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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**

NIOH: 1 filter, analysis in µg, not for xrf SRM: 2 loaded + 2 blank filters, analysis in ng, good for nondestructive analysis

Number	Al	As	B	Ba	Be	Cd	Co	Cr	Cu	Fe	Mg	Mn	Mo	Na	Ni
NIOH A3	225	7.65	(38)	37.4	1.48	15.0	37.3	47.8	75.0	521	74.5	150	37.6	.	60.3
NIOH B3	110	3.76	(18)	18.4	0.73	7.35	18.3	23.5	36.9	256	36.6	73.6	15.9	.	29.7
SRM 2783 loaded *	23210	11.8	.	335	.	.	7.7	135	404	26500	8620	320	.	1860	68
SRM 2783 blank	(30)	.	.	(0.4)	.	.	(0.04)	(70)	.	.	.	.	.	(15)	(8)

Number	Pb	Pt	S	Sb	Sn	Sr	Ti	Tl	V	W	Zn	Zr
NIOH A3	37.0	35.2	.	37.5	37.7	35.2	37.0	2.61	15.5	(38)	226	37.3
NIOH B3	18.2	17.3	.	18.4	18.6	17.3	17.8	1.28	7.61	(19)	111	18.3
SRM 2783 loaded *	317	.	(1050)	71.8	.	.	1490	.	48.5	(5.0)	1790	.
SRM 2783 blank	(0.4)	.	(100)	.	.	.	.	.	.	.	(50)	.

\* SRM 2783 loaded also has certified Ca: 13200, K: 5280; informational Ce: 23.4, Rb: 24.0, Sc: 3.54, Si: 58600, Sm: 2.04, Th: 3.23, and U: 1.234.

**RM ASH**

typical analysis listed in mass %

Number	Type of Ash	pH	Al	Ca	Cr	Cu	Fe	K	Mg	Na	Ni	Ti	Zn
RT 001	Power Plant	10.98	.	.	0.00291	0.00407	(1.6300)	.	.	.	0.00198	(0.0465)	.
RT 012	Industrial	2.86	0.2160	0.2110	16.2000	0.3020	2.8700	7.3300	0.1510	2.9200	1.3300	.	0.0635
RT 019	Water Incenerator	6.64	(3.2800)	(5.1949)	0.00552	0.0279	(1.2700)	(4.9300)	0.6310	(5.0500)	0.00222	(0.2870)	2.2400

continued analysis listed in mg/kg

Number	As	Ag	B	Ba	Be	Cd	Co	Hg	Mn	Mo	Pb	Sb	Se	Sn	Sr	Tl	V	Units
RT 001	.	.	.	428	.	.	.	(306)	.	.	.	.	.	(1010)	.	.	.	100 g
RT 012	.	54.8	.	18.7	.	362	(22.4)	.	202	.	120	.	.	.	.	(51.8)	.	100 g
RT 019	77.2	7.35	(336)	352	(2)	432	(26)	(2)	(480)	(26)	4540	(223)	4.11	(410)	(173)	(42)	28.9	50 g

**CRM ATTRITION INDEX**

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

**CRM CALCIUM CARBONATE**

certified analysis in mg/kg		CaCO <sub>3</sub> content is 99.79%										informational values								100 g units		
Number	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	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

**CEMENT**

# = 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	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
1	SRM 1886a	67.87	.	22.38	3.875	0.152	0.093	1.932	0.021	0.022	2.086	(0.018)	0.084	(1.56)	4 x 5 g
1	NCS DC62103	66.68	.	21.96	4.54	2.76	0.56	2.30	0.12	.	0.23	.	0.28	0.42	25 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	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	SRM 1889a	65.34	.	20.66	3.89	1.937	0.605	0.814	0.195	0.110	2.69	0.042	0.227	(3.28)	4 x 5 g
1	JCA CRM-1	65.21	.	20.99	5.26	2.67	0.56	2.13	0.26	0.28	2.05	0.05	0.35	(0.63)	60 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
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
2	JCA 211R	64.37	.	20.77	5.67	2.65	0.44	1.16	0.22	0.10	2.13	.	0.31	1.86	30 g
2	CCRL 170	64.32	.	21.71	3.77	2.48	0.628	1.44	0.092	0.074	2.75	.	0.17	2.78	30 g
1	SRM 1880b	64.16	.	20.42	5.183	3.681	0.646	1.176	0.0914	0.2443	2.710	(0.0272)	0.236	(1.666)	4 x 5 g
2	CCRL 171	63.60	.	21.29	4.16	4.53	0.700	2.06	0.065	0.064	2.24	.	0.22	1.02	30 g
2	CCRL 169	63.47	.	22.07	3.17	3.70	0.429	2.00	0.201	0.135	2.15	.	0.23	2.30	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	JCA RM 612	62.95	.	20.12	5.19	2.81	0.90	1.52	0.52	1.02	4.51	0.045	0.28	(2.52)	30 g
1	NCS DC62101b	62.76	.	20.88	4.48	2.64	0.66	2.05	0.11	.	2.98	.	0.32	3.00	20 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	SRM 1885a	62.39	.	20.909	4.026	1.929	0.206	4.033	1.068	0.1220	2.830	0.638	0.195	(1.68)	4 x 5 g
1	GBW 03201a	62.34	.	20.56	5.02	3.16	1.15	1.40	0.18	.	2.29	.	0.21	3.39	25 g
2	CCRL 168	62.28	.	19.91	5.11	2.14	1.227	3.88	0.226	0.191	3.48	.	0.20	0.86	30 g
1	SRM 1884a	62.26	.	20.57	4.264	2.695	0.997	4.475	0.2161	0.1278	2.921	0.2984	0.186	(1.06)	4 x 5 g
2	CCRL 172	61.78	.	19.30	4.66	2.93	0.935	4.74	0.267	0.111	3.21	.	0.26	2.09	30 g
2	CCRL 167	61.64	.	19.29	5.92	2.44	1.068	3.11	0.355	0.240	4.39	.	0.24	0.84	30 g
1	NCS DC62102	61.42	.	20.81	4.54	2.48	0.61	2.62	0.13	.	2.78	.	0.34	3.91	25 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 1887a	60.90	.	18.637	6.202	2.861	1.100	2.835	0.4778	0.306	4.622	0.322	0.2658	(1.43)	4 x 5 g
1	NCS DC62102a	58.67	.	21.19	5.31	3.17	0.91	2.91	0.14	.	2.33	.	0.32	4.50	20 g
1	NCS DC62116	57.86	.	16.34	4.01	2.22	0.55	2.28	0.11	.	2.3	.	0.22	13.86	20 g
1	SRM 1881a	57.58	.	22.26	7.060	3.09	1.228	2.981	0.199	0.1459	3.366	0.036	0.3663	(1.59)	4 x 5 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 CRM103	54.71	.	26.86	7.72	1.77	0.77	4.42	0.33	0.09	2.72	0.070	0.371	0.35	50 g
1	FLX CRM101	48.24	.	30.31	8.81	3.52	2.10	1.70	0.68	0.191	3.16	0.248	0.469	3.84	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	NCS DC62105c	43.94	.	11.77	3.27	2.09	0.59	1.58	0.10	.	0.10	.	0.19	36.18	.
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	NCS DC62104a	38.70	.	14.26	3.70	2.45	0.70	1.61	0.28	.	0.39	.	0.24	37.40	25 g
1	DH X0202 *	38.01	.	4.08	39.31	15.83	0.111	0.487	0.033	0.043	0.105	.	1.81	.	100 g
1	SRM 1883a	29.52	.	0.24	70.04	0.078	0.014	0.19	0.30	(0.003)	.	(0.019)	(0.020)	(0.35)	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	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	Unignited SO <sub>3</sub>	V <sub>2</sub> O <sub>5</sub>	ZnO	Ins. Res.
BCS 354	.	.	.	.	.	.	.	.	0.058	.	.	.	.	.
SRM 1886a	.	.	.	(0.0042)	0.0024	(0.02)	.	.	0.0073	.	.	.	(0.001)	(0.23)
NCS DC62103	.	.	.	.	.	.	.	.	.	.	.	.	.	0.11
JCA RM 611	.	.	.	.	.	.	.	0.06	.	.	.	.	.	.
NCS DC62117	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SRM 1889a	.	.	.	(0.0019)	0.0072	(0.05)	.	.	0.2588	.	.	.	0.0048	(0.66)
JCA CRM-1	.	.	.	.	.	.	0.06	.	.	.	.	.	.	.
SRM 634a	.	.	(1.86)	.	(0.0114)	.	.	.	(0.0229)	.	.	.	(0.0222)	(0.21)
BCS 353	.	.	.	.	.	.	.	.	0.23	.	.	.	.	.
FLX CRM100	.	.	.	(0.09)	0.009	.	.	.	0.066	.	.	.	0.051	.
JCA 211R	.	.	.	0.009	.	.	0.07	.	.	.	.	.	.	0.08
CCRL 170	.	1.88	1.38	0.003	0.008	.	.	.	0.045	.	.	.	0.008	0.56
SRM 1880b	.	.	(2.227)	0.01830	0.01927	(0.0539)	.	.	0.1981	(0.0131)	.	.	(0.01054)	(0.487)
CCRL 171	.	0.88	0.88	0.008	0.011	.	.	.	0.050	.	.	.	0.016	0.21
CCRL 169	.	1.66	1.36	0.005	0.013	.	.	.	0.111	.	.	.	0.110	0.28
SRM 1888b	.	.	(1.42)	0.0143	(0.01021)	(0.048)	.	.	0.0652	(0.15)	.	.	(0.01253)	(0.32)
JCA RM 613	.	.	.	.	.	.	.	0.08	.	.	.	.	.	.
JCA RM 612	.	.	.	.	.	.	.	0.06	.	.	.	.	.	.
NCS DC62101b	.	.	.	.	.	.	.	.	.	.	.	.	.	0.75
CCRL 173	.	0.6	1.65	0.023	0.009	.	.	.	0.060	.	.	.	0.024	0.36
CCRL 174	.	.	1.04	0.005	0.006	.	.	.	0.073	.	.	.	0.014	0.26
SRM 1885a	.	.	.	(0.0040)	0.0195	(0.13)	.	.	0.0478	.	.	.	(0.0029)	(0.22)
GBW 03201a	.	.	.	.	.	.	.	.	.	.	.	.	.	0.98
CCRL 168	.	.	0.70	0.004	0.011	.	.	.	0.089	.	.	.	0.014	0.33
SRM 1884a	.	.	.	(0.0037)	0.0166	(0.11)	.	.	0.0853	.	.	.	(0.0101)	(0.25)
CCRL 172	.	1.38	1.04	0.008	0.009	.	.	.	0.088	.	.	.	0.004	0.44
CCRL 167	.	.	0.43	0.0006	0.012	.	.	.	0.098	.	.	.	0.013	0.27
NCS DC62102	.	.	.	.	.	.	.	.	.	.	.	.	.	0.68
NCS DC62118	.	.	.	.	.	.	.	.	.	.	.	.	.	1.18
SRM 1887a	.	.	.	(0.0104)	(0.009)	(0.09)	.	.	0.1186	.	.	.	0.0667	(0.13)
NCS DC62102a	.	.	.	.	.	.	.	.	.	.	.	.	.	0.68
NCS DC62116	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SRM 1881a	.	.	.	(0.013)	0.0588	(0.09)	.	.	0.1042	.	.	.	0.0489	(5.2)
JCA CRM-2	.	.	.	.	.	.	0.15	.	.	(0.32)	(1.91)	.	.	.
FLX CRM103	.	.	.	(0.04)	0.007	.	.	.	0.169	(0.33)	.	SO4:2.26	0.014	.
FLX CRM101	.	.	.	(0.05)	0.010	.	.	.	0.118	.	.	.	0.044	.
DH X0210	0.071	.	.	.	.	.	.	.	0.327	1.77	.	0.011	.	.
NCS DC62105c	.	.	.	.	.	.	.	.	.	.	.	.	.	.
SRM 1882a	.	.	.	.	(0.113)	.	.	.	(0.060)	.	.	.	(0.004)	.
NCS DC62104a	.	.	.	.	.	.	.	.	.	.	.	.	.	.
DH X0202 *	.	.	.	(<0.01)	.	0.009	.	.	0.039	.	* more certified trace data listed in database			
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	.	.

last

**CRM CHLORINE and FLUORINE in CEMENT**

Number	Description	CaF <sub>2</sub>	F	Cl-	Units
NCS DC62121	Cement Raw Meal	.	.	0.029	20 g
NCS DC62122	Cement	.	.	0.012	20 g
NCS DC62125a	Cement	(0.37)	0.18	.	20 g

**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 DC62119	4.5	5.8	1.2	0.98		Ordinary Portland Cement
NCS DC62120	0.5	18.5	7	3.5	97.5	Portland Blast-Furnace Slag Cement

**CRM CEMENT COMPRESSIVE STRENGTH**

Class	Day Number	3 Strength	7 Strength	28 Strength	Units
CRM RM	CAN CM-2 JCA 401G	28.1 N/mm <sup>2</sup>	45.8 N/mm <sup>2</sup>	39.8 Mpa 64.8 N/mm <sup>2</sup>	2500 g 4800 g

**CRM PORTLAND CEMENT FINENESS AND BLAINE STANDARD**

Number	Remaining after passing through 80 micron sieve	Blaine m <sup>2</sup> /kg	Density g/cm <sup>3</sup>	Units
NCS DC62127	2.03 %	354.7	3.16	200 g

**CRM CEMENT FINENESS**

certified analysis

informational analysis listed in mass %

46H: 10 x 5 g units

114q: powder 20 x 5 g units

Number ASTM METHOD	Surface Area		45 µm Sieve	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
	Blaine C204-96a	Wagner C115-96a	Residue C430-96	C150-02				C114-02										
SRM 114g SRM 46h	3818 cm <sup>2</sup> /g	2183 cm <sup>2</sup> /g	0.79 % 7.43 %	14 15	60 59	7 8	10 8	4.7 4.9	64.0 63.9	3.2 2.8	0.70 0.68	2.2 1.9	0.07 0.19	0.12 0.21	2.4 2.9	20.7 20.6	0.30 0.30	1.67 1.5

**CRM CEMENT FINENESS**

particle size analysis detailed on certificates

2 x 25 g units

Number	Density g/cm <sup>3</sup>	Blaine cm <sup>2</sup> /g	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	F.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>	Insol.	LOI
TECH 9	3.15	4,175	12	62	7	9	4.66	64.00	1.09	3.01	0.76	2.20	0.26	0.07	2.74	20.47	0.20	0.45	1.46
TECH 7	3.12	3,440	22	52	12.5	4	5.78	62.73	0.94	2.07	0.43	1.04	0.25	0.10	3.17	22.90	0.32	2.61	1.13

**RM CEMENT SET JCA 601A**

available in set/15 only each unit: powder 20 g

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	MnO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SO <sub>3</sub>	SrO	TiO <sub>2</sub>
XRF 3	66.32	20.67	4.57	2.43	0.45	1.53	0.08	0.30	0.13	3.18	0.049	0.28
XRF 6	66.23	20.71	5.02	2.70	0.23	1.81	0.19	0.26	0.05	2.61	0.035	0.24
XRF 4	66.17	20.71	4.73	2.80	0.54	1.37	0.05	0.24	0.40	2.64	0.036	0.26
XRF 5	65.99	20.52	5.07	2.99	0.46	0.94	0.28	0.32	0.10	3.02	0.027	0.25
XRF 2	65.17	21.31	5.29	2.93	0.50	1.77	0.21	0.38	0.11	1.91	0.045	0.31
XRF 9	64.75	23.82	3.40	4.18	0.39	0.78	0.11	0.24	0.06	1.94	0.024	0.16
XRF 7	64.27	22.76	4.26	4.11	0.35	1.03	0.06	0.17	0.06	2.42	0.030	0.25
XRF 8	64.15	23.23	3.82	4.02	0.54	1.52	0.21	0.10	0.19	1.93	0.038	0.27
XRF 1	64.14	22.23	5.35	3.05	0.40	1.75	0.15	0.29	0.06	2.33	0.037	0.33
XRF 10	61.67	22.99	6.29	2.39	0.62	2.71	0.14	0.17	0.13	.	0.043	0.52
XRF 11	59.15	24.43	7.37	2.26	0.51	2.63	0.16	0.26	0.23	.	0.046	0.55
XRF 13	55.36	26.62	9.22	2.02	0.41	2.98	0.61	0.30	0.06	.	0.037	0.41
XRF 14	55.15	25.74	8.70	2.03	0.31	3.98	0.28	0.26	0.04	.	0.051	0.66
XRF 12	54.90	26.34	8.95	1.82	0.44	3.33	0.18	0.23	0.17	.	0.051	0.73
XRF 15	49.28	29.29	10.70	1.32	0.42	5.12	0.48	0.25	0.06	.	0.071	0.64

**CRM CEMENT COMPONENT MATERIAL**

analysis listed in mass %

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 DC62110	Portland Blast Furnace Slag	57.4	.	6.26	23.48	.	2.39	0.59	3.31	0.17	.	2.02	0.43	3.68
NCS DC62109	Portland Pozzolanic	47.57	.	6.52	32.67	.	3.54	1.43	1.86	0.85	.	2.59	0.16	2.44
NCS DC62111	Portland Fly Ash	46.52	.	8.93	24.31	.	4.9	0.61	1.9	0.32	.	2.47	0.33	9.09
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 DC62126	Cement Black Raw Meal	38.89	70.9	.	.	0.15	2.74	.	.	.	.	.	.	37.46
NCS DC62113	Granulated Blast Furnace Slag	35.62	.	12.23	34.93	.	1.26	0.54	10.66	0.42	0.61	1.17	1.06	1.05
NCS DC62112	Aluminate	34.56	.	51.15	7.95	.	1.91	0.13	0.63	0.04	0.1	.	2.03	0.68
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 DC62115	Fly Ash for Cement	4.42	.	36.62	48.93	.	4.37	0.57	0.84	0.17	.	0.35	1.46	1.76
NCS DC62114	Pozzolana for Cement	2.83	.	24.2	57.53	.	5.1	3.05	1.24	1.42	.	0.08	1.07	2.99

COAL

# = class, where 1=CRM and 2=RM analysis listed in mass % unless otherwise noted \* Hg in mg/kg AS(C)RM: 250 g SABS: 150 g 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
2	IARM HC-30500B	5.4	22.3	32	(11,600) BTU	.	(1.1)	64.2	(45)	.	.	4.2	.	1.10	3	.
2	IARM HC-30450A	4.72	16.8	39	(11,640) BTU	.	(4.9)	64	(44)	.	.	(4.7)	.	(1.2)	(7.5)	.
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	NCS FC28210	3.17	25.9	8.4	24,470 J	.	.	.	.	.	.	.	.	.	.	.
2	IARM HC-30300B	3.02	8.6	40	(13,900) BTU	.	(1.2)	77	(51.0)	.	.	5.0	.	1.6	5.7	.
1	NCS FC28008e	2.78	15.54	35.09	28,130 J	1.45	.	68.22	.	.	.	4.44	.	1.22	.	.
1	NCS FC28216	2.79	8.7	10.78	32,340 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28011c	2.20	20.41	6.87	27,120 J	1.72	.	72.79	.	.	.	2.09	.	0.51	.	.
1	NCS FC28215	2.17	25.2	28.79	24,830 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28112	2.10	8.08	33.7	33,040 J	1.33	.	78.86	.	.	.	5.01	.	1.31	.	.
1	SRM 2683b	1.955	(9.93)	(36.31)	(30,620) J and (13,163) BTU	.	.	.	.	(0.15)	.	0.0900	.	.	.	.
1	NCS FC28217	1.79	8.68	36.06	31,330 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28209	1.76	27.33	8.21	23,960 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28106	1.70	8.41	31.92	32,870 J	1.35	.	78.98	.	.	.	4.95	.	1.38	.	.
2	IARM HC-30150C	1.72	18.75	34	(12,060) BTU	.	(2.2)	67.3	(47)	.	.	4.50	.	1.39	(6.2)	.
1	NCS FC28002j	1.61	23.69	30.22	23,750 J	1.58	.	60.00	.	.	.	3.67	.	1.07	.	.
1	NCS FC28214	1.66	27.85	29.21	23,630 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28213	1.49	9.88	36.2	30,760 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28218	1.35	14.58	6.16	29,260 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28140	1.30	25.88	30.31	22,710 J	1.62	.	58.12	.	.	.	3.40	.	1.04	.	.
1	NCS FC28111	1.28	25.19	28.39	24,350 J	1.57	.	60.24	.	.	.	3.73	.	1.04	.	.
1	SABS 053	1.20	29.42	27.86	.	.	.	55.76	.	.	.	3.61	.	1.28	.	0.041
1	SRM 2692b	1.170	.	.	.	.	.	.	.	0.1651	.	.	.	.	.	.
1	NCS FC28105	1.06	9.61	12.21	32,310 J	1.43	.	81.54	.	.	.	3.7	0.1333	1.16	.	.
1	NCS FC28202	1.05	8.65	33.36	30,770 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28208	1.03	15.48	20.57	29,190 J	.	.	.	.	.	.	.	.	.	.	.
1	SABS 035	1.02	26.81	22.18	.	.	.	58.01	.	.	.	2.98	.	1.52	.	0.05
2	IARM HC-30100B	1.00	6.96	34	(13,370) BTU	.	(6.3)	77	(58)	.	.	5	.	(1.8)	(9)	.
1	SABS 028	0.99	27.00	23.10	.	.	.	57.24	.	.	.	2.94	.	1.45	.	0.09
1	NCS FC28006k	0.96	14.89	32.41	27,540 J	1.47	.	68.47	.	.	.	4.21	.	1.21	.	.
1	SABS 024	0.96	10.94	33.05	.	.	.	71.01	.	.	.	4.35	.	1.90	0.073	.
1	NCS FC28204	0.96	8.09	34.25	31,340 J	.	.	.	.	.	.	.	.	.	.	.
1	SABS 041	0.94	27.62	22.84	.	.	.	57.61	.	.	.	3.08	.	1.48	.	0.065
1	NCS FC28211	0.88	13.41	9.08	30,230 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28110	0.87	8.42	32.94	30,920 J	1.41	.	75.96	.	.	.	4.56	.	1.33	.	.
1	SABS 029	0.86	32.97	23.96	.	.	.	50.86	.	.	.	2.86	.	1.17	0.051	.
1	SABS 040	0.86	26.63	23.00	.	.	.	58.36	.	.	.	3.14	.	1.51	.	0.058
1	NCS FC28206	0.86	14.42	28.56	26,730 J	.	.	.	.	.	.	.	.	.	.	.
1	SABS 052	0.85	7.94	5.17	.	.	.	85.79	.	.	.	2.47	.	1.77	.	0.020

#	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	SABS 042	0.78	26.66	22.40	.	.	.	57.78	.	.	.	2.98	.	1.46	.	0.100
2	IARM HC-30075C	0.76	7.2	36	(13,820) BTU	.	(1.9)	77.4	57	(0.2)	.	5.0	0.24	1.47	(8)	.
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	SABS 044	0.73	24.01	22.79	.	.	.	60.54	.	.	.	3.06	.	1.54	.	0.093
1	SABS 051	0.72	39.70	20.89	.	.	.	44.44	.	.	.	2.45	.	1.10	.	0.11
1	NCS FC28203	0.71	10.36	20.69	31,660 J	.	.	.	.	.	.	.	.	.	.	.
1	SABS 031	0.69	12.02	21.20	.	.	.	79.13	.	.	.	4.30	.	1.74	.	0.03
1	NCS FC28107	0.67	10.41	15.3	31,640 J	1.43	.	79.89	.	.	.	3.80	.	1.12	.	.
1	SABS 046	0.66	11.86	26.87	.	.	.	74.21	.	.	.	3.77	.	1.76	.	.
1	SABS 026	0.65	37.83	22.07	.	.	.	46.63	.	.	.	2.59	.	1.11	0.066	.
1	SABS 030	0.62	8.14	29.26	30,860 J	.	.	77.44	.	.	.	4.43	.	1.91	0.110	.
1	SABS 047	0.60	13.58	25.45	.	.	.	71.85	.	.	.	3.81	.	1.66	.	0.06
1	NCS FC28109	0.58	11.98	11.30	30,660 J	1.49	.	79.42	.	.	.	3.28	.	1.09	.	.
1	NCS FC28108	0.57	13.68	30.84	29,900 J	1.42	.	72.94	.	.	.	4.46	.	1.26	.	.
1	NCS FC28116	0.54	6.08	32.34	31,820 J	1.39	.	78.68	.	.	.	4.59	.	1.34	.	.
1	NCS FC28212	0.53	8.52	25.65	30,940 J	.	.	.	.	.	.	.	.	.	.	.
1	SABS 048	0.50	15.66	25.40	.	.	.	71.24	.	.	.	3.76	.	1.65	.	0.09
1	SABS 001	0.50	14.50	24.50	.	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28001j	0.50	9.63	24.43	31,470 J	1.41	.	78.35	.	.	.	4.28	.	1.36	.	.
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	.	0.10
1	SABS CCS 008	0.48	16.33	24.36	27,520 J	.	.	70.50	.	.	.	3.62	.	1.61	.	0.086
1	SABS 049	0.48	16.34	24.31	.	.	.	70.96	.	.	.	3.61	.	1.63	.	0.09
1	SABS 037	0.48	15.26	24.84	.	.	.	71.17	.	.	.	3.67	.	1.72	0.102	.
1	SABS 033	0.48	15.19	24.85	.	.	.	71.55	.	0.0060	0.0278	3.86	.	1.71	.	0.15
1	NCS FC28201	0.47	10.45	17.7	31,570 J	.	.	.	.	.	.	.	.	.	.	.
1	SRM 2693	0.4571	.	.	.	.	.	.	.	0.03696	.	.	.	.	.	.
1	NCS FC28207	0.43	16.26	7.26	26,100 J	.	.	.	.	.	.	.	0.0373	.	.	.
1	NCS FC28115	0.42	6.38	32.22	31,050 J	1.41	.	77.44	.	.	.	4.42	.	1.21	.	.
1	NCS FC28104	0.40	10.09	11.00	32,040 J	1.45	.	81.45	.	.	.	3.52	.	1.34	.	.
1	SABS 023	0.37	16.54	25.63	.	.	.	68.25	.	.	.	3.63	.	1.62	.	0.10
1	NCS FC28103	0.36	10.51	9.60	31,800 J	1.47	.	81.55	.	.	.	3.33	.	1.30	.	.
1	NCS FC28205	0.31	14.49	11.39	29,980 J	.	.	.	.	.	.	.	.	.	.	.
2	IARM HC-30025C	0.30	6.3	44	(11,850) BTU	.	(21.3)	70	(50)	<0.01	.	4.7	0.07	0.97	17.9	.
1	NCS FC28003f	0.28	16.29	6.35	26,410 J	1.95	.	78.13	.	.	.	0.95	.	0.23	.	.
1	NCS FC28219	0.28	6.1	31.24	30,090 J	.	.	.	.	.	.	.	.	.	.	.
1	NCS FC28113	0.27	7.06	33.40	30,030 J	1.41	.	74.8	.	.	.	4.47	.	1.02	.	.
1	NCS FC28017	0.21	21.01	5.90	25,010 J	1.97	.	73.64	.	.	.	0.91	.	0.23	.	.
1	NCS FC28114	0.20	4.66	33.20	30,580 J	1.40	.	76.69	.	.	.	4.42	.	1.08	.	.
1	NCS FC28101	0.20	3.95	6.64	34,340 J	1.47	.	90.27	.	.	.	3.01	.	0.59	.	.
1	NCS FC28102	0.19	6.46	7.90	33,100 J	1.50	.	87.47	.	.	.	2.86	.	0.60	.	.
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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## SULFUR IN COAL

# = class, where 1 = CRM and 2 = RM VS: part number matches sulfur analysis listed in mass %

#	Number	S	Units	#	Number	S	Units	#	Number	S	Units
2	IARM-HC20500B	5.4	50 g	2	VS1-1.77	1.77	50 g	2	IARM-HC20075C	0.76	50 g
1	ASCRM 012 D	5.21	125 g	2	IARM-HC20150C	1.72	50 g	2	VS1-0.73	0.73	50 g
1	BCR 335	5.08	20 g	1	BCR 334	1.609	20 g	1	ASRCM 012 B	0.72	250 g
2	IARM-HC20450A	4.72	50 g	2	VS1-1.49	1.49	50 g	2	VS1-0.70	0.70	50 g
2	VS1-4.25	4.25	50 g	1	BCR 333	1.344	20 g	1	BCR 331	0.499	20 g
2	VS1-3.56	3.56	50 g	1	ASCRM 012 C	1.22	125 g	2	VS1-0.40	0.40	50 g
1	BCR 336	3.290	20 g	2	VS1-1.11	1.11	50 g	2	VS1-0.51	0.51	50 g
2	VS1-3.19	3.19	50 g	2	IARM-HC20100B	1.00	50 g	2	VS1-0.55	0.55	50 g
2	IARM-HC20300B	3.02	50 g	1	BCR 332	0.961	20 g	1	ASCRM 012 A	0.33	125 g
2	VS1-2.89	2.89	50 g	2	VS1-0.93	0.93	50 g	2	IARM-HC20025B	0.28	50 g
2	VS1-2.60	2.60	50 g								
2	VS1-2.33	2.33	50 g								
2	VS1-2.07	2.07	50 g								
2	VS1-1.97	1.97	50 g								

## RM COAL

typical analysis listed in mass % except Heat values, which are BTU/lb

50 g units

Number	S	DRY ANALYSIS				Volatile Matter	IGNITED ANALYSIS					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>
		C	Heat BTU/lb	Ash	C		Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O								
VS6-056	3.23	(51.61)	(13,719)	8.12	40.30	20.72	4.15	23.92	1.62	0.72	0.04	0.47	0.43	4.19	41.79	1.01		
VS6-046	1.82	(70.69)	(14,004)	10.32	19.00	28.17	1.66	14.79	2.21	0.78	0.02	0.27	0.37	1.36	48.08	1.23		
VS6-006	1.60	(50.98)	(12,302)	16.98	31.97	24.27	1.07	10.01	1.96	0.76	0.04	0.15	0.16	1.03	56.34	1.81		
VS6-026	1.56	(52.33)	(12,761)	14.50	33.12	27.83	0.74	7.52	3.79	0.98	0.01	0.44	0.09	0.54	54.56	1.43		
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		
VS6-036	0.65	(76.70)	(14,994)	4.88	18.58	20.73	12.36	15.22	1.51	1.94	0.07	0.46	0.10	11.52	33.39	1.16		
VS6-066	0.61	(58.57)	(13,811)	9.27	32.17	26.62	1.03	3.06	2.57	0.84	0.01	0.33	0.08	1.20	60.19	1.62		

## CRM COAL

analysis listed in mass %

BCR: 15 g units

SRM 1635: 75 g units

other SRM: 50 g units

analysis listed in mg/kg

Number	Ash	Volatile Matter	Calorific Value J/g	C	Al	Cl	Fe	H	K	N	Na	S	Hg	Mn	V	Zn
SRM 2685b	(15.94)	.	(26940)	(64.6)	(1.7)	0.0517	(3.9)	(4.5)	(0.26)	(1.1)	(0.08)	4.730	0.1462	(41)	(31)	(17)
BCR 182	12.27	(28.8)	29680	73.29	(1.56)	0.370	(0.73)	(4.22)	(0.43)	1.636	.	.	0.040	195	24.3	33.3
SRM 1632c	(7.16)	(36.0)	(32100)	(77.45)	(0.915)	0.1139	(0.735)	5.11	0.1100	(1.54)	0.02988	1.462	0.0938	13.04	(23.72)	12.1
SRM 2682b	(6.32)	.	(25660)	(66.6)	(0.46)	(0.00161)	(0.24)	(4.3)	(0.01)	(1.0)	(0.10)	0.4917	0.1088	(26)	(15)	(8.6)
SRM 1635	(4.6)	.	.	.	(0.32)	.	0.239	.	.	.	(0.24%)	0.3616	0.0109	21.4	5.2	4.7

continued

analysis listed in mg/kg

Number	As	Ba	Br	Cd	Ce	Co	Cr	Cu	F	Ni	Pb	Rb	Sb	Se	Sr	Th	U
SRM 2685b	(12)	(105)	(5.6)	.	(18)	(4.6)	(22)	.	.	.	.	(17)	.	(1.9)	.	(2.7)	(0.95)
BCR 182	(1.47)	.	(36.5)	0.057	(17)	(8.7)	(20)	(12.3)	.	(39)	(15.3)	(22)	.	0.68	.	(2.3)	.
SRM 1632c	(6.18)	41.1	(18.7)	(0.072)	(11.9)	3.48	(13.73)	(6.01)	(72.7)	(9.32)	(3.79)	7.52	0.461	1.326	63.8	1.40	(0.513)
SRM 2682b	(1.0)	(382)	(3.7)	.	(10)	(1.7)	(15)	.	.	.	.	(<2)	.	(0.91)	.	(1.5)	(0.52)
SRM 1635	0.42	.	.	0.03	(3.6)	(0.65)	2.5	3.6	25.9	1.74	1.9	.	.	0.9	.	0.62	0.24

## CRM COAL

analysis listed in mass %

SARM: 120 g units

US: 50 g units

analysis listed in mg/kg

Number	Type	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>	S	SiO <sub>2</sub>	TiO <sub>2</sub>	ASH	LOI	As	Ba	Be	Ce	Co
SARM 20	Sasolberg	11.27	1.87	1.17	0.14	0.43	0.27	0.14	0.51	17.66	0.63	.	64.66	4.7	372	2.5	87	8.3
SARM 19	OFS	8.01	1.39	1.75	0.24	0.20	0.29	.	1.49	15.00	0.341	.	71.28	7	304	2.8	56	5.6
SARM 18	Witbank	2.57	0.18	0.29	0.145	0.11	.	.	0.56	6.20	0.114	.	90.11	.	78	4.1	22	6.7
US CLB-1	Maryland	(1.51)	0.22	1.25(T)	0.0760	0.0470	0.0230	(0.0700)	(1.49 T)	(2.51)	(0.0780)	(6.3)	.	(13)	34	.	10	7.0

continued

analysis listed in mg/kg

Number	Cr	Cs	Cu	Ga	Ge	Hf	Hg	La	Li	Mn	Mo	Ni	P	Pb	Rb	Sc	Se	Sm	Sr	Ta	Th	U	V	Y	Zn	Zr
SARM 20	(67)	(2)	18	16	.	4.8	0.25	43	.	80	.	25	.	26	10	10	0.8	6.3	330	1.2	18	4	47	29	17	(180)
SARM 19	50	1.4	13	14	13	5.4	(0.2)	27	.	157	.	16	130	20	9	7.6	.	4.9	126	.	12	5	35	.	12	351
SARM 18	16	(1)	5.9	(8)	(8)	1.7	(0.04)	10	.	22	.	10.8	30	(5)	8.1	4.3	.	2.0	44	.	3.4	1.5	23	.	5.5	67
US CLB-1	9.7	.	(10)	(3)	.	.	(0.2)	(5)	(8)	(8)	(9)	18	.	5.1	5.2	2.0	(2)	.	.	.	(1.4)	(0.55)	12	.	48	.



**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 D	92.7	0.58	4.8	0.04	1.2	2.2	0.08	1.4	<0.5	1.3	2.2	4	0.84	0.6	<2	0.030	9	.	1	0.6
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
DOMTAR CTP A	.	358	.	18	1.2	88	115
DOMTAR CTP B	0.57	408	3.7	16	0.89	90	118
DOMTAR CTP D	0.014	10	<0.2	0.32	0.06	1	86.5
DOMTAR CTP C	0.03	20	<0.7	19	170	1	129

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

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.

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

**RM CONTINUOUS CASTING POWDER**

typical analysis listed in mass %

50 g units

Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	Ba	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	Sr	SrO	TiO <sub>2</sub>	Y	Zr
DH 3011	43.23	4.40	.	26.58	5.95	2.122	0.606	5.85	0.033	2.23	0.106	0.058	.	0.029	0.178	0.028	.
DH 3005	43.10	5.14	.	27.35	7.18	0.233	0.376	0.39	0.007	7.93	0.091	0.019	.	.	0.086	.	.
DH 3004	41.35	7.19	.	28.02	6.01	0.318	0.256	0.779	0.043	7.09	0.034	0.033	.	.	0.028	.	.
DH 3012	38.87	6.53	.	28.82	6.97	0.716	0.104	0.750	0.015	7.59	0.071	0.111	0.017	.	0.348	0.034	0.012
DH 3010	38.56	5.05	.	27.06	8.97	2.63	0.155	4.13	0.059	5.479	0.454	0.131	.	.	0.055	.	.
DH 3013	37.70	5.95	0.108	30.73	5.84	0.437	0.288	1.93	0.045	6.43	0.047	0.077	.	.	0.064	.	.

**CRM CRYOLITE**

SOLD IN SET NCS DC91001 - DC91006 or INDIVIDUALLY

100 g units

Number	Al	CaO	F	Fe <sub>2</sub> O <sub>3</sub>	Na	P <sub>2</sub> O <sub>5</sub>	SO <sub>4</sub> <sup>2-</sup>	SiO <sub>2</sub>	LOI
NCS DC91001	17.34	(0.606)	55.45	0.053	21.75	0.0034	0.233	0.087	4.53
NCS DC91002	15.18	(0.597)	54.66	0.032	26.32	0.025	0.199	0.211	2.97
NCS DC91003	13.65	(0.719)	53.89	0.036	29.29	0.013	0.205	0.363	2.25
NCS DC91004	13.16	(0.508)	53.2	0.033	30.26	0.037	0.293	0.389	2.12
NCS DC91005	12.69	(0.0062)	52.14	0.0098	32.01	0.065	0.45	0.485	1.4
NCS DC91006	11.75	0.112	51.21	0.04	33.24	0.051	0.683	0.238	1.6



**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 E5	Blast Furnace	.	2.87	.	13	7.9	0.013	.	0.085	.	0.013	0.049	44.3	.	.
VS E4	Blast Furnace	.	2.33	0.0018	13.2	8.8	.	.	.	.	0.034	0.023	44.6	.	.
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)
VS E3	Open Hearth Furnace	.	0.25	0.0067	0.082	0.69	0.013	.	0.203	.	0.242	.	52.9	.	.

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 E5	2.26	0.5	.	.	0.022	0.041	.	0.26	7.17	.	1.63	.	0.39	0.27	150 g
VS E4	0.82	0.47	.	.	0.033	0.015	0.015	0.44	7.46	.	0.2	.	0.041	1.52	150 g
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
VS E3	1.84	0.86	.	.	0.062	0.083	0.49	2.78	0.43	0.017	.	.	.	4.2	60 g

**RM DUST**

typical analysis listed in mass %

\* DH 6206 lists 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 6201	Cupola	1.25	6.75	2.36	4.51	.	0.038	0.155	4.30	1.51	2.56	0.150	3.43	26.38	0.080	30.67
DH 6204	Cupola	1.06	8.08	2.02	2.54	3.62	0.072	0.098	4.16	1.53	2.63	0.051	3.48	26.94	0.184	30.65
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
DH 6207	Filter	1.03	2.45	0.712	9.11	2.44	0.435	0.269	1.65	4.79	1.65	0.269	2.59	4.19	.	22.74
DH 1501	Iron Ore Sinter	1.23	2.78	2.59	7.11	1.11	.	.	1.59	1.49	0.121	0.104	0.103	6.13	0.107	.

continued

Number	CdO	F	Fe	FeO	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
DH 6201	.	.	6.22	.	.	1.53	.	.	.	1.07	.	.	.	1.79 at 500°C
DH 6204	.	0.377	6.29	.	.	0.97	.	.	0.023	1.09	.	.	.	0.055 at 500°C
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
DH 6207	.	0.696	.	.	41.84	.	2.26	.	.	.	1.51	.	.	0.770 at 900°C
DH 1501	0.001	0.247	52.32	3.24	71.20	.	0.327	.	.	.	0.830	.	0.051	1.04 at 600°C

continued analysis of DH 6204 and 6207 listed in mg/kg

Number	Ba	Bi	Cd	Co	Ga	In	Li	Mo	Nb	Ni	Sn	Sr	Ti	Tl	V	Zr
DH 6204	.	.	20	.	.	.	.	500	.	.	.	.	.	.	.	.
DH 6207	381.6	87.8	276.6	29.5	52.2	4.0	23.5	50.5	9.1	263.1	392.9	74.8	520.6	2.2	198.1	41.3

**CRM NON-FERROUS DUST**

analysis listed in mass %

Number	As	Cd	Cu	Fe	H <sub>2</sub> O	Hg	Pb	Si	Zn	Units
CAN PD-1	0.76	(0.28)	(7.03)	(12.2)	(0.4)	0.0389	2.75	(3.05)	(35.9)	200 g

**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)	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 in mass %

100 g units

Number	Al	Ca	Cr	Cu	F	Fe	K	Mg	Mn	Na	Ni	P	Pb	S	Si	Ti	Zn	Other
ECRM 880-1	1.28	3.15	0.027	0.005	0.034	31.0	0.108	0.714	0.218	0.041	0.014	0.038	0.017	0.425	3.34	0.081	0.064	Cl: 0.085
ECRM 876-1	0.34	3.43	0.17	0.42	.	24.85	1.63	1.31	2.84	1.98	0.034	0.128	.	0.87	1.72	0.048	23.29	As: 0.023

**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 USED AUTOMOBILE EXHAUST CATALYST**

analysis listed in mg/kg

powder 250 g units

Number	Pt +/-	Pd +/-	Rh +/-
BAM EB504	1777 15	279 6	338 4

**FERROBORON**

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

DH: 50 g units

all others: 100 g units

#	Number	B	Fe	Al	C	Cr	Cu	Mn	Nb	Ni	P	S	Si	Sn	Ti	V	Zn
2	DH 1701	21.22	75.48	1.54	0.009	0.092	.	0.275	0.033	0.039	0.014	.	0.66	.	0.050	0.177	.
1	VS F21/2	20.91	.	1.546	0.047	.	0.012	.	.	.	0.0119	.	0.73	0.0055	.	.	0.0055
2	DH 1703	18.78	79.36	0.141	0.318	0.080	0.064	0.246	.	0.359	0.018	.	0.326	.	0.017	0.004	.
1	ECRM 587-1	18.67	.	0.047	0.738	0.104	.	0.272	.	.	0.020	.	0.129	.	0.039	0.004	.
1	VS F22/3	8.95	.	7.78	0.161	.	3.43	.	.	.	0.021	0.018	7.82	.	.	.	.

**FERROCHROMIUM**

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

VS F11, F15, F35: chips

all others: powder

#	Number	Cr	Al	C	Co	Cu	Fe	Mn	N	Ni	P	S	Si	Ti	V	Units
1	VS F14/2	73.2	.	8.06	.	.	.	.	.	.	0.012	0.033	0.102	.	.	100 g
1	IRSID 509-1	72.85	.	0.012	.	.	.	.	0.029	.	(0.019)	.	0.230	.	.	100 g
1	JK 14B	72.84	.	0.0233	0.044	0.0090	.	0.293	0.0432	0.317	0.0143	0.0022	0.652	.	0.097	100 g
1	ECRM 580-1	72.18	.	0.019	0.047	.	.	.	0.035	.	0.011	.	0.306	.	0.083	100 g
1	VS F35/1	71.3	.	0.88	.	.	26.74	.	.	.	.	0.0022	0.37	.	.	100 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	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
1	VS F15/1	68.1	0.3	0.078	.	.	.	.	1.78	.	0.036	0.0023	2.1	.	.	100 g
1	SRM 64c	68.00	.	4.68	0.051	0.005	24.98	0.16	0.045	0.43	0.020	0.067	1.22	0.002	0.15	100 g
1	VS F11/2	67.9	.	0.139	.	.	29.88	0.168	0.043	0.377	0.023	0.0017	1.48	.	0.103	100 g
1	NCS HC25609a	66.78	.	0.074	.	.	.	.	.	.	0.027	0.0070	0.20	.	.	50 g
1	NCS HC25631	66.14	.	6.88	.	.	.	0.30	.	.	0.019	0.024	1.82	.	.	50 g
1	NM 303	64.95	.	6.43	.	.	.	.	.	.	.	.	1.77	.	.	100 g
1	CMSI 1653	64.83	.	0.68	.	.	.	0.32	.	.	0.032	0.004	0.94	.	.	50 g last
1	NCS HC25651	63.31	.	2.55	.	.	.	0.47	.	.	0.023	0.047	2.04	.	.	50 g
2	DH 1820	53.76	.	1.98	.	.	41.79	0.150	.	0.206	0.037	.	0.888	.	.	50 g
2	BS 130/2	52.61	.	7.76	.	(0.007)	.	0.45	.	.	0.013	0.045	2.12	(0.10)	(0.38)	100 g
2	BS 130/1	51.60	.	7.06	.	(0.011)	.	1.20	.	.	0.016	0.034	4.46	(0.16)	(0.39)	100 g
1	SARM 74	49.7	.	6.44	0.06	.	37.5	0.193	.	0.21	0.018	0.04	4.34	0.47	0.36	100 g
1	ECRM 585-2	49.05	.	5.488	0.0622	.	38.67	0.801	0.0127	0.294	0.0255	0.0320	4.69	0.263	0.282	100 g
2	BS 130/3	49.01	.	6.54	.	(0.011)	.	0.76	.	.	0.014	0.029	6.25	(0.18)	(0.36)	100 g
#	Number	Cr	Al	C	Co	Cu	Fe	Mn	N	Ni	P	S	Si	Ti	V	Units

**CRM CARBON IN FERROCHROMIUM**

Number	C	Co	Units
VS F39	9.23	.	Powder 100 g
VS F38	4.62	.	Powder 100 g
VS F37	1.1	.	Chips 100 g
VS F12/3	0.289	.	Chips 100 g
VS F10/1	0.021	.	Chips 100 g
VS F10/2	0.018	.	Chips 100 g
VS F9/2	0.012	0.042	Chips 100 g

**FERROMANGANESE**

# = class, where 1 = CRM and 2 = RM analysis listed in mass % DH, NCS: 50 g IPT: 120 g JSS: 150 g all others: 100 g units

#	Number	Mn	Fe	Si	C	P	S	As	Co	Cr	Cu	Ni	Pb	Ti	V	Zn	Other
1	VS F5/3	95.9	2.73	1.25	0.079	0.062	0.0095	.	.	.	0.0055	.	.	.	.	.	.
1	VS F6/2	90.3	5.40	2.00	1.90	0.330	0.0031	.	.	.	0.050	.	.	.	.	.	.
2	DH 1203	88.15	8.87	0.863	1.293	0.114	.	.	0.141	0.076	0.051	0.067	0.003	0.001	0.015	0.030	.
2	DH 1207	88.00	8.780	1.113	1.630	0.081	.	.	0.039	0.060	0.016	0.022	0.002	.	0.026	0.009	.
2	DH 1204	87.19	11.50	0.738	0.057	0.075	.	.	0.041	0.029	0.023	0.020	0.002	.	0.016	.	.
1	ECRM 583-1	86.42	.	0.396	0.333	0.146	(0.007)	.	.	.	.	.	.	.	.	.	.
1	NM 331	85.48	.	1.74	0.115	0.129	.	.	.	.	.	.	.	.	.	.	.
1	VS F29/2	84.6	2.16	.	0.299	0.053	0.032	.	.	.	.	.	.	.	.	.	N: 4.69
2	DH 1202	81.59	15.34	0.791	1.353	0.261	.	.	0.014	0.371	0.007	0.053	0.003	0.001	0.011	0.003	.
2	BS 121	81.4	14.9	0.62	1.62	0.38	0.004	.	.	(0.080)	(0.15)	.	.	(<0.001)	.	.	.
1	NM 332	80.8	.	1.14	6.82	0.19	.	.	.	.	.	.	.	.	.	.	.
1	IRSID 503-1	80.8	.	0.865	0.700	0.069	(0.009)	.	.	.	.	.	.	.	.	.	.
1	IPT 54	80.4	15.9	1.74	1.20	0.22	0.003	.	.	0.043	0.059	0.14	.	.	.	.	.
2	DH 1206 *	80.24	15.91	0.350	1.482	0.229	.	0.159	0.166	0.105	0.088	0.140	.	0.004	0.072	0.001	Mo: 0.028
2	DH 1907 *	80.24	15.91	0.350	1.48	0.229	.	0.159	0.166	0.105	0.088	0.140	.	0.004	0.072	0.001	Mo: 0.028
1	SRM 68c	80.04	12.3	0.225	6.72	0.19	0.008	0.021	.	0.074	.	.	.	.	.	.	.
1	VS F7/4	79.8	12.75	0.269	6.8	0.372	0.0037	.	.	.	.	.	.	.	.	.	.
1	NCS HC25632	78.42	.	0.69	6.68	0.204	0.009	.	.	.	.	.	.	.	.	.	.
2	DH 1216	78.30	17.03	1.25	1.44	0.123	.	.	0.019	0.071	.	0.047	.	.	0.019	.	Al: 0.033
1	ECRM 502-2	77.87	.	.	6.94	0.148	.	.	.	0.0265	0.0370	0.0384	0.0179	0.0034	.	.	.
1	JSS 701-6	74.4	.	(0.03)	6.94	0.112	(0.002)	.	.	.	.	.	.	.	.	.	.

\* DH 1206 is a reissues of DH 1907

**FERROMOLYBDENUM**

# = class, where 1 = CRM and 2 = RM DH, NCS: 50 g all others: 100 g units

#	Number	Mo	Fe	Si	C	Co	Cr	Cu	Mn	N	Ni	O	P	S	V	W	Other
2	DH 2010	78.09	20.66	0.161	.	0.020	0.035	0.464	0.010	.	0.112	.	<0.017	.	.	.	Al: 0.008
2	DH 2006	73.83	24.03	0.252	0.031	0.194	0.018	0.134	0.070	0.006	0.905	0.329	0.086	.	0.007	0.050	Mg: 0.007
2	DH 2008	72.82	25.51	0.71	0.018	.	0.039	0.378	0.088	0.009	0.020	0.216	0.017	0.059	0.022	0.022	.
1	ECRM 578-1	72.23	.	0.208	0.016	.	.	0.136	.	.	.	.	0.024	0.065	.	.	.
2	DH 2012	69.99	27.82	0.790	0.011	.	.	0.390	0.042	0.014	.	0.534	0.028	0.084	.	.	.
1	NCS HC26610	66.52	.	1.20	0.049	.	.	0.52	.	.	.	.	0.035	0.064	.	.	.
2	DH 2020	62.20	36.71	0.210	0.028	.	0.057	0.376	0.013	0.026	0.019	0.068	0.034	0.079	.	0.155	.
1	VS F17/3 *	61.2	.	0.48	0.42	.	.	0.31	.	.	.	.	0.042	0.085	.	0.022	.
1	NM 321A	59.36	39.06	1.155	0.028	.	.	.	0.023	.	.	.	0.08	0.035	.	.	.
1	NCS HCl8605	55.78	.	0.055	0.015	.	.	0.63	.	.	.	.	0.154	0.079	.	.	.

\* VS F17/3 also contains As: 0.021, Bi: 0.0009, Pb: 0.0051, Sb: 0.024, Sn: 0.0029, and Zn: 0.0038

**CRM FERRONICKEL**

Number	Ni	As	C	Co	Cr	Cu	Fe	Mn	P	S	Si	Units
VS F41	91.4	0.058	0.0124	2.04	.	0.47	5.68	.	.	0.132	.	powder 100 g
JSS 760-3	19.56	.	1.73	0.504	1.19	0.0219	.	0.162	0.022	0.0093	1.29	chips 150 g

## FERRONIObIUM

# = 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
2	DH 2816	69.27	27.12	1.748	0.568	0.069	0.026	0.026	0.177	0.132	0.079	0.056	0.064	0.382	0.015	.	.
1	JSS 755-2	68.14	.	1.82	1.79	0.100	.	.	.	0.065	.	0.053	(0.37)	.	.	.	.
2	DH 2811	67.50	29.29	0.271	1.309	0.080	0.038	.	0.181	0.090	0.038	0.066	0.102	0.695	0.011	.	.
2	DH 2803	66.99	28.38	1.88	1.25	0.076	.	0.062	0.276	0.101	.	.	.	0.141	0.084	.	.
2	DH 2805	65.40	26.50	1.53	1.53	0.047	0.023	0.033	2.52	0.149	0.249	0.079	0.350	0.919	0.025	.	0.015
2	DH 2806	65.05	30.69	2.11	0.061	0.081	0.028	0.341	0.129	0.109	0.034	0.084	0.071	0.044	0.015	0.009	0.005
2	DH 2801	64.69	29.77	1.90	0.800	0.432	0.007	0.011	0.102	0.105	0.058	0.098	0.099	0.439	0.028	0.019	.
2	DH 2808	64.49	24.02	3.17	3.20	0.181	0.038	0.048	0.415	0.071	0.008	0.051	0.171	1.82	1.16	.	0.222
2	DH 2812	64.37	29.84	2.09	1.132	0.135	0.012	0.095	0.441	0.089	0.005	0.052	0.317	0.683	0.052	0.008	0.121
2	DH 2807	64.09	31.93	1.94	0.064	0.099	0.028	0.279	0.136	0.114	0.021	0.012	0.066	0.045	0.014	0.018	.
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	.	.	.
2	DH 2809	60.12	27.46	3.47	2.22	0.495	0.035	0.037	0.530	0.097	0.010	.	0.217	1.35	0.878	.	0.238
1	ECRM 576-1	43.90	.	1.79	2.53	0.201	.	.	.	.	.	0.195	0.306	1.32	.	.	.

Number	Co	Mg	N	Ni	S	Units
DH 2816	.	.	.	0.006	0.025	50 g
JSS 755-2	.	.	.	.	0.15	150 g
DH 2811	.	.	.	0.012	0.085	50 g
DH 2803	.	.	0.010	.	0.36	50 g
DH 2805	0.025	.	.	.	.	50 g
DH 2806	0.004	.	0.583	0.017	0.280	50 g
DH 2801	.	0.016	.	0.003	.	50 g
DH 2808	0.003	.	.	0.012	.	50 g
DH 2812	.	0.012	.	0.006	.	50 g
DH 2807	0.005	.	.	0.015	.	50 g
VS F20/3	0.0056	.	0.067	.	0.0091	100 g
ECRM 579-1	0.005	.	.	.	0.021	100 g
DH 2809	0.003	.	.	0.017	.	50 g
ECRM 576-1	.	.	.	.	.	100 g

## FERROPHOSPHORUS

# = class, where 1 = CRM and 2 = RM analysis listed in mass % DH, GBW: 50 g units SRM: 75 g units VS: 100 g units

#	Number	P	Fe	Al	C	Ca	Cr	Cu	Mn	Mo	Nb	Ni	S	Si	Ti	V
2	DH 2203	27.40	66.53	0.012	0.015	0.158	0.230	0.13	2.10	0.011	0.026	0.090	0.002	0.479	1.89	0.356
1	SRM 90	26.2	.	.	.	.	.	.	.	.	.	.	.	.	.	.
1	VS F28/2	16.05	.	.	.	.	.	.	1.20	.	.	.	0.021	1.11	.	.

## FERROTITANIUM

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

#	Number	Ti	Al	Sol.Al	C	Co	Cr	Cu	Fe	Mn	P	S	Si	V	Zr
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	VS F30/3	70	3.63	.	0.308	.	0.58	0.113	19.74	0.335	0.0044	0.012	0.4	0.56	0.397
2	DH 2414	68.40	5.34	.	0.132	0.115	0.506	0.146	16.93	0.151	.	0.0152	.	2.32	0.866
1	ECRM 589-1	68.4	5.34	.	0.13	0.11	.	0.15	16.9	0.15	0.010	0.016	0.41	.	(0.89)
1	ECRM 584-1	37.17	7.19	(6.0)	0.044	.	.	.	.	1.13	0.032	0.030	1.80	.	.
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	CMSI 1651	28.76	5.08	.	0.023	.	.	0.012	.	2.54	0.040	0.012	4.68	.	.
1	NCS HC26609	27.47	6.21	.	0.048	.	.	0.102	.	2.36	0.035	0.020	5.61	.	.
1	VS F42	27.13	11.41	.	0.55	.	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	.	.
2	BS FeTi-1	19.9	12.5	.	0.57	0.028	0.33	0.60	.	7.7	0.050	0.009	2.9	0.69	3.6
2	BS FeTi-2	19.4	12.7	.	0.46	0.04	0.30	0.43	.	7.91	0.053	0.012	3.2	0.81	3.6

Number	B	Ca	Mg	Mo	N	Nb	Ni	Pb	Sn	W	Zn	Units
NCS HC15601	.	.	.	0.028	.	.	0.29	.	.	.	.	50 g
VS F30/3	.	.	.	0.92	0.68	.	0.6	(0.0006)	0.1	.	(0.003)	100 g
DH 2414	.	.	.	0.934	0.64	.	0.663	.	0.550	.	.	50 g
ECRM 589-1	.	.	.	.	0.65	.	.	.	.	.	.	100 g
ECRM 584-1	.	.	.	.	.	.	.	.	.	.	.	100 g
VS F43	.	.	.	0.0036	0.085	.	.	.	0.013	.	0.032	100 g
CMSI 1651	.	.	.	.	.	.	.	.	.	.	.	50 g
NCS HC26609	.	.	.	.	.	.	.	.	.	.	.	50 g
IRSID 510-1	.	.	.	.	.	.	.	.	.	.	.	100 g
VS F42	.	.	.	0.106	.	.	.	.	.	0.33	0.129	100 g
NM 341	.	.	.	.	.	.	.	.	.	.	.	100 g
BS FeTi-1	0.60	1.12	(0.4)	0.06	0.143	0.05	0.17	.	0.11	.	(0.04)	100 g
BS FeTi-2	1.10	0.96	(0.4)	0.15	0.16	0.03	0.16	.	0.16	.	(0.02)	100 g

**CRM FERROTUNGSTEN**

Number	W	Si	Al(tot)	As	C	Cr	Cu	Fe	Mn	Mo	P	Pb	S	Sb	Sn	Units
JK 17	80.8	0.2	.	0.08	0.74	.	.	.	.	.	.	.	.	.	0.05	150 g
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
VS F33/1	78.9	0.62	.	0.002	.	0.048	0.06	.	0.089	5.39	0.017	.	0.022	0.0006	0.0017	100 g
CMSI 1650	76.66	0.34	.	.	0.055	.	0.43	.	0.12	.	(0.028)	.	0.048	.	.	150 g
VS F18/2	74.7	0.35	.	0.028	0.075	.	0.105	.	0.095	0.56	0.042	0.00014	0.071	0.0069	0.038	100 g

**FERROVANADIUM**

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

#	Number	V	Fe	Si	Al	As	C	Co	Cr	Cu	Mg	Mn	Mo	N	Nb	Ni	P	S
1	IRSID 511-1	80.7	.	0.341	.	.	0.049	.	.	.	.	.	.	.	.	.	(0.016)	0.018
1	VS F40	80.1	.	1.31	2.12	.	0.096	.	0.185	0.81	.	1.49	.	.	.	.	0.022	0.014
1	ECRM 591-1	79.72	14.59	0.847	3.19	0.0022	0.141	.	.	0.0596	.	0.307	.	(0.308)	.	0.0141	0.0299	0.0153
1	DH 2507	76.14	15.82	0.959	4.04	.	0.289	0.009	.	0.059	.	0.101	0.015	0.30	0.007	0.032	0.031	0.0108
2	DH 2505	76.12	19.99	0.805	0.845	0.007	0.216	0.004	0.119	0.219	0.023	0.326	0.201	.	0.002	0.022	0.036	0.021
1	JSS 750-2	53.40	.	0.52	3.20	.	0.14	.	.	.	.	.	.	.	.	.	0.018	0.0110
1	NM 351	52.10	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
2	DH 2508	51.54	41.26	1.34	0.026	<0.001	0.294	0.019	0.596	0.189	0.059	3.16	0.004	.	0.003	0.049	0.072	.
1	ECRM 577-1	50.16	.	1.79	0.414	.	0.089	.	.	0.054	.	0.158	.	.	.	0.053	0.035	0.034
2	BS FeV 45	45.27	33.8	4.86	(0.013)	.	0.24	.	5.82	0.41	(0.014)	4.14	0.01	0.26	.	4.28	0.12	0.33
1	VS F19/3	42.6	.	1.47	(0.005)	0.0009	0.418	.	1.21	0.204	.	3.30	.	.	.	.	0.059	0.0102
2	BS FeV 42	42.35	39.45	3.81	(0.06)	.	0.30	.	5.21	0.31	(0.06)	3.37	0.024	0.20	.	3.85	0.12	0.31
1	VS F32/3	40.2	(40)	(1.2)	(<0.05)	(<0.001)	(0.4)	.	(0.2)	.	.	3.14	.	7.51	.	.	(0.05)	(0.008)
2	DH 2509	37.63	52.05	3.73	0.480	.	0.216	0.010	2.16	0.315	0.010	2.41	0.136	.	.	0.327	0.034	.

Number	Ca	O	Sn	Ti	W	Units
IRSID 511-1	.	.	.	.	.	100 g
VS F40	.	.	.	.	.	100 g
ECRM 591-1	.	.	.	.	.	100 g
DH 2507	.	0.60	.	0.047	0.029	50 g
DH 2505	.	.	0.023	0.034	0.031	50 g
JSS 750-2	.	.	.	.	.	150 g
NM 351	.	.	.	.	.	100 g
DH 2508	.	.	0.020	0.011	0.011	50 g
ECRM 577-1	.	.	.	.	.	100 g
BS FeV 45	(0.009)	.	0.022	.	.	100 g
VS F19/3	.	.	.	.	.	100 g
BS FeV 42	(0.042)	.	0.033	.	.	100 g
VS F32/3	.	.	.	.	.	100 g
DH 2509	.	.	.	0.345	0.009	50 g

**CRM RARE EARTH FERROSILICON**

analysis listed in mass % \* VS F31/2 lists Rare Earth Oxides

NCS HC28609-28612: 80 g all others: 100 g

Number	RE	Si	Fe	Ca	Mg	Mn	Ti	Al	C	Ce	Co	Cr	Cu	La	Ni	P	S	Se
VS F31/2	36.0*	39	18	1.7	0.3	.	.	8.3	0.03	.	.	.	0.03	.	.	.	.	15.0
NCS HC28614	26.38	38.92	.	6.26	.	0.460	0.416	.	.	.	.	.	.	.	.	.	.	.
NCS HC28613	23.78	40.00	.	5.00	.	0.455	0.280	.	.	.	.	.	.	.	.	.	.	.
NCS HC39602	21.20	37.18	22.18	1.98	10.56	3.43	1.92	.	.	.	.	.	.	.	.	.	.	.
NCS HC39601	20.09	40.31	20.81	3.21	9.50	2.72	1.50	.	.	.	.	.	.	.	.	.	.	.
NCS HC28615	20.00	41.02	.	5.60	.	0.390	0.235	.	.	.	.	.	.	.	.	.	.	.
NCS HC39603	18.10	43.55	21.78	2.65	8.51	2.23	1.35	.	.	.	.	.	.	.	.	.	.	.
NCS HC28609	8.66	43.98	31.67	1.01	10.20	0.66	0.540	.	.	.	.	.	.	.	.	.	.	.
NCS HC28612	6.42	43.54	36.43	0.90	8.25	0.58	0.435	.	.	.	.	.	.	.	.	.	.	.
NCS HC28611	5.10	43.3	40.7	0.84	5.70	0.51	0.362	.	.	.	.	.	.	.	.	.	.	.
NCS HC28610	3.71	42.2	43.4	0.76	5.52	0.42	0.275	.	.	.	.	.	.	.	.	.	.	.
SRM 347	0.86	47.6	.	0.81	4.49	0.53	0.036	0.78	0.017	0.45	0.004	0.14	0.065	0.26	0.082	0.023	0.005	.

**FERROSILICON**

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

#	Number	Si	Fe	Al	C	Ca	Cr	Cu	Mn	Ni	P	S	Ti
1	BAM 529-1	91.11	6.15	0.86	0.10	0.46	.	0.01	0.04	.	0.013	.	0.09
1	NCS HC14606	78.96	20.24	0.24	0.024	0.064	0.0053	0.049	0.058	0.035	0.0093	0.0037	0.032
1	DH 2314	78.33	19.89	0.410	0.031	0.094	0.082	0.049	0.190	0.044	0.028	.	0.067
1	VS F3/3	77.7	.	1.96	0.049	0.40	0.095	.	0.122	.	0.025	0.0023	0.121
1	DH 2315	77.06	19.86	1.316	0.042	0.357	0.143	0.042	0.159	0.048	0.023	.	0.086
1	CMSI 1655	76.74	.	.	0.081	0.30	0.140	.	0.172	.	0.023	0.004	.
2	DH 2305	76.58	18.62	1.64	0.238	1.45	0.021	0.009	0.070	0.004	0.016	.	0.107
1	JSS 720-4	76.35	.	1.52	(0.045)	.	.	.	0.21	.	0.032	(0.003)	.
1	DH 2310	75.94	19.42	2.041	0.11	1.019	0.019	0.011	0.139	0.006	0.021	.	0.093
1	NCS HC15602	75.9	23.65	0.011	0.0074	(0.0013)	0.077	0.057	0.149	0.026	0.014	0.0035	0.027
1	JK 39	75.9	21.6	1.45	0.105	0.24	.	0.013	0.165	.	0.018	.	0.116
1	SRM 195	75.3	23.6	0.046	0.034	0.053	0.047	0.047	0.17	0.032	0.017	0.001	0.037
1	ECRM 582-2	75.2	21.42	1.154	0.150	0.405	0.074	.	0.230	.	0.0184	(0.003)	0.225
1	IPT 143	75.1	22.4	0.57	0.054	0.79	0.0044	0.014	0.110	0.0028	0.025	0.0012	0.068
1	NM 312	74.37	.	1.23	.	1.80	.	.	.	.	0.031	.	.
1	VS F4/2	74.1	.	0.076	0.023	(0.03)	0.119	0.073	0.14	0.061	0.024	(0.002)	0.094
1	SRM 58a	73.20	25.23	0.95	0.014	0.30	0.020	0.024	0.16	0.012	0.009	<0.002	0.051
1	NCS HC19602	69.47	23.81	2.45	0.12	2.47	0.077	.	0.308	.	0.027	.	.
2	DH 2306	66.98	30.09	1.42	0.120	0.193	0.155	0.103	0.222	0.075	0.023	.	0.118
1	NCS HC14607	55.73	41.89	0.78	0.19	0.14	0.014	0.060	0.22	0.0063	0.038	0.0048	0.119
2	BS 140/2	51.85	46.12	0.62	(0.03)	0.03	(0.25)	0.14	0.53	0.15	(0.02)	(0.004)	0.10
2	DH 2311	50.00	9.06	4.36	8.31	7.84	0.027	0.016	0.080	0.007	0.011	0.048	0.070
2	BS 140/4	49.80	47.50	0.90	(0.05)	0.09	(0.19)	0.09	1.00	0.11	(0.02)	(0.004)	0.09
2	DH 2312	48.30	12.38	3.40	4.96	10.48	0.083	0.020	0.114	0.013	0.011	0.056	0.062
1	SRM 59a	48.10	50.05	0.35	0.046	0.042	0.080	0.052	0.75	0.033	0.016	0.002	.
2	BS 140/3	47.20	50.85	0.59	(0.05)	0.09	(0.18)	0.09	0.60	0.09	(0.02)	(0.004)	0.07
2	BS 140/1	45.20	52.80	0.68	(0.03)	0.04	(0.25)	0.13	0.46	0.15	(0.02)	(0.004)	0.09
1	IPT 70	44.7	54.1	0.21	0.087	0.16	0.046	0.066	0.283	0.022	0.018	(0.006)	0.018
1	VS F2/3	44.2	.	1.03	0.027	0.056	0.324	.	0.306	.	0.035	0.0023	.
1	VS F1/3	24.5	.	0.74	0.499	.	0.361	.	0.510	.	0.042	0.0027	0.072
1	SARM 33	15.60	80.2	0.62	1.01	.	0.43	0.29	0.75	0.28	0.043	.	.

#	Number	Si	Fe	Al	C	Ca	Cr	Cu	Mn	Ni	P	S	Ti
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Number	As	B	Ba	Co	Mg	Mo	N	O	Sn	Sr	V	Zn	Zr	Units
BAM 529-1	.	.	.	.	0.04	.	.	.	.	.	.	.	.	100 g
NCS HC14606	0.0012	0.0029	0.0060	0.0031	0.0051	0.0013	.	(0.256)	0.0003	.	0.0024	.	.	70 g
DH 2314	.	.	.	.	.	.	.	.	.	.	.	.	.	50 g
VS F3/3	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g
DH 2315	.	.	.	.	0.025	.	.	.	.	.	.	.	.	50 g
CMSI 1655	.	.	.	.	.	.	.	.	.	.	.	.	.	50 g
DH 2305	.	.	.	.	0.013	.	.	.	.	.	0.005	.	.	50 g
JSS 720-4	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g last of stock
DH 2310	.	.	0.042	.	0.029	.	.	.	.	.	.	.	.	50 g
NCS HC15602	.	.	.	.	.	.	.	.	.	.	0.0036	.	.	50 g
JK 39	.	.	.	.	.	.	.	.	.	.	.	.	.	50 g
SRM 195	.	0.0010	.	<0.01	.	.	.	.	.	.	.	.	0.011	75 g
ECRM 582-2	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g last of stock
IPT 143	.	.	0.126	.	0.039	.	.	.	.	0.014	.	.	0.082	50 g
NM 312	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g
VS F4/2	.	.	.	.	.	.	(0.02)	.	.	.	.	0.0013	.	100 g
SRM 58a	.	0.0010	.	<0.01	.	.	.	.	.	.	.	.	0.002	75 g
NCS HC19602	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g
DH 2306	.	.	.	.	0.019	.	.	.	.	.	0.007	.	.	50 g
NCS HC14607	0.0015	0.0032	0.0043	0.0047	0.0068	0.011	.	(0.665)	0.0004	.	0.011	.	.	70 g
BS 140/2	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g
DH 2311	.	.	.	.	1.153	.	.	.	.	.	.	.	.	50 g
BS 140/4	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g
DH 2312	.	.	.	.	0.193	.	.	.	.	.	.	.	.	50 g
SRM 59a	.	0.058	.	.	.	.	.	.	.	.	.	.	.	50 g
BS 140/3	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g
BS 140/1	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g
IPT 70	.	.	.	.	0.016	.	.	.	.	.	.	.	.	60 g
VS F2/3	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g
VS F1/3	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g
SARM 33	.	.	.	.	.	.	.	.	.	.	.	.	.	100 g

**FERROSILICALCIUM, FERROSILICOCHROMIUM, and FERROSILICOTITANIUM**

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

DH: 50 g units VS: 100 g units

#	Number	Si	Fe	Ca	Cr	Ti	Al	C	Cu	Mg	Mn	Mo	Ni	P	S	V	Zr
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	.	.
2	DH 2903	61.48	23.14	0.246	0.059	10.01	0.650	0.623	0.025	0.273	1.57	0.130	0.044	0.012	0.010	0.149	0.041
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



**CRM URANIUM IN GLASS**

analysis listed in mg/kg 12 mm Ø x 5 mm

Number	U
IRMM 540R	15.0
IRMM 541	49.4

**CRM GLASS SAND**

SGT: 200 g SRM 89: 45 g other SRM: 75 g IPT, UNS: 100 g units

Number	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	As <sub>2</sub> O <sub>3</sub>	As <sub>2</sub> O <sub>5</sub>	BaO	CaO	Cl	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>	PbO	SO <sub>3</sub>	TiO <sub>2</sub>	ZrO <sub>2</sub>	LOI
IPT 61	99.79	0.054	.	.	.	(0.004)	.	0.014	(0.007)	(0.003)	.	(0.002)	.	.	.	0.026	0.010	(0.06)
IPT 62	99.62	0.11	.	.	.	(0.004)	.	0.072	(0.007)	(0.004)	.	(0.002)	.	.	.	0.036	0.010	0.10
UNS SPS	99.32	0.248	.	.	.	0.029	.	0.037	0.058	0.0071	.	0.045	.	.	.	0.035	.	0.167
SGT S6	98.66	0.60	.	.	.	<0.02	.	0.032 T	0.40	<0.02	.	<0.02	.	.	.	0.024	.	0.14
SGT S9	97.24	1.35	.	.	.	0.02	.	0.103 T	0.82	0.06	.	0.10	.	.	.	0.044	.	0.24
SGT S8	95.63	2.07	.	.	.	0.06	.	0.26 T	1.06	0.12	.	0.20	.	.	.	0.073	.	0.48
SRM 1413	82.77	9.90	.	.	0.12	0.74	.	0.24	3.94	0.06	.	1.75	.	.	.	0.11	.	.
SRM 89	65.35	0.18	0.03	0.36	1.40	0.21	0.05	0.049	8.40	0.03	0.088	5.70	0.23	17.50	0.03	0.01	0.005	0.32
SRM 81a	.	0.66	.	.	Cr <sub>2</sub> O <sub>3</sub>	0.0046	.	0.082	.	.	.	.	.	.	.	0.12	0.034	.
SRM 165a	.	0.059	.	.	.	.	.	0.012	.	.	.	.	.	.	.	0.011	0.006	.

**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	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 3610	98.80	0.234	.	0.008	.	0.030	0.419	0.014	.	.	0.009	<0.003	.	0.009	.	.	0.153
DH 3608	97.88	0.680	0.056	0.129	.	0.026	0.542	0.097	0.056	.	0.018	0.020	0.010	0.001	.	0.034	0.30
DH 3609	96.35	1.46	<0.025	0.047	0.005	0.029	0.706	0.334	0.104	.	0.020	0.045	0.019	.	.	0.086	0.48
DH 3605	95.42	0.346	0.030	3.33	0.0002	0.020	0.346	0.070	0.079	0.018	.	0.012	0.008	.	0.013	0.044	0.043

continued analysis listed in mg/kg

listed in mg/kg

Number	BaO	C	CeO <sub>2</sub>	CuO	NiO	V <sub>2</sub> O <sub>5</sub>	ZnO	ZrO <sub>2</sub>	La	Li	Sr
DH 3610	.	.	.	.	.	.	.	.	.	.	.
DH 3608	.	0.028	.	.	.	.	.	.	.	.	.
DH 3609	.	.	.	.	.	<0.006	.	.	.	.	.
DH 3605	0.003	0.020	0.0001	0.005	0.065	0.002	0.001	0.004	1.6	5.9	11.2

**HARGROVE GRINDABILITY INDEX**

Class	Set Number	HGI	HGI	HGI	HGI	units
CRM	SABS 1001	sample A : 37	sample B : 49	sample C : 55	sample D : 71	4 kg of each sample A - D
CRM	NCS AG82001c-4c	sample 1c: 36	sample 2c: 56	sample 3c: 75	sample 4c: 120	250 g of each sample 1c - 4c
RM	ASRM 011-10	sample A : 32	sample B : 50	sample C : 72	sample D : 97	2 kg of each sample A - D

**CRM GLASS REFRACTIVE INDEX**

Number	High Wavelength	Refractive Index	Low Wavelength	Refractive Index	Certified Data Points	Units
SRM 1822	1082.97 nm	1.507143	404.66 nm	1.532710	15	5 x 12 x 17 mm
SRM 1822a	644.0250 nm	1.517277	480.1254 nm	1.526132	6	25 x 25 x 3 mm

**CRM HARDNESS TEST BLOCKS**

please indicate desired hardness when ordering

Number	Scale	Available Range	Units (mm)
NCS HBS	Brinell Hardness S	(8-650)	100 x 80 x 16
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
NCS HRA	Rockwell Hardness A	(20-88)	60 x 40 x 10
NCS HRB	Rockwell Hardness B	(20-100)	60 x 40 x 10
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
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

Number	Energy	Uncertainty	Temperature	Units	Type
SRM 2098	176 - 244 J	8.8 - 12.2 J	21 °C +/- 1'	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
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
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
SRM 2096	88 - 136 J	4.4 - 6.8 J	-40 °C +/- 1'	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
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
ERM-FA014	60.7 J	1.7 J	20 °C +/- 2'	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
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
SRM 2092	13 - 20 J	1.4 J	-40 °C +/- 1'	5 pcs of 10 mm x 10 mm x 55 mm	CHARPY v-notch
SRM 2115	13 - 25 J	1.4 J	21 °C +/- 1'	5 pcs of 10 mm x 10 mm x 75 mm	IZOD beam

**CRM LAYER THICKNESS**

BAM L101: BK7 glass plate 30 x 30 x 1 mm  
other BAM: 100Cr6 steel disc 30 mm Ø x 5 mm

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

Number	Material	Thickness	(+/-)	Layer	1	2	3	4	5	6	7	8	9	10
BAM L102/002	TiN	single layer	3.14 µm	0.19 µm	.	.	.	.	.	.	.	.	.	.
BAM L105/050	VC	single layer	2.69 µm	0.16 µm	.	.	.	.	.	.	.	.	.	.
BAM L104/050	TiC	single layer	2.57 µm	0.17 µm	.	.	.	.	.	.	.	.	.	.
BAM L103/003	VN	single layer	2.20 µm	0.19 µm	.	.	.	.	.	.	.	.	.	.
BAM L100/001	Ti/Al	multi layer	1.63 µm	0.15 µm	.	.	.	.	.	.	.	.	.	.
BAM L101	TiO <sub>2</sub> /SiO <sub>2</sub>	multi layer	964 nm	24 nm	(93.6)	(91.5)	(92.1)	(106.2)	(93.5)	(92.4)	(93.7)	(101.7)	(91.4)	(108.4)
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 5204a	SiO <sub>2</sub>	single layer	3.49 nm	0.19 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 LENGTH STANDARDS**

The following certified length standards are available in different 'grades.' These grades specify the standard deviation of the certified length. Each set has certain grades available to choose from.

**SET L-D83 - Includes 83 pieces, from 0.5 mm to 100 mm. Choose any grade for the set.**

0.5, 1.0, 1.005, 1.01, 1.02, 1.03, 1.04, 1.05, 1.06, 1.07, 1.08, 1.09, 1.1, 1.11, 1.11, 1.12, 1.13, 1.14, 1.15, 1.16, 1.17, 1.18, 1.19, 1.2, 1.21, 1.22, 1.23, 1.24, 1.25, 1.26, 1.27, 1.28, 1.29, 1.3, 1.31, 1.32, 1.33, 1.34, 1.35, 1.36, 1.37, 1.38, 1.39, 1.4, 1.41, 1.42, 1.43, 1.44, 1.45, 1.46, 1.47, 1.48, 1.49, 1.5, 1.6, 1.7, 1.8, 1.9, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

**L-D38 - Includes 38 pieces, from 1 to 100 mm. Choose any grade from B to E.**

1, 1.005, 1.01, 1.02, 1.03, 1.04, 1.05, 1.06, 1.07, 1.08, 1.08, 1.09, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100

**L-D10A - Includes 10 pieces, from 1 mm to 1.009 mm. Choose any grade from B to E for the set.**

1, 1.001, 1.002, 1.003, 1.004, 1.005, 1.006, 1.007, 1.008, 1.009

**L-D10B - Includes 10 pieces, from 0.991 mm to 1 mm. Choose any grade from B to E for the set.**

0.991, 0.992, 0.993, 0.994, 0.995, 0.996, 0.997, 0.998, 0.999, 1

**L-D8 - Includes 8 pieces, from 125 mm to 500 mm. Choose any grade from B to E for the set.**

125, 150, 175, 200, 250, 300, 400, 500

**L-D5 - Includes 5 pieces, from 600 mm to 1000 mm. Choose any grade from B to E. Available as a set or individually.**

600, 700, 800, 900, 1000

**LK-D12 - Includes 12 pieces from 10 mm to 291.8 mm. Choose any grade from B to E for the set.**

10, 20, 20H, 41.2, 51.2, 81.5, 101.2, 121.5, 121.8, 191.8, 201.5, 291.8

**LQ-D20A - Includes 20 pieces, from 5.12 mm to 100 mm. Choose any grade from B to E for the set.**

5.12, 10.24, 15.36, 21.5, 25, 30.12, 35.24, 40.36, 46.5, 50, 55.12, 60.24, 65.36, 71.5, 75, 80.12, 85.24, 90.36, 96.5, 100

**LQ-D20B - Includes 5 pieces, from 5.12 mm to 25 mm. Choose any grade from B to D for the set.**

5.12, 10.24, 15.36, 21.5, 25

**LQ-D20C - Includes 6 pieces, from 25 mm to 50 mm. Choose any grade from B to D for the set.**

25, 30.12, 35.24, 40.36, 46.5, 50

**LQ-D20D - Includes 6 pieces, from 50 mm to 75 mm. Choose any grade from B to D for the set.**

50, 55.12, 60.24, 65.36, 71.5, 75

**LQ-D20E - Includes 6 pieces, from 75 mm to 100 mm. Choose any grade from B to D for the set.**

75, 80.12, 85.24, 90.36, 96.5, 100

The following grades specify the standard deviation ( ± µm)

Length (mm)	Grade A	Grade B	Grade C	Grade D	Grade E
-10	0.1	0.1	0.2	0.5	1.0
>10-18	0.1	0.2	0.3	0.6	1.0
>18-30	0.1	0.2	0.3	0.6	1.0
>30-50	0.1	0.2	0.4	0.7	1.5
>50-80	0.1	0.3	0.5	0.8	1.5
>80-120	0.2	0.3	0.6	1.0	2.0
>120-180	0.2	0.4	0.8	1.2	2.5
>180-250	0.3	0.5	1.0	1.6	3.5
>300	0.4	0.7	1.2	2.0	4.0
400	0.5	0.8	1.5	2.4	4.5
500	0.5	1.0	1.8	2.8	6.0
600	0.6	1.2	2.2	3.5	7
700	0.7	1.4	2.5	4.0	8
800	0.8	1.6	3.0	4.5	9
900	0.9	1.8	3.5	5	10
1000	1.0	2.0	4.0	6	11

**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

**MULTIELEMENT OXIDE MATERIAL**

analysis listed in mass %

BAM: CRM glass disc 39 mm Ø x 5 mm

BR: RM powder 5 g units

Number	Al <sub>2</sub> O <sub>3</sub>	As <sub>2</sub> O <sub>3</sub>	BaO	CaO	CdO	CeO <sub>2</sub>	Cl	CoO	Cr <sub>2</sub> O <sub>3</sub>	CuO	FeO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	MnO	MoO <sub>3</sub>	Na <sub>2</sub> O
BR 8	1.27	0.172	0.577	0.67	.	0.128	0.49	0.56	0.69	0.50	0.57	.	0.71	0.76	0.46	0.137	0.74
BAM S005A	(1.1)	0.0132	0.0115	(10.5)	0.0062	0.0105	0.0247	0.00494	0.00156	0.0112	.	0.0422	(0.7)	(2.3)	0.0124	0.0343	(13.7)
BAM S005B	(1.1)	0.0132	0.0115	(10.5)	0.0062	0.0105	0.0247	0.00494	0.00152	0.0112	.	0.0422	(0.7)	(2.3)	0.0124	0.0343	(13.7)

continued \* estimated value based on synthesis

Number	NiO	PbO	S	SO <sub>3</sub>	Sb <sub>2</sub> O <sub>3</sub>	Se	SiO <sub>2</sub>	SnO	SnO <sub>2</sub>	SrO	TiO <sub>2</sub>	Ti <sub>2</sub> O <sub>3</sub>	V <sub>2</sub> O <sub>5</sub>	ZnO	ZrO <sub>2</sub>
BR 8	0.66	0.108	0.43	.	0.11997	0.20*	1.31	0.106	.	0.743	0.63	0.112*	0.143	0.137	0.547
BAM S005A	0.00590	0.0202	.	0.1942	0.0132	0.00196	(71)	.	0.0100	0.0151	0.0164	.	0.0350	0.0203	0.0842
BAM S005B	0.00590	0.0202	.	0.1942	0.0132	0.00196	(71)	.	0.0100	0.0151	0.0163	.	0.0349	0.0203	0.0842

analysis listing continued for BR 8 \* estimated value based on synthesis

Number	Ag <sub>2</sub> O	BeO	Bi <sub>2</sub> O <sub>3</sub>	Br	Cs <sub>2</sub> O	F	Ga <sub>2</sub> O <sub>3</sub>	Gd <sub>2</sub> O <sub>3</sub>	GeO <sub>2</sub>	Hf <sub>2</sub> O <sub>3</sub>	I	In <sub>2</sub> O <sub>3</sub>	La <sub>2</sub> O <sub>3</sub>	Nb <sub>2</sub> O <sub>5</sub>	Nd <sub>2</sub> O <sub>3</sub>	P <sub>2</sub> O <sub>5</sub>
BR 8	0.118	0.277*	0.095	0.098	0.012	0.51	0.010	0.012	0.11	0.0153	0.39*	0.0066	0.101	0.186	0.115*	1.145

Number	Pr <sub>2</sub> O <sub>3</sub>	Rb <sub>2</sub> O	Ru <sub>2</sub> O <sub>3</sub>	S	Sc <sub>2</sub> O <sub>3</sub>	Sm <sub>2</sub> O <sub>3</sub>	Ta <sub>2</sub> O <sub>5</sub>	Tb <sub>2</sub> O <sub>3</sub>	TeO <sub>2</sub>	ThO <sub>2</sub>	UO <sub>3</sub>	WO <sub>3</sub>	Y <sub>2</sub> O <sub>3</sub>
BR 8	0.117*	0.01095	0.0124*	0.43	0.0117	0.00812	0.111	0.0105	0.475*	0.102	0.1002	0.0064	0.0064

**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)

**RM OXIDES**

analysis listed in mass %

continued analysis listed in mg/kg

100 g units

Number	CaO	CO <sub>2</sub>	MnO <sub>2</sub>	Mn <sub>3</sub> O <sub>4</sub>	Al <sub>2</sub> O <sub>3</sub>	BaO	C tot	CaO	Cl (H <sub>2</sub> O)	Cl tot	CO <sub>2</sub>	Co <sub>3</sub> O <sub>4</sub>	Cr <sub>2</sub> O <sub>3</sub>	CuO
DH P0101	55.96	43.95	.	.	.	5.7	.	.	.	.	.	.	.	1.2
DH P0301	.	.	99.947	.	15.9	11.3	.	2.2	.	.	.	59.2	32.7	.
DH P0302	.	.	.	99.986	21	12.3	.	3.2	.	.	.	.	67.3	.
DH P0401	Iron Oxide	.	.	.	22.1	3.1	.	4.6	.	.	70.0	30.7	23.4	.
DH P0402	Iron Oxide	.	.	.	805	.	107	41	957	.	117	575	133	.
DH P0403	Iron Oxide	.	.	.	924	.	(113)	46	1360	1373	.	112	591	132

Number	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	MgO	Mn <sub>3</sub> O <sub>4</sub>	MoO <sub>3</sub>	Na <sub>2</sub> O	NiO	P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	SO <sub>3</sub>	SrO	TiO <sub>2</sub>	WO <sub>3</sub>	ZnO	-H <sub>2</sub> O(900°C)
DH P0101	5.6	.	165.7	.	.	78	.	.	(<20)	(100)	164	.	.	.	.
DH P0301	112.5	.	1.2	.	.	13.3	2	.	76.2	.	1.8	.	.	.	.
DH P0302	129.4	.	1.5	.	.	10.9	2.4	.	81.3	.	1.9	.	.	.	.
DH P0401	.	.	3.7	11.9	5.3	<7	.	2.9	.	16.5	0.12	.	12.6	9.5	173
DH P0402	.	12	12	3226	.	(27)	301	176	138	32	.	89	.	.	.
DH P0403	.	20	13	3522	.	(203)	301	195	376	62	.	87	.	.	.

**RM HALFNIUM DIOXIDE**

analysis listed in mass								30 g units
Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	MgO	SiO <sub>2</sub>	TiO <sub>2</sub>	ZrO <sub>2</sub>	
OSO HFO-4-95	0.030	0.090	0.028	0.019	0.11	0.20	0.070	
OSO HFO-3-95	0.015	0.056	0.016	(0.010)	0.046	0.11	1.03	
OSO HFO-2-95	0.0045	0.012	0.0065	0.0031	0.013	0.021	0.44	
OSO HFO-1-95	0.0030	0.0023	0.0045	0.0024	0.0035	0.0022	2.12	

**CRM IRON OXIDE**

analysis listed in mass %													75 g units	
Number	Fe2O3	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	(0.006)	(<0.005)	0.292	0.024	(0.04)	0.0110	(0.1)

**CRM IRON OXIDE**

Number	Total Iron	Al <sub>2</sub> O <sub>3</sub>	CaO	Cl-	MnO	SiO <sub>2</sub>	SO <sub>4</sub> <sup>2-</sup>	Units
NCS HS41701-7	69.49	0.0030	0.017	0.233	0.212	0.0098	0.019	80 g last of stock

**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 IRON OXIDE and SILICON OXIDE**

analysis listed in mass % except * which is mg/kg																	
Number	SiO <sub>2</sub>	Si	Al <sub>2</sub> O <sub>3</sub>	Al*	CaO	C	Cr*	Fe	MgO	Mg*	MnO	Mn*	Ni*	S*	TiO <sub>2</sub>	LOI	Units
IRSID 608-1	60.39	.	9.94	.	8.70	.	.	4.00	1.34	.	0.057	.	.	.	0.714	.	100 g
JSS 009-3 *	.	(<0.004)	.	(3)	.	(0.02)	9.7	69.84 (tot)	.	(0.3)	.	(0.6)	(0.3)	(1)	.	(0.4)	50 g

\* JSS 009-3 contains (<0.0002) of As, Bi, Ca, Co, Cu, K, Na, P, Pb, Sn, Ti, V, and Zn.

**CRM NICKEL OXIDE**

certified analysis listed in mass % except * which is mg/kg														25 g units
Number	NiO	Al	Co	Cr	Cu	Fe	Mg	Mn	Si	Ti	Bi*	Pb*	Se*	
SRM 673	77.7	0.001	0.016	0.0003	0.002	0.029	0.003	0.0037	0.006	0.003	0.06	3.5	0.2	
SRM 672	77.1	0.004	0.55	0.003	0.018	0.079	0.020	0.095	0.11	0.009	0.3	38	0.40	
SRM 671	76.6	0.009	0.31	0.025	0.20	0.39	0.030	0.13	0.047	0.024	0.07	16	2.0	

continued informational analysis in mg/kg

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
SRM 672	0.3	74, 45	1.7	0.4	0.5	4	<0.2	<0.1	140
SRM 671	0.5	59, 45	0.7	0.8	0.4	2.7	<0.2	<0.1	160

Certified values show concentrations in nickel oxide. To convert values to the percent concentration in total metal present, multiply the values by 1.28 for SRM 671 and 672; for SRM 673 multiply by 1.29.

Where As has two values, the first is atomic absorption and the second is photometric (extraction and distillation.)

**CRM TITANIUM DIOXIDE SET**

Number	analysis listed in mass %				available in SET/8 ONLY					20 g units
	Cr	Cu	Fe	Mn	Mo	Ni	Si	Sn	V	
GSO 2158-81	0.0010	.	.	.	.	.	0.00054	0.00020	.	
GSO 2159-81	0.00035	.	0.00055	.	.	0.00046	0.0010	.	.	
GSO 2160-81	0.0013	0.0110	0.0010	0.090	.	0.0120	0.0015	0.0018	0.0014	
GSO 2161-81	0.0013	0.0024	0.0023	0.0010	0.0130	0.0088	.	0.0028	.	
GSO 2162-81	0.0023	0.0043	0.0180	0.0025	0.0048	0.0029	0.0130	0.0047	0.1800	
GSO 2163-81	0.038	0.032	.	0.0180	.	0.0280	0.0030	.	0.0016	
GSO 2164-81	.	.	0.0095	.	0.0110	.	0.0180	.	.	
GSO 2165-81	.	0.0023	0.0082	0.0040	0.0017	0.0014	.	0.035	0.0040	

**CRM TITANIUM DIOXIDE**

Number	TiO <sub>2</sub>	Uncertainty	Units
SRM 154c	99.591	+/- 0.062	90 g

**CRM VANADIUM PENTOXIDE**

Number	analysis listed in mass %													NCS: 50 g units		SARM, VS: 100 g units		
	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 HC26612	98.09	.	.	.	.	.	0.16	.	.	0.15	.	1.11	0.027	0.014	0.17	.	.	As: 0.016
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 ZINC OXIDE**

Number	Zn	Al <sub>2</sub> O <sub>3</sub>	As	CaO	Cd	Cl	Co	F	Fe	MgO	Ni	Pb	S	Sb	SiO <sub>2</sub>	Units
IMN TC/P10	60.6	0.14	.	2.54	.	.	.	.	6.7	1.38	.	2.31	3.07	.	0.56	240 g
IMN TC9	53.4	.	.	6.96	0.0049	0.033	.	0.055	5.64	3.50	.	3.77	0.52	.	5.47	220 g

**CRM YTTRIUM OXIDE**

Number	analysis listed in mg/kg											10 g units		
	CeO <sub>2</sub>	Dy <sub>2</sub> O <sub>3</sub>	Er <sub>2</sub> O <sub>3</sub>	Eu <sub>2</sub> O <sub>3</sub>	Gd <sub>2</sub> O <sub>3</sub>	Ho <sub>2</sub> O <sub>3</sub>	La <sub>2</sub> O <sub>3</sub>	Lu <sub>2</sub> O <sub>3</sub>	Nd <sub>2</sub> O <sub>3</sub>	Pr <sub>6</sub> O <sub>11</sub>	Sm <sub>2</sub> O <sub>3</sub>	Tb <sub>4</sub> O <sub>7</sub>	Tm <sub>2</sub> O <sub>3</sub>	Yb <sub>2</sub> O <sub>3</sub>
NCS DC93001	2.16	2.14	2.11	2.48	2.15	2.31	2.88	2.02	2.44	2.12	2.16	2.05	2.06	2.21
NCS DC93002	17.22	21.25	21.62	22.6	21.22	21.25	17.54	20.17	21.52	18.84	21.07	20.85	20.34	21.04

**CRM PAPER**

AVAILABLE IN SET/20 ONLY includes software for data processing 5 pages per sample, 8.5 x 11" each

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/m <sup>2</sup>
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
TECH 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
TECH 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**

analysis listed in µm

5 x 2.5 g powder

Number	Weight Percentile	Certified Value	Uncertainty
SRM 659	10	0.48	0.10
	25	0.81	0.10
	50	1.43	0.10
	75	2.08	0.11
	90	2.80	0.13

**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	± 0.1	± 0.2	210 g

**CRM POROUS MATERIALS**

Pressure/Volume and Diameter/Volume curves are also certified

Number	Description	Units	(nm)	(nm)	(cm <sup>2</sup> /g)	(mm <sup>3</sup> /g)	(mm <sup>3</sup> /g)	(mm <sup>3</sup> /g)	(mm <sup>3</sup> /g)	(mm <sup>3</sup> /g)
			Mean Pore Radius	Most Frequent Pore Radius	Specific Surface Area	Specific Pore Volume	Pore Volume 100 Mpa	Pore Volume 195 Mpa	Pore Volume 200 Mpa	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 PM 103	Al <sub>2</sub> O <sub>3</sub> Type 60	10g	3.18	1.93	156.0	0.250	.	.	.	.
BAM PM 104	Al <sub>2</sub> O <sub>3</sub> Type 150	10g	5.31	3.23	79.8	0.210	.	.	.	.
BAM PM 120	Alpha-Al <sub>2</sub> O <sub>3</sub>	10g	228.0	232.2	.	.	545.0	546.7	546.8	548.1
BAM PM 121	Porous glass	12g	15.1	15.3	.	.	621.8	621.9	621.9	624.6
BAM PM 122	Porous glass	15g	139.0	140.2	.	.	919.7	922.5	922.6	924.4

**RM PLASTER**

analysis listed in mass %

Number	Al <sub>2</sub> O <sub>3</sub>	Fe <sub>2</sub> O <sub>3</sub>	CaO	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SiO <sub>2</sub>	TiO <sub>2</sub>	LOI	Units
BCS 202a	0.32	0.1	37.6	0.1	0.38	0.1	<0.01	1.33	0.02	7.0	100 g

**CRM ROHS/WEEE SAMPLES**

analysis listed in mg/kg										T = total
Number	As	Br	Cd	Cl	Cr	Hg	Pb	S	Material	Units
NMIJ 8116a	.	.	93.67	.	943.7	938.7	940.6	.	ABS resin disc	30 mm Ø x 2 mm
NMIJ 8115a	.	.	9.341	.	94.27	93.81	94.21	.	ABS resin disc	30 mm Ø x 2 mm
ERM EC681k	29.1	770	137	800	100	237	98	630	LDPE granule	Pellets 100 g
ERM EC680k	4.1	96	19.6	102.2	20.2	4.64	13.6	76	LDPE granule	Pellets 100 g
NMIJ 8113a	.	.	93.93	.	943.6	941.5	945.0	.	ABS resin	Pellets 25 g
NMIJ 8112a	.	.	9.383	.	94.47	94.10	94.98	.	ABS resin	Pellets 25 g
JSAC 0602-3	.	.	50.6	.	112.5	12.1	112.1	.	Polyester	Chips 50 g
JSAC 0601-2	.	.	5.2	.	10.8	1.3	11.6	.	Polyester	Chips 50 g
JSAC 0403	199	.	183	.	257 T	11.1	224	.	Soil	Powder 50 g
JSAC 0402	41.6	.	18.5	.	90.5 T	1.3	45.2	.	Soil	Powder 50 g

**ROHS/WEEE SETS**

sold in sets only, as grouped										analysis listed in mass %
Number	As	Br	Cd	Cr	Hg	Pb	Se		Units	
CRM plastic set										
JSAC 0631	.	.	0.00225	0.00258	0.00197	0.00245	.		40 mm Ø x 4 mm	
JSAC 0632	.	.	0.00461	0.00933	0.00594	0.00929	.			
CRM soil set										
JSAC 0466	0.01093	.	0.01199	0.1483	0.01135	0.1214	0.1175		Powder 25 g	
JSAC 0465	0.0550	.	0.06074	0.0738	0.00578	0.6124	0.0587			
JSAC 0464	0.02711	.	0.03010	0.0499	0.00286	0.03027	0.02919			
JSAC 0463	0.01376	.	0.01468	0.0244	0.001476	0.01516	0.01415			
JSAC 0462	0.00715	.	0.00742	0.01496	0.000727	0.00737	0.00716			
JSAC 0461	0.002153	.	(0.000030)	0.00972	0.0000075	0.00244	(0.000044)			
RM polyethylene set										
PE High	.	0.1073	0.0300	0.0999	0.1101	0.1198	.		31 mm Ø x 12 mm	
PE Low	.	0.0488	0.0100	0.0400	0.0201	0.0401	.			
PE Blank	.	0	0	0	0	0	.			
RM polyvinyl chloride set										
PVC High	.	0.1101	0.0300	0.1001	0.1101	0.1201	.		31 mm Ø x 12 mm	
PVC Low	.	0.0500	0.0100	0.0400	0.0200	0.0400	.			
PVC Blank	.	0	0	0	0	0	.			
RM polyethylene packaging set										
PACK High	.	.	0.0100	0.0101	0.0100	0.0101	.		31 mm Ø x 12 mm	
PACK Low	.	.	0.0060	0.0031	0.0031	0.0031	.			
PACK Blank	.	.	0	0	0	0	.			

**CRM ZINC ROHS/WEEE SAMPLES**

cast	mass %				50 mm Ø x 20 mm
Number	Cd	Cr	Hg	Pb	
41X ZSC6	0.215	<0.0002	0.029	0.0077	
41X ZSC3	0.119	0.0148	0.0021	0.0273	
41X ZSC5	0.0502	<0.0002	0.147	0.013	
41X ZSC1	0.0288	0.0039	0.026	0.06	
41X ZSC4	0.0131	0.0299	0.050	0.156	
41X ZSC2	0.0016	0.0036	0.0053	0.111	

## REFRACTORIES

# = class, where 1 = CRM and 2 = RM      T = Total      VS K6: 75 g      VS K10: 125 g      all others: 100 g

#	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>3</sub>	TiO <sub>2</sub>	ZrO <sub>2</sub>	-H <sub>2</sub> O
1	ASMW FF10	69.66	24.04	.	.	0.36	1.70	1.73	0.31	.	.	0.12	.	.	.	1.49	.	.
2	DH 2611	60.07	36.82	0.033 T	.	0.054	0.509	0.362	0.170	0.011	.	0.055	0.036	.	0.014	1.50	0.047	0.186
1	ASMW FF8	53.79	36.91	.	.	0.36	2.93	1.69	0.54	.	.	0.09	.	.	.	2.54	.	.
2	DH 2608	45.33	41.87	0.257 T	0.343	1.18	2.33	1.14	4.82	.	0.061	0.173	0.129	.	0.102	1.57	0.081	0.447
2	FQZ 2610	43.75	40.21	0.020 T	0.008	11.55	0.94	1.44	0.39	.	0.025	0.141	0.051	<0.001	.	1.01	0.049	0.124
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
2	DH 2602	34.49	62.82	.	0.004	0.438	1.087	0.24	0.161	.	0.019	.	0.029	.	0.031	0.288	.	0.101
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	.	.
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	VS K6/3	2.02	0.54	.	.	2.92	2.23	.	92.4	.	.	.	.	.	.	.	.	.
1	VS K10/3	(0.2)	97	(0.05)	.	(0.03)	1.82	(0.03)	.	.	.	(0.5)	.	.	.	0.35	.	.

continued

Number	CuO	Cr <sub>2</sub> O <sub>3</sub>	NiO	V <sub>2</sub> O <sub>5</sub>
ASMW FF10	.	.	.	.
DH 2611	.	.	.	.
ASMW FF8	.	.	.	.
DH 2608	.	.	.	.
FQZ 2610	.	.	.	.
DH 2612	.	0.385	0.032	0.027
DH 2602	.	.	.	.
DH 2613	0.004	0.140	.	0.020
DH 2609	.	.	.	.
VS K6/3	.	.	.	.
VS K10/3	.	.	.	.

## CRM ALUMINA REFRACTORY SET

SOLD IN SET/10 ONLY

20 g units

Number	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	B <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 310	94.7	0.41	.	0.03	0.02	1.32	0.97	0.04	0.08	2.06
JRRM 309	89.8	2.12	.	1.02	1.27	0.92	0.28	0.00	0.42	3.85
JRRM 308	86.5	10.2	.	0.09	0.41	0.10	0.05	0.11	0.26	1.79
JRRM 307	80.1	10.8	.	0.15	2.97	2.36	0.61	0.01	1.08	1.22
JRRM 306	74.1	17.3	.	0.62	1.95	1.75	0.10	0.01	0.99	2.68
JRRM 305	68.6	20.0	.	0.65	2.81	3.11	0.30	0.01	0.80	3.30
JRRM 304	63.0	27.5	.	0.18	3.46	0.38	0.37	0.05	0.27	4.34
JRRM 303	59.2	36.1	.	1.03	1.47	0.20	0.85	0.00	0.69	0.16
JRRM 302	53.9	37.7	.	0.87	4.49	0.66	0.69	0.20	0.56	0.59
JRRM 301	46.8	43.9	(0.87)	0.79	3.52	2.00	0.69	0.01	0.17	1.03

## 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 BURNT REFRACTORIES**

IPT: 80 g units SRM: 75 g units

Number	Al <sub>2</sub> O <sub>3</sub>	SiO <sub>2</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	K <sub>2</sub> O	Li <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SrO	TiO <sub>2</sub>	ZrO <sub>2</sub>	LOI
SRM 78a	71.7	19.4	0.11	1.2	1.22	0.12	0.70	0.078	1.3	0.25	3.22	.	(0.42)
IPT 57	71.5	24.3	0.05	1.25	0.83	0.008	0.13	0.35	0.054	0.009	1.19	0.20	0.20
SRM 77a	60.2	35.0	0.05	1.00	0.090	0.025	0.38	0.037	0.092	0.009	2.66	.	(0.22)
IPT 51	40.3	55.0	0.06	1.19	0.69	0.018	0.20	0.09	0.09	.	2.19	0.070	0.16
SRM 76a	38.7	54.9	0.22	1.60	1.33	0.042	0.52	0.07	0.120	0.037	2.03	.	(0.34)

**CRM CHROME-MAGNESIA REFRACTORY SET**

SOLD IN SET/12 ONLY

certified values

informational values

20 g units

Number	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**

SOLD IN SET/10 ONLY

20 g units

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	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**

SOLD IN SET/15 ONLY

20 g units

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>	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	SOLD IN SET/10 ONLY					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**

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	Li <sub>2</sub> O	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	TiO <sub>2</sub>	ZrO <sub>2</sub>	LOI	Units
IPT 63	96.28	0.48	2.21	0.52	0.043	0.18	0.008	(0.0005)	0.013	0.013	0.030	(0.002)	0.17	80 g

**CRM SILICA 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 210	97.69	0.16	0.30	0.83	0.00	0.78	0.00	0.02	0.00					
JRRM 209	96.22	0.87	1.89	0.37	0.17	0.10	0.06	0.03	0.05					
JRRM 208	94.43	0.46	4.19	0.06	0.02	0.05	0.00	0.63	0.00					
JRRM 207	94.05	1.70	2.51	0.96	0.21	0.16	0.04	0.04	0.07					
JRRM 206	92.88	1.77	1.20	3.20	0.50	0.07	0.01	0.18	0.01					
JRRM 205	90.40	3.08	3.11	1.24	0.50	0.09	0.06	0.93	0.32					
JRRM 204	89.64	4.49	1.79	2.08	0.90	0.31	0.10	0.31	0.15					
JRRM 203	87.33	5.09	3.97	1.78	0.24	0.47	0.11	0.61	0.18					
JRRM 202	85.72	7.59	0.81	3.97	0.02	0.02	0.00	1.01	0.56					
JRRM 201	84.36	9.71	2.77	1.46	0.14	0.73	0.14	0.31	0.03					

**CRM ZIRCON-ZIRCONIA REFRACTORY SET**

Number	SOLD IN SET/10 ONLY					20 g units								
	ZrO <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>	HfO <sub>2</sub>	K <sub>2</sub> O	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	TiO <sub>2</sub>	LOI	
JRRM 601	92.01	0.26	0.11	5.58	0.00	0.10	1.59	0.00	0.06	0.00	0.00	0.16	(0.07)	
JRRM 602	88.25	0.33	0.07	0.22	0.01	1.61	1.52	0.00	5.29	0.76	1.33	0.16	(0.25)	
JRRM 603	84.70	0.96	5.29	0.95	0.02	2.85	1.45	0.65	0.96	0.18	0.83	0.93	(0.11)	
JRRM 604	79.26	3.04	6.91	0.09	3.06	0.42	1.35	1.93	0.01	1.08	1.99	0.13	(0.23)	
JRRM 605	75.36	10.78	4.83	1.93	1.54	0.17	1.31	0.54	1.99	0.45	0.35	0.12	(0.31)	
JRRM 606	72.35	22.03	0.53	0.02	0.00	0.93	1.26	0.01	0.32	2.02	0.01	0.11	(0.32)	
JRRM 607	61.31	32.75	3.51	0.04	0.00	0.12	1.21	0.04	0.03	0.02	0.08	0.13	(0.56)	
JRRM 608	58.84	34.62	0.70	0.52	0.49	0.09	1.21	0.01	3.12	0.03	0.11	0.10	(0.06)	
JRRM 609	55.56	40.50	0.88	0.30	0.01	0.15	1.12	0.02	0.15	0.94	0.08	0.15	(0.12)	
JRRM 610	48.70	45.66	0.45	3.07	0.00	0.30	0.98	0.01	0.54	0.04	0.11	0.09	(0.07)	

**RM RICE STRAW ASH - THERMOSTIL**

Number	typical analysis													100 g units	
	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 5706	87.92	0.073	3.62	0.056	1.04	0.125	3.10	0.526	0.271	0.124	0.755	0.593	0.231	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 5707	82.15	0.223	4.03	0.158	1.78	1.50	1.89	5.09	0.259	0.117	0.443	0.524	0.223	1.82	
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 4505	58.23	6.62	0.659	0.031	18.41	11.30	0.502	3.98	0.096	0.059	0.045	<0.01	0.022	0.242	0.139	0.114	0.003	.	.
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

**RM FOUNDRY SAND**

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

100 g units

Number	BaO	CeO <sub>2</sub>	Co <sub>3</sub> O <sub>4</sub>	Cr <sub>2</sub> O <sub>3</sub>	CuO	La*	Li*	Nd*	NiO	Sr*	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	ZnO	ZrO <sub>2</sub>
DH 3301	0.015	0.003	0.020	0.538	0.012	14.0	6.7	8.3	0.003	35.0	0.213	0.007	0.015	0.127

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>	SO <sub>3</sub>	SiO <sub>2</sub>
DH 3301	2.76	0.720	3.84	0.169	0.570	0.070	0.297	0.027	0.116	90.36

**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 % CERAM: 25 or 100g SRM: 45g VS: 75g 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 K1/2	96.0	0.6	.	1.37	.	1.2	.	.	0.05	0.03	.	0.010	.	.	.
1	ECRM 777-1	95.06	0.795	.	2.826	.	0.330	0.154	.	0.071	.	0.02	.	.	0.444	.
1	ASMW FF11	92.24	4.14	.	0.10	.	0.49	0.46	.	0.11	.	0.04	.	.	0.40	.
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	.	.	.	1.91	.
2	CERAM 2CAS7	49.9	44.4	0.08	0.36	.	2.58	0.54	0.07	0.4	.	0.13	.	.	1.35	0.07
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**

analysis listed in mass %

T = Total

Number	Type	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
CRM															
BCS 313/1	High Si	99.78	0.036	0.006	<0.001	0.012	0.005	0.0013	0.0013	0.003	.	0.017	.	100 g	
GBW 03112	High Si	98.51	0.84	0.077	0.00034	0.093	0.061	0.066	(0.0016)	0.021	(0.0041)	0.020	0.24	60 g	
CMSI 1781	High Si	98.38	0.57	0.009	.	0.45	.	0.021	.	.	.	0.20	.	100 g	
GBW 03113	High Si	95.74	2.36	0.17	0.00054	0.21	0.67	0.098	(0.0033)	0.25	(0.0076)	0.036	0.35	60 g	
SRM 2696	Si Fume	95.61	0.2080	0.426	.	(0.055)	0.652	0.235	0.032	(0.129)	(0.0863)	.	(2.11)	70 g	ZnO:0.051
GBW 03114	High Si	89.59	5.48	0.34	0.0012	0.48	2.07	0.16	(0.010)	1.09	(0.014)	0.102	0.53	60 g	
GBW 03117	Si Glass	71.25	2.56	6.37	.	0.18	1.10	3.98	.	13.77	.	0.057	0.44	50 g	
SARM 69 *	Ceramic	66.6	14.4	2.37	Cr:0.0223	7.18T	1.96	1.85	0.129	(0.79)	(0.28)	0.777	(3.6)	100 g	Zn:0.0068 Ba:0.0518
RM															
CERAM CEB1	Earthware	74.0	16.2	0.52	<0.01	0.48	1.75	0.16	.	0.71	0.14	0.34	5.60	25 or 100g	BaO: 0.05

\* SARM 69 also contains (in ppm) Co: 28, Cu: 46, Ni: 53, and Sc: 20

**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 listed in mg/kg

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 07707	2.0	200	200	2000	20	20	2.0	200	200	200	200	200	213	2000
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 07707	20	200	200	200	20	20	203	2000	200	20	200	20	200	200
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

SRM: 40 g units

Number	Al	C	Ca	Cr	Cu	Fe	Mg	Mn	Ni	P	S	Ti	V	Zr
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	.

**CRM SILICON CARBIDE**

Number	SiC	Al	Al <sub>2</sub> O <sub>3</sub>	C Free	Fe	Fe <sub>2</sub> O <sub>3</sub>	Units
VS K9/2	99.6	(0.002)	.	.	(0.06)	.	150 g
NCS DC93021	98.73	.	0.11	0.11	.	0.45	100 g
NCS DC93022	88.76	.	1.65	2.14	.	2.14	100 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 S003	29.89	0.0493	.	(0.0481)	(0.0600)	0.0372	0.0063	0.00294	0.00035	0.00015	0.0149	.	0.00063
JCRM 1001	29.81	0.04	.	0.06	.	0.008	.	<0.001	.	.	0.044	.	<0.001
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
JCRM R022	30.4	1.62	68.1	0.31	.	0.058	.	0.025	0.006	.	0.051	.	0.005
JCRM R021	29.9	0.86	68.8	0.57	.	0.039	.	0.007	0.004	.	0.018	.	0.0021
JCRM R023	29.6	0.39	69.3	0.20	.	0.003	.	0.003	0.001	.	0.015	.	0.001

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)	Chips 100 g
NMIJ 8002a	0.000160	0.0109	.	.	.	.	0.00477	.	0.58	.	Beta Phase	Powder 50 g
BAM S003	0.000144	.	(0.0093)	0.00177	0.00329	0.0910	0.0079	0.00414	.	0.00252	green micro F800	Powder 50 g
JCRM 1001	.	.	0.030	.	.	0.048	0.0035	.	.	.	after HF treatment SiC: 99.58%	Chips 50 g
NMIJ 8001a	.	.	.	.	.	.	0.000637	.	0.31	.	Alpha Phase	Powder 50 g
ECRM 780-1	0.029	.	0.325	(0.0502)	.	.	.	.	.	.	n/a	Chips 100 g
JCRM R022	0.001	.	.	.	0.001	0.98	0.003	<0.001	.	0.001	set JCRM R021 - R023 only	Powder 50 g
JCRM R021	<0.001	.	.	.	0.001	1.08	0.010	0.002	.	0.001	set JCRM R021 - R023 only	Powder 50 g
JCRM R023	<0.001	.	.	.	0.001	0.86	<0.001	<0.001	.	<0.001	set JCRM R021 - R023 only	Powder 50 g

**CRM SILICON NITRIDE**

Number	analysis listed in mass %								analysis listed in mg/kg								Units
	Si	N	Al	C	Ca	Fe	Mg	O	Co*	Mn*	Na*	Ni*	Ti*	W*	Zr*	̑-phase of Si <sub>3</sub> N <sub>4</sub>	
SRM 8983	.	39.23	.	0.107	.	.	.	1.20	.	.	.	.	.	.	.	.	4.5 g
NMIJ 8004a	59.226	38.485	0.07397	.	0.00727	0.01969	0.001029	.	.	2.987	.	2.485	8.519	.	2.146	.	25 g
BAM ED101	.	38.1	0.0469	0.162	0.00141	0.00795	0.00043	(1.91)	43.5	.	7.59	.	.	41.3	.	7.43	50 g

**CRM SILICON NITRIDE**

Number	Powder	analysis listed in mass %		SRM 656 is two 10 g powder units, one ̑ and one ̒ phase powder		Amorphous	Uncertainty ±
		Mass ̑	Uncertainty ±	Mass ̒	Uncertainty ±		
SRM 656	̑	87.5	0.59	3.0	0.05	9.5	0.61
SRM 656	̒	16.3	0.81	75.1	2.54	8.6	0.60

**CRM SILICOALUMINUM**

Number	analysis listed in mass %											50 g units	
	Al	Si	Fe	Ba	C	Ca	Cr	Cu	Mg	Mn	Ni	P	S
NCS HCl14605	36.67	25.94	24.97	9.12	0.13	1.33	0.152	0.045	.	0.12	0.167	0.018	0.012
NCS HCl14603	32.84	24.12	33.54	7.57	0.13	0.71	0.085	0.061	.	0.14	0.042	0.015	0.015
NCS HCl14602	32.82	19.21	38.09	6.52	0.14	0.85	0.017	0.137	.	0.25	0.014	0.015	0.013
NCS HCl13602	32.55	32.01	20.59	7.41	0.27	1.17	.	.	0.85	0.197	.	0.017	0.0096
NCS HCl14604	25.44	19.21	49.14	2.64	0.24	0.44	0.053	0.172	.	0.25	0.018	0.011	0.011
NCS HCl14601	1.55	59.24	9.71	16.54	0.21	9.89	0.035	0.13	.	0.067	0.012	0.024	0.051

**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
2	DH 0405	32.84	57.48	1.193	.	.	0.006	<0.009	3.47	0.021	0.039	.	0.012	0.014	.	0.055	50 g
2	BS 119	32.3	62.3	0.46	.	0.30	.	3.0	.	.	.	.	0.033	0.01	.	.	100 g
2	DH 0406	30.48	60.79	0.333	.	0.61	<0.009	<0.010	5.17	0.010	0.056	<0.021	<0.007	0.031	0.022	0.019	50 g
1	VS F26/2	29.9	59.5	1.52	.	.	.	6.29	.	.	.	.	.	0.024	0.030	0.156	100 g
2	DH 0403	28.60	60.12	1.59	.	0.40	0.018	0.016	5.56	0.188	0.611	0.003	0.008	0.014	.	0.169	50 g
2	DH 0402	28.48	58.68	1.13	.	.	0.009	0.014	6.74	0.047	0.051	.	.	0.013	.	0.055	50 g
2	DH 0404	26.79	62.53	1.74	.	0.533	0.016	0.020	5.03	0.036	0.094	0.026	0.007	0.011	.	0.238	50 g
1	VS F25/3	21.3	51.5	0.67	.	.	.	23.06	.	.	.	.	.	0.011	0.0056	.	100 g
1	NCS HCl13601	12.70	58.89	1.55	12.61	0.73	.	.	9.26	0.85	0.0741	.	.	0.0129	0.052	.	50 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

**SILICOMANGANESE**

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

#	Number	Mn	Si	Fe	Al	B	C	Ca	Co	Cr	Cu	Ni	P	S	Ti	V	Units
2	DH 0107	77.82	17.36	2.64	.	.	1.65	.	0.030	.	0.012	0.021	0.135	.	0.122	0.015	50 g
1	VS F23/2	73	18.08	.	.	.	1.43	.	.	.	.	.	0.488	0.022	.	.	100 g
2	DH 0104	68.20	19.47	9.88	.	0.0052	1.165	.	0.109	0.045	0.042	0.093	0.148	.	0.208	.	50 g
1	NCS HC26611	67.51	17.53	.	.	.	1.67	.	.	.	.	.	0.087	0.023	.	.	50 g
1	NCS HC25654	65.29	19.26	.	.	0.022	0.876	.	.	.	.	.	0.109	0.0122	0.19	.	50 g
1	ECRM 586-1	62.48	33.96	2.887	0.218	.	0.0252	0.0386	0.0069	0.0440	.	.	0.040	.	.	0.0408	100 g
2	DH 0301	59.06	30.16	9.91	0.016	0.0048	0.015	.	0.028	0.035	0.019	0.033	0.050	.	0.471	0.015	50 g

## 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
ECRM 804-1	0.407	.	36.88	.	.	11.92	.	0.88	1.48	.	7.67	0.127	2.59	0.152	0.460	.

## 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	37.0	10.3	0.20	0.23	.	0.17	5.87	0.19	0.16	.	1.14	0.20	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	IRSID 802-1 *	42.84	32.43	16.12	.	0.576	.	.	4.76	0.593	.	0.250	0.714	0.611	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
2	BS 100A	37.6	35.2	10.13	0.07	0.30	.	0.49	12.9	0.35	0.18	.	1.2	0.50	100 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 Slag 3	37.3	37.44	12.9	0.03	0.25	.	0.81	8.3	1.72	0.26	.	0.81	0.63	50 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
2	BS Slag 1	30.2	36.7	18.5	0.07	0.28	.	0.36	11.01	1.11	0.20	.	1.8	0.42	50 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

GBW: 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>
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	53.7	.	.	18.8	1.47	.	.	11.0	(0.006)	.	3.1	5.2	(0.028)	0.77	.	0.19	0.92	.
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	52.4	.	.	23.7	0.61	.	.	6.3	(0.003)	.	9.2	3.45	0.009	0.78	.	0.18	0.8	.
2	BS 101/4	51.9	.	.	16.5	0.87	.	.	13.4	(0.007)	.	4.6	4.7	(0.023)	0.80	.	0.15	1.21	.
1	IRSID 804-1	51.60	.	.	5.54	(0.79)	.	.	11.92	.	.	1.46	1.91	.	17.58	.	0.127	0.25	0.82
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	47.0	.	.	16.8	0.9	.	.	15.2	(0.006)	.	8.1	4.8	0.031	0.70	.	0.23	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	46.0	.	.	14.9	0.57	.	.	19.2	(0.005)	.	5.5	5.7	(0.043)	0.71	.	0.12	1.1	.
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 147	40.29	.	.	12.87	4.40	0.48	.	19.59	16.11	.	5.20	5.45	.	2.44	.	0.146	0.50	.
1	NH 148	39.76	.	.	6.52	1.62	0.86	.	18.44	0.29	.	4.94	3.78	.	10.84	.	0.112	0.25	.
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	NH 155	34.35	.	.	19.19	10.20	0.68	.	13.17	0.11	.	4.70	3.91	.	4.26	.	0.124	0.38	.
1	NH 142	29.56	.	.	22.16	3.13	0.55	.	16.52	16.89	.	5.38	12.09	.	2.08	.	0.067	0.69	.
1	CMSI 1744	26.73	.	.	8.91	3.92	.	.	34.33	36.55	.	12.15	2.01	.	0.87	.	0.107	0.32	.
1	NH 141	26.22	.	.	22.47	2.74	(0.85)	.	21.37	22.99	.	(4.02)	10.85	.	2.14	.	0.081	0.63	.
1	VS W4/1	25.7	.	.	16.80	3.62	.	.	22.9	24.6	.	17.8	4.23	.	P: 0.265	.	0.036	1.05	.
1	VS W4/4	25.5	.	.	16.7	3.62	.	.	23.2	25.5	.	18.3	4.37	.	P: 0.259	.	0.037	1.02	.
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 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 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 144	20.50	.	.	22.18	2.42	1.32	.	28.47	31.61	.	2.85	9.72	.	2.02	.	0.091	0.55	.
1	NH 153	15.17	.	.	12.12	3.37	36.50	.	7.09	8.05	.	16.68	4.47	.	(0.01)	.	0.036	2.26	.
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

**BLAST FURNACE SLAG**

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

JSS: 70 g units

all others: 100 g units

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 905-1	42.1	.	34.2	14.2	6.8	0.17	.	K: 0.308	.	0.22	Na: 0.143	0.008	.	0.558	0.56
2 DH 3227	41.07	.	37.50	12.09	6.314	0.196	.	0.527	0.433	.	.	.	.	0.989	0.700
2 DH 3231	40.85	.	37.31	12.5	6.225	0.252	.	0.43	0.362	.	.	.	.	1.069	0.776
2 DH 3229	40.68	.	37.35	12.53	6.15	0.193	.	0.529	0.365	.	.	.	0.008	1.05	0.742
2 DH 3221	40.54	28.97	35.69	10.99	10.00	0.230	.	0.525	0.161	.	0.428	.	.	1.55	0.572
2 DH 3230	40.42	.	37.24	12.64	5.94	0.667	.	0.431	0.402	.	.	.	.	1.044	0.729
2 DH 3225	.	28.59	38.06	12.80	7.63	0.385	.	0.115	0.129	.	0.092	.	.	1.55	0.247
2 DH 3218	.	28.35	36.86	12.38	7.63	0.358	.	0.557	0.292	.	0.364	.	0.006	1.32	0.480
2 DH 3219	.	28.24	39.26	10.00	7.47	0.383	.	0.744	0.981	.	0.303	.	0.026	0.818	0.533
1 VS W1/2	38.8	.	37.9	8.48	9.35	.	0.47	.	.	0.22	.	.	.	0.69	.
1 NCS HCl3810	38.57	.	34.08	7.08	16.97	0.64	0.58	.	.	0.089	.	.	0.037	0.536	0.36
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)
2 DH 3223	.	27.21	38.07	9.39	9.53	0.662	.	1.62	0.726	.	0.391	.	0.012	1.08	0.393
2 DH 3224	.	27.10	37.88	12.86	7.03	2.53	.	0.170	0.145	.	0.102	.	.	1.55	0.265
2 DH 3207	.	26.62	42.09	7.29	9.35	0.872	.	0.600	0.754	.	0.192	.	.	0.65	0.471
1 NCS HCl3809	36.50	.	30.95	7.84	20.77	0.78	0.60	.	.	0.077	.	.	0.049	0.535	0.84
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)
1 VS W3/2	31.7	.	30.1	14.5	12.1	.	.	.	.	0.58	.	.	.	0.51	9.62

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 905-1	.	.	.	.	.	.	.	.	.	.	.
DH 3227	0.094	.	.	.	.	0.054	.	.	0.039	.	.
DH 3231	.	.	.	.	.	0.055	.	.	0.044	.	.
DH 3229	.	.	.	.	.	0.055	.	.	0.045	.	.
DH 3221	.	.	.	.	.	0.066	.	.	.	.	.
DH 3230	0.090	.	.	.	.	0.054	.	.	0.042	.	.
DH 3225	0.086	.	.	.	.	0.053	.	.	0.046	.	.
DH 3218	0.093	.	.	0.008	.	0.086	.	.	0.041	.	.
DH 3219	.	0.028	0.060	.	.	0.045	.	.	.	.	0.07
VS W1/2	.	.	.	.	.	.	.	.	.	.	.
NCS HCl3810	.	.	.	.	.	.	.	.	.	.	.
IMZ 276	.	.	.	.	.	.	(0.009)	.	.	.	.
DH 3223	.	.	.	.	.	0.120	.	.	.	.	.
DH 3224	0.083	.	.	.	.	0.052	.	.	0.043	.	.
DH 3207	.	.	.	.	0.030	.	.	.	0.016	.	.
NCS HCl3809	.	.	.	.	.	.	.	.	.	.	.
IMZ 277	.	.	.	.	.	.	(0.012)	.	.	.	.
VS W3/2	.	.	.	.	.	.	0.25	.	.	.	.

**CRM COPPER CONVERTER SLAG**

Number	Ag	Co	Cu	Fe	Ni	Mo	S	V	Units
IMN ZM6	0.0031	0.39	2.12	46.72	0.080	0.021	1.04	0.006	250 g

**CONVERTER SLAG**

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

#	Number	CaO	Ca	SiO <sub>2</sub>	Al <sub>2</sub> O <sub>3</sub>	F	Fe	FeO	K <sub>2</sub> O	MgO	Mn	MnO	Na <sub>2</sub> O	Nb <sub>2</sub> O <sub>5</sub>	P <sub>2</sub> O <sub>5</sub>	S	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>
2	DH 3917	59.02	.	14.86	1.304	.	10.15	.	.	1.907	2.994	.	.	.	1.89	0.206	0.47	0.54
2	DH 3913	56.31	.	9.87	0.76	.	14.61	.	.	1.07	4.40	.	.	0.077	2.29	0.152	0.423	0.553
2	DH 3918	56.02	.	13.47	1.25	.	12.71	.	.	2.21	3.11	.	.	0.045	1.88	0.218	0.421	0.538
1	NCS HC19808	53.81	.	7.88	1.93	0.294	14.39	.	.	5.04	.	1.39	.	.	.	0.34	1.88	3.57
2	DH 3919	52.95	.	11.94	0.974	.	16.08	.	.	2.235	3.167	.	.	0.044	1.766	0.213	0.368	0.508
2	DH 3911	50.50	.	8.58	0.933	.	18.51	.	.	1.54	4.42	.	.	0.055	2.65	0.160	0.350	0.590
2	DH 3921	50.05	.	10.56	4.79	0.500	16.92	.	0.013	2.99	2.31	.	0.020	0.030	1.36	0.196	0.780	0.422
1	VS SH5/3	48.3	.	16.0	1.25	.	17.1	3.01	.	3.14	.	4.89	.	.	.	0.209	.	.
1	NCS HC19809	47.6	.	15.74	9.92	0.297	7.64	.	.	3.9	.	3.57	.	.	.	0.244	3.04	2.9
2	DH 3923	46.50	.	11.52	1.27	0.030	20.33	.	0.013	3.23	2.74	.	0.014	0.046	1.73	0.288	1.21	0.522
1	NCS HC13813	.	34.55	18.85	1.55	.	12.96	9.75	.	9.27	.	3.10	.	.	0.98	0.096	0.46	.
1	CMSI 1754	.	31.73	26.40	7.75	0.80	5.55	.	0.36	9.24	.	1.93	0.12	.	0.58	0.459	0.531	.
1	CMSI 1755	.	25.90	12.20	3.08	0.85	18.82	.	0.052	11.67	.	1.64	0.030	.	0.95	0.089	0.781	.

Number	CaF	Cr	Cr <sub>2</sub> O <sub>3</sub>	CuO	MoO <sub>3</sub>	SrO	Zn	ZnO	Units
DH 3917	.	0.108	.	.	.	.	0.002	.	100 g
DH 3913	.	0.168	.	0.009	0.007	.	.	.	100 g
DH 3918	.	0.120	.	.	.	0.030	.	.	100 g
NCS HC19808	.	.	.	.	.	.	.	.	80 g
DH 3919	.	0.141	.	.	.	0.028	.	.	100 g
DH 3911	.	0.154	.	0.007	.	.	.	0.003	100 g
DH 3921	.	0.196	.	0.007	.	.	.	.	100 g
VS SH5/3	.	.	.	.	.	.	.	.	100 g
NCS HC19809	.	.	.	.	.	.	.	.	80 g
DH 3923	.	.	0.216	.	.	.	.	.	100 g
NCS HC13813	1.03	.	.	.	.	.	.	.	100 g
CMSI 1754	.	.	.	.	.	.	.	.	50 g
CMSI 1755	.	.	.	.	.	.	.	.	50 g

**CRM ELECTRIC FURNACE SLAG**

100 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 1757	28.87	8.73	0.82	1.89	2.25	15.67	2.39	0.030	0.25	24.77	0.25
CMSI 1756	16.19	4.00	0.17	15.27	13.12	21.18	13.16	0.125	0.036	21.35	0.18
NCS HC13812	15.53	4.10	0.52	24.03	21.08	14.06	5.11	0.41	0.085	23.49	0.44

**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 EZP 1	31.62	.	36.76	.	24.85	.	.	(0.85)	.	.	2.61	.	.
JK S9	17.3	35.5	39.0	29.1	31.5	0.042	0.04	2.2	0.04	0.005	1.4	0.05	0.11
IMZ EZP 3	15.78	.	39.53	.	19.13	.	.	8.44	.	.	1.68	.	.
IMZ EZP 2	(0.89)	.	24.03	.	41.38	.	.	16.89	.	.	5.81	.	.

**RM LADLE SLAG**

100 g units

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	F	Fe	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>	TiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	-H <sub>2</sub> O @ 1000°C
FQZ 0107	35.86	41.99	0.161	0.190	4.04	0.021	4.92	4.47	0.119	0.710	0.059	4.29	0.540	0.380	(0.09)
FQZ 0207	35.98	47.40	0.053	0.50	2.72	0.013	5.35	2.09	0.035	0.178	0.114	3.72	0.287	0.119	(0.11)
FQZ 0298	20.93	43.08	0.360	0.128	13.16	0.011	5.69	4.96	0.007	0.59	0.079	4.23	0.251	0.204	0.120
FQZ 0398	1.24	48.58	0.243	0.098	16.69	0.021	1.54	3.76	0.066	1.82	0.068	16.19	0.96	0.91	0.064

Number	Tot. C	CO <sub>2</sub>	Nb <sub>2</sub> O <sub>5</sub>	SrO	ZrO <sub>2</sub>
FQZ 0107	0.01	0.018	0.020	.	.
FQZ 0207	0.01	0.018	0.010	.	.
FQZ 0298	0.029	<0.01	0.007	0.018	0.004
FQZ 0398	0.027	<0.01	0.005	0.018	<0.001

**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	.
DH 7402	.	0.113	5.99	11.92	0.405	7.02	.	3.96	0.164	0.118	.	14.03	0.114	11.01	45.16

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	.
DH 7402	.	.	0.086	0.133	0.386	.	0.274	.	0.024	0.077

**CRM OPEN HEARTH SLAG**

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	FeO	T.Fe	MgO	MnO	P <sub>2</sub> O <sub>5</sub>	TiO <sub>2</sub>	S	SiO <sub>2</sub>	Units
NCS HC13811	4.47	18.11	35.40	29.44	13.19	2.32	0.91	0.51	0.050	23.35	100 g

**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 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>	Ti <sub>2</sub> O <sub>3</sub>	Al <sub>2</sub> O <sub>3</sub>	CaO	Cr <sub>2</sub> O <sub>3</sub>	T.Fe	Fe <sub>2</sub> O <sub>3</sub>	MgO	MnO	S	SiO <sub>2</sub>	V <sub>2</sub> O <sub>5</sub>	LOI
SARM 57	85.4	(27.1)	1.23	0.16	0.16	.	11.8	0.98	1.76	.	1.72	0.39	(3.92)
DSZU 123.23-95	85.21	.	3.40	0.76	1.12	3.29	.	0.60	0.24	0.12	2.50	0.30	.
DSZU 123.24-01	85.19	.	3.28	.	0.76	3.69	.	.	0.85	0.12	2.88	0.31	.

**RM TITANIUM SLAG SET**

available in SET/9 ONLY

20 g units

Number	Al	Ca	Cr	Fe	Mg	MnO	Si	V
OSO 6-88	1.44	0.29	0.64	4.38	0.44	0.70	0.89	0.21
OSO 7-88	1.80	0.26	0.69	3.72	0.30	0.71	1.29	0.22
OSO 8-88	1.91	0.34	0.70	9.10	0.76	0.97	1.96	0.35
OSO 9-88	2.22	0.43	1.19	10.04	1.23	1.27	2.50	0.64
OSO 10-88	2.99	0.67	1.58	8.86	1.59	1.83	1.68	0.53
OSO 11-88	3.18	1.11	1.64	6.68	0.88	2.31	2.03	0.93
OSO 12-88	2.14	1.23	1.95	9.32	2.29	1.14	1.10	1.00
OSO 13-88	3.93	1.23	2.17	2.33	1.07	1.27	2.23	1.21
OSO 14-88	3.95	1.76	3.75	4.50	2.98	1.41	2.82	1.47



**RM SLUDGE**

typical analysis listed in mass % unless otherwise noted

Number	Type of Sludge	pH	Tot.Residue	Tot.Org.C	Kjeldahl N(TKN)	N as NH <sub>3</sub>	Tot.P	Oxygen Demand	Units
RT 006	Paint Sludge	10.84	.	.	.	.	.	.	50 g dry
RT 005	Sewage Sludge	7.59	.	.	.	.	(1.01)	.	50 g dry
RT 009	Electroplating	7.99	.	.	.	.	.	.	100 g wet
RT 010	Electroplating	3.86	.	.	.	.	.	.	100 g wet
RT 011	Electroplating	3.46	.	.	.	.	.	.	100 g wet
RT 018	Residential/Industrial	8.07	(55.3)	(15.4)	(2.6)	(0.7170)	(2.29)	.	50 g wet
RT 055	Residential/Industrial	7.61	(92.1)	.	4.11	(0.242)	2.31	0.0771	50 g dry
RT 029	Residential/Industrial	7.2	88.2	(12.3)	2.33	(0.623)	2.04	.	50 g dry
RT 031	Residential/Industrial	6.53	(93)	(15.3)	(4.1)	(0.6950)	(3.51)	.	40 g dry

continued analysis listed in mass %

Number	Al	B	Ba	Ca	Cr	Cu	Fe	K	Na	Ni	Pb	Sn	Zn
RT 006	0.00734	.	0.9970	0.0111	0.00111	.	0.00644	0.8710	0.00913	.	0.0753	.	73.700
RT 005	1.5300	.	0.0853	11.9000	0.00413	0.0465	1.2700	0.6230	0.2490	0.00260	0.00892	.	0.0625
RT 009	(0.0890)	(0.0150)	(0.0050)	(0.1100)	0.00503	12.1000	(0.3800)	(0.0640)	(1.8000)	0.0343	1.4200	(3.8000)	(0.0040)
RT 010	0.0693	.	0.0173	0.0563	0.00795	6.3200	0.2700	.	(0.1580)	0.0194	11.9000	.	0.0183
RT 011	(0.0020)	(1.8000)	(0.0005)	(0.0180)	5.9200	0.0108	(0.4700)	(4.9000)	(2.3000)	4.2000	0.0269	(0.0120)	.
RT 018	2.2400	(0.00258)	0.1100	4.9100	0.00401	0.0840	0.9900	0.2660	0.1000	0.00204	0.0126	.	0.1120
RT 055	1.3200	.	0.0347	4.8000	0.00404	0.0402	2.2500	.	(0.0715)	0.00192	0.00254	.	0.0563
RT 029	1.8200	(0.00166)	0.0806	3.7300	0.0325	0.0665	0.8640	0.2340	0.1110	0.0150	0.0277	.	0.0847
RT 031	2.1700	(0.00175)	0.0906	4.5900	0.00372	0.0805	0.9810	0.2420	0.0880	0.00196	0.0119	0.0134	0.1060

continued analysis listed in mg/kg

Number	Ag	As	Be	Cd	Co	Hg	Mg	Mn	Mo	Sb	Se	Si	Sr	Tl	V
RT 006	.	.	.	32.4	.	.	47.0	.	.	.	.	.	.	.	.
RT 005	36.3	6.91	0.610	13.7	6.18	3.23	6700	172	14.2	.	19.9	.	.	(2.99)	109
RT 009	8.90	(20)	.	(1)	(7)	(1)	(150)	(40)	(20)	(9)	.	.	(30)	(30)	(1)
RT 010	56.4	.	.	.	.	(1.4)	(80)	17.5	.	.	.	.	.	.	.
RT 011	(1)	(20)	.	(4)	(10)	(10)	(50)	(30)	.	(10)	(4)	.	(1)	(20)	(20)
RT 018	72.1	6.63	0.300	5.57	3.22	4.78	4300	200	10.5	(<2)	8.38	(609)	420	(<1)	39.2
RT 055	18	3.3	(1.17)	1.74	2.97	(1.71)	.	232	10.4	3.33	(6.21)	.	.	.	12
RT 029	54	26.5	4.35	537	3.07	4.17	3900	165	8.77	(2.41)	19.0	(782)	(372)	.	30.9
RT 031	101	6.45	88.3	5.74	2.96	5.18	4290	199	11.4	38.4	8.23	.	.	85.9	114

**CRM RED SLURRY**

analysis listed in mass % 50 g units

Number	Al <sub>2</sub> O <sub>3</sub>	CaO	Fe <sub>2</sub> O <sub>3</sub>	Na <sub>2</sub> O	SiO <sub>2</sub>	TiO <sub>2</sub>
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available individually

DSZU 123.41-03	12.7	5.96	57.6	1.12	6.18	4.25
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available in SET/6 ONLY

ShK411-01	12.7	5.67	58.7	.	4.57	4.85
ShK412-01	13.3	7.0	57.3	.	4.67	4.32
ShK413-01	11.2	11.8	35.6	.	22.3	2.09
ShK414-01	11.4	3.35	67.2	.	3.44	3.27
ShK415-01	17.3	4.04	44.4	.	10.5	7.11
ShK416-01	15.1	5.13	52.1	.	7.35	5.92

**CRM SULFUR**

Number	Recommended S Value (%)	95% Confidence Limits		Standard Deviation of Laboratories (%)		Number of Sets	Results	Units
		Low%	High%	Between	Within			
CAN HCC-1	33.92	33.80	34.03	0.14	0.095	9	53	50 g
CAN INM-1	22.17	21.97	22.37	0.24	0.051	9	53	50 g

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

Number	Multipoint +/-		Single Point +/-		Units
SRM 1899	10.67	0.19	10.52	0.62	4 g silicon nitride powder
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**

data shows estimates of (material, measurement) uncertainty

Number	ksi Tensile Strength	ksi Yield Strength	% Total Elongation	% Reduction	Material	Units
BS TRM-2	136.3 (0.3, 2.0)	128.9 (0.6, 3.9)	16.1 (0.4, 2.5)	54.6 (0.3, 1.7)	1018 steel	rod 25 mm $\varnothing$ x 158 mm
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-1A	83.9 (0.3, 1.7)	70.2 (0.2, 1.5)	18.8 (0.3, 1.8)	56.9 (0.5, 3.2)	600 nickel	rod 25 mm $\varnothing$ x 158 mm

**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 661A	300 $\pm$ 7	318 $\pm$ 7	750 $\pm$ 13	40.9 $\pm$ 0.9	60 $\pm$ 4	3 rods 14 mm $\varnothing$ x 150 mm
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 TUNGSTEN CARBIDE**

analysis listed in mass %

SRM 276b: 75 g units

all others: 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	.	.	.	.	.
BCS 352/1	W94-C6	6.154	0.036	.	0.0029	.	.	.	.	.
SRM 276b		6.10	.	.	.	.	.	.	.	.
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 ZIRCON CONCENTRATE**

analysis listed in mass %

DSU: 20 or 50 g units

all others: 100 g units

Number	ZrO <sub>2</sub>	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	HfO <sub>2</sub>	MgO	Na <sub>2</sub> O	P <sub>2</sub> O <sub>5</sub>	SnO <sub>2</sub>	TiO <sub>2</sub>	ThO <sub>2</sub>	U <sub>3</sub> O <sub>8</sub>	LOI
DSZU 123.47-03	.	66.1	.	0.75	.	0.074	.	.	.	.	0.099	.	0.22	.	.	.
SARM 62 *	64.2	.	32.8	0.88	(0.11)	0.07	.	1.31	(0.04)	.	0.12	.	0.13	0.0158	0.0354	.
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

\* SARM 62 lists Total Fe as Fe<sub>2</sub>O<sub>3</sub> and Ti as TiO<sub>2</sub>