00024	0.57	0.022	0.0021	0.0018
NCS FC28027	0.89	0.026	28,120	1.65	14.83	.	.	.	.	.	.
NCS FC28022a	0.84	0.018	29,160	2.10	11.81	3.97	0.00020	0.56	0.053	0.0022	0.0017
NCS FC28026	0.79	0.031	28,950	1.36	12.18	.	.	.	.	.	.
NCS FC28020a	0.66	0.028	29,090	1.53	12.32	4.33	0.00013	0.65	0.042	0.0034	0.0020
NCS FC28019a	0.67	0.027	28,950	1.42	11.62	4.08	0.00012	0.45	0.026	0.0017	0.0019
NCS FC28025	0.62	0.021	29,320	1.45	11.50	.	.	.	.	.	.
NCS FC28024	0.41	0.041	28,170	1.98	15.43	.	.	.	.	.	.

continued analysis for samples with more data

Number	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	Ni	Pb	SiO <sub>2</sub>	SrO	TiO <sub>2</sub>	V
NCS FC28023	0.90	0.11	0.099	0.0044	0.067	0.0010	0.0008	8.15	0.0084	0.20	0.0037
NCS FC28022a	0.62	0.068	0.17	0.012	0.081	0.0008	0.0006	5.60	0.0088	0.19	0.0031
NCS FC28020a	0.61	0.055	0.13	0.0080	0.14	0.0009	0.0005	5.56	0.013	0.20	0.0035
NCS FC28019a	0.58	0.057	(0.10)	0.0055	0.078	0.0009	0.0007	5.48	0.0095	0.18	0.0028

**CRM COKE**

analysis listed in mass % except \* which is mg/kg

Number	Al%	Ca%	Cd*	Co*	Cr*	Cu*	Fe%	K%	Mg%	Mn%	Na%	Ni*	P%	Pb*	Si%	Ti%	V*	Zn*
NCS FC28131	2.72	0.29	<1	7	11	16	0.51	0.094	0.046	0.008	0.050	13	0.015	.	3.22	0.12	27	18
NCS FC28129	2.34	0.60	.	7	15	21	0.75	0.093	0.11	0.021	0.13	15	0.020	14	2.97	0.12	41	11
NCS FC28130	1.96	0.52	<1	6	12	17	0.63	0.061	0.11	0.015	0.063	12	0.022	.	2.35	0.099	34	11

**COKE ASH**

analysis listed in mass %

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Co <sub>3</sub> O <sub>4</sub>	Fe	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	SiO <sub>2</sub>	SrO	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	LOI
NCS FC28137	35.62	2.82	.	.	5.02	0.78	0.53	0.070	0.47	0.24	.	47.81	.	1.38	0.033	.
NCS FC28136	30.66	6.00	.	.	7.51	0.61	1.50	0.16	0.70	0.41	.	41.61	.	1.37	0.050	.
NCS FC28135	29.95	5.67	.	.	7.23	0.76	1.25	0.18	1.18	0.31	.	42.87	.	1.41	0.049	.
DH 3713	26.33	4.16	0.011	.	8.57	4.120	2.94	0.172	0.568	0.215	S:0.228	49.74	0.056	1.095	0.060	.
DH 3711	13.79	11.60	0.007	7.79	.	3.29	8.69	0.189	3.08	0.607	0.091	43.5	0.103	2.78	0.058	0.52

Number	C.tot	CO <sub>2</sub>	Cr <sub>2</sub> O <sub>3</sub>	CuO	NiO	ZnO	ZrO <sub>2</sub>	Units
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NCS FC28137	.	.	.	.	.	.	.	CRM, 5 g
NCS FC28136	.	.	.	.	.	.	.	CRM, 5 g
NCS FC28135	.	.	.	.	.	.	.	CRM, 5 g
DH 3713	.	.	0.046	0.037	0.026	0.232	0.028	RM, 100 g
DH 3711	0.039	0.045	0.036	0.009	0.030	0.010	0.041	RM, 100 g

**CRM DUST**

Number	Type	Al	Al <sub>2</sub> O <sub>3</sub>	As	C	CaO	Co	Cr	Cr <sub>2</sub> O <sub>3</sub>	Cu	CuO	F	Fe	FeO	K
VS E2	Converter	(0.07)	.	(0.002)	1.383	7.97	(0.003)	(0.1)	.	(0.04)	.	(0.5)	56.4	6.2	(0.2)
VS E1	Electric Furnace	.	3.06	(0.004)	0.684	5.85	(0.03)	.	20.3	(0.1)	.	(0.7)	29.7	(21)	(0.1)

Number	MgO	MnO	Na	Ni	NiO	P	Pb	S	SiO <sub>2</sub>	Sn	TiO <sub>2</sub>	V	V <sub>2</sub> O <sub>5</sub>	Zn	Units
VS E2	1.64	1.41	(0.1)	(0.03)	.	0.065	0.276	0.116	1.76	(<0.0005)	.	(0.01)	.	0.59	100 g
VS E1	9.3	1.56	(0.1)	.	3.68	(0.02)	(0.05)	0.072	10.3	(<0.0005)	2.79	(0.04)	.	(0.2)	150 g

**RM DUST**

typical analysis listed in mass % \* samples list Cu as CuO and Ni as NiO DH 6203-6205: 20 g all others: 100 g

Number	Type	Al <sub>2</sub> O <sub>3</sub>	C	CO <sub>2</sub>	CaO	Cl	Cr <sub>2</sub> O <sub>3</sub>	CuO	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	PbO	SiO <sub>2</sub>	TiO <sub>2</sub>	ZnO
DH X2901	Blast Furnace	0.961	.	.	5.28	.	0.038	.	0.778	1.147	0.119	0.153	0.006	4.28	0.068	0.267
DH X2902	Blast Furnace	0.823	.	.	3.12	.	0.037	.	0.84	0.678	0.138	0.165	0.017	3.28	0.053	0.271
DH X2903	Blast Furnace	0.701	.	.	2.00	.	0.040	0.006	0.705	0.502	0.111	0.158	0.018	2.44	0.058	1.19
DH 6205	Cupola	1.30	6.80	3.84	4.91	2.88	0.041	0.163	3.68	1.85	2.26	0.147	2.43	34.52	0.060	21.01
DH 6206 *	Cupola	0.220	2.57	.	0.090	.	0.048	2.021	0.086	0.020	0.085	0.191	.	0.430	0.014	91.1
DH 6203	Electric Furnace	2.57	4.22	1.01	1.23	2.00	0.004	0.311	2.51	3.10	5.12	0.52	1.05	15.65	0.517	12.32

continued

Number	F	Fe	Fe <sub>2</sub> O <sub>3</sub>	Mn	Mn <sub>3</sub> O <sub>4</sub>	MoO <sub>3</sub>	NiO	S	SO <sub>3</sub>	SnO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	-H <sub>2</sub> O
DH X2901	.	59.37	.	0.367	.	.	0.015	0.488	.	.	0.020	.
DH X2902	.	61.67	.	0.341	.	.	0.016	0.577	1.44	.	.	.
DH X2903	.	63.01	.	0.425	.	.	0.012	0.392	.	.	0.020	.
DH 6205	0.096	.	9.49	.	2.57	0.013	.	.	2.70	0.018	0.019	0.107 at 900°C last
DH 6206 *	.	.	0.572	0.04	0.061	.	0.297	0.305	.	0.047	.	1.17 at 900°C
DH 6203	0.570	.	36.85	.	4.97	.	.	.	5.29	.	0.004	0.214 at 900°C last of stock

**CRM FLUE DUST**

informational analysis listed in mass %

30 g units

Number	Type	Al <sub>2</sub> O <sub>3</sub>	CO <sub>2</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	SO <sub>3</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>
BL 12-1-11	Sinter Plant	4.00	8.60	6.77	3.18	1.23	2.22	0.03	4.11	1.15	65.58	0.23
BL 12-1-10	Foundry	1.64	5.39	12.80	60.95	0.28	7.59	0.16	0.15	2.22	9.80	0.075

continued

certified analysis listed in mg/kg

Number	Ag	As	Ba	Cd	Co	Cr	Cu	Mo	Ni	Pb	Sb	Sn	Sr	V	Zn
BL 12-1-11	(8)	(8)	160	(3)	8	3910	27	(10)	36	(25)	(43)	(58)	56	50	
BL 12-1-10	(1)	(8)	(150)	5	31	189	76	(4)	47	56	(3)	(40)	(50)	(33)	86

**CRM FURNACE DUST**

analysis listed in mass %

100 g units

Number	Ag	Al	As	Bi	C	Ca	Cd	Cl	Co	Cr	Cu	F	Fe	H <sub>2</sub> O	Hg
ECRM 876-1	.	0.034	0.023	.	.	3.43	.	.	.	0.17	0.42	.	24.85	.	.
ECRM 880-1	.	1.28	.	.	.	3.15	.	0.085	.	0.027	0.005	0.034	31.0	.	.
ECRM 884-1	0.0028	0.379	0.0054	0.0280	(0.82)	5.22	0.0045	0.991	0.0046	1.86	0.1569	0.411	31.67	(0.30)	(0.0002)

continued

Number	K	Mg	Mn	Mo	Na	Ni	P	Pb	S	Si	Sn	Ti	V	Zn	LOI
ECRM 876-1	1.63	1.31	2.84	.	1.98	0.034	0.128	.	0.87	1.72	.	0.048	.	23.29	.
ECRM 880-1	0.108	0.714	0.218	.	0.041	0.014	0.038	0.017	0.425	3.34	.	0.081	.	0.064	.
ECRM 884-1	0.979	1.848	5.85	0.208	0.585	0.197	0.079	0.442	(0.49)	2.100	0.0186	0.0230	0.0303	17.50	(2.94)

**CRM INDOOR DUST**

analysis listed in mg/kg

8 g units

Number	As	Cd	Cr	Hg	Pb
SRM 2584	17.4	10.0	135.0	5.20	9761
SRM 2583	7.0	7.3	80	1.56	85.9

**CRM ROAD DUST**

analysis listed in mg/kg except \* which is µg/kg

Number	Pd*	Pt*	Rh*	Cd	Co	Hf	Mo	Rb	Sb	Th	V	Y	Units
BCR 723	6.1	81.3	12.8	(2.5)	(29.8)	(2.2)	(40.0)	(75)	(28.2)	(4.8)	(74.9)	(12.5)	25 g

continued analysis listed in mass %

Number	Al	Ba	Cr	Fe	Mn	Ni	Pb	Sr	Ti	Zn	Moisture
BCR 723	(3.75)	(0.046)	(0.0440)	(3.29)	(0.128)	(0.0171)	(0.0866)	(0.0254)	(0.258)	(0.166)	(~3%)

**CRM USED AUTOMOBILE EXHAUST CATALYST**

mg/kg

Number	Pb	+/-	Pd	+/-	Pt	+/-	Rh	+/-	Units
SRM 2557	13931	97	233.2	1.9	1131	11	135.1	1.9	70 g
SRM 2556	6228	49	326.0	1.6	697.4	2.3	512	0.5	70 g
BAM M504b	.	.	1128	9	1159	8	314.2	2.6	200 g
FLX CRM133	.	.	1075	33	465	32	242	4	30 g

**RM ELECTRODE CARBON**

Number	Size Analysis	Ash	Bulk Density	Relative Density	Moisture	Volatile Matter	Units
ACIRS EC	<1% @ +212 im	2.8%	1028 g/L	2.08	0.2%	0.8%	1 kg

**ELECTRONIC SCRAP POWDER**

analysis listed in mass %

200 g units

Number	Ag	As	Au	Be	Cd	Cr	Cu	Hg	In	Ni	Pb	Pd	Pt	Sn
BAM M505a	0.0633	0.0372	0.00524	0.00068	0.00164	0.980	16.76	<(0.0005)	(0.0043)	0.694	1.13	0.00480	0.00057	0.468

**FERROBORON**

# = class, where 1 = CRM and 2 = RM typical analysis

#	Number	B	Al	C	Cr	Cu	Fe	Mn	Ni	P	S	Si	Sn	Ti	V	W	Zn	Units
1	VS F21/2	20.91	1.546	0.047	.	0.012	.	.	.	0.0119	.	0.73	0.0055	.	.	.	0.0055	100 g
1	NCS HC11612	20.82	0.018	0.086	.	.	.	0.305	.	0.020	0.0018	0.353	.	.	.	.	.	70 g
1	NCS HC25658	20.58	0.99	0.022	.	.	.	.	.	0.017	0.0016	1.68	.	.	.	.	.	50 g
2	DH 1705	20.23	0.085	0.62	0.925	0.072	75.71	0.416	0.097	0.061	.	1.011	.	0.025	0.006	0.127	.	50 g
1	NCS HC28632	19.33	0.185	0.19	0.26	0.050	.	0.575	0.056	0.027	0.0020	0.65	.	0.030	0.010	.	.	50 g
2	DH 1704	19.13	0.064	0.322	0.038	0.013	79.74	0.299	0.012	0.015	.	0.229	.	0.011	.	0.015	.	50 g
1	NCS HC28631	18.92	0.036	0.40	0.025	0.015	.	0.310	0.013	0.025	0.0023	0.18	.	0.017	0.0090	.	.	50 g
1	NCS HC93623	18.69	0.083	0.45	.	.	.	.	.	0.025	0.0044	0.44	.	0.019	.	.	.	50 g
1	ECRM 587-1	18.67	0.047	0.738	0.104	.	.	0.272	.	0.020	.	0.129	.	0.039	0.004	.	.	100 g
1	IARM FBP-20	18.4	0.049	0.39	0.13	0.010	77.0	0.25	0.012	.	(0.004)	(0.66)	0.0027	0.28	(0.005)	0.0022	.	100 g
1	NCS HC11613	17.65	0.035	0.181	.	.	.	0.35	.	0.030	0.0023	0.549	.	.	.	.	.	70 g
1	VS F22/3	8.95	7.78	0.161	.	3.43	.	.	.	0.021	0.018	7.82	.	.	.	.	.	100 g

**FERROCHROMIUM**

# = class, where 1 = CRM and 2 = RM

chips as noted

all others: powder

#	Number	Cr	Al	C	Co	Cu	Fe	Mn	N	Ni	P	S	Si	Ti	V	Units	
1	IRSID 509-1	72.85	.	0.012	.	.	.	.	0.029	.	(0.019)	.	0.230	.	.	100 g	
1	VS F11/4	71.41	.	0.119	.	.	27.20	0.161	0.035	.	0.362	0.023	0.0021	0.68	.	0.084	100 g
2	DH 1602	71.20	0.017	8.12	Nb:0.006	.	19.38	0.103	W:0.038	.	0.304	0.014	Mg:0.049	0.153	0.009	0.102	50 g
1	IPT 65	71.2	9.2	0.051	0.016	.	17.9	0.128	.	.	0.077	0.006	0.016	0.71	.	.	100 g
1	BCS 203/6	71.01	.	0.0270	0.0442	.	.	0.153	.	0.218	0.0195	0.004	0.381	.	0.0729	100 g	
1	SRM 196	70.83	.	0.035	.	.	.	.	.	.	0.020	0.003	0.373	.	.	100 g	
1	IRSID 507-1	70.30	.	5.40	.	.	.	0.270	0.049	.	0.017	.	1.20	.	.	100 g	
2	DFS 1	69.8	.	0.0549	H:(0.0024)	.	O:(0.56)	0.0973	.	(0.027)	(0.0017)	(0.87)	.	.	.	50 g	
2	DFS 2	69.6	.	9.03	.	.	O:(0.2)	(0.0178)	.	(0.021)	(0.0174)	(0.2)	.	.	.	50 g	
1	VS F47/1	69.3	.	8.60	.	.	.	0.024	.	0.029	0.042	0.106	.	.	.	100 g	
1	JSS 733-1	69.24	.	8.35	.	.	.	.	.	0.0219	0.0248	(0.262)	.	.	.	150 g	
1	NCS HC37618	69.12	.	8.44	.	.	.	.	.	0.026	0.026	0.30	.	.	.	50 g	
1	VS F45	69.0	0.041	0.071	.	.	.	.	0.082	.	0.027	0.0024	1.10	.	.	100 g	
1	VS F35/2	68.9	.	0.79	.	.	28.16	0.38	0.185	.	0.027	0.0022	0.181	.	.	100 g	
1	IARM FCrP-20	68.8	.	8.6	0.036	0.0040	20.6	0.12	(0.013)	0.32	0.019	0.027	0.33	O:0.43	Mg:0.12	100 g	
1	BCS 204/6	68.77	.	8.57	0.0359	.	.	0.225	.	0.289	0.0164	0.0190	0.715	0.0565	0.094	100 g	
1	NCS HC93604	68.13	.	0.038	.	.	.	0.103	.	0.260	0.022	0.015	0.466	0.016	.	50 g	
1	SRM 64c	68.00	(0.006)	4.698	0.0515	0.0053	24.99	0.1624	0.0449	0.429	0.0193	0.0673	1.216	0.0179	0.1528	100 g	
1	NCS HC26607b	65.86	.	7.23	.	.	.	0.38	.	0.29	0.017	0.020	2.18	0.15	.	50 g	
1	NCS HC25603b	65.27	.	7.37	0.044	.	24.90	0.31	.	0.39	0.020	0.015	1.27	0.104	0.138	50 g	
1	NCS HC37607	64.32	.	0.086	.	.	.	0.35	.	.	0.034	0.005	1.39	.	.	40 g	
1	VS F50	64.3	0.168	0.079	.	.	.	.	11.2	.	0.0048	0.0058	1.29	.	.	100 g	
2	DFS 3	64.2	.	(0.068)	.	.	O:(3)	9.71	.	(0.023)	(0.016)	(0.54)	.	.	.	50 g	
1	NCS HC11606	64.17	.	6.37	.	.	.	0.32	.	0.023	0.013	4.29	.	.	.	100 g	
1	NCS HC37608	64.06	.	0.243	.	.	.	0.34	.	0.039	0.019	0.99	.	.	.	40 g	
1	NCS HC37615	63.50	.	8.78	.	.	.	.	.	0.023	0.025	0.78	0.097	.	.	50 g	
1	NCS HC25636a	62.81	.	0.078	0.16	0.032	35.56	0.39	.	0.34	0.028	0.0052	0.32	.	0.098	50 g	
1	NCS HC25644	62.57	.	0.0064	.	.	.	.	8.69	.	0.024	0.029	0.75	.	.	50 g	
1	NCS HC28621	62.54	.	7.78	.	.	27.09	0.307	.	.	0.026	0.033	1.45	0.166	0.138	50 g	
1	NCS HC25653	62.49	.	8.70	.	.	.	0.11	.	0.025	0.024	0.15	0.016	.	.	50 g	
1	NCS HC37609	61.54	.	8.49	.	.	.	0.20	.	0.024	0.015	2.15	0.24	.	.	40 g	
1	NCS HC93611	60.42	.	8.13	.	.	.	0.21	.	0.022	0.059	0.92	.	.	.	50 g	
1	NCS HC28622	60.00	.	7.72	.	.	28.65	0.340	.	0.025	0.033	2.43	0.261	0.153	.	50 g	
1	NCS HC93605	59.71	.	8.00	.	.	.	0.308	.	0.312	0.037	0.037	2.94	0.410	.	50 g	
1	NCS HC37617	59.35	.	8.32	.	.	.	.	.	0.021	0.040	1.91	.	.	.	50 g	
1	NCS HC11610	58.83	.	0.040	.	.	.	0.313	4.76	.	0.020	0.042	0.525	.	.	70 g	
1	NCS HC93609	58.28	.	8.36	.	.	.	0.207	.	0.023	0.068	1.15	.	.	.	50 g	
1	NCS HC14615a	57.44	.	8.00	.	.	31.46	0.24	.	0.23	0.017	0.015	1.96	.	0.28	50 g	
1	NCS HC28619	56.76	.	7.28	.	.	30.22	0.300	.	.	0.023	0.024	4.25	0.412	0.203	50 g	
1	NCS HC14615	56.16	.	8.07	.	.	.	0.23	.	0.017	0.045	2.30	.	.	.	50 g	
1	NCS HC14614	55.81	.	7.67	.	.	.	0.28	.	0.018	0.032	2.57	.	.	.	50 g	
1	NCS HC28620	55.77	.	7.60	.	.	31.41	0.382	.	0.022	0.031	3.95	0.423	0.175	.	50 g	
1	NCS HC14613	54.04	.	7.56	.	.	.	0.18	.	0.020	0.032	2.58	.	.	.	50 g	
1	<b>BS 130/1</b>	51.6	.	7.12	.	(0.015)	.	1.25	.	Mo:(0.005)	0.014	0.034	4.41	(0.38)	(0.32)	100 g	
1	AMIS 0392	50.1	.	.	.	.	36.81	.	.	.	.	.	2.01	0.409	(0.3346)	100 g	
1	<b>BS 130/3</b>	49.01	.	6.47	.	(0.01)	.	0.76	.	Mo:(0.003)	0.015	0.028	6.20	(0.41)	(0.38)	100 g	
1	SARM 144	49	.	.	.	.	36.9	0.33	.	0.21	.	.	5.31	0.67	0.37	100 g	
1	VS F38	.	.	4.62	.	.	.	.	.	.	.	.	.	.	.	100 g	
1	VS F12/3	.	.	0.289	.	.	.	.	.	.	.	.	.	.	.	100 g	
1	VS F10/2	.	.	0.018	.	.	.	.	.	.	.	.	.	.	.	100 g	
1	VS F9/2	.	.	0.012	0.042	.	.	.	.	.	.	.	.	.	.	100 g	

#	Number	Cr	Al	C	Co	Cu	Fe	Mn	N	Ni	P	S	Si	Ti	V	Units
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**CRM FERRONICKEL**

Number	Ni	N	C	Co	Cr	Cu	Fe	Mn	P	S	Si	V	Units
VS F41	91.4	0.058	0.0124	2.04	.	0.47	5.68	.	.	0.132	.	.	powder 100 g
NCS HC11617	16.45	.	1.85	0.241	1.87	0.021	.	0.041	0.037	0.213	3.11	.	powder 60 g
NCS HC28059	13.96	.	2.17	0.320	1.71	0.038	.	0.066	0.014	0.276	2.72	0.027	chips 75 g
NCS HC11616	13.34	.	2.12	0.247	1.98	0.022	.	0.051	0.039	0.283	3.25	.	powder 60 g
NCS HC28057	12.25	.	2.15	0.226	2.77	0.022	.	0.065	0.020	0.235	4.10	0.034	chips 75 g
NCS HC25656	12.16	.	3.06	.	3.62	.	.	.	0.046	0.245	1.04	.	powder 50 g
NCS HC11618	10.70	.	1.65	0.198	1.56	0.021	.	0.053	0.032	0.211	2.54	.	powder 60 g
NCS HC28058	10.19	.	2.87	0.236	1.68	0.033	.	0.072	0.110	1.00	2.07	0.027	chips 75 g
NCS HC35609	10.01	.	2.58	0.29	2.25	0.023	.	0.16	0.054	0.288	2.30	.	powder 50 g

**FERRONIUBIUM**

# = class, where 1 = CRM and 2 = RM

\* notes the total of Nb+Ta

#	Number	Nb	Fe	Si	Al	C	Cr	Cu	Mn	P	Pb	Sn	Ta	Ti	V	W	Zr
1	NCS HC25650	66.34	.	1.01	0.89	0.074	.	0.023	.	0.085	.	.	(0.081)	0.49	.	.	.
1	NCS HC18606	66.24	.	1.09	1.35	0.070	.	.	0.29	0.159	.	.	0.084	0.78	.	.	.
1	NCS HC11609	64.89	.	1.34	0.711	0.114	.	0.059	0.37	0.172	.	.	0.087	0.870	.	.	.
1	NCS HC93607	64.60	.	1.04	1.50	0.101	.	0.038	.	0.194	.	.	0.097	0.585	.	.	.
1	VS F20/3	63.5*	33.3	0.67	0.35	0.136	.	.	.	0.039	.	0.0014	63.5*	0.292	.	.	.
1	ECRM 579-1	62.87	.	1.03	1.86	0.037	.	.	.	0.064	.	0.344	3.85	0.567	.	.	.
1	ECRM 576-1	43.90	.	1.79	2.53	0.201	.	.	.	.	.	0.195	0.306	1.32	.	.	.

Number	Co	Mg	Mo	N	Ni	S	Units
NCS HC25650	.	.	.	.	.	0.028	50 g
NCS HC18606	.	.	.	.	.	0.008	50 g
NCS HC11609	.	.	.	.	.	0.014	70 g
NCS HC93607	.	.	.	.	.	0.013	50 g
VS F20/3	0.0056	.	.	0.067	.	0.0091	100 g
ECRM 579-1	0.005	.	.	.	.	0.021	100 g
ECRM 576-1	.	.	.	.	.	.	100 g

**CRM FERROPHOSPHORUS** analysis listed in mass %

Number	P	C	Cr	Mn	S	Si	Ti	Units
NCS HC93622	27.50	0.228	0.226	0.70	0.017	0.156	0.53	50 g
SRM 90	26.2	.	.	.	.	.	.	75 g
NCS HC11614	25.81	0.032	.	0.638	0.0038	0.60	2.14	70 g
NCS HC11615	21.49	0.130	.	1.07	0.061	0.382	0.62	70 g
VS F28/2	16.05	.	.	1.20	0.021	1.11	.	100 g

**FERROTITANIUM**

# = Class, where 1 = CRM and 2 = RM

#	Number	Ti	Al	Sol.Al	C	Co	Cr	Cu	Fe	Mn	P	S	Si	V	Zr
2	DH 2409	72.74	2.93	.	.	.	0.384	0.074	19.27	0.192	0.004	.	0.180	1.167	0.383
1	VS F30/4	70.3	3.83	.	0.154	.	0.154	0.065	21.51	0.189	0.0030	0.0054	0.163	2.29	0.231
1	NCS HC15601	70.02	0.3	.	0.057	.	0.039	0.037	26.57	0.106	0.0071	0.0047	1.47	0.011	.
1	NCS HC19604	43.81	10.64	.	0.041	.	.	.	.	1.59	0.051	0.011	3.46	0.158	.
1	NCS HC19605	38.81	8.61	.	0.032	.	.	0.025	.	0.81	0.032	0.009	4.20	0.303	.
1	ECRM 584-1	37.17	7.19	(6.0)	0.044	.	.	.	.	1.13	0.032	0.030	1.80	.	.
1	NCS HC93608	32.22	3.00	.	0.095	.	.	0.281	.	0.255	0.014	0.015	0.30	.	.
1	VS F43	31.9	11.11	.	0.098	.	0.354	0.336	.	1.22	0.038	0.0058	2.50	0.152	0.059
1	NCS HC26613	30.24	8.13	.	0.019	.	.	(0.005)	.	1.11	0.020	0.012	1.84	0.19	.
1	NCS HC18604	27.93	5.38	.	0.065	.	.	0.117	.	2.67	0.043	0.013	4.68	.	.
1	NCS HC28638	27.34	7.82	.	0.033	.	0.055	.	.	0.362	0.015	0.0048	4.51	0.15	.
1	VS F42	27.13	11.41	.	0.055	.	2.22	1.32	.	1.1	0.05	0.023	6.74	.	.
1	IRSID 510-1	26.95	(4.9)	.	0.058	.	.	.	.	.	(0.035)	.	4.65	.	.
1	NM 341	24.91	5.54	.	.	.	.	.	.	.	.	.	2.55	.	.
1	<b>BS FeTi-1</b>	20.0	12.5	.	0.57	(0.03)	0.33	0.60	.	7.7	(0.05)	(0.009)	2.8	0.69	3.7
1	<b>BS FeTi-2</b>	19.6	12.6	.	0.455	0.037	0.30	0.43	.	7.9	(0.05)	(0.01)	3.2	0.76	3.8

Number	B	Ca	Mg	Mo	N	Nb	Ni	Pb	Sn	W	Zn	Units
DH 2409	.	.	0.070	0.814	.	0.072	0.047	.	0.246	.	.	50 g
VS F30/4	.	.	.	0.60	0.38	.	0.053	.	0.077	.	.	100 g
NCS HC15601	.	.	.	0.028	.	.	0.29	.	.	.	.	50 g
NCS HC19604	.	.	.	.	.	.	.	.	0.056	.	.	100 g
NCS HC19605	.	.	.	.	.	.	.	.	0.061	.	.	100 g
ECRM 584-1	.	.	.	.	.	.	.	.	.	.	.	100 g
NCS HC93608	.	.	.	.	.	.	.	.	.	.	.	50 g
VS F43	.	.	.	0.0036	0.085	.	.	.	0.013	.	0.032	100 g
NCS HC26613	.	.	.	.	.	.	.	.	.	.	.	50 g
NCS HC18604	.	.	.	.	.	.	.	.	.	.	.	50 g
NCS HC28638	.	.	.	.	.	.	.	.	.	.	.	50 g
VS F42	.	.	.	0.106	.	.	.	.	0.33	0.129	.	100 g
IRSID 510-1	.	.	.	.	.	.	.	.	.	.	.	100 g
NM 341	.	.	.	.	.	.	.	.	.	.	.	100 g
<b>BS FeTi-1</b>	0.60	1.14	(0.4)	0.058	0.144	(0.05)	0.17	.	0.11	.	(0.03)	100g
<b>BS FeTi-2</b>	1.10	0.98	(0.4)	0.15	(0.15)	0.036	0.156	.	0.160	.	(0.03)	100g

**17025, 17034****17025, 17034**

**CRM FERROTUNGSTEN**

Number	W	Si	Al(tot)	As	C	Cu	Fe	Mn	Mo	P	Pb	S	Sb	Sn	Units
ECRM 555-1	79.9	1.75	0.14	.	0.025	.	(15.2)	.	.	(0.02)	.	(0.018)	.	0.034	100 g
ECRM 590-1	79.55	1.05	(0.36)	.	0.0250	0.0484	.	0.136	0.101	.	.	.	.	0.045	100 g
NCS HC25606a	76.24	0.34	.	0.041	0.036	0.079	.	0.102	.	0.033	.	0.052	.	0.041	50 g
VS F48	71.0	0.47	0.64	0.037	0.074	0.096	.	0.695	0.047	0.035	0.0048	0.211	0.014	0.031	100 g

**FERROVANADIUM**

# = Class, where 1 = CRM and 2 = RM

#	Number	V	Fe	Si	Al	C	Cr	Cu	Mg	Mn	Mo	N	Ni	P	S
1	ECRM 591-2	84.28	13.86	0.246	.	0.0206	.	0.0036	.	0.0207	.	.	0.0086	0.0050	0.0037
1	NCS HC93629	80.90	.	0.86	1.33	0.032	.	.	.	0.046	.	.	.	0.036	0.014
2	DH 2510	80.85	14.25	0.894	0.783	0.120	0.201	0.038	0.010	1.154	0.029	.	0.009	0.051	0.016
1	NCS HC11608	79.27	.	0.653	1.41	0.109	.	0.0089	.	0.106	.	.	0.010	0.021	0.035
2	DH 2511	78.91	14.85	1.900	0.991	0.305	0.173	0.176	.	0.165	0.040	.	0.084	0.019	0.026
1	VS F40/1	77.2	.	0.89	1.29	0.115	0.21	0.074	.	1.26	.	0.185	.	0.035	0.017
1	ECRM 593-1	67.05	(23.5)	4.73	.	0.555	.	0.166	(0.023)	0.861	0.422	.	0.451	0.116	0.198
1	NCS HC28633	54.02	.	0.682	0.0026	0.285	0.110	0.054	.	0.663	.	.	0.011	0.056	0.0044
1	NCS HC26608c	53.78	.	0.81	(0.0025)	0.17	0.71	.	.	2.00	.	.	.	0.043	0.0040
1	JSS 750-3	52.83	.	0.290	(3.04)	(0.1282)	.	.	.	.	.	.	.	0.0148	0.0079
1	NCS HC19606	51.14	.	0.68	0.084	0.565	0.32	.	.	0.43	.	.	.	0.087	0.010
1	NCS HC26608b	50.57	.	0.84	(0.002)	0.22	0.70	.	.	1.64	.	.	.	0.051	0.0044
1	NCS HC93628	50.24	.	0.730	6.10	0.130	.	.	.	0.474	.	.	.	0.042	0.016
1	ECRM 577-1	50.16	.	1.79	0.414	0.089	.	0.054	.	0.158	.	.	0.053	0.035	0.034
1	NCS HC93628a	50.09	.	0.730	6.03	0.152	.	.	.	0.475	.	.	.	0.043	0.017
1	NCS HC37616	49.72	.	0.50	5.18	0.081	.	.	.	0.58	.	.	.	0.016	0.012
1	NCS HC11607	49.40	.	1.67	.	0.235	.	0.022	.	0.321	.	.	.	0.121	0.010
1	NCS HC18608	48.93	.	0.76	0.158	0.40	.	.	.	0.26	.	.	.	0.049	0.043
1	NCS HC28634	47.32	.	1.89	0.0061	0.475	0.289	0.064	.	0.365	.	.	0.067	0.093	0.014
1	<b>BS FeV 45</b>	45.1	33.7	4.90	0.017	0.241	5.82	0.40	0.014	4.12	0.0079	0.26	4.32	(0.13)	0.334
1	VS F19/3	42.6	.	1.47	(0.005)	0.418	1.21	0.204	.	3.30	.	.	.	0.059	0.0102
1	<b>BS FeV 42</b>	42.2	39.2	3.77	(0.05)	0.297	5.18	0.31	0.059	3.37	0.023	0.19	3.87	0.127	0.31
1	VS F32/3	40.2	(40)	(1.2)	(<0.05)	(0.4)	.	(0.2)	.	3.14	.	7.51	.	(0.05)	(0.008)
1	VS F51	.	.	68.9	1.00	.	.	.	.	.	.	.	.	.	Ca: 1.30 Ba: 3.8

Number	As	B	Ca	Co	Nb	Pb	Ti	W	Zn	Units
ECRM 591-2	0.0045	0.00048	.	.	.	.	0.0017	.	0.0181	100 g
NCS HC93629	.	.	.	.	.	.	.	.	.	25 g
DH 2510	.	.	0.008	0.013	.	.	0.071	0.025	.	50 g
NCS HC11608	0.0024	.	.	.	.	.	.	.	.	70 g
DH 2511	.	.	0.040	0.009	.	.	0.047	0.028	.	50 g
VS F40/1	.	.	.	.	.	.	.	.	.	100 g
ECRM 593-1	0.0028	0.0052	.	.	.	.	0.0147	.	0.0088	100 g
NCS HC28633	0.0017	.	0.022	.	.	0.0006	.	.	.	50 g
NCS HC26608c	.	.	.	.	.	.	.	(0.004)	.	50 g
JSS 750-3	.	.	.	.	.	.	.	.	.	150 g
NCS HC19606	.	.	.	.	.	.	.	.	.	50 g
NCS HC26608b	.	.	.	.	.	.	.	(0.0024)	.	50 g
NCS HC93628	.	.	.	.	.	.	.	.	.	30 g
ECRM 577-1	.	.	.	.	.	.	.	.	.	100 g
NCS HC93628a	.	.	.	.	.	.	.	.	.	30 g
NCS HC37616	.	.	.	.	.	.	.	.	.	50 g
NCS HC11607	0.021	.	.	.	.	.	.	.	.	70 g
NCS HC18608	.	.	.	.	.	.	.	.	.	50 g
NCS HC28634	0.024	.	0.115	.	.	0.0004	.	.	.	50 g
<b>BS FeV 45</b>	(0.013)	.	0.010	.	.	.	0.021	.	.	100 g
VS F19/3	0.0009	.	.	.	.	.	.	.	.	100 g
<b>BS FeV 42</b>	(0.01)	.	(0.052)	.	.	.	0.033	.	.	100 g
VS F32/3	(<0.001)	.	.	.	.	.	.	.	.	100 g
VS F51	.	.	.	.	.	.	.	.	.	100 g

**CRM RARE EARTH FERROSILICON**

\* VS F31/2 lists Rare Earth Oxides

Number	RE	Si	Fe	Ca	Mg	Mn	Ti	Al	C	Ce	Cu	La	Units
VS F31/3 *	39.0	39.6	16.26	1.76	0.320	.	.	7.60	0.032	15.65	0.51	.	100 g
NCS HC39601	20.09	40.31	20.81	3.21	9.50	2.72	1.50	.	.	.	.	.	100 g
NCS HC28615	20.00	41.02	.	5.60	.	0.390	0.235	.	.	.	.	.	100 g
NCS HC28609	8.66	43.90	(31.67)	1.01	10.20	0.70	0.54	.	.	.	.	.	80 g
NCS HC28612	6.42	43.44	(36.43)	0.90	8.25	0.63	0.435	.	.	.	.	.	80 g
NCS HC28611	5.10	43.22	(40.7)	0.84	5.70	0.55	0.362	.	.	.	.	.	80 g

**FERROSILICOALUMINUM, FERROSILICOCALCIUM, FERROSILICOCHROMIUM, and FERROSILICOTITANIUM**

# = class, where 1 = CRM and 2 = RM

DH, NCS: 50 g units VS: 100 g units

#	Number	Si	Fe	Ca	Cr	Ti	Al	C	Cu	Mg	Mn	Mo	Ni	P	S	V	Zr
2	DH 2902	59.25	24.80	0.220	0.059	11.21	0.613	0.284	0.022	0.234	1.64	0.126	0.043	0.010	0.005	0.154	0.046
2	DH 2901	56.73	26.58	0.200	0.062	12.03	0.597	0.183	0.021	0.210	1.72	0.149	0.044	0.013	0.005	0.161	0.046
1	VS F25/3	51.5	23.06	21.3	.	.	0.67	.	.	.	.	.	.	0.011	0.0056	.	.
2	DH 5403	40.46	20.93	0.028	36.93	0.124	0.579	0.034	0.020	.	0.41	.	0.190	0.022	.	0.074	0.005
1	VS F24/2	49.9	.	.	29.2	.	0.9	0.02	.	.	.	.	.	0.03	0.002	.	.
1	NCS HC93635	27.36	26.23	.	.	.	38.51	1.90	.	.	0.18	.	.	0.072	0.015	.	.
1	NCS HC93636	26.11	.	.	.	.	36.22	0.11	.	.	1.70	.	.	0.021	0.0071	.	.



**CRM WELDING FLUX**

Number	Al <sub>2</sub> O <sub>3</sub>	C	CaF <sub>2</sub>	CaO	Fe	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P	S	SiO <sub>2</sub>	TiO <sub>2</sub>	Units
VS SH15	35.2	.	15.5	18.4	.	0.72	0.22	0.91	15.88	1.28	0.0066	0.011	15.07	5.65	100 g
VS SH7/3	29.8	.	28.5	24	.	0.56	0.94	11.4	0.4	1.41	0.011	0.031	23.4	.	100 g
VS SH8/4	26.5	0.039	68.6	52.7	0.147	.	.	.	.	.	0.013	0.013	1.77	.	100 g
VS SH6/2	3.00	.	7.71	12.72	.	1.3	.	1.6	38.5	.	0.069	0.0092	39.2	.	125 g

**CRM GLASS**

BCS 525: 25g powder    NCS: 50g powder    \*: 25g pieces    SRM: 45g powder    SV: 100g powder

Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	B <sub>2</sub> O <sub>3</sub>	BaO	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	Li <sub>2</sub> O	MgO	Na <sub>2</sub> O	PbO	SO <sub>3</sub>	TiO <sub>2</sub>	ZnO	ZrO <sub>2</sub>	LOI	Other
SRM 92	(75.0)	(1.5)	0.70	.	(8.3)	.	.	(0.6)	.	(0.1)	(13.1)	.	.	.	(0.2)	.	(0.42)	R <sub>2</sub> O <sub>3</sub> =Al <sub>2</sub> O <sub>3</sub>
SGT G10 *	72.7	1.62	.	0.02	10.7	0.020	0.325	0.35	1.81	12.2	.	0.05	0.097	.	(0.024)	.	.	.
SGT G7 *	72.64	1.50	.	11.03	.	.	0.044T	0.43	0.14	13.90	.	0.19T	0.042	.	.	.	0.07	.
BCS 533 *	72.57	1.447	.	0.0024	9.66	.	0.0191	0.0293	.	2.16	13.66	.	0.221	0.0393	.	.	.	.
BCS 525	72.55	0.167	.	0.0041	8.91	.	0.0166	0.087	.	4.28	13.43	.	0.284	SrO:0.0038	0.0045	.	.	Mn <sub>3</sub> O <sub>4</sub> : 0.0012
SGT G11 *	70.7	1.83	.	0.03	10.3	0.205	0.342	0.69	2.14	13.6	.	0.06	0.068	.	(0.015)	.	.	.
SGT G4 *	69.49	3.02	0.19	.	4.24	.	0.099	0.57	<0.05	15.45	.	<0.05	0.041	3.28	.	0.22	.	F: 4.96
SV 4003	59.49	0.119	(0.02)	(0.003)	(0.014)	(0.0006)	0.017	12.34	.	(0.006)	1.85	23.97	.	0.019	1.55	0.025	.	As <sub>2</sub> O <sub>3</sub> : 0.161
SGT G8 *	56.34	0.05	0.36	.	<0.02	.	0.010T	11.85	.	<0.02	0.23	30.59	.	0.02	.	.	0.21	As <sub>2</sub> O <sub>3</sub> : 0.32T
NCS DC61104	53.98	14.50	8.87	.	16.54	.	0.34	0.59	.	4.40	0.096	.	.	0.19	.	.	0.26	F: 0.54

**GLASS**

# = class, where 1 = CRM and 2 = RM    analysis listed in mass %

#	Number	Type	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	B <sub>2</sub> O <sub>3</sub>	BaO	CaO	CdO	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	PbO	SO <sub>3</sub>	SrO	TiO <sub>2</sub>	ZnO
1	SRM 93a	Borosilicate	80.8	2.28	12.56	.	0.01	.	0.014	0.005	3.98	.	.	.	0.014	.
2	JCRM R102	Borosilicate	80.5	2.27	12.7	.	.	.	0.029	.	3.99	.	.	.	0.011	.
1	SRM 1831	Soda-Lime	73.08	1.21	.	.	8.20	.	0.33	3.51	13.32	.	0.25	.	0.019	.
1	SRM 1830	Soda-Lime	73.07	0.12	.	.	8.56	.	0.04	3.90	13.75	.	0.26	.	0.011	.
1	SGT G10D	Soda-Lime	72.7	1.62	.	0.02	10.7	.	0.35	1.81	12.2	.	0.05	.	0.097	.
1	SGT G7D	Soda-Lime	72.64	1.50	.	.	11.03	.	0.43	0.14	13.90	.	0.19	.	0.042	.
1	SRM 620	Soda-Lime	72.08	1.80	.	.	7.11	.	0.41	3.69	14.39	.	0.28	.	0.018	.
1	BCS 534	Float Glass	71.62	0.428	.	0.0094	9.92	.	0.234	3.40	13.95	.	0.222	.	0.0233	.
1	SGT G11D	Soda-Lime	70.7	1.83	.	0.03	10.3	.	0.69	2.14	13.6	.	0.06	.	0.068	.
1	SGT G4D	Soda-Lime	69.49	3.02	0.19	.	4.24	.	0.57	<0.05	15.45	.	<0.05	.	0.041	3.28
1	SRM 1411	Borosilicate	58.04	5.68	10.94	5.00	2.18	.	2.97	0.33	10.14	.	.	0.09	0.02	3.85
1	SRM 1412	Multicomponent	42.38	7.52	4.53	4.67	4.53	4.38	4.14	(4.69)	4.69	4.40	.	4.55	.	4.48

Number	As <sub>2</sub> O <sub>3</sub>	Cl	Cr <sub>2</sub> O <sub>3</sub>	F	FeO	Fe <sub>2</sub> O <sub>3</sub>	Li <sub>2</sub> O	ZrO <sub>2</sub>	Units
SRM 93a	0.060	.	.	.	0.016	0.028 (T.Fe)	.	0.042	1 Disc 32 mm Ø x 6 mm
JCRM R102	0.057	.	.	.	0.033	0.033	.	0.032	11 Rods 5 mm Ø x ~95 mm
SRM 1831	.	.	.	.	0.025	0.087 (T.Fe)	.	.	3 Plates 37 mm x 37 mm x 3 mm
SRM 1830	.	.	.	.	0.032	0.121 (T.Fe)	.	.	3 Plates 38 mm x 38 mm x ~6 mm
SGT G10D	.	.	0.020	.	.	0.325	.	(0.024)	1 Disc 40 mm Ø
SGT G7D	.	.	.	.	.	0.044 (T.Fe)	.	.	1 Disc 40 mm Ø    LOI: 0.07
SRM 620	0.056	.	.	.	.	0.043	.	.	3 Plates 35 mm x 35 mm x 3 mm
BCS 534	.	.	.	.	.	0.057	.	.	1 Disc 40 mm Ø x 5 mm
SGT G11D	.	.	0.205	.	.	0.342	.	(0.015)	1 Disc 40 mm Ø
SGT G4D	.	.	.	4.96	.	0.099	.	.	1 Disc 40 mm Ø    LOI: 0.22
SRM 1411	.	.	.	.	.	0.050	.	.	10 Plates 32 mm x 32 mm x 3 mm
SRM 1412	.	.	.	.	.	(0.031)	(4.50)	.	8 Plates 32 mm x 32 mm x 3 mm

**CRM GLASS DISC**

analysis listed in mg/kg except % for mass %

38 mm Ø x 4 mm

Number	Al%	As	Ba	Ca%	Cd	Ce	Co	Cr	Cu	Fe	K%	Mg%	Mn	Mo	Na%	Ni	P	Pb	Sb	Se	Si%	Sn	Sr	Ti	V	Zn	Zr
BAM S005C	0.587	81	102	7.43	47	80	33.2	10.8	86	295	0.595	1.37	69.6	215	10.33	41.3	(8.3)	182	103	(2.5)	33.1	72.9	134	101	189	157	544

**CRM GLASS DISC**

analysis listed in mass %

analysis listed in mg/kg

~40 mm Ø x ~3 mm

Number	Si	Al	B	Ba	Ca	K	Li	Mg	Na	Sr	Zn	Ag	As	Cd	Cr	Fe	Ga	P	Pb	S	Sb	Se
SRM 1412a	27.68	4.63	1.23	0.102	2.85	3.27	1.86	2.33	2.93	3.42	3.10	80	84	72	59	88.1	<10	<5	176	(20)	138	(40)

**CRM TRACE ELEMENTS IN GLASS**

analysis listed in mg/kg    glass plate 50 mm x 50 mm x 7 mm

Number	As	Ba	Cd	Cl	Co	Cr	Pb	Sb	Se
BCR 664	5.9	29.1	5.7	68.4	2.77	2.65	53.1	24.3	8.6

**CRM FLOAT GLASS FOR DETERMINATION OF ABRADABILITY INDEX**

Number	Mass Loss	Units
ASCRM 002-1	1.26 g	plate, 6 x 50 x 75 mm
ASCRM 002-2	13.55 g	plate, 10 x 100 x 100 mm

**CRM                    HEXAVALENT CHROMIUM IN GLASS**

Number	Hexavalent Cr	Cr	Al <sub>2</sub> O <sub>3</sub>	BaO	CaO	Cr <sub>2</sub> O <sub>3</sub>	Cu	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	SiO <sub>2</sub>	SO <sub>3</sub>	ZnO	Units
BAM S004	0.0094	0.0471	(2.15)	(1.2)	(9.4)	(0.07)	(0.04)	(0.06)	(0.16)	(0.90)	(14.5)	(70.9)	(0.17)	(0.33)	chips 50g

**CRM                    IRON IN FLAT SODA LIME GLASS**

Number	Fe	FeII	FeII as Fe <sub>2</sub> O <sub>3</sub>	FeIII	Units
BAM S052	0.597	0.164	(0.234)	(0.433)	100 mm x 50 mm x 3.2 mm
BAM S051	0.0481	0.0158	(0.0226)	(0.0323)	100 mm x 50 mm x 5.9 mm
BAM S050	0.0084	0.0027	(0.0038)	(0.0057)	100 mm x 50 mm x 3.2 mm

**CRM                    MULTI-ELEMENT GLASS DISCS**

listed in mg/kg                    each unit contains uncertified 72% SiO<sub>2</sub>, 12% CaO, 14% Na<sub>2</sub>O, and 2% Al<sub>2</sub>O<sub>3</sub>                    each sample is 4 wafers ~13 mm Ø

3 mm	1 mm	Ag	Au	B	Ba	Cd	Ce	Co	Cu	Dy	Er	Eu	Fe	Ga	Gd	K	La
SRM 610	SRM 611	(254)	(25)	(351)	.	.	.	(390)	(444)	.	.	.	458	.	.	(461)	.
SRM 612	SRM 613	22.0	(5)	(32)	(41)	.	(39)	(35.5)	(37.7)	(35)	(39)	(36)	51	.	(39)	(64)	(36)
SRM 614	<del>SRM 615</del>	0.42	(0.5)	(1.30)	.	(0.55)	.	(0.73)	1.37	.	.	(0.99)	(13.3)	(1.3)	.	30	(0.83)
SRM 616	SRM 617	.	(0.18)	(0.20)	.	.	.	.	(0.80)	.	.	.	(11)	(0.23)	.	29	(0.034)

  

3 mm	1 mm	Mn	Nd	Ni	Pb	Rb	Sb	Sc	Sm	Sr	Th	Ti	Tl	U	Yb	Zn
SRM 610	SRM 611	485	.	458.7	426	425.7	.	.	.	515.5	457.2	(437)	(61.8)	461.5	.	(433)
SRM 612	SRM 613	(39.6)	(36)	38.8	38.57	31.4	.	.	(39)	78.4	37.79	(50.1)	(15.7)	37.38	(42)	.
SRM 614	<del>SRM 615</del>	.	.	(0.95)	2.32	0.855	(1.06)	(0.59)	.	45.8	0.748	(3.1)	(0.269)	0.823	SRM 615	SOLD OUT
SRM 616	SRM 617	.	.	.	1.85	(0.100)	(0.078)	(0.026)	.	41.72	0.0252	(2.5)	(0.0082)	(0.0721)	.	.

**CRM                    URANIUM IN GLASS**

analysis listed in mg/kg                    15 mm Ø x 2 mm

Number	U
IRMM 540R	15.0

**CRM                    GLASS SAND**

T = Total

SRM 89: 45 g

other SRM: 75 g

all others: 100 g units

Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	BaO	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Mn <sub>3</sub> O <sub>4</sub>	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	PbO	SO <sub>3</sub>	TiO <sub>2</sub>	ZrO <sub>2</sub>	LOI
BCS 531	99.74	0.0327	0.00112	0.0040	.	0.00636	0.0039	0.00132	0.00014	.	.	0.00082	SRM:0.00017	0.0160	.	.	.
UNS SPS	99.32	0.248	.	0.029	.	0.037	0.058	0.0071	.	.	0.045	.	.	0.035	.	.	0.167
BCS 516	98.73	0.513	0.0040	0.0243	0.0081	0.0596	0.127	0.0387	.	0.0012	0.0195	(0.013)	0.0127	.	0.175	(0.075)	0.24
BCS 528	95.62	2.447	0.0298	0.237	0.0008	0.1111	0.875	0.0887	.	.	0.101	(0.20)	0.0006	.	0.0486	(0.014)	0.271
SRM 1413	82.77	9.90	0.12	0.74	.	0.24	3.94	0.06	.	.	1.75	.	.	0.11	.	.	.
SRM 89 *	65.3	0.15	1.4	0.19	0.051	0.048	8.32	0.033	0.08	.	5.7	0.23	17.43	0.03	0.013	(0.004)	(0.32)
SRM 81a	.	0.66	.	.	0.0046	0.082	.	.	.	.	.	.	.	.	0.12	0.034	.
SRM 165a	.	0.059	.	.	.	0.012	.	.	.	.	.	.	.	.	0.011	0.006	.

\* SRM 89 also contains As<sub>2</sub>O<sub>3</sub>: 0.04, As<sub>2</sub>O<sub>5</sub>: 0.36, Cl: 0.051

**RM                    GRAVEL**

typical analysis listed in mass %

100 g units

Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CO <sub>2</sub>	CaO	Co <sub>3</sub> O <sub>4</sub>	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Mn <sub>3</sub> O <sub>4</sub>	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	S	TiO <sub>2</sub>	-H <sub>2</sub> O 900°C
DH 3610	98.80	0.234	.	0.008	.	0.030	0.419	0.014	.	0.009	<0.003	.	0.009	.	0.153
DH 3609	96.44	1.46	0.010	0.047	0.005	0.029	0.703	0.334	0.104	0.020	0.045	0.019	.	0.086	0.48

**HARDGROVE GRINDABILITY INDEX**

Class	Set Number	HGI	HGI	HGI	HGI	Units
CRM	NCS AG82001i-4i	sample 1i: 39	sample 2i: 62	sample 3i: 69	sample 4i: 89	250 g of each 1i - 4i
RM	ACIRS H9	sample A : 30	sample B : 45	sample C : 62	sample D : 87	1 kg of each sample
RM	COCO HGI SET	sample 29: 37	sample 35: 53	sample 25: 62	sample 41: 91	1 kg of each sample

**RM HARDGROVE GRINDABILITY INDEX**

individually available in 1 kg units

Number	HGI	Number	HGI	Number	HGI	Number	HGI	Number	HGI
COCO HGI 025	62	COCO HGI 030	58	COCO HGI 006	54	COCO HGI 034	52	COCO HGI 015	46
COCO HGI 013	61	COCO HGI 004	56	COCO HGI 014	53	COCO HGI 012	51	COCO HGI 023	46
COCO HGI 036	61	COCO HGI 003	55	COCO HGI 035	53	COCO HGI 020	51	COCO HGI 032	46
COCO HGI 008	60	COCO HGI 019	55	COCO HGI 038	53	COCO HGI 027	48	COCO HGI 033	46
COCO HGI 009	59	COCO HGI 037	55	COCO HGI 024	52	COCO HGI 022	47	COCO HGI 029	37
								COCO HGI 010	31

**CRM HARDNESS TEST BLOCKS**

for NCS items, please indicate desired hardness when ordering

NOTE: we are unaware of any 17034 blocks, please inform if any are available

Number	Scale	Available Range	Units (mm)
NCS HBW	Brinell Hardness W	(8-650)	100 x 80 x 16
NCS HL	Leeb Hardness	(200-900)	90 Ø x 55
NCS HLG	Leeb Type G Hardness	(300-750)	120 Ø x 70
<del>NCS HRN</del>	<del>Rockwell Hardness A</del>	<del>(20-86)</del>	<del>60 x 40 x 10</del>
NCS HRB	Rockwell Hardness B	(20-100)	60 x 40 x 10
BS TRM-3	Rockwell Hardness B	86.3	300 x 300 x ~2
NCS HRC	Rockwell Hardness C	(20-70)	60 x 40 x 10
NCS HR15N	Rockwell Superficial Hardness 15N	(70-94)	60 x 40 x 10
NCS HR30N	Rockwell Superficial Hardness 30N	(42-86)	60 x 40 x 10
NCS HR45N	Rockwell Superficial Hardness 45N	(20-77)	60 x 40 x 10
<b>BS TRM-4</b>	Rockwell Superficial Hardness 15T	71.9	300 x 300 x ~2 <b>17025</b>
NCS HR15T	Rockwell Superficial Hardness 15T	(67-93)	60 x 40 x 10
NCS HR30T	Rockwell Superficial Hardness 30T	(29-82)	60 x 40 x 10
NCS HR45T	Rockwell Superficial Hardness 45T	(1-72)	60 x 40 x 10
NCS HSD	Shore Hardness	(5-105)	65 x 52 x 15
NCS HV	Vickers Hardness	(5-1000)	60 x 40 x 10
NCS HVM	Vickers Microhardness	(5-1000)	25 x 25 x 6

**CRM INCINERATED WASTE**

analysis listed in mg/kg

30 g powder

Number	As	Ba	Be	Cd	Co	Cr	Cu	Hg	Mo	Ni	Pb	Sb	Se	Sn	Sr	V	Zn
BL 12-1-12	45	3600	(8)	(60)	23	731	375	7.8	(10)	198	(1389)	(67)	4	(815)	(233)	(69)	10450

informational analysis listed in mass %

Number	Al <sub>2</sub> O <sub>3</sub>	CO <sub>2</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>
BL 12-1-12	(11.92)	(11.05)	(13.68)	(4.44)	(3.23)	(3.41)	(0.46)	(2.56)	(1.77)	(2.22)	(41.78)	(1.14)

**CRM IMPACT**

approximate analysis

Class	Number	Energy	Uncertainty	Temperature	Units	Type
CRM	LNE 160J	160.0 J	4.8 J	n/a	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
CRM	ERM-FA415	155.1 J	4.6 J	20 'C +/- 2'	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
CRM	ERM-FA016	122.0 J	3.6 J	20 'C +/- 2'	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
CRM	LNE 120J	121.7 J	3.5 J	n/a	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
CRM	ERM-FA015	79.8 J	2.4 J	20 'C +/- 2'	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
CRM	LNE 70J	75.3 J	2.8 J	n/a	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
CRM	ERM-FA013	28.1 J	0.8 J	20 'C +/- 2'	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
CRM	LNE 25J	21.1 J	0.9 J	n/a	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
CRM	SRM 2115	13 - 25 J	1.4 J	21 'C +/- 1'	5 pcs of 10 mm x 10 mm x 75 mm	IZOD beam last of stock

**CRM LAYER THICKNESS**

BCR: 2 sets of 4 Tantalum foils, 5 mm x 10 mm NMIJ: 13-15 mm squares

Number	Material	Thickness	(+/-)	Layer 1	2	3	4	5	6	7	8
NMIJ 5202a	Si, SiO <sub>2</sub> multi layer	n/a nm	0.7 nm	(20.5)	20.0	20.5	19.9	20.4	surface oxide: (1.32)		
NMIJ 5203a	GaAs, AlAs multi layer	n/a nm	0.10 nm	(9.24)	9.65	9.51	9.64	9.51	9.62	.	.
NMIJ 5204b	GaAs, AlAs single layer	3.26 nm	0.41 nm	.	.	.	.	.	.	.	.
BCR 261T	Ta <sub>2</sub> O <sub>5</sub> single layer	1.72 nm	0.07 nm	30 nm material			.	.	.	.	.
BCR 261T	Ta <sub>2</sub> O <sub>5</sub> single layer	5.40 nm	0.12 nm	100 nm material			.	.	.	.	.

**CRM NANOSCALE LAYER THICKNESS**

last of stock

Number	Certified Values	Informational Data	Units
BAM L200	35 certified lengths from 3.5 - 4642 nm	5 informational lengths 1 - 5 nm	block 10 x 4 x 5 mm

**CRM LEAD PAINT FILMS**

sold in SET/6 only, thin paint film on polyester sheets

last of stock

~7cm wide and ~10 cm long

Number	film, Pb in mg/kg	film, Pb in mg/kg	film, Pb in mg/kg	film, Pb in mg/kg	film, Pb in mg/kg	film, Pb in mg/kg	film, Pb in mg/kg	film, Pb in mg/kg	film, Pb in mg/kg	film, Pb in mg/kg	film, Pb in mg/kg			
SRM 2579a	2571	3.58	2572	1.527	2572	1.527	2573	1.040	2574	0.714	2575	0.307	2570	<0.001

**RM ELECTROLYTIC MANGANESE**

typical analysis

50 g units

Number	Al	C	Co	Cr	Cu	Fe	Mn	Ni	P	S	Si	Zn	-H <sub>2</sub> O@900°C
DH 7701	(0.0015)	0.120	0.0012	0.411	0.0070	2.07	95.85	0.0068	0.056	0.0160	1.09	0.0011	0.019

**CRM MANGANESE METAL POWDER**

analysis listed in mass %

50 g units

Number	Mn	C	Cr	Cu	Fe	N	Ni	P	S	Se	Si
NCS HC15603a	97.43	0.081	0.010	0.0049	2.04	.	0.0020	0.017	0.0089	.	0.27
NCS HC15604a	93.65	0.062	0.0056	0.0032	5.07	.	0.0042	0.0044	0.020	.	0.31
NCS HC26615	91.56	0.007	.	.	0.039	7.84	.	.	0.031	0.049	0.009

**MELTING POINT**

Class Number Form Melting point °C

RM	501-951-1002	6 inch nickel wire	1455
CRM	<del>502-496-1029</del>	6 inch gold wire	1062 <del>17034</del>

**CRM NIOBIUM CARBIDE**

analysis listed in mass %							60 g units
Number	C	Cfree	H	N	O	S	
BAM S013	10.66	(0.10)	(0.0076)	(0.0031)	0.307	(0.0017)	

**CRM OXIDE**

analysis listed in mg/kg except % which is mass %														100 g units
Number	Notes	Ag	Al	As	B	Ba	Be	C	Ca	Cd	Ce	Cl	Co	Cr
BAM RS 1	SiO <sub>2</sub> > 99.99%	.	8.7	<0.1	.	.	.	.	0.42	<0.05	.	.	.	0.062
BAM RS 2	Al <sub>2</sub> O <sub>3</sub> = 99.76%	.	.	(<0.5)	(<5)	.	(<0.2)	.	3.1	(<0.5)	(<0.1)	(<10)	<1	<1.5
BAM RS 5	NiO	<1	(<15)	<0.2	.	<1	.	14	2.2	<0.2	.	.	<2	16.1
BAM RS 6A	MgO 100 - 350 μm	.	46	.	.	(<10)	.	(<50)	994	.	.	.	(<5)	9.2
BAM RS 6B	MgO 50 - 100 μm	.	49	.	.	(<20)	.	(<210)	956	.	.	.	(<5)	8.1

continued

Number	Cu	Fe	Ga	Ge	Hg	In	K	La	Li	Mg	Mn	Mo	Na	Ni	Pb
BAM RS 1	<0.1	0.62	.	<1	<0.05	.	0.48	.	0.25	<0.5	<0.2	.	<2	<0.2	<0.15
BAM RS 2	<2.5	3.3	(<2)	.	.	(<0.5)	(<5)	(<0.3)	<1	<3	<1.5	(<1)	<15	<10	.
BAM RS 5	1.53	41	<0.5	.	.	<1	<2	.	(<2)	<1	<1	<5	<2	78.57%	<2
BAM RS 6A	(<6)	72	.	.	.	.	.	.	.	60.19%	5.4	(<10)	.	3.9	(<5)
BAM RS 6B	(<6)	71	.	.	.	.	.	.	.	60.17%	5.2	(<10)	.	3.3	(<5)

continued

Number	S	Sb	Se	Si	Sn	Sr	Te	Ti	Tl	V	W	Zn	Zr
BAM RS 1	.	.	.	.	.	.	.	1.3	.	.	.	<1.3	<0.1
BAM RS 2	.	.	.	<20	(<1)	.	.	<2	.	(<1)	.	<2	3.2
BAM RS 5	(4)	(<0.1)	<1	(<5)	(<1)	(<1)	(<0.2)	(<2)	(<0.5)	<1	(<1)	3.4	(<1)
BAM RS 6A	.	.	.	.	.	2.0	.	1.3	.	8.4	.	(<6)	(<20)
BAM RS 6B	.	.	.	.	.	2.1	.	1.2	.	7.8	.	(<6)	(<105)



**CRM IRON OXIDE**

analysis listed in mass %

75 g units

Number	Fe <sub>2</sub> O <sub>3</sub>	FeO	Al	C	Ca	Cr	Cu	K	Mg	Mn	Ni	S	Si	Other Impurities
VS P26/2	99.49	<0.1	0.026	(0.005)	(0.005)	0.0194	0.0090	(0.001)	<0.005	0.292	0.024	(0.04)	0.0110	(0.1)

**CRM IRON OXIDE**

analysis listed in mass %

analysis listed in mg/kg

100 g units

Number	T.Fe	Cl	Mn	Al	Ca	Co	Cr	Cu	K	Mg	Mo	Na	Ni	P	Si	Sn	Ti	Zn
ECRM 686-1	69.44	0.095	0.231	407	97	19	182	38	24	27	7	58	127	78	83	25	14	4

**CRM NICKEL OXIDE**

certified analysis listed in mass % except \* which is mg/kg

25 g units

Number	Al	Co	Cr	Cu	Fe	Mg	Mn	Si	Ti	Bi*	Pb*	Se*
SRM 673	0.001	0.016	0.0003	0.002	0.029	0.003	0.0037	0.006	0.003	0.06	3.5	0.2

continued informational analysis in mg/kg

Certified values show concentrations in nickel oxide. To convert values to the percent concentration in total metal present, multiply the values by 1.29.

Number	Ag	As	Cd	Ga	Sb	Sn	Te	Tl	Zn
SRM 673	<0.1	0.4	0.05	<0.1	<0.5	<0.5	0.4	<0.1	1.7

**CRM SILICON OXIDE**

analysis listed in mass % except

Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe	MgO	MnO	TiO <sub>2</sub>	Units
IRSID 608-1	60.39	9.94	8.70	4.00	1.34	0.057	0.714	100 g

**CRM TITANIUM DIBORIDE**

analysis listed in mass %

powder 50 g

Number	Ti	B	B <sub>2</sub> O <sub>3</sub>	Al	C	Ca	Cr	Fe	Mg	Mn	Mo	Ni	O	V	Zr	InsRes
BAM S012	68.3	30.7	0.35	0.0012	(0.169)	0.0044	0.0097	0.064	0.00016	0.00038	0.00117	0.0023	(0.48)	0.00102	0.0121	(0.22)

**CRM VANADIUM PENTOXIDE**

analysis listed in mass %

NCS: 25-50 g units

SARM, VS: 100 g units

Number	V <sub>2</sub> O <sub>5</sub>	V <sub>2</sub> O <sub>4</sub>	V	Al <sub>2</sub> O <sub>3</sub>	C	CaO	Fe	Fe <sub>2</sub> O <sub>3</sub>	K	K <sub>2</sub> O	Na	Na <sub>2</sub> O	P	S	Si	SiO <sub>2</sub>	TiO <sub>2</sub>	Others
NCS HC19611	98.80	.	.	.	Cr:0.018	.	0.061	.	.	0.14	.	1.03	0.010	0.011	0.102	.	.	As: (<0.001)
NCS HC19610	96.68	.	.	.	Cr:0.099	.	0.43	.	.	0.18	.	0.96	0.007	0.014	0.40	.	.	As: (<0.001)
SARM 38	95.52	3.07	55.84	0.14	.	.	.	0.119	.	0.600	.	0.22	.	(0.0045)	.	0.11	.	MgO: 0.0037
VS R30	94.3	.	.	.	0.007	0.88	0.51	.	0.053	.	0.032	.	0.0064	0.0072	.	0.43	0.21	MnO: 2.58

**CRM PAPER**

AVAILABLE IN SET/20 ONLY

includes software for data processing

5 pages per sample, 8.5 x 11" each

last of stock

Number	dry TAPPI analysis listed in mass %							Total	400'C	900'C	Base Weight
	CaCO <sub>3</sub>	Kaolin	TiO <sub>2</sub>	Talc	Muscovite	Al <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>	Filler	Ash	Ash	g/m2
A	9.88	0.28	0.00	1.41	0.00	.	.	11.57	11.88	7.32	75
B	18.20	0.28	0.00	0.00	0.00	.	.	18.48	18.53	10.65	75
C	12.53	0.56	0.00	0.60	0.00	.	.	13.69	13.58	8.11	75
D	18.29	0.00	0.00	0.00	0.00	.	.	18.29	18.76	10.51	75
E	9.45	0.00	0.00	0.00	0.00	.	.	9.45	10.14	5.78	75
F	11.22	0.00	0.39	0.60	0.00	.	.	12.21	12.34	7.49	75
G	12.26	0.18	0.00	0.41	0.00	.	.	12.85	13.08	7.56	75
H	11.19	1.34	0.00	0.38	0.00	.	.	12.91	11.98	8.01	75
I	18.94	0.00	0.00	0.28	0.00	.	.	19.22	19.71	11.11	80
J	14.79	0.51	0.09	1.48	0.00	.	.	16.87	17.11	10.65	75
K	14.12	2.10	0.28	1.88	0.00	.	.	18.38	18.30	12.17	75
L	0.00	7.54	1.75	0.00	0.00	.	.	9.29	8.81	8.38	75
M	0.16	10.91	0.18	0.00	0.00	.	.	11.25	11.16	10.12	75
N	1.74	0.00	1.51	10.74	0.00	.	.	13.99	14.70	13.28	75
O	1.86	12.69	0.00	0.47	7.57	.	.	22.59	22.99	20.34	80
P	25.61	0.35	0.00	0.00	0.00	.	.	25.96	26.93	15.61	105
Q	0.00	0.30	38.60	0.00	0.00	2.70	1.87	43.47	43.39	43.13	85
R	0.13	19.02	0.25	0.00	0.65	.	.	20.05	20.21	17.56	45
S	0.14	32.04	0.42	0.00	1.08	.	.	33.68	33.57	29.43	60
BLANK	0.00	0.00	0.00	0.00	0.00	.	.	0.02	0.02	0.01	75

**CRM PARTICLE SIZE and MASS VOLUME in ALUMINA**

Number	Permeametry	BET Absorption	Obligatory Porosity	Size Range	Median Size
TL AA	2,300 cm <sup>2</sup> /g	5,000 cm <sup>2</sup> /g	0.57	1-64 Ø µm	12.7 Ø µm
TL AB	10,300 cm <sup>2</sup> /g	31,000 cm <sup>2</sup> /g	0.67	1-31.50 Ø µm	2.1 Ø µm

**CRM PARTICLE SIZE**

Number	Average Diameter, $\mu\text{m}$	Uncertainty, $\mu\text{m}$	Material	Units
SRM 1691	0.269	$\pm 0.007$	Polystyrene Spheres	5 mL

**CRM PARTICLE SIZE**

Number	Quartz Form	Certified Property	Size Range in Microns	Unit Size
BCR 066	Powder	Stokes' diameter	0.35 - 3.50	10 g
BCR 070	Powder	Stokes' diameter	1.2 - 20	10 g
BCR 067	Powder	Stokes' diameter	2.4 - 32	10 g
BCR 069	Powder	Stokes' diameter	14 - 90	10 g
BCR 130	Powder	Volume diameter	50 - 220	50 g
BCR 068	Sand	Volume diameter	160 - 630	100 g
BCR 131	Powder	Volume diameter	480 - 1800	200 g
BCR 132	Gravel	Volume diameter	1400 - 5000	700 g

**CRM PARTICLE SIZE**

Number	Percentage of Particles Under 20 Microns	Standard Deviation	Uncertainty @ 95% CL	Units
ASCRM 026	1.0	$\pm 0.1$	$\pm 0.2$	210 g

**CRM PARTICLE DENSITY, SURFACE AREA, AND SIZE DISTRIBUTION**

Number	Particle Density Picnometer Method	Blaine Area With EN 196-6	Particle Size by Laser Diffraction ISO 13320-1	Air Jet Sieving Alpine Test NF X11-640	Units
TL 1BGa	3.11 g/cm <sup>3</sup>	3396 cm <sup>3</sup> /g	11.4% @ 2.0 $\mu\text{m}$ - 99.9% @ 160 $\mu\text{m}$	71.4% @ 31.5 $\mu\text{m}$ - 100% @ 160 $\mu\text{m}$	20 x 5 g last

**RM PLASTER** analysis listed in mass % 100 g units

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	SiO <sub>2</sub>	SrO	TiO <sub>2</sub>	LOI
BCS 202A	0.33	37.4	0.10	0.10	0.39	<0.03	<0.01	53	1.38	0.33	0.03	7.0

**RM PLASTIC - POLYETHYLENE** analysis listed in mass % 50 g pellets

Number	Al	Ca	Cl	Cr	F	Fe	Mg	Na	P	S	Si	Ti	Zn
JSM P702-1	0.0012	0.0013	(0.0017)	0.0012	.	0.0015	0.0015	0.0012	0.0011	(0.0014)	(0.0008)	0.0009	0.0010
JSM P703-1	0.022	0.023	(0.018)	0.020	(0.018)	0.021	0.029	0.024	0.017	(0.021)	0.018	0.017	0.020

**CRM POROUS MATERIAL**

Number	Description	Units	Specific Pore Volume	Median Pore Diameter	Density
BAM P 128	Alumina Ceramic	6 Cylinders 7 g total	220 mm <sup>3</sup> /g	27.6 $\mu\text{m}$	(3.6405) g/cm <sup>3</sup>

## CRM POROUS MATERIALS and SURFACE AREA

Number	Description	Units	$A_{BET}$ ( $m^2/g$ ) BET Specific Surface Area	$V_p$ ( $cm^3/g$ ) Specific Pore Volume	$D_1$ (nm) Hydraulic Pore Diameter	$D_2$ (nm) Most Frequent Pore Diameter	$D_3$ (nm) Most Frequent Pore Diameter	(nm) Median Pore Width
BAM P 109	Activated Carbon	10g	1396	.	.	.	.	.
BAM P 105	Glass Material	10g	198.5	0.2327	4.69	4.38	5.80	.
BAM P 115	Titanium Dioxide	12g	147.3	0.214	5.79	4.75	5.40	.
BAM FD107	Faujasite Zeolite	10g	.	0.217 $cm^3/g-1$	.	.	.	0.86

Number	Description	Units	(nm) Mean Pore Radius	(nm) Most Frequent Pore Radius	( $cm^2/g$ ) Specific Surface Area	( $mm^3/g$ ) Pore Volume 100 Mpa	( $mm^3/g$ ) Pore Volume 195 Mpa	( $mm^3/g$ ) Pore Volume 200 Mpa	( $mm^3/g$ ) Pore Volume 395 Mpa
BAM PM 101	SiO <sub>2</sub>	10g	.	.	0.177	.	.	.	.
BAM PM 102	Alpha-Al <sub>2</sub> O <sub>3</sub>	10g	.	.	5.41	.	.	.	.
BAM FD 120	Alpha-Al <sub>2</sub> O <sub>3</sub>	10g	228.0	232.2	.	545.0	546.7	546.8	548.1
BAM FD 122	Porous glass	15g	139.0	140.2	.	919.7	922.5	922.6	924.4

## RoHS/WEEE SAMPLES

# = class, where 1 = CRM and 2 = RM analysis listed in mass %

#	Type	Units	Number	As	Br	Cd	Cr	Hg	Pb	Se	Sold As
1	ABS resin	pellets 25 g	NMIJ 8112a	.	.	0.000938	0.009447	0.009410	0.009498	.	individually
1	ABS resin	granules 100g	BAM H010 gran	.	0.0240	0.0093	0.0470	(0.0415)	0.0479	.	individually
1	ABS resin	40 mm Ø x 1 mm	BAM H010 1mm	.	0.0240	0.0093	0.0470	(0.0415)	0.0479	.	individually
1	ABS resin	40 mm Ø x 2 mm	BAM H010 2mm	.	0.0240	0.0093	0.0470	(0.0415)	0.0479	.	individually
1	ABS resin	40 mm Ø x 6 mm	BAM H010 6mm	.	0.0240	0.0093	0.0470	(0.0415)	0.0479	.	individually
1	ABS resin	40 mm Ø x 1-6 mm	BAM H010 set	.	0.0240	0.0093	0.0470	(0.0415)	0.0479	.	set of above 3 discs
1	polyester	40 mm Ø x 4 mm	JSAC 0631	.	.	0.00225	0.00258	0.00197	0.00245	.	set only
1	polyester	40 mm Ø x 4 mm	JSAC 0632	.	.	0.00461	0.00933	0.00594	0.00929	.	set only
1	polyester	chips 50 g	JSAC 0602-3	.	.	0.00506	0.01125	0.00121	0.01121	.	last, individually
2	polyethylene	31 or 40 mm Ø	ASI ROHS-PE3-1	.	0.0000	0.0000	0.0000	0.0000	0.0000	.	set only
2	polyethylene	31 or 40 mm Ø	ASI ROHS-PE3-2	.	0.0250	0.0050	0.0050	0.0050	0.0050	.	set only
2	polyethylene	31 or 40 mm Ø	ASI ROHS-PE3-3	.	0.0500	0.0100	0.0100	0.0100	0.0100	.	set only
1	low density polyethylene	pellets 100 g	ERM-EC681m	0.00170	0.143	0.0146	0.00451	0.00099	0.00697	also Cl S Sb Sn Zn, individually	
1	low density polyethylene	pellets 100 g	ERM-EC680m	0.00047	0.0181	0.00208	0.00096	0.000256	0.00113	also Cl S Sb Sn Zn, individually	
2	polyvinyl	31 or 40 mm Ø	ASI ROHS-PVC3-1	.	0.0000	0.0000	0.0000	0.0000	0.0000	.	set only
2	polyvinyl	31 or 40 mm Ø	ASI ROHS-PVC3-2	.	0.0250	0.0050	0.0050	0.0050	0.0050	.	set only
2	polyvinyl	31 or 40 mm Ø	ASI ROHS-PVC3-3	.	0.0500	0.0100	0.0100	0.0100	0.0100	.	set only
1	polyvinyl chloride	granules 21 g	FLX PVC1	Ca: (4.5)	.	<0.0001	Zn: (0.05)	.	0.0008	.	set or individually
1	polyvinyl chloride	granules 21 g	FLX PVC2	Ca: (4.7)	.	0.0035	Zn: (0.06)	.	0.0089	.	set or individually
1	polyvinyl chloride	granules 21 g	FLX PVC3	Ca: (4.6)	.	0.0085	Zn: (0.06)	.	0.00837	.	set or individually
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0611	.	.	0.00000	0.00000	.	0.00000	.	set only
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0612	.	.	0.00086	0.00243	.	0.00242	.	set only
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0613	.	.	0.00219	0.00488	.	0.00485	.	set only
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0614	.	.	0.00430	0.00966	.	0.00959	.	set only
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0615	.	.	0.00866	0.01941	.	0.01929	.	set only
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0621	.	.	.	.	(<0.0001)	.	.	set only
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0622	.	.	.	.	0.00100	.	.	set only
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0623	.	.	.	.	0.00490	.	.	set only
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0624	.	.	.	.	0.01211	.	.	set only
1	polyvinyl chloride	40 mm Ø x 4 mm	JSAC 0625	.	.	.	.	0.0244	.	.	set only
1	soil	powder 25 g	JSAC 0466	0.01093	.	0.01199	0.1483	0.01135	0.1214	0.1175	set only
1	soil	powder 25 g	JSAC 0465	0.0550	.	0.06074	0.0738	0.00578	0.6124	0.0587	set only
1	soil	powder 25 g	JSAC 0464	0.02711	.	0.03010	0.0499	0.00286	0.03027	0.02919	set only
1	soil	powder 25 g	JSAC 0463	0.01376	.	0.01468	0.0244	0.001476	0.01516	0.01415	set only
1	soil	powder 25 g	JSAC 0462	0.00715	.	0.00742	0.01496	0.000727	0.00737	0.00716	set only
1	soil	powder 25 g	JSAC 0461	0.002153	.	(0.000030)	0.00972	0.0000075	0.00244	(0.000044)	set only
1	aluminum	40 mm Ø x ~25 mm	IMN AA1	.	.	0.00759	0.0663	0.0614	0.0764	.	individually
1	aluminum	40 mm Ø x ~25 mm	IMN AA2	.	.	0.0126	0.453	0.124	0.412	.	individually
1	copper	40 mm Ø x ~25 mm	IMN CCC1	.	.	0.00495	0.0352	uncertified	0.0516	.	individually
1	copper	40 mm Ø x ~25 mm	IMN CCC2	.	.	0.0099	0.0696	uncertified	0.0987	.	individually
1	iron	35 x 35 x 20 mm	IMN FA1	0.0501	.	0.00114	0.0751	.	0.1087	.	individually
1	iron	35 x 35 x 20 mm	IMN FA2	0.0732	.	uncertified	0.0905	.	0.0941	.	individually
1	iron	35 x 35 x 20 mm	IMN FA3	0.1066	.	uncertified	0.1361	.	0.1536	.	individually
1	iron	35 x 35 x 20 mm	IMN FA4	0.1177	.	uncertified	0.1389	.	0.161	.	individually
1	tin	40 mm Ø x ~20 mm	IMN LE1	.	.	0.00763	0.00285	0.0661	0.1232	.	individually
1	tin	40 mm Ø x ~20 mm	IMN LE2	.	.	0.01376	(0.0042)	0.128	0.1265	.	individually
1	tin	40 mm Ø x ~20 mm	IMN LE3	.	.	0.00757	0.0703	0.0688	0.0731	.	individually
1	zinc	40 mm Ø x ~25 mm	IMN ZN1	.	.	0.00674	0.0614	0.0745	0.0732	.	individually
1	zinc	40 mm Ø x ~25 mm	IMN ZN2	.	.	0.0117	0.129	0.150	0.132	.	individually
1	zinc	50 mm Ø x 20 mm	41X ZSC6A	.	.	0.215	<0.0002	0.029	0.0077	.	individually
1	zinc	50 mm Ø x 20 mm	41X ZSC3A	.	.	0.119	0.0148	0.0021	0.0273	.	individually
1	zinc	50 mm Ø x 20 mm	41X ZSC1A	.	.	0.0288	0.0039	0.026	0.06	.	individually
1	zinc	50 mm Ø x 20 mm	41X ZSC4A	.	.	0.0131	0.0299	0.050	0.156	.	individually
1	zinc	50 mm Ø x 20 mm	41X ZSC2A	.	.	0.0016	0.0036	0.0053	0.111	.	individually

#	Type	Units	Number	As	Br	Cd	Cr	Hg	Pb	Se	Sold As
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## REFRACTORIES

# = class, where 1 = CRM and 2 = RM

#	Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	C	CO <sub>2</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Mn <sub>3</sub> O <sub>4</sub>	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	S	SO <sub>2</sub>	TiO <sub>2</sub>	ZrO <sub>2</sub>	LOI
1	IPT 63	96.28	0.48	.	.	2.21	0.52	0.043	0.18	0.008	.	0.013	0.013	.	.	0.030	(0.002)	0.17
1	IPT 51	55.0	40.3	.	.	0.06	1.19	0.69	0.20	.	.	0.09	0.09	.	.	2.19	0.070	0.16
1	SRM 76a	54.9	38.7	.	.	0.22	1.60	1.33	0.52	.	.	0.07	0.120	.	.	2.03	.	(0.34)
2	DH 2615	52.69	42.17	0.023	.	0.261	1.613	0.778	0.295	.	0.011	0.115	0.092	.	.	1.387	0.108	.
2	DH 2612	40.80	36.45	0.437	0.54	1.80	3.10	0.759	13.13	0.125	.	0.242	0.279	0.034	.	1.25	0.163	0.75
1	SRM 77a	35.0	60.2	.	.	0.05	1.00	0.090	0.38	.	.	0.037	0.092	.	.	2.66	.	(0.22)
2	DH 2613	25.83	42.78	1.779	0.53	2.31	2.57	0.404	21.03	.	0.122	0.118	0.122	0.066	.	1.199	.	.
1	IPT 57	24.3	71.5	.	.	0.05	1.25	0.83	0.13	.	.	0.35	0.054	.	.	1.19	0.20	0.20
2	DH 2609	23.41	63.82	0.739 T	0.170	2.25	1.75	0.526	4.17	0.282	.	0.220	0.339	.	0.121	1.27	0.097	.
1	SRM 78a	19.4	71.7	.	.	0.11	1.2	1.22	0.70	.	.	0.078	1.3	.	.	3.22	.	(0.42)
1	FLX CRM112	12.16	79.81	.	.	0.147	0.326	0.090	0.755	.	0.024	0.267	0.074	.	(0.04)	0.273	5.95	(5.42)
1	VS K6/4	2.12	0.54	.	.	2.95	2.26	.	92.4	.	.	.	.	.	.	.	.	.
1	FLX 139	0.61	96.2	.	.	0.47	0.11	.	0.24	.	.	0.14	.	.	.	0.04	0.58	.
1	FLX 140	0.48	1.48	.	.	0.05	.	0.098	0.20	.	.	0.23	.	.	.	0.16	89.6	.
1	VS K10/3	(0.2)	97	(0.05)	.	(0.03)	1.82	(0.03)	.	.	.	(0.5)	.	.	.	0.35	.	.

Number	Co <sub>3</sub> O <sub>4</sub>	CuO	Cr <sub>2</sub> O <sub>3</sub>	HfO <sub>2</sub>	La <sub>2</sub> O <sub>3</sub>	Li <sub>2</sub> O	NiO	SrO	V <sub>2</sub> O <sub>5</sub>	WO <sub>3</sub>	Y <sub>2</sub> O <sub>3</sub>	Units
IPT 63	.	.	.	.	.	(0.0005)	.	.	.	.	.	80 g
IPT 51	.	.	.	.	.	0.018	.	.	.	.	.	80 g
SRM 76a	.	.	.	.	.	0.042	.	0.037	.	.	.	75 g
DH 2615	BaO: 0.029	.	0.099	.	.	.	.	0.019	0.027	0.060	.	100 g
DH 2612	.	.	0.385	.	.	.	0.032	.	0.027	.	.	100 g
SRM 77a	.	.	.	.	.	0.025	.	0.009	.	.	.	75 g
DH 2613	.	0.004	0.140	.	.	.	.	.	0.020	.	.	100 g
IPT 57	.	.	.	.	.	0.008	.	0.009	.	.	.	80 g
DH 2609	.	.	.	.	.	.	.	.	.	.	.	100 g
SRM 78a	.	.	.	.	.	0.12	.	0.25	.	.	.	75 g
FLX CRM112	<0.01	.	0.017	0.099	.	.	<0.01	.	.	0.041	.	80 g
VS K6/4	.	.	.	.	.	.	.	.	.	.	.	100 g
FLX 139	.	.	0.36	0.01	0.33	.	.	0.17	.	.	0.085	61 g
FLX 140	.	.	0.124	1.92	0.28	.	.	0.16	.	.	.	74 g
VS K10/3	.	.	.	.	.	.	.	.	.	.	.	125 g

## CRM ALUMINA REFRACTORY SET SOLD IN SET/12 ONLY 20 g units

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	ZrO <sub>2</sub>
JRRM 321	38.9	0.92	0.99	3.97	2.28	3.18	0.06	0.46	3.36	44.6	0.94	0.02
JRRM 322	49.7	1.10	0.05	4.51	0.71	0.60	0.29	1.10	0.64	39.8	0.57	0.51
JRRM 323	55.8	2.07	0.20	1.70	0.19	2.71	0.23	1.45	2.63	31.8	0.20	0.65
JRRM 324	62.7	0.31	0.30	3.30	0.39	0.97	0.09	0.12	1.55	24.9	4.98	0.00
JRRM 325	68.9	0.70	0.03	2.47	3.08	0.26	0.01	1.69	0.14	19.9	2.24	0.04
JRRM 326	73.8	0.49	0.49	1.88	1.69	0.39	0.02	1.83	0.31	15.9	2.62	0.30
JRRM 327	76.3	0.21	0.68	3.06	2.89	1.48	0.14	2.16	0.55	9.97	1.45	0.99
JRRM 328	85.8	0.10	0.10	0.20	0.10	0.05	0.18	0.60	1.97	7.05	3.36	0.00
JRRM 329	85.5	1.49	0.37	1.01	1.34	0.21	0.03	0.86	0.08	2.01	3.78	0.15
JRRM 330	92.4	0.04	0.01	0.03	0.99	1.95	0.00	0.23	0.98	0.97	1.92	0.00
JRRM 331	99.0	0.03	0.00	0.11	0.12	0.02	0.00	0.28	0.08	0.23	0.01	0.04
JRRM 332	99.9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

## CRM ALUMINA-MAGNESIA REFRACTORY SET

SOLD IN SET/10 ONLY

certified values

20 g units

informational values

Number	Al <sub>2</sub> O <sub>3</sub>	MgO	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	Cr <sub>2</sub> O <sub>3</sub>	MnO	ZrO <sub>2</sub>	LOI
JRRM 801	93.49	3.26	0.14	2.00	0.01	0.19	0.00	0.35	0.21	0.00	0.00	0.00	0.14
JRRM 802	84.25	6.13	2.00	1.03	0.46	0.15	0.95	3.32	1.48	0.00	0.00	0.00	0.06
JRRM 803	74.23	16.20	0.57	4.90	0.00	0.86	0.01	0.58	2.51	0.00	0.00	0.00	0.36
JRRM 804	64.66	20.84	4.76	4.02	0.04	0.08	0.11	5.17	0.13	0.01	0.02	0.00	0.01
JRRM 805	58.03	36.04	0.28	0.73	0.01	0.54	0.68	2.49	1.05	0.00	0.00	0.00	0.17
JRRM 806	48.85	49.43	0.97	0.16	0.00	0.04	0.04	0.51	0.00	0.00	0.02	0.00	0.21
JRRM 807	39.96	55.07	2.75	0.32	0.15	0.32	0.53	0.58	0.19	0.00	0.00	0.00	0.57
JRRM 808	28.68	67.01	0.99	0.56	0.69	0.40	0.22	0.79	0.71	0.00	0.01	0.00	0.84
JRRM 809	19.86	70.11	4.47	0.11	0.98	0.04	1.06	0.36	2.88	0.00	0.00	0.00	0.48
JRRM 810	10.08	78.96	0.18	3.11	0.16	0.75	0.51	4.21	1.91	0.00	0.01	0.00	0.22

## CRM ALUMINA-ZIRCONIA-SILICA REFRACTORY SET

SOLD IN SET/10 ONLY

certified values

20 g units

informational values

Number	Al <sub>2</sub> O <sub>3</sub>	ZrO <sub>2</sub>	SiO <sub>2</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	HfO <sub>2</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	TiO <sub>2</sub>	MnO	P <sub>2</sub> O <sub>5</sub>	LOI
JRRM 710	82.29	2.96	5.62	0.22	1.02	1.15	1.51	0.63	0.04	1.41	3.00	0.00	0.04	0.09
JRRM 708	79.52	12.84	0.54	1.17	0.29	0.80	1.03	0.74	1.64	0.08	1.02	0.00	0.00	0.13
JRRM 705	64.14	27.96	1.99	0.19	2.01	0.14	0.48	0.01	0.46	0.30	2.02	0.00	0.01	0.16
JRRM 707	55.78	18.16	21.17	1.08	0.18	1.81	0.36	0.15	0.84	0.19	0.28	0.00	0.05	0.01
JRRM 709	50.35	8.32	34.38	0.52	2.91	0.47	0.18	0.21	1.20	1.03	0.09	0.00	0.00	0.20
JRRM 703	46.34	37.35	14.64	0.03	0.00	0.05	0.72	0.00	0.01	0.53	0.07	0.00	0.03	0.09
JRRM 702	38.14	42.54	9.99	1.55	0.11	0.37	2.08	0.57	1.97	2.02	0.21	0.00	0.02	0.18
JRRM 706	25.95	22.72	39.33	1.58	0.01	0.13	1.19	0.95	0.15	3.49	3.77	0.00	0.01	0.72
JRRM 704	19.58	33.46	42.61	0.15	0.51	0.55	0.68	1.40	0.51	0.22	1.02	0.08	0.13	0.07
JRRM 701	10.09	48.06	28.44	2.07	1.01	2.00	0.85	0.02	0.47	1.84	4.96	0.00	0.02	0.09

**CRM CHROME-MAGNESIA REFRACTORY SET**

Number	SOLD IN SET/12 ONLY								certified values					informational values					20 g units	
	MgO	Cr <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	MnO	SiO <sub>2</sub>	TiO <sub>2</sub>	NiO	P <sub>2</sub> O <sub>5</sub>	V <sub>2</sub> O <sub>5</sub>	ZnO	LOI							
JRRM 501	87.60	2.82	2.92	0.92	4.80	0.02	0.92	0.00	0.01	0.03	0.01	0.00	0.13							
JRRM 502	76.28	7.49	11.98	0.20	1.02	0.01	3.11	0.01	0.02	0.02	0.02	0.00	0.06							
JRRM 503	63.11	13.60	7.14	3.81	3.00	0.03	9.09	0.04	0.03	0.03	0.03	0.01	0.11							
JRRM 504	54.85	18.35	17.56	2.60	4.11	0.01	2.18	0.01	0.01	0.03	0.01	0.01	0.12							
JRRM 505	50.14	21.74	7.76	0.49	17.76	0.10	1.82	0.11	0.07	0.02	0.07	0.02	0.08							
JRRM 506	46.65	28.19	14.69	0.46	7.49	0.07	2.16	0.13	0.09	0.01	0.08	0.01	0.07							
JRRM 508	30.86	38.18	3.98	1.03	22.70	0.00	3.08	0.01	0.01	0.01	0.00	0.00	0.05							
JRRM 512	24.81	4.98	29.25	4.06	26.01	0.02	10.57	0.04	0.01	0.01	0.01	0.01	0.02							
JRRM 507	22.36	32.03	25.02	1.61	12.98	0.11	5.69	0.16	0.20	0.01	0.13	0.03	-0.11							
JRRM 509	20.45	42.57	20.28	2.86	10.15	0.08	1.96	1.20	0.04	0.01	0.11	0.03	0.13							
JRRM 510	16.86	50.38	12.21	0.29	14.99	0.17	4.91	0.13	0.19	0.01	0.11	0.04	-0.25							
JRRM 511	10.62	52.51	6.68	0.07	27.22	0.12	2.90	0.10	0.10	0.00	0.05	0.05	-0.48							

**CRM FIRECLAY REFRACTORY SET**

Number	SOLD IN SET/10 ONLY										20 g units	
	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	TiO <sub>2</sub>			
JRRM 101	88.57	8.10	1.06	0.31	0.16	0.21	0.11	1.01	0.30			
JRRM 102	80.47	13.79	0.04	3.97	0.14	0.67	0.01	0.30	0.45			
JRRM 103	80.32	18.07	0.07	0.40	0.35	0.01	0.00	0.12	0.37			
JRRM 104	67.35	22.52	0.25	3.24	3.04	0.07	0.01	0.30	2.94			
JRRM 105a	69.17	25.35	0.40	0.76	0.81	0.22	0.11	0.65	2.24			
JRRM 106	63.61	29.91	0.14	1.92	1.81	0.98	0.02	0.59	0.67			
JRRM 107	55.32	37.08	0.71	2.20	2.57	0.49	0.01	0.21	1.15			
JRRM 108	55.31	40.08	0.27	1.54	0.80	0.27	0.02	0.20	1.05			
JRRM 109	54.23	41.24	0.14	0.89	0.79	0.12	0.01	0.30	1.96			
JRRM 110	49.54	46.68	0.10	0.84	0.34	0.16	0.01	0.08	1.66			

**CRM FIRECLAY REFRACTORY SET**

Number	SOLD IN SET/15 ONLY										20 g units			
	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	TiO <sub>2</sub>	ZrO <sub>2</sub>	LOI	
JRRM 121	86.3	6.07	1.96	0.01	0.40	0.23	0.12	0.02	3.20	0.32	0.05	1.11	(0.05)	
JRRM 125	79.2	18.7	0.13	0.01	0.50	0.69	0.08	0.00	0.07	0.04	0.30	0.02	(0.07)	
JRRM 123	79.1	13.3	0.13	0.01	4.13	0.10	1.32	0.01	0.29	0.80	0.45	0.00	(0.03)	
JRRM 122	78.2	10.2	0.43	0.81	0.24	2.05	0.65	0.20	1.04	4.89	1.03	0.20	(0.12)	
JRRM 124	73.9	16.5	1.09	0.11	2.60	1.79	0.10	0.24	0.31	0.19	2.74	0.11	(0.10)	
JRRM 127	68.5	23.0	0.18	0.27	0.92	0.54	0.15	0.17	1.75	1.78	2.19	0.04	(0.07)	
JRRM 126	66.9	21.3	0.45	0.65	3.34	3.13	0.12	0.03	0.28	0.49	2.84	0.04	(0.17)	
JRRM 129	62.2	30.1	0.15	0.10	1.46	1.92	2.23	0.01	0.23	0.20	0.96	0.11	(0.11)	
JRRM 128	54.3	26.0	2.80	0.85	4.45	1.84	3.10	0.24	0.37	3.36	1.37	1.01	(0.02)	
JRRM 130	53.4	32.7	1.95	1.05	0.53	1.42	0.61	0.37	2.32	0.91	3.35	0.83	(0.11)	
JRRM 131	52.7	36.6	0.78	0.07	2.20	2.61	1.02	0.03	0.76	1.61	1.16	0.26	(0.17)	
JRRM 132	50.6	39.1	1.29	0.11	1.64	0.79	0.34	0.11	2.16	2.38	0.29	0.75	(0.15)	
JRRM 133	50.1	39.0	0.10	1.27	3.69	0.91	2.03	0.01	0.33	0.34	1.93	0.57	(0.08)	
JRRM 134	47.2	44.3	0.20	0.24	1.07	0.37	0.20	0.24	0.13	3.83	1.74	0.35	(0.14)	
JRRM 135	37.2	48.9	2.36	0.42	3.05	2.77	1.24	0.04	2.87	0.48	0.07	0.20	(0.18)	

**CRM MAGNESIA REFRACTORY SET**

Number	certified values					informational values							20 g units	
	MgO	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	B <sub>2</sub> O <sub>3</sub>	Cr <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	TiO <sub>2</sub>		
JRRM 410	99.08	0.05	0.59	0.05	0.18	0.02	0.00	0.00	0.01	0.00	0.04	0.00		
JRRM 409	98.03	0.20	0.74	0.49	0.53	0.03	0.01	0.00	0.01	0.00	0.02	0.00		
JRRM 408	96.19	2.55	0.67	0.13	0.46	0.09	0.00	0.00	0.01	0.00	0.01	0.00		
JRRM 407	94.55	0.10	0.67	2.14	2.43	0.02	0.08	0.00	0.01	0.00	0.04	0.00		
JRRM 405	91.95	1.37	1.69	1.34	3.47	0.01	0.01	0.01	0.07	0.00	0.12	0.05		
JRRM 406	91.85	1.13	4.80	0.87	1.19	0.01	0.00	0.00	0.01	0.00	0.04	0.00		
JRRM 404	88.02	6.01	1.78	2.90	1.22	0.01	0.00	0.00	0.03	0.00	0.05	0.00		
JRRM 403	85.48	4.06	0.61	1.55	8.14	0.03	0.01	0.00	0.01	0.00	0.04	0.00		
JRRM 402	83.77	1.99	3.57	5.05	5.46	0.12	0.00	0.00	0.01	0.01	0.07	0.02		
JRRM 401	81.24	8.10	0.20	3.89	6.42	0.01	0.00	0.00	0.01	0.00	0.03	0.01		

**CRM SILICA REFRACTORY SETS**

Number	SOLD IN SETS ONLY, AS GROUPED												20 g units	
	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	ZrO <sub>2</sub>		
JRRM 221	10.03	2.78	0.02	1.57	0.27	0.68	0.15	0.46	0.01	83.8	0.04	0.01		new 2017
JRRM 222	7.66	0.16	0.006	3.86	0.78	0.94	0.05	0.20	0.006	84.8	0.78	0.48		
JRRM 223	5.22	4.14	0.03	2.04	0.37	0.27	0.20	0.69	0.01	86.0	0.04	0.67		
JRRM 224	4.66	1.95	0.30	2.47	0.90	0.29	0.16	0.28	0.68	87.9	0.15	0.003		
JRRM 225	3.22	3.19	0.01	1.27	0.63	0.13	0.07	0.90	0.01	89.9	0.42	0.01		
JRRM 226	2.63	0.97	0.24	2.99	0.47	0.09	0.02	0.19	0.23	91.2	0.29	0.32		
JRRM 227	1.66	2.41	0.45	0.81	0.11	0.05	0.23	0.05	0.003	92.9	0.09	0.88		
JRRM 228	0.39	1.78	0.08	0.08	0.10	0.11	0.03	1.18	0.99	93.8	1.21	0.01		
JRRM 229	1.17	1.41	0.37	0.19	0.07	0.46	0.07	0.07	0.01	95.7	0.12	0.20		
JRRM 230	0.18	0.60	0.05	0.70	0.02	0.01	0.12	0.07	0.38	97.7	0.03	0.001		
JRRM 231	0.63	0.005	0.18	0.04	0.004	0.004	0.004	0.006	0.001	98.6	0.003	0.38		
JRRM 232	0.05	0.004	0.002	0.05	0.004	0.001	0.005	0.005	0.001	99.7	0.002	(0.001)		

**CRM SILICON CARBIDE REFRACTORY SET** available in SET/9 ONLY 50 g

Number	SiC	Tot C	Free C	LOI	Al	Ca	Fe	Mg	N	O	Ti	Free Si
JRRM 1001	99.58	29.81	0.04	.	0.008	<0.001	0.044	<0.001	0.030	0.048	0.0035	0.06
JRRM 1002	0.06	5.03	4.98	5.11	.	.	.	.	.	.	.	.
JRRM 1003	.	10.06	10.01	10.11	.	.	.	.	.	.	.	.
JRRM 1004	.	20.04	19.92	20.01	.	.	.	.	.	.	.	.
JRRM 1005	.	29.93	29.81	29.95	.	.	.	.	.	.	.	.
JRRM 1006	.	49.99	49.97	49.95	.	.	.	.	.	.	.	.
JRRM 1007	89.29	36.75	10.01	.	.	.	.	.	.	.	.	.
JRRM 1008	29.74	14.12	5.21	.	.	.	.	.	.	.	.	.
JRRM 1009	6.18	39.43	37.67	.	.	.	.	.	.	.	.	.

**CRM ZIRCON-ZIRCONIA REFRACTORY SET**

Number	SOLD IN SET/10 ONLY												20 g units	
	ZrO <sub>2</sub>	HfO <sub>2</sub>	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	TiO <sub>2</sub>		
JRRM 601	92.0	1.59	0.26	0.11	5.58	0.00	0.10	0.00	0.06	0.00	0.00	0.16		
JRRM 602	88.4	1.52	0.33	0.07	0.22	0.01	1.62	0.00	5.30	0.76	1.34	0.16		
JRRM 603	84.8	1.45	0.96	5.29	0.95	0.02	2.86	0.65	0.96	0.18	0.83	0.93		
JRRM 604	79.4	1.35	3.05	6.93	0.09	3.06	0.43	1.94	0.01	1.09	1.99	0.13		
JRRM 605	75.5	1.31	10.8	4.84	1.94	1.55	0.17	0.54	1.99	0.45	0.35	0.12		
JRRM 606	72.5	1.26	22.1	0.53	0.02	0.00	0.93	0.01	0.32	2.03	0.01	0.11		
JRRM 607	61.6	1.21	32.9	3.53	0.04	0.00	0.12	0.04	0.03	0.02	0.08	0.13		
JRRM 608	58.8	1.21	34.6	0.70	0.52	0.49	0.09	0.01	3.12	0.03	0.11	0.10		
JRRM 609	55.6	1.12	40.5	0.88	0.30	0.01	0.15	0.02	0.15	0.94	0.08	0.15		
JRRM 610	48.7	0.98	45.7	0.45	3.07	0.00	0.30	0.01	0.54	0.04	0.11	0.09		

**RM RICE STRAW ASH - THERMOSTIL** typical analysis 100 g units

Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	C	CO <sub>2</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	TiO <sub>2</sub>	-H <sub>2</sub> O 900°C
DH 5704	92.49	0.198	3.60	0.008	0.30	0.090	0.97	0.362	0.062	0.070	0.273	0.177	0.004	1.38
DH 5708	86.67	1.15	3.83	0.094	0.97	0.931	0.872	3.10	0.117	0.085	0.226	0.255	0.126	1.70
DH 5705	76.31	0.363	4.33	0.265	2.51	2.89	0.653	9.60	0.245	0.116	0.123	0.409	0.217	2.32

RM	SAND FOR SLIDING GATES																	typical analysis listed in mass %	100 g units
Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	C	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe	K <sub>2</sub> O	MgO	Mn <sub>3</sub> O <sub>4</sub>	Na <sub>2</sub> O	NiO	P <sub>2</sub> O <sub>5</sub>	S	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	WO <sub>3</sub>	ZrO <sub>2</sub> -H <sub>2</sub> O	900°C	
DH 4501	72.21	4.92	0.607	0.025	11.53	5.14	0.633	2.40	0.065	0.059	0.053	0.008	.	0.195	0.102	.	.	0.204	
DH 4502	65.97	5.69	0.47	0.038	14.75	6.31	0.693	3.24	0.074	0.062	0.033	0.007	0.010	0.203	0.110	.	.	0.177	
DH 4507	27.95	11.00	0.326	0.096	33.41	14.51	.	7.29	0.179	.	0.090	CO <sub>2</sub> :	0.013	0.486	0.270	0.019	.	0.129	
DH 4506	10.22	12.93	0.700	<0.017	42.01	25.03	.	8.18	0.703	.	.	.	0.007	0.510	0.382	.	.	0.091	

CRM	ZIRCON SAND						
Number	ZrO <sub>2</sub> + HfO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	LOI	Units
JCRM R501	66.5	0.39	0.06	32.6	0.16	0.11	100 g
JCRM R502	60.3	5.87	0.10	32.8	0.24	0.26	100 g

CRM	SILICA POWDER SET									SOLD IN SET/3 ONLY	100 g units
Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	SiO <sub>2</sub>	TiO <sub>2</sub>	LOI		
JCRM R405	1.07	0.029	0.053	0.71	0.023	0.060	97.78	0.022	0.13		
JCRM R406	1.31	0.016	0.102	0.13	0.005	0.030	96.71	0.564	0.97		
JCRM R404	0.0011	0.00002	0.00006	0.00004	<0.00001	0.0001	>99.99	0.0006	0.00		

### SILICA BRICK

# = class, where 1 = CRM and 2 = RM analysis listed in mass % NH, VS: 75g SRM: 45g others: 100g

#	Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	BaO	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	Li <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P	P <sub>2</sub> O <sub>5</sub>	TiO <sub>2</sub>	LOI
1	VS K1/3	96.1	0.55	.	1.35	.	1.36	.	.	0.045	0.031	.	0.0122	.	.	.
1	ECRM 777-1	95.06	0.795	.	2.826	.	0.330	0.154	.	0.071	.	0.02	.	.	0.444	.
1	ECRM 776-1	62.76	29.28	0.122	0.31	0.022	1.43	2.92	0.019	0.476	.	0.488	.	0.062	1.62	.
1	VS K2/4	58.6	35.1	.	0.4	.	2.94	0.69	.	0.48	0.06	0.19	.	.	1.91	.
1	VS K3/2	32.3	63.6	.	0.44	.	1.15	0.15	.	0.27	.	0.17	.	.	1.34	.
1	SRM 198	.	0.16	.	2.71	.	0.66	0.017	0.001	0.07	.	0.012	.	0.022	0.02	0.21
1	SRM 199	.	0.48	.	2.41	.	0.74	0.094	0.002	0.13	.	0.015	.	0.015	0.06	0.17

### SILICEOUS MATERIAL

# = class, where 1 = CRM, 2 = RM analysis listed in mass % T = Total

#	Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	TiO <sub>2</sub>	LOI	Units	Other
1	BCS 313/2	99.73	0.068	0.0160	BaO:0.00067	0.0229	0.0108	0.0038	0.00032	0.0057	.	0.0243	.	100 g	SrO: 0.00024
1	NCS DC60116a	98.32	1.10	0.038	0.00030	0.076	0.15	0.026	0.0013	0.076	(0.0069)	0.023	0.14	50 g	
1	GBW 03113	95.74	2.36	0.17	0.00054	0.21	0.67	0.098	(0.0033)	0.25	(0.0076)	0.036	0.35	50 g	
1	SRM 2696	95.61	0.2000	0.426	.	(0.055)	0.652	0.235	0.032	(0.129)	(0.0863)	.	(2.11)	70 g	ZnO:0.051
1	NCS DC60117a	94.41	3.20	0.094	0.00034	0.088	1.26	0.025	0.0011	0.47	(0.0070)	0.019	0.27	50 g	
1	GBW 03114	89.59	5.48	0.34	0.0012	0.48	2.07	0.16	(0.010)	1.09	(0.014)	0.102	0.53	50 g	
2	CERAM CEB1	74.0	16.2	0.52	BaO:0.05	0.48	1.75	0.16	last	0.71	0.14	0.34	5.60	25 g	SrO: 0.02
1	GBW 03117	71.25	2.56	6.37	.	0.18	1.10	3.98	.	13.77	.	0.057	0.44	50 g	

RM	CERAMIC POWDER															
Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	TiO <sub>2</sub>	Ba	Co	Cr	Cu	Ni	Sc	Zn	Units
SARM 69	66.6	14.4	2.37	7.18	1.96	1.85	0.129	0.777	0.0518	0.0028	0.0223	0.0046	0.0053	0.0020	0.0068	100 g



**CRM SYNTHETIC SILICATE WITH TRACE ELEMENTS**Material base: SiO<sub>2</sub> 72%, Al<sub>2</sub>O<sub>3</sub> 15%, Fe<sub>2</sub>O<sub>3</sub> 4%, CaMg(CO<sub>3</sub>)<sub>2</sub> pure dolomite 4%, Na<sub>2</sub>SO<sub>4</sub> 2.5%, K<sub>2</sub>SO<sub>4</sub> 2.5% analysis listed in mg/kg 70 g units

Number	Ag	As	B	Ba	Be	Bi	Cd	Ce	Co	Cr	Cu	La	Li	Mn
GBW 07701	(0.034)	2.0	2.1	24	0.26	0.31	0.022	2.0	2.6	2.3	2.0	2.1	15	27
GBW 07702	0.064	5.0	5.1	54	0.56	0.61	0.052	5.0	5.6	5.3	5.0	5.1	18	57
GBW 07703	0.11	10	10.0	104	1.1	1.1	0.1	10.0	10.6	10.3	10.0	10	23	107
GBW 07704	0.21	20	20	204	2.1	2.1	0.2	20	20.6	20.3	20.0	20	33	207
GBW 07705	0.51	50	50	504	5.1	5.1	0.5	50	50.6	50	50	50	63	507
GBW 07706	1.0	100	100	1000	10	10	1.0	100	101	100	100	100	113	1000
GBW 07708	5.0	500	500	5000	50	50	5.0	500	500	500	500	500	513	5000
GBW 07709	10.0	.	1000	10000	100	100	10	1000	.	1000	1000	.	1010	10000
GBW 07710	20	.	.	.	200	200	20	.	.	.	2000	.	.	.
GBW 07711	50	.	.	.	500	.	50	.	.	.	5000	.	.	.

continued

Number	Mo	Nb	Ni	Pb	Sb	Sn	Sr	Ti	V	W	Y	Yb	Zn	Zr
GBW 07701	0.21	2.3	2.6	2.5	0.28	0.28	5.0	24	2.8	0.20	2.0	0.2	3.0	2.2
GBW 07702	0.51	5.3	5.6	5.5	0.58	0.58	8.0	54	5.8	0.50	5.0	0.5	6.0	5.2
GBW 07703	1.0	10.3	10.6	10.5	1.1	1.1	13	104	10.8	1.0	10	1.0	11.0	10.2
GBW 07704	2.0	20.3	20.6	20.5	2.1	2.1	23	204	20.8	2.0	20	2.0	21	20
GBW 07705	5.0	50	50.6	50	5.1	5.1	53	504	51	5.0	50	5.0	51	50
GBW 07706	10	100	101	100	10	10	103	1000	101	10	100	10	101	100
GBW 07708	50	500	500	500	50	50	500	5000	500	50	500	50	500	500
GBW 07709	100	.	.	1000	100	100	1000	10000	1000	100	.	100	1000	1000
GBW 07710	200	.	.	2000	200	200	2000	20000	.	200	.	.	2000	.
GBW 07711	500	.	.	5000	500	500	5000	.	.	500	.	.	5000	.

**CRM SILICON METAL POWDER**

analysis listed in mass %

IPT: 60 g units

NCS: 50 g units

SRM: 40 g units

Number	Al	C	Ca	Cr	Cu	Fe	Mg	Mn	Ni	P	S	Ti	V	Zr
NCS DC25007	0.24	.	0.31	.	.	0.39	.	.	.	.	.	.	.	.
SRM 57B	0.1690	(0.0200)	(0.00222)	(0.00173)	(0.00172)	0.3400	.	0.00782	0.00153	0.00163	(0.0030)	0.0346	(0.0025)	0.00178
IPT 134	0.085	0.025	0.102	0.0011	0.0014	0.29	0.0048	0.0113	0.0006	0.0033	0.002	0.0097	0.0004	.
IPT 135	0.045	0.018	0.011	0.0006	0.0008	0.125	0.0012	0.0070	0.0005	0.0027	0.002	0.0113	0.0003	.
NCS HC25649	0.032	.	0.060	.	.	0.53	.	.	.	0.0067	.	0.026	.	.
NCS HC25648	0.026	.	0.055	.	.	0.44	.	.	.	0.0065	.	0.023	.	.

**CRM SILICON CARBIDE**

analysis listed in mass %

Number	SiC	Al	Fe	Units
VS K9/2	99.6	(0.002)	(0.06)	150 g

**CRM SILICON CARBIDE**

in the chart below, (F) = Free and (T) = Total analysis listed in mass % except \* which is mg/kg

Number	C (T)	C (F)	Si (T)	Si (F)	SiO <sub>2</sub> (F)	Al	B	Ca	Cr	Cu	Fe	K	Mg
ECRM 781-1	48.251	(37.22)	35.56	(4.66)	.	4.39 (T)	(0.0149)	(0.0433)	(0.0240)	.	(0.8061)	(0.3765)	(0.0421)
NMIJ 8002a	29.93	.	68.01	.	.	0.0189	.	.	0.00619	0.0115	0.0130	.	.
BAM S008	29.9	0.045	.	(<0.03)	(<0.01)	0.0047	0.00030	0.00025	0.000016	0.000010	0.00048	.	0.000007
BAM S003A	29.89	0.0493	.	(0.0481)	(0.0600)	0.0372	0.0063	0.00294	0.00035	0.00015	0.0149	.	0.00063
NMIJ 8001a	29.80	.	68.31	.	.	0.00832	.	.	.	.	0.00467	.	.
ECRM 780-1	26.381	.	63.5	.	.	1.86 (T)	.	0.84	.	.	1.30 (T)	(0.0112)	0.051
BCS 360	23.53	(0.085)	60.8	(0.54)	.	6.52	.	0.115	.	.	(0.19)	.	.
BCS 359	23.46	(0.061)	67.6	(0.32)	.	0.118	.	0.108	.	.	0.175	.	.

Number	Mn	Mo	N	Na	Ni	O	Ti	V	Y*	Zr	Notes	Units
ECRM 781-1	(0.0274)	.	(0.0282)	(0.0308)	(0.0210)	.	(0.0320)	(0.0216)	.	.	P: (0.0117) Mo: (0.0264)	100 g
NMIJ 8002a	0.000160	0.0109	.	.	.	.	0.00477	.	0.50	.	Beta Phase	50 g
BAM S008	0.000005	0.0018	.	0.000017	0.00009	0.0146	0.0067	0.0275	.	0.00044	(SiC-6H:99.7, SiC-15R:0.23, SiC-4H:0.06)	50 g
BAM S003A	0.000144	.	(0.0093)	0.00177	0.00329	(0.0910)	0.0079	0.0041	.	0.00252	Green Micro F800	50 g
NMIJ 8001a	.	.	.	.	.	.	0.000637	.	0.31	.	Alpha Phase	50 g
ECRM 780-1	0.029	.	0.325	(0.0502)	.	.	.	.	.	.	n/a	100 g
BCS 360	.	.	(4.77)	.	.	(4.03)	0.025	.	.	.	Sialon Bonded	100 g
BCS 359	.	.	(7.84)	.	.	(0.53)	0.022	.	.	.	Nitrogen Bearing	100 g

CRM		SILICON CARBIDE SET										SOLD IN SET/3 ONLY		F = Free	T = Total	50 g each	
Number	T.Si	F.Si	F.SiO <sub>2</sub>	T.C	F.C	Al	Ca	Cl	Cr	Cu	F	Fe	Mg				
JCRM R024	68.97	(0.042)	(0.593)	29.85	(0.423)	0.0193	0.0019	(<0.002)	0.0056	(<0.0006)	(<0.001)	0.0219	0.0002				
JCRM R025	68.43	(0.014)	(0.356)	30.49	(1.24)	0.0184	0.0008	(<0.002)	0.0097	0.0021	(0.0574)	0.0233	(<0.0001)				
JCRM R026	69.03	(0.012)	(0.311)	29.85	(0.598)	0.0059	0.0004	(<0.002)	(<0.0005)	(<0.0006)	0.0686	0.0011	(<0.0001)				

  

Number	Mn	Mo	N	Ni	O	P	S	Ti	V	Zn	Zr
JCRM R024	0.0004	(<0.001)	(0.048)	0.0060	0.97	(<0.01)	(<0.005)	0.0340	0.0013	(<0.0005)	0.0047
JCRM R025	(<0.0003)	0.0126	0.113	0.0011	0.94	(<0.01)	(0.0431)	0.0040	0.0053	(<0.0005)	0.0012
JCRM R026	(<0.0003)	(<0.001)	0.034	(<0.001)	0.71	(<0.01)	(<0.005)	0.0016	0.0018	(<0.0005)	(<0.0005)

CRM		SILICON NITRIDE								analysis in mass %								analysis in mg/kg							
Number	Si	N	Al	C	Ca	Fe	O	Co	Mg	Cr	Mn	Na	Ni	Ti	W	Zr	̑-phase of Si <sub>3</sub> N <sub>4</sub>	Units							
INDIVIDUAL																									
SRM 8983		39.23		0.107			1.20											4.5 g							
NMIJ 8004a	59.226	38.485	0.07397		0.00727	0.01969			10.29		2.907		2.485	8.519		2.146		25 g							
BAM ED101		38.1	0.0469	0.162	0.00141	0.00795	(1.91)	43.5	4.3			7.59			41.3		7.43	last 50 g							
SET ONLY																									
JCRM R006	59.57	38.98	<0.002	0.101	<0.0003	0.0012	1.18		<2	<6	<1		<8	<4		<7		20 g							
JCRM R007	59.45	39.13	0.0707	0.136	0.0931	0.0169	0.79		68	49	28		<8	58		<7		20 g							
JCRM R008	59.03	38.46	0.116	0.097	0.225	0.171	1.56		12	92	86		<8	72		9		20 g							

CRM		BORON NITRIDE										analysis listed in mass %					T = Total	AO = adherent oxide					50 g units	
Number	B.T	B.AO	N	Al	C	Ca	Co	Cr	Fe	H <sub>2</sub> O	Mg	Na	O	Si	Ti									
BAM ED103	43.5	0.070	55.6	0.00070	(0.018)	0.0273	(<0.00001)	0.00047	0.00150	(<0.1)	0.0056	0.00123	0.68	0.0017	0.00049									

CRM		SILICOALUMINUM															analysis listed in mass %		50 g units	
Number	Al	Si	Fe	Ba	C	Ca	Co	Cr	Cu	Mg	Mn	Ni	P	S	Sr	Ti	Units			
NCS HC14605	36.67	25.94	24.97	9.12	0.13	1.33		0.152	0.045		0.12	0.167	0.018	0.012			70 g			
NCS HC93615	34.80	29.87	30.47														50 g			
NCS HC14603	32.84	24.12	33.54	7.57	0.13	0.71		0.085	0.061		0.14	0.042	0.015	0.015			70 g			
NCS HC14602	32.82	19.21	38.09	6.52	0.14	0.85		0.017	0.137		0.25	0.014	0.015	0.013			70 g			
NCS HC13602	32.55	32.01	20.59	7.41	0.27	1.17				0.85	0.197		0.017	0.0096			50 g			
NCS HC93614	31.91	33.75	27.84														50 g			
NCS HC93633	29.67	28.31	37.44	0.45							0.426		0.023	0.022			50 g			
NCS HC14604	25.44	19.21	49.14	2.64	0.24	0.44		0.053	0.172		0.25	0.018	0.011	0.011			70 g			
NCS HC28635	16.63	43.60	17.53	1.64	1.00	15.18		0.054	0.046	0.027	0.095	0.026	0.051	0.040	0.023		50 g			
NCS HC14609	14.46	33.41	35.46	7.72	0.22	5.74		0.116	0.32	0.18	0.33	0.016	0.018	0.017	0.092	0.055	60 g			
NCS HC14610	13.47	40.58	23.25	10.70	0.24	8.25	0.0032	0.032	0.29	0.12	0.23	0.012	0.021	0.025	0.094	0.124	60 g			
NCS HC14608	9.14	53.39	14.22	12.39	0.13	8.28	0.0022	0.021	0.176	0.21	0.17	0.0061	0.022	0.021	0.132	0.084	60 g			
NCS HC28636	4.07	50.36	16.68	24.26	0.34	1.44		0.083	0.032	0.032	0.11	0.021	0.016	0.038	0.095		50 g			
NCS HC14611	1.47	56.74	5.77	17.00	1.56	13.61	0.0016	0.0044	0.0097	0.045	0.065	0.0020	0.016	0.14	0.22	0.126	60 g			

CRM		SILICOBARIUM										analysis listed in mass %		50 g units	
Number	Ba	Si	Al	C	Ca	Fe	Mg	Mn	P	S	Sr				
NCS HC93632	27.54	47.56	2.78	0.99		11.75		0.16	0.024	0.13					
NCS HC93634	14.14	52.62	1.82	0.64	14.08	12.97	0.051	0.104	0.022	0.204	0.063				
NCS HC93631	10.00	37.19	13.46	0.78	5.16	27.56	0.098	0.43	0.032	0.044					

## SILICOCALCIUM

# = class, where 1 = CRM and 2 = RM

#	Number	Ca	Si	Al	Ba	C	Cr	Cu	Fe	Mg	Mn	Mo	Ni	P	S	Ti	Units
1	NCS HC93613	31.67	56.20	1.77	.	1.30	.	.	5.58	.	.	.	.	0.018	0.088	.	50 g
1	<b>BS 119</b>	31.3	62.9	0.44	.	0.30	.	.	3.03	.	.	.	.	0.034	0.012	<b>17025</b>	100 g
1	NCS HC37620	30.70	60.09	Sol.Al:1.09	.	0.68	.	.	.	.	.	.	.	0.017	0.033	.	50 g
1	NCS HC11604a	30.45	56.02	1.97	.	0.94	.	.	6.93	.	0.037	.	.	0.054	0.073	.	50 g
1	VS F26/3	29.9	60.1	1.52	.	.	.	.	6.19	.	.	.	.	0.024	0.029	0.161	100 g
1	VS F26/2	29.9	59.5	1.52	.	.	.	.	6.29	.	.	.	.	0.024	0.030	0.156	100 g
2	DH 0402	28.48	58.68	1.13	.	.	0.010	0.014	6.74	0.049	0.051	.	.	0.014	.	0.055	50 g
1	58A CQ42001	28.25	55.31	1.88	.	2.44	.	.	6.08	.	.	.	.	0.019	0.0132	.	50 g
1	NCS HC93627	28.02	57.43	1.76	.	1.02	.	.	6.94	.	.	.	.	0.030	0.045	.	50 g
1	NCS HC11619	27.15	61.11	2.15	.	0.55	.	.	6.61	.	0.053	.	.	0.048	0.029	.	50 g
1	NCS HC37621	25.25	60.19	Sol.Al:1.55	.	0.71	.	.	.	.	.	.	.	0.031	0.020	.	50 g
1	VS F25/3	21.3	51.5	0.67	.	.	.	.	23.06	.	.	.	.	0.011	0.0056	.	100 g
1	NCS HC11605	13.22	53.46	2.34	14.02	0.385	0.054	0.079	13.57	0.022	0.075	Sr:0.235	0.023	0.014	0.039	.	60 g
1	VS F44	12.6	49.7	1.68	.	0.166	.	.	19.91	9.6	.	.	V:(2.5)	0.014	0.0066	.	100 g

## CRM

## SILICOCHROMIUM

Number	Cr	Si	Fe	Al	B	C	Co	Cu	Mn	Ni	P	S	Ti	V	Units
SRM 689	36.4	39.5	23.2	0.049	0.0017	0.043	0.034	0.013	0.32	0.20	0.026	0.002	0.40	0.09	100 g
NCS HC25633	33.90	44.06	.	1.00	.	0.045	.	.	0.29	.	0.013	(0.002)	.	.	50 g
NCS HC25643	32.62	49.17	.	1.24	.	0.018	.	.	0.429	.	0.0083	0.0025	.	.	50 g

## SILICOMANGANESE

# = class, where 1 = CRM and 2 = RM

#	Number	Mn	Si	Fe	C	Co	Cr	Cu	Ni	P	S	Ti	V	Units
1	<b>BS SiMn-1</b>	73.2	16.0	8.2	1.80	(0.051)	0.019	(0.042)	(0.083)	0.278	0.016	(0.19)	(0.04)	100 g
1	MHCX04	70.0	22.7	5.31	0.80	0.111	0.103	0.104	0.122	0.149	0.012	0.28	0.085	70 g
1	NCS HC25605b	69.77	14.20	.	2.21	.	.	.	.	0.153	0.0052	.	.	50 g
1	NCS HC25657	67.96	25.03	.	0.58	.	.	.	.	0.065	0.011	0.18	.	50 g
1	VS F23/1	67.53	21.18	.	1.45	Al: 0.070	B: 0.012	Ca: 0.208	.	0.235	0.0155	0.137	.	100 g
1	NCS HC26611b	67.44	18.24	.	1.24	.	.	.	.	0.080	0.009	.	.	50 g
1	NCS HC28618	67.40	19.34	11.65	1.05	0.017	0.045	0.051	0.036	0.107	0.017	0.255	0.063	50 g
1	NCS HC25605c	67.20	21.87	10.01	0.456	0.020	0.029	0.019	0.013	0.132	0.0076	0.175	0.040	50 g
1	NCS HC37612	67.02	18.96	.	1.10	.	.	.	.	0.178	0.016	0.276	.	50 g
1	NCS HC18603	66.70	17.21	.	1.70	.	.	.	.	0.183	0.025	.	.	50 g
1	NCS HC93619	66.40	17.55	.	1.65	.	.	.	.	0.137	0.025	.	.	50 g
1	NCS HC11603b	66.37	17.63	.	1.34	.	.	.	.	0.065	0.008	.	.	100 g
1	NCS HC25605a	66.30	18.28	.	1.09	.	.	.	.	0.145	0.010	0.18	.	50 g
1	NCS HC19607	66.20	18.41	.	1.56	.	.	.	.	0.126	0.022	.	.	50 g
1	NCS HC93625	65.74	17.19	.	1.66	.	.	.	.	0.151	0.026	.	.	50 g
1	NCS HC11603a	65.67	17.49	.	1.33	.	.	.	.	0.065	0.011	.	.	100 g
1	NCS HC37605	65.51	17.46	.	1.56	.	.	.	.	0.149	0.019	0.164	.	50 g
1	NCS HC25640a	65.50	24.47	.	0.197	.	.	.	.	0.117	0.0079	.	.	50 g
1	MHCX03	65.5	29.2	4.92	0.04	.	0.20	0.13	0.11	0.047	0.004	0.49	.	100 g
1	NCS HC25654	65.29	19.26	.	0.876	.	.	.	.	0.109	0.0122	0.19	.	50 g
2	DH 0106	65.24	18.38	14.60	1.21	0.013	0.011	0.017	0.042	0.080	0.010	0.121	0.015	50 g
1	NCS HC28617	64.97	17.59	15.16	1.57	0.035	0.055	0.096	0.092	0.127	0.018	0.221	0.060	50 g
1	NCS HC93624	64.86	16.87	.	1.79	.	.	.	.	0.120	0.024	.	.	50 g
1	NCS HC93618	63.91	19.04	.	1.13	.	.	.	.	0.140	0.022	.	.	50 g
1	NCS HC93626	63.80	16.42	.	1.91	.	.	.	.	0.097	0.020	.	.	50 g
1	JSS 705-5	62.69	14.99	.	1.941	.	.	.	.	0.239	(0.0087)	.	.	150 g
1	NCS HC28616	62.53	14.33	20.00	2.28	0.048	0.060	0.080	0.167	0.205	0.020	0.222	0.095	50 g
2	DH 0302	62.17	27.95	8.69	0.092	0.054	0.016	0.031	0.032	0.089	.	0.288	0.015	50 g
1	NCS HC26621	61.49	27.49	.	0.039	.	.	.	.	0.072	0.009	0.24	.	50 g
2	DH 0303	60.60	30.66	7.52	0.029	0.023	0.024	0.016	0.039	0.059	.	0.444	0.015	50 g
1	NCS HC25641	60.29	27.88	.	0.082	.	.	.	.	0.078	0.0069	0.41	.	50 g
1	NCS HC37606b	60.13	13.87	.	2.26	.	.	.	.	0.42	0.040	0.25	.	50 g
1	NCS HC25646	59.34	32.90	.	0.018	.	.	.	.	0.043	0.0034	0.24	.	50 g
1	58A CQ43001	58.49	15.96	.	1.84	.	.	.	.	0.32	0.026	.	.	50 g
1	NCS HC26620	54.97	19.15	.	0.40	.	.	.	.	0.060	0.011	0.24	.	50 g

the below continuation shows only the samples with more data

Number	As	B	Ca	Pb	Sb	Zr
<b>BS SiMn-1</b>	(0.010)	(0.014)	(0.05)	(0.0005)	(0.002)	(0.0007)
MHCX04	0.004	0.03	(0.010)	0.008	.	Zn:0.012
NCS HC28618	0.0099	.	.	0.0007	0.0004	.
NCS HC25605c	.	0.010	.	.	.	.
NCS HC25605a	.	0.0063	.	.	.	.
MHCX03	.	(0.009)	.	.	.	.
NCS HC25654	.	0.022	.	.	.	.
NCS HC28617	0.010	.	.	0.0005	0.0009	.
JSS 705-5	.	0.0231	.	.	.	.
NCS HC28616	0.015	.	.	0.0012	0.0025	.
DH 0302	.	.	.	.	.	0.008
NCS HC25641	.	0.021	.	.	.	.
NCS HC25646	.	0.048	.	.	.	.
NCS HC26620	.	Al:0.015	.	.	Mo:(0.0009)	.

**17025** many more values on certificate  
Al: 0.010, Mo: 0.016, Sn: 0.008

## SILICOZIRCONIUM

Number	Zr	Si	Fe	Al	C	Ca	Cr	Cu	Hf	Mn	N	Ni	P	S	Ti	Units
CRM VS F27/2	51.5	26.1	(12)	7.48	0.111	.	.	1.47	.	.	.	.	0.044	(0.001)	0.215	100 g
RM DH 3001	36.06	51.14	8.87	0.852	0.338	0.157	0.004	.	0.804	0.210	0.027	0.013	0.033	0.002	0.073	50 g

## CRM BASIC SLAG

analysis listed in mass %

100 g units

Number	Al	B	Ca	Cr	F	Fe	K	Mg	Mn	Na	P	S	Si	Ti	V	Zn
IRSID 802-1	8.53	0.0245	30.62	0.0053	0.243	0.576	0.491	2.87	0.460	0.236	0.109	0.714	15.16	0.366	0.028	0.0025
IRSID 804-1	0.407	.	36.88	.	.	11.92	.	0.88	1.48	.	7.67	0.127	2.59	0.152	0.460	.

## CRM FERROALLOY SLAG

100 g units

Number	Al <sub>2</sub> O <sub>3</sub>	BaO	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P	S	SiO <sub>2</sub>	SrO	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>
NCS HC19821	56.53	.	9.01	.	0.695	.	.	27.14	0.08	.	0.013	0.013	1.13	.	.	3.18
NCS HC19822	65.99	.	10.20	.	0.442	.	.	18.20	0.06	.	0.006	0.013	0.570	.	.	3.41
AMIS 0536	8.17	1.72	27.6	0.064	.	1.69	0.608	5.27	26.0	.	.	0.85	26.7	0.57	0.35	.
AMIS 0533	6.99	1.63	26.73	0.119	.	0.908	0.649	6.31	23.69	0.417	.	0.827	30.09	0.504	0.338	.

## IRON MAKING SLAG

# = class, where 1 = CRM and 2 = RM

#	Number	CaO	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	C	Fe	FeO	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	S	TiO <sub>2</sub>	Units
1	NH 7-1-009	49.6	32.8	9.2	.	0.47	.	(0.19)	1.1	0.60	(0.14)	.	1.17	0.38	75 g
2	BS Slag 2	44.6	36.9	10.3	(0.2)	0.24	.	0.16	5.9	0.19	0.16	.	1.16	0.204	50 g
1	IRSID 803-1	43.28	36.38	13.19	.	0.613	.	.	4.05	0.713	.	0.270	0.767	0.502	100 g
1	NH 7-1-008	42.1	39.1	8.4	.	0.30	.	(0.52)	6.1	0.73	(0.33)	.	(0.65)	0.30	75 g
1	NH 7-1-005	38.8	35.3	10.0	.	0.21	.	(0.19)	12.0	0.47	(0.13)	.	(0.85)	0.32	75 g
1	CAN SL-1	37.48	35.73	9.63	.	.	0.92	(0.51)	12.27	(0.86)	(0.39)	.	1.26	(0.38)	200 g
2	BS 100A	37.0	35.3	10.10	(0.2)	0.29	.	(0.5)	12.85	0.33	(0.2)	0.0034	1.77	0.48	100 g
1	NH 7-1-010	31.2	44.0	7.94	.	5.5	.	(0.59)	0.73	3.40	(0.18)	.	0.14	0.91	75 g
1	NH 7-1-007	31.2	39.0	6.2	.	0.55	.	(0.38)	18.9	0.78	(0.24)	.	(0.57)	0.39	75 g
1	NH 7-1-014	30.1	33.6	24.0	.	1.27	.	(0.07)	9.3	(0.3)	(0.07)	.	(0.02)	(0.07)	75 g
1	NH 7-1-011	29.4	21.9	24.0	.	1.9	.	(0.04)	17.5	1.97	(0.19)	.	(0.03)	(0.09)	75 g
1	NH 7-1-013	28.7	20.3	38.6	.	1.12	.	(0.03)	8.0	0.26	(0.04)	.	(0.03)	0.78	75 g
1	NH 7-1-015	28.0	(44.7)	14.5	.	1.7	.	(0.08)	9.2	0.58	(0.1)	.	(0.02)	(0.08)	75 g

\* Oxides Calculated, see previous chart "BASIC SLAG" for actual certified values

## STEEL MAKING SLAG

# = class, where 1 = CRM and 2 = RM

CMSI, GBW, RH: 50 g units

NH: 75 g units

all others: 100 g units

#	Number	CaO	T.Ca	CaF <sub>2</sub>	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Cr <sub>2</sub> O <sub>3</sub>	F	Fe	FeO	K <sub>2</sub> O	MgO	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	s.P <sub>2</sub> O <sub>5</sub>	S	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>
2	RH02	64.7	.	.	(12.9)	11.0	(0.03)	.	(0.2)	(0.2)	.	3.5	0.024	.	P:0.003	.	(0.9)	0.07	.
1	JK S11 *	.	60.0	.	26.8	2.85	0.17	(7.9)	.	(0.2)*	.	4.7	0.12	.	(<0.005)	.	0.30	0.95	(<0.01)
2	BS 101/3	54.4	.	.	18.8	1.42	.	.	10.9	.	0.005	3.0	5.0	0.027	0.74	.	0.18	(0.9)	.
1	CMSI 1745	.	37.64	1.41	14.91	1.78	.	.	13.38	12.33	.	9.28	1.86	.	1.02	.	0.097	0.42	.
2	BS 101/1	52.9	.	.	23.3	0.70	.	.	5.8	.	0.008	8.7	3.47	0.013	0.76	.	0.19	0.8	.
1	<b>BS 101/4</b>	52.5	.	.	16.7	0.86	.	.	(13.3)	.	0.007	4.8	4.79	0.018	0.81	.	0.15	1.16	.
1	BCS 381	49.0	.	.	8.78	0.67	0.33	.	13.3	3.69	.	1.03	3.16	.	15.7	15.2	0.19	0.35	0.94
1	IRSID 805-1	48.92	.	.	6.63	0.616	.	.	14.87	.	.	1.86	2.05	.	16.20	.	0.092	0.342	0.918
2	BS 101/2	47.6	.	.	16.9	0.91	.	.	15.1	.	0.008	7.0	4.8	0.031	0.63	.	0.20	(0.8)	.
1	IRSID 806-1	46.13	.	.	11.72	0.901	.	.	17.89	.	.	3.02	5.94	.	2.25	.	0.110	0.504	0.514
2	BS 101/5	46.1	.	.	15.2	0.74	.	.	19.4	.	0.0044	5.0	5.7	(0.04)	0.71	.	0.12	1.2	.
1	ECRM 879-1	43.70	.	.	8.82	0.803	0.477	0.368	18.97	.	.	2.19	4.45	.	8.46	7.59	0.102	0.535	0.738
1	NH 143	42.90	.	.	4.88	(0.50)	0.97	.	14.53	8.62	.	5.29	2.84	.	16.71	.	0.083	0.15	.
1	NH 146	40.56	.	.	11.38	4.29	0.69	.	20.30	18.47	.	5.47	5.52	.	2.11	.	0.165	0.39	.
1	NH 151	34.83	.	.	15.97	2.06	0.65	.	14.94	0.14	.	5.05	8.44	.	7.92	.	0.079	0.53	.
1	NH 156	34.66	.	.	15.20	7.80	0.75	.	16.35	0.14	.	4.66	3.81	.	5.98	.	0.111	0.36	.
1	VS W4/5	25.4	.	.	16.7	3.67	.	.	23.2	25.1	.	18.2	4.22	.	P:0.261	.	0.038	1.01	.
1	NH 150	21.77	.	.	15.69	3.23	1.74	.	24.23	27.30	.	(14.46)	8.16	.	0.62	.	0.044	0.15	.
1	NH 152	21.95	.	.	15.91	2.60	28.67	.	14.40	12.79	.	6.17	4.85	.	(0.12)	.	0.028	0.37	.
1	NH 145	20.85	.	.	22.43	2.39	0.99	.	27.97	30.46	.	2.71	9.26	.	2.05	.	0.089	0.56	.
1	NH 149	9.85	.	.	8.42	3.36	53.81	.	14.09	8.12	.	2.89	3.74	.	(0.03)	.	0.040	0.22	.
1	SARM 77	3.64	.	.	26.8	27.5	12.5	.	5.31T	.	.	22.99	.	.	.	.	0.32T	.	.
1	NH 154	(1.15)	.	.	48.67	3.68	1.54	.	10.65	13.36	.	2.44	(28.0)	.	(0.03)	.	0.074	0.27	.

\* JK S11 lists total Fe as FeO

17025

BLAST FURNACE SLAG		analysis in mass %										JSS: 70g	NCS HC15x, 28x: 80g	all others: 100g		
#	Number	CaO	Ca	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	MgO	Fe	FeO	K <sub>2</sub> O	Mn	MnO	Na <sub>2</sub> O	P	P <sub>2</sub> O <sub>5</sub>	S	TiO <sub>2</sub>
1	IMZ 278	51.70	.	17.43	1.49	3.24	12.37	10.96	(0.013)	4.47	.	(0.026)	0.451	.	0.139	(0.178)
1	IMZ 275	44.35	.	40.99	4.71	5.18	0.548	.	1.01	0.598	.	(0.823)	(0.0097)	.	0.368	0.160
1	IMZ 272	43.85	.	41.80	4.74	5.26	(0.93)	.	(0.423)	0.608	.	(0.342)	0.010	.	0.534	(0.170)
1	IMZ 271	43.81	.	41.35	4.76	5.03	1.57	.	0.426	0.615	.	0.350	(0.011)	.	0.535	(0.188)
1	IMZ 273	43.45	.	42.50	7.09	1.98	1.08	.	0.674	0.882	.	0.620	(0.0097)	.	0.572	0.258
1	IMZ 274	43.37	.	38.91	5.25	4.67	3.36	.	0.456	0.635	.	0.331	(0.011)	.	0.563	0.205
1	JSS 905-3	42.70	.	34.29	13.12	5.84	0.442 (tot)	.	K:0.253	0.233	.	0.152	0.0151	.	0.831	0.592
2	DH 3226	41.95	.	35.92	13.01	6.37	0.174	.	0.407	0.236	.	0.265	.	0.005	1.17	0.614
2	DH 3227	41.07	.	37.50	12.09	6.314	0.196	.	0.527	0.433	.	.	.	.	0.989	0.700
2	DH 3225	.	28.54	37.82	12.75	7.63	0.384	.	0.115	0.128	.	0.089	.	.	1.57	0.246
1	NCS HC28805	39.20	.	34.91	12.80	9.27	0.76	.	.	0.090	.	.	0.012	.	0.90	0.42
1	IMZ 276	38.57	.	10.92	1.02	5.75	25.12	22.11	(0.0062)	4.88	.	(0.017)	0.416	.	0.076	(0.172)
1	DH 3234	37.26	.	41.51	11.32	5.37	0.742	.	0.890	0.971	.	.	.	.	0.90	0.618
1	NCS HC28804	37.13	.	31.18	16.26	7.52	2.01	.	.	1.23	.	.	0.043	.	0.79	0.58
2	DH 3232	36.59	.	39.03	11.81	8.12	0.417	.	1.228	0.671	.	0.437	.	.	1.06	0.589
2	DH 3233	36.30	.	41.53	11.53	5.27	1.72	.	0.462	0.907	.	0.193	.	0.026	0.804	0.621
1	NCS HC28803	36.26	.	31.82	16.85	9.92	0.92	.	.	0.78	.	.	0.018	.	0.75	0.52
2	DH 3228	35.66	.	38.69	11.93	8.56	0.332	.	1.235	1.342	.	0.388	.	0.014	0.812	0.638
1	IMZ 277	35.65	.	16.32	1.61	6.39	23.63	(21.69)	(0.019)	4.04	.	(0.032)	0.392	.	0.065	(0.177)
2	DH 3235	34.35	24.55	39.33	15.68	6.289	2.87	.	0.090	0.341	.	0.103	.	0.015	1.539	0.229
1	NH 7-1-006	32.7	.	38.5	7.05	16.8	0.59	.	(0.61)	.	1.24	(0.35)	.	.	(0.56)	0.34
1	VS SH14	32.5	.	28.2	15.4	11.9	0.89	.	.	0.59	.	.	.	.	0.45	9.63
1	NCS HC19805	25.57	.	22.67	13.85	9.05	0.80	.	.	0.74	.	.	.	.	0.234	25.28
1	VS SH16	19.9	.	43.2	9.13	5.93	14.95	.	.	0.93	.	.	0.166	.	0.364	0.37
1	ECRM 883-1 *	.	21.32	16.67	6.55	8.86	0.9820	.	0.393	0.546	.	0.316	0.0033	.	1.0885	1.3331
1	NH 7-1-012	0.57	.	51.4	45.2	(0.21)	1.02	.	(0.02)	.	0.06	(0.52)	.	.	(0.009)	(0.09)

Number	BaO	C tot.	CO <sub>2</sub>	Cr <sub>2</sub> O <sub>3</sub>	Sr	SrO	V <sub>2</sub> O <sub>5</sub>	Zn	Zr	ZrO <sub>2</sub>	-H <sub>2</sub> O 900°C
IMZ 278	.	.	.	.	.	.	(0.003)	.	.	.	.
IMZ 275	.	.	.	.	.	.	(0.0026)	.	.	.	.
IMZ 272	.	.	.	.	.	.	(0.050)	.	.	.	.
IMZ 271	.	.	.	.	.	.	(0.036)	.	.	.	.
IMZ 273	.	.	.	.	.	.	(0.0026)	.	.	.	.
IMZ 274	.	.	.	.	.	.	0.051	.	.	.	.
JSS 905-3	.	.	.	.	.	.	.	.	.	.	.
DH 3226	0.093	.	.	0.064	.	.	.	0.039	.	.	.
DH 3227	0.094	.	.	.	0.054	.	.	0.039	.	.	.
DH 3225	0.079	.	.	.	0.055	.	.	0.045	.	.	.
NCS HC28805	.	.	.	.	.	.	.	.	.	60 g	.
IMZ 276	.	.	.	.	.	.	(0.009)	.	.	.	.
DH 3234	0.087	.	.	0.018	.	0.048	0.016	.	.	.	60 g
NCS HC28804	.	.	.	.	.	.	.	.	.	.	60 g
DH 3232	0.087	.	.	.	.	0.076	.	.	0.022	.	.
DH 3233	0.082	.	.	0.021	.	0.047	0.019	.	0.046	.	.
NCS HC28803	.	.	.	.	.	.	.	.	.	60 g	.
DH 3228	0.097	.	.	.	.	0.062	0.007	.	0.035	.	.
IMZ 277	.	.	.	.	.	.	(0.012)	.	.	.	.
DH 3235	0.107	.	.	.	.	0.072	.	.	0.064	.	.
NH 7-1-006	.	.	.	.	.	.	.	.	.	.	.
VS SH14	.	.	.	.	.	0.23	.	.	.	.	.
NCS HC19805	.	.	.	.	.	0.44	.	.	.	.	.
VS SH16	.	.	.	.	.	.	.	.	.	.	.
ECRM 883-1 *	0.0436	.	Ni:0.00053	0.0130	0.0380	.	0.122	.	0.0276	.	* ECRM 883-1 is certified for elements only, not any oxides
NH 7-1-012	.	.	.	.	.	.	.	.	.	.	.

## CRM SLAGS WITH EXTENSIVE ANALYSIS

analysis listed in mass %																100 g units									
Number	Al	Al <sub>2</sub> O <sub>3</sub>	C	Ca	CaO	CeO <sub>2</sub>	Cr	Cr <sub>2</sub> O <sub>3</sub>	Fe	Fe <sub>2</sub> O <sub>3</sub>	HfO <sub>2</sub>	K	K <sub>2</sub> O	Mg	MgO										
AMIS 0393	16.2021	31.09	.	6.6463	9.65	.	8.3191	12.188	3.8285	5.55	.	0.1038	0.111	12.2968	20.93										
AMIS 0600	0.9396	1.78	0.0922	.	0.23	0.031	0.1697	0.25	5.98	8.55	0.007	.	.	0.7341	1.22										
Number	Mn	MnO	Na	Na <sub>2</sub> O	Nb <sub>2</sub> O <sub>5</sub>	S	Si	SiO <sub>2</sub>	SO <sub>3</sub>	Ti	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	Zr	ZrO <sub>2</sub>	LOI	Density									
AMIS 0393	0.1289	0.155	0.1504	0.192	.	0.412	10.2425	22.64	.	0.3813	0.657	.	0.0095	.	.	3.54									
AMIS 0600	1.29	1.66	.	0.13	0.078	1.46	3.11	0.18	50.06	83.78	0.42	0.2245	0.30	-3.28	4.03										
continued analysis listed in mg/kg																									
Number	Ba	Be	Ce	Co	Cs	Cu	Dy	Er	Eu	Gd	Hf	Ho	La	Li	Lu	Nb	Nd	Ni	Pr	Rb	Sb	Sc	Sm	Sn	Sr
AMIS 0393	253	2	45	0.3	23	3	2	1	3	3	1	21	13	0.3	2	16	135	4	4	1	18	3	.	171	
AMIS 0600	79	.	254	5	0.6	.	12	7	1	17	62	2	117	235	2	891	117	.	31	5	9	95	22	11	54
Number	Ta	Tb	Th	Tm	U	W	Y	Yb																	
AMIS 0393	.	1	6	0.3	.	.	20	2																	
AMIS 0600	56	2	88	1	12	13	64	9																	

**CONVERTER SLAG**

# = class, where 1 = CRM and 2 = RM

#	Number	Fe	FeO	CaO	Ca	CaF <sub>2</sub>	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Mn	MnO	Nb <sub>2</sub> O <sub>5</sub>	P <sub>2</sub> O <sub>5</sub>	S	TiO <sub>2</sub>	V	V <sub>2</sub> O <sub>5</sub>
1	IMN ZM6	46.72	.	.	.	.	.	.	.	.	.	.	.	.	1.04	.	0.0064	.
2	DH 3908	18.96	.	47.13	.	.	12.70	1.096	0.008	2.513	4.31	.	0.072	1.488	0.110	0.558	.	0.273
1	NCS HC28810	16.52	.	.	33.35	.	14.45	1.76	.	7.10	.	2.78	.	1.60	0.120	1.25	.	.
1	NCS HC28809	13.50	.	.	32.65	.	15.40	4.38	.	7.75	.	2.30	.	1.67	0.195	1.02	.	.
1	NCS HC13804	13.38	12.33	.	37.64	1.41	14.91	1.78	.	9.28	.	1.86	.	1.02	0.097	0.42	.	.

Number	Ag	Co	Cr	Cu	CuO	Mo	Ni	SrO	ZnO	Units
IMN ZM6	0.0031	0.39	.	2.12	.	0.021	0.080	.	.	250 g last
DH 3911	.	.	0.154	.	0.007	.	.	.	0.003	100 g
NCS HC28810	.	.	.	.	.	.	.	.	.	80 g
NCS HC28809	.	.	.	.	.	.	.	.	.	80 g
NCS HC13804	.	.	.	.	.	.	.	.	.	50 g

**CRM ELECTRIC FURNACE SLAG** 50 g units

Number	Ca(tot)	Al <sub>2</sub> O <sub>3</sub>	F	FeO	T.Fe	MgO	MnO	P <sub>2</sub> O <sub>5</sub>	S	SiO <sub>2</sub>	TiO <sub>2</sub>
CMSI 1756	16.22	4.00	0.17	(15.25)	13.11	21.18	13.16	0.125	0.036	21.37	0.18

**CRM FLUORINE SLAG** 100 g units

Number	F	T.CaF <sub>2</sub>	Ca	CaO	Al <sub>2</sub> O <sub>3</sub>	C	FeO	MgO	MnO	P	SiO <sub>2</sub>	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>
JK S10	34.4	70.7	50.8	20.3	0.54	0.022	0.10	0.30	0.03	0.002	7.8	0.05	(<0.01)
IMZ E2P 1	31.62	.	36.76	.	24.85	.	.	(0.85)	.	.	2.61	.	.
IMZ E2P 3	15.78	.	39.53	.	19.13	.	.	8.44	.	.	1.68	.	.
IMZ E2P 2	(0.89)	.	24.03	.	41.38	.	.	16.89	.	.	5.81	.	.

**MANGANESE SLAG**

analysis listed in mass %

DH: RM, 100 g units

VS: CRM, 150 g units

Number	Mn	Mn <sub>3</sub> O <sub>4</sub>	Al <sub>2</sub> O <sub>3</sub>	C	CaO	CuO	Fe	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	P	P <sub>2</sub> O <sub>5</sub>	S	SiO <sub>2</sub>	ZnO
VS SH11/1	48.0	.	.	.	.	.	.	.	.	.	.	0.014	.	.	.
DH 7403	4.93	.	19.84	.	15.95	.	0.088	.	1.30	12.34	.	0.002	0.818	43.23	.
DH 7404	2.66	.	24.61	.	26.16	.	0.086	.	0.630	7.04	.	0.003	0.959	37.39	.

Number	Ba	CO <sub>2</sub>	Cr <sub>2</sub> O <sub>3</sub>	Na <sub>2</sub> O	SnO <sub>2</sub>	SrO	TiO <sub>2</sub>	Y <sub>2</sub> O <sub>3</sub>	ZrO <sub>2</sub>	-H <sub>2</sub> O@900'C
VS SH11/1	.	.	.	.	.	.	.	.	.	.
DH 7403	(0.475)	0.032	0.007	0.433	.	0.083	0.100	(0.009)	0.039	0.062
DH 7404	0.925	.	0.007	(0.229)	.	0.109	0.164	0.014	0.035	.

**CRM PHOSPHATE SLAG**

Number	total P <sub>2</sub> O <sub>5</sub>	citric acid sol. P <sub>2</sub> O <sub>5</sub>	CaO	SiO <sub>2</sub>	Units
BAM 826-1	14.65	10.73	46.48	8.96	100 g
BAM 827-1	20.70	18.79	47.38	6.21	100 g

**CRM SLAG**

analysis listed in mass %

Number	Al <sub>2</sub> O <sub>3</sub>	C	Ca	CaO	F	Fe	FeO	K <sub>2</sub> O	MgO	Mn	MnO	Na <sub>2</sub> O	P	P <sub>2</sub> O <sub>5</sub>	S	SiO <sub>2</sub>	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	Units
NCS HC18809	21.94	.	35.21	.	.	0.30	.	.	6.55	.	0.18	.	.	0.024	0.69	16.50	1.03	.	100 g
NCS HC28808	18.05	.	35.71	.	.	0.48	0.55	0.42	10.92	.	0.542	0.36	.	0.027	0.885	29.62	0.753	.	50 g
NCS HC28806	16.92	.	37.53	.	.	0.211	0.35	0.46	10.80	.	0.414	0.39	.	0.013	1.15	30.36	0.762	.	50 g
NCS HC18807	16.48	.	35.77	.	.	1.10	.	.	8.77	.	0.74	.	.	0.009	0.90	33.04	0.73	.	100 g
NCS HC18806	14.11	.	38.84	.	.	0.60	.	.	8.45	.	0.30	.	.	0.008	1.13	32.75	2.63	.	100 g
FLX 141	9.42	Cr <sub>2</sub> O <sub>3</sub> :0.229	34.94	.	.	23.43	.	.	8.30	.	2.57	.	.	0.900	.	8.73	0.741	0.139	35 g
NCS HC25801	4.91	.	7.79	.	.	1.77	.	.	3.99	35.31	.	.	0.0056	.	0.66	33.47	.	.	50 g
NCS HC28807	3.67	.	32.32	.	0.76	13.54	10.44	0.033	7.27	.	4.06	0.057	.	1.72	0.134	14.54	1.13	.	50 g
NCS HC18808	1.25	.	24.10	.	.	25.55	.	.	11.66	.	3.34	.	.	2.00	0.13	13.44	2.22	.	100 g
NCS HC15804	.	0.014	.	.	.	0.22	.	.	.	44.42	.	.	0.0032	.	0.32	25.16	.	.	100 g

**CRM TIN SLAG**

Number	Sn	Al <sub>2</sub> O <sub>3</sub>	CaO	FeO	SiO <sub>2</sub>	Units
NCS HC35801	11.96	7.36	4.12	46.18	19.61	70 g
NCS HC35802	2.32	9.32	19.76	22.22	37.49	70 g

**CRM TITANIUM SLAG**

100 g units

Number	TiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	T.Fe	MgO	MnO	S	SiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>
NCS HC19815	94.69	2.62	0.287	.	1.02	2.67	1.21	0.166	1.92	.
DSZU 123.23-95	85.21	3.40	0.76	1.12	3.29	0.60	0.94	0.16	2.50	0.30
DSZU 123.24-01	85.19	3.28	.	0.76	3.69	.	0.85	0.12	2.88	0.31
NCS HC19814	84.94	3.04	1.83	.	1.08	7.27	0.74	0.247	4.13	.
NCS HC19813	77.66	2.64	1.52	.	6.43	5.28	1.08	0.118	5.50	.

**RM TUNDISH SLAG**

typical analysis listed in mass %

100 g units

Number	CaO	SiO <sub>2</sub>	MgO	Al <sub>2</sub> O <sub>3</sub>	CO <sub>2</sub>	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MnO	Mn <sub>3</sub> O <sub>4</sub>	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	S	SO <sub>3</sub>	TiO <sub>2</sub>	-H <sub>2</sub> O 900°C
DH 6604	1.609	24.75	64.45	1.884	0.35	4.62	0.089	.	0.098	0.516	0.084	.	0.026	0.141	1.02
DH 6606	1.37	27.46	62.63	1.30	0.16	4.93	0.070	0.093	.	0.055	0.055	0.022	.	0.103	1.15
DH 6605	.	.	.	.	0.40179	.	.	.	.	0.347	.	.	.	.	1.15451

Number	C Tot	Cr <sub>2</sub> O <sub>3</sub>	NiO
DH 6604	0.471	0.255	0.165
DH 6606	.	.	.
DH 6605	.	.	.

**VACUUM SLAG**

# = class, where 1 = CRM and 2 = RM

100 g units

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr	Cr <sub>2</sub> O <sub>3</sub>	Fe	K <sub>2</sub> O	MgO		Nb <sub>2</sub> O <sub>5</sub>		S	SiO <sub>2</sub>	SrO	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	ZrO <sub>2</sub>	
2 DH 5121	23.56	51.14	0.039	.	1.27	0.011	11.98		Mn: 0.769	0.109	P <sub>2</sub> O <sub>5</sub> : 0.028	0.369	7.63	0.031	0.869	0.012	0.232
2 DH 5120	20.33	52.90	.	0.039	1.55	0.011	11.68		Mn: 1.27	0.202	P <sub>2</sub> O <sub>5</sub> : 0.039	0.281	8.13	0.032	1.28	0.016	0.230
1 NCS HC19818	4.05	1.57	.	3.03	28.96	.	3.28		MnO: 7.80	.	P: 0.037	0.053	15.93	.	11.53	17.69	.
1 NCS HC19817	3.84	1.96	.	2.40	30.48	.	3.34		MnO: 6.87	.	P: 0.054	0.054	16.90	.	10.87	16.18	.

**CRM VANADIUM SLAG**

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	Fe	MgO	MnO	P	SiO <sub>2</sub>	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	Units
VS SH9/3	1.76	1.61	3.32	28.9	3.53	9.73	0.015	16.63	7.39	22.2	150 g

**CRM SLUDGE**

analysis listed in mg/kg except % which is mass %

ERM: 30 g

SRM 2781: 40 g

SRM 2782: 70 g

all others: 40 g units

Number	Type	Ag	Al%	As	Ba	Be	Bi	Ca%	Cd	Ce	Cl	Co	Cr	Cu	Fe%	Ga	Hg	In
SRM 2782	industrial	30.6	1.37	166	254	.	.	0.67	4.17	1240	.	66.3	109	2594	26.9	35	1.10	236
BCR 145R	mixed	.	.	.	.	.	.	.	3.50	.	.	5.61	(313)	696	.	.	2.01	.
SRM 2781	domestic	98	1.6	7.82	.	.	.	3.9	12.78	.	.	.	202	627.4	2.8	.	3.64	.
BCR 143R	amended soil	.	.	.	.	.	.	.	71.8	.	.	12.3	(577)	130.6	.	.	1.10	.
ERM-CC144	sewage	.	(1.9)	7.7	.	.	.	(3.1)	14.5	.	.	6.5	168	348	3.29	.	5.9	.

continued SRM 2782 also contains (2.1%) Carbon and trace informational values for Au, Eu, Hf, Rb, Sc, Sm, Ta, Tb, Th, U, Y, and Yb.

Number	K%	La	Li	Mg%	Mn	Mo	N%	Na%	Ni	P%	Pb	S%	Sb	Se	Se	Sn	Sr	Ti	V	Zn
SRM 2782	0.32	58.1	(5.0)	0.26	(300)	10.07	.	1.30	154.1	0.50	574	(0.2)	(2.0)	0.44	(20.3)	.	.	0.0880	80	1254
BCR 145R	.	.	.	.	156	.	.	.	247	.	286	.	.	.	.	.	.	.	.	2122
SRM 2781	0.49	.	.	0.59	.	46.7	4.78	0.21	80.2	2.42	202.1	.	.	16.0	5.1	.	.	0.32	.	1273
BCR 143R	.	.	.	.	(904)	.	.	.	299	.	179.7	.	.	(0.6)	.	.	.	.	.	1655
ERM-CC144	(0.29)	.	.	(0.38)	352	.	.	(0.18)	91	.	157	.	.	(P <sub>2</sub> O <sub>5</sub> :3.8%)	(SiO <sub>2</sub> :7.3%)	.	(0.15)	.	980	



**RM****SODA ASH**

analysis listed in mass %      100 g units

Number	Na <sub>2</sub> CO <sub>3</sub>	NaCl	Fe <sub>2</sub> O <sub>3</sub>	Na <sub>2</sub> SO <sub>4</sub>
BCS 526	99.74	0.126	0.0005	0.008

**CRM SURFACE AREA**  
 data listed in m<sup>2</sup>/g

Number	Multipoint	+/-	Single Point	+/-	Units
SRM 2206	10.99	0.68	10.73	0.68	5 g granulated glass
SRM 1900	2.85	0.09	2.79	0.07	4 g silicon nitride powder

**CRM TENSILE CREEP**

Number	Creep Rate at 400 h	Time to 2% Strain	Time to 4% Strain	Units
BCR 425	$72 \times 10^{-6} \text{ h}^{-1} \pm 5$	278 h $\pm 16$	557 h $\pm 30$	3 rods 14 mm $\varnothing$ x 150 mm

**CRM TENSILE STRENGTH and HARDNESS**  
 data shows estimates of (material, measurement) uncertainty

Number	ksi Tensile Strength	ksi Yield Strength	% Total Elongation	% Reduction	Hardness	Material	Units
BS TRM-3	98.2 (0.6, 5.5)	44.7 (0.3, 3.1)	52.0 (1.2, 10.8)	57.1 (1.9, 17.3)	HRB 86.3 (0.7, 6.3)	304 steel	sheet 30 cm x 30 cm
BS TRM-1	93.3 (0.3, 2.1)	89.3 (0.5, 3.2)	15.6 (0.2, 1.6)	55.0 (0.4, 2.7)	.	1018 steel	rod 25 mm $\varnothing$ x 158 mm
BS TRM-4	36.0 (0.1, 0.8)	28.4 (0.1, 0.7)	11.4 (0.1, 1.1)	(37.0) -	HR15T 71.9 (0.6, 5.4)	5056 aluminum	sheet 30 cm x 30 cm

**CRM TENSILE STRENGTH**

Number	0.2% Proof Stress (MPa)	0.5% Proof Stress (MPa)	Tensile Strength (MPa)	Elongation Fracture (A in %)	Reduction in Area at Fracture (Z in %)	Units
BCR 661B	300 $\pm$ 7	318 $\pm$ 7	750 $\pm$ 13	40.9 $\pm$ 0.9	60 $\pm$ 4	1 rod 14 mm $\varnothing$ x 500 mm

**CRM BORON CARBIDE**

analysis listed in mass %

analysis listed in mg/kg

100 g

Number	Tot.B	Sol.B	B Isotopic Abundance	C	N	O	Al	Ca	Co	Cr	Cu	Fe	Mn	Na	Ni	Si	Ti	Zr
BAM ED102	78.47	0.116	19.907	21.01	0.209	0.10	157	97	0.39	5.6	2.2	686	10.4	63	8.0	268	96	48.9

**CRM CHROMIUM CARBIDE**

analysis listed in mass %

Number	C	Cr	S	Si	Units
NCS HC37619	12.53	83.83	0.008	0.22	50 g

**CRM SILICON CARBIDE**

analysis listed in mass %

Number	SiC	Free C	Si	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	MgO	Units
NCS DC93028	97.87	0.48	0.18	0.55	0.10	0.055	0.39	0.008	50 g
NCS DC93026	84.09	1.71	1.45	6.15	1.41	0.17	0.86	0.082	50 g
NCS DC93027	90.86	3.48	0.24	2.00	0.77	0.47	1.12	0.039	50 g

**CRM TUNGSTEN CARBIDE**

analysis listed in mass %

100 g units

Number	Grade	C	Free C	Co	Fe	Mo	Nb	Ni	Ta	Ti
ECRM 783-1	W94-C6	6.188	(0.04)	.	0.0022	.	.	.	.	.
NCS NS51001a		6.118	.	.	.	.	.	.	.	.
SRM 889	W75-Co9-Ta5-Ti4	(6.0)	.	9.50	(<0.05)	(<0.05)	(<0.05)	(<0.05)	4.60	4.03
SRM 887	W83-Co10	(5.5)	.	10.35	(<0.05)	(<0.05)	(<0.05)	(<0.01)	(<0.01)	(<0.05)
SRM 888	W64-Co25-Ta-5	(4.6)	.	24.7	(<0.05)	(<0.05)	(<0.05)	(<0.05)	4.77	(0.04)

CRM		URBAN AEROSOLS																analysis listed in mass %
Number	Al	Ba	Ca	Cl	Cu	Fe	K	Mg	Mn	Na	P	Pb	S	Si	Sr	Ti	Zn	
NIES 28	5.04	0.0874	6.69	(0.807)	0.0104	2.92	1.37	1.40	0.0686	0.796	(0.145)	0.0403	(3.91)	(14.9)	0.0469	0.292	0.114	
analysis listed in mg/kg																		
Number	As	Be	Cd	Co	Cr	La	Mo	Ni	Rb	Sb	Sc	Se	Sn	Th	U	V	Y	Units
NIES 28	90.2	(5.09)	5.60	(22.0)	(65.6)	(32.7)	(28.4)	63.8	(64.1)	(20.1)	(10.7)	(14.4)	(21.5)	(11.1)	4.33	73.2	(21.9)	1.5 g

CRM		URBAN PARTICULATE MATTER																analysis listed in mass %	Org = organic Elem = Elemental		powder 2 g
Number	Al	C	C.Org	C.Elem	Ca	Cl	Cu	Fe	K	Mg	Mn	Na	Pb	S	Si	Ti	Zn				
SRM 1648a	3.43	(12.7)	(10.5)	(2.3)	5.84	0.4543	0.0610	3.92	1.056	0.813	0.0790	0.4240	0.655	5.51	12.8	0.4021	0.4800				
analysis listed in mg/kg																					
Number	Ag	As	B	Br	Cd	Ce	Co	Cr	Cs	Hf	La	Ni	Rb	Sb	Sc	Se	Sm	Sr	Th	V	W
SRM 1648a	6.0	115.5	161	502	73.7	54.6	17.93	402	3.4	(5.2)	39	81.1	51.0	45.4	(6-120)	28.4	4.3	215	(7-107)	127	4.6

CRM		VANADIUM NITROGEN ALLOY													analysis listed in mass %
Number	V	N	C	O	Al	Mn	P	S	Si	As	Ca	Cr	Fe	Units	
NCS HC28641	78.04	14.13	5.71	(0.6)	0.26	0.0065	0.012	0.0013	0.26	0.0014	0.064	0.082	0.65	25 g	
NCS HC28642	77.73	16.64	3.39	(0.6)	0.24	0.0050	0.010	0.0016	0.23	0.0012	0.044	0.082	0.57	25 g	
NCS HC93630	77.73	14.57	3.96	.	0.164	0.0082	0.0075	0.0014	0.061	.	.	.	.	25 g	
NCS HC28639	77.58	9.44	9.22	(0.5)	0.24	0.0091	0.147	0.0025	0.40	0.0074	0.066	0.0032	1.95	25 g	
NCS HC28640	76.73	13.31	6.01	(0.7)	0.28	0.0045	0.142	0.0019	0.40	0.012	0.10	0.019	1.76	25 g	
Y 19606	76.57	15.55	3.07	2.26	0.043	0.076	0.011	0.0099	0.24	.	.	.	.	100 g	

CRM		ZIRCON CONCENTRATE												DSU: 50 g	BCS: 100 g
Number	ZrO <sub>2</sub> +HfO <sub>2</sub>	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SnO <sub>2</sub>	TiO <sub>2</sub>	LOI			
DSZU 123.47-03	66.1	.	0.75	.	0.074	.	.	.	0.099	.	0.22	.			
BCS 204A	53.8	37.6	0.74	0.15	0.18	0.017	0.012	0.014	0.77	1.69	2.22	0.50			

CRM		ZIRCONIA - Yttrium Stabilized Zirconium Oxide												
Number	Al	Ca	Fe	Hf	Mg	P	Si	Th	Ti	U	Y	monoclinic ZrO <sub>2</sub>	Units	
ERM-ED105	0.0660	0.0242	0.0095	1.535	0.00129	(<0.0075)	0.0195	0.0112	0.0497	0.0292	6.11	(1.94)	powder 47 g	

CRM		ZIRCONIA SET										available in SET/4 only	50 g units
Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	HfO <sub>2</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	Nb <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	LOI		
JCRM R051	.	0.0017	0.0017	1.96	.	0.0004	0.015	.	(0.005)	(0.0005)	0.71		
JCRM R052	.	0.019	(0.0004)	1.81	0.0013	0.0042	0.0021	.	0.019	0.0012	0.25		
JCRM R053	.	0.021	0.030	1.67	(0.0007)	0.0020	0.028	0.054	0.036	0.127	0.65		
JCRM R054	0.136	0.535	0.132	1.60	(0.0003)	0.208	0.0027	0.427	0.300	0.138	0.15		