

60 second analysis time per filter, all switched on

Elements that are in BLUE BOLD should be detected

Elements not in BLUE BOLD need not be detected but record if present

| NIST HIGH 2710 | Certified | Low     | High   | Measured  | Err     | Pass | <LOD? |
|----------------|-----------|---------|--------|-----------|---------|------|-------|
| Ba             | 707       | 507     | 907    | 772.882   | 33.332  | OK   |       |
| Cs             | 107       | 0       | 400    | 53.549    | 6.412   | OK   |       |
| Te             | NR        | -300    | 300    | 49.089    | 18.277  | OK   |       |
| Sb             | 38.4      | -100    | 110    | 39.198    | 7.025   | OK   |       |
| Sn             | NR        | -100    | 100    | 14.846    | 5.441   | OK   |       |
| Cd             | 21.8      | -10     | 50     | -0.539    | 4.301   | OK   | < LOD |
| Ag             | 35.3      | 0       | 60     | 30.824    | 3.711   | OK   |       |
| Pd             | NR        | -70     | 70     | 2.474     | 5.367   | OK   | < LOD |
| Mo             | 19        | 0       | 30     | 22.357    | 2.225   | OK   |       |
| Zr             | NR        |         |        | 145.496   | 4.12    |      |       |
| Sr             | 330       | 280     | 380    | 335.338   | 4.663   | OK   |       |
| U              | 25        | 10      | 40     | 24.157    | 4.94    | OK   |       |
| Rb             | 120       | 80      | 160    | 127.88    | 3.66    | OK   |       |
| Th             | 13        | -80     | 80     | 38.9      | 8.5     | OK   |       |
| Pb             | 5532      | 5400    | 5700   | 5660.156  | 40.619  | OK   |       |
| Se             | NR        | -30     | 30     | 7.093     | 4.563   | OK   |       |
| As             | 626       | 510     | 750    | 726.9     | 31.4    | OK   |       |
| Hg             | 32.6      | 0       | 50     | 34.0      | 7.6     | OK   |       |
| Zn             | 6952      | 6700    | 7250   | 7138.8    | 50.1    | OK   |       |
| W              | 93        | 0       | 400    | 154.1     | 32.0    | OK   |       |
| Cu             | 2950      | 2700    | 3200   | 2805.3    | 36.9    | OK   |       |
| Ni             | 14.3      | 0       | 105    | 58.69     | 19.25   | OK   |       |
| Co             | 10        | -270    | 270    | -72.191   | 78.687  | OK   | < LOD |
| Fe             | 33800     | 30420   | 37180  | 36358.445 | 217.912 | OK   |       |
| Mn             | 10100     | 9500    | 11000  | 10760.8   | 147.3   | OK   |       |
| Cr             | 39        | -100    | 120    | 48.034    | 8.283   | OK   |       |
| V              | 76.6      | -200    | 300    | 68.968    | 17.291  | OK   |       |
| Ti             | 2830      | 2260    | 3400   | 2762.132  | 61.184  | OK   |       |
| Sc             | 8.7       | -160    | 160    | 82.79     | 30.75   | OK   |       |
| Ca             | 12500     | 8000    | 17000  | 9142.0    | 115.4   | OK   |       |
| K              | 21100     | 16100   | 26100  | 17791.2   | 211.1   | OK   |       |
| S              | 2400      | -140000 | 140000 | 3897.63   | 313.16  | OK   |       |

| SiO2 (Blank) | Expected** | Low     | High   | Measured | Err    | Pass | <LOD? |
|--------------|------------|---------|--------|----------|--------|------|-------|
| Ba           | 0          | -200    | 200    | -32.488  | 22.392 | OK   | < LOD |
| Cs           | 0          | -260    | 260    | -8.954   | 4.701  | OK   | < LOD |
| Te           | 0          | -220    | 220    | 7.389    | 13.797 | OK   | < LOD |
| Sb           | 0          | -120    | 80     | -6.423   | 5.065  | OK   | < LOD |
| Sn           | 0          | -120    | 70     | 0.063    | 0.063  | OK   | < LOD |
| Cd           | 0          | -50     | 50     | -0.539   | 4.301  | OK   | < LOD |
| Ag           | 0          | -30     | 30     | -1.147   | 2.389  | OK   | < LOD |
| Pd           | 0          | -50     | 50     | -3.015   | 4.026  | OK   | < LOD |
| Mo           | 0          | -10     | 10     | -1.333   | 1.252  | OK   | < LOD |
| Zr           | 0          | -10     | 10     | -0.671   | 0.986  | OK   | < LOD |
| Sr           | 0          | -10     | 10     | -0.889   | 0.573  | OK   | < LOD |
| U            | 0          | -10     | 10     | -1.057   | 1.405  | OK   | < LOD |
| Rb           | <210       | -10     | 210    | 0.186    | 0.619  | OK   | < LOD |
| Th           | 0          | -10     | 10     | -0.768   | 0.973  | OK   | < LOD |
| Pb           | 0          | -10     | 10     | 2.764    | 1.973  | OK   | < LOD |
| Se           | 0          | -20     | 20     | 2.362    | 1.464  | OK   |       |
| As           | 0          | -10     | 10     | 0.219    | 1.554  | OK   | < LOD |
| Hg           | 0          | -10     | 10     | -0.188   | 2.80   | OK   | < LOD |
| Zn           | 0          | -10     | 10     | 9.038    | 3.28   | OK   |       |
| W            | 0          | -60     | 60     | -6.702   | 11.44  | OK   | < LOD |
| Cu           | 0          | -20     | 20     | 3.409    | 5.64   | OK   | < LOD |
| Ni           | 0          | -70     | 70     | -3.714   | 10.991 | OK   | < LOD |
| Co           | 0          | -50     | 50     | -7.06    | 9.946  | OK   | < LOD |
| Fe           | 0          | -50     | 50     | -18.345  | 14.255 | OK   | < LOD |
| Mn           | 0          | -100    | 300    | -31.855  | 22.442 | OK   | < LOD |
| Cr           | 0          | -120    | 120    | -19.593  | 3.31   | OK   | < LOD |
| V            | 0          | -160    | 160    | -10.879  | 3.537  | OK   | < LOD |
| Ti           | 0          | -700    | 700    | 8.113    | 9.288  | OK   | < LOD |
| Sc           | 0          | -100    | 100    | 4.228    | 3.079  | OK   | < LOD |
| Ca           | 0          | -2000   | 2000   | -531.816 | 8.841  | OK   | < LOD |
| K            | 0          | -3000   | 3000   | 12.637   | 20.436 | OK   | < LOD |
| S            | 0          | -140000 | 140000 | 133.993  | 66.087 | OK   |       |

| NIST LOW 2709 | Certified | Low     | High   | Measured  | Err     | Pass | <LOD? |
|---------------|-----------|---------|--------|-----------|---------|------|-------|
| Ba            | 968       | 638     | 1238   | 857.822   | 30.155  | OK   |       |
| Cs            | 5.3       | -300    | 300    | 17.111    | 5.596   | OK   |       |
| Te            | NR        | -300    | 300    | 10.536    | 16.15   | OK   | < LOD |
| Sb            | 7.9       | -90     | 100    | 0.977     | 5.972   | OK   | < LOD |
| Sn            | NR        | -100    | 100    | -2.227    | 4.688   | OK   | < LOD |
| Cd            | 0.38      | -60     | 60     | -2.896    | 4.988   | OK   | < LOD |
| Ag            | 0.41      | -40     | 40     | 2.617     | 2.863   | OK   | < LOD |
| Pd            | NR        | -60     | 60     | -3.509    | 4.7     | OK   | < LOD |
| Mo            | 2         | -10     | 10     | 3.095     | 1.67    | OK   |       |
| Zr            | 160       | 120     | 200    | 159.793   | 3.224   | OK   |       |
| Sr            | 231       | 180     | 300    | 225.699   | 3.281   | OK   |       |
| U             | 3         | -80     | 80     | 4.584     | 3.163   | OK   | < LOD |
| Rb            | 96        |         |        | 86.90     | 2.46    |      |       |
| Th            | 11        | -80     | 80     | 11.10     | 1.92    | OK   |       |
| Pb            | 18.9      | 0       | 35     | 23.305    | 3.245   | OK   |       |
| Se            | 1.57      | -30     | 30     | 3.89      | 1.95    | OK   |       |
| As            | 17.7      | 0       | 35     | 18.16     | 2.85    | OK   |       |
| Hg            | 1.4       | -10     | 10     | -0.1      | 3.7     | OK   | < LOD |
| Zn            | 106       | 50      | 160    | 113.17    | 6.57    | OK   |       |
| W             | 2         | -80     | 80     | 20.26     | 15.56   | OK   | < LOD |
| Cu            | 34.6      | 0       | 60     | 36.04     | 7.89    | OK   |       |
| Ni            | 88        | 0       | 125    | 71.12     | 15.40   | OK   |       |
| Co            | 13.4      | -250    | 250    | 141.903   | 62.834  | OK   |       |
| Fe            | 35000     | 25000   | 35000  | 29735.283 | 167.872 | OK   |       |
| Mn            | 538       | 0       | 700    | 500.0     | 41.0    | OK   |       |
| Cr            | 130       | 50      | 200    | 112.7     | 8.5     | OK   |       |
| V             | 112       | -300    | 400    | 117.2     | 18.1    | OK   |       |
| Ti            | 3420      | 2700    | 4100   | 3461.8    | 64.1    | OK   |       |
| Sc            | NR        | -250    | 250    | 130.8     | 36.7    | OK   |       |
| Ca            | 18900     | 13900   | 23900  | 15232.7   | 136.7   | OK   |       |
| K             | 20300     | 15300   | 25300  | 18378.3   | 205.2   | OK   |       |
| S             | 890       | -150000 | 150000 | 758.9     | 210.3   | OK   |       |

| RCRA          | Expected** | Low | High | Measured  | Err     | Pass | <LOD? |
|---------------|------------|-----|------|-----------|---------|------|-------|
| Ba            |            |     |      | 629.592   | 32.068  |      |       |
| Cs            |            |     |      | 30.057    | 6.201   |      |       |
| Te            |            |     |      | 14.9      | 17.77   |      |       |
| Sb            | 0          | 0   | 0    | 4.318     | 7.286   |      |       |
| Sn            | 0          | 0   | 0    | 11.166    | 6.1     |      |       |
| Cd            | 500        | 400 | 600  | 542.083   | 10.883  | OK   |       |
| Ag            | 500        | 400 | 600  | 454.47    | 8.217   | OK   |       |
| Pd            |            |     |      | 21.702    | 6.246   |      |       |
| Mo            |            |     |      | 5.573     | 1.953   |      |       |
| Zr            |            |     |      | 253.99    | 4.181   |      |       |
| Sr            | NA         |     |      | 188.287   | 3.328   |      |       |
| U             |            |     |      | 1.135     | 3.435   |      |       |
| Rb            | NA         |     |      | 84.528    | 2.707   |      |       |
| Th            |            |     |      | 9.948     | 3.172   |      |       |
| Pb            | 500        | 400 | 600  | 538.187   | 13.306  | OK   |       |
| Se            | 500        | 400 | 600  | 596.487   | 10.235  | OK   |       |
| As            | 500        | 400 | 600  | 448.701   | 12.317  | OK   |       |
| Hg            | NA         |     |      | 1.681     | 4.705   |      |       |
| Zn            | NA         |     |      | 93.639    | 6.935   |      |       |
| W             |            |     |      | 25.166    | 18.23   |      |       |
| Cu            | NA         |     |      | 57.963    | 9.616   |      |       |
| Ni            | NA         |     |      | 89.645    | 18.335  |      |       |
| Co            | NA         |     |      | 161.946   | 88.099  |      |       |
| Fe            | NA         |     |      | 49354.543 | 237.606 |      |       |
| Mn            | NA         |     |      | 956.075   | 55.659  |      |       |
| Cr (variable) | 500        |     |      | 291.492   | 11.198  |      |       |
| V             |            |     |      | 135.243   | 19.258  |      |       |
| Ti            |            |     |      | 3979.472  | 69.521  |      |       |
| Sc            |            |     |      | 126.4     | 50.515  |      |       |
| Ca            |            |     |      | 26563.781 | 189.317 |      |       |
| K             |            |     |      | 16530.914 | 212.581 |      |       |
| S             |            |     |      | 802.338   | 243.996 |      |       |

| NIST MED 2711 | Certified | Low     | High   | Measured | Err     | Pass | <LOD? |
|---------------|-----------|---------|--------|----------|---------|------|-------|
| Ba            | 726       | 500     | 900    | 774.337  | 29.941  | OK   |       |
| Cs            | 6.1       | -300    | 300    | 22.942   | 5.645   | OK   |       |
| Te            | NR        | -300    | 300    | 22.58    | 16.285  | OK   | < LOD |
| Sb            | 19.4      | -80     | 100    | 15.883   | 6.173   | OK   |       |
| Sn            | NR        | -90     | 90     | 6.945    | 4.792   | OK   | < LOD |
| Cd            | 41.7      | 0       | 70     | 47.773   | 5.641   | OK   |       |
| Ag            | 4.63      | -30     | 40     | 3.166    | 2.888   | OK   | < LOD |
| Pd            | NR        | -60     | 60     | -1.171   | 4.774   | OK   | < LOD |
| Mo            | 1.6       | -10     | 10     | 5.473    | 1.872   | OK   |       |
| Zr            | 230       | 30      | 430    | 321.797  | 4.353   | OK   |       |
| Sr            | 245.3     | 180     | 300    | 245.647  | 3.522   | OK   |       |
| U             | 2.6       | -15     | 15     | 3.202    | 3.485   | OK   | < LOD |
| Rb            | 110       | 60      | 115    | 106.40   | 2.79    | OK   |       |
| Th            | 14        | -20     | 50     | 19.55    | 3.85    | OK   |       |
| Pb            | 1162      | 1000    | 1200   | 1148.733 | 16.406  | OK   |       |
| Se            | 1.52      | -10     | 15     | 1.36     | 2.43    | OK   | < LOD |
| As            | 105       | 65      | 145    | 104.08   | 12.48   | OK   |       |
| Hg            | 6.25      | -10     | 15     | 6.1      | 4.2     | OK   | < LOD |
| Zn            | 350.4     | 250     | 450    | 319.24   | 10.14   | OK   |       |
| W             | 3         | -80     | 80     | 33.17    | 16.63   | OK   |       |
| Cu            | 114       | 74      | 154    | 108.68   | 9.61    | OK   |       |
| Ni            | 20.6      | -30     | 100    | 31.82    | 15.28   | OK   |       |
| Co            | 10        | -200    | 200    | 163.411  | 57.902  | OK   |       |
| Fe            | 28900     | 20000   | 40000  | 29423.85 | 153.135 | OK   |       |
| Mn            | 638       | 300     | 700    | 591.7    | 43.3    | OK   |       |
| Cr            | 47        | -250    | 300    | 46.9     | 6.9     | OK   |       |
| V             | 81.6      | -300    | 350    | 73.6     | 15.2    | OK   |       |
| Ti            | 3060      | 2450    | 3670   | 2883.8   | 54.7    | OK   |       |
| Sc            | 9         | -300    | 300    | 118.4    | 40.1    | OK   |       |
| Ca            | 28800     | 20160   | 37440  | 22685.7  | 151.9   | OK   |       |
| K             | 24500     | 17150   | 31850  | 21436.0  | 204.9   | OK   |       |
| S             | 420       | -160000 | 160000 | 960.9    | 204.4   | OK   |       |

| DL1a | Certified | Low | High | Measured | Err    | Pass | <LOD? |
|------|-----------|-----|------|----------|--------|------|-------|
| Ba   | ND        |     |      | 301.057  | 25.417 |      |       |
| Cs   | ND        |     |      | 1.45     | 5.072  |      |       |
| Te   | ND        |     |      | 5.116    | 14.754 |      |       |
| Sb   | ND        |     |      | -5.579   | 0      |      |       |
| Sn   | ND        |     |      | 0.487    | 4.306  |      |       |
| Cd   | ND        |     |      | -3.262   | 4.565  |      |       |
| Ag   | ND        |     |      | -1.726   | 2.546  |      |       |
| Pd   | ND        |     |      | 1.75     | 4.401  |      |       |
| Mo   | ND        |     |      | 7.982    | 1.7    |      |       |
| Zr   | ND        |     |      | 95.682   | 2.346  |      |       |
| Sr   | ND        |     |      | 16.358   | 1.053  |      |       |
| U    | 116       | 93  | 140  | 111.727  | 4.561  | OK   |       |
| Rb   | ND        |     |      | 96.77    | 2.71   |      |       |
| Th   | 76        | 60  | 92   | 70.27    | 3.04   | OK   |       |
| Pb   | ND        |     |      | 71.61    | 4.346  |      |       |
| Se   | ND        |     |      | 1.15     | 1.80   |      |       |
| As   | ND        |     |      | 4.85     | 3.25   |      |       |
| Hg   | ND        |     |      | -1.0     | 3.3    |      |       |
| Zn   | ND        |     |      | 80.31    | 5.44   |      |       |
| W    | ND        |     |      | 28.19    | 13.88  |      |       |
| Cu   | ND        |     |      | 18.72    | 6.67   |      |       |
| Ni   | ND        |     |      | 20.23    | 12.73  |      |       |
| Co   | ND        |     |      | 48.415   | 27.359 |      |       |
| Fe   | 9000      |     |      | 5469.114 | 68.728 |      |       |
| Mn   | ND        |     |      | 66.5     | 27.7   |      |       |
| Cr   | ND        |     |      | 40.2     | 4.5    |      |       |
| V    | ND        |     |      | 29.2     | 8.1    |      |       |
| Ti   | 900       |     |      | 992.8    | 27.3   |      |       |
| Sc   | ND        |     |      | 11.7     | 9.7    |      |       |

|    |       |         |        |           |        |    |       |
|----|-------|---------|--------|-----------|--------|----|-------|
| Rb | 161   | 100     | 210    | 154.11    | 3.26   | OK |       |
| Th | 17.4  | -40     | 70     | 44.01     | 2.93   | OK |       |
| Pb | 50    | 30      | 70     | 58.281    | 4.487  | OK |       |
| Se | NR    | -15     | 15     | 5.75      | 2.38   | OK |       |
| As | 111   | 80      | 140    | 106.03    | 4.93   | OK |       |
| Hg | NR    | -15     | 15     | 3.4       | 4.8    | OK | < LOD |
| Zn | 70    | 45      | 95     | 75.30     | 6.32   | OK |       |
| W  | 204   | 130     | 270    | 175.92    | 19.62  | OK |       |
| Cu | 237   | 200     | 280    | 214.39    | 11.46  | OK |       |
| Ni | 17    | -50     | 90     | 35.82     | 15.54  | OK |       |
| Co | 8     | -300    | 300    | 84.762    | 69.423 | OK | < LOD |
| Fe | 39700 | 29700   | 49700  | 35021.645 | 187.11 | OK |       |
| Mn | 490   | 300     | 600    | 442.4     | 41.6   | OK |       |
| Cr | 53    | -50     | 150    | 50.3      | 7.8    | OK |       |
| V  | 67    | -150    | 250    | 86.7      | 18.1   | OK |       |
| Ti | 4840  | 3870    | 5808   | 4531.2    | 67.8   | OK |       |
| Sc | 10    | -150    | 150    | 40.5      | 25.7   | OK |       |
| Ca | NR    |         |        | 6402.4    | 99.5   |    |       |
| K  | NR    |         |        | 22884.1   | 230.6  |    |       |
| S  | 800   | -130000 | 130000 | 677.4     | 208.1  | OK |       |

This certificate is issued in accordance with Thermo Fisher Scientific factory specifications.  
The measurements were found to be within specification limits at the time of manufacture and calibration.

Standards are traceable to National Institute of Standards & Technology (NIST) standards.  
**\*\* - Not Certified**

Signed: 