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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 ₂ | CO ₃ | Ca | Fe | K | Mg | Mn | Na | P | S as SO ₄ | 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 kgCaCO₃/t

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

CRM AIR PARTICULATE ON FILTER MEDIA

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

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

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

CRM ATTRITION INDEX

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

RM CALCIUM ALUMINATE

typical analysis 100 g

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

CRM CALCIUM CARBONATE

certified analysis in mass % and mg/kg

analysis in mg/kg

100 g

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

CRM CASTING POWDER

analysis listed in mass %

30 g

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

RM PORTLAND CEMENT WITH EXTENSIVE ANALYSIS analysis listed in mass %

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

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

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

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

CEMENT chart 2 of 2

= class, where 1 = CRM and 2 = RM

analysis listed in mass %

Table with columns: #, Number, CaO, Ca, SiO2, Al2O3, Fe2O3, K2O, MgO, Na2O, P2O5, SO3, SrO, TiO2, LOI, Units. Contains multiple rows of cement analysis data for various products like SRM 1884b, FLX CRM122, etc.

Table with columns: Number, BaO, Free CaO, Cl, Cr2O3, F, Mn, Mn2O3, S, Unignited SO3, V2O5, ZnO, Ins. Res. Contains detailed analysis for products like SRM 1884b, FLX CRM122, etc.

RM CEMENT SET JCA 601B

available in set/15 only

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

Table with columns: Number, Al2O3, CaO, Fe2O3, K2O, MgO, MnO, Na2O, P2O5, SO3, SiO2, SrO, TiO2. Lists analysis for JCA 601B products 1 through 15.

CRM CHLORINE and FLUORINE in CEMENT

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

CRM PORTLAND CEMENT HEAT OF HYDRATION

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

CRM COMPRESSIVE STRENGTH N/mm²

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

CRM CLASSIC CEMENT CHEMISTRIES

20 g units

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

CRM CEMENT CLINKER PHASE ABUNDANCE

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

CRM PORTLAND CEMENT FINENESS AND BLAINE STANDARD

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

expired, last of stock
expries March 2027

CRM CEMENT FINENESS

certified analysis

informational analysis listed in mass %

20 x 5 g units

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

CRM CEMENT FINENESS

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

last

RM CEMENT FINENESS - SIEVING METHOD

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

CRM CEMENT COMPONENT MATERIAL

analysis listed in mass %

NCS DC61106: 50g

others: 20 g units

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

CRM FUSIBILITY OF COAL

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

SULFUR IN COAL

= class, where 1=CRM and 2=RM

analysis listed in mass %

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

RM COAL

typical analysis listed in mass %

50 g units, last of stock

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

CRM COAL

analysis listed in mass %

(T) = Total

SARM 20 also contains Ta: 0.00012, Y: 0.0029

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

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

CRM COAL

analysis in mass %

50g units

analysis in mg/kg

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

continued analysis in mg/kg

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

CRM COAL

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

powder 50 g

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

CRM COAL ASH

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

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

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

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

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

CRM COAL FLY ASH analysis listed in mass %

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

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

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

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

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

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

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

continued analysis in mg/kg

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

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

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

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

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

INDUSTRIAL FLY ASH

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

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

| Number | Bi | C | Cl | F | Mg | Mn | S | Si | Sn | Units, Class |
|--------|----|---|----|---|----|----|---|----|----|--------------|
|--------|----|---|----|---|----|----|---|----|----|--------------|

| | | | | | | | | | | |
|--------------|--------|-------|--------|--------|--------|-----|-------|--------|--------|------------|
| ECRM 882-1 | 0.0026 | (1.0) | (2.35) | (0.07) | (0.48) | (2) | (0.5) | (1.05) | (0.02) | 100 g, CRM |
| JK 43 | . | . | . | . | . | . | . | . | . | 15 g, CRM |
| JK 44 | . | . | . | . | . | . | . | . | . | 25 g, CRM |
| JK 45 | . | . | . | . | . | . | . | . | . | 15 g, CRM |
| 502-843-1000 | . | 42.4 | . | . | . | . | 0.29 | . | . | 20 g, RM |

RM**COAL-TAR PITCH**

analysis listed in mg/kg except as noted

60 g units

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

continued informational values listed in mg/kg except as noted

| Number | Sb | Si | Sn | Ti | V | Zn | Soft Point °C |
|--------|----|----|----|----|---|----|---------------|
|--------|----|----|----|----|---|----|---------------|

| | | | | | | | | |
|--------------|------|-----|------|----|------|----|-----|------|
| DOMTAR CTP A | . | 358 | . | 18 | 1.2 | 88 | 115 | last |
| DOMTAR CTP B | 0.57 | 408 | 3.7 | 16 | 0.89 | 90 | 118 | last |
| DOMTAR CTP C | 0.03 | 20 | <0.7 | 19 | 170 | 1 | 129 | last |

CRM **COATING THICKNESS**Number nominal μm coating thickness

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

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

CONTINUOUS CASTING POWDER

analysis listed in mass %

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

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

RM**CONTINUOUS CASTING POWDER**

typical analysis listed in mass %

100 g units

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

RM**COVER POWDER**

analysis listed in mass %

100 g units

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

CRM COKE

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

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

COKE ASH

analysis listed in mass %

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

| Number | C.tot | CO ₂ | Cr ₂ O ₃ | CuO | NiO | ZnO | ZrO ₂ | Units |
|--------|-------|-----------------|--------------------------------|-----|-----|-----|------------------|-------|
|--------|-------|-----------------|--------------------------------|-----|-----|-----|------------------|-------|

| | | | | | | | | |
|-------------|-------|-------|-------|-------|-------|-------|-------|-----------|
| NCS FC28137 | . | . | . | . | . | . | . | CRM, 5 g |
| NCS FC28136 | . | . | . | . | . | . | . | CRM, 5 g |
| NCS FC28135 | . | . | . | . | . | . | . | CRM, 5 g |
| DH 3713 | . | . | 0.046 | 0.037 | 0.026 | 0.232 | 0.028 | RM, 100 g |
| DH 3711 | 0.039 | 0.045 | 0.036 | 0.009 | 0.030 | 0.010 | 0.041 | RM, 100 g |

CRM DUST

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

| Number | MgO | MnO | Na | Ni | NiO | P | Pb | S | SiO ₂ | Sn | TiO ₂ | V | V ₂ O ₅ | Zn | Units |
|--------|-----|-----|----|----|-----|---|----|---|------------------|----|------------------|---|-------------------------------|----|-------|
|--------|-----|-----|----|----|-----|---|----|---|------------------|----|------------------|---|-------------------------------|----|-------|

| | | | | | | | | | | | | | | | |
|-------|------|------|-------|--------|------|--------|--------|-------|------|-----------|------|--------|---|-------|-------|
| VS E2 | 1.64 | 1.41 | (0.1) | (0.03) | . | 0.065 | 0.276 | 0.116 | 1.76 | (<0.0005) | . | (0.01) | . | 0.59 | 100 g |
| VS E1 | 9.3 | 1.56 | (0.1) | . | 3.68 | (0.02) | (0.05) | 0.072 | 10.3 | (<0.0005) | 2.79 | (0.04) | . | (0.2) | 150 g |

RM DUST

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

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

continued

| Number | F | Fe | Fe ₂ O ₃ | Mn | Mn ₃ O ₄ | MoO ₃ | NiO | S | SO ₃ | SnO ₂ | V ₂ O ₅ | -H ₂ 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 6206 * | . | . | 0.572 | 0.04 | 0.061 | . | 0.297 | 0.305 | . | 0.047 | . | 1.17 | at 900°C |
| DH 6203 | 0.570 | . | 36.85 | . | 4.97 | . | . | . | 5.29 | . | 0.004 | 0.214 | at 900°C last of stock |

CRM FLUE DUST

informational analysis listed in mass %

30 g units

| Number | Type | Al ₂ O ₃ | CO ₂ | CaO | Fe ₂ O ₃ | K ₂ O | MgO | MnO | Na ₂ O | SO ₃ | SiO ₂ | TiO ₂ |
|------------|--------------|--------------------------------|-----------------|-------|--------------------------------|------------------|------|------|-------------------|-----------------|------------------|------------------|
| 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 listed in mass %

100 g units

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

continued

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

CRM INDOOR DUST

analysis listed in mg/kg

8 g units

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

CRM ROAD DUST

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

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

continued analysis listed in mass %

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

CRM USED AUTOMOBILE EXHAUST CATALYST

mg/kg

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

RM ELECTRODE CARBON

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

ELECTRONIC SCRAP POWDER

analysis listed in mass %

200 g units

Table with 15 columns: Number, Ag, As, Au, Be, Cd, Cr, Cu, Hg, In, Ni, Pb, Pd, Pt, Sn. Row: BAM M505a 0.0633 0.0372 0.00524 0.00068 0.00164 0.980 16.76 (<0.0005) (0.0043) 0.694 1.13 0.00480 0.00057 0.468

FERROBORON

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

Table with 19 columns: # Number, B, Al, C, Cr, Cu, Fe, Mn, Ni, P, S, Si, Sn, Ti, V, W, Zn, Units. Rows include materials like VS F21/2, NCS HC11612, NCS HC25658, DH 1705, NCS HC28632, DH 1704, NCS HC28631, NCS HC93623, ECRM 587-1, IARM FBP-20, NCS HC11613, VS F22/3.

FERROCHROMIUM

= class, where 1 = CRM and 2 = RM

chips as noted

all others: powder

Table with 19 columns: # Number, Cr, Al, C, Co, Cu, Fe, Mn, N, Ni, P, S, Si, Ti, V, Units. Rows include materials like IRSID 509-1, VS F11/4, DH 1602, IPT 65, BCS 203/6, SRM 196, IRSID 507-1, DFS 1, DFS 2, VS F47/1, JSS 733-1, NCS HC37618, VS F45, VS F35/2, IARM FCrP-20, BCS 204/6, NCS HC93604, SRM 64c, NCS HC26607b, NCS HC25603b, NCS HC37607, VS F50, DFS 3, NCS HC11606, NCS HC37608, NCS HC37615, NCS HC25636a, NCS HC25644, NCS HC28621, NCS HC25653, NCS HC37609, NCS HC93611, NCS HC28622, NCS HC93605, NCS HC37617, NCS HC11610, NCS HC93609, NCS HC14615a, NCS HC28619, NCS HC14615, NCS HC14614, NCS HC28620, NCS HC14613, BS 130/1, AMIS 0392, BS 130/3, SARM 144, VS F38, VS F12/3, VS F10/2, VS F9/2.

CRM FERRONICKEL

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

FERRONIUBIUM # = class, where 1 = CRM and 2 = RM * notes the total of Nb+Ta

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

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

CRM FERROPHOSPHORUS analysis listed in mass %

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

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

| # | Number | Ti | Al | Sol.Al | C | Co | Cr | Cu | Fe | Mn | P | S | Si | V | Zr |
|---|------------------|-------|-------|--------|-------|--------|---------|---------|--------|-------|---------|---------|----------|---------|-------|
| 2 | DH 2409 | 72.74 | 2.93 | . | . | . | 0.384 | 0.074 | 19.27 | 0.192 | 0.004 | . | 0.180 | 1.167 | 0.383 |
| 1 | VS F30/4 | 70.3 | 3.83 | . | 0.154 | . | 0.154 | 0.065 | 21.51 | 0.189 | 0.0030 | 0.0054 | 0.163 | 2.29 | 0.231 |
| 1 | NCS HC15601 | 70.02 | 0.3 | . | 0.057 | . | 0.039 | 0.037 | 26.57 | 0.106 | 0.0071 | 0.0047 | 1.47 | 0.011 | . |
| 1 | ECRM 589-2 | 68.94 | 3.172 | . | 0.179 | 0.0149 | (1.060) | 0.0697 | (22.0) | 0.247 | . | 0.0101 | (0.3516) | (1.336) | 0.260 |
| 1 | NCS HC19604 | 43.81 | 10.64 | . | 0.041 | . | . | . | . | 1.59 | 0.051 | 0.011 | 3.46 | 0.158 | . |
| 1 | NCS HC19605 | 38.81 | 8.61 | . | 0.032 | . | 0.025 | . | 0.81 | 0.032 | 0.009 | 0.009 | 4.20 | 0.303 | . |
| 1 | ECRM 584-1 | 37.17 | 7.19 | (6.0) | 0.044 | . | . | . | 1.13 | 0.032 | 0.030 | 0.030 | 1.80 | . | . |
| 1 | NCS HC93608 | 32.22 | 3.00 | . | 0.095 | . | . | 0.281 | . | 0.255 | 0.014 | 0.015 | 0.30 | . | . |
| 1 | VS F43 | 31.9 | 11.11 | . | 0.098 | . | 0.354 | 0.336 | . | 1.22 | 0.038 | 0.0058 | 2.50 | 0.152 | 0.059 |
| 1 | NCS HC26613 | 30.24 | 8.13 | . | 0.019 | . | . | (0.005) | . | 1.11 | 0.020 | 0.012 | 1.84 | 0.19 | . |
| 1 | NCS HC18604 | 27.93 | 5.38 | . | 0.065 | . | . | 0.117 | . | 2.67 | 0.043 | 0.013 | 4.68 | . | . |
| 1 | NCS HC28638 | 27.34 | 7.82 | . | 0.033 | . | 0.055 | . | 0.362 | 0.015 | 0.0048 | 0.0048 | 4.51 | 0.15 | . |
| 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 | . | . |
| 1 | BS FeTi-1 | 20.0 | 12.5 | . | 0.57 | (0.03) | 0.33 | 0.60 | . | 7.7 | (0.05) | (0.009) | 2.8 | 0.69 | 3.7 |
| 1 | BS FeTi-2 | 19.6 | 12.6 | . | 0.455 | 0.037 | 0.30 | 0.43 | . | 7.9 | (0.05) | (0.01) | 3.2 | 0.76 | 3.8 |

| Number | B | Ca | Mg | Mo | N | Nb | Ni | Pb | Sn | W | Zn | Units |
|------------------|------|----------|----------|--------|--------|--------|-------|----------|-------|------|----------|-------|
| DH 2409 | . | . | 0.070 | 0.814 | . | 0.072 | 0.047 | . | 0.246 | . | . | 50 g |
| VS F30/4 | . | . | . | 0.60 | 0.38 | . | 0.053 | . | 0.077 | . | . | 100 g |
| NCS HC15601 | . | . | . | 0.028 | . | . | 0.29 | . | . | . | . | 50 g |
| ECRM 589-2 | . | (0.0404) | (0.1010) | 0.549 | . | . | 0.191 | (0.0061) | 0.166 | . | (0.0113) | 100 g |
| NCS HC19604 | . | . | . | . | . | . | . | . | 0.056 | . | . | 100 g |
| NCS HC19605 | . | . | . | . | . | . | . | . | 0.061 | . | . | 100 g |
| ECRM 584-1 | . | . | . | . | . | . | . | . | . | . | . | 100 g |
| NCS HC93608 | . | . | . | . | . | . | . | . | . | . | . | 50 g |
| VS F43 | . | . | . | 0.0036 | 0.085 | . | . | . | 0.013 | . | 0.032 | 100 g |
| NCS HC26613 | . | . | . | . | . | . | . | . | . | . | . | 50 g |
| NCS HC18604 | . | . | . | . | . | . | . | . | . | . | . | 50 g |
| NCS HC28638 | . | . | . | . | . | . | . | . | . | . | . | 50 g |
| VS F42 | . | . | . | 0.106 | . | . | . | . | . | 0.33 | 0.129 | 100 g |
| IRSID 510-1 | . | . | . | . | . | . | . | . | . | . | . | 100 g |
| NM 341 | . | . | . | . | . | . | . | . | . | . | . | 100 g |
| BS FeTi-1 | 0.60 | 1.14 | (0.4) | 0.058 | 0.144 | (0.05) | 0.17 | . | 0.11 | . | (0.03) | 100g |
| BS FeTi-2 | 1.10 | 0.98 | (0.4) | 0.15 | (0.15) | 0.036 | 0.156 | . | 0.160 | . | (0.03) | 100g |

17025, 17034

17025, 17034

FERROSILICON

= Class, where 1 = CRM and 2 = RM

Table with 13 columns: #, Number, Si, Fe, Al, C, Ca, Cr, Cu, Mn, Ni, P, S, Ti. It lists various ferrosilicon grades and their chemical compositions.

Table with 15 columns: #, Number, As, B, Ba, Co, Mg, Mo, N, O, Sn, Sr, V, Zn, Zr, Units. It lists the same ferrosilicon grades and provides additional trace element analysis and unit weights.

CRM WELDING FLUX

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

CRM GLASS

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

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

GLASS

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

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

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

CRM GLASS DISC

analysis listed in mg/kg except % for mass %

38 mm Ø x 4 mm

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

CRM GLASS DISC

analysis listed in mass %

analysis listed in mg/kg

~40 mm Ø x ~3 mm

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

CRM TRACE ELEMENTS IN GLASS

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

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

CRM FLOAT GLASS FOR DETERMINATION OF ABRADABILITY INDEX

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

CRM HEXAVALENT CHROMIUM IN GLASS

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

CRM IRON IN FLAT SODA LIME GLASS

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

CRM MULTI-ELEMENT GLASS DISCS

listed in mg/kg each unit contains uncertified 72% SiO₂, 12% CaO, 14% Na₂O, and 2% Al₂O₃ each sample is 4 wafers ~13 mm Ø

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

| 3 mm | 1 mm | Mn | Nd | Ni | Pb | Rb | Sb | Sc | Sm | Sr | Th | Ti | Tl | U | Yb | Zn |
|---------|--------------------|--------|------|--------|-------|---------|---------|---------|-------|-------|--------|-------|----------|----------|---------|----------|
| SRM 610 | SRM 611 | 485 | . | 458.7 | 426 | 425.7 | . | . | . | 515.5 | 457.2 | (437) | (61.8) | 461.5 | . | (433) |
| SRM 612 | SRM 613 | (39.6) | (36) | 38.8 | 38.57 | 31.4 | . | 0.037 | 0.058 | (39) | 78.4 | 37.79 | (50.1) | (15.7) | 37.38 | (42) |
| SRM 614 | SRM 615 | . | . | (0.95) | 2.32 | 0.855 | (1.06) | (0.59) | . | 45.8 | 0.748 | (3.1) | (0.269) | 0.823 | SRM 615 | SOLD OUT |
| SRM 616 | SRM 617 | . | . | . | 1.85 | (0.100) | (0.078) | (0.026) | . | 41.72 | 0.0252 | (2.5) | (0.0082) | (0.0721) | . | . |

CRM URANIUM IN GLASS

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

| Number | U |
|-----------|------|
| IRMM 540R | 15.0 |

CRM GLASS SAND

T = Total

SRM 89: 45 g

other SRM: 75 g

all others: 100 g units

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

* SRM 89 also contains As₂O₃: 0.04, As₂O₅: 0.36, Cl: 0.051

RM GRAVEL

typical analysis listed in mass %

100 g units

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

HARDGROVE GRINDABILITY INDEX

| Class | Set Number | HGI | HGI | HGI | HGI | Units |
|-------|-----------------|---------------|---------------|---------------|---------------|----------------------|
| CRM | NCS AG82001J-4J | sample 1: 41 | sample 2: 53 | sample 3: 86 | sample 4: 106 | 250 g of each sample |
| RM | ACIRS H9 | sample A : 30 | sample B : 45 | sample C : 62 | sample D : 87 | 1 kg of each sample |
| RM | COCO HGI SET | sample 29: 37 | sample 35: 53 | sample 25: 62 | sample 41: 91 | 1 kg of each sample |

RM HARDGROVE GRINDABILITY INDEX

individually available in 1 kg units

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

CRM HARDNESS TEST BLOCKS

for NCS items, please indicate desired hardness when ordering

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

| Number | Scale | Available Range | Units (mm) |
|--------------------|-----------------------------------|--------------------|-----------------------------|
| NCS HBW | Brinell Hardness W | (8-650) | 100 x 80 x 16 |
| NCS HL | Leeb Hardness | (200-900) | 90 Ø x 55 |
| NCS HLG | Leeb Type G Hardness | (300-750) | 120 Ø x 70 |
| NCS HRN | Rockwell Hardness A | (20-86) | 60 x 40 x 10 |
| NCS HRB | Rockwell Hardness B | (20-100) | 60 x 40 x 10 |
| BS TRM-3 | Rockwell Hardness B | 86.3 | 300 x 300 x ~2 |
| NCS HRC | Rockwell Hardness C | (20-70) | 60 x 40 x 10 |
| NCS HR15N | Rockwell Superficial Hardness 15N | (70-94) | 60 x 40 x 10 |
| NCS HR30N | Rockwell Superficial Hardness 30N | (42-86) | 60 x 40 x 10 |
| NCS HR45N | Rockwell Superficial Hardness 45N | (20-77) | 60 x 40 x 10 |
| BS TRM-4 | Rockwell Superficial Hardness 15T | 71.9 | 300 x 300 x ~2 17025 |
| 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 ₂ O ₃ | CO ₂ | CaO | Fe ₂ O ₃ | K ₂ O | MgO | MnO | Na ₂ O | P ₂ O ₅ | SO ₃ | SiO ₂ | TiO ₂ |
|------------|--------------------------------|-----------------|---------|--------------------------------|------------------|--------|--------|-------------------|-------------------------------|-----------------|------------------|------------------|
| BL 12-1-12 | (11.92) | (11.05) | (13.68) | (4.44) | (3.23) | (3.41) | (0.46) | (2.56) | (1.77) | (2.22) | (41.78) | (1.14) |

CRM IMPACT

approximate analysis

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

CRM LAYER THICKNESS

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

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

CRM NANOSCALE LAYER THICKNESS

last of stock

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

CRM LEAD PAINT FILMS

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

last of stock

~7cm wide and ~10 cm long

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

RM ELECTROLYTIC MANGANESE

typical analysis

50 g units

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

CRM MANGANESE METAL POWDER

analysis listed in mass %

50 g units

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

MELTING POINT

Class Number Form Melting point °C

| | | | |
|-----|-------------------------|--------------------|-----------------------|
| RM | 501-951-1002 | 6 inch nickel wire | 1455 |
| CRM | 502-496-1029 | 6 inch gold wire | 1062 17034 |

CRM NIOBIUM CARBIDE

analysis listed in mass % 60 g units

| Number | C | Cfree | H | N | O | S |
|----------|-------|--------|----------|----------|-------|----------|
| BAM S013 | 10.66 | (0.10) | (0.0076) | (0.0031) | 0.307 | (0.0017) |

CRM OXIDE

analysis listed in mg/kg except % which is mass % 100 g units

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

continued

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

continued

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

CRM IRON OXIDE

analysis listed in mass %

75 g units

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

CRM IRON OXIDE

analysis listed in mass %

analysis listed in mg/kg

100 g units

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

CRM NICKEL OXIDE

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

25 g units

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

continued informational analysis in mg/kg

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

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

CRM SILICON OXIDE

analysis listed in mass % except

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

CRM TITANIUM DIBORIDE

analysis listed in mass %

powder 50 g

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

CRM VANADIUM PENTOXIDE

analysis listed in mass %

NCS: 25-50 g units

SARM, VS: 100 g units

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

CRM PAPER

AVAILABLE IN SET/20 ONLY

includes software for data processing

5 pages per sample, 8.5 x 11" each

last of stock

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

CRM PARTICLE SIZE and MASS VOLUME in ALUMINA

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

CRM PARTICLE SIZE

| Number | Average Diameter, μm | Uncertainty, μm | Material | Units |
|----------|---------------------------------|----------------------------|---------------------|-------|
| SRM 1691 | 0.269 | ± 0.007 | Polystyrene Spheres | 5 mL |

CRM PARTICLE SIZE

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

CRM PARTICLE SIZE

| Number | Percentage of Particles Under 20 Microns | Standard Deviation | Uncertainty @ 95% CL | Units |
|-----------|--|--------------------|----------------------|-------|
| ASCRM 026 | 1.0 | ± 0.1 | ± 0.2 | 210 g |

CRM PARTICLE DENSITY, SURFACE AREA, AND SIZE DISTRIBUTION

| Number | Particle Density Pycnometer Method | Blaine Area With EN 196-6 | Particle Size by Laser Diffraction ISO 13320-1 | Air Jet Sieving Alpine Test NF X11-640 | Units |
|---------|---------------------------------------|------------------------------|---|---|---------------|
| TL 1BGa | 3.11 g/cm ³ | 3396 cm ³ /g | 11.4% @ 2.0 μm - 99.9% @ 160 μm | 71.4% @ 31.5 μm - 100% @ 160 μm | 20 x 5 g last |

RM PLASTER analysis listed in mass % 100 g units

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

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

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

CRM POROUS MATERIAL

| Number | Description | Units | Specific Pore Volume | Median Pore Diameter | Density |
|-----------|-----------------|-----------------------|------------------------|----------------------|----------------------------|
| BAM P 128 | Alumina Ceramic | 6 Cylinders 7 g total | 220 mm ³ /g | 27.6 μm | (3.6405) g/cm ³ |

CRM POROUS MATERIALS and SURFACE AREA

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

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

RoHS/WEEE SAMPLES

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

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

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

CRM CHROME-MAGNESIA REFRACTORY SET

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

CRM FIRECLAY REFRACTORY SET

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

CRM FIRECLAY REFRACTORY SET

| Number | SOLD IN SET/15 ONLY | | | | | | | | | | 20 g units | | | |
|----------|---------------------|--------------------------------|------|--------------------------------|--------------------------------|------------------|------|------|-------------------|-------------------------------|------------------|------------------|--------|--|
| | SiO ₂ | Al ₂ O ₃ | CaO | Cr ₂ O ₃ | Fe ₂ O ₃ | K ₂ O | MgO | MnO | Na ₂ O | P ₂ O ₅ | TiO ₂ | ZrO ₂ | 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 ₂ O ₃ | CaO | Fe ₂ O ₃ | SiO ₂ | B ₂ O ₃ | Cr ₂ O ₃ | K ₂ O | MnO | Na ₂ O | P ₂ O ₅ | TiO ₂ | | | | | |
| JRRM 410 | 99.08 | 0.05 | 0.59 | 0.05 | 0.18 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.04 | 0.00 | | | | | |
| JRRM 409 | 98.03 | 0.20 | 0.74 | 0.49 | 0.53 | 0.03 | 0.01 | 0.00 | 0.01 | 0.00 | 0.02 | 0.00 | | | | | |
| JRRM 408 | 96.19 | 2.55 | 0.67 | 0.13 | 0.46 | 0.09 | 0.00 | 0.00 | 0.01 | 0.00 | 0.01 | 0.00 | | | | | |
| JRRM 407 | 94.55 | 0.10 | 0.67 | 2.14 | 2.43 | 0.02 | 0.08 | 0.00 | 0.01 | 0.00 | 0.04 | 0.00 | | | | | |
| JRRM 405 | 91.95 | 1.37 | 1.69 | 1.34 | 3.47 | 0.01 | 0.01 | 0.01 | 0.07 | 0.00 | 0.12 | 0.05 | | | | | |
| JRRM 406 | 91.85 | 1.13 | 4.80 | 0.87 | 1.19 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.04 | 0.00 | | | | | |
| JRRM 404 | 88.02 | 6.01 | 1.78 | 2.90 | 1.22 | 0.01 | 0.00 | 0.00 | 0.03 | 0.00 | 0.05 | 0.00 | | | | | |
| JRRM 403 | 85.48 | 4.06 | 0.61 | 1.55 | 8.14 | 0.03 | 0.01 | 0.00 | 0.01 | 0.00 | 0.04 | 0.00 | | | | | |
| JRRM 402 | 83.77 | 1.99 | 3.57 | 5.05 | 5.46 | 0.12 | 0.00 | 0.00 | 0.01 | 0.01 | 0.07 | 0.02 | | | | | |
| JRRM 401 | 81.24 | 8.10 | 0.20 | 3.89 | 6.42 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.03 | 0.01 | | | | | |

CRM SILICA REFRACTORY SETS

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

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

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

CRM ZIRCON-ZIRCONIA REFRACTORY SET

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

RM RICE STRAW ASH - THERMOSTIL typical analysis 100 g units

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

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

| CRM | ZIRCON SAND | | | | | | |
|-----------|-------------------------------------|--------------------------------|--------------------------------|------------------|------------------|------|-------|
| Number | ZrO ₂ + HfO ₂ | Al ₂ O ₃ | Fe ₂ O ₃ | SiO ₂ | TiO ₂ | 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 ₂ O ₃ | CaO | Fe ₂ O ₃ | K ₂ O | MgO | Na ₂ O | SiO ₂ | TiO ₂ | LOI | | | | |
| JCRM R405 | 1.07 | 0.029 | 0.053 | 0.71 | 0.023 | 0.060 | 97.78 | 0.022 | 0.13 | | | | |
| JCRM R406 | 1.31 | 0.016 | 0.102 | 0.13 | 0.005 | 0.030 | 96.71 | 0.564 | 0.97 | | | | |
| JCRM R404 | 0.0011 | 0.00002 | 0.00006 | 0.00004 | <0.00001 | 0.0001 | >99.99 | 0.0006 | 0.00 | | | | |

SILICA BRICK

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

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

SILICEOUS MATERIAL

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

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

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

CRM SYNTHETIC SILICATE WITH TRACE ELEMENTS

Material base: SiO₂ 72%, Al₂O₃ 15%, Fe₂O₃ 4%, CaMg(CO₃)₂ pure dolomite 4%, Na₂SO₄ 2.5%, K₂SO₄ 2.5% analysis listed in mg/kg 70 g units

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

continued

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

CRM SILICON METAL POWDER

analysis listed in mass %

IPT: 60 g units NCS: 50 g units SRM: 40 g units

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

CRM SILICON CARBIDE

analysis listed in mass %

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

CRM SILICON CARBIDE

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

| Number | C (T) | C (F) | Si (T) | Si (F) | SiO2 (F) | Al | B | Ca | Cr | Cu | Fe | K | Mg |
|------------|--------|---------|--------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| ECRM 781-1 | 48.251 | (37.22) | 35.56 | (4.66) | . | 4.39 (T) | (0.0149) | (0.0433) | (0.0240) | . | (0.8061) | (0.3765) | (0.0421) |
| NMIJ 8002a | 29.93 | . | 68.01 | . | . | 0.0189 | . | . | 0.00619 | 0.0115 | 0.0130 | . | . |
| BAM S008 | 29.9 | 0.045 | . | (<0.03) | (<0.01) | 0.0047 | 0.00030 | 0.00025 | 0.000016 | 0.000010 | 0.00048 | . | 0.000007 |
| BAM S003A | 29.89 | 0.0493 | . | (0.0481) | (0.0600) | 0.0372 | 0.0063 | 0.00294 | 0.00035 | 0.00015 | 0.0149 | . | 0.00063 |
| NMIJ 8001a | 29.80 | . | 68.31 | . | . | 0.00032 | . | . | . | . | 0.00467 | . | . |
| ECRM 780-1 | 26.381 | . | 63.5 | . | . | 1.86 (T) | . | 0.84 | . | . | 1.30 (T) | (0.0112) | 0.051 |
| BCS 360 | 23.53 | (0.085) | 60.8 | (0.54) | . | 6.52 | . | 0.115 | . | . | (0.19) | . | . |
| BCS 359 | 23.46 | (0.061) | 67.6 | (0.32) | . | 0.118 | . | 0.108 | . | . | 0.175 | . | . |

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

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

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

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

| CRM | | BORON NITRIDE | | | | analysis listed in mass % | | | | | | | | | | T = Total | AO = adherent oxide | | 50 g units | |
|-----------|------|---------------|------|---------|---------|---------------------------|------------|---------|---------|--------|--------|---------|------|--------|---------|-----------|---------------------|--|------------|--|
| Number | B.T | B.AO | N | Al | C | Ca | Co | Cr | Fe | H2O | Mg | Na | O | Si | Ti | | | | | |
| BAM ED103 | 43.5 | 0.070 | 55.6 | 0.00070 | (0.018) | 0.0273 | (<0.00001) | 0.00047 | 0.00150 | (<0.1) | 0.0056 | 0.00123 | 0.68 | 0.0017 | 0.00049 | | | | | |

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

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

SILICOZIRCONIUM

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

CRM BASIC SLAG

analysis listed in mass %

100 g units

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

CRM FERROALLOY SLAG

100 g units

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

IRON MAKING SLAG

= class, where 1 = CRM and 2 = RM

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

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

STEEL MAKING SLAG

= class, where 1 = CRM and 2 = RM

CMSI, GBW, RH: 50 g units

NH: 75 g units

all others: 100 g units

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

* JK S11 lists total Fe as FeO

BLAST FURNACE SLAG

analysis in mass %

JSS: 70g

NCS HC15x, 28x: 80g

all others: 100g

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

Number BaO C tot. CO₂ Cr₂O₃ Sr SrO V₂O₅ Zn Zr ZrO₂ -H₂O 900°C

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

CRM SLAGS WITH EXTENSIVE ANALYSIS

analysis listed in mass %

100 g units

| Number | Al | Al ₂ O ₃ | C | Ca | CaO | CeO ₂ | Cr | Cr ₂ O ₃ | Fe | Fe ₂ O ₃ | HfO ₂ | K | K ₂ O | Mg | MgO |
|-----------|---------|--------------------------------|--------|--------|------|------------------|--------|--------------------------------|--------|--------------------------------|------------------|--------|------------------|---------|-------|
| AMIS 0393 | 16.2021 | 31.09 | . | 6.6463 | 9.65 | . | 8.3191 | 12.188 | 3.8285 | 5.55 | . | 0.1038 | 0.111 | 12.2968 | 20.93 |
| AMIS 0600 | 0.9396 | 1.78 | 0.0922 | . | 0.23 | 0.031 | 0.1697 | 0.25 | 5.98 | 8.55 | 0.007 | . | . | 0.7341 | 1.22 |

| Number | Mn | MnO | Na | Na ₂ O | Nb ₂ O ₅ | S | Si | SiO ₂ | SO ₃ | Ti | TiO ₂ | V ₂ O ₅ | Zr | ZrO ₂ | LOI | Density |
|-----------|--------|-------|--------|-------------------|--------------------------------|-------|---------|------------------|-----------------|--------|------------------|-------------------------------|--------|------------------|------|---------|
| AMIS 0393 | 0.1289 | 0.155 | 0.1504 | 0.192 | . | 0.412 | 10.2425 | 22.64 | . | 0.3813 | 0.657 | . | 0.0095 | . | . | 3.54 |
| AMIS 0600 | 1.29 | 1.66 | . | 0.13 | 0.078 | 1.46 | 3.11 | 0.18 | 50.06 | 83.78 | 0.42 | 0.2245 | 0.30 | -3.28 | 4.03 | |

continued analysis listed in mg/kg

| Number | Ba | Be | Ce | Co | Cs | Cu | Dy | Er | Eu | Gd | Hf | Ho | La | Li | Lu | Nb | Nd | Ni | Pr | Rb | Sb | Sc | Sm | Sn | Sr |
|-----------|-----|----|-----|-----|-----|----|----|----|----|----|----|----|-----|-----|----|-----|-----|----|----|----|----|----|----|-----|----|
| AMIS 0393 | 253 | 2 | 45 | 0.3 | 23 | 3 | 2 | 1 | 3 | 3 | 1 | 21 | 13 | 0.3 | 2 | 16 | 135 | 4 | 4 | 1 | 18 | 3 | . | 171 | |
| AMIS 0600 | 79 | . | 254 | 5 | 0.6 | . | 12 | 7 | 1 | 17 | 62 | 2 | 117 | 235 | 2 | 891 | 117 | . | 31 | 5 | 9 | 95 | 22 | 11 | 54 |

| Number | Ta | Tb | Th | Tm | U | W | Y | Yb |
|-----------|----|----|----|-----|----|----|----|----|
| AMIS 0393 | . | 1 | 6 | 0.3 | . | . | 20 | 2 |
| AMIS 0600 | 56 | 2 | 88 | 1 | 12 | 13 | 64 | 9 |

CONVERTER SLAG

= class, where 1 = CRM and 2 = RM

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

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

CRM ELECTRIC FURNACE SLAG 50 g units

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

CRM FLUORINE SLAG 100 g units

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

MANGANESE SLAG

analysis listed in mass %

DH: RM, 100 g units

VS: CRM, 150 g units

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

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

CRM PHOSPHATE SLAG

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

CRM SLAG

analysis listed in mass %

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

CRM TIN SLAG

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

RM TUNDISH SLAG

typical analysis listed in mass %

100 g units

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

| Number | C Tot | Cr ₂ O ₃ | NiO |
|---------|-------|--------------------------------|-------|
| DH 6604 | 0.471 | 0.255 | 0.165 |
| DH 6606 | . | . | . |
| DH 6605 | . | . | . |

VACUUM SLAG

= class, where 1 = CRM and 2 = RM

100 g units

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

CRM VANADIUM SLAG

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

CRM SLUDGE

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

ERM: 30 g

SRM 2781: 40 g

SRM 2782: 70 g

all others: 40 g units

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

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

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

RM**SODA ASH**

analysis listed in mass % 100 g units

| Number | Na ₂ CO ₃ | NaCl | Fe ₂ O ₃ | Na ₂ SO ₄ |
|---------|---------------------------------|-------|--------------------------------|---------------------------------|
| BCS 526 | 99.74 | 0.126 | 0.0005 | 0.008 |

CRM SURFACE AREA
data listed in m²/g

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

CRM TENSILE CREEP

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

CRM TENSILE STRENGTH and HARDNESS

data shows estimates of (material, measurement) uncertainty

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

CRM TENSILE STRENGTH

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

CRM BORON CARBIDE

analysis listed in mass %

analysis listed in mg/kg

100 g

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

CRM CHROMIUM CARBIDE

analysis listed in mass %

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

CRM SILICON CARBIDE

analysis listed in mass %

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

CRM TUNGSTEN CARBIDE

analysis listed in mass %

100 g units

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

CRM URBAN AEROSOLS analysis listed in mass %

| Number | Al | Ba | Ca | Cl | Cu | Fe | K | Mg | Mn | Na | P | Pb | S | Si | Sr | Ti | Zn |
|---------|------|--------|------|---------|--------|------|------|------|--------|-------|---------|--------|--------|--------|--------|-------|-------|
| NIES 28 | 5.04 | 0.0874 | 6.69 | (0.807) | 0.0104 | 2.92 | 1.37 | 1.40 | 0.0686 | 0.796 | (0.145) | 0.0403 | (3.91) | (14.9) | 0.0469 | 0.292 | 0.114 |

analysis listed in mg/kg

| Number | As | Be | Cd | Co | Cr | La | Mo | Ni | Rb | Sb | Sc | Se | Sn | Th | U | V | Y | Units |
|---------|------|--------|------|--------|--------|--------|--------|------|--------|--------|--------|--------|--------|--------|------|------|--------|-------|
| NIES 28 | 90.2 | (5.09) | 5.60 | (22.0) | (65.6) | (32.7) | (28.4) | 63.8 | (64.1) | (20.1) | (10.7) | (14.4) | (21.5) | (11.1) | 4.33 | 73.2 | (21.9) | 1.5 g |

CRM URBAN PARTICULATE MATTER analysis listed in mass % Org = organic Elem = Elemental powder 2 g

| Number | Al | C | C.Org | C.Elem | Ca | Cl | Cu | Fe | K | Mg | Mn | Na | Pb | S | Si | Ti | Zn |
|-----------|------|--------|--------|--------|------|--------|--------|------|-------|-------|--------|--------|-------|------|------|--------|--------|
| SRM 1648a | 3.43 | (12.7) | (10.5) | (2.3) | 5.84 | 0.4543 | 0.0610 | 3.92 | 1.056 | 0.813 | 0.0790 | 0.4240 | 0.655 | 5.51 | 12.8 | 0.4021 | 0.4800 |

analysis listed in mg/kg

| Number | Ag | As | B | Br | Cd | Ce | Co | Cr | Cs | Hf | La | Ni | Rb | Sb | Sc | Se | Sm | Sr | Th | V | W |
|-----------|-----|-------|-----|-----|------|------|-------|-----|-----|-------|----|------|------|------|---------|------|-----|-----|---------|-----|-----|
| SRM 1648a | 6.0 | 115.5 | 161 | 502 | 73.7 | 54.6 | 17.93 | 402 | 3.4 | (5.2) | 39 | 81.1 | 51.0 | 45.4 | (6-120) | 28.4 | 4.3 | 215 | (7-107) | 127 | 4.6 |

CRM VANADIUM NITROGEN ALLOY analysis listed in mass %

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

CRM ZIRCON CONCENTRATE DSU: 50 g BCS: 100 g

| Number | ZrO ₂ +HfO ₂ | SiO ₂ | Al ₂ O ₃ | CaO | Fe ₂ O ₃ | K ₂ O | MgO | Na ₂ O | P ₂ O ₅ | SnO ₂ | TiO ₂ | LOI |
|----------------|------------------------------------|------------------|--------------------------------|------|--------------------------------|------------------|-------|-------------------|-------------------------------|------------------|------------------|------|
| DSZU 123.47-03 | 66.1 | . | 0.75 | . | 0.074 | . | . | . | 0.099 | . | 0.22 | . |
| BCS 204A | 53.8 | 37.6 | 0.74 | 0.15 | 0.18 | 0.017 | 0.012 | 0.014 | 0.77 | 1.69 | 2.22 | 0.50 |

CRM ZIRCONIA - Yttrium Stabilized Zirconium Oxide

| Number | Al | Ca | Fe | Hf | Mg | P | Si | Th | Ti | U | Y | monoclinic ZrO ₂ | Units |
|-----------|--------|--------|--------|-------|---------|-----------|--------|--------|--------|--------|------|-----------------------------|-------------|
| ERM-ED105 | 0.0660 | 0.0242 | 0.0095 | 1.535 | 0.00129 | (<0.0075) | 0.0195 | 0.0112 | 0.0497 | 0.0292 | 6.11 | (1.94) | powder 47 g |

CRM ZIRCONIA SET available in SET/4 only 50 g units

| Number | Al ₂ O ₃ | CaO | Fe ₂ O ₃ | HfO ₂ | K ₂ O | MgO | Na ₂ O | Nb ₂ O ₅ | SiO ₂ | TiO ₂ | LOI |
|-----------|--------------------------------|--------|--------------------------------|------------------|------------------|--------|-------------------|--------------------------------|------------------|------------------|------|
| JCRM R051 | . | 0.0017 | 0.0017 | 1.96 | . | 0.0004 | 0.015 | . | (0.005) | (0.0005) | 0.71 |
| JCRM R052 | . | 0.019 | (0.0004) | 1.81 | 0.0013 | 0.0042 | 0.0021 | . | 0.019 | 0.0012 | 0.25 |
| JCRM R053 | . | 0.021 | 0.030 | 1.67 | (0.0007) | 0.0020 | 0.028 | 0.054 | 0.036 | 0.127 | 0.65 |
| JCRM R054 | 0.136 | 0.535 | 0.132 | 1.60 | (0.0003) | 0.208 | 0.0027 | 0.427 | 0.300 | 0.138 | 0.15 |