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## CRM ALUMINUM BASE CHIPS

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

| Number         | Si      | Cr       | Cu       | Fe      | Mg       | Mn       | Ni      | Pb      | Sn       | Sr       | Ti       | V        | Zn       | Zr       | Al        | B*              | Be       | Cd      | Ga    | Units |
|----------------|---------|----------|----------|---------|----------|----------|---------|---------|----------|----------|----------|----------|----------|----------|-----------|-----------------|----------|---------|-------|-------|
| BAM 201        | 13.20   | .        | 0.009    | 0.18    | 0.0024   | 0.38     | 0.20    | 0.09    | 0.17     | .        | 0.011    | .        | 0.038    | .        | .         | .               | .        | .       | .     | 100 g |
| BCS 505        | 12.8    | .        | 0.05     | 0.30    | 0.05     | 0.52     | 0.046   | 0.056   | 0.027    | .        | 0.03     | .        | 0.24     | .        | .         | .               | .        | .       | .     | 100 g |
| BCS 182/3      | 11.03   | .        | 0.037    | 0.51    | 0.067    | 0.26     | 0.37    | 0.11    | 0.10     | 0.018    | 0.065    | (0.014)  | 0.128    | (0.003)  | .         | Ca: (0.002)     | .        | .       | 100 g |       |
| SRM 856a       | 9.21    | 0.060    | 3.50     | 0.85    | 0.063    | 0.35     | 0.016   | 0.019   | 0.010    | 0.018    | 0.065    | (0.012)  | 0.385    | (0.003)  | .         | Ca: (0.001)     | .        | .       | 30 g  |       |
| SRM 855a       | 7.07    | 0.013    | 0.13     | 0.14    | 0.37     | 0.060    | 0.048   | 0.093   | 0.057    | .        | 0.005    | <0.01    | 0.16     | .        | .         | .               | .        | 0.020   | 100 g |       |
| NCS HC28974-AL | 7.03    | 3.73     | 0.51     | 0.51    | 0.071    | 0.062    | 0.57    | 0.093   | 0.057    | .        | 0.18     | .        | 0.299    | .        | .         | .               | .        | 0.020   | 50 g  |       |
| SRM 87a        | 6.24    | 0.11     | 0.30     | 0.61    | 0.37     | 0.26     | 0.16    | 0.028   | 0.031    | .        | 0.008    | .        | 0.028    | .        | .         | .               | .        | 0.020   | 75 g  |       |
| NM 511         | 6.150   | .        | 0.295    | 0.790   | .        | 0.195    | .       | .       | .        | .        | .        | .        | 0.025    | .        | .         | .               | .        | last    | 100 g |       |
| NM 251.1       | 6.1     | .        | 0.28     | 0.75    | 0.63     | 0.22     | 0.017   | 0.055   | 0.016    | .        | (0.008)  | .        | 0.079    | .        | .         | .               | .        | .       | 100 g |       |
| BCS 268/1      | 5.49    | .        | 1.35     | 0.47    | 0.49     | 0.24     | 0.16    | 0.028   | 0.031    | .        | 0.024    | .        | 0.028    | .        | .         | .               | .        | .       | 100 g |       |
| BCS 380/1      | 1.93    | .        | 0.91     | 1.24    | 0.24     | 0.094    | 0.94    | .       | .        | .        | .        | .        | 38.92    | .        | 58.18     | .               | .        | .       | 100 g |       |
| SRM 2426       | 1.925   | .        | .        | 0.454   | .        | .        | .       | .       | .        | .        | .        | .        | 0.028    | .        | .         | .               | .        | .       | 40 g  |       |
| BCS 349        | 1.19    | <0.001   | 3.40     | 0.154   | 0.024    | 0.111    | 0.0006  | 0.077   | 0.074    | .        | 0.034    | 0.0030   | 0.299    | .        | .         | <0.0001         | .        | .       | 100 g |       |
| SRM 858        | 0.79    | 0.0011   | 0.84     | 0.078   | 1.01     | 0.48     | 0.24    | 0.052   | 0.052    | .        | 0.042    | 0.0030   | 1.04     | .        | .         | .               | .        | .       | 35 g  |       |
| BCS 216/3      | 0.74    | 0.110    | 5.45     | 0.77    | 0.76     | 0.76     | 0.24    | 0.052   | 0.052    | .        | 0.20     | 0.086    | 0.214    | 0.086    | .         | .               | .        | .       | 100 g |       |
| BCS 343        | 0.52    | 0.14     | 0.28     | 0.39    | 0.70     | 0.69     | .       | .       | .        | .        | 0.024    | .        | 0.028    | .        | .         | .               | .        | .       | 100 g |       |
| BCS 181/3      | 0.30    | 0.04     | 2.48     | 0.72    | 1.57     | 1.10     | 2.00    | 0.101   | 0.074    | .        | 0.058    | 0.0035   | 2.52     | 0.0132   | .         | 0.00087(0.0003) | 0.008    | .       | 100 g |       |
| FARM 111B      | 0.192   | 0.205    | 1.38     | 0.225   | 2.20     | 0.093    | 0.0098  | 0.0063  | (0.002)  | (0.0004) | 0.0427   | 0.01842  | 5.70     | (0.0023) | (0.8)     | .               | 0.0176   | .       | 40 g  |       |
| SRM 853a       | 0.1810  | <0.0005  | 0.1504   | 0.504   | 1.092    | 1.251    | 0.00429 | <0.0003 | (0.0003) | <0.0001  | 0.0205   | .        | 0.0514   | .        | .         | .               | .        | .       | 40 g  |       |
| GW 02202       | 0.18    | .        | 0.095    | 0.38    | 0.021    | 1.38     | 0.013   | 0.032   | .        | .        | 0.036    | .        | 0.10     | .        | .         | .               | .        | .       | .     | 100 g |
| BCS 262/1      | 0.16    | (0.002)  | 0.039    | 0.20    | 10.75    | 0.084    | 0.071   | (0.05)  | (0.04)   | .        | 0.005    | 0.0174   | 0.085    | .        | .         | <0.01           | (0.0006) | 0.0185  | 100 g |       |
| SRM 854a       | 0.1553  | 0.0340   | 0.0494   | 0.1990  | 4.474    | 0.3753   | 0.0195  | .       | .        | (0.0002) | 0.0335   | 0.0018   | 0.0505   | 0.18     | .         | .               | .        | .       | 40 g  |       |
| BCS 300/1      | 0.14    | 0.13     | 1.27     | 0.24    | 2.74     | 0.33     | 0.24    | .       | .        | .        | 0.09     | .        | 5.87     | .        | .         | .               | .        | .       | 100 g |       |
| BAM 300        | 0.14    | 0.216    | 0.040    | 0.198   | 2.68     | 0.018    | .       | 0.014   | .        | .        | 0.012    | .        | 0.128    | .        | .         | .               | .        | .       | 100 g |       |
| BCS 263/2      | 0.14    | 0.074    | 0.019    | 0.26    | 4.67     | 0.36     | .       | .       | .        | .        | 0.022    | 0.0018   | 0.056    | .        | .         | <0.01           | .        | .       | 100 g |       |
| BAM 301        | 0.062   | .        | 0.0018   | 0.054   | 0.0008   | (0.001)  | .       | .       | .        | .        | 0.046    | 0.009    | 0.036    | .        | .         | .               | .        | .       | 100 g |       |
| FARM 109C      | 0.616   | 0.102    | 0.302    | 0.529   | 0.83     | 0.108    | 0.0123  | 0.0072  | (0.004)  | .        | 0.0176   | 0.009    | 0.121    | 0.0018   | last      | (0.001)         | (0.0003) | 0.013   | 100 g |       |
| BCS 195G       | 0.035   | .        | 0.001    | 0.080   | .        | 0.001    | .       | .       | .        | .        | .        | 0.004    | 0.015    | .        | 99.85     | .               | .        | 0.009   | 100 g |       |
| FARM 104B      | 0.150   | 0.0088   | 4.63     | 0.262   | 1.56     | 0.645    | 0.0053  | 0.014   | (0.003)  | (0.0003) | 0.056    | 0.006    | 0.065    | (0.0010) | .         | 0.00021         | .        | 0.011   | 100 g |       |
| BAM M319       | 0.104   | (0.060)  | 0.0015   | 0.29    | 4.96     | 0.371    | (0.037) | <0.001  | <0.001   | .        | 0.030    | (0.0093) | 0.0073   | 0.32     | Sc: 0.84% | .               | (0.0002) | (0.015) | 100 g |       |
| FARM 343A      | 0.050   | 0.0009   | 2.29     | 0.084   | 2.04     | (0.002)  | (0.005) | 0.0012  | .        | (0.0003) | 0.0175   | 0.0058   | 8.15     | 0.152    | .         | .               | (0.0002) | 0.012   | 100 g |       |
| JSAC 0121-C    | 0.00110 | 0.000113 | 0.000348 | 0.00094 | 0.000282 | 0.000173 | .       | .       | .        | .        | 0.000196 | .        | 0.000203 | 0.000203 | .         | 1.98            | .        | .       | 50 g  |       |

| Number         | Si      | Cr       | Cu       | Fe      | Mg       | Mn       | Ni      | Pb      | Sn       | Sr       | Ti       | V        | Zn       | Zr       | Al        | B*              | Be       | Cd      | Ga    | Units |
|----------------|---------|----------|----------|---------|----------|----------|---------|---------|----------|----------|----------|----------|----------|----------|-----------|-----------------|----------|---------|-------|-------|
| BAM 201        | 13.20   | .        | 0.009    | 0.18    | 0.0024   | 0.38     | 0.20    | 0.09    | 0.17     | .        | 0.011    | .        | 0.038    | .        | .         | .               | .        | .       | .     | 100 g |
| BCS 505        | 12.8    | .        | 0.05     | 0.30    | 0.05     | 0.52     | 0.046   | 0.056   | 0.027    | .        | 0.03     | .        | 0.24     | .        | .         | .               | .        | .       | .     | 100 g |
| BCS 182/3      | 11.03   | .        | 0.037    | 0.51    | 0.067    | 0.26     | 0.37    | 0.11    | 0.10     | 0.018    | 0.065    | (0.014)  | 0.128    | (0.003)  | .         | Ca: (0.002)     | .        | .       | 100 g |       |
| SRM 856a       | 9.21    | 0.060    | 3.50     | 0.85    | 0.063    | 0.35     | 0.016   | 0.019   | 0.010    | 0.018    | 0.065    | (0.012)  | 0.385    | (0.003)  | .         | Ca: (0.001)     | .        | .       | 30 g  |       |
| SRM 855a       | 7.07    | 0.013    | 0.13     | 0.14    | 0.37     | 0.060    | 0.048   | 0.093   | 0.057    | .        | 0.005    | <0.01    | 0.16     | .        | .         | .               | .        | 0.020   | 100 g |       |
| NCS HC28974-AL | 7.03    | 3.73     | 0.51     | 0.51    | 0.071    | 0.062    | 0.57    | 0.093   | 0.057    | .        | 0.18     | .        | 0.299    | .        | .         | .               | .        | 0.020   | 50 g  |       |
| SRM 87a        | 6.24    | 0.11     | 0.30     | 0.61    | 0.37     | 0.26     | 0.16    | 0.028   | 0.031    | .        | 0.008    | .        | 0.028    | .        | .         | .               | .        | 0.020   | 75 g  |       |
| NM 511         | 6.150   | .        | 0.295    | 0.790   | .        | 0.195    | .       | .       | .        | .        | .        | .        | 0.025    | .        | .         | .               | .        | last    | 100 g |       |
| NM 251.1       | 6.1     | .        | 0.28     | 0.75    | 0.63     | 0.22     | 0.017   | 0.055   | 0.016    | .        | (0.008)  | .        | 0.079    | .        | .         | .               | .        | .       | 100 g |       |
| BCS 268/1      | 5.49    | .        | 1.35     | 0.47    | 0.49     | 0.24     | 0.16    | 0.028   | 0.031    | .        | 0.024    | .        | 0.028    | .        | .         | .               | .        | .       | 100 g |       |
| BCS 380/1      | 1.93    | .        | 0.91     | 1.24    | 0.24     | 0.094    | 0.94    | .       | .        | .        | .        | .        | 38.92    | .        | 58.18     | .               | .        | .       | 100 g |       |
| SRM 2426       | 1.925   | .        | .        | 0.454   | .        | .        | .       | .       | .        | .        | .        | .        | 0.028    | .        | .         | .               | .        | .       | 40 g  |       |
| BCS 349        | 1.19    | <0.001   | 3.40     | 0.154   | 0.024    | 0.111    | 0.0006  | 0.077   | 0.074    | .        | 0.034    | 0.0030   | 0.299    | .        | .         | <0.0001         | .        | .       | 100 g |       |
| SRM 858        | 0.79    | 0.0011   | 0.84     | 0.078   | 1.01     | 0.48     | 0.24    | 0.052   | 0.052    | .        | 0.042    | 0.0030   | 1.04     | .        | .         | .               | .        | .       | 35 g  |       |
| BCS 216/3      | 0.74    | 0.110    | 5.45     | 0.77    | 0.76     | 0.76     | 0.24    | 0.052   | 0.052    | .        | 0.20     | 0.086    | 0.214    | 0.086    | .         | .               | .        | .       | 100 g |       |
| BCS 343        | 0.52    | 0.14     | 0.28     | 0.39    | 0.70     | 0.69     | .       | .       | .        | .        | 0.024    | .        | 0.028    | .        | .         | .               | .        | .       | 100 g |       |
| BCS 181/3      | 0.30    | 0.04     | 2.48     | 0.72    | 1.57     | 1.10     | 2.00    | 0.101   | 0.074    | .        | 0.058    | 0.0035   | 2.52     | 0.0132   | .         | 0.00087(0.0003) | 0.008    | .       | 100 g |       |
| FARM 111B      | 0.192   | 0.205    | 1.38     | 0.225   | 2.20     | 0.093    | 0.0098  | 0.0063  | (0.002)  | (0.0004) | 0.0427   | 0.01842  | 5.70     | (0.0023) | (0.8)     | .               | 0.0176   | .       | 40 g  |       |
| SRM 853a       | 0.1810  | <0.0005  | 0.1504   | 0.504   | 1.092    | 1.251    | 0.00429 | <0.0003 | (0.0003) | <0.0001  | 0.0205   | .        | 0.0514   | .        | .         | .               | .        | .       | 40 g  |       |
| GW 02202       | 0.18    | .        | 0.095    | 0.38    | 0.021    | 1.38     | 0.013   | 0.032   | .        | .        | 0.036    | .        | 0.10     | .        | .         | .               | .        | .       | .     | 100 g |
| BCS 262/1      | 0.16    | (0.002)  | 0.039    | 0.20    | 10.75    | 0.084    | 0.071   | (0.05)  | (0.04)   | .        | 0.005    | 0.0174   | 0.085    | .        | .         | <0.01           | (0.0006) | 0.0185  | 100 g |       |
| SRM 854a       | 0.1553  | 0.0340   | 0.0494   | 0.1990  | 4.474    | 0.3753   | 0.0195  | .       | .        | (0.0002) | 0.0335   | 0.0018   | 0.0505   | 0.18     | .         | .               | .        | .       | 40 g  |       |
| BCS 300/1      | 0.14    | 0.13     | 1.27     | 0.24    | 2.74     | 0.33     | 0.24    | .       | .        | .        | 0.09     | .        | 5.87     | .        | .         | .               | .        | .       | 100 g |       |
| BAM 300        | 0.14    | 0.216    | 0.040    | 0.198   | 2.68     | 0.018    | .       | 0.014   | .        | .        | 0.012    | .        | 0.128    | .        | .         | .               | .        | .       | 100 g |       |
| BCS 263/2      | 0.14    | 0.074    | 0.019    | 0.26    | 4.67     | 0.36     | .       | .       | .        | .        | 0.022    | 0.0018   | 0.056    | .        | .         | <0.01           | .        | .       | 100 g |       |
| BAM 301        | 0.062   | .        | 0.0018   | 0.054   | 0.0008   | (0.001)  | .       | .       | .        | .        | 0.046    | 0.009    | 0.036    | .        | .         | .               | .        | .       | 100 g |       |
| FARM 109C      | 0.616   | 0.102    | 0.302    | 0.529   | 0.83     | 0.108    | 0.0123  | 0.0072  | (0.004)  | .        | 0.0176   | 0.009    | 0.121    | 0.0018   | last      | (0.001)         | (0.0003) | 0.013   | 100 g |       |
| BCS 195G       | 0.035   | .        | 0.001    | 0.080   | .        | 0.001    | .       | .       | .        | .        | .        | 0.004    | 0.015    | .        | 99.85     | .               | .        | 0.009   | 100 g |       |
| FARM 104B      | 0.150   | 0.0088   | 4.63     | 0.262   | 1.56     | 0.645    | 0.0053  | 0.014   | (0.003)  | (0.0003) | 0.056    | 0.006    | 0.065    | (0.0010) | .         | 0.00021         | .        | 0.011   | 100 g |       |
| BAM M319       | 0.104   | (0.060)  | 0.0015   | 0.29    | 4.96     | 0.371    | (0.037) | <0.001  | <0.001   | .        | 0.030    | (0.0093) | 0.0073   | 0.32     | Sc: 0.84% | .               | (0.0002) | (0.015) | 100 g |       |
| FARM 343A      | 0.050   | 0.0009   | 2.29     | 0.084   | 2.04     | (0.002)  | (0.005) | 0.0012  | .        | (0.0003) | 0.0175   | 0.0058   | 8.15     | 0.152    | .         | .               | (0.0002) | 0.012   | 100 g |       |
| JSAC 0121-C    | 0.00110 | 0.000113 | 0.000348 | 0.00094 | 0.000282 | 0.000173 | .       | .       | .        | .        | 0.000196 | .        | 0.000203 | 0.000203 | .         | 1.98            | .        | .       | 50 g  |       |

ALUMINUM BASE CHIPS

typical analysis

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

| #      | Number        | Si    | Co      | Cr     | Cu     | Fe    | Mg       | Mn     | Ni       | Pb       | Sn       | Ti     | V       | Zn     | Be       | Bi     | Cd      | Ga      | Li      | Sb     | Zr      | Units |
|--------|---------------|-------|---------|--------|--------|-------|----------|--------|----------|----------|----------|--------|---------|--------|----------|--------|---------|---------|---------|--------|---------|-------|
| 1      | C55XG28J30    | 17.5  | 0.345   | 0.256  | 1.58   | 0.50  | 0.99     | 0.378  | 1.81     | 0.081    | 0.059    | 0.073  | 0.011   | 0.32   | 0.0044   | 0.020  | 0.004   |         |         |        |         | 50 g  |
| 2      | C55XA30J30    | 16.5  | 0.194   | 0.037  | 4.02   | 0.286 | 0.31     | 0.259  | 0.072    | 0.018    | 0.083    | 0.144  | 0.006   | 0.048  | <0.0005  |        |         |         |         |        |         | 50 g  |
| 1      | C55XG28J10    | 14.33 | 0.119   | 0.319  | 1.82   | 0.678 | 1.26     | 0.024  | 2.47     | 0.0038   | 0.182    | 0.104  | 0.0095  | 0.258  |          |        |         |         |         |        |         | 50 g  |
| 1      | C54XG06H50    | 13.76 | <0.005  | 0.026  | 0.0229 | 0.210 | (0.0022) | 0.85   | 0.0067   | (0.0020) | 0.022    | 0.106  | 0.008   | 0.225  |          |        |         |         |         |        |         | 50 g  |
| 1      | C54XG06H40    | 13.21 | 0.207   | 0.120  | 0.237  | 0.138 | 0.134    | 0.691  | 0.139    | 0.040    | (0.007)  | 0.124  | 0.011   | 0.131  |          |        |         |         |         |        |         | 50 g  |
| 1      | C54XG13H40 *  | 12.55 | (0.001) | 0.0264 | 0.643  | 0.405 | 0.78     | 0.617  | 0.84     | 0.055    | 0.068    | 0.083  |         | 0.251  | 0.0048   | <0.001 |         |         |         |        | 0.021   | 50 g  |
| 1      | C55XG02D60    | 12.4  | 0.018   | 0.035  | 0.48   | 1.28  | 0.34     | 0.64   | 0.027    | 0.46     | <0.01    | 0.35   |         | 0.083  |          |        |         |         |         |        |         | 50 g  |
| 1      | C54XG06H30    | 11.27 | 0.021   | 0.069  | 0.327  | 0.500 | 1.19     | 0.445  | 0.295    | 0.217    | 0.047    | 0.161  | 0.010   | 0.072  | 0.0052   | 0.08   | 0.010   |         |         |        |         | 50 g  |
| 2      | C55XG02D70    | 10.8  |         | 0.09   | 1.59   | 0.90  | 0.52     | 0.45   | 0.255    | 0.217    | 0.047    | 0.161  | 0.007   | 0.61   | 0.0006   | 0.08   |         |         |         |        |         | 50 g  |
| 2      | C54XG13H30    | 10.42 |         | 0.06   | 0.82   | 0.72  | 1.05     | 0.38   | 0.94     | 0.08     | 0.09     | 0.17   |         | 0.31   |          |        |         |         |         |        |         | 50 g  |
| 1      | C54XG13H20    | 10.04 | 0.004   | 0.103  | 1.29   | 0.767 | 1.37     | 0.248  | 1.15     | 0.083    | 0.145    | 0.166  |         | 0.530  |          |        |         |         |         |        |         | 50 g  |
| 2      | C55XG02D80    | 10.04 | 0.056   | 0.052  | 2.27   | 0.94  | 0.21     | 0.45   | 0.37     | 0.33     | 0.19     | 0.240  | 0.025   | 1.32   | 0.001    |        |         |         |         |        |         | 50 g  |
| 2      | C54XG23H10    | 9.82  |         | 0.089  | 1.19   | 0.80  | 0.45     | 0.029  | 0.31     | 0.145    | 0.082    | 0.022  |         | 0.60   | (0.0002) |        |         |         |         |        |         | 50 g  |
| 1      | C55XG26H30    | 9.6   | 0.076   | 0.130  | 2.19   | 1.07  | 1.01     | 0.45   | 0.51     | 0.228    | 0.16     | 0.147  | 0.020   | 0.79   |          |        | 0.011   | 0.006   |         |        |         | 50 g  |
| 1      | C55XG26H20    | 9.36  | 0.052   | 0.083  | 4.14   | 0.71  | 1.49     | 0.52   | 0.41     | 0.111    | 0.110    | 0.120  | 0.011   | 0.64   |          | 0.035  |         |         |         |        |         | 50 g  |
| 2      | C55XG02D40    | 8.98  |         | 0.11   | 3.16   | 0.64  | 0.10     | 0.18   | 0.67     | 0.19     | 0.26     | 0.09   |         | 2.46   |          |        |         |         |         |        |         | 50 g  |
| 1      | C54XG13H10    | 8.91  | 0.0051  | 0.062  | 1.87   | 0.801 | 2.89     | 0.0137 | 1.83     | 0.240    | 0.260    | 0.112  |         | 0.37   | 0.0078   | <0.001 |         |         |         |        |         | 50 g  |
| 1      | C55XG02D90    | 8.62  | 0.052   | 0.11   | 3.40   | 0.82  | 0.21     | 0.113  | 0.62     | 0.106    | 0.19     | 0.090  | 0.007   | 2.46   | 0.001    |        |         |         |         |        |         | 50 g  |
| 2      | C55XG26H10    | 7.69  | 0.022   | 0.20   | 4.34   | 1.78  | 0.29     | 0.012  | 0.012    | 0.24     | (0.008)  | 0.21   | 0.012   | 1.14   |          | 0.07   |         |         |         |        |         | 50 g  |
| 1      | C55XG04H100   | 7.32  | 0.043   | 0.090  | 1.36   | 0.52  | 0.004    | 0.53   | 0.023    | 0.010    | (0.01)   | 0.010  | 0.007   | 2.28   |          |        |         |         |         |        |         | 50 g  |
| 1      | C54XG25D40    | 7.22  | 0.047   | 0.019  | 0.160  | 0.13  | 0.072    | 0.090  | 0.10     | 0.162    | 0.092    | 0.09   | (0.002) | 0.11   | 0.02     | 0.09   |         |         |         |        |         | 50 g  |
| 1      | C55XG02D100   | 6.56  | 0.059   | 0.16   | 4.65   | 0.186 | <0.01    | 0.015  | 0.96     | (0.004)  | 0.9      | <0.005 |         | 4.76   | (0.002)  | 0.09   |         |         |         |        |         | 50 g  |
| 1      | C55XG04H90    | 5.99  | 0.010   | 0.005  | 2.64   | 0.304 | 0.079    | 0.304  | 0.231    | 0.062    | 0.031    | 0.009  |         | 1.89   |          | 0.0015 |         |         |         |        |         | 50 g  |
| 1      | C54XG25D30    | 5.86  |         | 0.062  | 0.113  | 0.86  | 0.20     | 0.29   | 0.114    | 0.074    | 0.06     | 0.083  |         | 0.092  | 0.003    |        |         |         |         |        |         | 50 g  |
| 2      | C55XG04H30    | 5.55  |         | 0.06   | 3.60   | 0.86  | 0.17     | 0.40   | 0.33     | 0.10     | 0.10     | 0.20   |         | 1.30   |          |        |         |         |         |        |         | 50 g  |
| Number | Number        | Si    | Co      | Cr     | Cu     | Fe    | Mg       | Mn     | Ni       | Pb       | Sn       | Ti     | V       | Zn     | Be       | Bi     | Cd      | Ga      | Li      | Sb     | Zr      | Units |
| 1      | C54XG25D20    | 3.93  | 0.10    | 0.150  | 0.130  | 0.58  | 0.59     | 0.48   | 0.139    | 0.073    | 0.042    | 0.152  | (0.006) | 0.169  | 0.049    | 0.22   |         |         |         |        |         | 50 g  |
| 1      | C54XG25D10    | 3.54  | 0.113   | 0.14   | 0.010  | 0.72  | 0.65     | 0.81   | 0.26     | 0.004    | <0.01    | 0.098  | 0.016   | 0.36   | 0.001    | 0.11   |         |         |         |        |         | 50 g  |
| 1      | C57XG12H10    | 2.52  |         | 0.069  | 5.54   | 0.88  | 0.40     | 0.032  | 0.31     | 0.016    | 0.095    | 0.114  | 0.153   | 1.03   |          | 0.285  | 0.012   | 0.008   |         |        | 0.07    | 50 g  |
| 1      | C55XG900J40   | 1.59  |         | 0.343  | 0.249  | 0.306 | 0.459    | 0.75   | 0.351    | 0.088    | 0.153    | 0.171  |         | 0.149  |          |        |         |         |         |        |         | 50 g  |
| 1      | C514X9091J30  | 0.74  |         | 0.106  | 0.623  | 0.94  | 0.149    | 11.3   | 0.143    | 0.114    | 0.019    | 0.425  |         |        |          |        |         |         |         |        | <0.005  | 50 g  |
| 1      | C51XG00H20    | 0.61  | 0.079   | 0.100  | 0.173  | 0.49  | 0.089    | 0.305  | 0.206    | 0.115    | 0.122    | 0.137  | 0.070   | 0.221  | 0.0024   | 0.063  | 0.023   | (0.017) |         | 0.056  |         | 50 g  |
| 1      | C57XG12H50    | 0.55  | 0.054   | 0.016  | 12.2   | 0.192 | 3.12     | 0.186  | 0.108    | 0.068    | 0.067    | 0.036  | 0.033   | 0.072  | 0.003    | 0.55   | 0.013   |         |         | 0.06   | 0.045   | 50 g  |
| 1      | C55XG900J20   | 0.44  |         | 0.118  | 0.864  | 0.378 | 0.622    | 0.145  | 0.133    | 0.52     | 0.341    | 0.054  | <0.005  | 0.309  |          |        |         |         |         |        |         | 50 g  |
| 2      | C511XG10H40   | 0.42  |         | 0.240  | 0.32   | 0.79  | 2.02     | 0.012  | 0.123    | 0.023    | 0.179    | 0.205  | 0.053   | 0.47   | (0.0002) |        |         |         |         |        |         | 25 g  |
| 1      | C511X G6063   | 0.412 |         | 0.0021 | 0.0014 | 0.185 | 0.437    | 0.0239 | 0.0021   | 0.0011   | (0.0006) | 0.0110 | 0.0087  | 0.0062 |          |        |         |         |         |        |         | 50 g  |
| 1      | C59XG77J30    | 0.366 | <0.005  | 0.023  | 2.42   | 0.712 | 2.27     | 0.594  | 0.43     | 0.075    | 0.137    | 0.107  | 0.006   | 4.57   |          | 0.046  | 0.0115  |         |         |        | 0.026   | 50 g  |
| 1      | C511XG05H20   | 0.35  | 0.008   | 0.30   | 0.37   | 0.60  | 3.12     | 1.06   | 0.22     | 0.062    | 0.028    | 0.22   | <0.005  | 0.140  | 0.004    |        |         |         |         |        |         | 50 g  |
| 2      | C511XG3000B30 | 0.35  |         | 0.056  | 0.120  | 0.376 | 0.80     | 1.06   | 0.116    | 0.062    | 0.028    | 0.097  |         | 0.140  | 0.005    |        |         |         |         |        |         | 50 g  |
| 2      | C511XG10H40   | 0.33  |         | 0.15   | 0.052  | 0.19  | 10.4     | 0.12   | 0.085    | 0.10     | <0.01    | 0.058  | 0.007   | 0.21   | 0.023    |        |         |         |         |        |         | 50 g  |
| 2      | C59XG77J50    | 0.30  |         | 0.050  | 0.122  | 1.32  | 0.72     | 0.030  | 1.38     | (0.003)  |          | 0.058  | 0.007   | 7.57   |          |        |         |         |         |        |         | 50 g  |
| 1      | C56XG250J10   | 0.26  | 0.008   | 0.0067 | 3.82   | 0.41  | 0.075    | 0.040  | 1.33     | 0.101    | 0.125    | 0.008  | 0.102   | 0.28   |          |        |         |         |         |        | (0.003) | 50 g  |
| 1      | C511XG05H30   | 0.24  |         | 0.06   | 0.10   | 0.54  | 5.35     | 0.38   | 0.09     | 0.10     | 0.10     | 0.07   | 0.09    | 0.09   |          |        |         |         |         |        |         | 50 g  |
| 2      | C511XG3000B20 | 0.23  | 0.007   | 0.200  | 0.20   | 0.335 | 0.68     | 0.81   | 0.063    | 0.137    | 0.105    | 0.111  | <0.005  | 0.098  | 0.0017   |        |         |         |         |        |         | 50 g  |
| 1      | C58XG50H40    | 0.11  |         | 0.029  | 0.056  | 0.14  | 5.16     | 0.547  | 0.040    | 0.152    | 0.144    | 0.048  | 0.018   | 0.062  |          |        |         |         |         | 0.324  | 0.247   | 50 g  |
| 1      | C58XG40H60    | 0.09  | 0.006   | 0.005  | 0.111  | 0.08  | (0.003)  | 0.004  | 0.008    | <0.002   | <0.005   | 0.064  | <0.005  | 7.55   | (0.002)  |        | 0.032   | (0.004) | <0.0005 |        |         | 50 g  |
| 1      | C56XG2000J10  | 0.05  |         | 0.005  | 3.50   | 0.13  | 2.75     | 1.42   | 0.01     | 0.01     | 0.1      | 0.004  | 0.021   | 1.01   |          | 0.16   |         |         |         | 0.076  | 0.22    | 50 g  |
| 1      | C59XG77J10    | 0.15  | 0.018   | 0.24   | 2.41   | 0.21  | 4.83     | 0.46   | 0.17     | 0.125    | 0.126    | 0.178  | 0.005   | 1.91   |          | 0.06   |         |         |         |        |         | 50 g  |
| 1      | C56XG250J30   | 0.11  | 0.264   | 0.024  | 4.90   | 0.079 | (0.011)  | 0.278  | 0.92     | 0.024    | 0.031    | 0.162  | 0.036   | 0.103  | 0.0014   |        |         |         |         | 0.35   | 0.275   | 50 g  |
| 1      | C511XG05H40   | 0.09  |         | 0.029  | 0.056  | 0.14  | 5.16     | 0.547  | 0.040    | 0.152    | 0.144    | 0.048  | 0.018   | 0.062  |          |        |         |         |         |        |         | 50 g  |
| 1      | C58XG40H60    | 0.09  | 0.006   | 0.005  | 0.111  | 0.08  | (0.003)  | 0.004  | 0.008    | <0.002   | <0.005   | 0.064  | <0.005  | 7.55   | (0.002)  |        | 0.032   | (0.004) | <0.0005 |        |         | 50 g  |
| 1      | C56XG2000J10  | 0.05  |         | 0.005  | 3.50   | 0.13  | 2.75     | 1.42   | 0.01     | 0.01     | 0.1      | 0.004  | 0.021   | 1.01   |          | 0.16   |         |         |         |        |         | 50 g  |
| 1      | C59XG77J60    | 0.04  |         | 0.0046 | 1.13   | 0.054 | 2.63     | 0.0024 | 0.003    | (0.005)  | 0.006    | 0.023  | 0.003   | 11.62  | <0.005   | <0.002 | (0.005) |         |         |        | 0.29    | 50 g  |
| 1      | C514X9091J10  | 0.035 |         | <0.005 | 0.046  | 0.081 | (0.001)  | 6.93   | (0.0026) | 0.016    | 0.013    | 0.0017 | 0.016   | 0.042  | 0.0004   | 0.011  |         |         |         |        |         | 50 g  |
| 1      | C51XG00H10    | 0.012 | 0.011   | 0.027  | 0.034  | 0.051 | 0.039    | 0.041  | 0.038    | 0.018    | 0.028    | 0.031  | 0.016   | 0.042  | 0.0004   | 0.011  |         |         |         | <0.005 |         | 50 g  |

**RM ARSENIC**

| Number | As     | Units                    |
|--------|--------|--------------------------|
| BM As  | 99.999 | 50 g chips last of stock |

**RM ANTIMONY**

| Number | Sb     | As      | Fe      | Pb      | Si      | Sn      | Units       |
|--------|--------|---------|---------|---------|---------|---------|-------------|
| BM Sb  | 99.999 | <0.0002 | <0.0002 | <0.0001 | <0.0001 | <0.0001 | 100 g chips |

**RM BISMUTH**

| Number | Bi    | Ag      | As      | Co     | Cu      | Fe     | Pb    | Sb      | Zn     | Units       |
|--------|-------|---------|---------|--------|---------|--------|-------|---------|--------|-------------|
| BM Bi  | 99.97 | <0.0001 | <0.0001 | <0.003 | <0.0001 | <0.001 | <0.02 | <0.0002 | <0.003 | 100 g chips |

**RM CADMIUM**

| Number | Cd    | Cu    | Fe     | Pb    | Ti     | Zn     | Units       |
|--------|-------|-------|--------|-------|--------|--------|-------------|
| BM Cd  | 99.96 | <0.01 | <0.002 | <0.02 | <0.003 | <0.004 | 100 g chips |

**CRM CHROMIUM**

analysis listed in mass %

BCS: 100 g powder VS: 100 g chips

| Number   | Cr   | Al       | C      | Ca       | Cu      | Fe     | N      | Ni      | O      | S      | Si     | V      |
|----------|------|----------|--------|----------|---------|--------|--------|---------|--------|--------|--------|--------|
| VS F36/1 | 99.9 | 0.0009   | 0.0030 | (0.0003) | 0.00023 | 0.005  | 0.0026 | 0.00019 | .      | 0.0023 | 0.0034 | 0.0037 |
| BCS 361  | .    | (0.083T) | 0.0039 | .        | .       | 0.0920 | 0.0079 | .       | 0.1010 | 0.0043 | 0.0449 | .      |

**CRM COBALT BASE CHIPS**

100 g

| Number            | Cr    | Co    | C      | Fe    | Mn     | Mo     | N      | Nb      | Ni    | Si    | W       |
|-------------------|-------|-------|--------|-------|--------|--------|--------|---------|-------|-------|---------|
| IARM CoR30016-22  | 30.9  | 57.6  | 1.10   | 0.84  | 1.50   | 0.97   | 0.026  | 0.037   | 2.86  | 0.65  | 4.01    |
| ECRM 378-1C       | 28.22 | .     | 1.181  | 0.606 | 0.0579 | 0.0503 | .      | .       | 0.617 | 1.172 | 4.43    |
| BAM 328-1         | 20.54 | 41.65 | 0.390  | 2.40  | 1.395  | 4.41   | 0.027  | 3.61    | 20.54 | 0.629 | 4.16    |
| IARM CoElgiloy-18 | 20.4  | 40.4  | 0.008  | 12.6  | 2.36   | 8.6    | 0.0034 | (0.006) | 15.9  | 0.05  | (0.008) |
| SRM 862           | 20.0  | 51.5  | 0.120  | 1.80  | 1.59   | .      | 0.026  | .       | 9.74  | 0.017 | 15.1    |
| IARM CoMP35N-18   | 19.9  | 32.7  | 0.0049 | 0.031 | 0.002  | 10.1   | 0.0018 | .       | 36.53 | 0.012 | .       |

| Number            | Al      | B       | Cu      | O      | P        | S        | Ta       | Ti      | V       |
|-------------------|---------|---------|---------|--------|----------|----------|----------|---------|---------|
| IARM CoR30016-22  | 0.054   | 0.0021  | 0.015   | 0.0012 | 0.0045   | (0.0004) | (0.0151) | 0.0076  | 0.011   |
| ECRM 378-1C       | .       | .       | .       | .      | (0.0023) | 0.0055   | .        | .       | .       |
| BAM 328-1         | 0.070   | .       | 0.013   | .      | 0.005    | .        | 0.18     | .       | .       |
| IARM CoElgiloy-18 | (0.011) | (0.002) | (0.005) | 0.009  | 0.0019   | (0.0018) | (0.01)   | (0.004) | (0.009) |
| SRM 862           | .       | .       | 0.0010  | .      | 0.002    | 0.0008   | .        | .       | 0.005   |
| IARM CoMP35N-18   | 0.060   | 0.009   | .       | .      | 0.0022   | 0.0013   | .        | 0.78    | 0.006   |

**CRM COPPER IN VARIOUS FORMS**

analysis listed in mg/g each of the blow available in 3 forms A: disc 39 mm Ø x 30 mm B: Rod 8 mm Ø x 100 mm C: Chips 50 g

| Number    | Ag   | Al  | As   | Au   | Be   | Bi   | Cd   | Co   | Cr   | Fe  | In   | Mg   | Mn   | Ni   | P    | Pb  | S     | Sb   | Se   | Si  | Sn    | Te   | Ti   | Zn   |       |
|-----------|------|-----|------|------|------|------|------|------|------|-----|------|------|------|------|------|-----|-------|------|------|-----|-------|------|------|------|-------|
| ERM-EB075 | 10.8 | 2.3 | 3.18 | 1.46 | 1.08 | 1.79 | 2.69 | 2.64 | 1.4  | 9.3 | 1.83 | 7.0  | 1.35 | 2.18 | 2.59 | 4.8 | 25    | 2.93 | 1.69 | 2.6 | 2.13  | 1.78 | 3.2  | 6.51 |       |
| ERM-EB074 | 1.03 | .   | 1.23 | 0.52 | 0.31 | 0.51 | 0.4  | 0.83 | 0.37 | 5.8 | 0.49 | 2.03 | 0.93 | 0.61 | 1.53 | 2.7 | (3.3) | 0.57 | 0.55 | .   | (1.5) | 0.5  | 0.97 | 2.2  | (8.8) |

**CRM COPPER CHIPS AND PINS**

analysis listed in mg/kg except % which is mass % IMN 001: 50 g of 0.31 g pins all others: chips as noted

| Number  | Ag    | As   | Au  | Bi    | Cd     | Co   | Cr   | Cu%   | Fe     | Mn    | Ni   | P | Pb   | S     | Sb     | Se   | Si    | Sn   | Te   | Zn   | Units |
|---------|-------|------|-----|-------|--------|------|------|-------|--------|-------|------|---|------|-------|--------|------|-------|------|------|------|-------|
| SRM 454 | 286   | 46   | 7.5 | 19    | .      | .    | .    | 99.84 | .      | .     | .    | . | 66   | .     | 24     | 479  | .     | 2.2  | 27   | 7    | 35 g  |
| SRM 400 | 181   | 140  | .   | 24.5  | .      | 0.6  | .    | 99.70 | 41     | .     | 603  | . | 128  | .     | 102    | 214  | last  | .    | 153  | 114  | 50 g  |
| SRM 399 | 117   | 47   | .   | 10.5  | .      | 0.5  | .    | 99.79 | 20.0   | .     | 506  | . | 114  | .     | 30     | 95   | .     | .    | 50   | 45   | 50 g  |
| IMN 001 | 27.59 | 3.17 | .   | 1.42  | (0.11) | 2.04 | 3.55 | .     | (13.9) | 5.18  | 3.42 | . | 4.28 | (6.0) | 2.33   | 1.38 | .     | 3.31 | 1.23 | 4.57 | above |
| IMN 5   | 10    | 4.0  | .   | 0.096 | .      | 8.1  | .    | .     | 4.5    | (1.3) | 4.4  | . | 27   | .     | (0.92) | .    | (2.6) | 4.6  | .    | (13) | 200 g |

**CRM COPPER CHIPS**

analysis listed in mass % C39X: typical analysis 50 g BAM, BCS, IARM: 100 g IPT: 50 g IMN: 200 g

| Number        | Cu    | Ag       | Al        | As       | Au     | B        | Be     | Bi        | C        | Cd       | Co       | Cr       | Fe        | Mg       |
|---------------|-------|----------|-----------|----------|--------|----------|--------|-----------|----------|----------|----------|----------|-----------|----------|
| IPT 64        | 99.98 | 0.0010   | <(0.0006) | (0.0002) | .      | .        | .      | <(0.0001) | .        | .        | .        | .        | 0.00045   | .        |
| IARM 70C      | 99.94 | (0.0011) | (0.0014)  | .        | .      | (0.0004) | <0.002 | (0.002)   | (0.002)  | (0.0008) | (0.0014) | (0.0002) | (0.0016)  | (0.0003) |
| BAM M365      | 99.73 | 0.0159   | .         | 0.00404  | .      | .        | .      | 0.00300   | .        | .        | 0.000213 | .        | 0.00061   | .        |
| BCS 399       | REM   | .        | .         | <(0.001) | .      | .        | .      | (0.001)   | .        | (0.003)  | .        | .        | (0.006)   | .        |
| C39X 178700   | .     | 0.0468   | 0.0012    | 0.0033   | 0.0009 | .        | .      | 0.0470    | .        | 0.0305   | 0.0017   | .        | .         | .        |
| C39X 178710   | .     | 0.025    | <0.0005   | 0.029    | 0.0048 | .        | .      | 0.069     | .        | 0.0031   | 0.0008   | .        | .         | .        |
| C39X 178680   | .     | 0.0249   | 0.0072    | 0.0226   | 0.0101 | .        | .      | 0.0308    | .        | 0.0130   | 0.0248   | .        | 0.110     | 0.0085   |
| IARM Cu101-18 | .     | 0.00130  | .         | 0.00015  | .      | .        | .      | 0.00005   | .        | .        | .        | .        | 0.00030   | .        |
| IARM Cu110-18 | .     | 0.00130  | .         | 0.00013  | .      | .        | .      | .         | (0.0018) | .        | .        | .        | (0.00009) | 0.00034  |
| C39X 178660   | .     | <0.001   | <0.002    | 0.037    | .      | .        | .      | 0.001     | .        | <0.001   | 0.003    | 0.002    | <0.001    | <0.001   |

| Number        | Mn        | Ni        | O         | P        | Pb        | S       | Sb        | Se        | Si       | Sn        | Te        | Zn      |
|---------------|-----------|-----------|-----------|----------|-----------|---------|-----------|-----------|----------|-----------|-----------|---------|
| IPT 64        | .         | 0.00018   | .         | .        | 0.00006   | .       | (0.0002)  | <(0.0002) | .        | <(0.0005) | <(0.0001) | (0.001) |
| IARM 70C      | (0.0002)  | (0.0004)  | (0.002)   | (0.0014) | (0.0013)  | 0.0008  | (0.003)   | (0.001)   | (0.0006) | 0.0005    | (0.001)   | (0.002) |
| BAM M365a     | .         | 0.0235    | (0.1712)  | .        | 0.0141    | .       | 0.00121   | 0.0179    | .        | (0.0029)  | 0.000127  | 0.0030  |
| BCS 399       | .         | (0.002)   | .         | 0.045    | (0.002)   | .       | <(0.001)  | .         | .        | (0.003)   | .         | (0.003) |
| C39X 178700   | Ge:0.0076 | 0.0062    | In:0.0078 | 0.0012   | 0.0447    | 0.0026  | 0.0478    | 0.0261    | .        | 0.0031    | 0.0011    | 0.129   |
| C39X 178710   | 0.0010    | 0.027     | .         | <0.0005  | 0.0092    | 0.0080  | 0.017     | 0.028     | <0.0005  | .         | 0.011     | .       |
| C39X 178680   | 0.0123    | 0.0222    | .         | 0.0507   | 0.1040    | 0.022   | 0.0295    | 0.0133    | .        | 0.103     | 0.0206    | 0.197   |
| IARM Cu101-18 | 0.00003   | 0.00027   | .         | .        | 0.00012   | 0.00050 | 0.00014   | .         | .        | 0.00020   | .         | 0.00008 |
| IARM Cu110-18 | 0.00006   | (0.00006) | 0.00100   | 0.00160  | (0.00005) | 0.00060 | (0.00010) | (0.00020) | .        | (0.00020) | .         | 0.00010 |
| C39X 178660   | <0.001    | 0.034     | .         | <0.002   | <0.001    | 0.003   | <0.001    | .         | <0.005   | 0.013     | <0.001    | 0.005   |

**RM PHOSPHORUS DEOXIDIZED COPPER CHIPS**

analysis listed in mass % except \* which is mg/kg 100 g chips

| Number     | Ag%    | Al* | As%    | Bi* | Co* | Cu%   | Fe* | Mn* | Ni* | P%    | Pb%     | Sb* | Si%    | Sn%    | Te%    | Zn%    |
|------------|--------|-----|--------|-----|-----|-------|-----|-----|-----|-------|---------|-----|--------|--------|--------|--------|
| CURM 09.03 | 0.012  | <3  | <0.001 | <3  | <3  | 99.92 | 33  | <3  | <3  | 0.056 | <0.0005 | <5  | <0.001 | <0.001 | <0.001 | <0.001 |
| CURM 09.01 | 0.011  | <5  | <0.001 | <3  | <3  | 99.82 | 19  | <3  | <3  | 0.151 | <0.0005 | <5  | <0.001 | <0.001 | <0.001 | 0.0008 |
| CURM 09.02 | 0.0055 | <5  | <0.001 | <5  | <5  | 99.90 | 42  | <5  | <5  | 0.078 | <0.001  | <5  | <0.002 | <0.001 | <0.001 | <0.001 |

**CRM COPPER ANODE**

analysis listed in mg/kg 425 g chips

| Number     | Ag  | Au  | As  | Fe | Pb  | Sn  | Te |
|------------|-----|-----|-----|----|-----|-----|----|
| CAN CUAR-1 | 294 | 2.3 | 145 | 76 | 864 | 113 | 33 |

**CRM COPPER CONCENTRATE POWDER**

| analysis listed in mass % |      |       |        |      |         |         |      | analysis listed in mg/kg |      |       |
|---------------------------|------|-------|--------|------|---------|---------|------|--------------------------|------|-------|
| Number                    | Cu   | Cd    | Fe     | Pb   | S       | SiO2    | Zn   | Ag                       | Re   | Units |
| VS 2891-84                | 40.4 | 0.029 | (5.78) | 2.25 | (15.98) | (21.74) | 2.89 | 7.077                    | 28.2 | 100 g |

**CRM SEBILOY / ENVIROBRASS / FEDERALLOY CHIPS**

| analysis listed in mass % |      |         |      | C32X: 50 g units, typical analysis |        |         |         |       |        |       | IARM: 100 g units |        |       |  |
|---------------------------|------|---------|------|------------------------------------|--------|---------|---------|-------|--------|-------|-------------------|--------|-------|--|
| Number                    | Bi   | Se      | Sn   | Zn                                 | Cu     | As      | Co      | Fe    | Ni     | P     | Pb                | Sb     | Si    |  |
| C32X SEB10                | 5.77 | 0.895   | 3.83 | 11.57                              | (76.7) | 0.051   | 0.0108  | 0.059 | 0.118  | 0.025 | 0.564             | 0.354  | .     |  |
| C32X SEB20                | 4.35 | 0.027   | 9.40 | 3.75                               | 81.8   | 0.009   | 0.013   | 0.078 | 0.078  | 0.014 | 0.42              | 0.013  | .     |  |
| IARM 264A                 | 3.6  | (0.001) | 3.03 | 5.33                               | (87.3) | (0.004) | (0.001) | 0.048 | 0.54   | 0.027 | 0.057             | 0.074  | 0.003 |  |
| IARM 263A                 | 2.55 | (0.002) | 3.5  | 15.8                               | (78)   | 0.003   | 0.001   | 0.047 | 0.66   | 0.040 | 0.022             | 0.06   | 0.003 |  |
| IARM 265A                 | 2.4  | (0.002) | 4.4  | 2.45                               | (90)   | (0.005) | (0.001) | 0.013 | 0.69   | 0.024 | 0.011             | 0.015  | 0.003 |  |
| IARM 266A                 | 2.37 | 0.001   | 6.9  | 3.48                               | (87)   | 0.004   | (0.001) | 0.035 | 0.46   | 0.032 | 0.010             | 0.010  | 0.002 |  |
| C32X SEB40                | 2.69 | 0.115   | 9.29 | 8.55                               | 78.58  | 0.0011  | 0.476   | 0.365 | 0.0092 | 0.006 | 0.010             | 0.0055 | .     |  |
| IARM 227A                 | 2.3  | 1.21    | 5.1  | 4.70                               | 85.9   | 0.003   | 0.001   | 0.060 | 0.53   | 0.003 | 0.042             | <0.01  | 0.002 |  |
| IARM 228A                 | 1.53 | 0.67    | 4.1  | 4.1                                | 89.0   | 0.003   | 0.001   | 0.052 | 0.45   | 0.032 | 0.026             | 0.010  | 0.002 |  |
| C32X SEB50                | 1.17 | 0.512   | 5.28 | 6.64                               | 85.5   | 0.0121  | 0.0048  | 0.360 | 0.308  | 0.183 | 0.0149            | 0.0344 | .     |  |

| Number     | Ag      | Al      | B      | C       | Cd     | Cr      | Mn      | N        | O       | S       |
|------------|---------|---------|--------|---------|--------|---------|---------|----------|---------|---------|
| C32X SEB10 | .       | .       | .      | .       | .      | .       | .       | .        | .       | .       |
| C32X SEB20 | .       | .       | .      | .       | .      | .       | .       | .        | .       | .       |
| IARM 264A  | (0.005) | 0.003   | .      | (0.004) | .      | (0.002) | (0.002) | .        | .       | 0.0013  |
| IARM 263A  | (0.006) | (0.002) | .      | <0.005  | .      | (0.002) | (0.002) | .        | .       | (0.002) |
| IARM 265A  | (0.002) | 0.003   | .      | .       | .      | (0.001) | (0.002) | .        | .       | (0.002) |
| IARM 266A  | (0.001) | 0.002   | .      | (0.002) | .      | (0.002) | (0.002) | .        | .       | (0.002) |
| C32X SEB40 | .       | .       | 0.0021 | .       | 0.0004 | .       | .       | .        | .       | .       |
| IARM 227A  | 0.004   | 0.002   | .      | 0.003   | .      | (0.001) | 0.001   | (0.0002) | 0.0013  | 0.005   |
| IARM 228A  | 0.003   | 0.002   | .      | 0.003   | .      | 0.001   | 0.001   | <0.0005  | (0.002) | 0.004   |
| C32X SEB50 | .       | .       | 0.0028 | .       | 0.0067 | .       | .       | .        | .       | .       |

## COPPER BASE CHIPS

# = class, where 1 = CRM and 2 = RM C3x, DH: typical analysis 50 g GBW: 95 g SRM: 50 g others: 100 g

| # | Number        | Sn       | Al       | Fe      | Mn       | Ni      | Pb      | Zn      | Be    | Bi       | Co      | Se     |
|---|---------------|----------|----------|---------|----------|---------|---------|---------|-------|----------|---------|--------|
| 2 | DH 0209       | 11.92    | .        | .       | .        | 0.265   | 0.542   | .       | .     | .        | .       | .      |
| 1 | BAM 228       | 9.76     | (0.0001) | 0.036   | (<0.001) | 0.109   | 1.24    | 3.32    | .     | 0.0086   | .       | 0.0012 |
| 2 | DH 0201       | 8.84     | 0.022    | 0.677   | 0.035    | 0.795   | 1.17    | 6.30    | .     | 0.006    | .       | .      |
| 2 | DH 0208       | 4.78     | 4.15     | 2.54    | 0.711    | 2.82    | 1.31    | 1.85    | .     | .        | .       | .      |
| 2 | DH 0206       | 2.78     | 0.059    | 1.79    | 0.044    | 0.221   | 0.891   | 10.89   | .     | .        | .       | .      |
| 2 | DH 0203       | 2.17     | 12.50    | 5.76    | 0.057    | .       | 0.59    | 1.36    | .     | .        | .       | .      |
| 2 | DH 0204       | 2.16     | 12.51    | 5.70    | 0.057    | .       | 0.58    | 1.36    | .     | .        | .       | .      |
| 2 | DH 0205       | 2.14     | 12.53    | 5.66    | 0.056    | .       | 0.76    | 1.36    | .     | .        | .       | .      |
| 1 | IARM Cu464-21 | 0.751    | 0.0006   | 0.096   | 0.0115   | 0.0084  | 0.066   | 38.5    | .     | 0.0010   | .       | .      |
| 2 | DH 0207       | 0.74     | .        | 0.936   | 0.027    | 0.174   | 2.16    | 30.20   | .     | .        | .       | .      |
| 2 | DH 0202       | 0.381    | .        | 0.911   | 0.007    | 0.034   | 0.139   | 0.229   | .     | .        | .       | .      |
| 1 | C37X2180      | 0.018    | 0.0025   | 0.075   | 0.084    | 2.51    | 0.0025  | 0.029   | .     | .        | .       | .      |
| 2 | C36XCBC40     | 0.01     | 0.06     | 0.09    | 0.003    | 0.04    | 0.30    | 0.02    | 1.82  | .        | 2.44    | .      |
| 1 | IARM 158B     | 0.01     | 0.002    | 0.090   | 0.019    | 0.32    | 0.01    | 0.014   | .     | .        | 0.002   | .      |
| 1 | IARM 158C     | 0.01     | 0.002    | 0.090   | 0.019    | 0.32    | 0.01    | 0.014   | .     | .        | 0.002   | .      |
| 1 | IARM Cu172-18 | 0.0009   | 0.022    | 0.029   | 0.0017   | 0.010   | (0.005) | 0.008   | 1.79  | .        | 0.344   | .      |
| 2 | IARM Cu172-19 | 0.0007   | 0.032    | 0.071   | 0.0019   | 0.237   | .       | .       | 1.89  | .        | 0.0017  | .      |
| 1 | SRM 460       | 0.006    | 0.048    | 0.098   | .        | 0.031   | 0.258   | 0.004   | 1.86  | .        | 0.217   | .      |
| 1 | IARM Cu954-21 | 0.0053   | 10.55    | 3.66    | 0.393    | 0.105   | 0.012   | 0.029   | .     | (0.0009) | (0.002) | .      |
| 1 | SRM 459       | 0.005    | 0.044    | 0.079   | .        | 0.039   | 0.001   | 0.002   | 1.82  | .        | 0.221   | .      |
| 1 | SRM 458       | 0.004    | 0.030    | 0.060   | .        | 1.60    | 0.002   | 0.002   | 0.360 | .        | 0.076   | .      |
| 2 | C36XCBC20     | 0.004    | 0.03     | 0.02    | (<0.01)  | 0.07    | 0.004   | 0.03    | 0.56  | .        | 0.13    | .      |
| 1 | C37X2260      | 0.0032   | 0.0020   | 1.52    | 0.582    | 0.0024  | (0.001) | 2.82    | .     | .        | .       | .      |
| 2 | IARM 160A     | (<0.01)  | (<0.01)  | (<0.01) | (<0.01)  | (<0.01) | (<0.01) | (<0.01) | .     | .        | (<0.01) | .      |
| 2 | IARM 159A     | (<0.01)  | (<0.01)  | (<0.01) | (<0.01)  | (<0.01) | (<0.01) | (<0.01) | .     | .        | (<0.01) | .      |
| 1 | IARM Cu182-18 | (0.002)  | 0.0031   | 0.041   | 0.0007   | 0.0007  | 0.0019  | 0.010   | .     | .        | 0.00013 | .      |
| 2 | C36XCBC30     | (<0.002) | 0.02     | 0.04    | (<0.01)  | 0.02    | 0.003   | 0.02    | 1.81  | .        | .       | .      |

| Number        | Ag     | As      | C       | Cr      | Mg     | O     | P       | S        | Sb       | Si      | Zr    | Cu     |
|---------------|--------|---------|---------|---------|--------|-------|---------|----------|----------|---------|-------|--------|
| DH 0209       | .      | .       | .       | .       | .      | .     | .       | .        | .        | .       | .     | 87.07  |
| BAM 228       | .      | 0.024   | .       | .       | .      | .     | 0.019   | 0.036    | 0.078    | .       | .     | 85.34  |
| DH 0201       | .      | 0.076   | .       | .       | .      | .     | 0.046   | .        | 0.104    | .       | .     | 81.84  |
| DH 0208       | .      | .       | .       | 0.009   | .      | .     | 0.027   | .        | 0.083    | 0.052   | .     | 81.67  |
| DH 0206       | .      | 0.025   | .       | .       | .      | .     | 0.017   | 0.059    | 0.060    | 0.043   | .     | 83.05  |
| DH 0203       | .      | .       | .       | .       | .      | .     | .       | .        | 0.329    | 0.23    | .     | 76.88  |
| DH 0204       | .      | .       | .       | 0.009   | .      | .     | 0.007   | .        | 0.336    | 0.22    | .     | 77.00  |
| DH 0205       | .      | .       | .       | .       | .      | .     | 0.008   | .        | 0.350    | 0.22    | .     | 76.82  |
| IARM Cu464-21 | 0.0040 | 0.0011  | .       | .       | .      | .     | 0.0012  | .        | 0.0016   | .       | .     | 60.7   |
| DH 0207       | .      | .       | .       | .       | .      | .     | .       | .        | 0.014    | .       | .     | 65.66  |
| DH 0202       | .      | .       | .       | 0.003   | .      | .     | .       | 0.037    | 0.008    | .       | .     | 98.15  |
| C37X2180      | .      | .       | (0.002) | 0.033   | .      | .     | 0.0015  | 0.006    | .        | 0.56    | .     | 96.60  |
| C36XCBC40     | .      | .       | .       | 0.01    | .      | .     | .       | .        | .        | 0.09    | .     | .      |
| IARM 158B     | (0.01) | (0.001) | 0.002   | 0.85    | .      | 0.002 | 0.005   | 0.003    | 0.002    | 0.02    | .     | 98.5   |
| IARM 158C     | (0.01) | (0.001) | 0.002   | 1.04    | .      | 0.002 | 0.005   | 0.003    | 0.002    | 0.02    | .     | 98.5   |
| IARM Cu172-18 | .      | .       | .       | 0.0007  | .      | .     | (0.003) | .        | .        | 0.057   | .     | 97.7   |
| IARM Cu172-19 | 0.0011 | .       | .       | 0.0017  | 0.112  | .     | 0.0036  | 0.0010   | 0.0007   | 0.045   | .     | (97.6) |
| SRM 460       | .      | .       | .       | 0.005   | 0.005  | .     | .       | .        | .        | 0.077   | .     | (97.5) |
| IARM Cu954-21 | 0.0012 | .       | .       | 0.022   | 0.0013 | .     | 0.0031  | (0.0019) | (0.0019) | 0.029   | .     | 85.1   |
| SRM 459       | .      | .       | .       | 0.005   | 0.007  | .     | .       | .        | .        | 0.077   | .     | (97.7) |
| SRM 458       | .      | .       | .       | 0.004   | 0.003  | .     | .       | .        | .        | 0.035   | .     | (97.9) |
| C36XCBC20     | .      | .       | .       | 0.005   | .      | .     | .       | .        | .        | 0.05    | .     | .      |
| C37X2260      | .      | .       | 0.006   | 0.003   | .      | .     | 0.0025  | 0.0005   | .        | 3.54    | .     | 91.58  |
| IARM 160A     | 3.03   | .       | 0.003   | (<0.01) | .      | .     | (0.004) | (<0.003) | .        | (<0.01) | 0.40  | .      |
| IARM 159A     | 3.48   | .       | (0.002) | (<0.01) | .      | .     | (<0.01) | (<0.01)  | .        | (<0.01) | .     | .      |
| IARM Cu182-18 | 0.0008 | .       | .       | 1.09    | 0.0019 | .     | 0.0012  | 0.0018   | .        | (0.09)  | 0.063 | 98.8   |
| C36XCBC30     | .      | .       | .       | 0.005   | .      | .     | .       | .        | .        | 0.06    | .     | .      |

## CUPRO-NICKEL AND COPPER-NICKEL-SILVER CHIPS

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

C3X: 50 g units, typical analysis

others: 100 g units

| #    | Number        | Ni    | Zn      | Ag       | Al       | C        | Co      | Cr       | Cu     | Fe      | Mg       | Mn      | P       | Pb       | S        | Si       |
|------|---------------|-------|---------|----------|----------|----------|---------|----------|--------|---------|----------|---------|---------|----------|----------|----------|
| 1    | C36XCN60      | 33.46 | 0.026   | .        | (0.0024) | 0.0180   | 0.0440  | 1.10     | 63.35  | 0.878   | .        | 0.451   | 0.031   | 0.0066   | 0.0109   | 0.144    |
| 1    | IARM Cu715-20 | 31.0  | (0.007) | .        | (0.004)  | (0.005)  | (0.004) | .        | 67.4   | 0.51    | (0.005)  | 0.80    | (0.009) | (0.001)  | (0.002)  | 0.09     |
| 1    | BCS 180/2     | 30.35 | .       | .        | .        | 0.04     | .       | .        | 68.12  | 0.68    | .        | 0.75    | .       | (0.003)  | 0.006    | (0.018)  |
| 2    | C36XCN40      | 30.2  | .       | .        | .        | .        | 0.04    | .        | .      | 0.50    | 0.003    | 0.33    | .       | 0.015    | .        | 0.54     |
| 1    | C36XCN100     | 29.3  | .       | .        | .        | 0.064    | 0.081   | 1.59     | 61.01  | 4.28    | 0.0026   | 0.262   | (0.020) | 0.004    | 0.055    | 1.02     |
| 2    | C36XCN90      | 28.1  | .       | .        | .        | 0.02     | <0.01   | 2.19     | .      | 0.93    | .        | 1.20    | 0.016   | 0.05     | 0.002    | 0.56     |
| 1    | IARM 298A     | 19.6  | 5.8     | (0.009)  | (0.003)  | (0.013)  | (0.016) | (0.005)  | 65.3   | 0.73    | 0.0004   | 0.34    | (0.004) | 4.0      | (0.011)  | 0.019    |
| 1    | SRM 880       | 18.13 | 27.3    | .        | .        | .        | .       | .        | 54.51  | (0.004) | .        | <0.001  | .       | (0.002)  | .        | .        |
| 1    | C34XNS50      | 17.16 | (23)    | 0.0102   | 0.674    | .        | 0.197   | 0.0014   | 55.11  | 0.717   | 0.704    | 0.127   | 0.067   | 1.29     | .        | 0.158    |
| 1    | GBW 02104     | 14.87 | 20.81   | .        | .        | .        | .       | .        | Rem    | 0.47    | 0.033    | 0.32    | 0.0048  | 0.019    | .        | 0.146    |
| IARM | CuH130-18     | 14.6  | 0.0015  | (0.0010) | 2.76     | (0.006)  | 0.0037  | (0.002)  | 80.9   | 0.84    | 0.0013   | 0.449   | (0.004) | (0.0020) | (0.0010) | 0.024    |
| IARM | CuH191-18     | 14.5  | 0.0010  | (0.0020) | 1.60     | (0.004)  | (0.002) | (0.0013) | (79.6) | 0.96    | 0.0059   | 3.79    | (0.003) | (0.0030) | (0.002)  | (0.017)  |
| 1    | SRM 875       | 10.42 | 0.11    | .        | .        | (0.0035) | .       | .        | 87.83  | 1.45    | (0.0010) | <0.0007 | 0.0020  | 0.0092   | (0.0011) | (0.0008) |
| 1    | SRM 874       | 10.18 | (0.002) | .        | .        | (0.0023) | .       | .        | 88.49  | 1.22    | (0.0002) | 0.0020  | (0.002) | <0.0005  | (0.0011) | (0.0006) |
| 1    | IARM 84C      | 9.8   | 0.13    | (0.002)  | .        | (0.003)  | (0.006) | .        | 89.4   | 0.28    | .        | (0.04)  | (0.06)  | 0.047    | (0.006)  | (0.004)  |
| 2    | C36XCN10      | 9.5   | .       | .        | .        | .        | 0.10    | .        | .      | 1.94    | 0.015    | 1.91    | .       | 0.05     | .        | 0.19     |
| 2    | CURM 62.12    | 7.94  | 0.180   | .        | .        | .        | 0.081   | .        | 89.42  | 0.45    | 0.002    | 1.59    | .       | 0.053    | 0.034    | 0.109    |
| 2    | C34XNS10      | 7.67  | 29.0    | .        | .        | .        | .       | .        | .      | 0.05    | .        | 0.02    | 0.010   | 0.05     | <0.002   | 0.03     |

| # | Number         | Ni       | Zn       | Ag       | Al          | C      | Co       | Cr       | Cu       | Fe           | Mg       | Mn  | P | Pb | S | Si |
|---|----------------|----------|----------|----------|-------------|--------|----------|----------|----------|--------------|----------|-----|---|----|---|----|
|   | Number         | As       | B        | Bi       | N           | Nb     | O        | Sb       | Sn       | Ti           | Zr       |     |   |    |   |    |
|   | C36XCN60       | .        | (0.0015) | 0.0058   | .           | 0.514  | .        | .        | 0.0307   | 0.0066       | .        |     |   |    |   |    |
|   | IARM Cu715-20  | .        | .        | .        | .           | .      | .        | .        | (0.004)  | 0.073        | .        |     |   |    |   |    |
|   | BCS 180/2      | .        | .        | .        | .           | .      | .        | .        | .        | .            | .        |     |   |    |   |    |
|   | C36XCN40       | .        | .        | .        | .           | .      | .        | .        | .        | .            | .        |     |   |    |   |    |
|   | C36XCN100      | .        | 0.0029   | 0.014    | .           | 0.89   | .        | .        | .        | 0.03         | (0.055)  |     |   |    |   |    |
|   | C36XCN90       | .        | 0.005    | <0.01    | .           | .      | .        | .        | .        | 0.12         | 0.13     |     |   |    |   |    |
|   | IARM 298A      | (0.004)  | <0.005   | 0.014    | <0.001      | <0.01  | <0.005   | (0.04)   | 4.0      | .            | <0.01    |     |   |    |   |    |
|   | SRM 880        | .        | .        | .        | .           | .      | .        | .        | .        | .            | .        |     |   |    |   |    |
|   | C34XNS50       | .        | .        | .        | .           | .      | .        | .        | 0.194    | .            | .        |     |   |    |   |    |
|   | GBW 02104      | 0.0098   | .        | 0.0019   | .           | .      | .        | 0.0020   | .        | .            | .        |     |   |    |   |    |
|   | IARM CuH130-18 | (0.0060) | (0.0009) | (0.0020) | (0.0006)    | .      | (0.0006) | (0.0030) | (0.0010) | (0.0010)     | (0.0008) | CRM |   |    |   |    |
|   | IARM CuH191-18 | .        | (0.0030) | (0.0020) | .           | .      | .        | .        | (0.0020) | .            | .        | CRM |   |    |   |    |
|   | SRM 875        | (0.0010) | .        | (0.003)  | Cd: 0.0022  | (0.14) | <0.001   | (0.009)  | (0.0002) | Se: (0.0004) |          |     |   |    |   |    |
|   | SRM 874        | (0.0006) | .        | <0.0002  | Cd: <0.0002 | (0.06) | <0.001   | 0.007    | (0.0001) | Se: 0.00015  |          |     |   |    |   |    |
|   | IARM 84C       | .        | .        | .        | .           | .      | (0.0012) | 0.13     | .        | .            | .        |     |   |    |   |    |
|   | C36XCN10       | .        | .        | .        | .           | .      | .        | .        | .        | .            | .        |     |   |    |   |    |
|   | CURM 62.12     | .        | .        | .        | .           | .      | .        | .        | 0.111    | .            | .        |     |   |    |   |    |
|   | C34XNS10       | .        | .        | .        | .           | .      | .        | .        | .        | .            | .        |     |   |    |   |    |
|   | Number         | As       | B        | Bi       | N           | Nb     | O        | Sb       | Sn       | Ti           | Zr       |     |   |    |   |    |

## GUN METAL CHIPS

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

C3X: 50 g units, typical analysis

100 g units

| # | Number     | Sn   | Ni    | Pb    | Zn   | Cu    | Ag     | Al       | As     | Bi     | Cr         | Fe    | Mn         | P       | S      | Sb     | Si       |
|---|------------|------|-------|-------|------|-------|--------|----------|--------|--------|------------|-------|------------|---------|--------|--------|----------|
| 1 | BCS 207/2  | 9.74 | 0.28  | 0.70  | 1.60 | 87.35 | .      | 0.013    | 0.066  | 0.04   | .          | 0.029 | .          | (0.018) | .      | 0.10   | 0.016    |
| 1 | C33XGM70   | 9.23 | 0.36  | 0.78  | 2.06 | .     | .      | 0.03     | 0.12   | 0.08   | .          | 0.05  | 0.18       | 0.067   | 0.001  | 0.06   | 0.09     |
| 1 | C33XGM60   | 7.31 | 1.069 | 3.11  | 2.99 | 84.46 | 0.0114 | 0.136    | 0.175  | 0.037  | 0.0019     | 0.131 | 0.0912     | 0.0566  | 0.07   | 0.258  | 0.124    |
| 1 | BCS 183/4  | 7.27 | 1.30  | 3.15  | 3.47 | 84.08 | .      | (0.002)  | 0.13   | 0.005  | .          | 0.056 | (0.01)     | 0.090   | 0.11   | 0.23   | (0.01)   |
| 1 | C33XGM290  | 6.12 | 0.029 | 0.052 | 4.27 | 89.30 | 0.0025 | (0.0004) | 0.0017 | 0.0020 | 0.0004     | 0.011 | 0.0005     | 0.136   | 0.002  | 0.0015 | 0.0030   |
| 1 | CURM 71.33 | 4.96 | 0.938 | 6.84  | 3.60 | 83.60 | <0.002 | <0.001   | <0.001 | <0.002 | <0.0005    | 0.018 | <0.0005    | <0.001  | <0.001 | <0.002 | <0.005   |
| 1 | C33XGM50   | 4.47 | 0.697 | 4.81  | 5.80 | 83.38 | 0.0419 | 0.084    | 0.0342 | 0.0493 | Cd: 0.0034 | 0.254 | Co: 0.0453 | 0.042   | 0.0697 | 0.0505 | 0.0283   |
| 2 | CURM 71.31 | 4.06 | 1.98  | 6.07  | 3.98 | 83.00 | 0.046  | 0.023    | 0.110  | 0.030  | 0.039      | 0.118 | 0.037      | 0.060   | 0.059  | 0.128  | 0.020    |
| 2 | C33XGM80   | 4.03 | 0.115 | 6.78  | 6.21 | 82.3  | 0.105  | 0.0067   | .      | 0.0138 | .          | 0.298 | 0.0010     | 0.0213  | 0.0055 | .      | (0.0010) |
| 1 | C33XRB20   | 3.19 | 0.255 | 3.85  | 9.14 | 82.67 | 0.0029 | 0.0362   | 0.0211 | 0.101  | 0.0017     | 0.493 | 0.0028     | 0.0208  | 0.078  | 0.019  | 0.0116   |
| 1 | C33XGM40   | 2.50 | 2.05  | 5.20  | 7.17 | 82.6  | 0.0062 | <0.002   | 0.021  | 0.041  | .          | 0.051 | (0.0019)   | <0.005  | 0.33   | 0.042  | <0.005   |



## BRASS CHIPS

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

C31X: 50 g units, typical analysis

GBW: 50-100 g

all others: 100 g

| # | Number     | Zn    | Al       | As      | Bi       | Cu     | Fe      | Mn       | Ni       | P         | Pb       | S        | Sb       | Si       | Sn      |
|---|------------|-------|----------|---------|----------|--------|---------|----------|----------|-----------|----------|----------|----------|----------|---------|
| 1 | GBW 02101  | Rem   | 0.26     | .       | 0.0024   | 58.00  | 0.89    | 0.73     | .        | 0.0076    | 0.19     | .        | 0.0091   | .        | 0.54    |
| 1 | BAM 224    | 39.40 | 0.0012   | 0.0025  | 0.0006   | 57.40  | 0.136   | 1.70     | 0.038    | 0.0112    | 1.13     | 0.0004   | 0.0026   | (0.002)  | 0.066   |
| 1 | IPT 40     | 39.1  | 0.010    | .       | .        | 58.10  | 0.007   | .        | 0.0012   | .         | 2.45     | .        | 0.023    | .        | 0.18    |
| 1 | BAM 223    | 38.82 | (<0.002) | 0.0084  | 0.0018   | 58.74  | 0.091   | (<0.001) | 0.0214   | 0.0003    | 2.13     | 0.0021   | 0.0040   | (<0.003) | 0.089   |
| 1 | BCS 390    | 38.6  | 0.83     | .       | .        | 57.1   | 0.83    | 1.30     | 0.033    | .         | 1.04     | .        | .        | (0.023)  | 0.34    |
| 1 | IARM 75C   | 38.1  | (0.003)  | (0.005) | (0.0012) | 60.7   | (0.06)  | (0.0024) | (0.013)  | (0.004)   | 0.42     | (0.0015) | (0.007)  | (0.005)  | 0.69    |
| 1 | IARM 75B   | 38.0  | (0.005)  | (0.004) | (0.001)  | 60.63  | 0.06    | (0.003)  | 0.02     | 0.003     | 0.63     | (0.001)  | (0.004)  | (0.003)  | 0.59    |
| 1 | BAM 229    | 36.63 | .        | 0.00217 | .        | 63.334 | 0.01061 | .        | 0.01114  | (0.00106) | 0.0192   | .        | 0.00072  | .        | 0.00485 |
| 1 | BCS 179/2  | 35.8  | 2.22     | (0.008) | .        | 58.5   | 1.02    | 0.86     | 0.56     | .         | 0.35     | .        | .        | 0.044    | 0.70    |
| 2 | CURM 48.01 | 32.6  | <0.001   | 0.067   | 0.038    | 66.98  | 0.049   | <0.001   | 0.134    | 0.016     | 0.106    | .        | 0.047    | 0.041    | 0.002   |
| 2 | CURM 48.02 | 32.58 | 0.013    | 0.025   | 0.004    | 67.16  | 0.053   | 0.067    | <0.001   | 0.012     | 0.084    | 0.007    | 0.037    | 0.010    | 0.035   |
| 2 | CURM 48.05 | 31.0  | <0.002   | <0.001  | <0.0005  | 68.69  | 0.066   | 0.016    | 0.117    | 0.007     | <0.003   | 0.013    | <0.0005  | 0.026    | 0.083   |
| 1 | C31X B40   | 28.39 | .        | 0.046   | 0.0076   | 71.10  | 0.026   | 0.0074   | 0.0571   | (0.023)   | 0.064    | 0.0091   | 0.0076   | 0.025    | 0.073   |
| 2 | CURM 48.04 | 26.99 | <0.001   | 0.034   | 0.014    | 72.68  | 0.008   | 0.012    | 0.096    | 0.006     | 0.043    | 0.011    | 0.026    | 0.004    | 0.018   |
| 1 | IARM 313A  | 21.3  | (0.001)  | 0.0010  | (0.001)  | 75.4   | 0.011   | (0.001)  | (0.002)  | 0.09      | 0.042    | 0.0016   | 0.014    | 3.09     | 0.006   |
| 1 | C31X B70   | 14.51 | 0.0015   | 0.0030  | 0.060    | 85.17  | 0.100   | 0.0010   | 0.0251   | .         | 0.0338   | .        | 0.0089   | 0.013    | 0.0876  |
| 1 | IARM 151B  | 12.94 | 0.002    | (0.002) | .        | 84.0   | 0.025   | 0.002    | 0.011    | 0.003     | 0.013    | <0.001   | (0.001)  | 3.11     | 0.009   |
| 1 | C31XB80    | 9.52  | (0.0013) | 0.0081  | 0.031    | 90.28  | 0.0267  | 0.0012   | 0.0083   | .         | 0.072    | .        | 0.0108   | 0.0051   | 0.035   |
| 2 | C31XB950   | .     | (0.001)  | (0.01)  | (0.01)   | 95.0   | (0.01)  | (<0.001) | (<0.001) | (<0.001)  | (<0.001) | (<0.001) | (<0.001) | (0.01)   | 0.5     |

| Number | Ag | B | C | Cd | Co | Cr | Se |
|--------|----|---|---|----|----|----|----|
|--------|----|---|---|----|----|----|----|

|            |         |        |         |          |          |         |         |
|------------|---------|--------|---------|----------|----------|---------|---------|
| GBW 02101  | .       | .      | .       | .        | .        | .       | .       |
| BAM 224    | .       | .      | .       | .        | .        | .       | .       |
| IPT 40     | 0.002   | .      | .       | 0.049    | .        | .       | .       |
| BAM 223    | .       | .      | .       | .        | .        | .       | .       |
| BCS 390    | .       | .      | .       | (0.011)  | .        | .       | .       |
| IARM 75C   | (0.004) | <0.1   | (0.002) | (0.0015) | (0.0007) | 0.0009  | (0.005) |
| IARM 75B   | (0.005) | .      | (0.004) | .        | (0.003)  | .       | .       |
| BAM 229    | .       | .      | .       | .        | .        | 0.0034  | .       |
| BCS 179/2  | .       | .      | .       | (0.003)  | .        | .       | .       |
| CURM 48.01 | .       | .      | .       | <0.0003  | .        | .       | .       |
| CURM 48.02 | .       | .      | .       | <0.0005  | .        | 0.004   | .       |
| CURM 48.05 | .       | .      | .       | <0.0003  | .        | .       | .       |
| C31XB40    | .       | .      | .       | 0.0330   | 0.033    | 0.087   | .       |
| CURM 48.04 | .       | .      | .       | <0.0003  | .        | .       | .       |
| IARM 313A  | 0.0017  | 0.0008 | (0.002) | (0.0003) | (0.004)  | (0.001) | (0.001) |
| C31X B70   | .       | 0.0029 | .       | 0.0011   | 0.0124   | 0.0006  | .       |
| IARM 151B  | (0.01)  | .      | 0.005   | .        | .        | (0.003) | .       |
| C31XB80    | .       | 0.0021 | .       | .        | .        | .       | .       |
| C31XB950   | .       | .      | .       | .        | .        | .       | .       |

## BRASS CHIPS

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

C31X: 50 g units, typical analysis

others: 100 g units

| # | Number     | Cu    | Zn     | Al     | Fe     | Mn               | Ni      | Pb     | Sn     | As      | Bi     | Sb     | Si     |
|---|------------|-------|--------|--------|--------|------------------|---------|--------|--------|---------|--------|--------|--------|
| 2 | CURM 30.09 | 89.53 | <10.47 | <0.001 | 0.0005 | <0.0003          | <0.003  | <0.001 | 0.001  | <0.001  | <0.001 | <0.001 | <0.001 |
| 2 | CURM 43.02 | 76.21 | 20.82  | 2.40   | 0.128  | 0.035            | 0.068   | 0.064  | 0.060  | 0.083   | <0.001 | <0.001 | 0.038  |
| 2 | CURM 43.01 | 74.36 | 22.44  | 2.75   | 0.008  | 0.064            | 0.121   | <0.002 | 0.116  | 0.118   | <0.002 | <0.001 | 0.063  |
| 1 | NM 242     | 70.19 | 29.47  | .      | 0.062  | .                | 0.05    | 0.029  | 0.07   | P:0.005 | .      | .      | .      |
| 2 | CURM 30.05 | 69.48 | 30.53  | <0.001 | <0.003 | <0.0005          | <0.0005 | <0.002 | <0.001 | <0.001  | <0.003 | <0.005 | <0.001 |
| 1 | BCS 344    | 68.98 | 30.98  | .      | .      | .                | .       | .      | .      | .       | .      | .      | .      |
| 2 | CURM 30.20 | 61.46 | 35.71  | 2.32   | <0.005 | <0.001           | <0.001  | <0.002 | 0.40   | <0.001  | <0.002 | <0.002 | 0.17   |
| 2 | CURM 30.15 | 60.66 | <38.88 | <0.001 | 0.50   | <0.001           | <0.001  | <0.005 | 0.002  | <0.005  | <0.001 | <0.001 | <0.005 |
| 2 | CURM 30.16 | 60.53 | <38.33 | <0.001 | 1.14   | <0.001           | <0.001  | <0.005 | 0.002  | <0.005  | <0.001 | <0.001 | <0.005 |
| 1 | C31XB20    | 60.3  | .      | 0.19   | 0.10   | 0.31             | 0.22    | 0.31   | 0.18   | 0.14    | 0.04   | 0.10   | 0.01   |
| 2 | CURM 30.11 | 59.86 | <38.17 | <0.001 | 0.002  | 0.23             | 1.70    | 0.005  | 0.002  | <0.001  | <0.002 | <0.001 | <0.001 |
| 2 | CURM 30.24 | 58.33 | <38.32 | <0.001 | 0.001  | <0.001           | <0.001  | 3.31   | 0.002  | <0.001  | <0.002 | <0.001 | <0.001 |
| 2 | CURM 30.21 | 56.23 | 40.08  | 1.44   | 0.003  | <0.001           | <0.001  | 0.004  | 2.01   | <0.001  | .      | <0.002 | 0.213  |
| 2 | DSZU MCX01 | Rem   | 36.3   | .      | 0.01   | no uncertainties | 0.005   | 0.0002 | 0.0001 | .       | .      | 0.0005 | .      |

## LEADED AND MANGANESE BRASS CHIPS

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

C31X: 50 g units, typical analysis

others: 100 g units

| # | Number        | Pb    | Mn       | Zn    | Al       | As     | Fe    | Ni     | P       | Sb      | Si      | Sn     | Cu    |
|---|---------------|-------|----------|-------|----------|--------|-------|--------|---------|---------|---------|--------|-------|
| 1 | IARM Cu844-18 | 6.7   | .        | 9.5   | 0.0010   | 0.0041 | 0.030 | 0.209  | 0.0018  | 0.037   | (0.001) | 3.08   | 80.5  |
| 1 | IARM Cu836-18 | 4.9   | .        | 5.09  | .        | 0.0098 | 0.049 | 0.423  | 0.028   | 0.103   | (0.003) | 5.02   | 84.5  |
| 2 | CURM H30.24   | 3.02  | <0.001   | 37.92 | <0.001   | <0.001 | 0.005 | <0.001 | .       | <0.001  | <0.001  | <0.001 | 58.87 |
| 1 | C31X 783510   | 2.91  | .        | 35.20 | 0.0146   | 0.0011 | 0.134 | 0.144  | 0.0197  | 0.0047  | 0.053   | 0.407  | 60.96 |
| 1 | IARM Cu360-18 | 2.73  | 0.0131   | 35.1  | (0.010)  | 0.026  | 0.27  | 0.0120 | (0.003) | 0.012   | (0.010) | 0.29   | 61.6  |
| 1 | NM 241        | 2.64  | 0.005    | 38.92 | .        | .      | 0.11  | 0.04   | 0.004   | .       | .       | 0.14   | 58.1  |
| 1 | NM 412        | 2.56  | .        | 38.99 | .        | .      | 0.09  | .      | .       | .       | .       | 0.12   | 58.18 |
| 1 | BCS 385       | 2.24  | (<0.005) | 38.5  | (<0.005) | .      | 0.15  | 0.13   | .       | (<0.01) | .       | 0.27   | 58.7  |
| 2 | C31X 783520   | 2.08  | .        | 32.88 | 0.199    | 0.046  | 0.077 | 0.0088 | 0.0149  | 0.053   | .       | 0.202  | 64.34 |
| 1 | C31X 783550   | 1.64  | .        | 6.23  | 0.077    | 0.104  | 0.126 | 0.249  | 0.018   | 0.114   | .       | 0.116  | 91.25 |
| 2 | C31X MNB10    | 1.44  | 0.188    | 29.37 | 0.596    | .      | 0.268 | 0.053  | .       | .       | .       | 0.105  | 67.77 |
| 1 | C31X 783530   | 1.376 | .        | 37.51 | 0.163    | 0.110  | 0.170 | 0.251  | 0.0391  | 0.084   | 0.038   | 0.121  | 60.07 |
| 1 | C31X 783540   | 1.03  | .        | 30.09 | 0.561    | 0.206  | 0.020 | 0.492  | 0.125   | 0.188   | .       | 0.046  | 67.11 |
| 1 | C31X MNB20    | 1.02  | 2.23     | 32.19 | 0.268    | .      | 0.66  | 0.118  | .       | .       | 0.233   | 0.319  | 63.02 |
| 1 | C31X MNB50    | 0.127 | 0.243    | 37.91 | 3.35     | .      | 0.56  | 1.31   | .       | .       | 0.49    | 1.75   | 54.14 |

| Number        | Ag     | B        | Bi       | C       | Cd       | Co     | Cr      | S        | Se       |
|---------------|--------|----------|----------|---------|----------|--------|---------|----------|----------|
| IARM Cu844-18 | 0.0133 | .        | 0.030    | .       | (0.0008) | 0.0015 | .       | 0.023    | 0.0040   |
| IARM Cu836-18 | 0.0292 | .        | 0.035    | .       | 0.0014   | 0.0026 | .       | 0.041    | 0.0016   |
| CURM H30.24   | .      | .        | <0.001   | .       | .        | .      | .       | O: (0.2) | .        |
| C31X 783510   | .      | 0.0005   | 0.0141   | .       | .        | 0.029  | .       | (0.001)  | (0.0045) |
| IARM Cu360-18 | 0.011  | .        | (0.0023) | (0.003) | 0.0034   | 0.0010 | (0.003) | .        | .        |
| NM 241        | .      | .        | .        | .       | .        | .      | .       | .        | .        |
| NM 412        | .      | .        | .        | .       | .        | .      | .       | .        | last     |
| BCS 385       | .      | .        | .        | .       | .        | .      | .       | .        | .        |
| C31X 783520   | .      | .        | .        | .       | .        | .      | .       | .        | .        |
| C31X 783550   | .      | .        | .        | .       | .        | .      | .       | .        | .        |
| C31X MNB10    | .      | .        | .        | .       | .        | .      | .       | .        | .        |
| C31X 783530   | .      | (0.0015) | 0.0116   | .       | 0.0039   | 0.0064 | .       | .        | 0.004    |
| C31X 783540   | .      | .        | .        | .       | .        | .      | .       | .        | .        |
| C31X MNB20    | .      | .        | .        | .       | .        | .      | .       | .        | .        |
| C31X MNB50    | .      | .        | .        | .       | .        | .      | .       | .        | .        |

## ADMIRALTY &amp; NAVAL BRASS CHIPS

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

C31X: 50 g units, typical analysis

others: 100 g units

| # | Number        | Sn    | Pb     | Zn    | Cu    | Al       | As      | Bi       | Co        | Fe     | Mn       | Ni      | P       | S        | Sb       | Si       |
|---|---------------|-------|--------|-------|-------|----------|---------|----------|-----------|--------|----------|---------|---------|----------|----------|----------|
| 2 | CURM 42.25    | 2.72  | 0.0023 | 39.20 | 57.78 | 0.021    | 0.118   | <0.001   | .         | 0.003  | 0.169    | <0.001  | 0.050   | 0.005    | <0.001   | <0.001   |
| 2 | C42.25        | 2.2   | <0.01  | rem   | 58.5  | 0.02     | 0.10    | <0.002   | .         | <0.005 | 0.13     | <0.005  | 0.06    | 0.001    | <0.005   | <0.002   |
| 2 | C31XNB40      | 2.07  | 0.09   | .     | 63.8  | 0.29     | 0.025   | 0.09     | .         | 0.11   | 0.02     | 0.16    | 0.20    | 0.002    | 0.39     | 0.22     |
| 2 | CURM 42.23    | 1.63  | 0.575  | 22.13 | 74.36 | 0.008    | 0.168   | 0.034    | .         | 0.354  | 0.019    | 0.168   | 0.128   | 0.045    | 0.356    | 0.015    |
| 1 | IARM Cu485-18 | 0.759 | 1.76   | 36.5  | 60.8  | (0.002)  | (0.055) | .        | .         | 0.062  | 0.0013   | 0.013   | .       | .        | (0.0018) | (0.003)  |
| 1 | IARM 76D      | 0.73  | 1.69   | 36.8  | 60.7  | (0.002)  | (0.004) | 0.0011   | 0.0010    | 0.013  | 0.0006   | (0.003) | 0.0018  | 0.0012   | 0.0040   | 0.0037   |
| 1 | IARM Cu486-18 | 0.692 | 1.31   | 36.5  | 61.2  | (0.0030) | (0.025) | (0.0004) | Cd:0.0009 | 0.036  | (0.0003) | 0.032   | (0.004) | (0.0030) | (0.0050) | (0.0020) |
| 2 | CURM 42.21    | 0.60  | 0.259  | 31.61 | 66.78 | 0.003    | <0.003  | 0.013    | .         | 0.119  | <0.001   | 0.120   | 0.087   | 0.034    | 0.25     | 0.15     |
| 1 | IARM 76C      | 0.66  | 1.6    | 37.2  | 60.4  | (0.004)  | (0.003) | .        | .         | 0.013  | (0.001)  | 0.003   | 0.003   | (0.001)  | (0.004)  | (0.003)  |
| 2 | C42.21        | 0.54  | 0.23   | rem   | 66.1  | 0.005    | <0.005  | 0.012    | .         | 0.06   | <0.005   | 0.096   | 0.081   | 0.007    | 0.19     | 0.081    |
| 1 | C31X NB10     | 0.535 | 0.504  | 29.73 | 68.35 | (0.0004) | 0.161   | 0.0065   | (0.0006)  | 0.0367 | 0.0508   | 0.520   | 0.0223  | 0.0024   | 0.0057   | 0.004    |

## SILICON BRASS CHIPS

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

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

50 g units

| # | Number        | Si   | Zn    | Cu     | Al      | Fe    | Mn    | Ni     | Pb    | Sn    | As     | Co    | Cr     | Mg       | P       | S       | Sb     | Bi*  | Cd*  |
|---|---------------|------|-------|--------|---------|-------|-------|--------|-------|-------|--------|-------|--------|----------|---------|---------|--------|------|------|
| 1 | C31XWSB50     | 6.07 | 0.343 | 90.06  | 0.218   | 0.79  | 0.496 | 0.492  | 0.100 | 1.050 | 0.0284 | 0.057 | 0.0087 | 0.0012   | 0.080   | 0.0081  | 0.124  | 298  | 47   |
| 1 | C31XWSB10     | 5.95 | 7.55  | (82.7) | 1.90    | 0.100 | 0.099 | 0.076  | 0.55  | 0.23  | 0.13   | 0.34  | 0.017  | 0.003    | 0.040   | <0.002  | 0.03   | .    | .    |
| 1 | C31XWSB40     | 4.40 | 5.61  | 86.09  | 0.290   | 0.592 | 1.45  | 0.228  | 0.204 | 0.802 | 0.0286 | 0.096 | 0.103  | 0.006    | 0.042   | (0.002) | 0.0335 | 318  | 12   |
| 1 | C31XWSB40     | 4.58 | 5.05  | 85.7   | 0.48    | 0.77  | 1.85  | 0.25   | 0.168 | 0.80  | 0.040  | 0.109 | 0.045  | (0.0007) | 0.060   | <0.005  | 0.067  | .    | .    |
| 1 | IARM Cu693-21 | 3.1  | 21.9  | 74.8   | 0.00043 | 0.028 | 0.041 | 0.0019 | 0.030 | 0.022 | .      | .     | 0.0006 | .        | 0.099   | .       | .      | .    | .    |
| 2 | C31XWSB60A    | 2.61 | 1.12  | Rem    | 0.10    | 0.05  | 0.29  | 0.37   | 0.96  | 0.39  | 0.01   | 0.05  | .      | 0.004    | 0.06    | 0.01    | 0.10   | 100g | last |
| 1 | C31XWSB60D    | 2.48 | 0.881 | 94.74  | 0.059   | 0.032 | 0.248 | 0.117  | 0.95  | 0.056 | 0.0051 | 0.247 | 0.058  | (0.001)  | (0.020) | (0.002) | 0.007  | 56   | 71   |

**BRONZE CHIPS**

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

SRM: 150 g chips

all others: 100 g chips

| # | Number        | Sn      | Al        | Bi      | Cu     | Fe       | Mn       | Ni     | P        | Pb       | Si       | Zn      |
|---|---------------|---------|-----------|---------|--------|----------|----------|--------|----------|----------|----------|---------|
| 1 | IARM 310A     | 10.56   | 0.0009    | (0.001) | 89.2   | 0.006    | (0.001)  | 0.043  | 0.094    | 0.064    | (0.001)  | 0.10    |
| 1 | IARM 92C      | 9.65    | 0.0013    | (0.011) | 80.35  | (0.008)  | (0.0016) | 0.170  | 0.073    | 9.42     | (0.0019) | 0.146   |
| 1 | IARM Cu903-18 | 8.3     | (0.0010)  | .       | 86.5   | (0.012)  | (0.0004) | 0.41   | (0.060)  | (0.066)  | (0.0040) | 4.6     |
| 1 | IARM Cu932-18 | 6.82    | (0.0007)  | 0.094   | 81.2   | 0.070    | .        | 0.454  | 0.040    | 7.95     | .        | 3.44    |
| 1 | IARM 91E      | 6.69    | 0.0015    | 0.109   | 81.3   | 0.110    | 0.0007   | 0.300  | 0.026    | 7.59     | 0.0021   | 3.68    |
| 1 | BAM 227       | 6.01    | (<0.0001) | 0.0088  | 85.57  | 0.129    | .        | 0.284  | (0.0002) | 4.12     | (<0.01)  | 3.46    |
| 1 | IARM CuMB1-18 | 5.58    | (0.0012)  | 4.51    | 88.98  | (0.0016) | .        | 0.58   | 0.049    | 0.015    | .        | 0.47    |
| 1 | IARM 267A     | 4.95    | 0.003     | (0.005) | 87.8   | 0.019    | (0.002)  | 5.1    | 0.037    | 0.026    | 0.003    | 2.06    |
| 1 | IARM 77B      | 4.66    | (0.001)   | (0.004) | 95.2   | 0.002    | (0.002)  | 0.002  | 0.148    | 0.016    | (0.003)  | 0.007   |
| 1 | SRM 158A      | 0.96    | 0.46      | .       | 90.93  | 1.23     | 1.11     | 0.001  | 0.026    | 0.097    | 3.03     | 2.08    |
| 1 | IARM 83B      | 0.85    | 0.002     | .       | 58.7   | 0.97     | 0.13     | 0.010  | 0.004    | 0.017    | (0.003)  | 39.3    |
| 1 | IARM 88C      | 0.147   | 5.79      | 0.004   | 64.5   | 2.98     | 2.99     | 0.276  | 0.020    | 0.133    | 0.091    | 22.86   |
| 1 | IARM 80D      | 0.093   | 9.67      | (0.004) | (81.7) | 2.99     | 0.346    | 5.01   | (0.005)  | (0.005)  | 0.025    | (0.007) |
| 1 | IARM 72B      | 0.029   | .         | .       | 90.08  | 0.007    | .        | 0.004  | 0.005    | 1.99     | (0.002)  | 7.81    |
| 1 | IARM 79B      | 0.017   | 9.19      | (0.003) | 88.4   | 2.13     | 0.16     | 0.075  | 0.005    | (0.003)  | 0.019    | 0.013   |
| 1 | IARM 82B      | 0.017   | 0.002     | .       | 95.3   | 0.080    | 1.04     | 0.011  | 0.004    | 0.011    | 3.22     | 0.38    |
| 1 | IARM 79C      | 0.010   | 9.20      | .       | 87.6   | 2.28     | 0.20     | 0.55   | 0.006    | <0.005   | 0.033    | 0.014   |
| 2 | IARM 94A      | (<0.01) | 10.63     | .       | .      | 4.04     | 0.16     | 4.37   | <0.01    | 0.009    | <0.01    | 0.09    |
| 1 | IARM Cu647-18 | (<0.01) | 0.0027    | CRM     | (96.5) | (0.0056) | (0.099)  | 2.69   | (<0.02)  | (<0.007) | 0.70     | (0.005) |
| 1 | IARM 93B      | 0.009   | 10.33     | .       | 85.4   | 3.87     | 0.024    | 0.088  | (0.002)  | 0.012    | 0.024    | 0.17    |
| 1 | IARM Cu655-18 | 0.009   | (0.0020)  | .       | 95.5   | 0.055    | 0.98     | 0.0034 | (0.0020) | (0.018)  | 3.15     | 0.149   |
| 1 | IARM 94B      | (0.003) | 10.8      | .       | 80.6   | 3.99     | 0.071    | 4.31   | 0.011    | 0.004    | 0.028    | 0.14    |

| # | Number | Sn | Al | Bi | Cu | Fe | Mn | Ni | P | Pb | Si | Zn |
|---|--------|----|----|----|----|----|----|----|---|----|----|----|
|---|--------|----|----|----|----|----|----|----|---|----|----|----|

| Number        | Ag        | As          | C        | Co          | Cr        | S        | Sb       |
|---------------|-----------|-------------|----------|-------------|-----------|----------|----------|
| IARM 310A     | 0.0020    | (0.002)     | (0.005)  | 0.0011      | (0.001)   | 0.0021   | (0.002)  |
| IARM 92C      | (0.05)    | (0.005)     | (0.002)  | (0.0007)    | (0.0007)  | 0.026    | 0.078    |
| IARM Cu903-18 | 0.0059    | (0.0010)    | (0.0020) | 0.0019      | Cr:0.0013 | (0.0017) | (0.002)  |
| IARM Cu932-18 | 0.019     | 0.0073      | (0.0025) | (0.0024)    | Cd:0.0007 | 0.031    | 0.31     |
| IARM 91E      | 0.015     | 0.008       | (0.003)  | 0.0024      | (0.0008)  | 0.028    | 0.168    |
| BAM 227       | Se:0.0028 | 0.081       | .        | Te:0.0012   | .         | 0.122    | 0.160    |
| IARM CuMB1-18 | .         | O:(0.003)   | .        | Se:(0.0025) | .         | (0.0020) | (0.003)  |
| IARM 267A     | (0.002)   | (0.004)     | (0.003)  | (0.002)     | (0.001)   | 0.0014   | <0.03    |
| IARM 77B      | (0.002)   | (0.001)     | 0.003    | .           | .         | 0.002    | 0.005    |
| SRM 158A      | .         | .           | .        | .           | .         | .        | .        |
| IARM 83B      | (0.002)   | .           | 0.003    | (0.003)     | (0.003)   | (0.001)  | (0.004)  |
| IARM 88C      | 0.004     | (0.007)     | 0.005    | 0.0010      | 0.008     | 0.0010   | (0.003)  |
| IARM 80D      | (0.04)    | (0.009)     | (0.004)  | 0.022       | (0.005)   | (0.003)  | <0.02    |
| IARM 72B      | (0.002)   | (0.003)     | 0.002    | .           | .         | 0.0015   | 0.006    |
| IARM 79B      | 0.002     | .           | 0.002    | (0.002)     | (0.003)   | (0.001)  | .        |
| IARM 82B      | .         | <0.002      | (0.003)  | .           | 0.004     | 0.003    | <0.01    |
| IARM 79C      | <0.005    | 0.003       | 0.003    | <0.005      | (0.002)   | <0.001   | <0.005   |
| IARM 94A      | .         | (<0.01)     | (0.014)  | 0.01        | .         | (0.003)  | (<0.01)  |
| IARM Cu647-18 | .         | Mg:(0.0086) | .        | Zr:0.044    | .         | .        | .        |
| IARM 93B      | (0.004)   | <0.01       | 0.007    | 0.006       | (0.007)   | 0.002    | (0.012)  |
| IARM Cu655-18 | (0.0015)  | (0.0004)    | (0.0100) | .           | .         | (0.0010) | (0.0008) |
| IARM 94B      | 0.017     | <0.01       | (0.006)  | 0.011       | 0.017     | 0.002    | (0.011)  |

Cd: 0.0011 Se: 0.004

| Number | Ag | As | C | Co | Cr | S | Sb |
|--------|----|----|---|----|----|---|----|
|--------|----|----|---|----|----|---|----|

## ALUMINUM BRONZE CHIPS

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

C32X: typical analysis

| # | Number        | Al    | Cu     | Fe    | Mn     | Ni      | P       | Pb    | Si      | Sn     | Zn    | As       | C         | Cr      | Mg        | Sb       | Units |
|---|---------------|-------|--------|-------|--------|---------|---------|-------|---------|--------|-------|----------|-----------|---------|-----------|----------|-------|
| 1 | C32XALB30     | 11.56 | 79.94  | 4.15  | 0.374  | 3.72    | 0.025   | 0.11  | 0.135   | 0.10   | 0.325 | 0.0060   | .         | 0.0089  | 0.088     | .        | 50 g  |
| 2 | CURM 52.52    | 10.69 | 79.26  | 6.02  | 0.145  | 3.56    | .       | 0.074 | 0.011   | 0.044  | 0.094 | .        | .         | 0.004   | 0.007     | .        | 100 g |
| 1 | IARM Cu954-20 | 10.48 | 84.7   | 3.84  | 0.54   | 0.30    | 0.009   | 0.018 | 0.029   | 0.010  | 0.068 | 0.0007   | .         | 0.028   | 0.0012    | 0.0018   | 100 g |
| 1 | IARM Cu955-18 | 10.37 | 80.8   | 3.50  | 0.77   | 4.5     | (0.013) | 0.006 | (0.022) | 0.0056 | 0.038 | (0.0020) | (0.0080)  | 0.0027  | Ag:0.0019 | Cr:0.008 | 100 g |
| 1 | IARM Cu954-18 | 10.36 | 84.7   | 4.23  | 0.29   | 0.134   | (0.016) | 0.016 | 0.025   | 0.047  | 0.141 | (0.0030) | Bi:0.0011 | .       | (0.0013)  | Co:0.017 | 100 g |
| 1 | C32XALB10     | 10.3  | (80.4) | 3.00  | 0.094  | 5.90    | 0.016   | 0.218 | 0.132   | 0.025  | 0.035 | (0.002)  | .         | 0.011   | 0.0013    | .        | 50 g  |
| 1 | IARM 334B     | 9.91  | 80.8   | 3.7   | 0.60   | 4.70    | 0.005   | 0.006 | 0.075   | 0.019  | 0.122 | (0.003)  | 0.005     | (0.004) | (0.001)   | (0.004)  | 100 g |
| 1 | IARM 334A     | 9.76  | 80.7   | 3.82  | 0.69   | 4.77    | (0.005) | 0.010 | 0.073   | 0.025  | 0.110 | (0.004)  | 0.0058    | (0.01)  | (0.001)   | 0.004    | 100 g |
| 1 | BCS 304/1     | 9.71  | 80.23  | 4.64  | 0.12   | 4.82    | .       | 0.010 | 0.08    | 0.03   | 0.31  | .        | .         | .       | (0.01)    | .        | 100 g |
| 1 | C32XALB20 *   | 9.6   | (80.7) | 4.1   | 0.055  | 4.6     | 0.045   | 0.26  | 0.29    | 0.095  | 0.25  | 0.007    | 0.01      | 0.003   | 0.003     | .        | 50 g  |
| 2 | CURM 51.14    | 8.42  | 88.57  | 0.72  | 0.55   | 0.219   | 0.12    | 0.003 | 0.286   | 0.113  | 0.656 | 0.44     | .         | .       | .         | .        | 100 g |
| 2 | C32XALB80     | 8.1   | (75.3) | 6.70  | 0.31   | 6.79    | 0.14    | 0.009 | 0.69    | 0.58   | 1.02  | 0.17     | .         | 0.045   | (0.002)   | .        | 50 g  |
| 1 | C32XALB60     | 8.05  | 81.98  | 2.53  | 0.904  | 5.31    | 0.0101  | 0.096 | 0.295   | 0.147  | 0.685 | 0.012    | (0.0025)  | 0.0097  | 0.0019    | .        | 50 g  |
| 1 | C32XALB40     | 7.87  | 79.61  | 3.55  | 1.028  | 7.03    | 0.036   | 0.120 | 0.252   | 0.085  | 0.264 | 0.0130   | .         | 0.022   | 0.153     | .        | 50 g  |
| 2 | CURM 52.54    | 7.85  | 81.59  | 3.31  | 1.20   | 5.40    | .       | 0.086 | 0.022   | 0.135  | 0.39  | .        | .         | <0.005  | <0.005    | .        | 100 g |
| 2 | C32XALB50     | 7.6   | .      | 1.95  | 1.39   | 5.11    | .       | 0.04  | 0.03    | 0.03   | 0.16  | .        | .         | .       | 0.018     | .        | 50 g  |
| 2 | CURM 51.13    | 7.30  | 88.79  | 1.81  | 0.898  | 0.057   | 0.022   | 0.104 | 0.174   | 0.270  | 0.335 | 0.215    | .         | .       | .         | .        | 100 g |
| 1 | IARM Cu642-18 | 6.5   | 90.0   | 0.039 | 0.0024 | (0.014) | (0.009) | 0.019 | 1.96    | 0.019  | 1.19  | .        | .         | .       | .         | .        | 100 g |
| 2 | CURM 51.12    | 6.36  | 88.29  | 2.87  | 1.33   | 0.112   | <0.001  | 0.219 | 0.005   | 0.196  | 0.45  | 0.111    | .         | .       | .         | .        | 100 g |
| 2 | CURM 51.11    | 5.27  | 93.95  | 0.060 | <0.001 | 0.012   | 0.035   | 0.33  | 0.159   | 0.027  | 0.111 | <0.001   | .         | .       | .         | .        | 100 g |

\* Provisional Analysis

## LEADED BRONZE CHIPS

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

C32X: typical analysis 50 g chips

IPT 74: 60 g chips

IPT 10B: 80 g chips

all others: 100 g chips

| # | Number     | Pb    | Sn     | Zn    | Cu     | Al      | As     | Bi      | Fe      | Mn      | Ni      | P      | S       | Sb      | Si       | Other      |
|---|------------|-------|--------|-------|--------|---------|--------|---------|---------|---------|---------|--------|---------|---------|----------|------------|
| 1 | IARM 184A  | 19.0  | 6.0    | 0.37  | (74)   | 0.0016  | 0.010  | (0.03)  | (0.003) | (0.002) | 0.30    | 0.008  | 0.021   | 0.27    | (0.002)  | .          |
| 1 | GBW 02140  | 17.62 | 4.24   | 5.37  | 72.25  | .       | .      | .       | .       | .       | .       | .      | .       | .       | .        | .          |
| 2 | CURM 50.01 | 11.13 | 9.01   | 0.91  | 75.38  | <0.0005 | .      | 0.024   | 0.074   | <0.001  | 1.93    | 0.069  | 0.188   | 0.50    | <0.001   | Ag: 0.19   |
| 2 | CURM 50.02 | 10.67 | 10.34  | 0.006 | 78.84  | <0.001  | <0.002 | <0.0005 | <0.001  | <0.0005 | <0.0005 | 0.046  | <0.001  | <0.0005 | <0.002   | .          |
| 2 | CURM 50.04 | 9.94  | 11.30  | 0.66  | 76.11  | 0.014   | 0.06   | 0.10    | 0.10    | 0.028   | 1.10    | 0.035  | 0.14    | 0.50    | 0.011    | .          |
| 1 | C32XLB20   | 9.42  | 12.38  | 0.27  | (76.8) | 0.04    | 0.017  | 0.009   | 0.40    | 0.22    | 0.22    | 0.04   | (0.001) | 0.023   | <0.01    | .          |
| 2 | C32XLB30   | 9.4   | (75.3) | <0.01 | .      | <0.01   | 0.02   | 0.025   | <0.01   | <0.01   | 1.52    | 0.006  | 0.020   | 0.04    | .        | .          |
| 1 | BCS 364    | 9.24  | 9.36   | 0.13  | 80.7   | (0.002) | (0.07) | (0.01)  | (0.005) | .       | 0.28    | 0.057  | (0.06)  | 0.18    | (0.005)  | .          |
| 2 | CURM 50.03 | 8.86  | 8.41   | 1.72  | 77.42  | 0.005   | 0.11   | 0.051   | 0.018   | 0.037   | 2.89    | 0.159  | 0.064   | 0.24    | 0.005    | .          |
| 1 | C32X LB130 | 7.59  | 5.80   | 0.520 | 84.87  | 0.0011  | 0.131  | 0.0721  | 0.0160  | 0.0005  | 0.828   | 0.0161 | 0.115   | 0.0186  | (0.0035) | Ag: 0.0063 |
| 1 | IPT 74     | 6.24  | 2.84   | 9.88  | 80.41  | .       | 0.002  | .       | 0.315   | .       | 0.15    | 0.002  | 0.056   | 0.016   | .        | Cd: 0.013  |
| 1 | GBW 02139  | 6.16  | 4.08   | 6.96  | 81.45  | .       | .      | .       | .       | .       | .       | .      | .       | .       | .        | .          |
| 2 | C32X SN10  | 5.15  | 11.75  | 0.804 | 79.96  | (0.002) | .      | .       | 0.0034  | 0.0018  | 2.17    | 0.0025 | 0.0064  | 0.006   | .        | .          |
| 1 | IPT 10B    | 4.74  | 4.61   | 4.73  | 85.2   | .       | 0.019  | .       | 0.211   | .       | 0.33    | 0.003  | 0.068   | 0.114   | .        | .          |
| 1 | C32X SN20  | 1.97  | 13.54  | 1.28  | 82.8   | 0.0004  | .      | .       | 0.0332  | 0.0043  | 0.104   | 0.082  | 0.0326  | 0.100   | .        | .          |
| 1 | C32X SN40  | 1.059 | 18.80  | 0.342 | 77.88  | 0.034   | 0.0468 | .       | 0.060   | 0.0065  | 0.556   | 0.988  | 0.040   | 0.102   | (0.004)  | Co: 0.151  |
| 1 | C32X SN30  | 0.270 | 16.51  | 0.43  | 81.32  | 0.0004  | .      | .       | 0.0782  | 0.0026  | 0.513   | 0.297  | 0.096   | 0.260   | .        | .          |

## PHOSPHOR BRONZE CHIPS

mass % except \* which is mg/kg

C32X: 50g typical analysis

GBW, BCS: 150 g

others: 100 g

| # | Number        | P      | Sn    | Zn     | Cu     | Al       | As       | C        | Fe       | Mg      | Mn        | Ni      | Pb       | S        | Sb       | Se* | Si      |
|---|---------------|--------|-------|--------|--------|----------|----------|----------|----------|---------|-----------|---------|----------|----------|----------|-----|---------|
| 2 | CURM 54.03    | 0.954  | 7.30  | 0.003  | 91.74  | <0.001   | 0.006    | .        | 0.005    | <0.0003 | <0.0005   | 0.0019  | 0.003    | <0.001   | 0.0007   | .   | <0.002  |
| 2 | C32XPB10      | 0.84   | 11.0  | 0.02   | .      | <0.01    | 0.05     | .        | <0.01    | .       | <0.01     | 0.12    | 0.37     | .        | 0.07     | .   | 0.01    |
| 1 | C32XPB110     | 0.72   | 3.00  | 1.93   | 89.6   | 0.068    | 0.175    | .        | 0.493    | <0.002  | 0.80      | 1.01    | 1.02     | 0.016    | 0.54     | .   | 0.52    |
| 1 | BCS 374       | 0.59   | 9.80  | 0.006  | 89.5   | (0.005)  | .        | .        | (0.005)  | .       | .         | 0.014   | 0.064    | 0.012    | (0.01)   | .   | (0.005) |
| 1 | GBW 02133     | 0.423  | 5.79  | .      | 93.72  | .        | .        | .        | .        | .       | .         | .       | .        | .        | .        | .   | 100g    |
| 2 | C32XPB120     | 0.42   | 4.64  | 0.49   | (92.0) | <0.001   | 0.098    | .        | 0.31     | <0.001  | 0.39      | 0.51    | 0.47     | (0.010)  | 0.024    | 55  | 0.01    |
| 1 | GBW 02136     | 0.372  | 5.79  | .      | 93.70  | .        | .        | .        | 0.011    | .       | .         | .       | 0.021    | .        | 0.0058   | .   | 0.0012  |
| 1 | SRM 872       | 0.26   | 4.16  | 4.0    | 87.36  | .        | .        | .        | (0.003)  | .       | .         | .       | 4.13     | .        | .        | .   | .       |
| 1 | GBW 02134     | 0.238  | 6.82  | .      | 92.85  | .        | .        | .        | .        | .       | .         | .       | .        | .        | .        | .   | .       |
| 1 | C32XPB130     | 0.22   | 6.96  | 0.27   | (91.5) | <0.001   | 0.052    | .        | 0.14     | <0.001  | 0.096     | 0.26    | 0.25     | (0.03)   | 0.12     | .   | <0.005  |
| 1 | IARM Cu510-18 | (0.16) | 4.54  | 0.0034 | 95.2   | (0.0004) | (0.0007) | (0.0018) | (0.0008) | .       | Ag:0.0019 | (0.017) | (0.0027) | (0.0020) | (0.0008) | .   | O:0.011 |
| 2 | CURM 54.02    | 0.107  | 5.53  | 0.410  | 92.87  | 0.020    | 0.023    | .        | 0.102    | 0.0020  | 0.101     | 0.109   | 0.663    | 0.030    | 0.026    | .   | 0.012   |
| 1 | GBW 02135     | 0.106  | 7.92  | .      | 91.73  | .        | .        | .        | .        | .       | .         | .       | .        | .        | .        | .   | .       |
| 1 | SRM 871       | 0.082  | 8.14  | 0.025  | 91.68  | .        | .        | .        | <0.001   | .       | .         | .       | 0.010    | .        | .        | .   | .       |
| 1 | IARM Cu544-18 | 0.069  | 4.14  | 3.80   | 88.0   | .        | .        | .        | (0.010)  | .       | .         | 0.019   | 3.92     | .        | .        | .   | .       |
| 2 | CURM 54.01    | 0.053  | 3.17  | 0.346  | 95.42  | 0.040    | 0.044    | .        | 0.028    | 0.008   | 0.158     | 0.348   | 0.307    | 0.023    | 0.070    | .   | 0.039   |
| 1 | C32XPB140     | 0.032  | 8.58  | 0.029  | 91.0   | (0.001)  | 0.021    | .        | 0.005    | <0.001  | <0.002    | 0.092   | 0.051    | 0.086    | 0.061    | .   | <0.005  |
| 2 | C32XPB100     | 0.0236 | 11.93 | 0.037  | 87.70  | (0.0008) | 0.011    | .        | 0.008    | 0.004   | 0.0010    | 0.057   | 0.055    | 0.018    | 0.0051   | .   | 0.0015  |

**CRM LEAD**

analysis listed in mg/kg

| Number       | Type             | Ag    | As      | Au   | Bi    | Cd    | Cu   | Ni    | Sb    | Se     | Sn    | Te    | Tl   | Zn   | Units        |
|--------------|------------------|-------|---------|------|-------|-------|------|-------|-------|--------|-------|-------|------|------|--------------|
| VS 2036-2001 | Powder           | 2322  | .       | 32.6 | .     | .     | .    | .     | .     | .      | .     | .     | .    | .    | 100 g powder |
| BCR 288B     | Added impurities | 30.5  | 55.7    | .    | 215.8 | 33.3  | 19.3 | 4.57  | 32.5  | <0.2   | 30.6  | 32.8  | 2.3  | 8.2  | 160 g chips  |
| BCR 287B     | Thermal refined  | 15.2  | <0.003  | .    | 67.3  | 0.36  | 0.98 | 0.024 | 0.040 | <0.005 | <0.05 | <0.02 | 0.73 | <0.1 | 160 g chips  |
| BCR 286B     | Electro refined  | 0.015 | <0.0002 | .    | 21.5  | 0.125 | 1.49 | 0.041 | 0.10  | <0.05  | <0.05 | <0.1  | 2.5  | <0.1 | 160 g chips  |

**LEAD BASE CHIPS AND POWDER**

# = class, where 1 = CRM and 2 = RM analysis listed in mass % BCS: 100g powder CX: 50g chips SRM: 150-200g powder others: 100g chips

| # | Number        | Sn      | Sb     | Ag      | As       | Bi     | Ca        | Cd       | Cu      | Fe      | In      | Na       | Ni      | Se       | Te     | Zn       | Other     |
|---|---------------|---------|--------|---------|----------|--------|-----------|----------|---------|---------|---------|----------|---------|----------|--------|----------|-----------|
| 1 | SRM 1129      | 62.7    | 0.13   | 0.075   | 0.055    | 0.13   | .         | .        | 0.16    | .       | .       | .        | 0.010   | .        | .      | .        | .         |
| 1 | SRM 127b      | 39.3    | 0.43   | 0.01    | 0.01     | 0.06   | .         | .        | 0.011   | .       | .       | .        | 0.012   | .        | .      | .        | .         |
| 1 | C93X S30APR30 | 33.0    | 0.96   | 0.021   | 0.018    | 0.28   | .         | 0.009    | 0.008   | 0.003   | .       | .        | 0.010   | .        | .      | 0.0053   |           |
| 1 | C93X S30APR20 | 30.68   | 1.80   | 0.049   | 0.0178   | 0.168  | .         | 0.0061   | 0.062   | 0.0026  | 0.0199  | .        | 0.042   | .        | 0.0102 | 0.028    |           |
| 1 | C93X S30APR10 | 28.58   | 2.54   | 0.0144  | 0.010    | 0.059  | .         | 0.0014   | 0.192   | (0.012) | 0.0094  | .        | 0.0010  | .        | 0.0024 | (0.004)  |           |
| 1 | GBW 02401     | 15.97   | 16.09  | .       | 0.014    | 0.024  | .         | .        | 1.96    | .       | .       | .        | 0.0031  | .        | .      | .        | Pb: 65.72 |
| 2 | C86X PSS40    | 10.69   | 16.97  | (0.006) | 0.278    | 0.120  | .         | 0.047    | 0.328   | *1      | 0.013   | .        | .       | .        | .      | *        |           |
| 2 | C86X PSS20    | 6.33    | 8.16   | 0.004   | 1.42     | 0.054  | .         | 0.069    | 0.118   | *1      | (0.002) | .        | 0.0080  | .        | .      | *        |           |
| 1 | SRM 53e       | 5.84    | 10.26  | .       | 0.057    | 0.052  | .         | .        | 0.054   | <0.001  | .       | .        | 0.003   | .        | .      | .        |           |
| 1 | GBW 02402     | 5.69    | 15.02  | .       | 0.012    | 0.0075 | .         | .        | 2.88    | .       | .       | .        | .       | .        | .      | .        | Pb: 76.22 |
| 1 | BCS 177/2     | 5.07    | 10.1   | .       | 0.05     | 0.028  | .         | .        | 0.12    | .       | .       | .        | 0.007   | .        | .      | .        | Pb: 84.5  |
| 2 | C85X PSn20    | 1.87    | 0.023  | 0.002   | *5       | 0.0093 | .         | *1       | 0.035   | .       | .       | .        | *1      | 0.0058   | *1     | *        |           |
| 1 | C85X ANTH     | 1.45    | 6.05   | 0.0071  | 0.217    | 0.0194 | .         | 0.0046   | 0.0291  | 0.010   | .       | .        | 0.0062  | 0.0149   | 0.0071 | (0.0007) |           |
| 1 | C85X HRH      | 0.874   | 1.13   | 0.247   | 0.74     | 0.092  | .         | (0.0002) | 0.080   | .       | .       | .        | 0.001   | 0.037    | 0.002  | .        |           |
| 1 | C84X BA10     | 0.85    | *1     | 0.0088  | *1       | 0.0084 | 0.106     | 0.0016   | 0.0041  | .       | .       | .        | .       | .        | 0.006  | 0.0007   |           |
| 1 | 83X PR8D-C    | 0.604   | 0.257  | 0.497   | 0.134    | 1.18   | Au:0.0106 | 0.199    | 0.0448  | .       | 0.293   | 50g unit | 0.0008  | (0.0003) | 0.0014 | 0.0004   | Hg: 0.086 |
| 2 | C84X BA20     | 0.51    | 0.002  | 0.008   | *05      | 0.024  | 0.061     | 0.0052   | 0.003   | .       | .       | .        | .       | .        | *2     | 0.019    |           |
| 1 | C84X BA80     | 0.293   | 0.0009 | 0.0043  | (0.0004) | 0.019  | 0.157     | 0.0010   | 0.0007  | .       | .       | .        | .       | .        | <0.002 | 0.0013   | Al: 0.021 |
| 2 | C85X PSb120   | 0.21    | 11.4   | 0.0015  | 0.11     | 0.007  | .         | *1       | 0.30    | *1      | .       | .        | 0.0016  | *1       | *5     | 0.087    |           |
| 2 | C85X PSb30    | 0.13    | 2.66   | *2      | 0.14     | 0.010  | .         | *1       | 0.032   | *1      | .       | .        | 0.0013  | 0.024    | *2     | (0.0002) |           |
| 2 | C84X BA40     | 0.11    | 0.061  | 0.003   | (0.0008) | 0.074  | (0.014)   | 0.010    | 0.031   | .       | .       | .        | 0.0007  | .        | 0.029  | (0.0003) |           |
| 2 | C85X PSb80    | 0.085   | 8.43   | 0.016   | 0.02     | 0.010  | .         | *1       | 0.032   | *1      | .       | .        | 0.0014  | 0.0007   | *5     | (0.0002) |           |
| 2 | C85X PSb100   | 0.080   | 10.2   | 0.0015  | 0.11     | 0.007  | .         | *1       | 0.14    | *5      | .       | .        | 0.0013  | *1       | *2     | 0.014    |           |
| 2 | C85X 0616Pb10 | 0.070   | 1.78   | 0.002   | 0.070    | 0.025  | .         | 0.0023   | 0.048   | *1      | .       | .        | 0.001   | 0.018    | 0.001  | 0.001    |           |
| 2 | C85X PSb50    | 0.057   | 5.14   | 0.0017  | 0.12     | 0.022  | .         | *1       | 0.007   | *1      | .       | .        | 0.0025  | 0.0008   | *1     | *1       |           |
| 1 | C83X PR40     | 0.009   | 0.012  | 0.014   | (0.002)  | 0.014  | 0.0026    | 0.010    | 0.015   | .       | 0.005   | 0.001    | 0.013   | 0.003    | 0.025  | 0.005    | Au: 0.002 |
| 2 | BM Pb         | <0.0005 | (5ppm) | <0.0003 | <0.0005  | <0.004 | .         | .        | <0.0005 | .       | .       | .        | <0.0001 | .        | .      | <0.001   | Pb: 99.99 |

\* In the above chart, \* represents <0.00 so that, for example, \*1=<0.001 C83X-86X, C93X: typical analysis

**LEAD-SILVER ALLOY CHIPS**

typical analysis

| Class | Number     | Ag   | Al     | As    | Bi   | Cd    | Cu    | Fe    | In    | Sb   | Sn   | Zn    | Units |
|-------|------------|------|--------|-------|------|-------|-------|-------|-------|------|------|-------|-------|
| RM    | C82X Ag6.0 | 6.0  | 0.002  | 0.025 | 0.54 | 0.010 | 0.19  | 0.001 | 0.006 | 0.48 | 0.50 | 0.008 | 50 g  |
| RM    | C82X Ag3.5 | 3.48 | <0.001 | 0.022 | 0.27 | 0.004 | 0.075 | 0.001 | 0.045 | 0.11 | 0.24 | 0.001 | 50 g  |
| CRM   | C82X Ag1.5 | 1.55 | .      | 0.006 | 0.06 | .     | 0.27  | .     | .     | 0.39 | 0.04 | 0.004 | 50 g  |

**RM LEAD BASE BATTERY ALLOY CHIPS**

typical analysis

50 g units

| Number    | Sn   | Ag    | As     | Bi    | Ca    | Cd      | Cu     | Sb    | Te     | Zn      |
|-----------|------|-------|--------|-------|-------|---------|--------|-------|--------|---------|
| C84X BA60 | 0.73 | 0.002 | <0.001 | 0.008 | 0.095 | (0.002) | 0.0010 | 0.001 | <0.001 | <0.001  |
| C84X BA70 | 0.61 | 0.002 | <0.001 | 0.009 | 0.036 | <0.002  | 0.0009 | 0.002 | <0.001 | <0.0005 |

| CRM       | MAGNESIUM CHIPS  |       |         |        |         |       |          |       |       |        |        |       |       |         |       | Units |
|-----------|------------------|-------|---------|--------|---------|-------|----------|-------|-------|--------|--------|-------|-------|---------|-------|-------|
|           | typical analysis |       |         |        |         |       |          |       |       |        |        |       |       |         |       |       |
| Number    | Ag               | Al    | Be      | Ca     | Cd      | Ce    | Cu       | Fe    | La    | Mn     | Ni     | Pb    | Si    | Sn      | Zn    | Units |
| C61XMgP30 | 0.013            | 0.090 | <0.0001 | 0.053  | 0.015   | 0.006 | 0.030    | 0.014 | 0.004 | 0.015  | 0.005  | 0.015 | 0.050 | 0.016   | 0.019 | 50 g  |
| C61XMgP20 | 0.003            | 0.065 | <0.0001 | 0.014  | 0.006   | 0.002 | 0.012    | 0.006 | 0.002 | 0.012  | 0.003  | 0.006 | 0.031 | 0.007   | 0.012 | 50 g  |
| C61XMgP10 | <0.001           | 0.013 | <0.0005 | <0.001 | <0.0005 | .     | (0.0006) | 0.027 | .     | 0.0037 | <0.002 | 0.005 | 0.005 | (0.001) | 0.002 | 50 g  |

### MAGNESIUM BASE CHIPS

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

BCS: 100 g units

CX: typical analysis 50 g units

| # | Number    | Al      | RE    | Ag      | Mn    | Zn    | Be     | Ca      | Cd    | Cu    | Fe    | Ni     | Pb    | Si    | Sn     | Zr       | Other                  |
|---|-----------|---------|-------|---------|-------|-------|--------|---------|-------|-------|-------|--------|-------|-------|--------|----------|------------------------|
| 1 | BCS 316   | 8.01    | .     | .       | 0.28  | 0.68  | .      | .       | .     | 0.040 | 0.009 | 0.004  | 0.024 | 0.055 | 0.005  | .        | .                      |
| 1 | C65XMgA10 | 5.45    | .     | 0.012   | 0.060 | 1.26  | 0.006  | 0.029   | 0.013 | 0.221 | 0.021 | 0.021  | 0.012 | 0.20  | 0.072  | (0.0015) | Ce: 0.009<br>La: 0.007 |
| 1 | C65XMgB30 | 3.21    | .     | (0.002) | 0.012 | 0.60  | 0.0030 | 0.029   | 0.011 | 0.021 | 0.007 | 0.0019 | 0.004 | 0.011 | 0.005  | .        | .                      |
| 1 | C65XMgB10 | 2.39    | .     | 0.03    | 0.68  | 1.71  | 0.0007 | 0.41    | 0.07  | 0.20  | 0.016 | 0.012  | 0.01  | 0.17  | 0.011  | .        | Ce: 0.015<br>La: 0.013 |
| 2 | C65XMgB20 | 2.32    | .     | .       | 0.44  | 0.95  | .      | 0.008   | .     | 0.096 | 0.015 | 0.005  | 0.012 | 0.06  | 0.012  | .        | .                      |
| 2 | C65XMgE20 | 0.056   | .     | .       | 1.58  | 0.04  | .      | (0.003) | .     | 0.058 | 0.009 | 0.012  | 0.013 | 0.035 | 0.011  | .        | .                      |
| 2 | C65XMgD30 | 0.041   | 0.008 | 0.005   | 0.28  | 1.97  | 0.0003 | (0.07)  | .     | 0.058 | 0.023 | 0.002  | 0.009 | 0.020 | 0.007  | 0.029    | .                      |
| 1 | C63XMgE30 | 0.015   | .     | 0.005   | 2.36  | 0.022 | .      | 0.13    | 0.001 | 0.012 | 0.004 | 0.0023 | 0.005 | 0.01  | 0.0057 | .        | .                      |
| 2 | C67XMgF30 | 0.01    | 2.40  | .       | 0.015 | 3.18  | .      | 0.006   | .     | 0.03  | 0.009 | 0.002  | 0.017 | 0.005 | 0.006  | 0.48     | .                      |
| 1 | BCS 307   | (0.008) | 2.84  | .       | 0.006 | 2.08  | .      | .       | .     | 0.005 | 0.002 | .      | .     | .     | .      | 0.56     | .                      |
| 2 | C66XMgD40 | 0.006   | .     | .       | 0.02  | 2.80  | .      | 0.004   | .     | 0.01  | 0.003 | 0.002  | 0.017 | 0.01  | 0.003  | 0.44     | .                      |
| 2 | C68XMgH40 | 0.004   | 2.4   | 2.05    | 0.015 | 0.17  | .      | .       | .     | 0.03  | 0.001 | 0.004  | .     | 0.002 | .      | 0.46     | .                      |
| 2 | C68XMgL10 | 0.002   | 2.09  | 1.41    | 0.016 | 0.009 | .      | .       | .     | 0.013 | 0.009 | 0.005  | .     | 0.001 | .      | 0.54     | Th: 0.24               |

| # | Number | Al | RE | Ag | Mn | Zn | Be | Ca | Cd | Cu | Fe | Ni | Pb | Si | Sn | Zr | Other |
|---|--------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|
|---|--------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|

RE = Total Rare Earths

### NICKEL POWDER

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

| Number             | Ag     | Al | Au   | C   | Cr | Cu   | Fe  | Ir   | Mn | Mo | Ni% | Os   | P | Pb  | Pd   | Pt  | Rh   | Ru   | S | Si | Units |
|--------------------|--------|----|------|-----|----|------|-----|------|----|----|-----|------|---|-----|------|-----|------|------|---|----|-------|
| CRM - nickel ore   |        |    |      |     |    |      |     |      |    |    |     |      |   |     |      |     |      |      |   |    |       |
| VS 1702-86         | 23.4   | .  | 0.84 | .   | .  | (3%) | .   | 0.11 | .  | .  | 5.4 | 0.06 | . | .   | 30.0 | 8.6 | 0.98 | 0.34 | . | .  | 100 g |
| RM - nickel powder |        |    |      |     |    |      |     |      |    |    |     |      |   |     |      |     |      |      |   |    |       |
| BS HPN-1           | (<0.1) | 70 | .    | 268 | 22 | 2    | 202 | .    | 2  | 3  | .   | .    | 5 | 0.2 | .    | .   | .    | .    | 4 | 6  | 100 g |

continued

informational values

| Number     | As   | B  | Ba | Be | Bi   | Ca | Cd   | Co | Ga   | H  | In   | Mg | N  | Na | O    | Sb   | Se   | Sn | Te   | Ti | Tl   | V  | Zn |
|------------|------|----|----|----|------|----|------|----|------|----|------|----|----|----|------|------|------|----|------|----|------|----|----|
| VS 1702-86 | .    | .  | .  | .  | .    | .  | .    | .  | .    | .  | .    | .  | .  | .  | .    | .    | .    | .  | .    | .  | .    | .  | .  |
| BS HPN-1   | <0.5 | <2 | <1 | <1 | <0.2 | 3  | <0.1 | <2 | <0.5 | 70 | <0.2 | 1  | 17 | 4  | 1400 | <0.1 | <0.2 | <1 | <0.2 | <1 | <0.1 | <1 | <1 |

**CRM NICKEL CHIPS**

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

100 g units

| # | Number    | Ag      | Al      | As       | B       | Be      | Bi       | C       | Ca      | Cd       | Co      | Cr       | Cu      | Fe      |
|---|-----------|---------|---------|----------|---------|---------|----------|---------|---------|----------|---------|----------|---------|---------|
| 2 | IARM 190A | 0.00109 | 0.0050  | 0.0028   | <0.0005 | <0.0001 | 0.00111  | 0.0022  | <0.0010 | 0.0005   | 0.0008  | (0.0001) | 0.0017  | 0.0099  |
| 2 | IARM 189A | 0.00024 | 0.0044  | 0.00007  | <0.0005 | <0.0001 | 0.00026  | 0.0023  | <0.0010 | 0.00008  | 0.00031 | (0.0010) | 0.00090 | 0.0038  |
| 2 | IARM 188A | 0.00011 | 0.0024  | 0.00007  | <0.0005 | <0.0001 | 0.00009  | 0.0022  | <0.0010 | 0.00002  | 0.00017 | (0.0006) | 0.00018 | 0.0019  |
| 2 | IARM 187A | 0.00001 | 0.0011  | 0.00001  | <0.0005 | <0.0001 | <0.00001 | 0.0013  | <0.0010 | <0.00001 | 0.00010 | (0.0003) | 0.00022 | 0.0019  |
| 2 | IARM 191A | 0.00001 | 0.00015 | 0.0013   | <0.0005 | <0.0001 | <0.00001 | 0.0014  | <0.0010 | <0.0001  | 0.0545  | 0.00021  | 0.00042 | 0.00079 |
| 1 | BAM RS 4  | <0.0001 | <0.0001 | <0.00005 | <0.0002 | .       | <0.00001 | 0.00094 | <0.0001 | <0.00002 | <0.0001 | <0.00005 | <0.0002 | 0.00042 |
| 1 | IARM 50C  | .       | (0.004) | .        | 0.0027  | .       | .        | 0.015   | .       | .        | (0.011) | (0.005)  | 0.028   | 0.084   |

| Number    | Ga       | Mg       | Mn       | Mo       | N        | Ni     | O        | P        | Pb       | S       | Sb       | Se       |
|-----------|----------|----------|----------|----------|----------|--------|----------|----------|----------|---------|----------|----------|
| IARM 190A | <0.00005 | (0.0006) | 0.00018  | <0.0001  | (0.0001) | .      | (0.0019) | 0.0034   | 0.00093  | 0.00033 | 0.0011   | 0.00065  |
| IARM 189A | <0.00005 | (0.0008) | 0.00019  | <0.0001  | (0.0001) | .      | (0.0018) | 0.00037  | 0.00029  | 0.00018 | 0.00039  | 0.00021  |
| IARM 188A | <0.00005 | (0.0004) | 0.00023  | <0.0001  | (0.0001) | .      | (0.0017) | 0.00014  | 0.00010  | 0.00018 | 0.00011  | 0.00007  |
| IARM 187A | <0.00005 | (0.0002) | 0.00030  | <0.0001  | (0.0001) | .      | (0.0014) | <0.00010 | 0.000015 | 0.00019 | <0.00005 | <0.00001 |
| IARM 191A | <0.00005 | (0.0002) | 0.00031  | <0.0001  | (0.0002) | .      | (0.0030) | <0.00010 | 0.00003  | 0.00021 | <0.00005 | 0.00019  |
| BAM RS 4  | <0.00002 | <0.00008 | <0.00005 | <0.00002 | 0.00025  | 99.995 | (0.0029) | .        | <0.0001  | <0.0002 | <0.00002 | <0.0001  |
| IARM 50C  | .        | 0.005    | 0.22     | .        | (0.002)  | 99.4   | .        | (0.0014) | .        | 0.0012  | .        | .        |

| Number    | Si       | Sn       | Te       | Ti       | Tl        | V         | W        | Zn       |
|-----------|----------|----------|----------|----------|-----------|-----------|----------|----------|
| IARM 190A | 0.0028   | 0.00062  | 0.00089  | (0.0006) | 0.00058   | <0.00005  | .        | 0.00081  |
| IARM 189A | 0.0019   | 0.00022  | 0.00017  | (0.0003) | 0.00023   | <0.00005  | .        | 0.00028  |
| IARM 188A | 0.0018   | 0.00011  | 0.00008  | (0.0002) | (0.00009) | <0.00005  | .        | 0.00023  |
| IARM 187A | (0.0018) | 0.00004  | <0.00001 | (0.0003) | <0.00002  | (0.00008) | .        | <0.00005 |
| IARM 191A | (0.0005) | 0.00004  | <0.00001 | <0.0001  | <0.00002  | <0.00005  | .        | 0.00019  |
| BAM RS 4  | <0.00002 | <0.00003 | <0.00002 | .        | <0.00002  | <0.00002  | <0.00001 | <0.0004  |
| IARM 50C  | 0.031    | .        | .        | 0.026    | .         | .         | .        | .        |

**NICKEL ALLOY CHIPS**

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

| # | Number         | Al      | C       | Co      | Cr       | Cu      | Fe      | Mg        | Mn      | Mo      | Nb      | Ni    | Si      | Ti      | V        | W       |
|---|----------------|---------|---------|---------|----------|---------|---------|-----------|---------|---------|---------|-------|---------|---------|----------|---------|
| 1 | IARM 52D       | 2.95    | 0.125   | 0.005   | (0.004)  | 29.6    | 1.38    | 0.0065    | 0.59    | .       | (0.002) | 64.5  | 0.170   | 0.60    | (0.0010) | .       |
| 1 | SRM 882        | 2.85    | (0.006) | (0.007) | (0.0001) | 31.02   | (0.009) | (0.001)   | 0.0007  | .       | .       | 65.25 | (0.006) | 0.57    | (0.0001) | .       |
| 1 | IARM NiB-3-18  | 0.41    | (0.003) | 0.142   | 1.55     | (0.014) | 1.57    | 0.010     | 0.70    | 28.2    | 0.15    | 67.2  | (0.021) | (0.007) | (0.007)  | (0.07)  |
| 1 | IARM 63B       | 0.31    | 0.0025  | 0.019   | 0.47     | 0.012   | 1.68    | 0.005     | 0.61    | 27.3    | (0.001) | 69.6  | 0.019   | 0.003   | (0.010)  | 0.060   |
| 1 | IARMNi244H-18  | 0.23    | 0.052   | (0.005) | 6.9      | 0.013   | 39.9    | 0.0014    | 10.9    | (0.003) | 0.70    | 41.1  | 0.16    | 0.20    | (0.004)  | .       |
| 1 | VS N2/3        | 0.20    | 0.018   | .       | 5.59     | 0.083   | Rem     | .         | 0.84    | .       | .       | 76.3  | 1.40    | .       | .        | .       |
| 1 | IARM 63D       | 0.13    | 0.0079  | (0.013) | 0.153    | (0.003) | 1.56    | (0.0013)  | 0.76    | 26.6    | (0.04)  | 70.4  | (0.03)  | 0.14    | (0.007)  | (0.02)  |
| 1 | IARM NiB2-23   | 0.13    | 0.0030  | 0.116   | 0.579    | .       | 1.36    | 0.0012    | 0.504   | 27.1    | .       | 70.2  | .       | 0.021   | .        | .       |
| 1 | IARM 51D       | 0.036   | 0.139   | 0.011   | 0.064    | 32.6    | 1.68    | 0.016     | 1.03    | 0.019   | (0.006) | 64.1  | 0.16    | 0.033   | .        | .       |
| 1 | BCS 363/1      | 0.027   | 0.140   | 0.032   | (0.05)   | 31.90   | 1.86    | .         | 1.26    | .       | .       | 64.7  | 0.028   | (0.03)  | .        | .       |
| 1 | IARM NiR405-20 | 0.043   | 0.117   | 0.040   | 0.499    | 31.2    | 1.71    | 0.018     | 0.96    | 0.102   | 0.103   | 64.8  | 0.161   | 0.0086  | (0.0020) | (0.005) |
| 1 | IARM Ni909-18  | (0.009) | (0.006) | 13.1    | (0.010)  | (0.007) | 42.4    | (0.00012) | (0.030) | .       | 4.6     | 37.7  | 0.42    | 1.62    | .        | (0.009) |
| 1 | BCS 371        | .       | 0.30    | 0.39    | .        | .       | .       | 0.060     | .       | .       | .       | .     | 0.34    | .       | .        | .       |
| 1 | VS N10/4       | .       | 0.0074  | .       | .        | (0.005) | 0.399   | .         | 0.237   | 27.04   | .       | .     | 0.093   | 0.085   | 1.57     | .       |
| 1 | VS N3/4        | .       | 0.0064  | .       | 2.16     | 4.98    | Rem     | .         | 0.424   | .       | .       | .     | 0.264   | .       | .        | .       |
| 1 | VS N4/3        | .       | 0.0057  | .       | 0.070    | 5.65    | 5.80    | .         | 0.762   | 4.87    | .       | .     | 0.81    | .       | .        | .       |
| 1 | NCS HC20502    | .       | 0.0015  | 0.043   | 0.466    | 0.027   | Rem     | .         | 0.983   | 4.13    | .       | 80.07 | 0.317   | 0.004   | .        | .       |

| Number         | B        | N      | O        | P       | Pb       | S        | Sn       | Zr       | Units |
|----------------|----------|--------|----------|---------|----------|----------|----------|----------|-------|
| IARM 52D       | (0.0020) | .      | .        | (0.002) | .        | (0.0012) | 0.0013   | 0.026    | 100 g |
| SRM 882        | (0.0001) | .      | .        | .       | (0.0006) | 0.0014   | (0.003)  | (0.0005) | 100 g |
| IARM NiB-3-18  | (0.0020) | 0.0027 | .        | (0.005) | .        | (0.0004) | .        | .        | 100 g |
| IARM 63B       | <0.002   | 0.0041 | 0.0010   | 0.004   | .        | (0.0004) | .        | (0.002)  | 100 g |
| IARMNi244H-18  | (0.002)  | 0.0087 | (0.0009) | (0.003) | .        | 0.0038   | (0.0003) | (0.0008) | 100 g |
| VS N2/3        | .        | .      | .        | 0.0034  | .        | 0.0025   | .        | .        | 100 g |
| IARM 63D       | 0.0017   | .      | .        | (0.004) | .        | (0.0006) | .        | (0.002)  | 100 g |
| IARM NiB2-23   | 0.0018   | 0.0007 | .        | .       | .        | (0.0007) | .        | .        | 100 g |
| IARM 51D       | .        | .      | .        | (0.010) | .        | 0.0015   | .        | .        | 100 g |
| BCS 363/1      | .        | .      | .        | .       | .        | (0.002)  | .        | .        | 100 g |
| IARM NiR405-20 | .        | 0.0007 | (0.0008) | 0.011   | 0.0010   | 0.040    | .        | 0.006    | 100 g |
| IARM Ni909-18  | 0.0013   | 0.0026 | (0.004)  | (0.002) | .        | 0.0018   | .        | .        | 100 g |
| BCS 371        | .        | .      | .        | .       | .        | 0.013    | .        | .        | 100 g |
| VS N10/4       | .        | .      | .        | 0.0022  | .        | 0.0028   | .        | .        | 100 g |
| VS N3/4        | .        | .      | .        | .       | .        | 0.0018   | .        | .        | 100 g |
| VS N4/3        | .        | .      | .        | 0.0019  | .        | .        | .        | .        | 100 g |
| NCS HC20502    | .        | .      | .        | 0.0007  | .        | 0.0024   | .        | .        | 100 g |

last of stock

## NICKEL BASE CHIPS AND POWDER WITH Cr &gt; 10 % CONTINUED ON THE NEXT PAGE

# = class, where 1 = CRM, 2 = RM, and 3 = RM with no uncertainties

IARM 718P-18 is powder, all others chips

| # | Number         | Cr    | Mo      | Al      | C       | Co       | Cu       | Fe      | Mn    | Nb      | Ni     | Si      | Ti      | W        |
|---|----------------|-------|---------|---------|---------|----------|----------|---------|-------|---------|--------|---------|---------|----------|
| 1 | IARM 329A      | 33.7  | 8.38    | 0.29    | 0.0086  | 0.052    | 0.065    | 0.92    | 0.222 | 0.131   | 55.8   | 0.053   | (0.005) | 0.021    |
| 1 | IARM NiG30-22  | 29.2  | 5.13    | 0.186   | 0.0177  | 0.18     | 1.31     | 15.5    | 0.96  | 0.85    | 44.6   | 0.47    | 0.140   | 1.43     |
| 1 | IARM Ni690-18  | 29.1  | (0.013) | 0.25    | 0.025   | 0.013    | (0.012)  | 10.0    | 0.154 | (0.007) | 59.8   | (0.049) | 0.324   | (0.003)  |
| 1 | IARM 372A      | 28.3  | (0.006) | 3.28    | 0.030   | 0.009    | (0.004)  | 3.12    | 0.285 | 0.71    | 63.6   | 0.020   | 0.486   | (0.02)   |
| 1 | VS N11/3       | 27.04 | .       | 2.83    | 0.057   | .        | .        | 0.47    | 0.147 | .       | .      | 0.263   | .       | .        |
| 1 | IARM 357A      | 27.0  | 3.48    | 0.09    | 0.0199  | 0.17     | 0.81     | 34.3    | 1.63  | 0.089   | 31.9   | 0.458   | 0.079   | 0.108    |
| 1 | IARM 338A      | 25.0  | 0.0017  | 2.13    | 0.168   | 0.035    | 0.0059   | 9.74    | 0.052 | (0.004) | 62.3   | 0.020   | 0.130   | .        |
| 1 | IARM 282A      | 24.6  | 0.210   | 0.085   | 0.054   | 0.12     | 0.0615   | 35.7    | 0.81  | 0.57    | 37.1   | 0.63    | 0.019   | 0.043    |
| 1 | VS N14/3       | 24.35 | 1.32    | 0.164   | 0.012   | .        | 0.0082   | 2.16    | 0.385 | .       | 57.0   | 0.67    | 0.40    | 13.47    |
| 1 | SRM 867        | 23.4  | 2.73    | (0.062) | (0.021) | 0.089    | 1.74     | 26.6    | 0.39  | (0.45)  | 43.5   | 0.32    | 0.75    | (0.006)  |
| 1 | IARM Ni825-18  | 22.4  | 2.80    | 0.11    | (0.006) | 0.55     | 1.81     | 29.5    | 0.49  | 0.31    | 40.8   | 0.17    | 0.96    | 0.230    |
| 1 | IARM Ni625-23  | 22.27 | 8.74    | 0.303   | 0.031   | 0.116    | 0.076    | 3.98    | 0.080 | 3.50    | 60.4   | 0.076   | 0.296   | 0.088    |
| 1 | IARM NiX-18    | 22.0  | 8.6     | 0.24    | 0.080   | 1.43     | 0.046    | 19.2    | 0.215 | (0.024) | 46.9   | 0.49    | (0.017) | 0.55     |
| 1 | IARM 366A      | 22.0  | 0.079   | 1.51    | 0.025   | 0.041    | 0.038    | 14.3    | 0.205 | 0.069   | 60.9   | 0.19    | 0.43    | 0.02     |
| 1 | IARM Ni617-18  | 21.9  | 9.33    | 1.08    | 0.079   | 11.81    | (0.009)  | 1.45    | 0.24  | 0.197   | 53.3   | 0.21    | 0.32    | (0.02)   |
| 1 | SRM 865        | 21.9  | 8.6     | 0.21    | 0.037   | (0.072)  | 0.36     | 4.5     | 0.18  | 3.5     | 59.5   | 0.41    | 0.28    | (0.007)  |
| 1 | IARM 68F       | 21.9  | 1.35    | 0.26    | 0.101   | 0.24     | 0.031    | 1.50    | 0.499 | 0.084   | (59.6) | 0.381   | 0.010   | 14.5     |
| 1 | IARM 68E       | 21.88 | 1.18    | 0.30    | 0.099   | 0.16     | 0.022    | 1.06    | 0.51  | 0.035   | (59.9) | 0.39    | 0.015   | 14.6     |
| 1 | IARM 65D       | 21.5  | 13.1    | 0.29    | 0.0021  | 1.22     | 0.050    | 3.66    | 0.28  | 0.033   | 56.8   | 0.035   | 0.005   | 2.81     |
| 1 | VS N16/2       | 21.12 | 0.49    | 0.90    | 0.049   | .        | 0.011    | 1.11    | 0.224 | 0.367   | .      | 0.267   | 2.71    | .        |
| 1 | IARM 274A      | 21.0  | 8.06    | 0.26    | 0.007   | 0.143    | 0.10     | 7.60    | 0.08  | 3.48    | 57.5   | (0.02)  | 1.55    | 0.06     |
| 1 | IARM Ni155-18  | 20.9  | 2.87    | 0.153   | 0.116   | 19.2     | 0.039    | 31.4    | 1.46  | 1.00    | 20.1   | 0.55    | 0.0026  | 2.42     |
| 1 | IARM Ni925-18  | 20.8  | 2.82    | 0.23    | 0.0114  | 0.43     | 1.69     | 26.4    | 0.518 | 0.40    | 44.2   | 0.075   | 2.19    | 0.27     |
| 1 | NCS HC41501    | 20.69 | 8.37    | 0.016   | 0.043   | (0.011)  | .        | 3.50    | 0.124 | 3.19    | 63.72  | 0.071   | 0.011   | .        |
| 1 | IARM 328A      | 20.57 | 3.16    | 0.189   | (0.006) | (0.003)  | 1.94     | 22.41   | 0.017 | 3.14    | 47.03  | 0.021   | 1.53    | (0.015)  |
| 1 | IARM 276A      | 20.54 | 16.20   | 0.245   | 0.0040  | 0.041    | 0.038    | 1.30    | 0.305 | 0.014   | 61.1   | 0.043   | (0.004) | (0.03)   |
| 1 | IARM Ni725-18  | 20.5  | 7.9     | 0.22    | (0.008) | 0.077    | 0.103    | 7.47    | 0.076 | 3.47    | 58.4   | 0.084   | 1.55    | (0.04)   |
| 1 | IARM 328B      | 20.5  | 3.12    | 0.116   | 0.010   | 0.063    | 2.0      | 15.0    | 0.077 | 3.99    | 53.7   | (0.05)  | 1.53    | (0.04)   |
| 1 | IARM Ni686-20  | 20.4  | 16.1    | 0.34    | 0.0087  | 0.017    | 0.039    | 0.44    | 0.270 | 0.13    | 58.6   | 0.037   | 0.058   | 3.59     |
| 1 | IARM 362B      | 20.4  | 16.1    | 0.32    | 0.0079  | (0.010)  | .        | (0.010) | 0.229 | (0.015) | 58.7   | (0.04)  | 0.052   | 3.90     |
| 1 | IARMNi256Mo-18 | 20.3  | 6.63    | 0.17    | 0.0182  | (0.02)   | 1.98     | 44.0    | 0.83  | (0.010) | 25.5   | 0.41    | (0.006) | (0.010)  |
| 1 | NCS HC23504    | 20.30 | 2.06    | 0.635   | 0.059   | .        | 0.442    | .       | .     | .       | 63.1   | 0.631   | 0.613   | .        |
| 1 | IARM Ni800-19  | 20.13 | (0.006) | 0.44    | 0.079   | (0.0027) | (0.0039) | 47.04   | 0.662 | .       | 30.9   | 0.34    | 0.497   | .        |
| 1 | SRM 866        | 20.1  | 0.36    | 0.29    | 0.082   | 0.075    | 0.49     | 46.1    | 0.92  | (0.09)  | 30.8   | 0.17    | 0.31    | (<0.002) |
| 1 | VS N5/3        | 20.03 | .       | .       | 0.076   | .        | .        | 0.53    | 0.274 | .       | .      | 0.60    | 0.28    | .        |

| #                | Number         | Cr    | Mo      | Al      | C       | Co       | Cu      | Fe    | Mn      | Nb      | Ni    | Si      | Ti       | W        |
|------------------|----------------|-------|---------|---------|---------|----------|---------|-------|---------|---------|-------|---------|----------|----------|
| 1                | IARM 25D       | 20.0  | 2.1     | 0.015   | 0.028   | 0.14     | 3.46    | 38.7  | 1.14    | 0.66    | 32.6  | 0.70    | 0.009    | 0.13     |
| 1                | VS N6/4        | 20.0  | .       | 0.8     | 0.008   | .        | 0.8     | 0.2   | .       | .       | .     | 0.1     | 2.7      | .        |
| 1                | IARM NiWasp-18 | 19.7  | 4.28    | 1.36    | 0.038   | 13.13    | 0.009   | 0.69  | 0.022   | 0.033   | 57.8  | 0.028   | 3.01     | 0.030    |
| 1                | BCS 478        | 19.69 | 0.0061  | 0.54    | 0.071   | .        | .       | 0.51  | .       | .       | 30.9  | 0.290   | 0.479    | .        |
| 1                | IARM Ni718P-18 | 19.6  | 3.13    | 0.49    | 0.036   | 0.097    | (0.018) | 17.0  | 0.026   | 4.95    | 53.6  | 0.036   | 1.01     | (0.010)  |
| 1                | IARM Ni282-18  | 19.4  | 8.40    | 1.57    | 0.060   | 10.38    | 0.012   | 0.90  | 0.042   | 0.058   | 56.8  | 0.054   | 2.20     | (0.043)  |
| 1                | BCS 310/1      | 19.45 | .       | 1.06    | 0.068   | 17.0     | .       | 0.25  | 0.35    | .       | 58.6  | 0.46    | 2.43     | .        |
| 1                | IARM Ni800-18  | 19.38 | 0.033   | 0.421   | 0.070   | 0.023    | 0.068   | 47.2  | 0.61    | .       | 31.3  | 0.42    | 0.520    | .        |
| 1                | SRM 349A       | 19.3  | 4.25    | 1.23    | 0.035   | 12.46    | (0.007) | 1.15  | 0.019   | (0.05)  | 58.1  | 0.018   | 3.06     | (0.06)   |
| 1                | BCS 351/1      | 19.14 | 3.04    | 0.554   | 0.0255  | 0.145    | 0.0222  | 17.20 | 0.0562  | 5.31    | 53.35 | 0.080   | 0.938    | 0.0209   |
| IARM NiRene41-21 | 18.98          | 9.61  | 1.58    | 0.081   | 11.1    | (0.0025) | 18.54   | 0.013 | 0.022   | 52.6    | 0.028 | 3.10    | 0.006    | .        |
| 1                | NCS HC41502    | 18.56 | 3.28    | 0.635   | 0.027   | 0.111    | 0.023   | 2.92  | 0.057   | 5.15    | 52.27 | 0.080   | 1.03     | .        |
| 1                | IARM Ni718-20  | 18.5  | 3.01    | 0.54    | 0.028   | 0.066    | 0.025   | 18.1  | 0.027   | 5.24    | 53.3  | 0.044   | 0.94     | 0.013    |
| 1                | IARM 287A      | 18.47 | 3.51    | 3.02    | 0.079   | 16.99    | (0.001) | 0.086 | (0.002) | 0.022   | 54.8  | 0.02    | 3.02     | 0.013    |
| 1                | IARM Ni718-22  | 18.46 | 2.91    | 0.56    | 0.036   | 0.253    | 0.059   | 18.4  | 0.071   | 5.17    | 52.8  | 0.108   | 0.91     | 0.049    |
| 1                | IARM Ni330-21  | 18.18 | 0.142   | (0.008) | 0.062   | 0.057    | 0.046   | 43.9  | 1.382   | 0.067   | 34.8  | 1.35    | 0.0088   | .        |
| 1                | IARM Ni718-23  | 18.08 | 2.90    | 0.484   | 0.0258  | 0.293    | 0.034   | 18.10 | 0.047   | 5.44    | 53.4  | 0.053   | 1.00     | 0.038    |
| 1                | VS N13/4       | 17.89 | 4.39    | 2.83    | 0.0097  | 5.52     | .       | 0.268 | 0.203   | .       | .     | 0.407   | 1.12     | 6.50     |
| 3                | C22X 8030      | 17.7  | 0.50    | 1.84    | 0.03    | 1.99     | 0.08    | 1.88  | 0.21    | .       | rem   | 1.09    | 1.81     | .        |
| 1                | VS N9/4        | 17.44 | 2.88    | 1.33    | 0.0102  | .        | 0.0122  | 7.63  | 0.010   | 0.83    | .     | 0.096   | 2.10     | 3.09     |
| 1                | IARM NiPE16-18 | 16.6  | 3.29    | 1.20    | 0.052   | 0.77     | (0.053) | 34.4  | 0.122   | 0.040   | 42.9  | 0.13    | 1.18     | 0.038    |
| 1                | BAM 326-1      | 16.37 | (0.025) | .       | 0.092   | 0.223    | (0.027) | .     | 0.406   | .       | 61.16 | 1.46    | .        | .        |
| 1                | IARM NiH214-18 | 16.24 | (0.004) | 4.28    | 0.036   | 0.007    | 0.0011  | 3.48  | 0.185   | (0.003) | 75.6  | (0.020) | (0.003)  | (0.02)   |
| 1                | IARM 53F       | 16.0  | 0.084   | 0.170   | 0.078   | 0.056    | 0.077   | 9.5   | 0.260   | 0.088   | 72.7  | 0.170   | 0.255    | (0.014)  |
| 1                | IARM NiC276-18 | 15.9  | 15.4    | 0.114   | 0.0032  | 0.170    | 0.14    | 6.09  | 0.42    | (0.061) | 58.5  | (0.017) | 0.007    | 3.23     |
| 1                | SRM 864 **     | 15.74 | 0.204   | 0.252   | (0.063) | 0.0602   | 0.255   | 9.63  | 0.288   | (0.126) | 73.09 | (0.114) | (0.251)  | (<0.002) |
| 1                | IARM NiS-18    | 15.62 | 15.4    | 0.388   | 0.012   | 0.416    | .       | 0.81  | 0.65    | .       | 65.6  | 0.49    | (0.0023) | 0.36     |
| 1                | VS N12/3       | 15.49 | 16.12   | .       | 0.012   | .        | .       | 0.085 | 0.440   | .       | .     | 0.107   | .        | 4.08     |
| 1                | IARM 57E       | 15.3  | 0.014   | 0.74    | 0.060   | 0.021    | (0.010) | 8.01  | 0.079   | 1.00    | 72.1  | 0.052   | 2.54     | (0.009)  |
| 1                | IARM 277A      | 14.35 | 4.22    | 4.38    | 0.080   | 14.5     | 0.004   | 0.16  | 0.01    | 0.034   | 58.9  | 0.037   | 3.40     | 0.047    |
| 1                | NCS HC23505    | 14.28 | .       | 1.88    | 0.038   | .        | .       | .     | 0.28    | .       | 37.83 | 0.19    | 2.89     | 5.87     |
| 1                | BCS 350        | 13.43 | 4.29    | 5.97    | 0.138   | 0.338    | .       | 1.50  | 0.019   | 2.17    | 70.8  | 0.110   | 0.87     | 0.094    |
| 1                | BCS 387/1      | 11.50 | 6.00    | 0.20    | 0.050   | 0.020    | 0.020   | 38.00 | 0.020   | .       | 41.0  | 0.050   | 3.00     | .        |

| # | Number | Cr | Mo | Al | C | Co | Cu | Fe | Mn | Nb | Ni | Si | Ti | W |
|---|--------|----|----|----|---|----|----|----|----|----|----|----|----|---|
|---|--------|----|----|----|---|----|----|----|----|----|----|----|----|---|

\* Provisional Analysis

\*\* SRM 864 also contains, in mg/kg, Pb: 2.27 Tl:0.0029



## NICKEL BASE CHIPS AND POWDER WITH Cr &gt; 10 % CONTINUED FROM THE PREVIOUS PAGE

IARM 718P-18 is powder, all others chips

| Number         | Ag        | B        | Mg       | N       | O        | P       | S        | Sn       | Ta        | V       | Zr       | Units | Other       |
|----------------|-----------|----------|----------|---------|----------|---------|----------|----------|-----------|---------|----------|-------|-------------|
| IARM 329A      | 0.00007   | 0.0010   | 0.0124   | 0.073   | 0.0027   | 0.0059  | 0.0003   | (0.0005) | .         | 0.009   | (0.0012) | 100 g |             |
| IARM NiG30-22  | .         | 0.0011   | .        | 0.046   | 0.0024   | 0.0108  | 0.0005   | 0.0020   | .         | 0.035   | .        | 100 g |             |
| IARM Ni690-18  | .         | .        | 0.0030   | 0.012   | .        | (0.004) | 0.0007   | .        | .         | 0.048   | .        | 100 g |             |
| IARM 372A      | .         | 0.0016   | 0.016    | (0.011) | (0.0008) | (0.003) | 0.0016   | .        | .         | (0.008) | 0.017    | 100 g |             |
| VS N11/3       | .         | .        | .        | .       | .        | 0.0016  | 0.003    | .        | .         | .       | .        | 100 g |             |
| IARM 357A      | .         | (0.0014) | (0.005)  | (0.011) | (0.005)  | 0.013   | 0.0021   | .        | .         | 0.091   | .        | 100 g |             |
| IARM 338A      | (0.0001)  | 0.0049   | 0.0058   | 0.0276  | 0.0010   | (0.003) | 0.0008   | 0.00037  | (0.002)   | 0.0026  | 0.081    | 100 g | Y: (0.06%)  |
| IARM 282A      | (0.0001)  | 0.005    | (0.004)  | 0.207   | 0.0023   | 0.016   | 0.0003   | (0.003)  | (0.005)   | 0.052   | (0.002)  | 100 g |             |
| VS N14/3       | .         | .        | .        | .       | .        | 0.0020  | 0.0029   | .        | .         | .       | .        | 100 g |             |
| SRM 867        | (<0.0001) | (0.002)  | .        | (0.017) | (0.006)  | (0.018) | (0.002)  | .        | (0.001)   | (0.047) | .        | 100 g |             |
| IARM Ni825-18  | .         | 0.0023   | .        | 0.0093  | (0.0020) | 0.013   | .        | 0.0023   | (0.0011)  | 0.047   | (0.002)  | 100 g |             |
| IARM Ni625-23  | .         | 0.0019   | 0.0008   | 0.010   | .        | 0.0070  | 0.0004   | .        | (0.004)   | 0.016   | .        | 100 g |             |
| IARM NiX-18    | .         | 0.0038   | 0.0030   | 0.042   | (0.0012) | 0.0107  | (0.0050) | .        | .         | (0.037) | .        | 100 g |             |
| IARM 366A      | .         | .        | (0.004)  | 0.0136  | (0.0010) | 0.008   | (0.0003) | .        | .         | (0.028) | (0.012)  | 100 g |             |
| IARM Ni617-18  | .         | 0.0023   | (0.0011) | 0.0082  | (0.0010) | (0.004) | (0.0007) | .        | .         | (0.006) | (0.06)   | 100 g |             |
| SRM 865        | (0.0002)  | (<0.001) | .        | (0.066) | (0.004)  | (0.012) | (0.001)  | .        | (<0.01)   | (0.019) | .        | 150 g |             |
| IARM 68F       | .         | (0.0050) | (0.006)  | 0.045   | 0.0007   | (0.006) | (0.0005) | .        | .         | (0.007) | .        | 100 g |             |
| IARM 68E       | .         | 0.007    | (0.006)  | 0.050   | 0.0007   | (0.005) | (0.0005) | .        | .         | (0.007) | .        | 100 g |             |
| IARM 65D       | .         | (0.001)  | 0.007    | 0.019   | 0.0005   | 0.008   | 0.0004   | (0.001)  | (0.01)    | 0.012   | (0.002)  | 100 g |             |
| VS N16/2       | .         | 0.0066   | .        | .       | .        | 0.0028  | 0.0019   | .        | .         | 0.030   | .        | 100 g | Sb: 0.00014 |
| IARM 274A      | .         | 0.002    | 0.0019   | 0.007   | 0.0006   | 0.007   | 0.0004   | 0.001    | (0.002)   | 0.019   | (0.001)  | 100 g |             |
| IARM NiN155-18 | .         | 0.0024   | .        | 0.12    | .        | 0.008   | (0.0009) | .        | .         | 0.0236  | .        | 100 g |             |
| IARM Ni925-18  | .         | 0.0034   | .        | 0.0033  | 0.0011   | 0.012   | 0.0024   | .        | .         | (0.031) | .        | 100 g |             |
| NCS HC41501    | .         | .        | .        | .       | .        | 0.0023  | 0.0006   | .        | (0.001)   | .       | .        | 100 g |             |
| IARM 328A      | .         | 0.0011   | (0.0008) | 0.0056  | 0.0006   | (0.004) | 0.0006   | (0.0002) | (0.0004)  | 0.008   | (0.004)  | 100 g |             |
| IARM 276A      | 0.00010   | 0.0038   | 0.007    | 0.0388  | 0.0010   | 0.006   | 0.0005   | 0.0004   | 0.011     | (0.008) | (0.003)  | 100 g |             |
| IARM Ni725-18  | .         | 0.0023   | (0.005)  | 0.008   | .        | 0.0047  | (0.0008) | (0.0011) | (0.006)   | 0.013   | .        | 100 g |             |
| IARM 328B      | .         | (0.0010) | .        | (0.006) | .        | (0.005) | (0.0006) | .        | .         | (0.014) | .        | 100 g |             |
| IARM Ni686-20  | .         | .        | (0.009)  | 0.0097  | 0.0006   | (0.003) | 0.0005   | .        | .         | 0.009   | (0.0013) | 100 g |             |
| IARM 362B      | .         | .        | 0.008    | 0.0060  | (0.0006) | (0.005) | (0.0004) | .        | .         | (0.010) | .        | 100 g |             |
| IARMNi256Mo-18 | .         | 0.0009   | .        | 0.022   | .        | (0.004) | 0.0011   | .        | Ca:0.0014 | (0.009) | .        | 100 g |             |
| NCS HC23504    | .         | .        | .        | .       | .        | 0.0182  | 0.0107   | .        | .         | .       | .        | 100 g |             |
| IARM Ni800-19  | .         | 0.0004   | (0.001)  | 0.0070  | 0.0041   | 0.0021  | 0.0016   | .        | .         | 0.0083  | (0.0014) | 100 g |             |
| SRM 866        | (<0.0001) | (<0.001) | .        | (0.018) | (0.004)  | (0.017) | (0.001)  | .        | (<0.001)  | (0.040) | .        | 100 g |             |
| VS N5/3        | .         | .        | .        | .       | .        | 0.0014  | 0.0033   | .        | .         | .       | .        | 100 g |             |

| Number          | Ag        | B        | Mg       | N       | O        | P        | S        | Sn        | Ta         | V        | Zr        | Units | Other                   |
|-----------------|-----------|----------|----------|---------|----------|----------|----------|-----------|------------|----------|-----------|-------|-------------------------|
| IARM 25D        | .         | 0.0036   | 0.0016   | 0.034   | (0.005)  | 0.019    | 0.0013   | 0.008     | .          | 0.089    | .         | 100 g |                         |
| VS N6/4         | .         | .        | .        | .       | .        | 0.002    | 0.003    | .         | .          | .        | .         | 100 g | Pb: 0.004               |
| IARM NiWasp-18  | .         | 0.0061   | (0.0018) | 0.0046  | (0.0009) | 0.0032   | (0.0004) | .         | (0.005)    | (0.023)  | 0.058     | 100 g |                         |
| BCS 478         | .         | .        | .        | 0.007   | .        | 0.0057   | 0.0010   | .         | .          | .        | .         | 100 g |                         |
| IARM Ni718P-18  | .         | .        | .        | (0.010) | 0.014    | (0.006)  | (0.0013) | .         | (0.006)    | 0.017    | .         | 75 g  | POWDER                  |
| IARM Ni282-18   | .         | 0.0014   | 0.0054   | .       | .        | (0.003)  | (0.0006) | .         | .          | (0.013)  | (0.0014)  | 100 g |                         |
| BCS 310/1       | .         | .        | .        | .       | .        | .        | .        | .         | .          | .        | .         | 100 g |                         |
| IARM Ni800-18   | .         | 0.0025   | .        | 0.0087  | (0.002)  | 0.013    | 0.0012   | 0.0017    | .          | 0.028    | (0.0013)  | 100 g |                         |
| SRM 349A        | .         | (0.005)  | .        | .       | .        | (0.003)  | 0.0024   | .         | .          | (0.12)   | (0.053)   | 150 g |                         |
| BCS 351/1       | .         | 0.0035   | 0.0016   | 0.0077  | .        | 0.0045   | 0.00037  | 0.00033   | 0.0033     | 0.0181   | 0.0017    | 100 g | Sb: 0.00024             |
| IARMNiRene41-21 | .         | 0.0067   | 0.0019   | 0.0046  | 0.0007   | .        | (0.0002) | .         | .          | 0.012    | 0.0028    | 100 g |                         |
| NCS HC41502     | .         | 0.0025   | .        | .       | .        | 0.0033   | 0.0005   | .         | (0.008)    | .        | .         | 100 g |                         |
| IARM Ni718-20   | .         | 0.0039   | 0.0025   | 0.009   | .        | 0.0032   | (0.0030) | .         | 0.006      | 0.016    | .         | 100 g |                         |
| IARM 287A       | .         | 0.009    | 0.0023   | 0.0007  | 0.0005   | (0.001)  | 0.0008   | 0.0002    | 0.010      | (0.004)  | 0.008     | 100 g |                         |
| IARM Ni718-22   | .         | 0.0047   | .        | 0.0079  | .        | 0.0088   | (0.0005) | 0.0013    | 0.0033     | 0.035    | .         | 100 g |                         |
| IARM Ni330-21   | .         | 0.0016   | .        | 0.032   | 0.0026   | 0.015    | 0.0010   | 0.0015    | .          | 0.051    | (0.0016)  | 100 g |                         |
| IARM Ni718-23   | .         | 0.0039   | 0.0012   | 0.0070  | (0.0009) | 0.0073   | (0.0005) | .         | 0.004      | 0.026    | .         | 100 g |                         |
| VS N13/4        | .         | 0.0098   | .        | .       | .        | 0.0018   | 0.0020   | .         | .          | .        | .         | 100 g |                         |
| C22X 8030       | 0.018     | (<0.001) | 0.001    | .       | .        | .        | .        | 0.018     | .          | last     | 0.05      | 50 g  | Ce: 0.0047<br>Pb: 0.023 |
| VS N9/4         | .         | 0.0049   | .        | .       | .        | .        | .        | .         | .          | .        | .         | 100 g |                         |
| IARM NiPE16-18  | .         | 0.0028   | .        | (0.006) | (0.0006) | (0.006)  | (0.0007) | .         | .          | (0.018)  | 0.019     | 100 g |                         |
| BAM 326-1       | .         | .        | .        | .       | .        | 0.0028   | .        | .         | .          | .        | 0.129     | 100 g |                         |
| IARM NiH214-18  | .         | 0.0033   | 0.0053   | 0.0026  | .        | (0.0017) | (0.0004) | .         | Y: (0.008) | (0.003)  | 0.026     | 100 g |                         |
| IARM 53F        | .         | 0.0026   | 0.016    | .       | .        | 0.0070   | (0.0022) | (0.002)   | (0.004)    | 0.024    | .         | 100 g |                         |
| IARM NiC276-18  | .         | 0.0020   | (0.010)  | (0.017) | .        | (0.008)  | (0.0007) | .         | .          | (0.018)  | .         | 100 g |                         |
| SRM 864 **      | (<0.0001) | 0.00283  | 0.01383  | (0.01)  | (0.004)  | (0.011)  | (0.0028) | (0.00074) | (<0.001)   | 0.0327   | (0.00037) | 100 g |                         |
| IARM NiS-18     | .         | 0.0061   | 0.0021   | .       | .        | 0.006    | (<0.001) | .         | .          | (0.0027) | .         | 100 g | La: 0.031               |
| VS N12/3        | .         | .        | .        | .       | .        | 0.0021   | 0.0027   | .         | .          | .        | .         | 100 g |                         |
| IARM 57E        | .         | 0.008    | (0.0013) | .       | .        | (0.005)  | (0.0009) | .         | .          | 0.021    | 0.037     | 100 g |                         |
| IARM 277A       | .         | 0.015    | 0.0021   | 0.0017  | 0.0005   | 0.002    | 0.0010   | <0.003    | (0.02)     | 0.011    | 0.010     | 100 g |                         |
| NCS HC23505     | .         | .        | .        | .       | .        | 0.008    | .        | .         | .          | .        | .         | 100 g |                         |
| BCS 350         | .         | 0.013    | .        | .       | .        | .        | .        | .         | .          | .        | 0.072     | 100 g |                         |
| BCS 387/1       | .         | .        | .        | .       | .        | 0.005    | 0.005    | .         | .          | .        | .         | 100 g |                         |

\* Provisional Analysis

\*\* SRM 864 also contains, in mg/kg, Pb: 2.27 Tl:0.0029

**CRM IN 100 TYPE NICKEL ALLOY CHIPS**

analysis listed in mass %

| Number  | Al    | Co    | Cr   | Mo   | Ti   | V    | B     | C      | Zr    | Units |
|---------|-------|-------|------|------|------|------|-------|--------|-------|-------|
| BCS 345 | 5.58  | 14.70 | 9.93 | 3.01 | 4.74 | 1.00 | 0.019 | 0.153  | 0.044 | 100 g |
| BCS 346 | (5.5) | (15)  | (10) | (3)  | (5)  | (1)  | .     | (0.15) | .     | 100 g |

continued

analysis listed in mg/kg

| Number  | Ag   | As  | Bi   | Ca   | Cd   | In   | Ga   | Mg  | Pb  | Sb | Se   | Sn | Te   | Tl   | Zn   |
|---------|------|-----|------|------|------|------|------|-----|-----|----|------|----|------|------|------|
| BCS 345 | <0.2 | (2) | <0.2 | (<5) | <0.1 | .    | 8    | 5   | 0.2 | <2 | <0.5 | 6  | <0.2 | <0.2 | <0.5 |
| BCS 346 | 35   | 50  | 10   | (36) | 0.4  | (19) | (52) | 147 | 21  | 47 | 9    | 91 | 12   | .    | 29   |

**CRM TRACE ELEMENTS IN SUPERALLOY CHIPS**

analysis listed in mg/kg

HC11520-4: 150 g chips, others 100 g powder

| Number      | Ag   | As  | B     | Bi   | Ca  | Cd   | Ce    | Cu  | Hf  | Ga  | Ge | In   | P    | Mg  | Pb  | Sb  | Sc  | Se  | Sn   | Te  | Tl   | Zn  |
|-------------|------|-----|-------|------|-----|------|-------|-----|-----|-----|----|------|------|-----|-----|-----|-----|-----|------|-----|------|-----|
| NCS HC11529 | 5.4  | 25  | 13    | 1.8  | .   | .    | 0.19  | 53  | 12  | 49  | 27 | 10   | 80   | .   | 11  | 33  | 0.6 | 2.2 | 43   | 1.3 | 1.1  | 13  |
| NCS HC11522 | 5.3  | 15  | (90)  | 0.4  | 11  | 1.8  | (110) | .   | .   | 108 | .  | 30   | (40) | 15  | 11  | 59  | .   | 11  | 72   | 2.1 | 51   | 105 |
| NCS HC11521 | 4.6  | 11  | (100) | 0.4  | 21  | 4.6  | (40)  | .   | .   | 32  | .  | 2.6  | (40) | 16  | 4.1 | 95  | .   | 16  | 53   | 11  | 22   | 32  |
| NCS HC11528 | 4.4  | 44  | 24    | 2.0  | .   | .    | 0.28  | 94  | 33  | 52  | 75 | 31   | 131  | .   | 8.2 | 49  | 1.2 | 2.5 | 45   | 2.3 | 3.9  | 15  |
| NCS HC11520 | 3.5  | 17  | (100) | 4.2  | 42  | 7.3  | (30)  | .   | .   | 29  | .  | 11   | (40) | 82  | 12  | 204 | .   | 43  | 103  | 3.0 | 8.5  | 24  |
| NCS HC11527 | 2.5  | 96  | 25    | 1.2  | .   | .    | 0.44  | 172 | 3.8 | 38  | 38 | 2.6  | 55   | .   | 4.7 | 16  | 1.2 | 4.1 | 18   | 7.5 | 4.3  | 14  |
| NCS HC11526 | 1.0  | 14  | 47    | 0.19 | .   | .    | 1.8   | 363 | 7.4 | 34  | 24 | 7.2  | 36   | .   | 3.7 | 3.3 | 2.7 | 12  | 8.3  | 31  | 0.16 | 13  |
| NCS HC11525 | 0.78 | 6.7 | 90    | 0.14 | .   | 0.31 | 0.37  | 571 | 3.5 | 31  | 13 | 0.88 | 41   | .   | 3.4 | 1.4 | 1.3 | 9.8 | 3.2  | 28  | 0.13 | 12  |
| NCS HC11524 | 0.7  | 72  | (100) | 3.4  | 5.3 | 1.6  | (10)  | .   | .   | 63  | .  | 9.2  | (40) | 111 | 91  | 6.2 | .   | 53  | 92   | 83  | 8.1  | 6.0 |
| NCS HC11523 | 0.3  | 72  | (100) | 0.5  | 32  | 1.9  | (10)  | .   | .   | 28  | .  | 0.4  | (40) | 53  | 2.2 | 7.4 | .   | 43  | 1040 | 0.5 | 83   | 20  |

**CRM TRACE ELEMENTS IN SUPERALLOY CHIPS**

analysis listed in mg/kg

analysis listed in mass %

35 g units

| Number  | Bi    | Pb   | Se  | Te   | Tl    | Al  | B      | C      | Co    | Cr   | Hf    | Nb    | Ni  | Ta     | Ti  | W      | Zr    |
|---------|-------|------|-----|------|-------|-----|--------|--------|-------|------|-------|-------|-----|--------|-----|--------|-------|
| SRM 897 | (0.5) | 11.7 | 9.1 | 1.05 | 0.51  | (2) | (0.01) | (0.12) | (8.5) | (12) | (1.2) | (0.9) | Rem | (1.75) | (2) | (1.75) | (0.1) |
| SRM 899 | (0.3) | 3.9  | 9.5 | 5.9  | 0.252 | (2) | (0.01) | (0.12) | (8.5) | (12) | (1.2) | (0.9) | Rem | (1.75) | (2) | (1.75) | (0.1) |

**RM TIN CHIPS**

| analysis listed in mass % |       |         |                  | analysis listed in mg/kg |      |    |      |      |    |      |      | 100 g chips |     |      |
|---------------------------|-------|---------|------------------|--------------------------|------|----|------|------|----|------|------|-------------|-----|------|
| Number                    | C     | Sn      | Melting Point °C | As                       | Bi   | Cd | Cu   | Fe   | In | Ni   | Pb   | S           | Sb  | Zn   |
| BM Sn                     | .     | 99.9999 | .                | .                        | <0.5 | .  | <0.1 | <0.1 | .  | <0.1 | <0.3 | .           | .   | <0.4 |
| BCS 192h                  | 0.001 | 99.998  | 231.9            | <1                       | <1   | <1 | <1   | <1   | <1 | <1   | 6    | 2           | <5  | <1   |
| BCS 192j                  | 0.001 | 99.996  | 231.9            | <1                       | <1   | <1 | <1   | <1   | <1 | <1   | <10  | 2           | <10 | <1   |

last of stock

**CRM TIN POWDER**

| analysis listed in mass % |        |       |       |       |      |       |       |       |      |       |       |       |  |
|---------------------------|--------|-------|-------|-------|------|-------|-------|-------|------|-------|-------|-------|--|
| Number                    | Ag     | As    | Cu    | Fe    | Pb   | S     | Sb    | Zn    | SiO2 | Sn    | WO3   | Units |  |
| GBW 07231                 | 0.0025 | 0.574 | .     | 21.33 | 2.89 | 0.183 | 0.024 | 0.264 | .    | 45.80 | .     | 100 g |  |
| GBW 07232                 | .      | 0.306 | 0.043 | 9.53  | 1.62 | 0.090 | 0.016 | 0.120 | 0.93 | .     | 0.182 | 100 g |  |

**TIN CHIPS AND POWDER**

# = class, where 1 = CRM and 2 = RM      BCS: 100 g powder      GBW: 100 g chips      SRM: 75 g powder      all others: typical analysis 50 g chips

| # | Number     | Sb     | Ag      | Cd     | Cu     | Ni     | Pb     | Sn    | Zn      | Al       | As     | Au     | Bi     | Co     | Fe       | In     | Te     |
|---|------------|--------|---------|--------|--------|--------|--------|-------|---------|----------|--------|--------|--------|--------|----------|--------|--------|
| 2 | C73XSC70   | 14.01  | 0.006   | 0.0018 | 6.51   | 0.008  | 0.356  | .     | (0.003) | 0.001    | 0.047  | .      | 0.009  | 0.0160 | 0.046    | 0.014  | .      |
| 1 | GBW 02302  | 11.81  | .       | .      | 6.72   | .      | 1.20   | 80.27 | .       | .        | 0.020  | .      | 0.012  | .      | .        | .      | .      |
| 2 | C73XSC110  | 11.7   | 0.06    | 1.63   | 10.7   | 0.48   | 0.04   | .     | 0.066   | <0.005   | 0.30   | .      | 0.53   | .      | 0.07     | .      | .      |
| 1 | BCS 178/2  | 9.45   | (0.002) | 0.14   | 4.58   | 0.17   | 3.18   | 82.2  | 0.040   | .        | 0.15   | .      | 0.11   | .      | 0.024    | .      | .      |
| 2 | C73XSC90   | 8.18   | 0.004   | 0.078  | 8.47   | 0.008  | 0.20   | .     | (0.003) | <0.001   | 0.53   | .      | 0.066  | 0.0030 | 0.037    | 0.010  | .      |
| 1 | GBW 02301  | 7.87   | .       | .      | 4.06   | .      | 1.32   | 86.61 | .       | .        | 0.018  | .      | 0.014  | .      | .        | .      | .      |
| 1 | SRM 54d    | 7.04   | 0.0032  | .      | 3.62   | 0.0027 | 0.62   | 88.57 | .       | .        | 0.088  | .      | 0.044  | .      | 0.027    | .      | .      |
| 2 | C73XSC40   | 6.02   | 0.042   | 0.052  | 3.05   | 0.017  | 0.514  | .     | 0.008   | 0.005    | 0.005  | .      | 0.218  | 0.0035 | 0.011    | 0.011  | .      |
| 1 | C74XHB     | 5.00   | 0.070   | 0.011  | 4.75   | 1.12   | 0.058  | .     | 0.018   | .        | 0.026  | .      | 0.008  | .      | 0.12     | .      | .      |
| 2 | C72XSA50R  | 4.93   | .       | 0.05   | 0.018  | .      | 0.08   | .     | 0.035   | .        | 0.015  | .      | 0.006  | .      | (0.004)  | .      | .      |
| 1 | C71XSR20   | 0.063  | 0.029   | 0.042  | 0.055  | 0.005  | 0.13   | .     | 0.010   | 0.003    | 0.057  | 0.008  | 0.057  | .      | <0.001   | 0.051  | 0.023  |
| 1 | C71XSR10 * | 0.0156 | 0.0121  | 0.0104 | 0.0111 | 0.0041 | 0.0324 | .     | 0.0146  | (0.0016) | 0.0102 | 0.0014 | 0.0107 | .      | (0.0021) | 0.0120 | 0.0112 |

\* C71XSR10 also contains Ga: 0.0049 and Hg: 0.0142

**CRM TIN-LEAD SOLDER CHIPS AND POWDER**

BAM, BCS: powder      all others: typical analysis chips

| Number          | Sn    | Pb    | Ag      | As      | Au       | Bi     | Cd     | Cu     | Fe       | In       | Ni     | Sb     | Te    | Zn        | Units |
|-----------------|-------|-------|---------|---------|----------|--------|--------|--------|----------|----------|--------|--------|-------|-----------|-------|
| C91XS63 PR40    | 66.8  | Rem   | 0.030   | <0.002  | 0.05     | 0.030  | 0.021  | 0.021  | <0.005   | 0.014    | <0.005 | 0.093  | 0.006 | <0.001    | 50 g  |
| BAM BNM 010     | 63.40 | 36.47 | (0.014) | (0.012) | (<0.001) | 0.0245 | 0.0016 | 0.0417 | (0.0020) | (<0.001) | 0.0021 | 0.0488 | .     | (<0.0001) | 100 g |
| C91XS63 PR10    | 63.0  | Rem   | 0.01    | 0.007   | 0.046    | 0.06   | 0.006  | 0.009  | 0.003    | .        | 0.001  | 0.28   | .     | <0.001    | 50 g  |
| BCS 347         | 62.6  | Rem   | 0.099   | (0.02)  | 0.037    | 0.080  | 0.004  | 0.169  | (0.002)  | .        | 0.0072 | 0.191  | .     | 0.0015    | 100 g |
| C91XS63 PR20    | 62.6  | Rem   | 0.057   | 0.080   | 0.090    | 0.162  | 0.0168 | 0.052  | 0.030    | 0.019    | 0.0073 | 0.614  | 0.009 | 0.007     | 50 g  |
| C91X S63 PR00 * | 60.0  | Rem   | 0.01    | 0.01    | 0.015    | 0.007  | 0.010  | 0.02   | 0.002    | 0.005    | 0.002  | 0.02   | 0.003 | <0.001    | 50 g  |
| C91XS30 PR30    | 30.88 | Rem   | 0.024   | 0.0126  | 0.0063   | 0.294  | 0.0115 | 0.102  | 0.0016   | 0.0085   | 0.0269 | 0.269  | .     | (0.003)   | 50 g  |

\* Provisional Analysis

| RM        | TITANIUM POWDER |       |         |       |       |       |       |       |       |        |         |       |       |         | powder 50 g      |
|-----------|-----------------|-------|---------|-------|-------|-------|-------|-------|-------|--------|---------|-------|-------|---------|------------------|
|           |                 |       |         |       |       |       |       |       |       |        |         |       |       |         | typical analysis |
| Number    | Ti              | Al    | Co      | Cr    | Cu    | Fe    | Mn    | Mo    | Ni    | P      | Pb      | Si    | W     | Zn      | Zr               |
| DH SL2701 | 98.52           | 0.018 | 0.00123 | 0.046 | 0.001 | 0.174 | 0.009 | .     | 0.029 | .      | .       | 0.021 | 0.011 | 0.00027 | 0.00010          |
| DH SL2703 | 98.42           | 0.024 | 0.00190 | 0.059 | 0.002 | 0.238 | 0.017 | 0.016 | 0.031 | <0.006 | 0.00030 | .     | 0.015 | 0.00067 | 0.00020          |

last

**CRM TITANIUM** BCR produced by HIP; 090A: 40 mm Ø x 20 mm; 090B: 25 g of 0.2 g cubes IARM: 65 g

| Number       | Al       | B        | C       | Co       | Cr     | Cu       | Fe    | H        | Mn     | Mo       | N       | Nb      | Ni     |
|--------------|----------|----------|---------|----------|--------|----------|-------|----------|--------|----------|---------|---------|--------|
| IARM 361A    | (0.013)  | (0.0005) | (0.012) | <0.002   | 0.008  | (0.003)  | 0.095 | (0.0027) | <0.05  | 0.288    | (0.006) | (0.004) | 0.88   |
| IARM Ti64-18 | (0.0020) | .        | 0.053   | (0.0006) | 0.0017 | (0.0012) | 0.164 | 0.0019   | 0.0011 | (0.0007) | (0.003) | (0.002) | 0.0023 |

  

| Number       | O    | Pd       | S        | Si      | Sn      | V        | W        | Y        | Zr       |
|--------------|------|----------|----------|---------|---------|----------|----------|----------|----------|
| IARM 361A    | 0.15 | (0.002)  | <0.004   | (0.012) | (0.004) | (0.006)  | <0.03    | (0.0004) | (0.0016) |
| IARM Ti64-18 | 0.34 | P:0.0010 | (0.0014) | .       | 0.019   | (0.0005) | (0.0010) | .        | 0.0005   |

**CRM TITANIUM ALLOY CHIPS AND POWDER, chart 1 of 2**

I

| Number          | Al    | V     | C        | Cr       | Cu       | Fe     | Mn       | Mo       | N       | Nb       | Si       | Sn      | Zr       |
|-----------------|-------|-------|----------|----------|----------|--------|----------|----------|---------|----------|----------|---------|----------|
| IARM 269B       | 7.86  | 1.03  | (0.014)  | (0.0014) | (0.0023) | 0.071  | 0.0071   | 0.98     | (0.006) | (0.004)  | (0.025)  | 0.008   | (0.002)  |
| SRM 2433        | 7.63  | 0.98  | .        | .        | .        | 0.063  | .        | 0.99     | .       | .        | .        | .       | .        |
| TL 3001C        | 6.471 | 4.330 | 0.0098   | 0.0024   | .        | 0.1993 | 0.0025   | .        | .       | .        | .        | .       | .        |
| IARM Ti64P-18   | 6.47  | 4.24  | 0.051    | .        | .        | 0.216  | 0.011    | .        | (0.04)  | .        | .        | 0.008   | .        |
| C58A CP13005    | 6.46  | 5.1   | 0.01     | 0.02     | 0.0099   | 0.231  | 0.0064   | .        | .       | .        | 0.031    | 0.001   | .        |
| C58A BT13002    | 6.29  | 4.1   | 0.078    | .        | .        | 0.044  | .        | .        | .       | .        | .        | .       | .        |
| NCS HC57909a    | 6.29  | 4.10  | 0.078    | .        | .        | 0.044  | .        | .        | .       | .        | .        | .       | .        |
| IARM Ti64ELI-22 | 6.26  | 3.88  | 0.016    | 0.0139   | 0.0020   | 0.183  | (0.0004) | 0.0050   | 0.0061  | (0.004)  | 0.017    | (0.006) | 0.0021   |
| C58A CP13001    | 6.25  | 4.1   | .        | .        | .        | .      | .        | .        | .       | .        | .        | .       | .        |
| BCS 356         | 6.25  | 4.05  | (0.0085) | 0.0112   | 0.0055   | 0.124  | .        | 0.0020   | 0.0103  | .        | (0.0200) | .       | .        |
| SRM 173C        | 6.245 | 4.154 | 0.027    | 0.0165   | 0.0040   | 0.2130 | (0.002)  | 0.0068   | (0.028) | .        | (0.019)  | (0.010) | 0.0053   |
| C58A CP13004    | 5.88  | 1.61  | 0.017    | 0.028    | 0.0085   | 0.074  | 0.027    | 3.58     | .       | .        | 0.059    | 0.0085  | .        |
| C58A FG13003    | 5.85  | 3.92  | .        | .        | .        | 0.09   | .        | .        | 0.022   | .        | 0.026    | .       | .        |
| IARM Ti662-18   | 5.61  | 5.35  | 0.007    | 0.046    | 0.46     | 0.510  | (0.005)  | 0.0031   | 0.021   | .        | 0.011    | 2.01    | (0.0011) |
| IARM Ti5553-21  | 5.60  | 5.04  | 0.010    | 2.98     | 0.0019   | 0.353  | 0.0008   | 4.99     | 0.0036  | .        | 0.028    | .       | (0.0018) |
| IARM Ti662-19   | 5.58  | 5.53  | 0.0084   | 0.0050   | 0.47     | 0.52   | 0.0013   | 0.0015   | 0.022   | .        | (0.006)  | 2.03    | (0.0008) |
| BCS 357         | 5.46  | 3.53  | (0.0072) | 0.0521   | 0.0537   | 0.202  | .        | 0.053    | 0.0148  | .        | (0.0500) | .       | .        |
| IARM Ti42515-18 | 3.99  | 2.53  | 0.0067   | 0.015    | (0.0022) | 1.58   | (0.006)  | (0.0014) | 0.0026  | (0.0016) | 0.011    | (0.004) | (0.0019) |
| IARM Ti1023-22  | 3.38  | 10.1  | 0.010    | 0.014    | 0.0018   | 1.70   | 0.0011   | 0.0066   | 0.0058  | .        | 0.029    | .       | .        |
| SRM 2432        | 3.15  | 10.00 | 0.008    | <0.01    | <0.005   | 1.77   | <0.01    | .        | .       | .        | 0.029    | .       | <0.01    |
| C58A BT13007    | 3.13  | 14.99 | 0.015    | 2.95     | .        | 0.077  | .        | .        | .       | .        | .        | 3.15    | .        |
| SRM 649         | 3.08  | 15.1  | 0.011    | 2.96     | <0.001   | 0.133  | <0.01    | .        | (0.01)  | <0.01    | .        | 3.04    | .        |
| IARM 261E       | 3.05  | 2.51  | 0.012    | 0.016    | 0.0025   | 0.18   | (0.001)  | 0.003    | 0.006   | (0.005)  | 0.007    | 0.005   | (0.003)  |
| IARM 261C       | 3.05  | 2.46  | 0.011    | 0.014    | 0.003    | 0.180  | (0.003)  | 0.004    | 0.005   | (0.003)  | 0.007    | 0.006   | 0.003    |
| IARM 344B       | 3.03  | 14.7  | 0.0095   | 2.91     | (0.0024) | 0.118  | (0.003)  | (0.006)  | (0.016) | (0.003)  | (0.03)   | 3.01    | (0.002)  |
| IARM 261D       | 3.02  | 2.50  | 0.011    | 0.016    | 0.0028   | 0.185  | (0.002)  | 0.003    | 0.0051  | (0.003)  | 0.008    | 0.005   | 0.003    |
| IARM 261B       | 2.98  | 2.23  | 0.011    | 0.016    | 0.003    | 0.19   | (0.003)  | 0.004    | 0.004   | (0.002)  | 0.008    | 0.004   | (0.002)  |

  

| Number          | B          | Co        | H        | Ni      | O      | P       | Pd      | Ru       | S        | Ta       | Ti      | W       | Y        | Units       |
|-----------------|------------|-----------|----------|---------|--------|---------|---------|----------|----------|----------|---------|---------|----------|-------------|
| IARM 269B       | <0.001     | <0.0005   | 0.007    | (0.001) | 0.090  | (0.003) | <0.005  | (0.004)  | (0.003)  | <0.005   | (89.9)  | (0.001) | <0.001   | 65 g chips  |
| SRM 2433        | .          | .         | .        | .       | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| TL 3001C        | .          | .         | .        | .       | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| IARM Ti64P-18   | .          | .         | (0.0018) | .       | (0.15) | .       | .       | .        | (0.0014) | .        | .       | .       | .        | 75 g powder |
| C58A CP13005    | .          | .         | .        | .       | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| C58A BT13002    | .          | .         | .        | .       | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| NCS HC57909a    | .          | .         | .        | .       | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| IARM Ti64ELI-22 | .          | .         | (0.0012) | 0.017   | 0.119  | .       | .       | .        | (0.0007) | .        | .       | .       | .        | 65 g chips  |
| C58A CP13001    | .          | .         | .        | .       | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| BCS 356         | .          | .         | .        | 0.0070  | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| SRM 173C        | (0.000045) | (0.002)   | (0.006)  | 0.0203  | 0.164  | .       | .       | (0.0006) | .        | .        | (89.15) | (0.002) | .        | 50 g chips  |
| C58A CP13004    | .          | .         | .        | .       | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| C58A FG13003    | .          | .         | .        | .       | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| IARM Ti662-18   | .          | .         | 0.0089   | 0.039   | 0.19   | .       | .       | .        | .        | .        | 85.8    | .       | .        | 65 g chips  |
| IARM Ti5553-21  | .          | .         | 0.0020   | 0.0022  | 0.14   | (0.002) | .       | .        | (0.0008) | .        | .       | 0.002   | .        | 65 g chips  |
| IARM Ti662-19   | .          | (0.00026) | 0.0048   | 0.0032  | 0.19   | (0.003) | .       | .        | (0.002)  | .        | (85.7)  | .       | .        | 100 g chips |
| BCS 357         | .          | .         | .        | 0.0511  | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| IARM Ti42515-18 | .          | (0.0020)  | 0.0018   | 0.009   | 0.25   | .       | .       | .        | .        | .        | (91.6)  | .       | .        | 65 g chips  |
| IARM Ti1023-22  | .          | .         | 0.006    | 0.013   | 0.091  | .       | .       | .        | .        | .        | .       | .       | .        | 65 g chips  |
| SRM 2432        | <0.001     | .         | .        | <0.01   | .      | .       | .       | .        | .        | .        | .       | <0.001  | <0.001   | 50 g chips  |
| C58A BT13007    | .          | .         | .        | .       | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| SRM 649         | <0.001     | .         | .        | <0.01   | .      | .       | .       | .        | .        | .        | .       | .       | .        | 50 g chips  |
| IARM 261E       | 0.0003     | (0.0004)  | (0.0005) | 0.018   | 0.084  | <0.003  | (0.002) | (0.001)  | (0.001)  | .        | (94.1)  | (0.001) | (0.001)  | 65 g chips  |
| IARM 261C       | 0.0004     | (0.0005)  | 0.001    | 0.016   | 0.085  | (0.003) | (0.002) | (0.001)  | (0.001)  | .        | (94.1)  | (0.001) | (0.0004) | 65 g chips  |
| IARM 344B       | <0.001     | <0.004    | (0.007)  | 0.021   | 0.118  | <0.003  | <0.03   | <0.02    | <0.003   | <0.04    | (76.0)  | <0.03   | <0.006   | 65 g chips  |
| IARM 261D       | 0.0003     | <0.001    | (0.0005) | 0.018   | 0.083  | <0.004  | (0.002) | (0.0005) | (0.001)  | (0.0005) | (94.2)  | (0.001) | (0.0005) | 65 g chips  |
| IARM 261B       | 0.0004     | <0.004    | (0.001)  | 0.023   | 0.083  | (0.004) | .       | (0.001)  | (0.0004) | .        | (94.4)  | (0.003) | (0.0004) | 65 g chips  |



**CRM TUNGSTEN POWDER**

analysis listed in mg/kg

100 g

| Number   | Al   | Ca | Co | Cr   | Cu   | Fe | K    | Mg   | Mn   | Mo | Na | Ni | P     | Si  | Sn |
|----------|------|----|----|------|------|----|------|------|------|----|----|----|-------|-----|----|
| BAM S002 | 29.4 | 46 | 45 | 47.0 | 28.4 | 53 | 40.0 | 38.8 | 16.7 | 59 | 41 | 29 | (7.2) | 106 | 42 |

**ZINC CHIPS**

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

| # | Number    | Zn      | Al      | As       | Cd        | Cu      | Fe      | Mg        | Pb      | Sn        | Ti        | Tl      | Units |
|---|-----------|---------|---------|----------|-----------|---------|---------|-----------|---------|-----------|-----------|---------|-------|
| 1 | BM Zn     | 99.99   | <0.0003 | <0.0005  | <0.004    | <0.003  | <0.004  | <0.001    | <0.003  | <0.001    | <0.001    | .       | 100 g |
| 1 | 41X PZ-19 | (99.96) | 0.01260 | (<0.001) | (0.00008) | 0.00180 | 0.00520 | (0.00016) | 0.00170 | (0.00006) | (0.00004) | 0.00030 | 50 g  |
| 2 | IMN 1     | .       | .       | .        | 0.00066   | 0.00080 | 0.0012  | .         | 0.011   | 0.00021   | .         | .       | 100 g |

**CRM ZINC PELLETS**

| Number    | Cd     | Cu      | Fe     | Pb     | Units                                    |
|-----------|--------|---------|--------|--------|--|
| GBW 02701 | 0.0010 | 0.00010 | 0.0010 | 0.0030 | 50 grams of 3 mm Ø pellets last of stock |

**CRM ZINC PELLETS**

analysis listed in mg/kg

450g of 3mm Ø pellets

| Number  | Ag   | Al     | As       | Au      | Bi       | Ca     | Cd   | Co    | Cr      | Cu   | Fe   | Ga      | Hg     | In       | Ir       | K       | Mg       | Mn     |
|---------|------|--------|----------|---------|----------|--------|------|-------|---------|------|------|---------|--------|----------|----------|---------|----------|--------|
| SRM 728 | 1.08 | (0.07) | (<0.005) | (<0.02) | (<0.005) | (0.02) | 1.14 | (1.0) | (<0.03) | 5.68 | 1.84 | (<0.05) | (0.05) | (<0.005) | (<0.005) | (<0.01) | (<0.001) | (0.07) |

continued

| Number  | Mo      | Na     | Nb      | Ni     | Pb    | Pd      | Pt      | Rh      | Ru      | Sb    | Sc       | Si      | Sn     | Ti     | Tl    | V        | W     | Zr      |
|---------|---------|--------|---------|--------|-------|---------|---------|---------|---------|-------|----------|---------|--------|--------|-------|----------|-------|---------|
| SRM 728 | (<0.01) | (0.01) | (<0.01) | (0.45) | 11.13 | (<0.05) | (<0.01) | (<0.05) | (<0.01) | (0.5) | (<0.001) | (<0.01) | (0.02) | (0.04) | (0.2) | (<0.001) | (0.4) | (<0.01) |

**CRM ZINC POWDER**

listed in mg/kg

certified analysis

informational analysis

powder 200 g

| Number   | Ag   | Cd   | Cu   | Fe   | Ni   | Pb   | Ti   | Al   | As | Bi    | Co    | In   | Sb   | Sn   | V    |
|----------|------|------|------|------|------|------|------|------|----|-------|-------|------|------|------|------|
| BAM M603 | 1.00 | 1.69 | 3.69 | 2.18 | 0.43 | 15.8 | 3.81 | 0.22 | <1 | 0.102 | 0.041 | <0.5 | 0.04 | <0.1 | <0.2 |

**ZINC SPELTER CHIPS**

BS: 50 g units

SRM: 100 g units

| Number       | Al     | Cu      | Fe    | Pb     | Sb    | Sn     |
|--------------|--------|---------|-------|--------|-------|--------|
| RM BS SP-D   | 0.25   | <0.0005 | 0.060 | 0.038  | 0.006 | <0.001 |
| CRM SRM 2139 | 0.2049 | .       | .     | 0.0302 | .     | .      |
| RM BS SP-B   | 0.141  | <0.002  | 0.025 | 0.021  | 0.061 | <0.001 |
| RM BS SP-C   | 0.185  | <0.0005 | 0.041 | 0.005  | 0.031 | <0.001 |
| RM BS SP-A   | 0.051  | <0.0005 | 0.011 | 0.003  | 0.099 | <0.001 |

ZINC ALLOY CHIPS, chart 1 of 2

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

C41X-43X: 50 g typical analysis

FNE: 100 g

NCS, SRM: 150 g

others: 50 g units

| # | Number        | Al    | Cu     | Cd      | Fe      | Mg      | Mn     | Ni     | Pb      | Sb     | Sn       | Bi      | Cr       | Si       | Ti     |
|---|---------------|-------|--------|---------|---------|---------|--------|--------|---------|--------|----------|---------|----------|----------|--------|
| 2 | C43XZ230      | 29.8  | 2.73   | 0.002   | 0.008   | 0.01    | 0.002  | 0.003  | 0.002   | .      | 0.003    | .       | .        | .        | .      |
| 1 | CAN NZA-1     | 28.70 | 1.51   | 0.00098 | 0.046   | 0.020   | .      | .      | 0.0030  | .      | 0.0069   | .       | .        | .        | .      |
| 1 | CAN NZA-4     | 26.65 | 2.45   | 0.0029  | 0.027   | 0.0106  | .      | .      | 0.0101  | .      | 0.0087   | .       | .        | .        | .      |
| 1 | CAN NZA-3     | 25.99 | 2.00   | 0.0064  | 0.066   | 0.049   | .      | .      | 0.0045  | .      | 0.0034   | .       | .        | .        | .      |
| 2 | C43XZ210      | 24.9  | 2.05   | 0.01    | 0.05    | 0.06    | 0.009  | 0.002  | 0.007   | .      | 0.01     | .       | .        | .        | .      |
| 1 | CAN NZA-2     | 23.81 | 3.00   | 0.0047  | 0.021   | 0.029   | .      | .      | 0.0076  | .      | 0.0045   | .       | .        | .        | .      |
| 1 | CAN NZA-7     | 13.17 | 0.212  | 0.00020 | (0.016) | 0.052   | .      | .      | 0.0136  | .      | 0.0116   | .       | .        | .        | .      |
| 2 | C43XZ110      | 11.2  | 0.47   | 0.014   | 0.008   | 0.05    | 0.01   | 0.006  | 0.015   | .      | 0.02     | .       | .        | .        | .      |
| 1 | CAN NZA-5     | 10.85 | 1.04   | 0.0095  | (0.016) | 0.021   | .      | .      | 0.0012  | .      | 0.0017   | .       | .        | .        | .      |
| 1 | C43XZ120      | 10.05 | 0.796  | 0.0114  | 0.047   | 0.027   | 0.0059 | 0.004  | 0.0133  | 0.0039 | 0.0089   | (0.002) | 0.0023   | (0.008)  | 0.0054 |
| 1 | C43XZ130      | 9.58  | 0.977  | 0.0102  | 0.06    | 0.020   | 0.007  | 0.011  | 0.012   | 0.009  | 0.011    | .       | .        | .        | .      |
| 1 | C43XZ140      | 8.24  | 1.23   | 0.0067  | 0.015   | 0.0026  | 0.0033 | 0.0052 | 0.0082  | 0.011  | 0.0053   | 0.010   | 0.0046   | 0.010    | 0.0012 |
| 1 | CAN NZA-6     | 7.54  | 3.17   | 0.0147  | (0.105) | 0.00037 | .      | .      | 0.0109  | .      | 0.0051   | .       | .        | .        | .      |
| 1 | C43X Z150     | 7.36  | 1.53   | 0.0030  | 0.009   | 0.0024  | 0.0020 | 0.0019 | 0.0054  | 0.005  | 0.004    | 0.005   | 0.0025   | (0.011)  | 0.0020 |
| 1 | C42XZ80       | 7.03  | 0.0215 | 0.0003  | 0.013   | 0.0033  | 0.0014 | 0.0019 | 0.0025  | .      | (0.0023) | .       | (0.0002) | 0.013    | .      |
| 1 | NCSHC28974-Zn | 4.85  | .      | .       | .       | 0.083   | .      | .      | .       | .      | .        | .       | .        | .        | .      |
| 1 | C43XZ40       | 4.76  | 3.21   | 0.0025  | (0.064) | 0.0434  | 0.088  | 0.0286 | (0.002) | 0.0043 | (0.0024) | 0.012   | 0.0063   | (0.0065) | 0.0017 |
| 1 | C42XZ70       | 4.39  | 0.0249 | 0.030   | 0.027   | 0.0095  | 0.0045 | 0.0067 | 0.0097  | .      | 0.012    | .       | (0.001)  | 0.006    | .      |
| 2 | C42XZ10       | 4.3   | 0.003  | <0.001  | 0.002   | <0.001  | <0.001 | 0.001  | 0.002   | .      | 0.002    | .       | .        | .        | .      |
| 1 | C43XZ60       | 4.02  | 2.72   | 0.0016  | 0.019   | 0.0256  | 0.0006 | 0.029  | 0.0016  | 0.0045 | 0.0053   | 0.049   | 0.0006   | 0.012    | 0.0013 |
| 1 | C42XZ30       | 3.72  | 0.159  | 0.0048  | (0.047) | 0.0288  | 0.0252 | 0.0102 | 0.0060  | 0.003  | 0.0030   | .       | 0.0020   | 0.015    | .      |
| 1 | C43XZ40       | 3.64  | 1.59   | 0.0132  | 0.061   | 0.0143  | 0.0125 | 0.0061 | 0.0132  | 0.003  | 0.0125   | 0.018   | 0.004    | 0.005    | .      |
| 1 | C42XZ40       | 3.55  | 0.063  | 0.008   | 0.01    | 0.057   | 0.008  | 0.017  | 0.011   | 0.002  | 0.006    | .       | .        | .        | .      |
| 1 | C43XZ50       | 3.05  | 6.05   | 0.0111  | 0.023   | 0.041   | 0.0030 | 0.0021 | 0.0045  | .      | 0.0032   | .       | 0.0010   | 0.003    | 0.0009 |
| 2 | C43XZ20       | 3.2   | 0.89   | 0.01    | 0.02    | 0.042   | 0.008  | 0.003  | 0.008   | 0.008  | 0.01     | .       | .        | .        | .      |
| 2 | C41X0336240   | 1.39  | 0.874  | 0.638   | (0.018) | 0.179   | 0.038  | 0.0074 | 2.87    | 0.048  | 2.38     | 0.027   | .        | .        | .      |

| # | Number        | Ag     | As     | Ce       | In       | La       | Tl       |
|---|---------------|--------|--------|----------|----------|----------|----------|
| 2 | C43XZ230      | .      | .      | .        | .        | .        | .        |
| 1 | CAN NZA-1     | .      | .      | .        | .        | .        | .        |
| 1 | CAN NZA-4     | .      | .      | .        | .        | .        | .        |
| 1 | CAN NZA-3     | .      | .      | .        | .        | .        | .        |
| 2 | C43XZ210      | .      | .      | .        | .        | .        | .        |
| 1 | CAN NZA-2     | .      | .      | .        | .        | .        | .        |
| 1 | CAN NZA-7     | .      | .      | .        | .        | .        | .        |
| 2 | C43XZ110      | .      | .      | .        | .        | .        | .        |
| 1 | CAN NZA-5     | .      | .      | .        | .        | .        | .        |
| 1 | C43XZ120      | .      | .      | .        | .        | .        | .        |
| 1 | C43XZ130      | .      | .      | .        | .        | .        | .        |
| 1 | C43XZ140      | .      | .      | .        | .        | .        | .        |
| 1 | CAN NZA-6     | .      | .      | .        | .        | .        | .        |
| 1 | C43X Z150     | .      | .      | .        | .        | .        | .        |
| 1 | C42XZ80       | .      | .      | 0.0081   | .        | 0.0079   | .        |
| 1 | NCSHC28974-Zn | .      | .      | .        | .        | .        | .        |
| 1 | C43XZ40       | .      | .      | .        | .        | .        | .        |
| 1 | C42XZ70       | .      | .      | 0.053    | .        | 0.047    | .        |
| 2 | C42XZ10       | .      | .      | .        | .        | .        | .        |
| 1 | C42XZ50       | .      | .      | 0.011    | 0.0048   | 0.009    | 0.006    |
| 1 | C43XZ60       | .      | .      | .        | .        | .        | .        |
| 1 | C42XZ30       | .      | .      | (0.0003) | .        | (0.0003) | .        |
| 1 | C43XZ30       | .      | .      | .        | (0.0019) | .        | (0.0035) |
| 1 | C42XZ40       | .      | .      | 0.020    | 0.001    | 0.019    | 0.003    |
| 2 | C43XZ20       | .      | .      | .        | .        | .        | .        |
| 2 | C41X0336240   | 0.0023 | 0.0005 | .        | .        | .        | .        |

## ZINC ALLOY CHIPS, chart 2 of 2

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

typical analysis

50 g units

| # | Number      | Al     | Cu     | Cd      | Fe       | Mg      | Mn       | Ni       | Pb     | Sb     | Sn       | Bi      | Cr       |
|---|-------------|--------|--------|---------|----------|---------|----------|----------|--------|--------|----------|---------|----------|
| 1 | C41XGLV40   | 0.514  | 0.0321 | 0.0006  | 0.0028   | 0.0034  | 0.0089   | 0.0441   | 0.0062 | 0.0287 | 0.0024   | 0.0061  | 0.0007   |
| 1 | C41XGLV60   | 0.474  | 0.0394 | 0.0053  | 0.0047   | .       | 0.0013   | 0.0008   | 0.120  | 0.0112 | 0.0152   | 0.0249  | 0.0029   |
| 1 | C41X0336Z30 | 0.43   | 0.361  | 0.341   | 0.270    | 0.134   | 0.0058   | .        | 0.019  | .      | 0.111    | .       | .        |
| 1 | C41XGLV70   | 0.399  | 0.023  | 0.00056 | 0.0031   | .       | 0.0025   | 0.0060   | 0.082  | 0.0031 | (0.006)  | 0.0108  | 0.0010   |
| 1 | C41XGLV30   | 0.334  | 0.0260 | 0.0188  | 0.0031   | 0.00145 | 0.0111   | 0.0300   | 0.0091 | 0.058  | 0.0060   | 0.0016  | 0.00084  |
| 2 | C41X4380Z80 | 0.225  | 0.020  | 0.0079  | 0.003    | 0.007   | 0.0015   | 0.024    | 0.73   | 0.016  | 0.011    | 0.011   | 0.0019   |
| 1 | C41X4380Z40 | 0.144  | 0.0022 | 0.094   | 0.056    | 0.126   | 0.0007   | 0.0040   | 0.325  | 0.017  | 0.038    | 0.011   | (0.0003) |
| 1 | C41X4380Z70 | 0.137  | 0.012  | 0.015   | (0.0044) | 0.0028  | .        | 0.012    | 1.25   | 0.090  | 0.0047   | .       | 0.0045   |
| 1 | C41XZ50     | 0.13   | 0.023  | 0.024   | (0.02)   | 0.012   | 0.004    | 0.0116   | 0.0235 | 0.006  | 0.0213   | .       | .        |
| 2 | C41XGLV10   | 0.115  | 0.0028 | 0.0093  | 0.059    | .       | .        | 0.0141   | 0.056  | <0.001 | 0.010    | 0.0025  | .        |
| 1 | C41X2951Z30 | 0.078  | 1.89   | 0.0062  | 0.029    | 0.0164  | 0.0018   | 0.0010   | 0.0065 | .      | (0.006)  | .       | 0.184    |
| 2 | C41XGLV20   | 0.070  | 0.0053 | 0.0026  | 0.048    | .       | .        | 0.0071   | 0.214  | 0.007  | 0.003    | 0.017   | .        |
| 1 | C41X4380Z10 | 0.055  | 0.175  | 0.376   | 0.01     | 0.0012  | 0.0015   | 0.0029   | 0.068  | 0.002  | 0.049    | 0.0017  | 0.002    |
| 1 | C41X0336Z50 | 0.035  | 0.023  | 0.058   | 0.016    | <0.0005 | (0.0001) | (0.0005) | 0.91   | 0.008  | 0.21     | (0.001) | .        |
| 1 | C41X2951Z10 | 0.029  | 0.79   | 0.0005  | 0.011    | 0.0029  | 0.0013   | 0.0038   | 0.0042 | .      | (0.0007) | .       | 0.083    |
| 1 | C41X0336Z10 | 0.014  | 0.007  | 0.0056  | 0.0124   | 0.0049  | 0.0035   | (0.0006) | 0.95   | .      | 0.005    | .       | .        |
| 2 | C41XGLV50   | 0.014  | 0.0116 | 0.014   | 0.077    | .       | .        | 0.0029   | 0.019  | 0.163  | 0.020    | 0.0105  | .        |
| 1 | C41XZ40     | 0.0096 | 0.0047 | 0.0066  | 0.003    | 0.0019  | 0.0012   | 0.0069   | 0.0092 | 0.005  | 0.0070   | .       | .        |

| # | Number      | Ag     | As       | Co       | In     | Si      | Ti     | Tl    |
|---|-------------|--------|----------|----------|--------|---------|--------|-------|
| 1 | C41XGLV40   | .      | (0.0003) | 0.0037   | .      | .       | .      | .     |
| 1 | C41XGLV60   | .      | 0.0014   | 0.0047   | .      | .       | .      | .     |
| 1 | C41X0336Z30 | .      | .        | .        | .      | .       | .      | .     |
| 1 | C41XGLV70   | .      | 0.0016   | (0.0001) | .      | .       | .      | .     |
| 1 | C41XGLV30   | .      | (0.0007) | 0.00150  | .      | .       | .      | .     |
| 2 | C41X4380Z80 | .      | .        | .        | .      | (0.005) | 0.012  | .     |
| 1 | C41X4380Z40 | .      | .        | .        | .      | (0.002) | 0.005  | .     |
| 1 | C41X4380Z70 | .      | .        | .        | .      | .       | 0.009  | .     |
| 1 | C41XZ50     | .      | .        | .        | 0.004  | .       | .      | 0.003 |
| 2 | C41XGLV10   | <0.001 | .        | .        | .      | .       | .      | .     |
| 1 | C41X2951Z30 | .      | .        | .        | .      | .       | .      | 0.133 |
| 2 | C41XGLV20   | .      | <0.001   | .        | .      | .       | .      | .     |
| 1 | C41X4380Z10 | .      | .        | .        | .      | 0.006   | .      | .     |
| 1 | C41X0336Z50 | .      | .        | .        | .      | .       | .      | .     |
| 1 | C41X2951Z10 | .      | .        | .        | .      | .       | .      | 0.278 |
| 1 | C41X0336Z10 | .      | .        | .        | .      | .       | .      | .     |
| 2 | C41XGLV50   | .      | 0.004    | .        | .      | .       | .      | .     |
| 1 | C41XZ40     | .      | .        | .        | 0.0015 | .       | <0.005 | 0.003 |

## CRM ZIRCALOY-4 CHIPS

analysis listed in mass %

| Number   | Al       | B         | Co       | Cr     | Cu         | Fe     | Hf      | Mn        | N        | Nb      | Ni      | P         |
|----------|----------|-----------|----------|--------|------------|--------|---------|-----------|----------|---------|---------|-----------|
| SRM 360c | (0.0020) | 0.0000563 | 0.000512 | 0.1539 | (0.000531) | 0.1601 | 0.00317 | (0.00072) | (0.0033) | 0.00999 | 0.00178 | (0.00872) |
| BCR 098  | .        | .         | .        | 0.0906 | .          | 0.2143 | .       | .         | .        | .       | .       | .         |

| Number   | Pb       | Sn    | Ta      | Ti        | V        | W       | Units |
|----------|----------|-------|---------|-----------|----------|---------|-------|
| SRM 360c | 0.000798 | 1.990 | 0.01932 | (0.00126) | 0.001963 | 0.00221 | 100 g |
| BCR 098  | .        | .     | .       | .         | .        | .       | 10 g  |

## CRM ZIRCONIUM ALLOYS

analysis listed in mass %

powder 100 g

| Number        | Al    | C     | Cr      | Cu      | Fe     | H        | Hf   | N       | Nb   | O     | Sn     | Ti      |
|---------------|-------|-------|---------|---------|--------|----------|------|---------|------|-------|--------|---------|
| IARM Zr702-18 | 0.014 | 0.017 | (0.009) | .       | (0.09) | (0.0011) | 0.84 | (0.003) | .    | 0.141 | (0.04) | (0.004) |
| IARM Zr705-18 | .     | 0.009 | 0.007   | (0.007) | {0.08} | {0.0012} | 0.38 | {0.005} | 2.53 | 0.133 | .      | .       |